CHAPTER 6: UTILITIES INFRASTRUCTURE DEVELOPMENT PLAN

6.1 Water Supply

6.1.1 Existing water supply system and problems

(1) Organization

The water supply of Nouakchott city is under the jurisdiction of the National Water Corporation (SNDE) of the Hydraulic Department, the Ministry of Hydraulics and Sanitation. In the area where the water distribution network of SNDE is installed in the city, the Corporation is providing water service.

In areas where the distribution network is not well developed, 9 administrative communities (Communes) in the city and/or private water venders are providing water service by reselling water of SNDE.

(2) Water source

The water supply system of Nouakchott city has two water sources, a groundwater source at Iddini located about 60km east of the city and a surface water source of "Aftout Essahli Drinking Water Project" (hereinafter referred to as "Aftout project"), which is a surface water source of the Senegal River. The Aftout project responds to the water demand until 2030 with the aim of solving the water problem which is an obstacle to social and economic development of Nouakchott city. The construction work of the Aftout project commenced in 2007 and completed in August 2010, and the facilities of the project started service in November 2010. In addition to the above groundwater source of Iddini (capacity: 35,000m³/day), 226,000m³/day of surface water source is added as a water source for water supply.

Before supplying water from Aftout project, groundwater of approx. 65,000m³/day was taken from Iddini system, however, from the viewpoint of conservation of the groundwater source, the yield of groundwater of Iddini is limited to approx. 20,000m³/day after the service of the Aftout project was commenced.

(3) Aftout project

The Aftout project constructed a new water intake at Aftout, about 50km upstream from the estuary of the Senegal River, and takes raw water from the river. Raw water taken from the water intake is conveyed to the water treatment plant (the first water treatment plant) located in Béni Nadji, about 6 km from the water intake and the raw water is treated through coagulation and sedimentation processes as a pre-treatment plant (the second water treatment plant) located in the PK17, about 19 km south of Nouakchott city.

The pre-treated raw water transmitted from the first water treatment plant is temporarily stored in the raw water storage tank (capacity: 129,000m³) of the second water treatment plant, and then coagulant is dosed into the raw water. Micro-flocs formed in the flash mixer are directly filtrated by the rapid sand filters. In the second water treatment plant, various sensors are installed in the treatment processes, and the operation is centralized in the central control room. Back washing process of the rapid sand filter is also performed automatically.

The flow rate, turbidity, water temperature, pH value, etc. at each process of the water treatment are also constantly monitored and quality of the treated water is also controlled properly.

(4) **Present water supply situation**

Water service in Nouakchott city is provided by private connections connected to the water distribution network of SNDE, public water station, water tankers and water supply cart of water venders. It is estimated that per-capita water consumption for private connection is 80 lcd (liters per capia per day),

and 10 to 15 lcd for buying water from vendors. Water purchased from vendors is expensive (3 to 5 times) compared with SNDE's unit water rate, so the amount of water used is limited to the minimum water use of the people. The Aftout project has greatly improved the water supply situation in Nouakchott city.

The present water supply amount is below the planed amount due to delays in the construction of the water distribution network, but there is no situation in the city where the water supply amount is insufficient.

(5) Water distribution system

The existing water distribution network in Nouakchott city was heavily leaked due to the deterioration. For this reason, the network effective rate as of 2011 was 0.42 (estimated by SNDE). It has been gradually improving the network effective rate with the progress of the project for improving water distribution system, "Master Plan for Water Distribution in Nouakchott" prepared in 2007, and it is estimated that the rate in 2016 has improved to 0.68. In the above-mentioned project, 1,700km of water distribution pipes is planned to be installed in total. So far installation work of 1,560 km has been completed, of which 1,470km has already been in service. As for private connections, the project plans to connect to 80,000 households, of which 54,000 households have been completed as mentioned in the Table below.

Commune	Number of new connections				
Arafat	13,000				
Riyadh	5,200				
Teyarett	11,000				
Dar Naim	9,800				
Ksar	5,500				
Tevrag Zeina	3,000				
Sebkha	2,700				
El Mina	3,800				
Total	54,000				

Table 6.1: Number of New Connections in Communes

Currently, water distribution reservoirs that supply water to Nouakchott city are 3 ground type reservoirs of 5,000m³ capacity and 1 water tower of 1,000m³ in the city center (Zone Château d'Eau), a ground type reservoirs of 5,000m³ in Toujounine Commune and an elevated tank of 1,000m³ in the second water treatment plant of Aftout project, and the total storage capacity is 22,000m³.

In addition to the above-mentioned existing reservoirs, construction work of a water distribution facility consisting of two reservoirs of $5,000m^3 (5,000m^3 \times 2)$ and a pumping station supplying water to Sebkha and El Mina Communes located in the western part of Nouakchott city and a reservoir of $5,000m^3$ in the existing pumping station supplying water to Toujouniue Commune is in progress.

A plan to construct two new pumping stations in Zone Château d'Eau to supply water to the central urban district of the city and to the three communes in the northern part of the city (Dar Naim, Teyarett, and Tevrag Zeina) is on-going. When the above-mentioned construction work will be completed, the capacity of the water reservoir is expanded to 37,000m³. Also, due to the construction of the pumping stations and the improvement of the water distribution network, the water supply in the surrounding area of Nouakchott city, which is now poor water supply area, will be greatly improved.

Flow diagram of the Aflout project and the project for improving water distribution network is illustrated in Figure. 6.1.

(6) **Problems of the existing system**

Currently, water supply in Nouakchott city has been greatly improved due to the commencement of water service of Aflout project, but improvement of water distribution network cannot keep up with the expansion of urban area. For this reason, non-water supply areas are expanded in the city and residents

in the areas are obliged to rely on buying water from public water station, water tankers and water supply cart of water venders.

In order to resolve the non-water supply areas, it is necessary to implement the on-going project for improving the water distribution system without delay. In the future, as the water supply amount of the city increases with the progress of improving the water distribution network, it becomes gradually difficult to properly distribute water at the current capacity of distribution reservoir (22,000m³), so keeping pace with the improvement of the water distribution network, expansion of the capacity of the distribution reservoir also needs to be implemented.

6.1.2 Development issues and directions

(1) Secure water source

As mentioned above, the water supply in Nouakchott city has the Iddini system with groundwater source and the Aflout system with the surface water source from the Senegal river The Iddini system supplied water of 23.72 million tons per year (= $65,000m^3/day$) before the commencement of water service of the Aflout system, which is considered to be the maximum capacity of the Iddini system.

On the other hand, the maximum capability of the Aflout system is at present 150,000m³/day and it is supplying water from 60,000m³/day to 85,000m³/day. The system is able to expand water supply capacity up to 226,000m³/day, and in order to expand the capacity, it is necessary to construct a booster pump at the midpoint of the raw water transmission pipe (diameter 1,400mm×170km) between the first water treatment plant and the second water treatment plant of the system.

Construction work of the booster pump is in progress, and it is in the stage of test operation. In developing the water supply facilities, it is necessary to expand the capacity of water source at the appropriate time based on the capacities of the above-mentioned groundwater source and surface water source and increasing water demand in future.

(2) Increase of average specific water consumption

As a method of water supply in Nouakchott city, there is a private connection that is connected to the distribution network of SNDE, and a method of supplying water with a water tanker or a cart in the area where the water distribution network is not well developed. In addition, there are "full plumbing" (indoor piping) and "yard tap" (using external faucet) for private connections. According to the estimation by SNDE, after inaugurating water service of the Aftout project in November 2010, the water supply by cart decreased from 61.5% to 50.3%. On the other hand, households using full plumbing have increased from 11.2% to 24.2% (Project Performance Evaluation Report, June 2013).

Based on the above estimation, it is estimated that the proportion by type of water supply in the base year (2013) of the Project is approximately 50% cart, full plumbing and yard tap 25% respectively. For specific water consumption for each type of water supply, it is estimated that cart is 20 lcd (liters/capita/day), yard tap 50 lcd, full plumbing 150 lcd. When calculating the average specific water consumption using the above-mentioned specific water consumptions and the ratio for each type of water supply, it is consistent with 60 lcd which is the actual value of the average specific water consumption in 2013 estimated by SNDE as the average value of Nouakchott city as a whole.

The ratio of water supply by cart is considered to decrease year by year with the progress of the project for improving water distribution network. As a national policy, since all the people aim to connect to the water distribution network of SNDE and get water service, in preparing the development plan of the Project, it is necessary to consider the increase in the average specific water consumption due to the change in the ratio of each type of water supply.

(3) Distribution system corresponding to expansion of urban area

For the current water distribution system in Nouakchott city, water is transmitted to the water reservoirs located in the center of the city from the second water treatment plant at PK 17 and from the Iddini system and distributed to the city by the pump station attached to the water distribution reservoirs. SNDE reviewed the master plan in 2007 to cope with the expansion of the city area and to meet water demand until 2030, and plans to install an additional 800km water distribution pipe and 30,000 new connections.

Also, to cope with the possible expansion of the water supply area by 2030, the water supply area is planned to be divided into 8 water supply zones and to supply water individually. In the future, the urban area expands from the center toward the outside beyond the boundary of water supply area planned by SNDE in 2030 and expands from the center towards the outside.

It is considered that the existing water distribution system which is mainly distributed to the existing urban area will gradually become difficult to supply water to these expanded areas. When the urban area expands, it is necessary to define water supply areas (zones) where the existing water distribution facilities (water distribution reservoir + pump station) can supply water properly and for the expanded areas outside the zones, it is necessary to similarly set appropriate zones and to construct new water distribution facilities which supply water to the respective zones.

(4) **Development directions**

In preparing a development plan for water supply facilities in Nouakchott city, it is necessary to decide the served population in the planned water supply area up to the target year of the Project (2040) and water demand forecast is made based on specific water consumption taking into consideration the change of ratios on the types of water supply.

By comparing the results of the above water demand forecast with the water supply capacity of the existing water supply system, a plan for expanding the capacity of water source is formulated consistent with the estimated water demand. At the same time, in consideration of alignment with other infrastructure development plans such as land use plan, road improvement plan, etc. a water distribution plan is prepared, in which the planned water supply area is divided into zones with appropriate size and the existing and new water distribution facilities are assigned to the respective zones.

In addition, if the water demand until 2040 exceeds 291,000m³/day that is total of the capacity of groundwater source (65,000m³/day) of the Iddini system and the capacity after expansion of the Aflout system (226,000m³/day), plans for (a) development of new water source, (b) improvement of effectiveness of water distribution network, (c) reduction of water demand, etc. will be examined.

6.1.3 Development plan

(1) **Basic specifications**

1) Water supply area

The planned water supply area of the Project covers the entire city planning area (SDAU) of the Project.

2) Served population

The planned served population of the Project is the planned population projected in the Project with the coverage ratio in the SDAU set to 100%.

3) Specific water consumption

The ratio of water supply population by the type of water supply was cart 50%, yard tap 25%, full plumbing 25% as actual value in the base year (2013). The specific water consumption of the respective types of water supply is set as cart 20 lcd (liter/capita/day), yard tap 50 lcd, full plumbing 150 lcd.

As a national policy, since all residents aim to connect to SNDE's water distribution network and receive water supply, water supply by cart or water tanker reduces the ratio by 2% per year, and in 2038 after 25 years from the base year all residents will receive water supply from SNDE's distribution network.

In addition, as the water supply by cart or water tanker is reduced, the ratio of water supply population of yard tap and full plumbing receiving water supply from SNDE's network will increase year by year. Therefore, the population of water supply by yard tap and full plumbing is assumed to increase by 1% per year, respectively.

4) Network efficiency

Considering the progress of improvement of water distribution network by SNDE, the network efficiency will be improved from 0.53 in 2013 to 5% per annum until 2017 when the improvement work is completed. In and after 2018 the value is 0.75.

5) Water demand

Fig. 5.1.2 shows the water demand from 2013 to 2040 estimated using the served population, specific water consumption and network efficiency mentioned above.

(2) Water supply development plan

Based on the water demand forecast in (1) above, the water demand of Nouakchott city in the target year of the Project (2040) is estimated to be $291,277m^3$ /day. On the other hand, since the maximum water supply capacity of the existing water supply system is a total of $291,000m^3$ /day, which is the Iddini system 65,000m³/day and the Aflout system 226,000m³/day (after expansion), it is possible to cover the water demand up to 2040 with the water supply capacity of the existing system.

Figure. 6.2 shows the relationship between the above water demand and water supply capacity As shown in the figure, until 2026, water demand can be covered with the current water supply capacity of 150,000m³/day (before expansion) of Aflout system and current water supply amount (20,000m³/day) of Iddini system. Since the water demand in 2027 exceeds the water supply capacity (170,000m³/day) of the above two water supply systems, it is necessary to expand the water supply capacity of the Aflout system to 226,000m³/day by operating the booster pump located in the middle of the water transmission pipe.

Further, since the water demand in 2035 exceeds $246,000m^3/day$ that is a total water supply capacity of the Aflout system of $226,000m^3/day$ (after expansion) and the safe yield of the Iddini system ($20,000m^3/day$), it is necessary to increase the water supply amount of the Iddini system gradually to meet the water demand until 2040.

(3) Water supply facility development plan

According to (2) above, although the water supply capacity of the Aftout system is need to be expanded, the current water supply system of Nouakchott city is able to supply water by 2040 without implementing a new development plan with the development of a new water source. In addition to the expansion plan of the water distribution system planned by SNDE until 2030, it is necessary to plan a new water distribution system to properly supply water to the expanded urban area. In this case, instead of extending the existing distribution facility (distribution reservoir + pump station), according to the capacity of the current distribution facility appropriate size of water supply area (zone) is allocated to each distribution facility.

For areas that cannot be supplied with existing facilities, the areas are similarly divided into appropriate size of zones, and construct a new distribution facility that supplies water to the zone independently. In dividing the water supply areas, served population of about 180,000 to 200,000 people per zone is allocated considering the effective capacity of the existing distribution reservoir (5,000m³) by standard design.

Figure 6.3 shows a zoning plan of the water supply areas based on the above method. As shown in the figure, PLU is supplied water by six zones of the existing distribution facilities and five zones of new distribution facilities (distribution reservoirs and pump stations) constructed along the ring road planned in the Project. The above-mentioned expansion of the Aflout system and outline of the new distribution facility are as follows:

(a) Expansion of Aflout system

• Construction of a booster pump at the middle of the raw water transmission pipe (DN1,400mm $\times 170 km)$

•Construction of a clear water reservoir (6,000m³) at the second water treatment plant

•Construction of a pump station at the second water treatment plant

• Installation of a distribution main (DN1,000mm) from the second water treatment plant in parallel with the existing distribution main (DN1,200mm)

(b) New water distribution facility

•Construction of a water transmission pump at the second water treatment plant to supply water to the new zones.

•Installation of a water transmission pipe from the water transmission pump along the ring road.

•Construction of distribution reservoirs (capacity 5,000m³×5nos.)

•Construction of pump stations (5 nos., adjoining the above distribution reservoirs)

• Installation of distribution pipes and service installations (service pipe and water meter) in the new zones.



Figure 6.1: Flow Diagram of the Aflout Project and Water Distribution Network





	Mode of Water Use (%)		Av e. Sepcific Network	0	Water Demand	1		
rear	Cart	Yard Tap	Full Plumbing	(Icd)	E ffectiv eness	Population Projected	(m 3/day)	Remarks.
2013	50	25	25	60.0	0.53	958,399	108,498	Base Year
2014	48	26	26	61.6	0.58	1,000,788	106,291	Aflout+Iddini (Safe
2015	46	27	27	63.2	0.63	1,043,177	104,649	
2016	44	28	28	64.8	0.68	1,079,958	102,914	
2017	42	29	29	66.4	0.73	1,116,739	101,577	
2018	40	30	30	68.0	0.75	1,156,898	104,892	1
2019	38	31	31	69.6	0.75	1,197,057	111,087	1
2020	36	32	32	71.2	0.75	1,237,216	117,453	
2021	34	33	33	72.8	0.75	1,283,271	124,563	
2022	32	34	34	74.4	0.75	1,329,325	131,869	
2023	30	35	35	76.0	0.75	1,375,380	139,372	
2024	28	36	36	77.6	0.75	1,421,434	147,071	
2025	26	37	37	79.2	0.75	1,467,489	154,967	D
2026	24	38	38	80.8	0.75	1,518,121	163,552	Aflout Expansion
2027	22	39	39	82.4	0.75	1,568,753	172,354	-
2028	20	40	40	84.0	0.75	1,619,384	181,371	
2029	18	41	41	85.6	0.75	1,670,016	190,605	
2030	16	42	42	87.2	0.75	1,720,648	200,054	
2031	14	43	43	88.8	0.75	1,767.041	209,218	1
2032	12	44	44	90.4	0.75	1,813,433	218,579	
2033	10	45	45	92.0	0.75	1,859,826	228,139	
2034	8	46	46	93.6	0.75	1,906,219	237,896	Aflout+Iddini (Max)
2035	6	47	47	95.2	0.75	1,952,612	247,851	
2036	4	48	48	96.8	0.75	1,999,004	258,005	
2037	2	49	49	98.4	0.75	2,045,397	268,356	
2038	0	50	50	100,0	0.75	2,091,790	278,905	
2039	0	50	50	100.0	0.75	2,138,182	285,091	
2040	0	50	50	100.0	0.75	2.184.575	291,277	Target Year

Note: Specific Water Consumption Cart 20

Cart Yard Tap

Yard Tap 50 Full Plumbing 150 lcd

lcd

lod

Figure 6.2: Planned Water Demand and Water Supply Capacity



Figure 6.3: General Plan for Zoning of Water Supply Area and Proposed Facilities

6.2 Sanitation and Wastewater Treatment

6.2.1 Existing conditions of sanitation and wastewater treatment

(1) Organization

Organizations responsible to sanitation and sewerage system in Nouakchott city is the National Water and Sanitation Organization (ONAS: *Office National de l'Assainissement*) under the Sanitary Department of the Ministry of Hydraulics and Sanitation. ONAS was founded in April 2009 and is an implementing agency regarding the sewage system planning, maintenance and management of existing sewage treatment plants and sewage treatment practices in urban area including Nouakchott city.



Figure 6.4: Structure of Organization Related to Sanitation and Sewerage Treatment

(2) Existing sewerage system

The sewer system in Nouakchott city is limited to the area in Tevragh Zeina commune. It was constructed in 1962 and completed in 1965. There was a restoration work done in the 1990's but has not been expanded since then. The rainwater drainage system is separated, but eventually joins before the treatment site. The treatment capacity of the sewage treatment plant is $1,800 \text{ m}^3/\text{day}$. Since the plant has already been in operation for 50 years, the new masterplan proposes its disposal. Currently some 1,760 households, including offices and hospitals, are connected to the existing sewerage system.

The sludge generated in the sewage treatment plant is distributed as fertilizer to the applicant after the sun-dry process. The treated water is utilized for watering of a green belt adjacent to the treatment site. In the greenbelt, neighboring residents are cultivating vegetables (tomatoes, parsley, onion, etc.) and dates. It is also used for watering street trees in the city.

The total length of the existing sewerage system is around 38 km, and its flow system consists of three pumping stations and gravity. There are six places with holes to receive night soil from sanitary cars (scooping car) in the system. In addition, there is a bypass at the treatment site to let the dirty water flow directly to the green belt without passing through the treatment facility. This is used in case of emergency or malfunctioning of the system.

Although there are standards for water quality, periodic water quality tests are not carried out. When there are many stains of treated water visually observed, testing is outsourced to organizations capable of testing.

Figure 6.5 shows the existing sewerage system in Nouakchott.



Figure 6.5: Existing Sewerage System in Nouakchott City

(3) Situation of the area without sewerage system

There are three methods practiced for sewage treatment in areas where sewerage system is not installed:

By ONAS:

Hygiene vehicles (scooping cars: approx. 25 m³) collect wastewater from reservoirs and put it to the existing sewerage system. It is done by the request of houses and facilities with cost of USD 70 per collection. ONAS has 15 pumps and 30 sanitary cars (tank truck) to carry out this work. Private agent:

It is a collection system operated by private contractors. These operators use small sanitary cars (scooping car) with capacity of 8 to 10 m³. The charge is around 30 to 35 USD 100 per collection. The biggest reason for this high price is that the dumping site designated by the Ministry is located outside the city with significant distance.

Manpower:

It is to hire a worker at a cost of about USD 20. The worker would dig a hole in a part of the garden, move wastewater from the reservoir by a bucket, and infiltrate the wastewater to the underground. Sometimes it is very unsanitary, and it is reported that there are cases children die or injured by falling to the hole.

In the case of collection by private contractors, it is reported that wastewater is often thrown away in places close to Nouakchott city. The Ministry of the Environment has set a fine system to detect violations, but the situation has not successfully changed.



Figure 6.6: Example of Infiltration Hole

6.2.2 Current issues of sanitation and wastewater treatment

(1) A geological and urban context unfavorable to the flow of water

The topography of the city makes it, during times of rainfall, easy for the stream of water to infiltrate rapidly into elevated areas, this is due to the porous and mostly sandy nature of soil. Water then flows to the low areas. On the other hand, in several places characterized by low altitudes (between -0.5 and 1.5m), waste water, which has not been sanitized, is injected into the subsoil and forms, with the non-discharged rainwater, ponds on large areas and for long periods.

On the other hand, changes in soil texture, caused by urbanization, have a significant effect on runoff. Several factors combined help increase the rapidity and magnitude, with aggravated consequences in case of flooding. In Nouakchott, the artificialization of soils reduces the permeable surface of the soil and favors the stagnation of rainwater and its superficial runoff. This phenomenon is found in some capitals of the Sahel area, like Niamey in Niger.

(2) Multiple malfunctions related to equipment and maintenance

This difficult natural context has led to multiple malfunctions of the sewerage network, which covers a tiny part of the city (5%): poor state of the old hydro mechanical equipment, lack of maintenance of the network structures, frequent breakdowns of the water pumps. discharge stations due to the presence of debris of all kinds arriving at the suction covers, clogging of the drains, etc. In addition, problems specific to the STEP contribute to the paralysis of the network as a whole: defective screening, engine burnout, valve malfunction, Archimedes cattle problem, etc.

(3) Weak urban management system leading to malfunctioning of the network

In addition to the technical problems related to the operation of network components, there are factors related to the network environment. In fact, the management of urban space directly impacts the operation of sanitation networks. Road maintenance is essential in order to avoid network congestion and therefore the reduction of its transfer capacity. In Nouakchott, the lack of appropriation of urban space and the poor management of urban waste make the existing network largely clogged (municipal waste and silting). This problem has been identified in neighboring countries. In Dakar, the Senegalese capital, the drainage networks most often suffer from the presence of solid waste which increases the stagnation of water in an area where steep slopes are quite rare.

(4) Increased risk due to the lack of integrated urban water management

In addition to sanitary and aesthetic damages related to the non-treatment of domestic wastewater loaded with pathogenic microorganisms, the accumulation of this wastewater in the subsoil feeds the groundwater and contributes to its rise. A recent study (2011 - 2013) conducted as part of the bilateral

cooperation between Mauritania and the Netherlands suggests that the sewage combined with the absence of a treatment mechanism, lead to a waterproof thin layer. This situation has been aggravated since the lunch of the drinking water supply operation by the Aftout Sahli project in October 2010, increasing wastewater discharges into the subsoil. Bringing drinking water in quantity to Nouakchott is necessary, but this must be done by studying the feasibility of its evacuation and its treatment.

6.2.3 Development plan of sanitation and wastewater treatment

(1) A framework document for planning: The PDAN

1) Scope and value of PDAN

The Mauritanian government has made remarkable efforts to put in place a suitable sanitation system by updating the studies of the Nouakchott Sanitation Master Plan (PDAN). This Plan is the official solution chosen by the Mauritanian government. However, it is necessary to accelerate this approach on the operational level in order to cover the city extension and its development, which will require a new update of these studies.

Since the PDAN, validated in February 2017, represents the official document for sewage treatment for the Mauritanian government and that its execution is awaiting mobilization of the necessary funds (estimated at more than 280 M USD for the so-called priority phase for the 2030 horizon), it should be included in the development of the SDAU.

2) General characteristics of the sanitation network

The network proposed in the framework of the PDAN to collect and evacuate waste water, is made up of primary collectors along the existing roads and projected by the SDAU 2003, and lifting stations located along the collectors, structuring through several basins thus avoiding wedging the network to excessive depths and discharge stations for the transfer to the poles of purification on the other hand. According to the configuration proposed by the Consulting Engineer and retained by the Nouakchott City Sanitation Unit (CPAN), the city will be divided according to the topography in three treatment catchment areas (pole A, pole B and pole C) described in Table 6.2 below, which will need to be equipped with independent sanitation systems with a sanitation and rainwater segregation system.

Name	Commune	Share of the population in 2015	Share of water consumption	Network length (km)	Number of pumping stations	Process of purification	Purification capacity
Pole A	Tevragh Zeina, Ksar and Sebkha	16%	43%	164.4	29	Activated sludge at low load	127,000 EH-60g
Pole B	Teyarett, Dar Naim and Toujounine	39%	23%	186.2	9	Bacterial bed with tertiary treatment for reuse of	36,000 EH- 60g
Pole C	Arafat, Riyadh and El Mina	45%	34%	127	8	treated water for gardening	44,500 EH- 60g

 Table 6.2: Characteristics of Treatment Catchment Areas Proposed by PDAN

Source: JICA Study Team according to PDAN

3) Reuse of treated water for gardening

The PDAN proposes irrigation perimeters around the planned WWTPs. The volumes of treated water available in 2030 and 2045 for the A pole are respectively 19 000 m3 / d and 33 000 m3 / d, allowing the irrigation respectively of about 170 ha and 290 ha, based on the doses units generally adopted for gardening, namely 1.18 l / s / ha. The volumes of treated water available in 2030 and 2045 for the B pole are respectively 13 000 m3 / d and 41 000 m3 / d allowing the irrigation respectively of about 115 ha and 360 ha. The volumes of treated water available in 2030 and 2045 for the C pole are 14,500 m3 / d and 48,000 m3 / d for respectively irrigation of approximately 128 ha and 425 ha respectively.

Drying beds will be installed at the wastewater treatment sites to receive septic tanks waste. The recovered sludge is stable and can eventually be used in agriculture.

4) Measures for autonomous sanitation

Regarding the autonomous sanitation and while waiting for the generalization of the sanitation network, it is expected in the PDAN that the areas that will not be served in the first step will be provided for future extensions of an autonomous sanitation system that takes into account standing. Thus, it is proposed to retain:

- Ventilated pit latrines for low-standard housing;
- Pits for precarious housing;
- Septic tanks for the average housing standing.

(2) Extrapolation of PDAN data to the SDAU 2040 horizon

The PDAN is projected at the two horizons 2030 and 2045, while the SDAU is projected for 2040. Table 6.3 below presents a comparison of different demographic projections (ONS, JICA Study Team and PDAN) in order to check the adaptation of the PDAN to the SDAU horizon, namely 2040. To achieve this adaptation, we checked the relevance of the geometric model. This model gives the projected population according to the following formula:

$$P = P_0 \times (1+\alpha)^n$$

With :

- α : Rate of increase (%)
- P : Population after n years
- P0 : Population for the reference year
- n : Number of years taken into consideration

Table 6.3: Verification of the Adaptation of Demographic Projections of PDAN to SDAU 2040

Population 2015 according to ONS projections	1,043,177
Average growth rate between 2015 et 2030 according to ONS	3.39%
Population in 2030 according to the geometric model applied to ONS data	1,720,030
Population in 2030 according to ONS projections	1,720,648
Average growth between 2015 et 2040 taken into consideration	3.10%
Population in 2040 according to the geometric model applied to ONS data	2,237,817
Population in 2040 according to JICA Study Team	2,200,000
Population in 2015 taken into consideration by PDAN	1,016,814
Population in 2030 according to PDAN projections	1,654,595
Population 2045 according to PDAN projections	2,716,823
Average growth rate between 2030 et 2045 by PDAN	3.36%
Population in 2040 according to geometric model applied to PDAN data	2,302,591

Source: JICA Study Team according to PDAN

After this verification, it seems acceptable to adapt the pollutant loads to the SDAU 2040 horizon. Table 6.4 below details the allocation, consumption and discharges calculated for the different horizons of PDAN and including that of the SDAU 2040.

	Table 0.4. Evolution		Forecasts				CHOU	
		2013	2015	2020	2025	2 030	2045	2055
	Population	958,399	1,016,814	1,189,515	1,402,829	1,654,595	2,716,823	3,783,491
	Rate of increase (%)	4.25%	3.00%	3.19%	3.35%	3.36%	3.36%	3.37%
	Overall connection rate (%)	31.5%	31.2%	39.8%	45.7%	51.5%	67.0%	77.6%
lation	Global connected population	302,298	316,816	473,007	641,448	852,079	1,820,064	2,937,172
Popu	Not connected population	656,101	699,998	716,508	761,381	802,516	896,759	846,319
Tota (l/ha	al net allocation ab/j)	41	42	50	58	67	82	92
(j)	Connected population consumption	25,962	27,688	41,384	57,462	81,211	170,610	274,815
n (m ³ /	Consumption of not connected population	6,668	7,115	7,947	9,179	10,816	12,824	12,264
sumptio	Administrative and industrial consumption	7,071	7,528	10,535	14,153	19,464	38,382	59,724
Con	Total	39,700	42,331	59,866	80,794	111,490	221,816	346,804
Calo (m3	culated consumption /an)	14,490,412	15,450,728	21,851,267	29,489,951	40,693,883	80,963,017	126,583,366
	Connection rate of the total population to the sanitation network	2%	3%	15%	27%	55%	73%	91%
	Flow generated by the connected population (m ³ /j)	23,168	28,361	177,793	382,054	902,181	1,971,688	3,424,378
	Parasitic clear water level	10%	10%	10%	10%	10%	10%	10%
	Average flow rate of parasitic water (m ³ /j)	175	217	915	1,859	4,279	11,230	21,815
	Average total flow of wastewater (m ³ /j) ³	1,920	2,391	10,006	20,297	46,592	122,412	237,940
ischarge	Average total flow of wastewater without parasitic water (m^3/j)	1,745	745 2,173 9,147 18,5		18,586	42,790	112,301	218,154
ter d	Peak coefficient in time sec	2.1	2.0	1.7	1.7	1.6	1.6	1.5
Wastewa	Peak flow in dry weather Y / C spurious water (m ³ /j)	3,763	4,561	16,857	32,905	73,271	187,469	359,901

Table 6.4: Evolution of Water Consum	ption and Sewage Discharg	ges in the City of Nouakchott
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Source: JICA Study Team based on PDAN data

Given the rate of connection to the proposed collective sanitation network indicated in the table (approximately 67% of the population in 2040), the gap between the projected populations in 2040 (between the PDAN and the SDAU) becomes less important, which leads us to consider that the demographic hypothesis used for the PDAN could be maintained for the SDAU 2040.

(3) Evolution of polluting loads and produced sludge

After extrapolation of PDAN data to SDAU 2040, it is necessary to calculate the evolution of the polluting loads and the production of waste sludge on the SDAU 2040 horizon. This data is detailed in Tables 6.5 and 6.6 below. In order to adapt the sludge quantities by pole and horizon, we took the annual

³ By adapting this average flow rate to the SDAU 2040 horizon (97,138 = 46,592 + 10 * (122,412 - 46,592) / 15), we will obtain the sum of the three poles in the following page: 28,286 + 31,817 + 37035 = 97138 m3 / d (Average total flow of wastewater (m3/j) y/c ECP).

average of the quantities indicated in the PDAN between 2030 and 2045. This quantity was multiplied by 10 and added to the one indicated for 2030 in order to obtain the number of adjusted buoys for 2040.

		2030	2045	2040
	Population connected to the sanitation network (hab.)	200,370	343,621	295,871
Pôle A	Average total flow of wastewater (m3 / d) y / c ECP	19,065	32,897	28,286
	Domestic pollutant loads (Kg BOD5 / d)	7,626	13,159	11,315
	Population connected to the sanitation network (hab.)	329,246	772,239	624,575
Pôle B	Average total flow of wastewater (m3 / d) y / c ECP	13,003	41,224	31,817
	Domestic pollutant loads (Kg BOD5 / d)	5,201	16,490	12,727
	Population connected to the sanitation network (hab.)	372,565	855,828	694,740
Dâla C	Average total flow of wastewater (m3 / d) y / c ECP	1,4524	48,290	37,035
Pole C	Domestic pollutant loads (Kg BOD5 / d)	5,810	19,316	14,814
	Effluent concentration (mg BOD5 / 1)	400	400	400

Table 6.5: Evolution of polluting loads

Source: JICA Study Team according to PDAN.

Table 6.6: Evolution of the production of waste sludge

		2030	2045	2040
Pole A	Quantity of sludge produced (kg/day)	10,279	17,736	15,250
Pole B	Quantity of sludge produced (kg/day)	4,794	15,199	11,730
Pole C	Quantity of sludge produced (kg/day)	5,355	17,804	13,654

Source: JICA Study Team according to PDAN

(4) Quality of purified water for agriculture

A point that deserves special attention: The quality of the purified water that will be reused in agriculture. The values of the key parameters at the output of the WWTPs (BOD5, COD, MES, pH, etc.) must be in harmony with the recommendations of WHO and FAO. Standards in countries like Tunisia, which are adapted to these recommendations, can be used. For Senegal, the guideline values are: BOD5: 40mg / 1, COD: 100mg / 1 and MES: 50mg / 1. (Senegalese standards, NS 05-061, July 2001).

Also, it must be ensured that the characteristics of the soil at the sites chosen to host the agricultural perimeters are compatible with the projected crops, in order to guarantee the reliability of the proposals of the PDAN, thus avoiding any substantive modifications to the programmed works.

(5) Sanitation network layout plan

Figure 6.7 below shows the development plan for the future sanitation and wastewater treatment system by 2040, as proposed by PDAN.

Figure 6.8 shows the proposal made by the JICA Study Mission for the 2040 horizon based on proposed urban structure, future population and land use of each neighborhood of Nouakchott, and in particular the new balance pole of Tarhil. This proposal differs from that of the PDAN in the following points.

1) Reconsideration of the site for southern WWTP

With the proposed urbanization of the south of Tarhil, it is no long conceivable to construct a WWTP and its irrigated area, as it was planned by PDAN. As it is therefore necessary to find a new location for the WWTP, it is proposed to extend the discharge pipeline along the Rosso road and to set up the WWTP on the other side of the ring road, at a decent distance from the new cemetery.

2) Sanitation method for new development pole in Tarhil

To ensure a quality urban service to the new inhabitants of Tarhil, it will be necessary to proceed to the connection to the collective sewage network planned in the treatment catchment area C and to equip rapidly the houses located in the surrounding area by autonomous sanitation facilities, after connecting the population to the drinking water network. This is done to be able to meet collective and individual sanitation standards in the area and to limit pollution and external outtake to the groundwater.

The night population in 2040 of New Tarhil district used for the conception of sewage network is of 143,656 inhabitants. According to the variant adopted by the Ministry of Hydraulics and Sanitation in the framework of the PDAN, the overall rate of connection to the sewerage network is 70% by 2045.

This rate has thus been retained for New Tarhil area in view of its future function as a development pole. On the other hand, the particular connections, are calculated from the connected population by adopting a ratio of 1.5 households by domestic connection and 20% for the administrative connections. This brings us to project 16,090 units of connections by 2040 in New Tarhil district.

The rest of the main parameters of the network components network (flow rates, pollutant loads, pumping and discharge stations) are already considered for the entire municipality of Riyadh. They are compatible for the 2040 horizon.

For the rainwater drainage part, it is almost negligible, considering the nature of the sandy soil with good infiltration capacity and the absence of the phenomenon of rising water table. Indeed, according to the PDAN, the whole of pole C (3 communes) will be equipped with 1.86 km gravity gutters. For Tarhil alone, we took 20% of this linear, which corresponds to less than 400m and a cost of about 150,000 USD HT.



Figure 6.7: Sanitation network development plan proposed in PNDA



Figure 6.8: Sanitation network development plan proposed by SDAU 2040

(6) **Proposals for autonomous sanitation**

Regarding the outlying areas that will be equipped with an autonomous sanitation (individual), in addition to the solution retained in the PDAN (of the pit latrine for low-standard habitat, pits of ease for the precarious ones and septic tanks for the average standing habitant), we think that other more innovative ways are to possible, especially in a context where the groundwater is very close to the ground. Indeed, some technical innovations can improve the performance of sanitation services. They are gradually spreading from developed to developing countries. An alternative solution, already used in developed countries, concerns dry toilets. This type of structure makes it possible to isolate the urine from the feces, which has the main advantage of optimizing their revaluation in agriculture.

Moreover, even if it is still possible to propose a sanitation structure regardless of the type of soil, increasing the emptying frequency (more than once a year) constitutes a financial constraint and may represent a handicap for the viability of an autonomous sanitation project. The essential criteria of the capacity of a soil for autonomous sanitation will therefore be its infiltration capacity.

6.2.4 Institutional and management measures for the sanitation service

Sanitation is an essential service and a major socially speaking, due to its huge impact on health and environmental issues. As a result, it is the responsibility of the public authority responsible for sanitation, executing the project. In the Mauritanian case, and therefore in Nouakchott, the sanitation service is centralized at the state level. However, the new territorial reorganization resulted in the creation of a Region at the city level. The sanitation system management could possibly be managed by the Region. Whatever the mode of future management of the sanitation service in Nouakchott (State or Commune) and in a future projection that aims to better ensure the technical, administrative and financial management of the service, it is essential that this management can meet the following standards:

- Offer a quality service, respectful of technical and sanitary standards adapted to the local context;
- Define the roles and responsibilities of the various service actors;
- Guarantee the continuity of operations of the service within affordable prices;
- Ensure that a maximum number of users use the service according to practices favoring the maintenance in good condition of infrastructures and equipment; actions should be taken to ensure that industrial wastewater discharged into the system is well characterized (qualitatively and quantitatively). This will allow the network manager to discuss the injection modalities in the collective network: pre-treat the water before it is discharged into the collective network or pay according to the polluting load to be injected;
- Establish a mechanism of control of the service in order to guarantee its functioning and to be able to report it to the users.

The establishment of a management system that achieve these objectives can be divided into three components.

- Organize the management of the service: this step, which is prior to the implementation of the service, is the duty of the project execution unit;
- Implement day-to-day management system: this responsibility is the duty of the operational level of the service;
- Organize and implement a monitoring and control system: this aspect is the responsibility of the project execution unit.

It should be emphasized that the organization of the management of a sanitation service is a necessary prerequisite for its implementation. Figure 6.9 presents a management model adapted for Nouakchott.



Source: JICA Study Team

Figure 6.9: Proposition of a management model for sanitation

Moreover, it is obvious that in order to put an end to the consequences of the lack of adequate sanitation system, it is essential to provide the city with adequate infrastructures. However, some measures must precede, accompany and succeed the installation of the actual work. Without these measures, the solution will not be sustainable and will inevitably be incomplete. Effective and sustainable management of these basic facilities must be based on three levers of success: a detailed knowledge of the environment to be able to develop effective actions in a logic of impact optimization.





Figure 6.10: Key levers for efficient sanitation of wastewater and rainwater in Nouakchott

6.3 Rainwater Drainage

6.3.1 Existing conditions of rainwater drainage

(1) Organization

Urban Drainage of Nouakchott City is handled by the same organizations for sanitation and sewerage system. Policies are under the jurisdiction of the Sanitation Department of the Ministry of Hydrology and Sanitation, while ONAS is responsible for implementation of projects, and operation and management of facilities. SNDE is also involved for urban drainage matters as its pumps are often used for drainage purposes.

(2) Condition of water drainage and flood risks

Damages resulted from inundation is occurring frequently in the city. Due to the fact that underground water is close to the saturation state, the amount of underground infiltration of rainwater is very small. The existing drainage facilities are very limited. At the time of rainfall, sewerage infiltrates into the ground surface, which is a cause of malodorous.

ONAS has been mobilizing 15 pumps and 30 tank vehicles (also serving as a sanitary vehicle) at the event of floods. In practice, water in flooded areas are eliminated by pumps or sometimes by pumps and tank vehicles by ONAS.

In the city, there are multiple residual inland waters. Many smaller ones disappear due to evaporation, but large ones are being drained by mobile pumping vehicles. Figure 6.11 shows the location of residual inland water. Most of the residual inland water ponds are not hygienic enough because there is exudation of groundwater, contaminated by domestic wastewater.



Source: CNRE, CUN (OSPUN) **Figure 6.11: Flood Risk Zones and Location of Inland Water Areas** Figure 6.12 shows example of damages brought by floods.



Low land that became a pond at all times (the surroundings are arbitrarily created)



Low land and ruined houses (with flood marks)



SNDE's pumping station (foundation is being raised)



Health center that is no longer used due to inundation damage Ro (the mouse's color part is a flood trace) Figure 6.12: Example of Damag



Same as the left (in the past, vehicle could pass)



Same as left



Same as left (pump inlet)



Road situation in the city (paved area is often low, but no drain ditches)

Figure 6.12: Example of Damages Caused by Floods

(3) Plans and projects

1) Masterplan

The situation of preparation of master plans for urban drainage of Nouakchott is the same with that of sanitation sector. The latest master plan was the one revised in 2015 covering the detail designs and bidding documents.

2) Ongoing projects

ONAS has been implementing urban drainage projects with Chinese aid for 2 years based on Sanitation Master Plan from 2015. The area is highly urgent districts that are named Area-A in the master plan. The implementation of the project was decided on 17th December 2014. The total amount of assistance is USD 35 million. The outline of the project is to discharge rainwater into the ocean with an extended 34 km concrete catchment network, four pump stations and a 14 km pipeline.

The drainage system also aims to counter groundwater contamination. According to the master plan, the collected groundwater is to be purified and partially sent back as irrigation water. The construction of drainage facilities is currently underway, but the purification facilities have not been carried out.



Covered gutter

Pressure line

Pumping station

Source: Ministry of Hydraulic and Sanitation, Actualization of the Sanitation Master Plan of the City of Nouakchott in Mauritania (2014)

Figure 6.13: Ongoing Urban Drainage Project by Chinese Assistance

6.3.2 Current issues of rainwater drainage

(1) Risks

The lack of a rainwater drainage system makes the city very vulnerable to rainfall and rising of the water table, increasing the risk of devastating disasters, especially with the return of normal or abundant rains.

It is estimated that about 1026.8 ha (hectares) of urbanized land would be affected by a rise in the water table due to excessive rainfall and 273.8 ha by a marine incursion of the 1995 type (the annual rainfall was 226 mm), respectively the theoretical equivalent of 116 804 and 11 961 inhabitants. Damage is estimated globally at more than 13 billion MRO of which about 79% (10.3 billion ouguiya) related to the capping of the water table [5]. Huge problems arise from this deteriorated situation of the rainwater drainage.

(2) Health issues

At the health level, an overview of the situation shows significant differences between the medical consultations related to diarrhea and Schistosomiasis (Bilharzia) in the communes "most" affected by the lack of adequate sanitation compared to other communes.

Table 6.7 shows the comparison between two communes chosen based on the size of the population, the situation with respect to the stagnation of the water and the capping of the water table. As a result, the commune of El Mina (132,674 inhabitants in 2013) is much more affected than the commune of Toujounine (144,041 inhabitants in 2013).

Commune	Consultations for diarrhea in 2012	Consultations for diarrhea in 2013	Consultations for Schistosomiasis in 2012	Consultations for Schistosomiasis in 2013	
Toujounine	4,766	5,012	7	3	
El-Mina	12,303	12,933	279	413	

 Table 6.7: Epidemiological Record of Consultations for Diarrhea and Schistosomiasis in 2012 and 2013

Source: Regional Delegation for the Sanitary Action

The increase in diarrhea-related consultations in 2013 is certainly related to the increase in precipitation from 64.1mm in 2012 to 183.1mm in 2013. As for the visible gap between Schistosomiasis related consultations in the commune of El Mina, it can be explained by the presence of plots irrigated by the poor / untreated sewage from the WWTP and the contact with those plots.

(3) Environmental and social issues

The *Typha* (cattail) is developing in Nouakchott, invading the streets sometimes pushing people to abandon their homes.

In addition, the disruption of the traffic makes it difficult for the citizens to move on the main axes of the city. As an indication, the Jamal Abdel Nasser Avenue, one of the main avenues of the city, is experiencing water stagnation due to the inability of the current network to transit rainwater.

The damage caused by the lack of effective rainwater treatment also affects buildings for collective use (schools, administrations, banks, mosques, etc.), which become difficult to access or completely inaccessible, sometimes leading to postponement of the new school year.

6.3.3 Development plan of rainwater drainage

(1) The network under construction

As part of the bilateral Mauritanian-Chinese cooperation, the financing of a rainwater drainage system in the low areas of the city of Nouakchott, covering an area of 15.68km2 was set up in December 2014. The Chinese company CTCE was recruited in July 2015 and its actual start of the works took place in August 2016. This component of the project includes:

• A collection network of 31.3 km of closed gutters in reinforced concrete of dimensions 1.6x1.2m 1.2x0.8m & 1x1m, 1x0.8m and 0.8x0.8m.

- A network of fiberglass pressure pipes with a 12.072km diameter DN1000 to DN1500 mm (8112m DN1000 and 3960m DN1500).
- Four pumping stations (with underground basins). The pumping rate from the main station to the sea is 11,400 m3 / h (2 x 5,700), with an installed capacity of more than 250,000 m3 / d.
- The overall runoff coefficient is 0.2,
- The network is designed to evacuate 52mm of rain over 12 hours.

In December 2017, the overall weighted progress rate of this project exceeded 70%.

(2) Network planned by the Sanitation Master Plan (PDAN)

In order to reinforce the rainwater drainage system, the PDAN provides for a drainage network. It should be noted that no treatment is planned for the rainwater collected; it will be evacuated directly to the Atlantic Ocean. It is noted that the rainwater collection system is designed for a return period of 10 years. Here are the characteristics of this projected drainage network:

- The drainage of rainwater from the A, B and C poles will be ensured by means of a rainwater collection network composed of reinforced concrete scuppers of variable rectangular section along the existing roads and the main urban axes.
- The lines of this collection network are composed of scuppers set at shallow depths and equipped with drains.
- Sands should be retained by drains equipped with cesspits, regularly cleaned and maintained.
- Interception of runoff water will be provided by grid or drains to redirect the flow of rainwater to the different projected collectors.
- Projected collectors will be connected to the rainwater drainage system under construction.

Name of pole	Characteristics
Pole A	A total of 15 km of lines. The EP3 collector will follow the RN2 road of Nouadhibou with a rectangular section of $LxH = 600x600$ on 1,352 ml and then a section of $LxH = 800x600$ on a linear of 1,694 ml. It has two stations SR4 and SR5 along its route. The EP3-1 collector, approximately 1,253 ml long, will run along an existing urban roadway to connect to the projected EP3 collector.
Pole B	Approximately 3 km of lines. The EP1 collector will be along the road of Hope for 3 km with a rectangular section of 600 x 600 along its route. This collector comprises a single lifting station.
Pole C	The projected collector EP.2.1 will follow the RN2 road for about 2 km and will be connected to the EP2 collector projected in the A pole via the lifting station SR2.

Table 6.8: Characteristics of the poles of the drainage network planned by the PDAN

Source: PDAN



Source: JICA Study Team based on data from the PDAN

Figure 6.14: Planned and under construction rainwater drainage system



Figure 6.15: Nouakchott rainwater drainage network planned by the PDAN

Although the configuration of the rainwater drainage network is already adopted by the Mauritanian authorities in charge of the management of the sanitation problem in Nouakchott, in the framework of the PDAN, it is appropriate to recall that currently the tendency in urban areas is to favor alternative techniques favoring infiltration on site to limit rainwater runoff. This becomes more difficult in the presence of the water table under Nouakchott.

Indeed, a large part of the communes of Tevragh Zeina, Sebkha, Dar Naim, El-Mina and Riyadh is located on fairly flat areas and the land does not include depressions or streams that can constitute an outfall. On the other hand, the part of the city constituted by a part of the communes of Toujounine and Teyarett seems to represent better possibilities for discharge due to the presence of stronger slopes.

Developments to retain / infiltrate the water on these communes constitutes a real track to explore. The recovered water will be partially evaporated and infiltrated, while part of it could be used to irrigate the trees lining the city as part of the fight against desertification. This option saves and optimizes the use of drinking water used for irrigation until then, which is appropriate in a context of water-induced stress.

6.3.4 Institutional and management measures for urban drainage service

We have tried to present an organizational model that it supposed to contribute to a successful management of rainwater sanitation in Nouakchott. Figure 6.16 proposes a management model that can be used for Nouakchott, in a sustainable and participatory approach integrating all parties concerned by the management itself. It should be noted that the Council of Ministers held on October 19th 2017, decided to integrate by absorption the ENER to ATTM-SA so as to ensure the public service of road maintenance by the latter (the Absorbing Company) and to save the recurrent public charges generated by the other (the Absorbed Entity).



Source: JICA Study Team

Figure 6.16: Rainwater drainage management model, adapted for Nouakchott

The table below presents a roadmap for maintaining sustainable sanitation in Nouakchott. This table details the different phases (reflection, implementation and monitoring) and the main indicators to be controlled as a priority, in the process of improving the sanitation situation in Nouakchott.

Global indicators from reflection to sustainability							
DATA AND CONTEXT (variables to know with precision for the phase 1: preparations and reflections of improvement of the sanitation in Nouakchott)		ACTION (parameters to be verified in phase 2: implementation and exploitation of the projected infrastructures)		IMPACT (indicators to follow after phase 2)			
 Performar network Connection network Population Level of the Individual Soil quality perimeters Involvement all stakehol 	nce of the SNDE n rate to the SNDE n concerned he water table he water table / sanitation installation cy of irrigation s (salt content, MO) ent and commitment of olders in sanitation	•	Compliance with the specifications of the structures and components to be put in place Effective connection rate to the collective network and NCSIs Numbers and frequencies of breakdowns during the operation of the collective network Balance of income and expenditure of the operation	•	Water quality at the exit of STPs (and by what standard) Level of the water after 9 months of commissioning of collective sanitation & NCSI Mares, stagnant waters, Floods (causes -mm / jr- and frequency) Epidemiology of waterborne diseases and other water- related diseases Become by-products of STPs		
 projects Epidemio diseases (Amibian I Bacillary 	logy of waterborne Typhoid, Hepatitis A, Dysentery &) + Schistosomiasis	•	Respect of the maintenance recommended by the project managers User / operator relationship Frequency of draining NCSIs	•	and NCSIs (sludge, chemicals) Quality and future of irrigated perimeters products		

Table 6.9: Roadmap for Maintaining Sustainable Sanitation in Nouakchott

•	Means of the operator (equipment,	•	Status of NCSIs after one year	•	Living environment around
	humans, financial)		of operation		STPs (Health and
•	Respect of deadlines related to	•	Existence of regulation / charter		Environment)
	intellectual services (studies,	•	Governance & Communication		
	consultation)		(Government, communes,		
			private sector, civil society)		

Source: JICA Study Team

CHAPTER 7: PUBLIC FACITIES DEVELOPMENT PLAN

7.1 Existing Conditions of Public Facilities

7.1.1 Overview

During the recent years, Mauritanian State has implemented important steps in field of public buildings for various sectors (health facilities, schools, mosques, youth houses, stadiums and others), in addition to several projects which are entrusted to companies and executing agencies (Amextipe⁴, ISKAN, ADU, ERTT).

There 170 projects of public buildings and equipment are being completed by the Ministry of Housing Urbanization and Land Use (hereinafter referred to as "MoHUAT"), for a total amount of 11.7 billion MU. But the execution of these projects is confronted with several bottlenecks such as the lack of professionalism, and the failure to meet the execution deadlines. On other hand, PNIDDLE is carrying out micro-projects for 100 municipalities covering several public facilities. Also, TADAMUN Agency contributes in building several education and health facilities in many localities in the Mauritania including Nouakchott.

Despite these achievements, the public facilities are confronted with several restrictions linked to the absence of a strategic and prospective vision of regional planning and development, the weakness in the infrastructure makes the accessibility to the basic services difficult, the lack of maintenance mechanisms for the public buildings and equipment, in addition to the increased demands for the buildings with lack of financial resources.

7.1.2 Current planning process for the public facilities

The urban area was governed by decree No. 90-020/1990 which defines the skills to urban grant concessions within three categories:

- i. The cabinet: for an area greater than 2000m2;
- ii. The finance minister: for an area between 1000 to 2000m2;
- iii. *Hakem*: for an area less than 1000m2.

Regulatory Acts Decree n ° 2010-080 of March 31, 2010 replaced the decree n ° 2000/089 of July 17, 2000 implementing Ordinance 83 127 of June 5, 1983. Also, decree No. 90-020/ 1990 has been revised in 2010.

According to the article 126 of Decree n ° 2010-080: Cabinet is responsible for lands more than 1,000 m2, while the lands less than 1,000m2 are under the responsibility of Ministry of Finance. That means hakem does not have any involvement in attribution of urban concessions anymore.

The access to the property is very slow and laborious which encourages the illegal occupation of the land and the strong speculation. This phenomenon creates a significant pressure on the public lands which are often invested by the people for the purpose of housing.

On the other hand, municipal administrations are still regulated by Ordinance n °87-289 of October, 1987 which give it the duty to provide public services to fulfill the needs of the local population,

ISKAN: Real estate promotion and management corporation

ADU: Urban development agency

PNIDDLE: National support program for decentralization, local development, and youth employment TADAMUN: National agency to combat the effects of slavery, anti- poverty and integration

⁴ Amextipe: Mauritanian agency for the execution of works of public interest for employment

including:

- i. Construction, maintenance and equipment of school buildings dedicated to basic education
- ii. Construction, maintenance and equipment of clinics and centers for the care of mothers and infants
- iii. Water supply and street lighting;
- iv. Local road network;
- v. Urban, medical and school transportation;
- vi. Hygiene;
- vii. Domestic waste removal.

According to the decree n $^{\circ}$ 049, 2012; building all the public facilities is under the responsibility of MoHUAT including the schools and health centers.

In fact, the distribution of competences between the central state, CUN and the communes is still unclear and leads to incomprehension. The state gave many responsibilities to communes without transferring the financial means. Currently, MoHUAT- DoPBE manages the construction works and sets the design of the health centers and points.

Before 2008, by working with the communities as procurement agency; the *Education Project Number* 5 or *EDU-V* and AMEXTIPE constructed several projects (small and medium types of contractors) for the public facilities. This project had 70% financial support from WB or other international resources, and 30% from the municipalities.

In 2008; decree No. 149 gave the responsibility of the financial supply to the related ministries.

In 2015; the National Agency for Studying the Projects "ANSP" start to follow up the construction works of the public projects.

There is no clear process for the public facilities within the current master plan in Nouakchott. In the old areas which have growth in the population, MoHUA faces a problem in providing lands for the public facilities such as schools and health points. While it is not planning problem in the new areas which have already empty lands. However, the illegal expand the residential area is a big challenge.

The following figure shows the planning trends for the public facilities. There is no specific law gives detail about the percentage or the location of the public facilities. However, according to restructuring plan of Tevragh Zeina, Ksar and Teyaret; the percentage of the land use can be estimated as follows:

Percentage of the residential area is \sim 70%; Percentage of the reserved lands for the equipment is \sim 5.5%; and the Percentage for the roads and public spaces \sim 25%.





Another residential development area takes place in both of Riyadh and Toujounine in the south side of Nouakchott which name *Tarhil area*. The government established new public facilities in order To attract the people to live there. With the huge expected number of population and with more attractive facilities; the area could be new pole and can participate in creating a balance between the north and the south regions

7.1.3 Existing conditions by sub-sector

(1) Health Facilities

1) Health Institutions

Organizing and management of the health facilities are governed by Decree No.088/2015/PM which set the administration system of the Ministry of Health ⁵(hereinafter referred to as "MoH").

The administrative system is divided into three levels⁶:

- i. Central level: the central entities in the MoH monitor the intermediate level
- ii. Intermediate level: regional directorates coordinate and monitor the operational level
- iii. Operational level: the health unites and management teams of Moughataa coordinate and monitor the health facilities.
- 2) Public Structure and Planning Norms

The health system is subdivided into several components include modern public, modern private, community health and traditional medicine. Alongside the public system, the private care system is experiencing a real increasing. It uses mainly the public sector employees, which partially contributes to the deterioration of the quality of the public sector services.

The public health system in Mauritania is a pyramidal type with three levels: 1) Primary level (moughataa); 2) Secondary level (wilayah); and 3) Tertiary level (central).

Primary Level

A prophylactic level consists of two types of structures: health posts and health centers (type A and type B).

Decree No.198/2016 attributes the health bodies as follows:

- Artc.17: health post is a therapeutic body provides the citizens by the preventive services, and it is run by basic nursing.
- Artc.15: health center is a treatment body which is run by a basic doctor, and each regional circle has at least one center in its capital.
- Artc.16: health area (10 km in radius) includes one or more than health points, and basic health units which are runs by the community⁷.

Several hundred basic health units (USB) were installed in a non-negligible part of the village settlements far from the health posts and health centers (catchment area is 10 km in radius). Since the mid-1990s, most of these USB devices have been closed, mainly due to lack of professionalism according to MoH.

Secondary Level

The intermediate level consists of three types of hospitals in the regional capitals or moughataa. These types are moughataa hospital, regional hospital, and central regional hospital.

⁵ MoH-DoPCSI

⁶ Ministere de la santé (2014) "Carte Sanitaire Nationale De La Mauritanie)"

⁷ MoH-DoPCSI "National plan for health development, Volume1 Analyzing the situation" (February 2017)

Tertiary Level

- a) The tertiary level, mainly concentrated in Nouakchott, comprises four types of public reference establishments:
- b) National Hospital Center (CHN);
- c) Three other general hospitals, namely: the Cheikh Zayed Hospital (HCZ), Hospital of Friendship (HA) and Military Hospital;
- d) Five specialized centers: The Neuro-Psychiatry Center (CNP), the National Center of Cardiology (CNC), the National Center for Oncology (CNO), the Mother – Child Center (CME) Orthopedics and Functional Rehabilitation (CNORF);
- e) and Specialized centers of reference, namely: the National Center for Blood Transfusion (CNTS), the National Institute for Research in Public Health (INRSP), and the National Laboratory for Quality Control of Medicines (LNCQM).

As mentioned previously, there is a differentiation between the levels of the health facility, starting from provides the citizens of the preventive services in the health posts, to the advance treatment which is provided by the hospitals.

Table illustrates the main components of the three health levels and type of treatments.

	Primary level (Moughataa)			Secondary level (Wilayah)		Tertiary level (Central)
	Health post	Health center B	Health center A	Hospital for	Hospital for	National
	(HP)	(HCB)	(HCA)	moughataa	wilayah	Hospital
Population	500-1500	1500-10000	10000-20000	> 40000	> 40000	
Region level	Village	District	Moughataa	Big moughataa but not capital	Wilayah	For national level
Facilities	5-6 rooms, nursery, midwife	12beds, 1to 2doctors, motherhood, small laboratory	25 beds, 2-3 doctors, laboratory, radiology department, dental surgery	25-50 beds Health center type A + general health care	70-150 beds	400-500 beds
Kind of treatment	primary curative consultation, pre-natal, delivery, birth spacing Immunization, distribution of essential drugs, monitoring of children under 5 years	primary curative consultation, pre- natal, delivery, birth spacing Immunization, distribution of essential drugs, monitoring of children under 5 years	primary curative consultation, pre-natal, delivery, birth spacing Immunization, distribution of essential drugs, monitoring of children under 5 years	As HC type A with surgery and general medicine	As HC type A with surgery and general medicine	
Notes		HCB =5 HPs	Does not exist in the city center	Was added during the recent 5 years		Including the special hospital

Table 7.1: Main Components of Health System in Mauritania

Source1: MoH-DoPCSI, Source2: MoH-DoIMM, Source3: JICA STUDY TEAM

3) Health Infrastructures at the Level of Communes- Synthetic Data and Global Indicators

In general, the criterion of the population per hospital is poor due to the high population. Also, some communes such as El Mina, Riyadh, Teyaret and Toujounine do not have any hospitals, which make the citizens in some areas move for more than 5km to reach to the nearest hospital.

Teyaret has insufficient number of basic health facilities which raise attention about the health situation of the citizens.

In spite of the improvement in the health centers number, there is a lack of equipment. According to MoH and CUN reports; people prefer to go to the hospitals more than the health centers or posts due to the weakness of the treatment. On the other hand, some health centers are located in unsuitable physical
environment and closed due to saltiness problems, such as Dar Naim and El Mina.

There is uncontrolled number of pharmacies in Nouakchott, especially in Arafat and Tevragh Zeina, without respecting the planning norm which defines the distance between the pharmacies as "minimum distance between two pharmacies by 200m"

On the report of WHO in 20108, indicators of service availability cannot accurately reflect access to services. True indicators of access need to measure the proportion of the population living within a specified travel time and/or distance from health facilities. Thus, designing catchment areas around health facilities (5km, 10 Km buffer) as the current situation in Nouakchott without considering the capacity of each health facilities provides only a rough estimate of physical access.

In term of health facilities, Nouakchott does not fulfill the requirements of the huge number of population.

It is required 223 health facilities in 2018 (according to WHO norms: 2 facilities per 10,000p), and this number is very hard to achieve without organizing the work with the private scoter and NGOs.

In term of human resources, the density of the three categories of health care provider (general practitioners, midwives, and nurse) per 10,000 inhabitants remain below the norm of 23/10000 inhabitants set as the minimum threshold required for the provision of maternal and child health care services.

Based on the social survey, around 40% of people mentioned that the health facilities have low qualities, and around 30% mentioned that the health facilities are very crowded. Figure 7.2 shows the problems of the health facilities based on the social survey and the field survey.

⁸ World Health Organization "Monitoring the Building Blocks of Health Systems: A handbook of Indicators and their Measurement Strategies" 2010



Figure 7.2: Problems of health facilities based on the field and social surveys 2017

The availability of the health facilities is compared by its indicators, and the existing health facilities in Nouakchott City are summarized by communes in

Table .

1	Table 7.2. Current i ubic rieatin initiasti uctures Capacities at the Level of Communes								
commune	Populatio	Hospita	Populatio	HC	Population/HC	HC	Population/HC	Н	Population/H
	n 2017	ĺ	n/	Α	A	В	В	Р	P
		number	hospital						
		S	_						
Arafat	202,516	1	202,516	1	202,516	1	202,516	2	101,258
Dar Naim	167,381	1	167,381	2	83,691	1	167,381	5	33,476
El Mina	153,706	0	0	1	153,706	2	76,853	5	30,741
Ksar	54,908	3	18,303	0	-	2	27,454	1	54,908
Riyadh	135,884	0	0	3	45,295	1	135,884	3	45,295
Sebkha	83,913	1	83,913	1	83,913	0	-	2	41,956
Tevragh	56,793	4	14,198	0	-	0	-	2	28,397
Zeina									
Teyaret	93,743	0	0	1	93,743	0	-	4	23,436
Toujounin	167,893	0	0	1	167,893	1	167,893	2	83,947
e									
Total	1,116,738	10	54,034	10	92,306	8	86,442	26	49,268

 Table 7.2: Current Public Health Infrastructures Capacities at the Level of Communes

Source1: MoH-DoPCSI, Source2: ONS, RGPH 2000 and 2013 (annual statistics 2015) Source3: RDoHNN Source4: 9 Communes⁹ Source5: JICA Stdy Team

On the report of WHO in 2010¹⁰, indicators of service availability cannot accurately reflect access to services. True indicators of access need to measure the proportion of the population living within a specified travel time and/or distance from health facilities. So designing catchment areas around health facilities (5km, 10 Km buffer) without considering the capacity of each health facilities provides only a rough estimate of physical access.

The following table illustrates the situation of the sanitary facilities in Nouakchott without the clinics' number¹¹ comparing with WHO standers:

 Table 7.1: Current health facilities and number of core workers in Nouakchott compared with the international standards

	Health faciliti	es		Health core workers		
Commune	Population 2017 Current facilities per 10,000p		Required number in 2018 according to WHO norms(2 facilities per 10,000p	Current core professional per 10,000	Required number of core professional workers in 2018 according to WHO norms(23 facilities per 10,000p	
Arafat	202,516	0.2	41	2.32	466	
Dar Naim	167,381	0.5	33	2.93	385	
El Mina	153,706	0.5	31	2.54	354	
Ksar	54,908	1.1	11	8.92	126	

⁹ *There is differentiation in the number of health facilities, due to the bad physical situation of some buildings (which are not working), some health posts have temporary places , and some related entities have poor information

¹⁰ World Health Organization "Monitoring the Building Blocks of Health Systems: A handbook of Indicators and their Measurement Strategies" 2010

¹¹ Due to the lack of information

					1
Riyadh	135,884	0.5	27	4.34	313
Sebkha	83,913	0.5	17	3.46	193
Tevragh Zeina	56,793	1.1	11	3.70	131
Teyaret	93,743	0.5	19	7.36	216
Toujounine	167,893	0.2	34	1.91	386
Total	1,116,738	0.5	223	3.53	2,568

Source: JICA STUDY TEAM





Source: JICA STUDY TEAM Figure 7.3: Health facilities index in Nouakchott 2017



(2) Educational Facilities

The educational system in Mauritania consists of 6 categories, and several ministries share the responsibilities to manage the educational process and provide the necessary services. The six categories are:

- a) Pre -Preliminary education for three years (3-5 years old): administrated by the Ministry of Social Affairs, Children-hood and Family (hereinafter referred to as "MoSACF");
- b) Preliminary education for six years (6-11 years old): administrated by the Ministry of National Education (hereinafter referred to as "MoNE");
- c) General secondary education for seven years (12-18 years old): administrated by MoNE;
- d) Technical and vocational training with period between 6 months to 3 years: administrated by the Ministry of Employment, Professional Formation (hereinafter referred to as "MoEPF");
- e) High education with studying period between 2 to 7 years: mainly administrated by the Ministry of High Education (hereinafter referred to as "MoHE");
- f) Original education for teaching Qur'an, mathematics, Arabic language and for adult literacy: administrated by the Ministry of Islamic Affairs (hereinafter referred to as "MoIA").

It is claimed by the Ordinance No. 289-87; that the municipalities are responsible for constructing and maintaining the preliminary schools. But due to the lack of the financial resources; MoHUAT- DoPBE share the responsibility of the construction works (for the first four levels) with Regional Directorate of National Education ("DREN"); Directorate of Strategies, Planning and Cooperation(" DSPC"); Directorate of Financial, Patrimony and Maintenance ("DFPM"), after receiving the requests from the relative ministries.

1) Pre- Preliminary Education

It aims to educate the children aged from 3 to 6 years during two types: 1) Quranic schools named as Mahdra; 2) Kindergarten.

Typology and Planning Norms of the Kindergarten

It is a new system in Nouakchott since1990s, and there is a limited number of the buildings in the public sector due to the Islamic culture in Mauritania, which depend on the relation between the family's members to take care of the children instead of the kindergarten.

The mutual draft decision No -¹² identifies the conditions for opening starting the nursery schools as follows:

- a) The minimum distance between two pre-primary institutions is 500 m;
- b) The required population capacity for establishing a kindergarten is between $2000 3000^{13}$;
- c) The normal land area for establishing the kindergarten¹⁴ is between 500-1000 m2; and
- d) The maximum number of student per classroom is 25.

It is claimed by the ordinance no. 048-2006 (artc. no 8) that the rules of establishing and management the buildings will set by a mutual decision between the Minister of Social Affairs and the Ministry of Education¹⁵.

¹² To be confirmed

¹³ Ministry of Social Affairs

¹⁴ Ministry of Social Affairs

¹⁵ The decision is not issued yet

Current Kindergarten Infrastructures in Nouakchott

There is no system or harmony in the distribution of the kindergartens. However there is a project to set a new norm for the minimum regular distance between the two kindergartens as 500m.

The relatively high growth of private and community childcare facilities illustrates the importance of the parental demand pressure. However, the supply remains insufficient quantitatively and qualitatively.

El Mina has plenty of kindergartens due to the population number and the social situation, also Tevragh Zeina has more buildings comparing with the other communities due to the good financial situation.

On the report of RESEN 2014, the GER for children aged 3-6 years was 5.0% in 2004 and 9.3% in 2014-15, while the government seeks to raise the ratio to 16% by the end of 202016 and 20% in 2040.

The share of the public preschool will increase from 5% to 22%, while the private and community sectors will receive 18% and 60% in 2020;

The regional disparities and incomes levels are high with the concentration in the urban areas, notably in Nouakchott. Despite the progress in the accessibility, preschool coverage in Mauritania is still below the average for African countries with a comparable income (18.2% according to RESEN 2014) or Morocco (over 60%).¹⁷

According to the MoSA, there are 10 public kindergartens in Nouakchott, the other 112 were built and managed by the private sector. While according to CUN, there are 229 kindergartens, 5 public and 224 private.

Commune	number of public kindergartens	number of private kindergartens	total number of kindergarten	Population 2017	Current need of facilities 2017 according to the norm of 1/3000P
Arafat	1	29	30	202,516	68
Dar Naim	0	22	22	167,381	56
El Mina	6	38	44	153,706	52
Ksar	1	13	14	54,908	18
Riyadh	1	26	27	135,884	45
Sebkha	0	22	22	83,913	28
Tevragh Zeina	0	32	32	56,793	18
Teyaret	1	24	25	93,743	31
Toujounine	0	18	18	167,893	56
total	10	224	234	1,116,738	372

 Table 7.4: Current kindergarten in the 9 communes of Nouakchott

Source1: MoSA, Source 2: CUN Source: 9 Communes

¹⁶ PNDSII the National Program for Development the Education Sector 2011-2020

¹⁷ National Strategy for the Accelerated Growth and Mutual Prosperity SCAPP 2016-2030 (First Folder)

Stratégie Nationale de Croissance Accélérée et de Prospérité Partagée SCAPP 2016-2030

2) Preliminary Education

The decentralization law 1986 created urban and rural local governments and devolved the basic education responsibility for to them, including the construction, equipment, and maintenance. Funds of primary school infrastructure were largely managed by MoNE which has delegated the implementation of schools construction and maintenance to Parents' Association. In addition, school construction is managed by urban local government through urban development project, which delegated the management to AMEXTIPE.

*Note: the results of these experiences provide evidence that delegation of construction management to communities can lower the cost of construction and increase the production. ¹⁸

Currently, the construction works are administrated by MoHUAT.

Typology and Planning Norms

The mutual decision no.3612 in 28 Oct 2009 by the MoNE and the Ministry of Interior sets the conditions for establishing basic schools as follow:

- a) The minimum number of population in the residential area is 560 with 90 children in the age of studying;
- b) If the residential area has population number less than 560; the students go the other area if the distance is not more than 3km (the catchment area within a radius of 3km);
- c) The number of students in the classroom is not less than 30 and not more than 50;
- d) There are5 types of schools as follow:

Table 7.5. Typology of the basic schools (Tural-urban)								
Туре	Classroom	Population number	Number of students (minimum or maximum					
	numbers	in the residential area	according to the population number)					
		(threshold						
		population)						
Completed school (multi -levels)	3	560-930	60					
Completed school (multi -levels)	4	931-1250	150					
Completed school (multi -levels, normal)	6	1251-1875	300					
Completed school (multi -levels, normal)	9	1876-2800	450					
Completed school (multi -levels, normal)	12	2801-3750	600					
Completed school (multi -levels, normal)	18	More than 3750	900					
Alternate school	-	-	600					

Table 7.5: Typology of the basic schools (rural-urban)

Source: MoNE

*Note: The schools map identified the distance between the two schools by 600m.

* Generally: $T = S \times C/A \times E$ where T = threshold population (total); S = class size; C = number of classes per school; A = relevant age group as a percentage of total population; E = target enrollment rate. The class room area = $54m^2$

3) Current Primary Schools Facilities

There is a big gap between the private and the public sectors. However, the following are noted:

- a) Net enrollment rate in the south and north regions is about 70% which indicate the real demanding for improving the education facilities (quality and quantity);
- b) The big gross enrollment rate in the West region which is 122% indicates the weakness in the educational process (number of the students repeat the classes), in addition to the lack of the education facilities. Also, the unsuitable locations of some schools make the accessibility difficult for the students;
- c) A considerable number of schools are in bad physical situation in the southern region which raise the attention about improving the maintenance procedures and provide new suitable type of schools;
- d) In some areas like south of Riyadh and east of Toujounine; the students have to walk more than 600m to the nearest school;

¹⁸ (2009) Serge Theunynck "School Construction Strategies for Universal primary Education in Africa" The World Bank

- e) A considerable number of students cannot continue their education due to the transportation problem
- f) MoNE has reported that there is problem of providing new schools due to the difficulty is securing lands to build upon;
- g) Selling the lands of some schools in the city center to the general directorate of the state proprieties in the Ministry of Finance for commercial purposes indicates the future changing in the land use and considering more about increasing the schools capacity in the surrounding area.
- h) There are 6 schools have alternating system which indicate the lack of the buildings.
- i) The average number of students per classroom is more the 50 students in 30% of the schools in Arafat; 50% in Dar Naim; 25% in El Mina; and 65% in Riyadh.
- j) New type of schools is established for the special students with good physical quality which can be a type for other normal schools.
- k) Based on the social survey, around 38% of people mentioned that the schools have low qualities, and around 28% mentioned that the schools are very crowded. The Figure 7.5 shows the problems of the schools based on the social survey and the field trips.

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Figure 7.5: Educational faculties- problems-based on field trips and social survey

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Table	7.6: Norms of pr	imary schools, Gl	ER, physical situa	tion at the level of	Wilayah ¹⁹	
		Gross admission rate (GAR)	Gross enrollment	Net enrollment	Characteristics and physical conditions (wall)	
Wilayah	Sector	Number of students	rate (GER)	rate (NER)	Good/ acceptable	Bad
	Public	9243			226	34
West of Nouakchott	Private	18384	122%	96%	812	6
	Total	27627			1038	40
	Public	37174			734	81
South of	Private	25054	92%	69%	923	15
Nouakchott	Total	62228			1657	96
	Public	35954			657	51
North of	Private	18651	93%	68%	664	1
North of Nouakchott	Total	54605]		1321	52

Source: MoNE (Annuaire des Statistiques Scolaires 2015-2016)

Table 7.7: Current public primary schools - MoNE and 9 Communes 2017

Commune	Number of	Number of	Number of	Number of	Average of	Number of	Number of	Alternating
	Schools	students/20	students/20	classrooms	students in	Teachers	Teachers	schools
		17	18		classrooms	2017(avail	2018(need)	2017
						able)		
Arafat	30	11,040	14,110	337	33	425	448	0
Dar Naim	25	15,959	17,309	304	52	496	-	3
El Mina	24	11,540	11,774	289	40	294	401	0
Ksar	7	1,788	2,037	63	28	138	111	0
Riyadh	33	17,826	17,908	338	53	390	457	0
Sebkha	8	3,355	-	99	34	122	103	0
Tevragh	9	2,968	4,234	81	37	156	185	0
Zeina								
Teyaret	17	5,774	6,240	177	33	235	-	0
Toujounine	38	20,325	21,877	398	51	1,334	-	3
Total	191	90,575	95,489	2086	40	3,590	1705	6

4) Secondary Education

Current Secondary Schools Facilities in Nouakchott

The secondary education has a weakness in the public sectors comparing to the private one. However, the following are noted:

- 25% is the share of the public schools and the others are private schools. That reflects the a) weakness in the educational systems and the lack of the suitable facilities in the public sector.
- The average density of students per class is 57 students per class in the public schools, while b) it is 26 students in the private schools, which reflect the good quality and capacity of the private sector schools comparing to the public one.
- Gross enrollment rate is 57% which requires an improvement in the educational c) professional and better infrastructure to encourage the students to enhance the quality of the educational process.
- In the public schools; average number of students in the classrooms is bigger than 80 in d) Toujounine, and about 70 in Arafat. While in Tevragh Zeina, the average is less than 30.

¹⁹ The gross enrollment ratio = number of registered students/number of children between 6-11 years old

- e) The increasing number of the private schools indicates the weakness in the public faculties, on the contrary, such kind of unqualified increasing contributes more to deterioration of the educational process;
- f) Without including the private education; the lack of public educational facilities undermines quality education in the majority of municipalities.

There is a lack of the infrastructure for the majority of the secondary schools. The absence of water and sewage water facilities poses not only a health hazard for the pupils but also results in lower school attendance and higher teacher absenteeism.

The poor conditions of the school infrastructure, in addition to the slow pace of scaling-up provision, are partly attributable to a lack of proper planning and of clear and appropriate norms.

Adding spaces for sport and culture activities will contribute to improving the educational and social situation.

The performance of secondary education facilities is compared in Table and 7.9 by using the basic index.

Sector	Gross transition	Gross enrollment rate	physical conditions (walls)		physical conditions (roofs)	
	rate (GTR)	(GER)	Good	Bad	Good	Bad
Public			765	34	720	79
Private	68%	57%	1596	4	1592	8
Total			2361	38	2312	87

Table 7.8: Secondary schools, GTR, GER, physical situation²⁰

Source: MoNE

Table 7.9: Current public secondary schools - MoNE 2017 and 9 Commune 2017

Commune	Number of Schools	Number of students/2017	Number of students/2018	Number of classrooms	Average of students in classrooms	Number of Teachers 2017(available)
Arafat	11	10,467	12,949	144	73	313
Dar Naim	7	6,068		105	58	213
El Mina	5	5,785	7,674	95	61	151
Ksar	8	5,074	5,048	152	33	171
Riyadh	14	8,162	11,219	139	59	247
Sebkha	3	2,326	2,884	42	55	86
Tevragh Zeina	4	1,483	1,640	63	24	66
Teyaret	4	3,268		82	40	125
Toujounine	14	8,508		103	83	245
Total	70	51,141		925	55	1617

Source: MoE/RDoE

Distance to School

The school location planning was developed according to common technical criteria which are known as school mapping based on a process initiated in France in 1963²¹. As mentioned before, decision no.3612 on 28 Oct 2009 divided up the country into school catchment areas by applying norms regarding the minimum population required to establish a school and a maximum distance that children should be expected travel from home to school.

²⁰ There is no detailed data about the regions in annual statistics 2015-2016

²¹ (2009) Serge Theunynck "School Construction Strategies for Universal Primary Education in Africa" The World Bank Washington, DC

5) Vocational Education

Current Vocational Educational Facilities in Nouakchott according to MoEPF 2017

There are five educational institutions in Nouakchott City teach several vocational types such as metallic, mechanic, electric, civil engineering, accounting, infographics, hotel reception, traveling agencies, touristic, commercial, archivists-document lists and carpentry. Table illustrates the public infrastructures in Nouakchott.

	Table 7:10. Current public vocational culcational facilities in rouakenott according to PioErr 2017								
	(INAP-FTP)	CSET (High	LFTPI	LFTPC	CFPP				
	National institute for	center for	(Industrial Secondary	(Commercial Secondary	(Technical and				
	promotion of	technical	school for technical	school for technical and	vocational				
	technical and	education)	and vocational	vocational training)	training center)				
	vocational training)		training)						
Number of	-	21	100	54	38				
Teachers									
Number of	-	191	932	481	331				
Students									

Table 7.10: Current public vocational educational facilities in Nouakchott according to MoEPF 2017

Source: MoEPF

The technical and vocational training (hereinafter referred to as" FTP ") has experienced a significant increasing over the last decade. As mentioned in SCAPP 2016-2030²², the enrollment learners' number increased from 1,902 learners in 2004 to 7,602 in 2014, representing almost 15% of an average annual growth rate. However, the proportion of FTP remains low compared with the general secondary education (4.1% 2014) due to the lack of an appropriate system; insufficient number of specialist teachers, in addition to the high cost of suitable infrastructure.

According to SCAPP 2016- 2030, the government seeks to increase the current capacity from 5000 to 8000 students, but it might face different challenges such as:

- a) The difficulty of reconciling the social demands with the uncontrolled economic demand;
- b) The difficulty in mobilizing the trainers in the occupational specialties required which by the diversification of supply,
- c) The difficulty of mobilizing sufficient funding to achieve the objectives of the training;
- d) The weak involvement of the companies in the implementation process of the training;
- e) The difficulty of finding land for expanding the training centers.
- f) The necessity to establish several training bodies; and
- g) There is a necessity to find additional sources of support.

Current Vocational Educational facilities in Nouakchott according to CUN 2013

	Number of vocational education facilities according to CUN 2013									
commune	Arafat	Dar	El	Ksar	Riyadh	Sebkha	Tevragh	Teyaret	Toujounine	Total
		Naim	Mina				Zeina			Nouakchott
Public	0	1	3	4	0	0	0	0	1	9
Private	5	1	1	4	0	1	13	1	0	26
Total	5	2	4	8	0	1	13	1	1	35

Table 7.11: Current vocational educational facilities in the 9 communes

Source: CUN

Table , and Source: JICA STUDY TEAM

Figure show the number and the distribution of the vocational education facilities in Nouakchott. In total, there are 35 buildings, 9 of it are public while the others are private.

The majority are located in Ksar and El Mina while the other communes do not have any public facilities.

13 from 35 private centers are located in Tevragh Zeina, 8 are located in Ksar and 5in Arafat.

²² Stratégie Nationale de Croissance Accélérée et de Prospérité Partagée SCAPP 2016-2030

Riyadh does not have any vocational educational facilities.

6) Tertiary Education (Intermediate Institutions and Universities)

Administrative Entities

The high education facilities are administrated by several ministries. Seven of these institutions are administrated by MoHESR. The next table shows the high public educational institutions and the related administrative entities.

Table 7.12: Public educational institutions and its administrative entities

Administrative entity	The educational institutions
MoHESR	University of Nouakchott (faculty of legal sciences and economic, faculty of Arts, human sciences)
	High institute for technological education
	High institute for languages and interpretation
	High institute for Accounting and business administration
	High school for education
	National center for academic services
	University of science, technology and medicine
MoHESR,	High school for polytechnic
MoND	Preparatory institute for the engineering schools
MoND	High institute for marine sciences
MoEPF	High center for technological studies
	National schools for the public works
MoIA	Islamic University
	High institute for Islamic studies
MoPEM	Mauritanian school for minerals

Source: MoHE²³

Current High Education Facilities in Nouakchott

There are 15 educational institutions in Nouakchott; ten bodies are managed by the public sector while the others five are private bodies

According to SCAPP 2016-2020, the enrollment number of students has grown strongly during the last ten years. The annual growth rate is estimated as 8.3%. The percentage of students per 100000 inhabitants has increased from 434 in 2010 to 572 in 2014.

The estimated future number of students is 40.000 in 2030(including the other parts of Mauritania). And the governmental development trends will focus on the scientific and vocational sectors, in order to accelerate the intromission of the young people to the labor market.

Institution		Number of students	Number of teachers	
University of Nouakchott	Faculty of legal Sciences and Economy	8220	246	
(UN)	Faculty of Arts and Human Sciences			
University of Science,	Faculty of Sciences and Technologies	4635	222	
Technology and	Faculty of Medicine			
Medicine(USTM)	Professional Academic Institute			
High Institute for Accounting	and Business Administration (ISCAE)	1112	17	
High school for education (EN	IS)	593	67	
High school for polytechnic (E	ESP)	147	9	
High institute for Islamic Stud	ies (ISERI)	2924	64	
High center for technological	Education (CSET)	162	6	
Total		17793	631	

 Table 7.13: Current public educational institutions (Students, Teachers)

Source: MoHE

²³ "Annual Statistic of high education 2015-2016"

There are five private educational bodies in Nouakchott with 951 students in total as being shown in Table . These numbers reflect the small contribution of the private sector in the high educational process.

No. 125 84 104 278 360	951

Table 7.14: Current Private educational institutions (Students, Teachers)

Source: MoHE



Source: JICA STUDY TEAM

Figure 7.6: High educational and vocational training institutions -indicators and urban distribution

7) Original Education for Teaching Qur'an and Adult Literacy

Current Original Educational Facilities in Nouakchott

At the level of original education, the mahdra have a large number of pupils who receive the education in the fields of Islamic sciences and Arabic literature. But the informal type of mahdra makes it difficult to estimate its contribution in education process. There is no new information about the number of the mahdra, but mainly it is built close to the mosque. The total number is 1522 (based on the interview)

There is no clear norms control the distance between the mahdra and / or the Quranic schools, also there is no clear limitation for the numbers. Due to the absence of these norms, the huge increasing in the number of the unclassified mahdra need more control from the government and more working for enhancing the quality of the education, to contribute more in the education process and the literacy. Also, there is need for controlling the private sector and raise awareness of the necessity of the other public facilities for developing the master plan in Nouakchott.

According to the Directorate of Mahdra and Original Education, the Islamic schools are divided into several types.

type	Mahdra			Quranic school (kottab)			
Classification	United mahdra	Secondary mahdra	Elementary mahdra				
No. student	~60	~40	~20	~20			
Administration body	Religious institution	Religious institution	Private sector	Private sector			
Financial support	Mainly from the Mainly from the		Mainly from the private	Mainly from the private			
	from the	from the	sector ,Sometimes from	sector, Sometimes from the			
	government (MoIA)	government (MoIA)	the government (MoIA)	government (MoIA)			
Planning norms	Only one public Maho	Only one public Mahdra in the residential area					
Architectural design	House for the teacher	(Imam)+ class room(6*	7m)				

 Table 7.15: Typologies of the Islamic schools in Nouakchott

Source: MoIA, DoMOE

There is no new information about the number of the mahdra, but mainly it is built close to the mosque.

Table 7.16: Number of mahdra and Quranic schools in Nouakchott in 2010/2017

Number of	Number of Mahdra and Quranic School/CUN 2010										
commune	Arafat	Dar Naim	El Mina	Ksar	Riyadh	Sebkha	Tevragh Zeina	Teyaret	Toujounine	Total	
number	307	179	226	58	124	65	66	100	191	1316	
Number of Mahdra and Quranic School/ 9 Communes 2017											
	-	200	190	-	228	-	112 ²⁴	-	262		
a a	1010010	D 1 '		100	0	017					

Source: CUN 2013, Passed on interview with 9 Communes 2017

The total number is 1316 which are divided into 221 mahdra, 979 Quranic schools, and 116 unclassified.

(3) Sports, Socio-Cultural and Recreational Facilities

Sports, socio-cultural and recreational facilitate still very few and face many difficulties. In addition to the lack of the necessary infrastructures, equipment and maintenance works, the unclear situation of the real estate (the majority of the lands which were given to the sport or cultural activities are used for different purposes) contributed widely to the deterioration of these activities.

- a) There are considerable numbers of the private buildings or spaces which are used for sports and not being registered or licensed in the administrative bodies. This situation creates a possibility to change the usage from sport to other by the citizens, such as using it for temporary mosques or for housings.
- b) Currently, there are no public recreational facilities, parks or public spaces.

²⁴ There are 112 mosques and mahdara and no detailed information

- c) The youth centers which were built in Nouakchott recently are not suitable for the necessary tasks due to the lack of the equipment;
- d) There are no covered halls to make big sportive activities.
- e) Although, there are several stadium and youth clubs in Nouakchott, the physical situation and the equipment make some of them not suitable for use.

The weakness in this sector due to many reasons such as:

- a) Divided the Ministry of Sport, Youth, and Culture to become two ministries in 2014 did not followed by a good financial strategy for the Ministry of Culture.
- b) Merging between the traditional industries and cultural activities required new infrastructure and new financial policy.
- 1) Sports Infrastructure in Nouakchott

As claimed by the Ministry of Youth and Sport, during the period 1993-2007 with the international support, some buildings were rehabilitated and others are reconstructed. For instance, 20 youth centers (6 in Nouakchott for youth activities and sport); 10 stadiums;2 youth houses in Nouakchott; in addition to the Scout center which is occupied now by health facility and kindergarten. However, these infrastructures face series problem such as:

- a) Several deteriorated sportive spaces or invaded by the sand;
- b) The youth centers which were built in Nouakchott recently (Teyaret, Dar al Naim, Arafat, El Mina, Sebkha) are not suitable for the necessary tasks due to the lack of the equipment;
- c) The stadium in Toujounine is not completed yet and become in poor physical situation;
- d) Establishing new youth center in Al-Tarhil district in Toujounine;
- e) The youth center in Tevragh Zina was given to other administration institution; and
- f) There are no covered halls to make big sportive activities.
- 2) Situation of the stadiums in Nouakchott

Although, there are several stadium and youth clubs in Nouakchott, the physical situation and the equipment make some of them not suitable for use.

commun e	Arafat	Dar Naim	El Mina	Ksar	Riyadh	Sebkha	Tevragh Zeina	Teyaret	Toujounin e
Physical situation of stadiums	Medium	Fair	Flooded	One in medium situatio n, one in good situatio n	Medium	Fair	Under rehabilitatio n	Fair	-
Physical situation of youth clubs	Under rehabilitatio n	good	-	Old	good	Medium	-	Medium	Good
Facilitie s	handball court, basketball court	Socio- education al center	Football camp, basketba ll court	Manage d by the city hall, FFRIM	handball court, 3 basketba ll courts	polyvalen t basket ball, volleybal l) playing area	Complex Olympic office	polyvale nt (football, basketbal l, bowling)	polyvalen t (football, basketball

Table 7.17: Current situations of the public stadium and youth clubs

Source: MoYS

3) National strategy for improving the sport facilities 2011-2015, 2016-2019

MoYS seeks to improve the sports activities by achieving several projects and program as being illustrated in Table

 Table 7.18: Future activities in the national strategy project for sport and entertainment 2015-2019

Number	Activity	Financial amount
1	Rehabilitation of the Olympic stadium	1.800.000.000

2	New multi-using sportive hall	2.000.000.000
3	New stadium (30.000 seat)	8.000.000.000
4	Rehabilitation of the existing sportive establishments	720.000.000
5	Preparing a sportive route	170.000.000
6	Multi- sportive hall (3000 seat)	3.000.000.000
7	New stadium (5.000 seat)	1.800.000.000
8	Building two Olympic pools	2.750.000.000
9	Establishing a sportive district	-
10	Establishing a sportive medical center	1000.000.000
11	Establishing a new spaces for the young people	

Source: MoYS

(4) Socio-Cultural and Recreational Facilities

There is no clear policy occupied with starts from the state level and going through the local authorities for creating and managing the cultural facilities. The lack of this policy encouraged the private sectors to offer such kind of places and make more investment in these facilities.

Since 2014, the date of establishing the Ministry of Culture and Traditional Industries, the necessity to create new cultural spaces become more important. The Ministry started from Nouakchott by creating three spaces in each of Dar Naim, Riyadh and Ksar with a plan to create more in the other municipalities in the future.

1) The current situation infrastructures after establishing the Ministry of Culture 2014

Since 2014, the date of establishing the Ministry of Culture and Traditional Industries, the necessity to create new cultural spaces become more important. The Ministry started from Nouakchott by creating three spaces in each of Dar Naim, Riyadh and Ksar with a plan to create more in the other municipalities in the future. In general, the cultural facilities in Nouakchott City are:

The National Exhibition in very bad physical situation,

- a) Cultural House for the administrative and institutional offices includes national office for the museums; national library; Mauritanian institution for the research and others;
- b) One youth house was built by Moroccan side;
- c) 10 shops for the traditional products inside the cultural house;
- d) Three cultural spaces; and
- e) 9 books houses which became administration offices for the civil status.
- 2) The short and mid-term plan

The Ministry of Cultural follows a three-year plan for improving the culture sector. However, there is a lack of the financial resources in addition to the lands. The main goals in the current plan (2015-2017) which related to the infrastructures in Nouakchott are:

- a) To build an industrial or traditional village in the national exhibition;
- b) To build an international center for improving the traditional industry;
- c) To build cultural palace;
- d) To build cultural spaces in the other municipalities;
- e) To build multi-use cultural halls the three prefectures

(5) **Religious Facilities**

1) Current situation

There are three types of mosques in Nouakchott:

Type 1: Mosque for Friday prayers (named as Jamea); Type 2: Mosque for the daily 5 prayers (named as Mousalla); and Type 3: Temporary mosque (from zinc and wood building materials) without a license.

The following table shows the number of mosques in Nouakchott according to its types in 2013.

Table 7.19: Number of mosques in 2013-2017

Number of Mosqu	ues - CUN 2013				Number of Mosques -
Municipality	Type1 Jamea	Type 2 Mousalla	Type 3 temporary Mousalla	Total	Commune 2017

Nouakchott	City	Urban	Master	Plan	Developm	ent Project
					Fi	nal Report

Arafat	80	85	44	209	-
Dar Naim	67	68	4	139	240
El Mina	58	87	23	168	200
Ksar	56	38	11	105	-
Riyadh	35	37	0	72	203
Sebkha	25	19	10	54	-
Tevragh Zeina	42	27	20	89	112
Teyaret	22	19	1	42	84
Toujounine	67	81	23	171	292

Source 1: passed on interview with 9 Communes Source2 : CUN 2013

The table shows a massive number of religious buildings in Nouakchott. The number increased to become around 2200 mosques during the period 2009-2017. This huge increasing was caused by several factors such as:

Planning problem:

According to the ministerial committee decision in 2012, the planning norms of the mosques are:

- The minimum distance between the two mosques (type1 Jamea) is 500m;
- The minimum distance between the two mosques (type2 Mousalla) is 200m; and
- No more than one mosque in the residential area.

Due to the delay of enforcement of this decision, the number of mosques is still increasing. The map shows high density of the mosques type1 and type 2 according to the statistic 2011. In several regions, there are many cases of represents existing of more than two or three mosques type 2 in an area less than 200*200m, especially in Arafat and El Mina. While the increasing number of mosques type1 becomes a problem in the in all the regions. On the other hands, there is no specific classification for the public facilities in the master plans, which creates a difficulty in controlling the land use.

Awareness problem

Due to lack of citizen awareness to the importance of the public lands and other public facilities, the people use the empty land to build temporary mosques or give their own lands to the directorate of Endowment for building mosques or mahdra. This not only make problem in increasing the numbers but also problem for the administration bodies such as MoIA, for managing, financing and maintaining the buildings.

Institutional problem

Due to the absence of the harmony between the responsible administrations bodies especially between the MoHUAT and MoIA, there are no clear norms and procedures which control the design and the increasing numbers of the licensed mosques. On the other hand, there are no qualified designers inside the administration bodies for creating good types and managing the construction process.

The following two maps show the number of mosques according to the old statistics.

The number increased to become 2200. And there is no new information from MoIA about the GIS until now.



Source: JICA STUDY TEAM

Figure 7.7: Distribution of mosques type 1 (Jamea) within grid 500*500m in 2011



Figure 7.8: Distribution of mosques types 1+2 within grid 200*200m in 2011

2) Financial Policy

There is a big internal and the external international financial support for the religious facilities. However, the budget is divided into 4 classes.

	Monthly users	Yearly users	Total amounts	Details
Mosques	208	1292	1588	17% from the total number of Mosques
Mahdra	87	1097	1763	38% from the total number of Islamic schools
Literacy	15	-	-	15 classes
projects	427	-	-	There is a plan to build 5 typical Mahdra
Source: MolA	·			

Table 7.20: Financial support for the religious facilities

Source: MoIA

7.2 Development Plan

7.2.1 Estimated required public facilities number in 2018-2040

(1) Health

1) Required number of health facilities and core workers in the 9 communes

Table 7.21. Future needs of nearth infrastructures and core workers in 2040 according to write									
Commune	Estimated population Ta growth fac pe		Target number facilities(2 he per 10,000)	Target number of facilities(2 health facilities per 10,000)		Required number of beds (27 beds per 10,000)		Required number of core workers(23 core workers per 10,000)	
	2030	2040	2030	2040	2030	2040	2030	2040	
Arafat	208,469	243,094	42	49	563	656	479	559	
Dar Naim	236,566	277,598	47	56	639	750	544	638	
El Mina	168,106	186,094	34	37	454	502	387	428	
Ksar	136,546	203,196	27	41	369	549	314	467	
Riyadh	284,485	359,193	57	72	768	970	654	826	
Sebkha	110,487	104,821	22	21	298	283	254	241	
Tevragh Zeina	136,019	263,400	27	53	367	711	313	606	
Teyaret	149,409	229,151	30	46	403	619	344	527	
Toujounine	290,560	333,454	58	67	785	900	668	767	
total	1,720,648	2200000	344	440	4,646	5,940	3,957	5,060	

Table 7 21: Future needs of health infrastructures and core workers in 2040 according to WHO

Source: JICA STUDY TEAM

Arafat:

Current number of public health facilities /10,000p is 0.2; it needs 41 health facilities to fit the current population requirements according to WHO standards. It has around 47 core health workers and need more than 466. The future need of health facilities and workers is the highest; Need around 559 workers and 49 HFs in 2040.

Dar Naim:

Current number of public health facilities /10,000p is 0.5; it needs 33 health facilities to fit the current population requirements according to WHO standards. It has around 56 core health workers and need more than 385. Need around 638 workers and 56 HFs in 2040.

El Mina:

Current number of public health facilities /10,000p is 0.5; it needs 31 health facilities to fit the current population requirements. It has around 39 core health workers and need more than 354. Need around 428 workers and 37 HFs in 2040.

Ksar:

Relatively, it is the best served by health facilities. Current number of public health facilities /10,000p is 1.1; it needs 11 health facilities to fit the current population requirements. It has around 49 core health workers and need more than 126. Need around 467 workers and 41 HFs in 2040.

Riyadh:

Urban expands toward the east (Tarhil area). Current number of public health facilities/10,000p is 0.5; it needs 27 health facilities to fit the current population requirements according to WHO standards. It has around 59 core health workers and need more than 313. Need around 826 workers and 72 HFs in 2040.

<u>Sebkha:</u>

Current number of public health facilities /10,000p is 0.5; it needs 17 health facilities to fit the current population requirements. It has around 29 core health workers and need more than 193. Need around 241 workers and 21 HFs in 2040.

Tevragh Zeina:

Current number of public health facilities /10,000p is 1.1; it needs 11 health facilities to fit the current population requirements according to WHO standards. It has around 21 core health workers and need more than 131. Need around 606 workers and 53 HFs in 2040.

Teyaret:

Availability of health facilities is among the poorest. Current number of public health facilities /10,000p is 0.5; it needs 19 health facilities to fit the current population requirements according to WHO standards. It has around 69 core health workers and need more than 216. Need around 527 workers and 46 HFs in 2040.

Toujounine:

Urban sprawl toward the east with low density creates a big challenge for providing public facilities. It has the lowest availability of health facilities. Number of public health facilities /10,000p is 0.2; it needs 34 health facilities to fit the current population requirements according to WHO standards. It has around 32 core health workers and need more than 386. Need around 767 workers and 67 HFs in 2040.

2) Distribution of the health facilities based on the traffic zone-2040

The distribution method based on dividing the main traffic zones into district unites (10,000p/unit). Each unite include 16 residential blocks (area=3ha, population number is 800 to 2,000).

Also it is considered the catchment area of each type of health facilities.

The next table shows the estimated required number of health facilities and number of beds.

	health facilities proposal distribution for 2						(1HCA [*]	*2HCB*	10HP); c	atchmen	t area; b	eds numb	ber	
				2017				20	40			20	30	
Commu ne	Traffic Zone	total current facilitie s	Н	HCA)	HCB	HP	Н	HCA	HCB	HP	Н	HCA	HCB	HP
Tevragh	1010	5	4	1	-	-	-	-	-	1	0	0	0	0
Zeina	1020	1	-	-	-	1	-	-	-	1	0	0	0	1
	1030	-	-	-	-	-	-	-	1	4	0	0	0	3
	1040	1	-	-	-	1	-	-	-	-	0	0	0	0
	1050	-	-	-	-	-	-	4	6	16	0	1	4	8
	1051	-	-	-	-	-	1	-	2	3	0	0	1	1
	1052	-	-	-	-	-	-	-	1	3	0	0	1	2
	TOTAL	7	4	1	-	2	1	4	10	27	0	1	6	15
Ksar	2010	3	1	-	1	1	-	-	-	-	0	0	-	0
	2020	1	1	-	-	-	-	-	-	4	0	0	-	3
	2030	2	1	-	1	-	-	-	-	8	0	0	-	6
	2040	-	-	-	-	-	-	-	2	9	0	0	1	9
	2041	-	-	-	-	-	-	2	2	9	0	0	-	3
	TOTAL	6	3	-	2	1	-	2	4	30	0	0	1	21
Teyarett	3010	5	-	1	-	4	1	1	4	26	0	1	1	22
	3011	-	-	-	-	-	-	1	2	5	0	0	-	1
	TOTAL	5	-	1	-	4	1	2	6	31	0	1	1	23
Dar	4010	5	1	1	-	3	-	3	8	15	0	2	5	14
Naim	4020	4	-	1	1	2	-	3	1	9	0	2	1	9

Table 7.22: Estimated	required	number of health	facilities

	4021	-	-	-	-	-	-	-	2	6	0	0	2	3
	TOTAL	9	1	2	1	5	-	6	11	30	0	4	8	26
Sebkha	5010	4	1	1	-	2	-	2	7	8	0	2	7	8
	5020	-	-	-	-	-	-	-	-	-	0	0	-	0
	TOTAL	4	1	1	-	2	-	2	7	8	0	2	7	8
Arafat	6010	2	1	1	-	-	-	1	3	12	0	0	2	12
	6020	3	-	-	1	2	1	2	3	22	0	2	3	18
	TOTAL	5	1	1	1	2	1	3	6	34	0	2	5	30
Toujou	7010	3	-	-	1	2	1	3	4	21	1	2	4	18
nine	7020	1	-	1	-	-	1	1	5	10	1	1	5	10
	7030	-	-	-	-	-	1	1	3	10	0	1	3	8
	7031	-	-	-	-	-	-	-	-	1	0	0	-	0
	TOTAL	4	-	1	1	2	3	5	12	42	2	4	12	36
El mina	8010	5	-	1	2	2	-	1	2	11	0	1	2	11
	8020	3	-	-	-	3	-	2	3	7	0	1	1	7
	8030	-	-	-	-	0	-	-	1	2	0	0	1	2
	TOTAL	8	-	1	2	5	-	3	6	20	0	2	4	20
Riyadh	9010	5	-	1	1	3	1	3	7	17	1	3	6	17
	9011	-	-	-	-	-	1	4	8	18	1	2	4	14
	9020	1	-	1	-	-	-	-	-	3	0	0	-	1
	9021	-	-	-	-	-	-	-	1	2	0	0	-	2
	TOTAL	6	-	2	1	3	2	7	16	40	2	5	10	34

Source: JICA STUDY TEAM





Figure 7.9: Health facilities in Nouakchott- proposed location for the new hospitals

(2) Education

1) Pre-primary education

The following table shows the future needs of the kindergarten in 2040 (passed on the average of NER 20%) which has been recommended in the national strategy for the accelerated growth and mutual prosperity SCAPP 2016-2030.

The number of children is estimated as follow in order to know the current and future required number of schools;

i) Age 3-5: 10% of population; ii) Age 6-11: 16%10 of population; iii) Age 12-18: 15% of population

The number of students is estimated according to the NER=100% in SCAPP 2016-2030 for primary and secondary schools

	children rat	io at age of 3-	5 years	number of p NER (20%) 2016-2030	according to	y students SCAPP	number of classrooms (25 student/classroom)			
	2017	2030	2040	2017	2030	2040	2017	2030	2040	
Arafat	20,252	20,847	24,309	4,050	4,169	4,862	162	167	194	
Dar Naim	16,738	23,657	27,760	3,348	4,731	5,552	134	189	222	
El Mina	15,371	16,811	18,609	3,074	3,362	3,722	123	134	149	
Ksar	5,491	13,655	20,320	1,098	2,731	4,064	44	109	163	
Riyadh	13,588	28,449	35,919	2,718	5,690	7,184	109	228	287	
Sebkha	8,391	11,049	10,482	1,678	2,210	2,096	67	88	84	
Tevragh Zeina	5,679	13,602	26,340	1,136	2,720	5,268	45	109	211	
Teyaret	9,374	14,941	22,915	1,875	2,988	4,583	75	120	183	
Toujounin e	16,789	29,056	33,345	3,358	5,811	6,669	134	232	267	
Total	111,674	172,065	220,000	22,335	34,413	44,000	893	1,377	1,760	

Table 7.23: Future request number of kindergarten in Nouakchott-2040

Source: JICA STUDY TEAM

2) Primary education

Table 7.24: Estimated required number of primary schools in 2025

	140		iarea requir		- primary st		e	
Commune	Traffic Zone	children	Required	Current	Current	Final number	Final number	Required new
		numbers	class rooms	classrooms/(s	empty area in	of class	of schools to	lands to build
		(ratio16/100	2018	urvey 2017)	the current	rooms to be	be build with	new
		for age of 6-	(number of		schools for	build in the	area	schools(numb
		11)	students/50)		building new	current	4000m2/2flo	er of new
					classrooms	schools	ors/24classro	schools*4000
					up to		oms	m2)
					norm(60%			
					building			
					and40 empty)			
Tevragh Zeina	1010	2,229	45	50	-	-	0	-
	1020	977	20	23	5,128	-	0	-
	1030	2,124	42	0	-		2.0	8,000
	1040	550	11	0	-	-	1.0	4,000
	1050	2,709	54	6	-	-	2.0	8,000
	1051	-	0	0	-	-	0	-
	1052	497	10	0	-	-	0	-
	TOTAL	9,087	182	79	5,128	-	5.0	20,000
Ksar	2010	1,089	22	25	5,104	-	0	-
	2020	1,783	36	8	3,210	28	0	-
	2030	5,576	112	30	1,121	10	3.0	12,000
	2040	337	7	0	-	-	1.0	4,000
	2041	-	0	0	-	-	0	-
	TOTAL	8,785	176	63	9,435	37	4.0	16,000
Teyarett	3010	14,637	293	182	6,523	111	0	-

	3011	361	7	0	-	-	1.0	4,000
	TOTAL	14,999	300	182	6,523	111	1.0	4,000
Dar Naim	4010	14,664	293	174	8,994	119	0	-
	4020	11,645	233	117	4,043	44	3.0	12,000
	4021	472	9	0	-	-	1.0	4,000
	TOTAL	26,781	536	291	13,037	163	4.0	16,000
Sebkha	5010	13,287	266	86	9,487	156	1.0	4,000
	5020	139	3	0	-	-	1.0	4,000
	TOTAL	13,426	269	86	9,487	156	2.0	8,000
Arafat	6010	12,091	242	169	23,981	73	0	-
	6020	20,312	406	217	17,793	189	0	-
	TOTAL	32,403	648	386	41,774	262	0	-
Toujounine	7010	13,506	270	180	8,615	90	0	-
	7020	11,165	223	77	4,820	122	1.0	4,000
	7030	2,178	44	17	11,210	27	0	-
	7031	15	0	0	-	0	0	-
	TOTAL	26,863	537	274	24,645	239	1.0	4,000
El mina	8010	14,724	294	191	15,285	103	0	-
	8020	8,082	162	71	9,568	91	0	-
	8030	1,787	36	0	-	-	2.0	8,000
	TOTAL	24,593	492	262	24,853	194	2.0	8,000
Riyadh	9010	20,245	405	225	24,622	180	0	-
	9011	776	16	0	-	-	1.0	4,000
	9020	720	14	6	969	8	0	-
	9021	-	0	0	-	-	0	-
	TOTAL	21,741	435	231	25,591	188	1.0	4,000

Table 7.25: Estimated required number of primary schools in 2030

Commune	Traffic Zone	Children numbers (ratio16/100 for age of 6-11)	Required class rooms 2030 (number of students/50)	Current empty area in the current schools for building new classrooms up to norm(60% building and40 empty)	Final number of class rooms to be build in the current schools	Final number of schools to be build with area 4000m2/2floor s/24classrooms	Required new lands to build new schools(numbe r of new schools*4000m 2)
Tevragh Zeina	1010	2,906.11	58	-	-	1	4,000
	1020	1,327.55	27	5,128	4	0	-
	1030	2,616.05	52	-	-	3	12,000
	1040	654.10	13	-	-	1	4,000
	1050	10,057.19	201	-	-	8	32,000
	1051	1,424.84	28	-	-	2	8,000
	1052	2,777.16	56	-	-	3	12,000
	TOTAL	21,762.99	435	5,128	-	18	72,000
Ksar	2010	1,252.08	25	5,104	-	0	-
	2020	3,053.76	61	3,210	53	0	-
	2030	6,688.28	134	1,121	8	4	16,000
	2040	8,069.97	161	-	_	7	28,000
	2041	2,783.23	56	-	-	3	12,000
	TOTAL	21,847.32	437	9,435	61	14	56,000
Teyarett	3010	23,485.10	470	6,523	120	7	28,000
	3011	420.31	8	-	-	1	4,000
	TOTAL	23,905.41	478	6,523	120	8	32,000
Dar Naim	4010	20,593.59	412	8,994	166	3	12,000
	4020	12,890.29	258	4,043	69	3	12,000

4021	4,366.71	87	-	-	4	16,000
TOTAL	37,850.59	757	13,037	235	10	40,000
5010	17,452.72	349	9,487	167	4	16,000
5020	225.25	5	-	-	1	4,000
TOTAL	17,677.97	354	9,487	167	5	20,000
6010	12,455.87	249	23,981	80	0	-
6020	20,899.23	418	17,793	201	0	-
TOTAL	33,355.10	667	41,774	281	0	-
7010	22,469.26	449	8,615	149	5	20,000
7020	14,573.52	291	4,820	70	6	24,000
7030	9,399.32	188	11,210	171	0	-
7031	47.58	1	-	-	1	4,000
TOTAL	46,489.67	930	24,645	391	12	48,000
8010	15,092.43	302	15,285	111	0	-
8020	9,426.72	189	9,568	118	0	-
8030	2,377.84	48	-	-	2	8,000
TOTAL	26,896.99	538	24,853	228	2	8,000
9010	25,709.06	514	24,622	289	0	-
9011	16,641.62	333	-	-	14	56,000
9020	1,346.58	27	969	-	1	4,000
9021	1,820.38	36	-	-	2	8,000
TOTAL	45,517.63	910	25,591	289	17	68,000
	4021 TOTAL 5010 5020 TOTAL 6010 6020 TOTAL 7010 7020 7030 7031 TOTAL 8010 8020 8030 TOTAL 9010 9011 9020 9021 TOTAL	4021 4,366.71 TOTAL 37,850.59 5010 17,452.72 5020 225.25 TOTAL 17,677.97 6010 12,455.87 6020 20,899.23 TOTAL 33,355.10 7010 22,469.26 7020 14,573.52 7030 9,399.32 7031 47.58 TOTAL 46,489.67 8010 15,092.43 8020 9,426.72 8030 2,377.84 TOTAL 26,896.99 9010 25,709.06 9011 16,641.62 9020 1,346.58 9021 1,820.38 TOTAL 45,517.63	4021 4,366.71 87 TOTAL 37,850.59 757 5010 17,452.72 349 5020 225.25 5 TOTAL 17,677.97 354 6010 12,455.87 249 6020 20,899.23 418 TOTAL 33,355.10 667 7010 22,469.26 449 7020 14,573.52 291 7030 9,399.32 188 7031 47.58 1 TOTAL 46,489.67 930 8010 15,092.43 302 8020 9,426.72 189 8030 2,377.84 48 TOTAL 26,896.99 538 9010 25,709.06 514 9011 16,641.62 333 9020 1,346.58 27 9021 1,820.38 36 TOTAL 45,517.63 910	4021 4,366.71 87 - TOTAL 37,850.59 757 13,037 5010 17,452.72 349 9,487 5020 225.25 5 - TOTAL 17,677.97 354 9,487 6010 12,455.87 249 23,981 6020 20,899.23 418 17,793 TOTAL 33,355.10 667 41,774 7010 22,469.26 449 8,615 7020 14,573.52 291 4,820 7030 9,399.32 188 11,210 7031 47.58 1 - TOTAL 46,489.67 930 24,645 8010 15,092.43 302 15,285 8020 9,426.72 189 9,568 8030 2,377.84 48 - TOTAL 26,896.99 538 24,853 9010 25,709.06 514 24,622 9011 16,6	4021 4,366.71 87 - - TOTAL 37,850.59 757 13,037 235 5010 17,452.72 349 9,487 167 5020 225.25 5 - - TOTAL 17,677.97 354 9,487 167 6010 12,455.87 249 23,981 80 6020 20,899.23 418 17,793 201 TOTAL 33,355.10 667 41,774 281 7010 22,469.26 449 8,615 149 7020 14,573.52 291 4,820 70 7030 9,399.32 188 11,210 171 7031 47.58 1 - - TOTAL 46,489.67 930 24,645 391 8010 15,092.43 302 15,285 111 8020 9,426.72 189 9,568 118 8030 2,377.84 48 </td <td>4021 4,366.71 87 - - 44 TOTAL 37,850.59 757 13,037 235 10 5010 17,452.72 349 9,487 167 44 5020 225.25 5 - - 1 TOTAL 17,677.97 354 9,487 167 55 6010 12,455.87 249 23,981 80 00 6020 20,899.23 418 17,793 201 00 TOTAL 33,355.10 667 41,774 281 00 7010 22,469.26 449 8,615 149 5 7020 14,573.52 291 4,820 70 6 7030 9,399.32 188 11,210 171 0 7031 47.58 1 - - 1 TOTAL 46,489.67 930 24,645 391 12 8010 15,092.43 302</td>	4021 4,366.71 87 - - 44 TOTAL 37,850.59 757 13,037 235 10 5010 17,452.72 349 9,487 167 44 5020 225.25 5 - - 1 TOTAL 17,677.97 354 9,487 167 55 6010 12,455.87 249 23,981 80 00 6020 20,899.23 418 17,793 201 00 TOTAL 33,355.10 667 41,774 281 00 7010 22,469.26 449 8,615 149 5 7020 14,573.52 291 4,820 70 6 7030 9,399.32 188 11,210 171 0 7031 47.58 1 - - 1 TOTAL 46,489.67 930 24,645 391 12 8010 15,092.43 302

Source: JICA STUDY TEAM

Table 7.26: Estimated required number of primary schools in 2040

Commune	Traffic Zone	children	required class	Current empty	final number of	final number of	Required new
		numbers	rooms 2040	area in the	class rooms to	schools to be	lands to build
		(ratio16/100	(number of	current schools	be build in the	build with area	new
		for age of 6-11)	students/50)	for building	current schools	4000m2/2floor	schools(numbe
				new		s/24classrooms	r of new
				classrooms up			schools*4000m
				to norm(60%			2)
				empty)			
Tevragh Zeina	1010	5,121	102		_	3	12,000
6	1020	2,639	53	5,128	30	0	-
	1030	4,359	87	-		4	16,000
	1040	717	14	-	_	1	4,000
	1050	20,825	416	-	-	17	68,000
	1051	4,942	99	-	-	4	16,000
	1052	3,541	71	-	-	3	12,000
	TOTAL	42,144	843	5,128	30	32	128,000
Ksar	2010	1,599	32	5,104	7	0	-
	2020	3,870	77	3,210	45	1	4,000
	2030	7,761	155	1,121	29	4	16,000
	2040	9,044	181	-	-	8	32,000
	2041	10,238	205	-	-	9	36,000
	TOTAL	32,511	650	9,435	82	22	88,000
Teyarett	3010	29,966	599	6,523	105	13	52,000
	3011	6,698	134	-	-	6	24,000
	TOTAL	36,664	733	6,523	105	19	76,000
Dar Naim	4010	24,399	488	8,994	146	7	28,000
	4020	13,239	265	4,043	100	2	8,000
	4021	6,777	136	-	-	6	24,000
	TOTAL	44,416	888	13,037	246	15	60,000
Sebkha	5010	16,548	331	9,487	173	3	12,000
	5020	223	4	-	-	1	4,000
	TOTAL	16,771	335	9,487	173	4	16,000

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Arafat	6010	14,302	286	23,981	117	0	-
	6020	24,593	492	17,793	275	0	-
	TOTAL	38,895	778	41,774	392	0	-
Toujounine	7010	25,718	514	8,615	142	8	32,000
	7020	14,533	291	4,820	70	6	24,000
	7030	12,197	244	11,210	203	1	4,000
	7031	904	18	-	-	1	4,000
	TOTAL	53,353	1,067	24,645	415	16	64,000
El mina	8010	15,359	307	15,285	116	0	-
	8020	11,812	236	9,568	141	1	4,000
	8030	2,603	52	-	-	3	12,000
	TOTAL	29,775	595	24,853	257	4	16,000
Riyadh	9010	26,113	522	24,622	297	0	-
	9011	25,162	503	-	-	21	84,000
	9020	3,540	71	969	-	3	12,000
	9021	2,656	53	-	-	3	12,000
	TOTAL	57,471	1,149	25,591	297	27	108,000



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Source: JICA STUDY TEAM

Figure 7.10: Primary schools-indicators and urban distribution-Proposal 2040

3) Secondary education

Table 7.27: Current and future required number of secondary schools in 2017- 2025

Commune	Traffic Zone	Children	Required	Empty area in the	Final number	Final number	Required lands
		numbers	class rooms	schools for	of class rooms	of schools to be	to build new

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		(ratio15/100 for age of 12-18)	2018 (number of	building new	to be build in the current	build with area	schools(numbe
		uge of 12 10)	students/50)	norm(60% building and40 empty)	schools	s/32classrooms	schools*8000m 2)
Tevragh Zeina	1010	2,090	42	-	-	-	0
_	1020	916	18	-	-	1	8,000
	1030	1,991	40	-	-	2	16,000
	1040	516	10	-	-	1	8,000
	1050	2,540	51	-	-	2	16,000
	1051	-	0	-	-	-	0
	1052	466	9	-	-	1	8,000
	TOTAL	8,519	170	-	-	7	56,000
Ksar	2010	1,021	20	-	-	-	0
	2020	1,672	33	-	-	1	8,000
	2030	5,228	105	2,865	24	2	16,000
	2040	316	6	-	-	1	8,000
	2041	-	0	-	-	-	0
	TOTAL	8,236	165	2,865	24	4	32,000
Teyarett	3010	13,723	274	4,080	64	4	32,000.0
	3011	339	7	-	-	1	8,000.0
	TOTAL	14,061	281	4,080	64	3	24,000
Dar Naim	4010	13,748	275	6,515	92	4	32,000
	4020	10,917	218	1,778	14	6	48,000
	4021	443	9	-	-	1	8,000
	TOTAL	25,107	502	8,293	106	11	88,000
Sebkha	5010	12,457	249	3,830	47	5	40,000
	5020	130	3	-	-	1	8,000
	TOTAL	12,587	252	3,830	47	6	48,000
Arafat	6010	11,335	227	8,635	147	-	0
	6020	19,042	381	2,020	15	10	80,000
	TOTAL	30,377	608	10,655	162	10	80,000
Toujounine	7010	12,662	253	10,439	154	-	0
	7020	10,46/	209	-	-	6	48,000.0
	7030	2,041	41	-	-	1	8,000.0
	7031 TOTAI	25 194	504	- 10.420	155		0
El mino	101AL 8010	12 804	276	10,439	155	/	8,000
Ei iiiiia	8020	7 577	152	10,303	102	1	32,000
	8020	1,577	34	1,723	2		8,000
	ΤΟΤΔΙ	23.056		12 088	174	1	48.000
Rivadh	9010	18 980	380	25 366	229	0	- 0
ixiyaun	9011	728	15			1	0 8 000
	9020	675	13			1	8,000
	9021		14				
	ΤΟΤΔΙ	20 383	/08		220	2	0
	10IIIL	20,383	-00	25,300	229	2	10,000

Source: JICA STUDY TEAM

Table 7.28: Current and future required number of secondary schools in 2030

Commune	Traffic Zone	children numbers (ratio15/100 for age of 12- 18)	required class rooms 2030 (number of students/50)	Current empty area in the current schools for building new classrooms up to norm(60% building and40 empty)	final number of class rooms to be build in the current schools	final number of schools to be build with area 8000m2/2floor s/24classrooms	requierd new lands to build new schools(numbe r of new schools*8000m 2)
T 17'	1010	2,724.48	54	-	· 0	0	-
Tevragh Zeina	1020	1,244.58	25	-	0	1	8,000

	1030	2,452.55	49	-	0	2	16,000
	1040	613.21	12	-	0	0	-
	1050	9,428.62	189	-	0	6	48,000
	1051	1,335.78	27	-	-5	1	8,000
	1052	2,603.59	52	-	0	1	8,000
	TOTAL	20,402.80	408	-	-5	11	88,000
	2010	1,173.83	23	-	0	0	-
	2020	2,862.90	57		0	2	16,000
Ksar	2030	6,270.26	125	2,865	44	2	16,000
ix sai	2040	7,565.59	151	-	0	5	40,000
	2041	2,609.28	52	-	0	2	16,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	TOTAL	20,481.86	410	2,865	44	11	88,000
	3010	22,017.28	440	4,080	70	9	72,000
Teyarett	3011	394.04	8	-	0	0	-
	TOTAL	22,411.32	448	4,080	70	9	72,000
Teyarett Dar Naim Sebkha	4010	19,306.49	386	6,515	107	7	56,000
Don Maina	4020	12,084.65	242	1,778	6	7	56,000
Dar Naim	4021	4,093.79	82	-	0	3	24,000
	TOTAL	35,484.93	710	8,293	113	17	136,000
	5010	16,361.92	327	3,830	93	6	48,000
Sebkha	5020	211.17	4	-	0	1	8,000
	TOTAL	16,573.10	331	3,830	93	7	56,000
	6010	11,677.38	234	8,635	154	0	-
Arafat	6020	19,593.03	392	2,020	26	10	80,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	TOTAL	31,270.41	625	10,655	179	10	80,000
	7010	21,064.93	421	10,439	194	4	32,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	7020	13,662.67	273	-	0	7	56,000
	7030	8,811.86	176	-	0	5	40,000
	7031	44.60	1	-	0	0	-
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	TOTAL	43,584.07	872	10,439	194	16	128,000
	8010	14,149.15	283	10,365	169	1	8,000
F1	8020	8,837.55	177	1,723	4	5	40,000
El mina	8030	2,229.23	45	-	0	2	16,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	TOTAL	25,215.93	504	12,088	173	8	64,000
	9010	24,102.24	482	25,366	331	0	-
	9011	15,601.52	312	-	0	10	80,000
Riyadh	9020	1,262.42	25	-	0	1	8,000
	9021	1,706.60	34	-	0	1	8,000
	TOTAL	42,672.78	853	25,366	331	12	96,000

Table 7.29: Current and future required number of secondary schools in 2040

Commune	Traffic Zone	Children numbers (ratio15/100	Required class rooms 2040 (number of	Current empty area in the current schools for building new classrooms up	Final number of class rooms to be build in the current	Final number of schools to be build with area 8000m2/2floor	Required new lands to build new schools(numbe r of new
		for age of 6-11)	students/50)	to norm(60%) building and40	schools	s/24classrooms	schools*8000m
				empty)			2)
Commune Tevragh Zeina	1010	4,801	96	-	-	2	8,000
	1020	2,474	49	-	-	2	16,000
	1030	4,087	82	-	-	. 3	24,000
Tauna ah Zaina	1040	673	13	-	-	· 1	8,000
Commune Tevragh Zeina	1050	19,523	390	-	-	13	104,000
	1051	4,633	93	-	-	. 3	24,000
	1052	3,319	66	-	-	3	24,000
Commune Tevragh Zeina	TOTAL	39,510	790	-	-	. 27	216,000

	2010	1,499	30	-	-	0	-
	2020	3,628	73	-	-	2	16,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	2030	7,276	146	2,865	33	3	24,000
	2040	8,479	170	-	-	5	40,000
	2041	9,598	192	-	-	6	48,000
	TOTAL	30,479	610	2,865	33	16	128,000
	3010	28,093	562	4,080	64	13	104,000
Teyarett	3011	6,280	126	-	-	4	32,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina	TOTAL	34,373	687	4,080	64	17	136,000
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	4010	22,874	457	6,515	114	9	72,000
Dau Malua	4020	12,412	248	1,778	12	7	56,000
Dar Naim	4021	6,354	127	-	-	4	32,000
Sebkha Arafat	TOTAL	41,640	833	8,293	127	20	160,000
	5010	15,514	310	3,830	44	7	56,000
Sebkha	5020	209	4	-	-	0	-
	TOTAL	15,723	314	3,830	44	7	56,000
	6010	13,408	268	8,635	156	1	8,000
Arafat	6020	23,056	461	2,020	31	12	96,000
Teyarett Dar Naim Sebkha Arafat Toujounine El mina	TOTAL	36,464	729	10,655	187	13	104,000
	7010	24,111	482	10,439	191	6	48,000
	7020	13,625	272	-	-	8	64,000
Toujounine	7030	11,435	229	-	-	7	56,000
	7031	848	17	-	-	0	-
Ksar Teyarett Dar Naim Sebkha Arafat Toujounine El mina Riyadh	TOTAL	50,018	1,000	10,439	191	21	168,000
	8010	14,399	288	10,365	174	1	8,000
El mino	8020	11,074	221	1,723	-	7	56,000
Ei iiiiia	8030	2,441	49	-	-	2	16,000
	TOTAL	27,914	558	12,088	174	10	80,000
	9010	24,481	490	25,366	339	0	-
	9011	23,590	472	-	-	15	120,000
Riyadh	9020	3,318	66	-	2	2	16,000
	9021	2,490	50	-	-	2	16,000
Arafat Toujounine El mina Riyadh	TOTAL	53,879	1,078	25,366	341	19	152,000

(3) Sport and playgrounds

Table 7.30: Current and future required number of sport and playgrounds in 2017-2025

Commune	Traffic Zone	current public stadiums number	Required number of District- playground (populatio n /15,000)	Required number of Neighbor- playground (populatio n/5,000)	Required number of residential playground (populatio n/1,000)	number of stadiums to be built	Required area for stadium (35,000m2 / stadium)	Required area for the district- playground 5,000m2/ facility	Required area for the neighbor- playground (4,000m2 /facility)	Required area for the residential- playground (1,000m2/ facility)
	1010	0	1	3	14	0	-	4,644	11,145	13,931
	1020	1	0	1	6	0	-	2,036	4,886	6,108
	1030	0	1	3	13	0	-	4,426	10,621	13,277
Tevragh	1040	0	0	1	3	0	-	1,146	2,751	3,439
Tevragh Zeina	1050	0	1	3	17	0	-	5,644	13,544	16,931
	1051	0	-	-	-	0	-	-	-	-
	1052	0	0	1	3	0	-	1,036	2,486	3,108
	TOTAL	1	4	11	57	0	-	18,931	Required Rec area for the area neighbor-resi iplayground play (4,000m2 (1,0)/(1,0)/(1,0)) (4,000m2 (1,0)/(1,0)/(1,0)) (1,0)/(1,0)/(1,0) 4 11,145 5 4,886 5 10,621 5 2,751 4 13,544 - - 5 2,486 1 45,434 8 5,444 5 8,917 7 27,881 2 1,685 - - 3 43,926 5 73,187	56,793
Commune Tevragh Zeina Ksar Teyarett	2010	1	0	1	7	0	-	2,268	5,444	6,805
	2020	1	1	2	11	0	-	3,715	8,917	11,146
V	2030	0	2	7	35	0	-	11,617	27,881	34,851
Commune Tevragh Zeina Ksar Teyarett	2040	0	0	0	2	0	-	702	1,685	2,106
	2041	0	-	-	-	0	-	-	-	-
Tevragh Zeina Ksar	TOTAL	2	4	11	55	0	-	18,303	43,926	54,908
Teyarett	3010	1	6	18	91	0	-	30,495	73,187	91,484

	3011	0	0	0	2	0	-	753	1,807	2,259
	TOTAL	1	6	19	94	0	-	31,248	74,995	93,743
	4010	1	6	18	92	0	-	30,550	73,321	91,651
Den Meline	4020	0	5	15	73	1.0	35,000	24,260	58,223	72,779
Dar Naim	4021	0	0	1	3	0	-	984	2,361	2,951
	TOTAL	1	11	33	167	1.0	35,000	55,794	133,905	167,381
	5010	1	6	17	83	0	-	27,681	66,435	83,044
Sebkha	5020	0	0	0	1	0	-	290	695	869
	TOTAL	1	6	17	84	0	-	27,971	67,130	83,913
	6010	0	5	15	76	1.0	35,000	25,189	60,454	75,567
Arafat	6020	1	8	25	127	0	-	42,316	101,559	126,949
Sebkha Arafat Toujounine El mina	TOTAL	1	14	41	203	1.0	35,000	67,505	162,013	202,516
	7010	1	6	17	84	0	-	28,137	67,528	84,410
	7020	0	5	14	70	1.0	35,000	23,261	55,826	69,782
Toujounine	7030	0	1	3	14	0	-	4,537	10,888	13,610
	7031	0	0	0	0	0	-	30	73	91
	TOTAL	1	11	34	168	1.0	35,000	55,964	134,315	167,893
	8010	0	6	18	92	1.0	35,000	30,675	73,620	92,025
El mino	8020	0	3	10	51	0	-	16,837	40,408	50,510
Ei iiiiia	8030	0	1	2	11	0	-	3,724	8,937	11,171
	TOTAL	0	10	31	154	1.0	35,000	51,235	122,965	153,706
	9010	1	8	25	127	0	-	42,177	101,224	126,531
	9011	0	0	1	5	0	-	1,618	3,882	4,853
Riyadh	9020	0	0	1	5	0	-	1,500	3,600	4,500
	9021	0	-	-	-	0	-	-	-	-
	TOTAL	1	9	27	136	0	-	45,295	108,707	135,884

Table 7.31: Future required number of sport and playground in 2030

Commune	Traffic Zone	Required number of stadium (population /100000)	Required number of district- playground (population/ 15,000)	Required number of Neighbor- playground population /5,000)	Required number of residential playground (population/ 1,000)	Required area for stadium(12, 000m2/ stadium)	Required area for district- playground 5,000m2/ play ground)	Required area for neighbor- playground (4,000m2/ play ground)	Required area for residential- playground (1,000m2 /play ground)
	1010	0.2	1	4	18	2,180	6,054	14,531	18,163
	1020	(0.9)	1	2	8	-	2,766	6,638	8,297
	1030	0.2	1	3	16	1,962	5,450	13,080	16,350
Tevragh	1040	0.0	0	1	4	491	1,363	3,270	4,088
Zeina	1050	0.6	4	13	63	7,543	20,952	50,286	62,857
	1051	0.1	1	2	9	1,069	2,968	7,124	8,905
	1052	0.2	1	3	17	2,083	5,786	13,886	17,357
	TOTAL	0.4	9	27	136	4,322	45,340	108,815	136,019
	2010	(0.9)	1	2	8	-	2,609	6,260	7,826
	2020	(0.8)	1	4	19	-	6,362	15,269	19,086
Vcor	2030	0.4	3	8	42	5,016	13,934	33,441	41,802
Commune Tevragh Zeina Ksar Teyarett Dar Naim Sebkha	2040	0.5	3	10	50	6,052	16,812	40,350	50,437
	2041	0.2	1	3	17	2,087	5,798	13,916	17,395
	TOTAL	(0.6)	9	27	137	(7,615)	45,515	109,237	136,546
	3010	0.5	10	29	147	5,614	48,927	117,425	146,782
Commune Tevragh Zeina Ksar Teyarett Dar Naim Sebkha	3011	0.0	0	1	3	315	876	2,102	2,627
	TOTAL	0.5	10	30	149	5,929	49,803	119,527	149,409
	4010	0.3	9	26	129	3,445	42,903	102,968	128,710
Dor Noim	4020	0.8	5	16	81	9,668	26,855	64,451	80,564
Dai maini	4021	0.3	2	5	27	3,275	9,097	21,834	27,292
Commune Tevragh Zeina Ksar Teyarett Dar Naim Sebkha	TOTAL	1.4	16	47	237	16,388	78,855	189,253	236,566
Commune Tevragh Zeina Ksar Teyarett Dar Naim Sebkha	5010	0.1	7	22	109	1,090	36,360	87,264	109,079
	5020	0.0	0	0	1	169	469	1,126	1,408
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	TOTAL	0.1	7	22	110	1,258	36,829	88,390	110,487
	6010	0.8	5	16	78	9,342	25,950	62,279	77,849
Arafat	6020	0.3	9	26	131	3,674	43,540	104,496	130,620
	TOTAL	1.1	14	42	208	13,016	69,490	166,775	208,469
	7010	0.4	9	28	140	4,852	46,811	112,346	140,433
	7020	0.9	6	18	91	10,930	30,361	72,868	91,084
Toujounine	7030	0.6	4	12	59	7,049	19,582	46,997	58,746
	7031	0.0	0	0	0	36	99	238	297
	TOTAL	1.9	19	58	291	22,867	96,853	232,448	290,560
	8010	0.9	6	19	94	11,319	31,443	75,462	94,328
E1	8020	0.6	4	12	59	7,070	19,639	47,134	58,917
El mina	8030	0.1	1	3	15	1,783	4,954	11,889	14,862
	TOTAL	1.7	11	34	168	20,173	56,035	134,485	168,106
	9010	0.6	11	32	161	7,282	53,561	128,545	160,682
	9011	1.0	7	21	104	12,481	34,670	83,208	104,010
Riyadh	9020	0.1	1	2	8	1,010	2,805	6,733	8,416
	9021	0.1	1	2	11	1,365	3,792	9,102	11,377
	TOTAL	1.8	19	57	284	22,138	94.828	227,588	284,485

 Table 7.32: Future required number of sport and playground in 2040

Commune	Traffic Zone	Required	Required	Required	Required	Required	Required	Required	Required
		number of	number of	number of	number of	area for	area for the	area for the	area for the
		stadium	District-	Neighbor-	residential	stadium	district-	neighbor-	residential-
		(population/	playground	playground	playground	(12,000m2/	playground	playground	playground
		10,0000)	(population/	(population)	(population/	stadium)	5,000m2/pla	(4,000m2/pl	(1,000m2/pl
Touroch	1010	0	13,000) 2	/3,000)	1,000)	2 9/1	y ground) 10.670	ay ground)	
Zeina	1010	0	1	3	16	5,041	5 /08	13 106	16 / 05
	1020	0	2	5	27	3 269	9 081	21 795	27 244
	1040	0	0	1	4	538	1,494	3.587	4,483
	1050	1	9	26	130	15,619	43,385	104,123	130,154
	1051	0	2	6	31	3,706	10,295	24,708	30,885
	1052	0	1	4	22	2,656	7,376	17,703	22,129
	TOTAL	2	18	53	263	19,608	87,800	210,720	263,400
Ksar	2010	-	1	2	10	-	3,330	7,993	9,991
	2020	-	2	5	24	-	8,063	19,350	24,188
2 2 2	2030	0	3	10	49	5,820	16,168	38,803	48,503
	2040	1	4	11	57	6,783	18,843	45,222	56,528
	2041	1	4	13	64	7,678	21,329	51,189	63,986
	TOTAL	0	14	41	203	384	67,732	162,557	203,196
Teyarett	3010	1	12	37	187	10,474	62,428	149,828	187,285
	3011	0	3	8	42	5,024	13,955	33,492	41,865
	TOTAL	1	15	46	229	15,498	76,384	183,320	229,151
Dar Naim	4010	1	10	30	152	6,299	50,831	121,995	152,494
	4020	1	6	17	83	9,930	27,582	66,197	82,746
	4021	0	3	8	42	5,083	14,119	33,886	42,358
	TOTAL	2	19	56	278	21,312	92,533	222,078	277,598
Sebkha	5010	0	7	21	103	411	34,476	82,741	103,427
	5020	0	0	0	1	167	465	1,115	1,394
	TOTAL	0	7	21	105	578	34,940	83,856	104,821
Arafat	6010	1	6	18	89	10,726	29,796	71,510	89,387
	6020	1	10	31	154	6,445	51,236	122,966	153,707
	TOTAL	1	16	49	243	17,171	81,031	194,475	243,094
Toujounine	7010	1	11	32	161	7,289	53,580	128,592	160,740
	7020	1	6	18	91	10,900	30,277	72,666	90,832
	7030	1	5	15	76	9,148	25,410	60,985	76,231
	7031	0	0	1	6	678	1,884	4,521	5,651
	TOTAL	2	22	67	333	28,014	111,151	266,763	333,454

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El mina	8010	1	6	19	96	11,520	31,999	76,797	95,996
	8020	1	5	15	74	8,859	24,609	59,061	73,826
	8030	0	1	3	16	1,953	5,424	13,017	16,272
	TOTAL	2	12	37	186	22,331	62,031	148,875	186,094
Riyadh	9010	1	11	33	163	7,585	54,403	130,567	163,208
	9011	2	10	31	157	18,872	52,421	125,811	157,264
	9020	0	1	4	22	2,655	7,374	17,698	22,123
	9021	0	1	3	17	1,992	5,533	13,278	16,598
	TOTAL	3	24	72	359	31,103	119,731	287,354	359,193

(4) Parks and open spaces

Table 7.33: Current and future required number of sport and playground in 2017-2025

Commune	Traffic Zone	required	required	required	required	required	required	Required	required
		number of	number of	number of	number of	area for	area for the	area for the	area for the
		city parks	district-	neighbor-	residential-	city-parks	district-park	neighbor-	residential-
		(population/	parks	parks	parks	(50,000m2/	(5,000m2/p	parks	parks
		50,000)	(population	(population/	(population/	park)	ark)	(4,000m2/p	(800m2/par
			/15,000)	5,000)	1,200)			ark)	k)
Tevragh	1010	0.3	0.9	2.8	11.6	13,931	4,644	11,145	9,287
Zeina	1020	0.1	0.4	1.2	5.1	6,108	2,036	4,886	4,072
	1030	0.3	0.9	2.7	11.1	13,277	4,426	10,621	8,851
	1040	0.1	0.2	0.7	2.9	3,439	1,146	2,751	2,293
	1050	0.3	1.1	3.4	14.1	16,931	5,644	13,544	11,287
	1051	0.0	0.0	0.0	0.0	-	-	-	-
	1052	0.1	0.2	0.6	2.6	3,108	1,036	2,486	2,072
	TOTAL	1.1	3.8	11.4	47.3	56,793	18,931	45,434	37,862
Ksar	2010	0.1	0.5	1.4	5.7	6,805	2,268	5,444	4,537
	2020	0.2	0.7	2.2	9.3	11,146	3,715	8,917	7,431
	2030	0.7	2.3	7.0	29.0	34,851	11,617	27,881	23,234
	2040	0.0	0.1	0.4	1.8	2,106	702	1,685	1,404
	2041	0.0	0.0	0.0	0.0	-	-	-	-
	TOTAL	1.1	3.7	11.0	45.8	54,908	18,303	43,926	36,605
Teyarett	3010	1.8	6.1	18.3	76.2	91,484	30,495	73,187	60,990
	3011	0.0	0.2	0.5	1.9	2,259	753	1,807	1,506
	TOTAL	1.9	6.2	18.7	78.1	93,743	31,248	74,995	62,496
Dar Naim	4010	1.8	6.1	18.3	76.4	91,651	30,550	73,321	61,101
	4020	1.5	4.9	14.6	60.6	72,779	24,260	58,223	48,519
	4021	0.1	0.2	0.6	2.5	2,951	984	2,361	1,967
	TOTAL	3.3	11.2	33.5	139.5	167,381	55,794	133,905	111,588
Sebkha	5010	1.7	5.5	16.6	69.2	83,044	27,681	66,435	55,363
	5020	0.0	0.1	0.2	0.7	869	290	695	579
	TOTAL	1.7	5.6	16.8	69.9	83,913	27,971	67,130	55,942
Arafat	6010	1.5	5.0	15.1	63.0	75,567	25,189	60,454	50,378
	6020	2.5	8.5	25.4	105.8	126,949	42,316	101,559	84,633
	TOTAL	4.1	13.5	40.5	168.8	202,516	67,505	162,013	135,011
Toujounine	7010	1.7	5.6	16.9	70.3	84,410	28,137	67,528	56,273
	7020	1.4	4.7	14.0	58.2	69,782	23,261	55,826	46,522
	7030	0.3	0.9	2.7	11.3	13,610	4,537	10,888	9,073
	7031	0.0	0.0	0.0	0.1	91	30	73	61
	TOTAL	3.4	11.2	33.6	139.9	167,893	55,964	134,315	111,929
El mina	8010	1.8	6.1	18.4	76.7	92,025	30,675	73,620	61,350
	8020	1.0	3.4	10.1	42.1	50,510	16,837	40,408	33,673
	8030	0.2	0.7	2.2	9.3	11,171	3,724	8,937	7,447
	TOTAL	3.1	10.2	30.7	128.1	153,706	51,235	122,965	102,471
Riyadh	9010	2.5	8.4	25.3	105.4	126,531	42,177	101,224	84,354
	9011	0.1	0.3	1.0	4.0	4,853	1,618	3,882	3,235

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9020	0.1	0.3	0.9	3.8	4,500	1,500	3,600	3,000
9021	0.0	0.0	0.0	0.0	-	-	-	-
TOTAL	2.7	9.1	27.2	113.2	135,884	45,295	108,707	90,589

	Ta	ble 7.34: Fu	iture requii	red number	of sport an	d playgrou	nd in 2030		
Commune	Traffic	required	required	required	required	required	required	Required	required
	Zone	number of	number of	number of	number of	area for	area for the	area for the	area for the
		city parks	district-	neighbor-	residential-	city-parks	district-park	neighbor-	residential-
		(population/	parks	parks	parks	(50,000m2/	(5,000m2/	parks	parks
		50,000)	(population	(population/	(population/	park)	park)	(4,000m2/	(800m2/
TT 1	1010		/15,000)	5,000)	1,200)	10.1.(2	6.054	park)	park)
Tevragh Zoine		0.4		4	15	18,163	6,054	14,531	12,109
Zema	1020	0.2	l	2	7	8,297	2,766	6,638	5,531
	1030	0.3	1	3	14	16,350	5,450	13,080	10,900
	1040	0.1	0	1	3	4,088	1,363	3,270	2,725
	1050	1.3	4	13	52	62,857	20,952	50,286	41,905
	1051	0.2	1	2	7	8,905	2,968	7,124	5,937
	1052	0.3	1	3	14	17,357	5,786	13,886	11,571
	TOTAL	2.7	9	27	113	136,019	45,340	108,815	90,679
Ksar	2010	0.2	1	2	7	7,826	2,609	6,260	5,217
	2020	0.4	1	4	16	19,086	6,362	15,269	12,724
	2030	0.8	3	8	35	41,802	13,934	33,441	27,868
	2040	1.0	3	10	42	50,437	16,812	40,350	33,625
	2041	0.3	1	3	14	17,395	5,798	13,916	11,597
	TOTAL	2.7	9	27	114	136,546	45,515	109,237	91,030
Teyarett	3010	2.9	10	29	122	146,782	48,927	117,425	97,855
	3011	0.1	0	1	2	2,627	876	2,102	1,751
	TOTAL	3.0	10	30	125	149,409	49,803	119,527	99,606
Dar Naim	4010	2.6	9	26	107	128,710	42,903	102,968	85,807
	4020	1.6	5	16	67	80,564	26,855	64,451	53,710
	4021	0.5	2	5	23	27,292	9,097	21,834	18,195
	TOTAL	4.7	16	47	197	236,566	78,855	189,253	157,711
Sebkha	5010	2.2	7	22	91	109,079	36,360	87,264	72,720
	5020	0.0	0	0	1	1,408	469	1,126	939
	TOTAL	2.2	7	22	92	110,487	36,829	88,390	73,658
Arafat	6010	1.6	5	16	65	77,849	25,950	62,279	51,899
	6020	2.6	9	26	109	130,620	43,540	104,496	87,080
	TOTAL	4.2	14	42	174	208,469	69,490	166,775	138,980
Toujounine	7010	2.8	9	28	117	140,433	46,811	112,346	93,622
^c	7020	1.8	6	18	76	91,084	30,361	72,868	60,723
	7030	1.2	4	12	49	58,746	19,582	46,997	39,164
	7031	0.0	0	0	0	297	99	238	198
	TOTAL	5.8	19	58	242	290,560	96,853	232,448	193,707
El mina	8010	1.9	6	19	79	94,328	31,443	75,462	62,885
	8020	1.2	4	12	49	58,917	19,639	47,134	39.278
	8030	0.3	1	3	12	14.862	4,954	11.889	9,908
	TOTAL	3.4	11	34	140	168,106	56.035	134,485	112.071
Rivadh	9010	3.2	11	32	134	160,682	53 561	128 545	107 121
itiyuun	9011	2.1	7	21	87	104,010	34 670	83 208	69 340
	9020	0.2	1	21	7	8 416	2 805	6 733	5 611
	9021	0.2	1	2	9	11 377	2,005	9 102	7 585
	TOTAL	5.7	10	57	227	28/ 195	0/ 878	227 588	180 657
1	I VIIIL	5.7	19	57	237	207,703	77,020	227,500	10,057

Table 7.35: Future required number of sport facilities and playgrounds in 2040

Commune	Required Traffic Zone number of city parks	Required number of district- parks	required number of neighbor- parks	required number of residential- parks	required area for city-parks	required area for the district-park	Required area for the neighbor- parks	required area for the residential- parks
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(4,000m2/p (population (population (50,000m (population (population (5,000m (800m2/par (50.000) 15.000) 5.000) 1.200) 2/park) 2/park) ark) c) 1010 32,009 25,607 21,339 27 10,670 2 6 1020 0 1 3 14 16,495 5,498 13,196 10,997 2 1030 1 5 23 27,244 9,081 21,795 18,163 0 0 1040 1,494 3,587 2,989 1 4 4,483 Tevragh 86,769 Zeina 1050 3 9 26 108 43,385 130,154 104,123 1051 1 2 6 26 30,885 10,295 24,708 20,590 1052 0 1 4 18 22,129 7,376 17,703 14,753 TOTAL 5 18 53 219 263,400 87,800 210,720 175,600 2010 0 9,991 3,330 7,993 1 2 8 6,660 0 2 2020 5 20 24,188 8,063 19,350 16,125 2030 3 10 40 48,503 38,803 32,336 16,168 Ksar 2040 1 4 11 47 56,528 18,843 45,222 37,685 2041 4 53 63,986 21,329 51,189 42,658 1 13 14 TOTAL 4 169 162,557 41 203,196 67,732 135,464 3010 4 12 37 156 187,285 62,428 149,828 124,857 3011 3 8 41,865 13,955 33,492 27,910 35 Teyarett 15 TOTAL 5 46 191 229,151 76,384 183,320 152,767 3 4010 10 30 127 152,494 50,831 121,995 101,663 2 4020 6 17 69 82,746 27,582 66,197 55,164 Dar Naim 4021 3 42,358 28,238 1 8 35 14,119 33,886 19 277,598 92,533 185,065 TOTAL 6 56 231 222,078 5010 2 7 21 86 103,427 34,476 82,741 68,951 Sebkha 5020 0 0 0 1,394 465 1,115 929 1 7 TOTAL 2 21 34,940 83,856 69,880 87 104,821 71,510 6010 29,796 59,591 2 6 18 74 89,387 Arafat 6020 3 10 31 128 153,707 51,236 122,966 102,471 TOTAL 5 16 49 203 243,094 81,031 194,475 162,063 7010 3 11 32 134 160,740 53,580 128,592 107,160 2 7020 6 18 76 90,832 30,277 72,666 60,555 7030 2 5 76,231 25,410 60,985 50,821 Toujounine 15 64 0 0 5 1,884 4,521 3,767 7031 1 5,651 7 TOTAL 22 67 278 333,454 111,151 266,763 222,302 8010 2 19 95,996 31,999 63,997 6 80 76,797 8020 5 59,061 49,217 1 15 62 73,826 24,609 El mina 8030 0 10,848 1 3 14 16,272 5,424 13,017 4 12 124,062 TOTAL 37 155 186,094 62,031 148,875 9010 3 11 33 136 163,208 54,403 130,567 108,806 9011 3 10 31 131 157,264 52,421 125,811 104,843 0 Riyadh 9020 1 4 18 22,123 7,374 17,698 14,749 0 3 11,065 9021 1 14 16,598 5,533 13,278 TOTAL 24 72 299 359,193 119,731 287,354 239,462

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(5) Cultural facilities

Table 7.36: Current and future required number of cultural facilities in 2017- 2025

Commune	Traffic Zone	required number of sub library, cultural space (population /100,000)	required number of multipurpose community hall (population /50,000)	required number of cinema, outdoor theater, drama and music (population /100,000)	required area for sub library, cultural space /1,250m2	required area for the multipurpose community hall /1,250 m2	required area for cinema, outdoor theater, drama and music/ 1,250 m2
	1010	0.1	0.3	0.1	174	348	25.6
Tevragh	1020	0.1	0.1	0.1	76	153	13.2
Zeina	1030	0.1	0.3	0.1	166	332	21.8
	1040	0.0	0.1	0.0	43	86	3.6

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	1050	0.2	0.3	0.2	212	423	104.1
	1051	0.0	0.0	0.0	-	-	24.7
	1052	0.0	0.1	0.0	39	78	17.7
	ΤΟΤΑ						210.7
	L	0.6	1.1	0.6	710	1,420	210.7
	2010	0.1	0.1	0.1	85	170	8.0
	2020	0.1	0.2	0.1	139	279	19.4
	2030	0.3	0.7	0.3	436	871	38.8
Ksar	2040	0.0	0.0	0.0	26	53	45.2
	2041	0.0	0.0	0.0	-	-	51.2
	ΤΟΤΑ						162.6
-	L	0.5	1.1	0.5	686	1,373	102.0
	3010	0.9	1.8	0.9	1,144	2,287	149.8
Teyarett	3011	0.0	0.0	0.0	28	56	33.5
	TOTA		1.0	0.0	1 1 7 2	2 2 4 4	183.3
	L 4010	0.9	1.9	0.9	1,1/2	2,344	122.0
	4010	0.9	1.8	0.9	1,146	2,291	122.0
Dor Noim	4020	0.7	1.3	0.7	910	1,819	00.2
	4021 TOTA	0.0	0.1	0.0	37	/4	55.9
	L L	1.7	3.3	1.7	2,092	4,185	222.1
	5010	0.8	1.7	0.8	1,038	2,076	82.7
0.111	5020	0.0	0.0	0.0	11	22	1.1
Seokna	TOTA L	0.8	17	0.8	1 049	2 098	83.9
	6010	0.8	1.7	0.8	945	1 889	71.5
	6020	13	2 5	13	1 587	3 174	123.0
Arafat	TOTA	1.5	2.3	1.5	1,007	5,171	125.0
	L	2.0	4.1	2.0	2,531	5,063	194.5
	7010	0.8	1.7	0.8	1,055	2,110	128.6
	7020	0.7	1.4	0.7	872	1,745	72.7
Toujounin	7030	0.1	0.3	0.1	170	340	61.0
e	7031	0.0	0.0	0.0	1	2	4.5
	TOTA L	1.7	3.4	1.7	2,099	4,197	266.8
	8010	0.9	1.8	0.9	1,150	2,301	76.8
	8020	0.5	1.0	0.5	631	1,263	59.1
El mina	8030	0.1	0.2	0.1	140	279	13.0
	TOTA L	1.5	3.1	1.5	1,921	3,843	148.9
	9010	1.3	2.5	1.3	1,582	3,163	130.6
	9011	0.0	0.1	0.0	61	121	125.8
D' "	9020	0.0	0.1	0.0	56	113	17.7
Kiyadh	9021	0.0	0.0	0.0	-		13.3
	TOTA L	1.4	2.7	1.4	1,699	3,397	287.4

Table 7.37: Future required number of cultural facilities in 2030

Commune	Traffic Zone	required number of sub library, cultural space (population/ 100,000)	required number of multipurpose community hall (population/ 50,000)	required number of cinema, outdoor theater, drama and music (population/ 100,000)	required area for sub library, cultural space /1,250m2	required area for the multipurpose community hall /1,250 m2	required area for cinema, outdoor theater, drama and music/ 1,250 m2
T1 7-i	1010	0.2	0.4	0.2	227	454	227
Tevragn Zeina	1020	0.1	0.2	0.1	104	207	104

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	1020	0.0	0.2	0.0	20.4	100	20.4
	1030	0.2	0.3	0.2	204	409	204
	1040	0.0	0.1	0.0	51	102	51
	1050	0.6	1.3	0.6	/80	1,5/1	/80
	1051	0.1	0.2	0.1	217	223	217
	1052	0.2	0.3	0.2	217	434	21/
	101AL	1.4	2.7	1.4	1,700	3,400	1,/00
	2010	0.1	0.2	0.1	98	196	98
	2020	0.2	0.4	0.2	239	4//	239
Ksar	2030	0.4	0.8	0.4	523	1,045	523
	2040	0.3	1.0	0.5	030	1,201	030
	2041	0.2	0.3	0.2	217	433	217
	101AL 2010	1.4	2.7	1.4	1,/0/	3,414	1,/0/
T	3010	1.5	2.9	1.5	1,835	3,670	1,835
Teyarett	3011 TOTA I	0.0	0.1	0.0	1 9 (9	2 725	1 9 6 9
	101AL	1.3	3.0	1.5	1,868	3,/33	1,808
	4010	1.5	2.0	1.3	1,609	3,218	1,609
Dar Naim	4020	0.8	1.0	0.8	1,007	2,014	1,007
Dar Naim Sebkha	4021 TOT41	0.3	0.3	0.3	2 057	5.014	2 057
	101AL	2.4	4.7	2.4	2,957	3,914	2,957
G 111	5010	1.1	2.2	1.1	1,303	2,727	1,303
Seokna	5020 TOTAI	0.0	0.0	0.0	1 2 9 1	2 7 6 2	1 2 9 1
	101AL 6010	1.1	2.2	1.1	1,381	2,702	1,381
Arafat	6020	0.0	1.0	0.0	1 633	3 266	1 633
Alalai		1.5	2.0	2.1	2,606	5,200	2,606
	7010	1.4	2.8	2.1	2,000	3,212	1 755
	7010	0.9	2.8	0.9	1,755	2 277	1,733
Toujounine	7020	0.5	1.0	0.5	734	1 /69	734
Toujounne	7030	0.0	0.0	0.0	134	1,+07 7	/ 34
	ΤΟΤΔΙ	2.9	5.8	2.9	3 632	7 264	3 632
	8010	0.9	1.9	0.9	1 179	2 358	1 179
	8020	0.6	1.2	0.6	736	1 473	736
El mina	8030	0.0	0.3	0.0	186	372	186
	TOTAL	1.7	3.4	1.7	2,101	4,203	2.101
	9010	1.6	3.2	1.6	2,009	4.017	2,009
	9011	1.0	2 1	1.0	1,300	2.600	1,300
Rivadh	9020	0.1	0.2	0.1	105	210	105
	9021	0.1	0.2	0.1	142	284	142
	TOTAL	2.8	5.7	2.8	3,556	7,112	3,556
	101111	2.0	5.1	2.0	5,550	/,112	5,550

Table 7.38: Future required number of cultural facilities in 2040

Commune	Traffic Zone	required number of sub library, cultural space (population/ 100,000)	required number of multipurpose community hall (population/ 50,000)	required number of cinema, outdoor theater, drama and music (population/ 100,000)	required area for sub library, cultural space /1,250m2	required area for the multipurpose community hall /1,250 m2	required area for cinema, outdoor theater, drama and music 1,250 m2
	1010	0	1	0	400	800	400
	1020	0	0	0	206	412	206
	1030	0	1	0	341	681	341
Toursch Zaina	1040	0	0	0	56	112	56
Tevragn Zenna	1050	1	3	1	1,627	3,254	1,627
	1051	0	1	0	386	772	386
	1052	0	0	0	277	553	277
	TOTAL	3	5	3	3,292	6,585	3,292

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	2010	0	0	0	125	250	125
	2020	0	0	0	302	605	302
Vaar	2030	0	1	0	606	1,213	606
Ksar	2040	1	1	1	707	1,413	707
	2041	1	1	1	800	1,600	800
	TOTAL	2	4	2	2,540	5,080	2,540
	3010	2	4	2	2,341	4,682	2,341
Teyarett	3011	0	1	0	523	1,047	523
	TOTAL	2	5	2	2,864	5,729	2,864
	4010	2	3	2	1,906	3,812	1,906
Dau Malua	4020	1	2	1	1,034	2,069	1,034
Dar Naim	4021	0	1	0	529	1,059	529
	TOTAL	3	6	3	3,470	6,940	3,470
	5010	1	2	1	1,293	2,586	1,293
Sebkha	5020	0	0	0	17	35	17
	TOTAL	1	2	1	1,310	2,621	1,310
	6010	1	2	1	1,117	2,235	1,117
Arafat	6020	2	3	2	1,921	3,843	1,921
	TOTAL	2	5	2	3,039	6,077	3,039
	7010	2	3	2	2,009	4,018	2,009
	7020	1	2	1	1,135	2,271	1,135
Toujounine	7030	1	2	1	953	1,906	953
	7031	0	0	0	71	141	71
	TOTAL	3	7	3	4,168	8,336	4,168
	8010	1	2	1	1,200	2,400	1,200
El mino	8020	1	1	1	923	1,846	923
El IIIIIa	8030	0	0	0	203	407	203
	TOTAL	2	4	2	2,326	4,652	2,326
	9010	2	3	2	2,040	4,080	2,040
	9011	2	3	2	1,966	3,932	1,966
Riyadh	9020	0	0	0	277	553	277
	9021	0	0	0	207	415	207
	TOTAL	4	7	4	4,490	8,980	4,490

7.2.2 General planning perspective

It is clear from the satellites photos and the current plans in Nouakchott that the city follows the gridiron street pattern. But there is no planning code or formal norms or even perspective organize the relation between the public facilities.

Thus, it is necessary to set suitable planning norms without insufficiency or exaggeration.

Theses norms have to fit with the number of population in the future and the relation between the planning unites such as residential group or super block, neighbor area, district and sector.

(1) Compatibility matrix of the public facilities- Order levels

The public facilities include eighteen types. These facilities could divide according to the planning level into five degrees of orders:

- a) Higher-order public facilities: Serve the entire city; such as the hospitals, universities, Stadiums, museum, library, theater and national park, national exhibition. Not provided in the layout planning process for single residential settlements. The location of these facilities is determined by analyzing the most suitable and accessible location for the greatest number of people.
- b) Higher/Middle- order public facilities: Serve the commune; such as hospitals in the high density area, health center A, Youth center, cultural center (sub library), community park, community playground, police station, fire station.

- c) Middle- order public facilities: Serve a district or a number of diverse and different neighbor areas; include health center B, high schools, secondary school, vocational schools, District Park and playground, Jamee (mosque type 1). These facilities are essential to individual residential settlements but the facilities serve a threshold population which exceeds individual settlements, and therefore are supported by a number of settlements,
- d) Middle/lower- order: Serve one neighbor area; include health post, elementary school, mosalla (mosque type2), neighbor garden and playground, kinder garden and mahzara.
- e) Lower- order public facilities: utilized by a single or limited number of residential blocks; include residential group garden and play ground, and kindergarten (if there is need)

The following figure illustrates the distribution of the five degrees of orders in the urban planning levels.



Source: JICA STUDY TEAM

Figure 7.11: Five types of order within the planning levels

(2) Interrelationship between the public facilities

In addition to the five degrees of orders levels, the location of the public facilities can be classified into three different relations which are the compatible, neutral and incompatible.

The compatible means that there is no interrelationship between the facilities and it can be clustered. While the incompatible means that it is not suitable for the facilities to be located adjoining one another. And there is no obvious interrelationship between the facilities in the neutral relation.

The following figure shows the compatibility of the public facilities according to its order level in the master plan.



Figure 7.12: Public facilities- Inter relationship

7.2.3 High- order public facilities –SDAU level

A sizable population growth is expected in the coming years in Nouakchott city. Thus a healthy neighborhoods and suitable basic public services are necessary to improve the quality of life.

And in order for the city to provide services that the public expects, it must embrace the vision of becoming a sustainable city. On the other hand, the equitable distribution of the main facilities will contribute in creating a balance and pleasant city for all.

The next facilities are suggested to achieve within the coming twenty years:

1) Hospitals:

As mentioned before, the 5to 10 km catchment area is not enough to indict to estimate the number of hospital.

Several other factors are necessary to consider such as the population number and density; location of the residential area near industrial or pollution area; the national standers in addition to the trends of future expansion.

The proposed number of hospital is 10 hospitals. And the distribution of it is showed in エラー! 参照 元が見つかりません。

2) Tertiary educational facilities

In spite of the improvement in the high education in Nouakchott, the location of the new university is far from the south region which can be a future development pole. The huge number of population and the increasing demand of different new sectors of education can propose a new campus in the south part.

In order to improve the human resources to meet the needs of the future development of Nouakchott,

Establishing an engineering collage and MPI institute could be one solution, in addition to increase the capacity of the current high education facilities.

The south region can offer a good location to establish the new campus. In order to increase the attractiveness of the area, the government has to create more educational opportunity.

3) Sport Faculties

Rehabilitation of the current stadiums and sport facilities

a) Increase the area of the current sport play ground to be 4 ha as the stadium of Toujounine

	Tuble / 10 / 1	roposar for	the currer	it situatio	n or ene pu	one staara	in and youth	ciubs	
commun	Arafat	Dar Naim	El Mina	Ksar	Riyadh	Sebkha	Tevragh	Teyaret	Toujounin
e							Zeina		e
Physical situation of stadiums	Need Redevelop ment	Need Redevelo pment	Need Redevel opment	One in medium situatio n, one in good situatio	Need Redevel opment	Need Redevelo pment	Under rehabilitatio n	Need Redevelo pment	Good
				n					
Physical situation of youth center	Exist	Exist	Add youth center	Exist	Exist	Need maintena nce	Add youth center	Need maintena nce	Exist
Facilitie s to enhance	handball court, basketball court	Football camp, basketball court	Football camp, basketba ll court	Football camp, basketb all court	handball court, 3 basketba ll courts	polyvalen t basket ball, volleybal l) playing area	Complex Olympic office	polyvale nt (football, basketbal l, bowling)	polyvalen t (football, basketball
Current area	13,887	14,063	-	58,647	22,590	29794	20,1278	16,830	39,193
Suggeste d area	40,000	40,000	-	No change	40,000	40,000	No change	40,000	No change

Table 7 39. Proposal for the current situation of the public stadium and youth clubs

Source: MoYS, JICA STUDY TEAM

New suggested projects

Based on interview with MoYS and the national strategy for sport and entertainment 2015-2019; several projects and program are suggested:

- a) New multi-using sportive hall
- b) New stadium (30.000 seat)
- c) Multi- sportive hall (3000 seat)
- New stadium (5.000 seat) d)
- Swimming pools and health resort, medical center e)

In order to create a balance between the north and the south regions of Nouakchott, it is necessary to develop Al-tarhil area, and create more attractive facilities such as swimming pools and health resort. This area will include more than three hundred thousand persons after twenty years. Thus, such kind of facilities will create job opportunities for the local citizens.

4) **Recreational faculties**

City Park

The city citizens have the right to enjoy safe, convenient and equitable access to high-quality parks, natural areas, and recreational opportunities in their daily lives which contribute to their health and well-being. The city has to manage its natural areas and urban forest to give the opportunity to connect with nature.

There are three current green areas which can be developed as city parks:

a) The green areas near the president palace in the city center; around 6 ha.

- b) The green area between Tevragh Zeina and Sebkha, around 24ha
- c) The green area in Toujounine which can be a good opportunity to establish such Public Park or pleasuring ground for the benefit and enjoyment of the people, in addition to the necessity of reserving the current green area. This park can include a zoo and spaces for amusements and camping in addition to eco garden. The Eco Park has to include many environmental activities which are linked by pedestrian promenade paths. This park has to be in harmony with the site, and the farmers in Toujounine have to be a part of the project. In this case the project will be an important economically elements to Nouakchott in general and to Toujounine especial.
- d) Based on the social survey; there are big demands for more green and open spaces concentrated mainly around the former airport. Thus, the redevelopment area can be an opportunity to create more green and open spaces. On other hand, improve the design of the big mosques to have green open spaces should be considered in the new planned religious facilities.

Public green circulation routes

Establish and maintain a green circulation routes will be an option and a component of a network of facilities for bicyclists, pedestrians, and recreational users.

Enhancing the planned green belt and establishing recreational areas with a good management and maintenance system will be one solution for the lack of public and green spaces.

In order to keep the area safe, security posts have to be established within the green belt and beside the main roads, In addition to maintenance and management department especially for the green area.

Recreational facilities near the beach

It is one of the most frequent places, especially by the youngest age groups. It is part of the weekends for relaxing. Several activities are being held their as football game, in addition to a rally circuit which is formed informally at the seaside.

In spite of its importance as recreational place, the accessibility is so weak and needs more improvement to enable the people to visit the beach easily.

Based on the workshops, it is necessary to think about recreational development for the waterfront. Creating more public spaces (sports and leisure circuits), and improving the connection between coastal and urban areas is necessary to improve the quality of life.

5) Cultural Activities

The following faculties are proposed according to the main goals in the current plan (2015-2017) of the ministry of culture and based on interviews:

a) National exhibition:

The new urbanization toward the airport will offer more opportunities for business in several fields. Thus, the demands for more services will increase. National expo will offer the place the suitable services to such big companies which will participate in enhancing the investments in Nouakchott in the future.

- b) To build an industrial or traditional village in the national exhibition;
- c) To build cultural palace; and cultural spaces in the other municipalities;
- d) To build multi-use cultural halls the three prefectures; Theater or Cinema



Figure 7.13: High-order public facilities SDAU2040- general concept



Figure 7.14: High-order public facilities SDAU2040- type of facilities

7.2.4 Other order public facilities: high-middle- lower levels

The first parts shows the number of the public facilities which have to establish within the next twenty years depending on the expected population number.

However, it is necessary to consider about several planning norms to identify the places and areas and the relation with the surrounding area.

The next tables give more information about very necessary norms which might contribute in improving and organizing the planning process for public facilities in Nouakchott such as: catchment area or service radius/m; population number; beneficiary number; facility area or campus area m2. These standards are collected depending on three levels 1) Local norms (Mauritania but not formal norms by laws); 2) Neighbor countries (African and Arabic countries); International (several countries including the UN norms).

Note: the local standards are not formal or within the laws, it is just recommendation based on interviews with the responsible entities in Nouakchott 2017-2018.

(1) Health facilities



Source: JICA STUDY TEAM

Figure 7.15: Planning concept depending on the hierarchy of the health facilities

Table 7.40: proposed norms for the health	ı facilities	(local informal	standards,	neighbor	countries,
	internatio	nale)			

internationals)							
Norm	Health post	Health center B	Health center A	Hospital			
Catchment area/m	~1,500m (*local)	~2,500 (local)	~2,500 (local)	~5,000m(local)			
		~800m (neighbor)	~800m (neighbor)	~20,000m (neighbor)			
		~1,000 m	~1,000 m	~5,000-10,000m			
		(international)	(international)	(international)			
Population number/p	500 to 1,500 (local)	1,500 to 10,000(local)	10,000 to	40,000(local)			
	500 to 2,000 (WHO)	5,000 to 10,000	20,000(local)	20,000 to 250,000			
		(WHO)	30,000(neighbor)	(neighbor)			
			5,000 to 10,000	150,000 (international)			
			(WHO)				
Beneficiary number/p	-	5-10 beds/center	10-20 beds/center	70-150 beds(local)			
				2-4 beds /1,000 (neighbor)			
				105-130 beds/ 150,000p			
				(WHO)			
Facility area and	7.5*9m (~80m2) in	30*40m(building)	30*40m(building)	(total number of			
campus area/m2	the low capacity area			beds*40m2)or building			
	and 150m2 in the			4200 to 5200 m2; size of			
	higher capacity area			the site: 25 beds=2 ha,			
				100b beds=4ha, 200			
				beds=7ha; hospital up to			
				150beds should be single-			
				storey and minimum rate			
				for 100 beds is 1.5ha			
Other norms	Facilities number/ popu	lation =2/10,000; Inpatier	nt beds/ population =27/10	0,000; Maternity beds/			
	population =10/1000; C	Core medical professional/	population $= 23/10,000;$ s	should be grouped with other			
	institutional facilities su	ch as religious, education	al, tribal and market cent	er; it should be free from			
	dangers of flooding.						
Notes and	Design: The hospitals: t	the site must be large enou	igh for the planned functi	onal requirements to meet			
recommendations	any expansion envision	ed within the coming 20y	ears.				
	Health center B must ha	ave the ability to increase	the number of beds from	10 to 20 or more depending			
	on the <u>departmental blo</u>	<u>cking plan</u> (availability to	expand the floor area ~ 2	400m2). Enlarge the role of			
	the health post to serve	a district area by increasing	ng the area and enhance the	ne facilities.			
	Physical environment: Avoid the isolated location of the HFs and raise the building about 1m or more						
	over the ground could decrease the effects of the floods						
	Financial factors: Create a suitable system to manage the private health facilities (NGOs, treatment						
	offices) and increase its	role to support the govern	nment.				
	Encourage the proper us	se of traditional medicine	in district health facilities	and integrate it into the daily			
	work of health. Increase	e the financial support for	maintains the health facil	ities.			
	TVET or Technical and	vocational education train	ning skills development:				

There is need for more than 5,060 health workers in 2040. That requires increasing the capacity of the
academic education to meet the need of the medical sector.
District Planning:
Adapting a sustainable planning concept depending on the hierarchy of the health facilities : (4or 5
HPs= 1 HCB), (2 HCB= 1 HCA). HP= 2000 to 5000p.
Create a harmony between the number of public health posts and the private and NGOs facilities.
Institute and management: establish a new directorate in MoH to manage the work between the private
and the public sector.

Source: JICA STUDY TEAM

(2) Educational facilities:

Table 7.41: Proposed norms for the educational facilities (local informal standards, neighbor countries, international)

		meenational	
Norm	Kindergarten	Primary school	Secondary school
Catchment area/m	~500 (local)	~600-3,000 (local)	~750 m (neighbor)
	~200-300 m (neighbor)	~500-1,000 m(neighbors and international)	~1,500 to 3,000 m
	~750 m (international)		(international)
Population	2,000-3,000 (local)	560-3,750 and more (local)	6,000-10,000 (neighbor)
number/p	1,500-3,000	3,000-6,000 (neighbor)	
	m(neighbor)		
Beneficiary	90-180 (neighbor	300-900 (local)	540-900 (neighbor)
number/p	countries)	480-960(neighbor)	300-3,000 (international)
_	~1000 (international)	>1,000 (international)	
Facility area and	500 to 1,000m2	54m2/class(local)(~8,000m2)	campus area is at least
campus area/m2		Teaching area ratio is 60%(UNICIF);	8,000 (international)
-		campus area is ~1,000-4,000m2	
		(international)	
Other norms for	2-8 rooms; should be with	nin walking distance of residential units; could	be clustered with primary
kinder garden	school; accessibility shou	ld be by pedestrian pathways without having to	cross major streets; site not
-	less than 200m from noisy	y and noxious industries, 400m or more to the 1	eeward of factories; land
	level and well- drained, w	vater and other services readily available; easy a	access to a playing field.
	Mahzara is used to educat	te the students in same age as kindergarten, and	the Mauritanian society
	consider it as same type o	f facilities.	
Other norms for	30_50 students/class. Park	ks and playgrounds are located adjacent to elem	nentary schools; join the use
primary school	of these facilities for the p	oupils and the general community.	
Other norms for	Number of classrooms=12	2_20; and 20_36 students/ classrooms.	
secondary school			
Notes and	Design: where land is den	sely occupied, the concept of the traditional scl	hool with low-rise
recommendations	buildings, set in play area	, is not tenable. High-rise schools have already	become common in many
	countries. The availability	v of land for schools is decreasing. Design and a	administration of high-rise
	schools for small sites for	an average of enrolment of > 1000 students (ar	ea about 2.7m2 per place,
	operated in two shifts. Some	me recreation facilities	
	and play field shared by o	ther schools	
	Physical environment: An	rights-based, child school requires a healthy, hy	gienic and safe learning
	environment, with adequa	te water and sanitation facilities and health class	ssrooms. The physical
	environment requires the	presence of basic facilities (sanitation, clean wa	ater for drinking, separate
	toilets, lighting, and play	ground with secure boundary wall.	
	National Investment: budg	getary provision for the improvement of the qua	ality in education is low, as
	the quasi-totality of the ec	lucation budget is dedicated to regular mainten	ance costs and salaries. The
	investment in developmen	nt of pedagogic materials and schools facilities	remain neglected. The
	government does not prov	vide the school facilities for of all of the current	schools. Some schools are
	constructed on self- help l	basis by the community and thus the quality of	the facilities depends on the
	economic status and level	of development of the community. Significant	savings in cost can be
	achieved by modifying the	e existing building designs in term of layout an	d construction. By
	improving the design crite	eria, it is possible to achieve more appropriate s	school facilities than at
	present.		
	TVET or Technical and v	ocational education training skills development	: ensure that skills
	development policies are	fully integrated within socio-economic policy.	Skills of work have to be
	considered, in addition to	improving the image of the technical education	n. Involve the private sector
	in the funds and enable th	e IVET to generate revenues is a good step and	d need good management
	system		

Source: JICA STUDY TEAM

After analyzing the existing schools in Nouakchott, the average area of school is 5,000-8,000m2, and ratio of the building area is 30%. Thus, there is possibility of enlarging the schools by increasing the classrooms number (school norm is 60% building and 40% playground).

The following figure illustrate the current situation and the ability to enlarge the current school in addition to reduce the land in the new development residential area



Source: JICA STUDY TEAM

Figure 7.16: Proposed standards for the current and new schools in the old and the new development area

(3) Parks and green area

Table 7.42: Pro	posed norms	for the	parks and	green area
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Norm	Mini-park	Neighbor-park	District-park or	Regional-park (city			
			Community park	parks)			
Catchment area/m	100-200m (Neighbor) <400m(NRPA)	~800m	~1,600-3,000	3,000			
Population number/p	800-1,200	3,000-5,000	10,000-15,000	50,000			
Facility area and campus area/m2	800-1,500	4,000-5,000	5,000-10,000	50,000			
Other norms for mini park	For limited recreational 1	For limited recreational needs					
Other norms for	within 10 minutes walking	ng distance from the publi	c transport terminal; easy a	ccessible by public			
neighborhood park							
Other norms for	Parking area is required.	Location is central to 3 to	5 neighborhoods and prof	fered adjoining to			
district park	schools; for amenity and	visual enhancement,					
Other norms for	30 to 60 minutes travel d	listance; some green space	es have to be designated as	"Country Park" and			
regional park	"Special Area" which are	e conservation areas prote	cted by law, or are zoned" (Green Belt",			
	"Conservation Area", or	' Coastal Protection Area"	. These zones would generate	ally be for passive			
	recreation, conservation	and education/research us	es, and are not suitable for	development			
Notes and	Physical environment: T	he residential area should	be developed in a manner	that will retain certain			
recommendations	important features: 1- sm	nall, intimate, neighborhoo	od- based public spaces wh	ere social mingling may			
	occur. 2- Creation of a hierarchy from intimate, private space of dwelling to the public space in urban						
	center is so important underlying principle.						
	Lands: it is a reality that, creating new open spaces in the existing core urban area is a gigantic task						
	due to the limited financial ability of development authorities. Besides, core urban areas of the city are						

1.0	
	dense in term of physical development. Bearing this on mind, private prosperities that are still vacant can be utilized by the planning authorities in order to create recreational facilities and open spaces
	can be utilized by the plaining autionities in order to create recreational facilities and open spaces.
	Financial factors: As it is difficult for the authorities to acquire these lands with giving due
	compensation, authorities can provide underdevelopment incentive fee annually for the respective land
	owners. Fund fees may be collected from the users of open space and recreational facilities.
	District Planning: the city followed rectangular grid systems for streets with block modules. The street
	does not benefit from the shading, elimination of semi private spaces. Each residential block has small
	commune area. A detailed planning level by working with the residence to reuse these squares as
	public spaces on the residential level will be suitable solution.

(4) Play ground:

inde stievi reposen norms for the pugground							
Norm	Kid playground	Neighbor-playground	District-playground	Stadiums			
Catchment area/m	150-275m	250-800	1,600-2,400	-			
Population number/p	200-1,000p	3,000- 5,000p	10,000-15,000p	100,000			
Facility area and	900-1,000m	3,000-4,000	5,000-10,000	35,000-50,000			
campus area/m2							
Other norms	Easy walking distance. N						
	in the neighborhood						

Table 7.43: Proposed norms for the playground



Source: JICA STUDY TEAM

Figure 7.17: Proposed standards for the parks and play ground

(5) Religious and security facilities

1) Proposed standards

Table 7.44: Proposed norms for the religious and security facilities

	Religious		Security		
Norm	Mosque type 2 (mosalla)	Mosque type 1 (jamee)	Police station	Fire Station	
Catchment area/m	≥200	~500 to1,000	3,000 5,000	5,000 to7,000	
Population number/p	≥1,500	3,000 7,500	20,000 30,000	20,000 30,000	
Facility area and campus area/m2	180≥	-			

Other norms for Mosque type 2	Easy to arrive by walking without crossing the main roads; only one mosque in the district
Other norms for Mosque type 1	linked to road network and pedestrians

2) Proposal for organizing the location of the religious faculties

Depending on the satellite photos and field trip, the proposed idea to organize the location of the religious faculties is as follow:





Source: JICA STUDY TEAM

Figure 7.18: Proposed concept for organizing the current location of the religious faculties

7.2.5 Recommended distribution of public facilities based on the gridiron street pattern

Based on the disruption with the governmental side, the distribution of the public facilities and the planning program will be as follow starting from the residential block to the district level:

- Block area~3ha (250m*120m) Plot number ~152 Population~500 to 1,200 Two residential group playground (RGP)~900m2 NUMBER One part~20m*28m RGG Walking rout (1.5m) surrounding the play lot Residential group green area (RGG)~1,700m2: (34m*50m) as green area and car parking can use as 250m small space for the citizen social activities II. Neighbor level: Neighbor area~30ha Plots number ~1132 Н ΠΠ T THE Population~2,000 to 5,000 日田田日 HHH HHH Blocks number~8 Supper blocks number~2: Supper block area~9ha (550m*250m) Plots number ~456 Population~1,500 to 3,600 Compact area services: **HII** Elementary school ~3,600m2 (60*60m2)
 Health post~500m2/plot;180m2/building - Mosque type2(mosalla) ~800m2/plot,200m2/ building - kindergarten ~560m2/ or Mahzara~54m2 beside the Imam house - Neighbor-playground~4,000m2 HH 41 - Neighbor-park~4,000 m2 THE - Parking -Neighbor Neighbor play ground Green Park Π NPG NGP Elementar y school For respecting the custom of (500m between the mosques FS and 200 between mosallas); it possible to add only one mosalla (area~180m2) in the second supper block in one Kindergarten/ parcel beside the main road. But not in the public park mahzara and playground. Heal po Mosalla HP
- I. Residential group level:

III. District level

District ~120ha (540m*540m)	

Other services



Source: JICA STUDY TEAM

Figure 7.19: Proposed distribution of the public facilities according to the gridiron street pattern

7.2.6 Public facilities in the metropolitan gateway districts

Due to the necessity to develop the entrances of Nouakchott city as pleasant and welcoming places, and due to the shortage of available lands for the high level of public facilities; the metropolitan gateways are proposed in the four entrances.

Each gateway has several facilities in different scale, in addition to special character.

The following table illustrates the characters of the four gateways.

	First gateway	second gateway	Third gateway	Fourth gateway
Location	Nouadhibou Hwy	Akjout Rd	Hope Rd	Rosso Rd
Basic role	-North entrance -Connect the airport with the university	North east entrance	East entrance	South entrance
Characteristics	Scientific and administrative activities	Traditional activities	Green and natural atmosphere	Environmental and agricultural activities
Public facilities	 -Hospital and medical research center ~1.5 ha - Olympic stadium for 30,000 seats - Scientific center to serve the university - Recreational facilities - Administrative buildings - Fire station, police station 	 Hospital~1.5 ha Small stadium for 5000 seats Cultural spaces Hotel, offices Recreational facilities Fire station, police station 	 Hospital~1.5 ha Community center Commercial facilities Green and open spaces Fire station, police station 	 Hospital~1.5 ha Agricultural marketing Immigration services Fire station, police station

Table 7.45. Dasie characteristics of the metropolitan gateways
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7.2.7 Reccomendation for strengthening of local governance for financing public facilities development

The financing of decentralization and local development is ensured:

- by the state through the Regional Development Funds (hereinafter referred to as "FRD")grants; and
- by several donors in the framework of a project of various types (state, local, sectoral, punctual action.

The financing system of the communes are affected by:

- Level of competences exercised by the municipalities:
- The transfer of competences and budget are still theoretical.
- Mobilization of the resources in term of collecting the own revenues or in term of mobilization of external financing:

The level of resource mobilization is being far from the communes including the sectoral ministries which is essential. This might affect the taxation system and make it compulsory.

- Ability of operation and equipment requirements. The recurrent management costs of public services in the level of communes exceed the FRD:

The expenditure of the communes is limited to the level of operation, services consumed, staff costs and maintenance works of the public services.

The delays of mobilization of FRD by the state is too long, and level has not yet reached the 3% from the state operating budget rate which not be able to cover the real needs of pressing short, medium and long-term.

- The communes do not give a priority for the merchant services which will generate the revenue.

(1) **Problem of the commune:**

The functioning of the communes remains insufficient due to factors that include:

- The weakness of their financial resources;
- Weak capacity for project management
- Lack of training of local elected officials and staff
- Lack of technical supervision of the state

(2) Strengthening decentralization and local development for best offer of public services to citizen by:

- Support the autonomous administration toward effective participation of local people in managing their own business and creating real value.
- Improving the FRD by the state and establishing sustainable mechanism for integrated community funding
- Provide the communes by local investment plan with specified period, thus setting priorities and ensuring their feasibility and consistency with the other interventions at national and regional levels.
- Coordination between the sectoral policies and the financial and technical partners to ensure the coherence and avoid the duplication.
- Strengthening the financial capacity by endowment the commune's resources to finance their services and achieve a self-financing operations investment.

CHAPTER 8: PHASED IMPLEMENTATION STRATEGY

8.1 Phased Land Use Development Scenario

The realization of the SDAU urban master plan at horizon 2040 is expected to begin immediately following the completion of the JICA Study, i.e. from the year 2019. The period of 21 years of expected realization period of the SDAU has been divided in 4 major phases, namely phase 1: from 2019 to 2025; phase 2 from 2026 to 2030; phase 3 from 2031 to 2035 and phase 4 from 2036 to 2040.

The land use phase-wise development scenario explained in Table 8.1 and Figure 8.1 below has been elaborated based on the various factors such as (1) the legal and institutional framework of territorial administration and city planning in 2019 and the one expected 2040 according to our previsions based on capacity development program (refer to Chapter 2 of Part III), (2) the scale and complexity of planning issues to be tackled in 2019 and the way it is expected to change until 2040, especially in terms of climate change.

The formulation of land use phase-wise development scenario will help to facilitate the realization of the SDAU by setting-up the basic conditions and planning milestones to make its achievement possible. In the perspective of financial viability of the city development proposals, both public and private sectors, international donors are expected to support the realization of the SDAU.

	Phase 1	Phase 2	Phase 3	Phase 4
	(2019-2025)	(2026-2030)	(2031-2035)	(2036-2040)
Keyword	Preparation	Exploration	Maturation	Renewal
Major development trend at the scale of Nouakchott	The ongoing urbanization patterns are continuing in subdivisions of Northern and Southern areas of Nouakchott while all the strategic orientations elaborated in SDAU, especially the one which improve existing urban area, are studied in technical terms for further implementation.	Based on the knowledge accumulated from pilot studies of final technical study of SDAU strategies, first wave of large- scale implementation is carried out throughout the city. The city starts searching and experimenting its regeneration for the future while New Tarhil neighborhood is established.	Nouakchott city is finalizing its modern shape. The city limits are reached and most of urbanization is contained inside the ring road, expect for the airport city in the north which continues its growth. The urban planning policies and division of governance between State and communes reach maturity.	Nouakchott enters in a totally new phase of its urban history. Rather than building on new lands, large- scale urban renewal operations are going on. Intensification process is launched, while the city is showing its nomad identity of space largeness and freedom of movement through BRT system completion.
Major urban development operations	Preparation of New Tarhil balance pole with construction of necessary infrastructure networks and public facilities.	Large-scale housing development is open in New Tarhil neighborhood. The southern part of Nouakchott is filling inside the ring road.	First urban renewal operations are launched as pilot in several parts of the city, in cooperation with national and foreign investors.	Large-scale urban renewal operations are launched in parallel with the construction of BRT infrastructure and introduction of mass- transit system.
Priority infrastructure projects at the scale of Nouakchott	The outer ring road is built as a priority to give the skeleton of the future limits of the urban growth.	-	Preparation of construction of Sebkha-El Mina canal as a final bulwark to disasters.	-
Major studies to support SDAU realization	Flooding Risk Prevention Plan (PPRI) and	Legal studies are launched on several aspect of city	-	-

Table 8.1: Land Use Phase-wise Development Scenario

Nouakchott City Urban Master Plan Development Project Final Report

	Phase 1 (2019-2025)	Phase 2 (2026-2030)	Phase 3 (2031-2035)	Phase 4 (2036-2040)
	Nouakchott Coastal Planning Directive (DAL) are studied in priority to give a framework to PLU formulation.	planning realization: potential social housing policies, urban renewal operational process, etc.		
Decentralization and role of the communes	Preparation of next steps of decentral- lization of powers to communes by simplifying land request procedure to the State. Several PLU are completed in most advanced communes.	All PLU of Nouakchott are completed, and all communes are getting ready technically and financially to imple- ment their plans.	Division of competences and responsibilities between State services and commune enters a new era, with the delegation of city planning to CUN and communes.	-

Source: JICA Study Team



Phase 3 (2031-2035) Source: JICA Study Team

Phase 4 (2036-2040)



Strategic Orientation		Phase 1	Phase 2	Phase 3	Phase 4
		(2019-2025)	(2026-2030)	(2031-2035)	(2036-2040)
	1-1 Controlled urbanization in risk areas	Studie Trar s	slation to PLU		
	1-2 Urban renewal and densification: Intense City	Leg	al fram aration	ework	
1. Limit Urban	1-3 Public transit-led urban development		ent of bus	BRT intr	oduction
Sprawl and Intensify Urban Area	1-4 Social mix: The Solidarity City	Leg; prep	al fram Faration	ework	
	1-5 Polarization of urban extensions				
	1-6 Metropolitan Gateways	F/S pilo	and ZAC		
2. Build a New Relationship with Nature	2-1 External green belt as bulwark to sand and city	Completion of n	ew green		
	2-2 Coastal area as major public space	Studie Translat	on to PLUImplem	entatio	
	2-3 Green and blue internal network	Studie Translat	ion to PLU Im	lementation	
	2-4 Four major green poles to structure the city	Studie Translat	ion to PLU Ir	nplementation	
	2-5 Small scale green and public spaces	Studie Translat	ion to PLU		
	2-6 Leisure place in the desert		Studie Imple	mentation	
	2-7 Ensure security of green and public spaces	Studie Translat	ion to PLU	Implementati	on
	3-1 Promote economic poles with public transit		Implementat	ion	
	3-2 Economic network based on Ring Road	Studie Impler	mentation 1st phas	e Implementa pnas	tion 2nd e
3. Promote Economic Radiation	3-3 Support economic growth of sectoral poles	Imp	ementation	Relocat	on of El Mina
	3-4 Promote local jobs within neighborhoods	Studie Translat	on to PLU	Implementation	
	3-5 Promote economic diversification	Str.	idie Impl	ementation	

Table 8 2.	Realization	Schedule of	Strategic	Orientations
Table 0.2.	INCALLATION	Scheune of	Suaugic	Orientations

Source: JICA Study Team

8.2 **Proposed Sector Projects with Implementation Schedule**

Sector development projects were identified based on the development plan presented in Chapters 5, 6, and 7. Outline of the projects in each sector are listed followed by recommended implementation schedule.

8.2.1 Transport development

(1) Road network development projects

ID	Project Title	Location	Objective	Project components	Implementation	Cost
RD01	Construction/Widening of Airport Link Road	(traffic zone) • Tevragh Zeina (1050,1052) • Ksar (2030,2041,2040) • Teyarett (3011)	To increase traffic capacity and to reduce traffic congestions.	 Construction of Airport Link Road L = 23.21km (4 lane) Widening from 2 lane to 4 lane on Airport Link Road L = 1.77km 	MET	USD 42 million (Construction) USD 2 million (Widening)
RD02	Construction/Widening of Inner Ring Road	Tevragh Zeina (1010,1020,10 30) Ksar (2020,2030) Dar Naim (4010) Sebkha (5010) Arafat (6010,6020) El mina (8010,8020)	To increase traffic capacity and to reduce traffic congestions.	 Construction of Inner Ring Road L = 9.02km (4 Iane) Widening from 2 Iane to 4 Iane on Inner Ring Road L = 13.44km 	MET	USD 17 million (Construction) USD 14 million (Widening)
RD03	Construction/Widening of Middle Ring Road	• Tevragh Zeina (1050) • Ksar (2040) • Teyarett (3010) • Dar Naim (4020) • Toujounine (7010,7020,70 30) • Riyadh (9010,9011)	To increase traffic capacity and to reduce traffic congestions.	 Construction of Middle Ring Road L = 25.73km (4 lane) Widening from 2 lane to 4 lane on Middle Ring Road L = 7.35km 	MET	USD 47 million (Construction) USD 8 million (Widening)
RD04	Construction/Widening of Outer Ring Road	Whole Nouakchott	To increase traffic capacity and to reduce traffic congestions.	 Construction of Outer Ring Road L = 50.69km (4 lane) 	MET	USD 92 million (Construction) USD 19 million (Widening)

ID	Project Title	Location (traffic zone)	Objective	Project components	Implementation organization	Cost
				 Widening from 2 lane to 4 lane on Outer Ring Road L = 18.92km 		
RD05	Widening of National Road	Whole Nouakchott	To increase traffic capacity and to reduce traffic congestions.	 BRT (National Road 1 Northeast direction) 11.6km BRT (National Road 2 North direction) 8.7km BRT (National Road 2 South direction) 13.1km BRT (National Road 3 East direction) 13.8km 	MET	USD 472 million*
RD06	City Centre Road Development	•Inside Outer Rind Road (Except Tarhil City)	To increase traffic capacity and to reduce traffic congestions.	 Construction of Outer Ring Road L = 36.54km (2 lane) Construction of City Centre Road L = 5.04km (4 lane) Widening from 2 lane to 4 lane on City Centre Road L = 25.36km 	MET	USD 37 million (Construction) USD 10 million (Construction) USD 26 million (Widening)
RD07	Tarhil City Road Development	•Toujounine (7010,7030) •Riyadh (9011,9020,9021)	To increase traffic capacity and to reduce traffic congestions.	 Construction of Tarhil City Road L = 13.76km (2 lane) Construction of Tarhil City Road L = 20.79km (4 lane) 	MET	USD 14 million (Construction) USD 38 million (Construction)

ID	Project Title	Location (traffic zone)	Objective		Proj	ect components	Implementation organization	Cost
RD08	Airport City Road Development	•Tevragh Zeina (1051,1052) •Ksar (2040,2041) •Teyarett (3011)	To increase capacity and traffic conge	traffic l to reduce estions.	•	Construction of Airport City Road L = 112.66km (2 lane)	MET	USD 113million (Construction)
Total			USD 951m	illion				

*RD5 is same as PT06, in List of proposed projects for public transport plan

ID	Project Title	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
RD0 1	Construction/ Widening of Airport Link Road	F/S			Des	ign Co	nstruction	Test		Z			66	3									
RD0 2	Construction/ Widening of Inner Ring Road		-						1							N	///		3				
RD0 3	Construction/ Widening of Middle Ring Road												<u></u>										
RD0 4	Construction/ Widening of Outer Ring Road												88										
RD0 5	Construction/ Widening of Arterial Road																						
RD0 6	City Centre Road Development																						
RD0 7	Tarhil City Road Development																		3				1 23
RD0 8	Airport City Road Development		3	22				 :					5 55						3	Z			<u></u>

Table 8.4: Implementation Schedule of Proposed Projects for Traffic Management Plan

(2) Traffic management projectst

ID	Project Title	Location (traffic zone)	Objective	Project components	Implementation organization	Cost
TM01	Installation of median and road markings	Whole Nouakchott	To reduce traffic accident	Construction of median 10km	MET, MEF	USD 1 million
TM02	Intersection improvement	Whole Nouakchott	To reduce traffic accident To increase traffic capacity at intersection Total 150 intersections	Installation of traffic signal Geometric improvement	MET, MEF	USD 5 million
TM03	Parking Management	City Center	To restrict on-street	Installation of parking lane, marking and parking sign Installation of off street parking Enforcement of illegal parking etc	MET, Traffic Police, MEF	USD 2 million
TM04	Promotion of modal shift	Whole Nouakchott	To reduce total amount of private car trips. Modal-shift from private car trips to public users.	Encouraging of modal shift to the public transport. By Publication, Seminar, Mass Media, Education Improvement of Bus operation and improvement facilities of, priority lane, terminal and bus stops (including Public Transport Plan) Development of BRT/ BRT road, Automated Fare Collection System for BRT, Bus and Taxi (including Public Transport Plan)	MET, STP, MEF	USD 0.5 million – for publication, seminar, education etc.
TM05	Introduction of ITS	Whole Nouakchott	To improve traffic user service and to reduce traffic congestions and/or accidents	Area Traffic Signal Control Center and Emergency Call Center Public Transport Priority System Information Collection & Provision System	MET, MEF	USD 10 million
TM06	Introduction of Vehicle Inspection System	Whole Nouakchott	To reduce the old vehicle - reduction of NOx, Cox - reduction of total amount of cars	Vehicle Registration Database Vehicle Inspection System Traffic Enforcement System	MET, Traffic Police, MEF	USD 0.5 million
TM07	Traffic Safety	Whole Nouakchott	To reduce traffic accident	Traffic Safety Campaign	MET, Traffic Police, MEF	USD 1 million
TM08	Non-Motorize Transport(NMT) Infrastructure	Whole Nouakchott	To improve NMT environment To reduce the private car trip and promote public transport users.	Study on NMT (walk way, bicycle lane etc.) Network	MET, MEF	(USD 10 million) Basically, cost will be included in the road/public transport projects
10141						USD 20-30 millions

Table 8.5: Traffic Management Projct List

ID	Project Title	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
TM 01	Installation of median and road markings			I	nstallati	0																	
TM 02	Intersection improvement			Constru	iction		I				Const	ruction				Const	ruction						
TM 03	Parking Management				Ι	nstallati	0																
TM 04	Promotion of modal shift																						
TM 05	Introduction of ITS							In	stallatio														
TM 06	Vehicle Inspection System		In	stallatio								-											
TM	Traffic Safety																						
07			1	1	1	1	1			1	1		1	1	1	1	1	1	1		1		
TM 08	Non-Motorize Transport Infrastructure		Design	Constru	iction by	v coordi	nation v	vith road	l develo	pment a	nd publ	ic transp	ort										

Table 8.6. Implementation	Schedule of Prov	nosed Projects for	Traffic Managem	ant Plan
Table 6.0. Implementation	Schedule of 1 10	JUSEU I I UJECIS IUI	If and wranageme	спі і тап

(3) Public transport development projects

ID	Project Title	Location (traffic zone)	Objective	Project components	Implementation organization	Cost
PT01	Maintenance Operation Capacity Improvement	Whole Nouakchott	To implement a proper bus operation	Provision of equipment Provision of equipment (Buses, Spare parts, Repair tool kits etc.) Construction of bus repair shop	USD 10 millions	
				Human resources development (Mechanic)		
PT02	Management and Operation Capacity improvement	Whole Nouakchott	To implement a proper bus operation	Human resources development (Bus operations manager) Introduction of bus operation management system (Route guidance system, Bus tracking system, Electronic payment system etc.)	MET, STP, MEF	USD 5 millions
PT03	Bus Drivers Capacity Improvement	Whole Nouakchott	To improve bus safety driving	Human resources development (Bus driver) (Establishment of the bus driver's license system Construction of Practice facility for bus driving skill improvement etc.)	MET, STP, MEF	USD 5 millions
PT04	City Bus service and Airport/Intercity bus service	Whole Nouakchott	To improve bus service	Increase City Bus Service, Network Airport and intercity bus service Procurement of Bus Fleet	MET, STP, MEF	USD 20 millions
PT05	Introduction of Bus Terminal	Whole Nouakchott	To improve a change of other mode	Installation of bus terminal Installation of bus stop facilities (Bus terminal, Bus Stop Shelter, Bus Bay, Bus Stop Sign, Schedule, Route Map etc.)	MET, STP, MEF	USD 15 millions
PT06	Introduction of BRT	Whole Nouakchott	To accommodate future public transport demand	BRT (National Road 1 Northeast direction) 11.6km BRT (National Road 2 North direction) 8.7km BRT (National Road 2 South direction) 13.1km BRT (National Road 3 East direction) 13.8km BRT (branch line Tarhil) 5.7km Total 52.9km	MET, STP, MEF	USD 529 millions
Total						USD 584 millions

Table 8.7: Public Transport Project List

Source: JST

ID	Project Title	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
PT01	Maintenance operation																						
	capacity																						
PT02	O&M capacity																						
	improvement																						
PT03	Bus drivers																						
	improvement				1																		
PT04	City bus and																						
	airport, intercity																						
	bus service																						
PT05	Introduction of																						
	Bus Terminal																						
PT06	Introduction of												Nation	al Road	3(east c	irection	and Tai	th1l					
	BRT												direction	on) and	Nationa	l Road 2	(South	direction) ational	Road 2(North d	irection) and
																		T	lational	Road 1	NE dire	ction)	ŕ

Table 8.8: Implementation Schedule of Proposed Projects for Public Transport Plan
8.2.2 Utilities development

(1) Water supply projects

ID	Project Title	Location	Objective	Project components	Implementation organization	Cost
W01	Aftout system water supply capacity expansion project	PK17 (2nd water treatment plant of the Aftout system)	To expand the water supply capacity of the 2nd water treatment plant of the Aftout system.	Construction of a clear water reservoir (6,000m ³) Construction of a pump station Installation of a distribution main (DN1,000mm)	SNDE	USD XXX millions
W02	New development area water supply system improvement project	Whole Nouakchott	To improve and expand the water supply system in newly developed area	Zoning of the entire water supply area in Nouakchott Construction of a pump station in the 2nd water treatment plant Installation of a water transmission pipe from the pump station along the ring road Construction of water distribution reservoir (5,000m ³) and pump station (5 nos.) Installation of distribution pipes and service installations in the newly developed area.	SNDE	USD XXX millions

Table 8.9: List of Proposed Projects for Water Supply Sector

ID	Project Title	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
W01	Aftout system water distribution capacity expansion project					Desiç	n _{Co}	nstruction															
W02	New development area water supply system improvement project										F/S	De	sign	C	Constructio	n							

 Table 8.10: Implementation Schedule of Proposed Projects for Water Supply Sector

(2) Sanitation and rainwater drainage

ID	Project Title	Location	Objective	Project components	Implementation organization	Approximate Cost
T01	Construction of a sewage network and a rainwater evacuation system.	Whole Nouakchott	Provide the city of Nouakchott with modern sanitation, in order to preserve public health, fight against flooding and protect the environment, by connecting about 70% of the population (1.6 million inhabitants) to the collective sewerage system in 2040 and limiting runoff and stagnation of rainwater through an operational rainwater drainage system.	Sewerage network; Extension of the rainwater drainage system under construction (expected to be completed by the end of 2018 to beginning of 2019).	MHA	USD 290 million*
T02	Connection of 70% of the population of New Tarhil district to the collective sewerage network.	Planned New Tarhil district (balance pole)	Provide the new urban development district of New Tarhil with modern sanitation system.	Set up approximately 16,000 connection units, corresponding to 100,000 households.	МНА	USD 6.5 million
Т03	Construction of 3 Wastewater Treatment Plants (WWTP)	Communes of Tevragh Zeina, Riyadh and Dar Naim	Treat wastewater collected by the sewerage network so water can be reused in agriculture.	3 Wastewater Treatment Plants (WWTP)	МНА	USD 11.5 million
T04	Construction of the Sebkha-El Mina canal	Western part of the city in the zone of sebkhas of Sebkha and El Mina communes	Ecological restoration of the lagoons or ponds present on this part of the city, in a perspective of dual interests: limit the flood risk and create a space for socio-educational and tourist use.	Excavation Stone masonry Landscaping of the borders of the canal	MHA, MHUAT Ministry of Defense, Ministry of Trade and Tourism	USD 3,5 million

Table 8.11: List of Proposed Projects in Sanitation and Wastewater Treatment and Rainwater Drainage Sectors

Source: JICA Study Team

Note: (*) The cost of works on the horizon of the SDAU, with the connection of a population of about 1.6 million inhabitants (70% of the projected population), is about 287 million USD, including "escalation and risks" of around 11%. It also covers the operation of the different WWTPs for 5 years. This cost includes the assistance by a Consulting Engineer from the design up to and the reception of the installations, passing by the selection of the companies of the works (batches), notification of the markets and the follow-up of the works of execution. The exchange rate considered is: 1USD = 35.51 MRU (BCM website, 14/05/2018). This cost also includes the setup of the connections for New Tarhil district (project T02). In order to cover costs and ensure an acceptable and sustainable sanitation service, the proposed billing is in the order of USD 17 per ton of consumed water (USD 0.17 / m³).

ID	Project title	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
T01	Construction of a sewage network and a rainwater evacuation system.	F/S C	Design	Constru	iction	Test																	
T02	Connection of 70% of New Tarhil population to the collective sewerage network.																						
Т03	Construction of 3 Wastewater Treatment Plants (WWTP)					× ww	TP of Pole WWTP c WTP of P	A f Pole B ole C															
T04	Construction of the Sebkha-El Mina canal*																						

Table 8.12 : Implementation Schedule of Proposed Projects for Sanitation and Wastewater Treatment and Rainwater Drainage Sectors

Source: JICA Study Team

Note: (*) The 5-month test corresponds to the theoretical rainy period between August and October 2036. This period is ideal to observe the behavior of the water table and to evaluate the overall safety of the installations (overflow, pollution carried out by rainwater, fences, etc.).

8.2.3 Public facilities development projects

	List of proposed projects for public facilitie	es sector/ regions				
ID	Project Title	Location (traffic zone)	Project components	Implementation organization	Required land area/ m2	Cost/USD
H01	Hospitals construction projects		1 hospital		15,000	4,166,667
H02	Health centers A construction projects		8 health centers A	MoHUAI, MoH,	9,600	4,222,222
H03	Health centers B construction projects	71010, 1020, 1030, 1040, 1050, 1051, 1052, 2010, 2020, 2030	21 health centers B	private sector	25,200	8,750,000
H04	Health posts construction projects	2040, 2041, 5010, 5020	66 health posts	MoHUAT, MoH, Commune private sector	9,900	3,483,333
H05	Hospitals construction projects		4 hospital		60,000	16,666,667
H06	Health centers A construction projects		13 health centers A	MoHUAI, MoH,	15,600	6,861,111
H07	Health centers B construction projects	3010, 3011,4010, 4020, 4021,	29 health centers B	private sector	34,800	12,083,333
H08	Health posts construction projects	7010, 7020, 7030, 7031	103 health posts	MoHUAT, MoH, Commune private sector	15,450	5,436,111
H09	Hospitals construction projects		3 hospital		45,000	12,500,000
H10	Health centers A construction projects		13 health centers A	MoHUAT, MoH,	15,600	6,861,111
H11	Health centers B construction projects	6010, 6020 ,8010, 8020,	28 health centers B	private sector	33,600	11,666,667
H12	Health posts construction projects	8030,9010, 9011, 9020, 9021	94 health posts	MoHUAT, MoH, Commune private sector	14,100	4,961,111
E01	enlarge the current elementary schools	1010, 1020, 1030, 1040, 1050,	255classrooms	MOHUAT MOE		5,383,333
E02	elementary schools construction projects	1051, 1052, 2010, 2020, 2030, 2040, 2041, 5010, 5020	58 elementary school	Private sector	232,000	40,277,778
E03	enlarge the current elementary schools	3010, 3011,4010, 4020, 4021,	766 classrooms	MoHUAT, MoE,		16,171,111
E04	elementary schools construction projects	7010, 7020, 7030, 7031	50 elementary school	Private sector	200,000	34,722,222
E05	enlarge the current elementary schools	6010, 6020 ,8010, 8020,	947 classrooms	MoHUAT, MoE,		19,992,222
E06	elementary schools construction projects	8030,9010, 9011, 9020, 9021	31 elementary school	Private sector	124,000	21,527,778
E07	enlarge the current secondary schools	1010, 1020, 1030, 1040, 1050,	77 classrooms	Mohijat Moe	_	1,625,556
E08	secondary schools construction projects	1051, 1052, 2010, 2020, 2030, 2040, 2041, 5010, 5020	50secondary school	Private sector	392,000	13,194,444
E09	enlarge the current secondary schools	3010, 3011,4010, 4020, 4021,	382 classrooms	MoHUAT, MoE,	_	8,064,444
E10	secondary schools construction projects	7010, 7020, 7030, 7031	58 secondary school	Private sector	464,000	15,305,556
E11	enlarge the current secondary schools		702 classrooms		_	14,820,000

Table 8.13: List of proposed projects and cost estimation

	List of proposed projects for public facilitie	s sector/ regions				
E12	secondary schools construction projects	6010, 6020 ,8010, 8020, 8030,9010, 9011, 9020, 9021	42 secondary school	MoHUAT, MoE, Private sector	336,000	11,083,333
S01	Stadiums construction projects		4 stadiums		50,489	5,555,556
S02	District playground construction projects		38 district playgrounds	MoHUAT, MoS,	190,472	10,555,556
S03	Neighbor playground construction projects	1010, 1020, 1030, 1040, 1050, 1051, 1052, 2010, 2020, 2030	114 neighbor playground	private sector	457,133	60,166,667
S04	Residential playground construction projects	2040, 2041, 5010, 5020	571 residential playground	MoHUAT, MoS, Commune private sector	571,417	190,333,333
S05	Stadiums construction projects		5 stadiums		64,683	6,944,444
S06	District playground construction projects		56 district playgrounds	MoHUAI, MoS,	280,067	15,555,556
S07	Neighbor playground construction projects	3010, 3011,4010, 4020, 4021,	168 neighbor playground	private sector	672,162	88,666,667
S08	Residential playground construction projects	7010, 7020, 7030, 7031	840 residential playground	MoHUAT, MoS, Commune private sector	840,202	280,000,000
S09	Stadiums construction projects		6 stadiums		70,606	8,333,333
S10	District playground construction projects		53 district playgrounds	MoHUAI, MoS,	262,794	14,722,222
S11	Neighbor playground construction projects	6010, 6020 ,8010, 8020,	158 neighbor playground	private sector	630,705	83,388,889
S12	Residential playground construction projects	8030,9010, 9011, 9020, 9021	788 residential playground	MoHUAT, MoS, Commune private sector	788,381	262,666,667
G01	city parks construction projects		11 city parks		571,417	18,333,333
G02	District parks construction projects	1010, 1020, 1030, 1040, 1050,	38 district parks	MoHUAT, MoS,	190,472	12,666,667
G03	Neighbor parks construction projects	1051, 1052, 2010, 2020, 2030, 2040, 2041, 5010, 5020	114 neighbor parks	Sector	457,133	31,666,667
G04	Residential parks construction projects	2010, 2011, 3010, 3020	476 residential Parks	500101	380,944	26,444,444
G05	city parks construction projects		17 city parks		840,202	28,333,333
G06	District parks construction projects	3010, 3011,4010, 4020, 4021,	56 district parks	MoHUAT, MoS,	280,067	18,666,667
G07	Neighbor parks construction projects	7010, 7020, 7030, 7031	168 neighbor parks	sector	672,162	46,666,667
G08	Residential parks construction projects		700 residential Parks	500101	560,135	38,888,889
G09	city parks construction projects		16 city parks		788,381	26,666,667
G10	District parks construction projects	6010, 6020 ,8010, 8020,	53 district parks	MoHUAT, MoS,	262,794	17,666,667
G11	Neighbor parks construction projects	8030,9010, 9011, 9020, 9021	158 parks	sector	630,705	43,888,889
G12	Residential parks construction projects		657 residential Parks	500101	525,587	36,500,000
C01	sub library and cultural space projects	1010, 1020, 1030, 1040, 1050,	6 sub-library	MoHILAT MoC	7,143	6,666,667
C02	multipurpose community hall construction projects	1051, 1052, 2010, 2020, 2030, 2040, 2041, 5010, 5020	11 hall	private sector	14,285	6,111,111

-						
	List of proposed projects for public facilitie	s sector/ regions				
C03	cinema, outdoor theater, drama and music construction projects		6 cinema		7,143	5,000,000
C04	sub library and cultural space projects		8 sub-library		10,503	8,888,889
C05	multipurpose community hall construction projects	3010, 3011,4010, 4020, 4021, 7010, 7020, 7030, 7031	17 hall	MoHUAT, MoC,	21,005	9,444,444
C06	cinema, outdoor theater, drama and music construction projects	/010, /020, /030, /031	8 cinema	private sector	10,503	6,666,667
C07	sub library and cultural space projects		8 sub-library		9,855	8,888,889
C08	multipurpose community hall construction projects	6010, 6020 ,8010, 8020, 8030 9010 9011 9020 9021	16 hall	MoHUAT, MoC,	19,710	8,888,889
C09	cinema, outdoor theater, drama and music construction projects	0050,7010, 7011, 7020, 9021	8 cinema		9,855	6,666,667

ID	Project tit	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
H 0 1	н																	1 H (spita	I, 1H/	Зуеа	r s	
H 0 2	НА				3 H e	alth c	cente	sA,	1НА,	2 y e	ars				Ľ.	Неа	th ce	nters	A , 1	HA/	2		
H 0 3	НВ				14 H e	alth	cente	rsB,	1 H B	/2 y e	ars				7	Healt	h cen	ters B	3,1H	B / 2	years		
H 04	Н Р				4	4 Hea	alth po	osts,	1 H P	/ 1 y e	a r				:	2 H e a	lth p	osts,	1 H P	/ 1 y e	ars		
H 0 5	Н	2 H o	spita	,1H/	3 уеа	rs		2	Hosp	ital,	1 H / 3	ye ars	•			2	hosp	itals,	,1H/3	year	5		
H 06	НА			9	Healt	h cen	ters A	, 1⊦	A / 2	years	5				4	lealth	cent	ers A	, 1 H	A / 2 y	ears		
H 0 7	НВ			21 H	ealth	cente	ersB,	1 H B	/2 y e	ars			•	8	Healt	h cen	ters E	, 1 Н	B / 2	years			
H 08	Н Р			85 H e a	alth P	osts,	1 H P	/ 1 y e	a r						18	Heal	th po	sts, í	1 H P /	1 yea	rs		
Н 09	н				:	hosp	eitals,	1H/3	years				1 H d	spita	I,1H/	Зуеа	r s		1	. H o s p	oital,∶	1H/3 y	ears
H 10	H A			9	- e a l t ł	cent	ters A	, 1 H.	A / 2 y	ears					4	Hea	th ce	nters	A , 1	HA/	2 year	s	•
H 1 1	НВ	•			19 H	e alth	cente	rsB,	1 H B	/ 2 y e	ars				9	Неа	lth ce	nters	B , 1	НВ/	2 year	s	
Н 12	Н Р		84	Healt	th pos	ts, 1	HP/	1 yea	rs						1	0 Hea	lth ce	nter	s A , 1	HA/	2 yea	rs	
																					-		

Table 8.14: Proposed implementation plan for health facilities

E 0 1	ENES			19	b 3 clas	sroom	s			3	B clas	sroom	s	2 4	class	room	s						
E 0 2	ΕS			11	scho	o Is			2 6	scho	ls			10	scho	ls			11	sch o	o I s		
E 0 3	ENES		_	5 1	3 clas	sroom	s			32 cl	ssro	m s		2	clas	room	s						
E 0 4	ΕS	•	6 sch	o o I s					2 4	scho	ls			•	10 s	chool	s			10 sch	ools		
E 0 5	ENES		6	44 cla	ssroc	om s				15	class	room	5	Å	148 c	assro	oms						
E 0 6	ΕS	•	3 sch	ools				•	16 s	chool	s		•	6 sch	ools				6 s c	ools	•		
E 0 7	ENSS	•	71 cla	ssro c	m s			•	61 cl	assro	om s		•	17 cl	assro	oms							
E 0 8	S S	•	9 sch	ools		•	8 s c l	ools		2 sch	ools					11 s	chool	6		10 s	chool	6	
E 0 9	ENSS		3	5 cla	s s r o o	m s				52 cl	assro	oms	۷	5 clas	sroor	n s							
E 1 0	S S	•	23 s	ch o o l					1 9	scho	ols			8 s c	ıools	Â		8 s c	hools	Â			
E 1 1	ENSS			56	4 clas	s room	s		10	5 cla	ssroo	m s	1 9	clas	room	s							
E 1 2	S S		•	9 s c	ools		9 sch	ools		12 sc	nools			•				1	sch o	ols	•		•
S 0 1	S T																		stad	ium,	1 S / 3	years	
S 0 2	D P		1 3	play	grou	rds		•	13	playg	roun	ds		۲	6 pla	ygro	nds		•	6 pla	ygrou	nds	
S 0 3	NP			39 pla	ygro	unds			3	8 pla	/grou	n d s		A		•	37	playa	roun	d s			
S 0 4	RP			196 p	aygr	c u n d s			1	87 pla	ygroi	ınds		94	playą	roun	d s		94	play	groun	d s	
S 0 5	S T		2	Stadi	um s		•		2 stad	ium	1 S / 3	years		•				1 s 1	e adiur	0			
S 0 6	D P		2 9	play	grou	rds			16	playg	roun	ds		6 p	ygro	• unds					5 p l	aygro	● unds
S 0 7	N P			86 pla	ygro	unds			4	9 play	grou	nds		• 16 p	laygr	pund		1	7 pla	∙grou	nds		•
S 0 8	RP			429 p	aygr	cunds			2	48 pla	ygro	ınds		8 0	playg	roun	ds		83	playg	roun	i s	
S 0 9	S T			stad	ium,	1 H / 3	years		3 s	tadiu	m , 1 H	/3 ye	ars	1 sta	dium	, 1 H / S	year	s					
S 1 0	DP	33	playg	roun	ds			•	11	playg	round	l s		4 pla	ygro	• unds					5 p l	aygro	● unds
S 1 1	N P			98 pla	ygro	unds			3	4 play	grou	nds		1 3 p	laygr	unds		1	3 pla	g r o u	nds		•
S 1 2	RP			492 p	aygr	c u n d s			1	69 p I	aygro	unds		63 p	laygr	ounds			6	4 play	g r o u	nds	

Table 8.15: Proposed implementation plan for educational and sport facilities

•	1	1	L			1		1					1	1	1		· · · · · · · · · · · · · · · · · · ·				•	•	
G 0 1	СБР			l city	parks					4 city	parks							3 city	park	5			
G 0 2	DGP	13	park	6					1 3	parl	s				4 p a	rks		4 p a	'k s		4 p a	rk s	
G 0 3	NGP			39 pa	rks				3	8 parl	S			1 2 p	arks			12 μ	arks	Î	13 r	arks	
G 0 4	RGP			163	ots				1	56 lot	s			781	t s				7	9 lots			
G 0 5	CGP		9 c i	ty pa	rks				5	city pa	rks			1	city p	arks				2	city p	arks	•
G 0 6	DGP	29	park	s					16	park	s			•	6 p	arks			5 p	arks			
G 0 7	N G P	•	· · · ·		86 pa	rks			49	park	s			11p	arks	ĥ	•	11 p a	rks		1	1 par	ks
G 0 8	RGP	<u> </u>		35810	ots			•	2	06 lot	s			68 1	t s			-	6	8 lots	_		
G 0 9	СБР		10 ci	ty pa	rks			•	3	city p	arks			2	city p	arks				1	city p	arks	•
G 1 0	DGP	33	park	s					11	park	s			•	5 p a	rks			4 p a	rks			
G 1 1	N G P				98 p a	rks			34	park				8 p a	rks		•	8 p a 1	ks		1	0 par	ks
G 1 2	RGP			410	ots				1	4.1 n la	vgro	nds		•	5.2	lote		-		_	52.10	+ c	
C 0 1	S_L		1 lib	rary		1 1 1	rary	•	1 lib	rary	•	1 lib	rary	•		1013	1 lib	rary	•	•	1 lib	rarv	•
C 0 2	М РСН		4 h a	ls		1 115	lary	•	4 h a	ls		1 115	rary	•	1 h a	1		1 hal		•	1 ha	l	•
C 0 3	СОДТ							•	1		•	1		•	1 11 4	1 cin	0 m 3	•				1 cir	
C 0 4	S L			rario.	c	1 (11	n e m a	•		raries		1 011	iem a	•		1 011							
C 0 5	–		9 6 2	Le.				•	5 110	l c				•				1 6 6 1			rary		
C 0 6	СОРТ		4 cin	0	c			•		0				•	тпа					•	1 11 4		
C 0 7	S I		4 CTN	e mas	5			•	3 CTH	e m a s	• •	_		•	_		•	1 CIN	em a			 	
	D _ L		5 110	raries	s			•	1 lib	rary		1 lib	rary	• •	1 lib	rary		_		• •	_		•
0.0.8	мрсн		10 h	alls					3ha	ls					1 ha	1		1 ha	1		1 ha		
C 0 9	СОDТ		5 cin	em as	s				1 cin	e m a		1 cin	e m a									1 cir	e ma

Table 8.16: Proposed implementation plan for Green parks and cultural facilities

CHAPTER 9: ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

9.1 Objectives of Initial Environmental Examination (IEE)

In developing Mauritania Nouakchott Urban Infrastructure Development Plan, we will conduct an environmental survey at the Initial Environmental Examination (IEE) level covering the entire study area. The targeted infrastructure for the IEE are selected from the master plan.

9.2 Outline of Urban Planning Project Giving Environmental Society Impact

(1) Urban expansion scenario

In the Urban Master Plan project, the basic direction of urban development in Nouakchott City was discussed with residents of each commune. As a result, "Tripolar scale model at the metropolitan scale" was adopted from other two scenarios: The business as usual scenario and the bipolar development model supported by satellite cities.

The outline of the tripolar scale model is that the form of the ring road is modified in order to include vast public land reserves, in the south of the Tarhil district which will develop as social residential area, agriculture and agricultural distribution hub, and the area near the northern international airport will be developed as an area where international service can be provided. In other words, it is a development scenario that continuously connects the three poles of the northern international area, the urban commercial area, and the southern residential area. In this scenario, Green Belt and ring road are regarded as the growth limit of planar urban area expansion, and in principle, it will expand urban infrastructure in this ring road.

(2) Transport infrastructure

For expansion of urban areas proposed in urban planning master plan, roads and public transportation that connect existing urban areas and urban areas to be expanded are considered to be necessary. There is serious traffic congestion currently in the city center, traffic volume will double in 2040, and alleviation of traffic congestion is an important issue in the future urban planning. The proposals related to traffic infrastructure development are shown in the table below. Among them, road improvement (ring road, bypass road etc.) at the future development area, road improvement (establishment of road marking installation, intersection improvement) and improvement of bus transportation (bus vehicle introduction, bus terminal, bus stop) are priorities. In this IEE, evaluation is carried out for these priority projects. More detailed evaluation will be carried out at feasibility study.

No.	Proposed project	Main maintenance items	Priority*
1	Road network development	· Carriage way	M/L
		· Non-electric transport machine (NMT)	M/L
		· Review of cross section of road	M/L
		· Road maintenance in future development areas (ring road,	S-Priority
		bypass road)	
2	Traffic management plan	· Installation of road signs	S-Priority
		· Intersection improvement	S-Priority
		· Introduction of parking management system	M/L
		· Promotion of modal shift	M/L
		· Introduction of ITS (Intelligent Transport System)	M/L
		· Introduction of vehicle inspection system	M/L
		· Traffic safety (eradication of unlicensed driving, traffic safety	M/L
		campaign)	
3	Strategic public	· Introduction of BRT	M/L

Table 9.1: Proposed Project Outline (Transport infrastructure)

No.	Proposed project	Main maintenance items	Priority*
	transportation system	· Construction of city center bus terminal	S-Priority
	development plan	· New bus stop	S-Priority
		· Introduction of bus vehicles	S-Priority
		· Improvement of operation and maintenance of bus	S-Priority
		· Introduction of public transportation information provision	M/L
		system	

*M/L : Medium / Long, S: Short

(3) Water Supply

Water supply is one of the constraints for socioeconomic development in Nouakchott City, located in the desert area. Water supply in the city should be the most important infrastructure for citizens. The city has two water sources which are "Iddini ground water source" and "Senegal river water source (Aftout project)", which will improve the water supply capacity until 2040 by expanding the water supply capacity of existing facilities.

- Expansion of Aftout system such as installation of booster pump and maintenance of second water treatment plant.
- Maintenance of new distribution facilities such as installation of water pipes, construction of distribution tanks, installation of piping and water meters.

9.3 Environment Category

This project is a city urban master plan development and is classified as category B under the definition of "JICA Environmental and Social Consideration Guidelines in 2010".

Contents	Category A	Category B	
	Objects of Environmental Impact Study	Objects of Environmental Impact Statement	
1.Water	• Supply of drinking water to urban areas	• Supply of drinking water to the semi-urban area	
	Irrigation and drainage project (target area of	Irrigation and drainage project (target area less	
	over 200ha)	than 200ha)	
	Plumbing business	Water management plan	
	Construction and modernization project of water	Water related action plan	
	supply facilities	 Development of shallow water and alluvial 	
		plains	
2.Sanitation	Rain water drainage project	Hygiene management master plan	
	Solid waste management project.	Strategic sanitation plan	
10.Public	Road construction	Construction and repair of main trunk lines	
Works	Railroad construction	(main tracks)	
	Airport construction	• Repair of airport, harbor, shipyard, warship	
	Port Construction	repair shop	
	 Shipbuilding and warship repair workshop 	Repair of bus station and train station	
	Bus stop construction		
	 Railway station construction 		
	Infrastructure expansion project		
11.Urban	 Restructuring business in rural areas 	Development and Urban Planning Master Plan	
development	Cleaning business, urbanization business,	(SDAU)	
	various business	• Land use plan	
	Introduction of campgrounds or caravan parks	Introduction of campground or caravan park	
	(over 200 locations)	(less than 200 places)	
	• Building permit (over 3,000 m ²)	• Building permission (less than 3,000 m ²)	
	Architecture within 500 m from the coast	Land redevelopment project for building (less	
	• Land redevelopment project for building (3,000	than 3,000 m ²)	
	m ² or more)		

Table 9.2: Category classification for EIA

9.4 The Situation of the Environmental Society as the Baseline

(1) Air pollution

There is no quantitative data on air pollution, but it is presumed that exhaust gas volume and greenhouse gas emissions increase as traffic volume increases.

(2) Groundwater pollution

Groundwater contamination within the city area is a serious situation. It is due to underground penetration of domestic wastewater, as a result of population increase, expansion of urban area, shortage of maintenance of sewage system and aging. Also, because the groundwater level is near the surface of the earth, sewage water appears on the ground surface during precipitation, causing a bad odor and sanitary condition deterioration.

(3) Soil contamination

Soil contamination is also a serious situation because of the groundwater pollution. In addition, low altitude areas near the coast are undergoing salt damage due to seawater erosion, which is a cause of inhibition of plant growth and corrosion of building foundation.

(4) Waste

Solid waste management is the responsibility of each municipality under the jurisdiction of the Ministry of the Interior. In the case of Nouakchott, the Nouakchott Municipal Council (CUN) and a private company (under contract with CUN) collect waste and manage the landfill.

The final waste disposal site is located approximately 25 km east of Nouakchott, and the contractor carries out three round trips a day with 30 10-ton dump trucks from the relay accumulation point to the landfill site, a distance of approximately 30km. A general door-to-door collection service from houses to a primary collection site is carried out using a donkey cart. The collection fee is about 500 to 1,000 UTM ($190 \sim 380$ yen) a month. However, waste collected from households is often discarded at the neighboring roadsides, and dust is scattered in the transportation route.

(5) Noise and vibration

There is no qualitative data on noise and vibration damage. Because the traffic volume is small compared to the population, it is thought that large influence is not expected at the present stage. Since the traffic volume is expected to increase in the future, the influence of road noise may become obvious.

(6) Ground subsidence

Because the site is a sandy ground, the risk of subsidence is small. There is a possibility of liquefaction accompanying the earthquake, but no big earthquake has occurred. Although it is different from ground subsidence, there are artificial depressions caused by illegal collection of high quality sand as a construction material.

(7) Bad odor

Sewage odor may be confirmed when wastewater in groundwater is exposed after precipitation.

(8) Topography/geology

The Nouakchott city area can be outlined as a low altitude coastal city located in a desert climate, but it is divided into coastal areas, lowlands, urban areas and inland desert areas due to its topographical features.

1) Coastal area

Mauritania country faces the Atlantic Ocean, and there are coastlines long in the north and south. All coastlines in the Nouakchott area are sandy beaches. Sand dunes with a height of 3 to 5 m have developed on the sandy beach and it is said that they play a role as a breakwater against the flood from the sea, but in recent year illegal collection of sand dunes has been rampant, and loss of sand dunes is a concern. Facilities such as fish market, industrial port, hotel and factory are seen in the coastal area. The

industrial port was constructed with help from China, which influence sediment deposition to change at the coastline.

2) Lowlands

Although the Nouakchott city area is low altitude overall, there are many lowland areas below the sea level, which is a place where flood damage is likely to occur. Major lowlands include the northern part of the Nouakchott region, coastal hinterland and the land side lowland part in the northeast of the city. Since the groundwater is linked with seawater, flood damage increases when the influence of high tide and rainfall overlap. Especially in coastal lowlands, flooding damage frequently occurs, so there are cases where temporary drainages are made by residents.

3) Urban areas

The center of the city is located where it transit from coastal hinterland to land side desert area. Altitude rises along the land side, lending to land and north and south desert areas.

4) Inland desert areas

Desertification around the city and movement of the dunes are problems, and countermeasures such as installation of green belts are under way. On the other hand, the desert is an important recreational site for Nouakchott citizens.

5) Geology

The geology of Mauritania consists of five geological zones, and the geological zone of Nouakchott city is located in the Atlantic coast basin consisting of Cenozoic sedimentary rocks. The Atlantic coast sedimentary basin is located west of the Mauritanian variability zone and is largely composed of the lower Cretaceous to Quaternary sedimentary rocks and sediments (BRGM, 1975). At shallow depths, the geological composition of the Nouakchott city area is the same, the sand layer and then the limestone layer in the surface layer portion continue to the altitude of about -35 m, which forms the first aquifer (MDRE, 2004).

6) Water Condition

There is no river in Nouakchott city area. Because rainwater from the land side is extremely small, the invasion of seawater is progressing to about 50 km on the land side. For this reason, groundwater in Nouakchott city has high salt water concentration which causes corrosion of building foundation. And, there is no use of ground water for drinking water or agricultural water in the city area.

(9) Biological and ecological systems

Mauritania country has three nature reserves and two national parks, but they do not exist in Nouakchott city area. Because the land area is a desert climate, animals and plants are limited, in the waters the fishes are rich in biota, boasting the world's most catch. The plants that can grow are mainly dry-tolerant species, Acacia species (Acacia Senegal, Acacia nilotica), Ziziphus Mauritania, Prosopis juliflora, Parkinsonia aculeate, Azadirachta indica, Balanities and the like. The main places where plants can be confirmed within the city area are green areas, street trees, farmlands, orchards, gardens (private spaces), parks/green spaces (public spaces). Varieties cultivated in farmland in the city area are mint, lettuce, leek, tomato, eggplant, carrot and the like.

(10) Water use

There are Idini groundwater and Senegal River for the sources of Nouakchott. Because the groundwater in the city contains seawater, people do not use groundwater as drinking water in the city.

(11) Traffic accident

As traffic vehicles increase, traffic accidents in the city are increasing.

(12) Global warming

The estimated carbon dioxide emissions of Mauritania is 1635.9 kt in 2005 and 2,564.3 kt in 2016, and

it is on the rise. This source is due to consumption of solid, liquid and gaseous fossil fuels²⁵.

(13) Regional economy such as employment and livelihood measures

The gross domestic product of Mauritania is 5.390 million USD, which is 1489 dollars per capita²⁶. By industry, 22% for the primary industry, 36% for the secondary industry and 42% for the tertiary industry²⁷.

According to SDAU survey in 2003, in the formal sector in Nouakchott, the largest sector in terms of employment is the fisheries sector which employs 17 thousand people, followed by government agencies which employs 15 thousand people, followed by the transportation sector (such as taxi driver and truck driver) which employs 1.1 thousand people. On the other hand, the number of employees in the agriculture sector was only 100 people, which is extremely low.

(14) Land Use and regional resource utilization

Land in the city is regarded as the most important asset for families, and according to the 2014 household survey, 64.4% have houses. Land speculation is also generalized, 29.8% in private rental housing and 2.5% in social housing are leased. Most of the rental houses are located in downtown Northern Nouakchott.

(15) Existing social infrastructure and social services

According to a household survey carried out in 2017, the city service penetration rate (USPR) of Nouakchott is 91.7% in terms of electricity, 53.4% in terms of piped water distribution, 3.9% in sewerage and 24.3% in solid waste collection service. The average value of USPR is 43.3%, but the variation is large, and it is around 15% in residential areas along Adrar road and Boutilimit road.

(16) The poor, indigenous peoples, minorities

In terms of employment and household income, the spatial distribution has characteristics in relation to income and income sources. A wealthy family lives in a crescent shaped area from the fishing port to the old airport. Middle-income households and low-income households live in the center or margin of the city a lot.

Since Nouakchott is a relatively new city, indigenous peoples and ethnic minorities are not seen. However, there are many people who are migrating from the local area and often live along the main road entering the city, and there is bias in the place of residence.

(17) Uneven distribution of damage and benefits

In Nouakchott, social characteristics tend to concentrate by district. In some cases like the shantytown of Tervragh Zeina, the problem of irregular illegal residence spreading in some areas of the city may accumulate.

(18) Gender

Primary school enrollment rate in 2014 was 75.08%. Adult literacy rate in Mauritania was 52.12% in 2015^{28} . The proportion of women in the national assembly is $25.2\%^{29}$.

(19) Health

Neonatal mortality rate for Mauritania was 33.7 deaths per 1,000 live births (2016). Infant mortality rate was 54.4 deaths per 1,000 live births (2016). Maternal mortality ratio was 602 deaths per 100,000 live births $(2015)^{30}$. According to UNICEF's nutritional situation data in 2012, 12.2% of children under 5

²⁵ https://knoema.com/atlas/Mauritania/CO2-emissions

²⁶ IMF World Economic Outlook Database

²⁷ Nouakchott, the future as challenge,2015

²⁸ https://knoema.com/atlas/Mauritania/Primary-enrollment

²⁹ https://www.womenpoliticalleaders.org/parliament/mauritania-national-assembly/

³⁰ https://knoema.com/atlas/Mauritania/Neonatal-mortality-rate

years old were affected by wasting, 22.5% were stunted and 20.3% were underweight³¹. And, it is estimated that measles vaccination coverage is 70% of infants³².

9.5 Mauritania's Environmental and Social Consideration System and Organization

(1) Environmental Law

Mauritania's environmental law has been enacted as LAW No. 2000-045 / Pertaining to Environmental Code in July 2017 with the aim of harmonizing socioeconomic development with environmental conservation. The general rule of Chapter 1 of the Environmental Law stipulates that the following five items are implemented as a national environmental policy with certainty.

- ① Conservation of biodiversity and appropriate utilization of natural resources
- 2 Dealing with desertification
- ③ Prevention of environmental pollution
- ④ Improvement of conservation of living environment
- (5) Harmony between development and natural environmental protection

Chapter 2 is about the management of the national environmental policy. It describes the purpose of the establishment of the Ministry of the Environment, national environmental strategy, role of National Environmental and Development Council, National Environmental Action Plan, EIA and Intervention Fund for the Environment.

Chapter 3 is about preservation of natural environment and environmental resources. Chapter 4 shows prevention of environmental pollution and environmental degradation, Chapter 5 is about complying with environmental laws and penalties, and Chapter 6 describes other issues.

The Ministry of Environmental Sustainability Development ("MEDD") is relatively new, it was established in 2000. For this reason, the environmental legal system etc. are in the process of being prepared sequentially while receiving technical support and financial assistance from international organizations such as GIZ (Germany International Cooperation Corporation) and UNEP (United Nations Environment Program).

(2) Environmental Sstandard

At present, environmental standards and drainage standards are not stipulated.

(3) Environmental Impact Assessment (EIA)

1) Related Ministerial Order of EIA

Decree No. 2004-94 on the Environmental Impact Assessment, November 2004, for EIA indicated in the above environmental law Decree No.2007-105 on the Modification of Environmental Impact Assessment on Decree No. 2004-94 has been enacted.

2) Target project of EIA

According to ministerial ordinance concerning EIA, EIA is mandatory in all projects. The category classification by the EIA target project is shown in Annex 1 of ministerial ordinance concerning modified EIA. The definitions of A and B category are as follows;

A category: activities subjected to Environmental Impact Study.

B category: activities subjected to an Environmental Impact Statement.

Generally, the A category is an activity related to the construction implementation, the B category is an activity related to small scale construction and planning.

³¹ https://www.unicef.org/infobycountry/mauritania_statistics.html

³² https://data.unicef.org/wp-content/uploads/country_profiles/Mauritania/immunization_country_profiles/immunization_mrt.pdf

3) EIA process in Mauritania

The procedure of EIA in Mauritania begins with the entrepreneur submitting TOR to MEDD. After that, Environmental regulatory bureau checks the project outline and TOR. And if there is no deficiency, an MEDD-approved consultant entrusted with entrepreneur conducts EIA based on TOR. According to MEDD, what is emphasized in the process of EIA is to hold a public consultation such as public hearings, informative briefing sessions and to draw up a wide range of opinions.

4) Example of EIA report description

According to Annex II of Ministerial ordinance on EIA, examples of topics in the EIA report are as follows;

Table 9.3: Example of EIA Report Topics

0.	Summary
1.	Legislative, legal and institutional framework
2.	Overview of the project
3.	Baseline data
	• Air quality and noise
	Flora and fauna
	Geographic situation such as topography, geology, hydrology
	Economic and social and cultural
	Risk assessment
4.	Impact assessment
5.	Analysis of alternatives
6.	Environmental management plan
	a) Relaxing and mitigating effects
	b) Cost Evaluation
	c) Pollution prevention method
	d) Human resources development
7.	Methods for public construction and residents participation

In Mauritania, EIA is conducted in mining development, port development and fishing port development. There are no cases of EIA implementation with urban development and road improvement.

The following table shows examples of EIA described in the development of the Banda gas field off Nouakchott and the development of the gas power generation facility in the north of the city.

Table 9.4: Case examples of EIA report on gas power generation construction project

1.	Introduction
2.	Administrative and regulatory framework
3.	Project description
4.	Environmental and socio-economic baseline
5.	Impact identification and assessment
6.	Environmental management plan
7.	Public consultation
8.	References

Source: Tullow Petroleum (Mauritania) Pty Ltd, Banda Field development - Gas Project Environmental Impact Assessment, August 2013

(4) Strategic Environmental Assessment (SEA)

There are no rules of strategic environmental assessment in Mauritania. However, since understanding of the local community is important for construction of public infrastructure, describing the method of participation by residents in the EIA is required.

(5) Environmental strategy and Action plan

1) Stratégie de Développement Durable (2006)

As the sustainable development strategy for the whole country of Mauritania, MEDD developed "Strategic National Development Durable (2006)" which shows the vision for the decade until 2015. This sustainable development strategy consists of the following five basis axes;

- Mauritania strengthens institutional and political capacity to effectively manage the environment and natural resources.
- Mauritania promotes sustainable access to basic services as a strategic means of combating poverty.
- Mauritania, aware of the multi-sectorial and multi-scale challenges (from the local to the global level) of sustainable development, promotes integrated and participatory management at all levels for the efficient use of its natural resources.
- Mauritania manages its local and global environment in accordance with its commitments under international conventions.
- Mauritania develops funding mechanisms for its National Plan of Action for Environment and Sustainable Development.
- 2) Plan d'Action National pour l'Environnement (2006)

The Action Plan for Environment shows a concrete action to realize the National Strategy for Sustainable Development. In order to preserve valuable natural resources of the nation, its contents covered a wide range of genres, including strengthening of the management system, poverty alleviation, promotion off integrated participatory management, compliance with international treaties, development of a funding mechanism, but in practice, there was a shortage in terms of human and financial resources, in particular.

(6) Legal System of resettlement

Resident relocation is complicated as Mauritania's land system has a customary land ownership system as many African countries do. Although not listed in the EIA report based on the environmental law, according to interview with MEDD, as a part of Economic and Sociocultural Environment, a description of the impact assessment on resettlement relief is necessary. When resettlement in Mauritania, correspondence based on (1)Loi No. 60-139 du 2 Aout 1960 et textes 2)3) is supposed to be carried out. However, the legal system for involuntary resettlement relocation has not been fully developed. Therefore, according to the existing case, abbreviated resettlement action plan has been created in accordance with AfDB's Involuntary Resettlement Policy. And, in the case of agricultural irrigation development, it is described that the study was conducted in accordance with the World Bank's safeguard policy, Operation Policy OP 4. 12, Involuntary Resettlement.

(7) Requirements for EIA Report by JICA Guidelines and Mauritanian regulations

Contents	JICA Guidelines for Environmental and Social Considerations	Mauritania Regulations
Permission		
EIA	In the environmental checklist, four(4) main	Under the Environmental Law and other EIA
	check items are shown.	related Ministry order, implementation of EIA is obligatory for all projects.
SEA	It is stated that SEA is applied in the full investigation stage.	There is no regulation concerning the application of SEA in the Environmental Law.
Consideration of alternatives	Consideration of alternatives is required.	Under the Environmental Law, examination of alternatives is required.
Explanation to	Regarding the content and impact of the project,	Under the Environmental Law, emphasis is
local stakeholders	two check items, such as whether information	placed on holding a wide range of opinions by
	was made publicly disclosed to local	holding public consultation such as public
	stakeholders, whether they gained	hearing and residents briefing session.
	understanding, and whether comments from	
	residents, etc. were reflected in the contents of	
	the project.	
Information	In order to ensure accountability and	Under the Environmental Law, it is stated that
disclosure	participation of various stakeholders,	when the Public Consultation is held, it is
	information disclosure on environmental and	necessary for business operator to publicize the
	social considerations should be conducted under	results via the mass media such as radio,
	the cooperation of partner country.	television, newspaper etc. to promote

Table 9.5: Requirements for EIA Report by JICA Guidelines and Mauritania Regulations

Contents	JICA Guidelines for Environmental and Social Considerations	Mauritania Regulations		
		participation. The EIA report will be disclosed. Browsing is possible at each commune office		
Pollution control		blowshig is possible at each commune office.		
Air quality	Confirm whether targeted infrastructure facilities satisfy emissions standards and environmental standards of the recipient country.	According to the description example of the EIA report based on the environmental law, the impact assessment concerning air quality is listed in the entry item.		
Water quality	Confirm whether targeted infrastructure facilities satisfy leachate water standards and environmental standards of the recipient country.	According to the description example of the EIA report based on the environmental law, the impact assessment concerning water quality is listed in the entry item.		
Waste	Confirm the waste from targeted infrastructure facility is properly disposed according to the regulation.	Although not listed in the EIA report based on the Environment Law, according to interviews with MEDD, a description of waste is also necessary.		
Soil contamination	Confirm that soil and groundwater contamination does not occur due to drainage or leachate water from targeted infrastructure.	According to the interview from MEDD, a statement on soil contamination is also required although it is not listed in the EIA report based on the environmental law.		
Noise and vibration	Confirm that noise and vibration from targeted infrastructure can satisfy the reference value of the partner country.	According to the description example of the EIA report based on the environmental law, an impact assessment concerning noise is listed in the entry item.		
Grand subsidence	When pumping up a large amount of groundwater, confirm whether there is a possibility of ground subsidence.	Although not listed in the example of the EIA report based on the environmental law, according to interviews with MEDD, a description about land subsidence is also necessary.		
Bad odor	Confirm existence of maldor source and countermeasure.	Although not listed in the example of the EIA report based on the environmental law, according to interviews with MEDD, a description about bad odor is also necessary.		
Nature environment				
Reserve	Confirm that the target site is located within the protected area prescribed by the applicable laws or international treaties, etc.	Although not listed in the example of the EIA report based on the environmental low, according to the interview from MEDD, the description of the positional relation between the site and the protected area etc. is required at the explanation column of the project.		
Ecosystem	Four major check items are shown, including whether the site includes virgin forests, tropical natural forests, ecologically important habitats such as coral reefs, mangrove wetlands, tidelands etc.	According to the description example of the EIA report based on the environmental law, impact assessment on animals and plants is listed in the entry items.		
Water condition	Confirm that the flow of surface water and groundwater will be adversely affected by changes in the water system by the project.	According to the description example of the EIA report based on the environmental law, the evaluation items on the topography and geology are listed.		
Topography Geology	Confirm whether the project will modify the terrain and geological structure of the site and its surroundings on a large scale.	According to the example of the EIA report based on the Environmental Law, the evaluation items on the topography and geology are listed in the items described.		
Social environment				
Resettlement	Confirm whether voluntary resettlement will occur as the project is implemented. In case of	Although not listed in the EIA report based on the environmental law, According to interview		

Contents	JICA Guidelines for Environmental and Social	Mauritania Regulations
	occurrence 10 major check items are indicated	with MEDD as a part of Economic and
	including efforts to minimize the impact of	Sociocultural Environment, a description of the
	relocation	impact assessment on resettlement relief is
		necessary
		When resettlement in Mauritania
		correspondence based on (1) J of No. 60, 130 du
		2 A out 1960 at taxtas $2(3)$ is supposed to be
		2 Add 1900 et textes 2)5) is supposed to be
		La service de la sel service for inservice terre
		However, the legal system for involuntary
		developed
		Therefore according to the minting according
		I herefore, according to the existing case,
		abbreviated resettlement action plan has been
		created in accordance with AtDB's Involuntary
		Resettlement Policy.
		And, in the case of agricultural irrigation
		development, it is described that the study was
		conducted in accordance with the World Bank's
		sateguard policy, Operation Policy OP 4. 12,
		Involuntary Resettlement.
Livelihood	Confirm whether the project will adversely	According to interview with MEDD, it is
	affect lives of residents. If necessary, confirm	necessary to describe the impact assessment of
	that consideration is given to mitigate the	livelihood as part of Economic and
	influence.	Sociocultural Environment, although it is not
		listed in the EIA report under the Environmental
		Law.
Cultural heritage	Confirm by project whether there is a risk of	According to interviews with MEDD, although
	damaging archaeological, historical, cultural,	it is not described in the example of the EIA
	religious valuable heritage, historic sites etc	report based on the Environmental Law, as a
	Also, confirm whether measures taken in the	part of the Economic and Sociocultural
	country's national law are taken into account.	Environment, a description of the impact
		assessment on cultural heritage is necessary.
Landscape	If there is a landscape to be considered, it will	Although it is not mentioned in the example of
	be checked whether it will adversely affect it.	the EIA report based on the Environmental Law,
	When there is an influence, confirm whether	according to the interview from MEDD, as a
	necessary measures can be taken.	part of the Economic and Sociocultural
		Environment, a description of the impact
		assessment on the landscape is required.
Ethnic minorities,	Confirm whether care is taken to reduce the	According to interviews with MEDD, it is
Indigenous people	influence on ethnic minorities, culture of	necessary to describe the impact assessment on
	indigenous peoples, lifestyle.	ethnic minorities and indigenous peoples as part
		of Economic and Sociocultural Environment.
Working	Confirm whether the law concerning the	Although it is not listed in the EIA report based
environment	working environment of the country to be	on the Environmental Law, according to
	observed in the project is observed.	interview with MEDD, it is necessary to
		describe the impact assessment on ethnic
		minorities and indigenous peoples as part of the
		Economic and Sociocultural Environment.
Others		
Impact during	Confirm whether mitigation measures are	According to the example in the EIA report
construction	prepared for contamination such as noise,	based on the Environmental Law, it is necessary
	vibration, turbid water, dust, exhaust gas, waste,	to describe the measures of reducing the impact
	etc. during construction.	during construction and measures of mitigation.
Monitoring	Among the above environmental items, confirm	According to the description example of the
	whether the monitoring plan and	EIA report based on the Environmental Law,

Contents	JICA Guidelines for Environmental and Social Considerations	Mauritania Regulations
	implementation of the business operator is to be	activities classified as category A are required to
	implemented for items with potential impacts.	describe environmental pollution control
		measures.
Global	It is stated that if there is an element related to	Although not listed in the example of the EIA
environmental	the problem of global warming, the effect will	report based on the Environmental Law,
problems	be confirmed.	according to interview with MEDD, a
		description on climate change is necessary.

(8) Organization Structure to Implement Environmental and Social Considerations

1) Ministry of Environmental Sustainability Development (MEDD)

The organization chart of MEDD is shown in the figure below. Under the minster, adviser and vice minister, there are seven departments. Among them, the department responsible for the review, etc. of EIA is Directorate of Environmental Control.



Source: Listening and preparing team based on Decree No. 2014-055

Figure 9.1: MEDD organization chart

2) Ministry of Hydraulics and Sanitation

The Ministry of Hydraulics and Sanitation has two departments: The Hydraulics Department and The Sanitation Department. The Hydraulics Department consists of urban and rural areas. The Hydraulics Department plans the water supply works of the city, and practical affairs such as sale of drinking water, is done by the SNDE (Société National de l'Eau), which is a subordinate organization of the urban sector founded in 2001.



Source: preparing team based on listening

Figure 9.2: Organization of Ministry of Hydraulics and Sanitation

3) Office National de l'Assainissement : ONAS

ONAS (Office National de l'Assainissement) has been established as a subsidiary of the Ministry of Hydraulics and Sanitation, which is in charge of maintaining and managing the existing sewerage treatment plant in Nouakchott city and practicing sewerage treatment.

9.6 Consideration of Alternatives

Since the proposed infrastructure is at the planning level before the feasibility study, alternative plans have not been considered. However, in the urban structure plan, alternative plans were studied as part of SEA through public consultation.

9.7 Scoping

The urban planning master plan shows infrastructure development policies but does not consider concrete infrastructure plans. The scoping studies conducted assessed the impact of the proposed infrastructure on environment and society.

(1) Transport Infrastructure

The scoping study was conducted based on the environmental and social situation of Nouakchott cities, assuming priority projects in the proposed transport infrastructure (ring road, bypass road improvement, bus transportation improvement). Since the results of environmental measurements are insufficient, the survey method was basically based on field surveys, interviews with relevant organizations and reading existing documents.

	Evaluation					
Influence item	Construction	Operation	Reason for Evaluation			
	Phase	Phase				
Environmental pollution						
1.Air pollution			Operation phase: Future traffic volume is expected to increase.			
-			However, negative consequences are suppressed because it is thought			
	D	B-	that traffic congestion is alleviated by introducing ring road, bypass			
			road and introduction of public transportation and overall air			
			pollution is improved.			
2.Water pollution	D	D				
3.Waste	D	D	-			
4.Soil contaminant	D	D	_			
5.Noise and vibration			Operation phase: There is a possibility that the effect of noise and			
	B	B-	vibration may occur due to an increase in traffic volume and			
	2	2	maintenance of arterial roads.			
6 Ground subsidence	D	D				
7 Bad adar	D	D				
8 Bottom sediment	D	D	_			
Natural anvironment	D	D				
9.Reserve	C	G	Construction/Operation phase: I here are no national parks or			
	C	C	protected areas designated by the country in the target area, but there			
			is a possibility that it will be affected if it is built in the green belt.			
10.Biodiversity and			<u>Construction/Operation phase :</u> There are no national parks or			
Ecosystem	С	С	protected areas designated by the country in the target area, but there			
			is a possibility that it will be affected if it is built in the green belt.			
11.Water condition	D	С	-			
12.Topography and	D	C	-			
Geology	D	C				
Social environment	Social environment					
13.Resident resettlement	р	C	Before construction phase For road construction, there is a			
	D-	C	possibility that it is necessary to resettle residents or acquire land.			
14.The poor			<u>Construction phase</u> As employment occurs for road construction,			
			positive influences arise.			
	B+	A+	Operation phase As road development improves smooth			
			circulation and urban development, new employment opportunities			
			and livelihoods may be created.			
15.Ethnic minorities and	P	P	-			
indigenous peoples	D	D				

 Table 9.6: Scoping of Transport Infrastructure

	Evaluation		Reason for Evaluation
Influence item	Construction Operation		
	Phase	Phase	
16.Regional economy			<u>Construction phase</u> As employment occurs for road construction,
such as employment and			positive influences arise.
livelihood groups	B+	A+	Operation phase As road development improves smooth
			circulation and urban development, new employment opportunities
			and livelihoods may be created.
17.Land use and regional			Before construction/construction/operation phase: Changes in the
resource utilization	С	B^+	use of land in the municipalities occur due to roads and public
			transportation facilities that are constructed.
			Transportation facilities proposed will revitalize the area.
18.Water use, water right	С	С	_
and right to join			
19.Esising social			
infrastructure and social	С	С	-
services			
20.Scocial organizations			Before construction/operation phase : There is a possibility that the
such as social capital and	B-	С	interests of the local residents, such as the route of the main road and
regional decision-making			the position of the bus stop, may conflict.
organizations			
21.Uneven distribution of			Before construction/operation phase: While the improvement of ring
benefits and damage	B-	С	roads and public transportation contributes to the lives of local
			residents, benefits and damage will be unevenly distributed if residents
			are affected by relocation or land acquisition
22.Conflict of interest	B-	С	Before construction/operation phase: If benefits and damage are
within the region			unevenly distributed, conflicts of interest within the region may occur.
23.Cluture heritage	D	D	-
24.Landscape			Before construction/operation phase: There is nothing registered in
			the target area as an archaeological or historical heritage, but since
	B-	С	there are many mosques, it is necessary to consider harmony with the
			surrounding landscape at the time of road planning. In addition,
			consideration is necessary because partial increase of traffic volume
			may have a negative influence on the landscape of the area.
25.Gender	D	D	-
26.Child's rights	D	D	-
27.Infectious diseases	С	С	_
such as HIV/AIDS			
28.Working environment	С	B-	<u>Construction phase</u> Consideration for workers engaged in
			construction is necessary.
Others			
29.Traffic accident			Construction phase Traffic accidents are suppressed because traffic
	С	B+	congestion is alleviated by improvement of arterial roads and public
	-		transportation, but there is also the possibility of accidents on new
			roads.
30.Transboundary impact			Construction phase Suppression of global warming gas generation
and climate change	С	С	can be expected by alleviating traffic congestion, but its effect amount
			is unknown.

Notes: A + / -: Significant positive/negative impact is expected

B + / -: Some positive/negative impact is expected to some extent

C: Extent of positive/negative impact is unknown

D: No impact is expected

(2) Water supply

The scoping study was conducted based on the environmental and social situation of Nouakchott cities, assuming priority projects in the proposed water supply infrastructure (maintenance of the second water treatment plant, boost pumps, city water distribution facilities). Since the results of environmental

measurements are insufficient, the survey method was basically based on field surveys, interviews with relevant organizations and existing documents.

	Evaluation			
Influence item	Construction Operation		Influence item	
	Phase	Phase		
Environmental pollution				
1.Air pollution	D	D	-	
2.Water pollution	D	D	_	
3.Waste			Operation phase : Although it is expected that sludge will be	
			generated from the water purification plant, the capacity of the	
	D	С	waste disposal site is sufficiently secured and the influence is	
			small.	
4 Soil contaminant	D	D		
5 Noise and vibration			Operation phase : There is a possibility that the poise from the	
	C	B-	nump of the water purification plant will affect the newly	
	C	D	developed residential area	
6 Grand subsidence	D	D		
7 Bad odor	D	D		
8 Bottom sediment	D	D	_	
Natural environment	D			
9 Reserve	D	D	_	
10 Piediversity and Easystem	D	D	_	
11. Water and itier	D	D	Or and the alterna A and the test is a stand in the site and it	
11. water condition	D	С	Operation phase : As groundwater is not used in the city area, it	
10 7 1 10 1			is thought that influence on water elephant is small.	
12. Topography and Geology	D	D	-	
Social environment		1		
13. Resettlement			Before construction phase : Resident relocation and site	
	В-		acquisition may be necessary for construction of new water	
			distribution facilities.	
14. The poor			Construction phase : Since employment concerning various	
	B+	A+	constructions occurs, a positive influence arises.	
	_		Operation phase : Access to sanitary water is improved by	
			maintenance of distribution network.	
15. Ethnic minorities and	D	D	-	
indigenous peoples	D	5		
16. Regional economy such as			<u>Construction phase</u> : $\vec{\mathcal{I}}$ Positive influence occurs because of	
employment and livelihood	B+	C-	employment related to boost pump installation, water purification	
groups			plant maintenance, water distribution work, etc.	
17. Land use and regional	C	D⊥	Operation phase : Urban development will become active by	
resource utilization	C-	DT	maintenance of water supply infrastructure.	
18. Water use, water right and	C	D	Operation phase : Access to sanitary water is improved by	
right to join	C	B+	maintenance of distribution network.	
19. Existing social infrastructure	G	D	Operation phase : Access to sanitary water is improved by	
and social services	C	\mathbf{B}^+	maintenance of distribution network.	
20. Social organizations such as				
social capital and regional	С	С	o	
decision-making organizations				
21. Uneven distribution of			Before construction/operation phase : While the improvement	
benefits and damage		-	of water distribution facilities will contribute to the lives of local	
L C	В-	С	residents, benefits and damage will be unevenly distributed if	
			residents are affected by relocation or land acquisition.	
22.Conflict of interest within the			Before construction/operation phase : If benefits and damage are	
region	B-	С	unevenly distributed, conflicts of interest within the region may	
_			occur.	
23.Cluture heritage	D	D		
	~	-	I	

Table 9.7: Scoping of Water supply

	Evaluation				
Influence item	Construction	Operation	Influence item		
	Phase	Phase			
24.Landscape	С	С	-		
25.Gender	D	D	-		
26.Child's rights	D	D	_		
27.Infectious diseases such as	C C	C			
HIV/AIDS	U	U	—		
28.Working environment		р	Construction phase : Consideration for workers engaged in		
	C	D-	construction is necessary.		
Others					
29.Traffic accident	D	D	-		
30.Transboundary impact and	D	D			
climate change	D	D	_		

Notes: A + / -: Significant positive/negative impact is expected

 $\rm B\,{+}\,{\diagup}\,{-}\,{:}$ Some positive/negative impact is expected to some extent

C: Extent of positive/negative impact is unknown

D: No impact is expected

9.8 Impact Evaluation

In the screening described above, the results of the influence evaluation on the influence items of B- or less, in which negative influences are relatively considered, are shown below.

(1) Transport Infrastructure

Table 9.8: Environmental impacts accompanying the development of traffic infrastructure

Influence item	Evaluation of impact during scoping		Impact assessment based on survey results		Decom for Evolution
Influence item	Construct ion Phase	Operati on Phase	Construct ion Phase	Operatio n Phase	Keason for Evaluation
Environmental poll	ution				
1.Air pollution	D	B-	D	B-	Operation phase: Future traffic volume is expected to increase. However, because traffic congestion is relaxed by the maintenance of ring road and bypass road and the introduction of public transportation facilities, negative influence is suppressed because overall air pollution is considered to be improved.
5.Noise and vibration	B-	B-	B-	B-	Operation phase : There is a possibility that the effect of noise and vibration may occur due to an increase in traffic volume and maintenance of arterial roads.
Social environment	-	_	-		
13. Resident resettlement	B-	С	B-	С	Before construction phase : Resident resettlement and land acquisition may be necessary.
17.Land use and regional resource utilization	С	B+	С	B+	Operation phase : Changes in the use of land in the municipalities occur due to roads and public transportation facilities that are constructed. Revitalization of the area can be cited by improving access to logistics and transportation facilities.
20.Social organizations such as social capital and regional decision- making organizations	B-	С	B-	С	Before construction/operation phase : There is a possibility that the interests of the local residents, such as the route of the main road and the position of the bus stop, may conflict.
21.Uneven distribution of	B-	С	B-	С	Before construction/operation phase : While the improvement of arterial roads and public transportation contributes to the lives of local

benefits and damage					residents, Benefits and damage will be unevenly distributed if residents are affected by relocation or land acquisition.
22.Conflict of interest within the region	B-	С	B-	С	Before construction/operation phase : If benefits and damage are unevenly distributed, conflicts of interest within the region may occur.
28.Working environment	С	B-	С	C C Construction phase : Consideration is needed for workers engr construction, but it is unlikely to deteriorate from the current situat to general construction.	
Others					
29.Traffic accident	С	B±	С	B±	Operation phase : Traffic accidents are suppressed because traffic congestion is alleviated by improvement of arterial roads and public transportation but there is also the possibility of accidents on new roads

Notes: A + / -: Significant positive/negative impact is expected

B + / -: Some positive/negative impact is expected to some extent

C: Extent of positive/negative impact is unknown

D: No impact is expected

(2) Water supply

Table 9.9: Environmental impacts associated with development of water supply infrastructure

Influence item	Evaluation during s Constru ction	of impact scoping Operatio n	Impact as based or resu Construct ion Phase	ssessment n survey ults Operatio n Phase	Reason for Evaluation	
Environmental po	ollution	1 Hase		Thase		
5.Noise and vibration	B-	B-	С	С	<u>Construction/operation phase :</u> In the case of construction of an existing water treatment plant, the influence on the surrounding environment is considered to be small. The influence of noise and vibration is considered to be small as compared with the present situation at the time of construction work and service of the distribution facility in the city.	
	Social	environmer	nt			
21.Uneven distribution of benefits and damage	B-	С	B-	С	<u>Construction/operation phase</u> : While the improvement of water distribution facilities will contribute to the lives of local residents, benefits and damage will be unevenly distributed if residents are affected by relocation or land acquisition.	
22.Conflict of interest within the region	B-	С	B-	С	Before construction/operation phase : If benefits and damage are unevenly distributed, conflicts of interest within the region may occur.	
28.Working environment	С	B-	С	B-	Construction phase : Consideration is needed for workers engage construction, but it is unlikely to deteriorate from the current situat due to general construction.	

Notes: A + / -: Significant positive/negative impact is expected

B + / -: Some positive/negative impact is expected to some extent

C: Extent of positive/negative impact is unknown

D: No impact is expected

9.9 Mitigation Measures

(1) Transport Infrastructure

Table 9.10: Transport infrastructure mitigation measures

	Influence item	Assumed effect	Mitigation plan
Enviro	Air pollution	 Gas emissions increase due to increased traffic volume_o 	 Enhance regulations on automobile emissions Introduction of low pollution vehicles such as fuel cell vehicles

	Influence item	Assumed effect	Mitigation plan		
			 Modal shift from automobile to public transport Traffic Demand Management (TDM) Introduction of Intelligent Transport System (ITS) 		
	Noise and vibration	 Noise and vibration caused by an increase in traffic volume 	 Introduction of appropriate measurement and evaluation system Roadside environmental measures such as maintenance of environment facility zones, installation of low noise pavement, installation of sound insulation walls, etc. 		
Social en	Resident resettlement	• Resident resettlement will occur as the main road is built.	 Appropriate implementation including land acquisition and resident relocation plan formulation, monitoring and evaluation 		
vironment	Social organizations such as social capital and regional decision- making organizations	 Land problems occur. Regional demands complicate the route arrangement of public transportation etc. 	 Appropriate implementation including land acquisition and resident relocation plan formulation, monitoring and evaluation 		
	Uneven distribution of benefits and damage	 Regional benefits and damage are unevenly distributed due to road routes and route arrangement of public transport. 	• We will consult with local communities in advance at the planning stage (implementation of SEA).		
	Conflict of interest within the region	 If benefits and damage are unevenly distributed, conflicts of interest within the region may occur. 	We will consult with local communities in advance at the planning stage (implementation of SEA).		
	Traffic accident	Accidents occur on new roads.	 Promotion of traffic safety education for drivers and residents Installation of traffic signs 		

(2) Water supply

Infrastructure related to water supply can be said to be the most important infrastructure facility for Nouakchott citizen. Improvement of turbo pump, water purification plant, construction works of water distribution buildings themselves are thought to have little influence on pollution from the current city situation, but because they are important infrastructure facilities, benefits and damages may be unevenly distributed and conflict of interest may occur. In order to avoid these, it is necessary to consult with representatives of local communities beforehand in addition to making fair facilities placement plan for citizens.

Table 9.11:	Water	supply	mitigation	measures

	Influence item	Assumed effect	Mitigation plan		
Sc	21. Uneven distribution	If benefits and damage are	• We will consult with local communities in advance at the		
ocial	of benefits and damage	unevenly distributed, conflicts of	drawing stage (implementation of SEA).		
l en	22. Conflict of interest	interest within the region may	Consider this issue at the planning stage so that water		
viro	within the region	occur.	distribution facilities can be distributed fairly to residents		
nme			in the city.		
int					

9.10 Environmental Management Plan and Monitoring Plan

(1) Transport Infrastructure

Because construction of arterial roads may involve resident relocation, the most important monitoring items are implementation of relocation of residents including poor people. The other items are the occurrence of pollution such as air pollution, noise, vibration at the time of service. The draft monitoring plan should be reviewed according to the details of the project at the time of feasibility study, or design and contractor procurement.

(2) Water supply

Since water supply facilities are the most important infrastructure equipment for citizens of Nouakchott,

benefits and damage may be unevenly distributed and conflict of interest within the area may occur depending on the facility arrangement plan. It is necessary to consult with local stakeholders in advance beforehand.

9.11 Sustainability Priority Performance Indicators

In the light of JICA Urban Scope presented in the JICA Research on Sustainable Cities in Developing Countries, urban sustainability issues related to Nouakchott were identified in Section 3.1. From all the identified issues, several issues are selected as "Nouakchott Urban Sustainability Priority Performance Indicators". The selection was made based on the discussion with Technical Working Group members. Criteria for the selection was simple: the indicator is monitorable with the capacity of existing Mauritanian organizations. Table 9.12 shows the list of issues to be monitored.

JICA Urban Scope		Planning		
Theme	Sector	Issue to tackle	issue reference	Selected indicator
1. Various risks caused by sudden	Global environment (at	Sea level rise due to global warming	GE-08	Sea level rise measurement
change	the city level)	Frequent floods, drought, exhaustion of water resources due to climate change	GE-02 and 08	Flooding damage frequency
	Global environment (at the global level)	Global warming	EP-01	GHG emissions
	Environ-mental pollution	Loss of natural environment	UR-04	Area of green space per capita
		Air pollution	EP-01	SOx, NOx, PM 2.5 concentration
		Water quality deterioration	EP-02	Sewage treatment rate / BOD value of urban waters
	Social unrest	Rapid population growth,	SE-01	GINI coefficient
		expansion of regional disparity, urban sprawl, expansion of the gap between rich and poor	UR-06	Percentage of shantytown population
		Violent social change, deterioration of security, ethnic conflict, conflict due to various conflicts	SE-05	Feeling of insecurity
2. Inclusiveness	Situation of	Gap between rich and poor	SE-01	GINI coefficient
(poverty reduction/ disparity correction)	urban poverty	Distribution of shantytown area	UR-06	Percentage of shantytown population
		Infrastructure development situation in poor areas	SI-04	Urban service penetration rate in shantytowns
	Basic human	Life safety	UR-03	Average living area
	needs	Urban service penetration situation	SI-03	Urban service penetration rate (water supply, sewerage, electricity)
		Education / medical service dissemination situation	SF-03	Educational penetration rate (by gender)
			SF-03	Number of hospitals / beds per 1,000 people
	Mobility	Public transport penetration situation	TM-03	Public traffic share ratio / total distance
		Traffic spending household burden	TM-03	Percentage of traffic expenditure in total household expenditure
	Mutual assistance system	Traditional or historical mutual assistance system / religious system	SE-01	Share of population participating in mutual assistance system
4. Urban infrastructure and	Improvement of urban	Basic city service penetration situation	SI-04	Penetration of water supply, sewage, electricity
urban management that can respond to	infrastructure	Urban mobility	TM-01	Average commuting time, means sharing ratio, average

 Table 9.12: Nouakchott Urban Sustainability Priority Performance Indicators

JICA Urban Scope		Planning		
Theme	Sector	Issue to tackle	issue reference	Selected indicator
complexifying society and economy				number of trips, access time to international airport

Source: JICA and JICA Study Team

PART II: PLU

CHAPTER 1: OBJECTIVES

1.1 Objectives of Formulating a PLU in the Project

In the Urban Planning Law 2008, formulation of a PLU is imposed in the areas where SDAU is prepared and approved. The major function of a PLU is to provide tools to manage and control urbanization through the compulsory power to the citizens. The Law stipulates that in the formulation of PLU it has to follow the SDAU policies with the General Development Rules taken into account. Referring to this requirement, the Project formulate a model PLU aiming at the following objectives:

- To provide biding power to control urbanization in the most critically urgent areas in the city;
- To provide a direct/indirect reference to the areas where PLUs are to be prepared after the completion of the Project; and
- To facilitate the establishment of urban management mechanisms in Mauritania through a practice in the capital city.
CHAPTER 2: SELECTION OF TARGET AREA FOR MODEL PLU

2.1 Selection of Target Area for the Model PLU

In the light of objectives of the model PLU, the followings items need to be considered in determining the target area for the model PLU.

- Includes all the types of the urban context in Nouakchott in order to be useful for reference to formulate other PLUs in the remaining areas.:
- Includes critically urgent issues to provide countermeasures by the established model PLU: and
- Includes critical areas to achieve the concepts of proposed SDAU.

2.2 **Options for Setting a Target Area**

According to the Article 27 of the Law 2008, the planning area for PLU is a whole administrative area of a commune or a part of it. since the administrative boundaries of the nine Communes are kept to the old ones after the change of the boundary of *Moughatas* composing Nouakchott, there are several options to set the target area for the formulation of the model PLU.

- Option 1: Covering the whole area of a Commune
- Option 2: Covering a specific area within a Commune with critical urban issues to be addressed.
- Option 3: Covering a specific area across several communes with common critical urban issues to be addressed

Each option is assessed from merit and demerit points of view. As a result, it is recommended to take Option 3 for its advantageous effects after the completion of the Project.

Options	Merit	Demerit
Option1: The whole area of a commune	Can be implemented by the simple administrative body.	Not effective and applicable to other communes or other areas if the selected commune has limited urban issues.
Option2: A specific area within a commune	Detailed rules can be prepared to tackle a specific issue.	Not applicable to the areas which do not have the same issue. Communes do not acquire control tools to cover their whole entity.
Option3: An area across several communes	Covers various issues and thus applicable to other areas. Issues beyond a single commune can be covered.	Requires complex consensus building.

 Table 2.1: Evaluation of Options for the Premise of PLU Formulation

Source: JICA Study Team

2.3 Criteria for Selecting the Target Area

The target area for the Model PLU is selected from the candidate areas generally consist of existing commune boundaries plus newly expanded areas of the Nouakchott City. Criteria for examining the candidate areas prepared from the following points of view:

1) Urgency to tackle with the urban issues

- A commune where the rapid urbanization is taking place by subdivisions or large land concessions without any upper plans to guide,
- A commune where many medium-high rise buildings are under construction without examination of urban context, and

• A commune where degradation of living environment has been taking place by land speculations, illegal settlements, etc.

2) Adequacy to implement the SDAU concepts

- A commune where various types of land use exist, and
- A commune as one of the most favorable areas to implement and achieve the policy and strategies of SDAU.

3) Applicability and sustainability of PLU formulation

- A commune with smaller population, which enables closer participatory planning, and
- A commune having efficient administrative capacity to use the formulated PLU.

2.4 Selection of Target Area

Based on the selection criteria mentioned above, the candidate areas of Commune basis as well as the rest of the area extending to the northern part of Nouakchott are assessed by scoring as shown in Table 2.2. As evaluated in the table, Teveragh Zeina Commune and the northern area of Nouakchott were given higher scores.

Based on the evaluation result, it is determined that a combined area of Teveragh Zeina commune and the northern area of Nouakchott are selected for the target area to apply formulation of the Model PLU. The urgency to provide countermeasures to the northern area where the new international airport (Nouakchott-Oumtounsy International Airport) and the new university campus (Nouakchott-Al Sasirya University) have been developed and many coastal tourism developments are expected to be prioritized rather than Ksar Commune which has the same score with the Northern Area.

		Commune											
Selection Ci	riteria of PLU Formulation for Candidates of Communes	Teyarett	Ksar	Tevragh Zeina	Toujounine	Sebkha	El Mina	Dar Naïm	Arafat	Riyadh	Northern Area Nouakchott		
1. URGEN	CY												
1-1 Rrapid u	urbanization by subdivisions or large land concessions	В	Α	Α	А	С	В	В	С	С	Α		
1-2 Medium	n-high rise buildings without regulations are increased	С	В	А	С	С	С	С	С	С	В		
1-3 Degrada	ation of living environment has occurred continuously	В	В	А	А	В	В	В	С	В	А		
2. ADEQUA	ACY												
2-1 Various	existing land use involvement applicable to other areas	В	В	А	С	В	В	C	В	С	В		
2-2 For	1) Necessity of appropriate urban growth management	А	Α	А	А	С	В	Α	С	Α	А		
SDAU Policy &	2) Contribution to living environment improvement	В	Α	А	А	В	Α	В	С	С	А		
Strategies	3) Contribution to sustainable urban industry	А	А	А	В	В	А	А	В	В	А		
3.APPLICA	ABILITY				-								
3-1 Smaller	size of population manageable for building concensus	В	Α	А	С	В	С	С	С	С	Α		
3-2 Adminis	strative capacity for sustainable implementation	В	В	Α	В	В	В	С	С	С	С		
	Total evaluation points	19	23	27	19	15	18	16	11	13	23		

Table 2.2: Assessment of Candidate Areas (Commune basis+others) for PLU Formulation

Legend: Scoreing by A=3 points, B=2 points, C=1 point

2.5 Selected Target Area as Priority Area for the Model PLU

The boundary for the planning area of the Model PLU is defined by the coordinates of key points as shown in Table 2.3, covering entire area of Teveragh Zeina Commune and the large part of northern area of Nouakchott covering surroundings of the Nouakchott-Oumtounsy International Airport, Nouakchott-

Al Sasirya University, and the major concession areas to be developed as large-scale land blocks or coastal tourism purposes.

No.	Latitude	Longitude	No.	Latitude	Longitude
1	18.453253°	-16.056670°	14	18.100077°	-15.975646°
2	18.456807°	-15.873707°	15	18.098576°	-15.967977°
3	18.413389°	-15.888260°	16	18.097336°	-15.967999°
4	18.226294°	-15.890806°	17	18.086638°	-15.970067°
5	18.225920°	-15.977725°	18	18.087109°	-15.972898°
6	18.150859°	-15.978731°	19	18.077315°	-15.974656°
7	18.133914°	-15.977107°	20	18.078582°	-15.983074°
8	18.131760°	-15.979029°	21	18.076817°	-15.985620°
9	18.119362°	-15.973462°	22	18.085131°	-15.991294°
10	18.118269°	-15.975203°	23	18.098405°	-16.020659°
11	18.111373°	-15.972077°	24	18.097088°	-16.021923°
12	18.10 <mark>6968°</mark>	-15.972876°	25	18.096800°	-16.026506°
13	18.104437°	-15.974883°			

Table 2.3: Coordinates of Key Points

Source: JICA Study Team

Following Figure 2.1 shows the location of key points corresponding to Table 2.3.



Source: JICA Study Team

Figure 2.1: Location Map of the Priority Area for PLU Formulation

2.6 Planning Scope for the Model PLU

(1) Applicable planning tools to the target planning area

According to the Urban Planning Law 2008, there are several statutory plans apart from PLU, as tools to materialize the proposed elements of SDAU. These statutory plans are the Detailed Development Plan

(PAD³³), Concerted Development Zone (ZAC³⁴) and Subdivision (LT³⁵). Application of these planning tools would be determined by physical conditions and implementation body, among others.

The target planning area involves several types of land areas regarding the current development status and on-going planning procurement status. Application of these planning tools can be proposed in the model PLU to be applied in accordance with the typology of the land area and development status. Table 2.4 and Figure 2.2 show suitable statutory planning tools as implementation measures to be applied to the target planning area based on the development status of five types as described below.

- TYPE1: Vacant area as national domain (not deeded yet)
- TYPE2: Land deeded or to be deeded such as large-scale concession land without occupation
- TYPE3: Subdivision areas of both planned or under implementation
- TYPE4: Existing built-up areas with occupation land plots
- TYPE5: Airport adjacent areas with Government Control
- TYPE6: Existing urban planning area for "Airport City Development" (see note below)

Table 2.4: Effective Planning Tools and Implementation Measures Applied to the PLU Planning Area

			Effe	ective Measur	es to be App	olied	
Statutory Plan (Urban Planni	ning Tools and Implementation Measures ng Law 2008)	TYPE-1 (vacant land)	TYPE-2: (Land to be deeded)	TYPE-3: (Subdivisio n Area)	TYPE 4: (Built-up Areas)	TYPE 5: (Airport Adjacent Areas)	TYPE 6: (Airport City)
	Zoning and Regulations (urbanization)	•	0	0	•	0	0
	Large Public Use Area to be designated	•	•	•	0		
Local Urban Plan PLU)	Key Road Network to be designated	•	•	•	0	•	•
,	Reservation Area for Future Development	•	0	0	0	•	•
	Conservation Area to be protected	•	•	0	0	•	•
Detailed Deve	elopment Plan (PAD) *	•	•	•		•	•
	Subdivision (Plan: LT)	0	•	•		0	0
Implementat ion Measures	Concerted Development Zone (ZAC) *	•	•	0	0	•	•
	Others for urban revitalization (RU, RBU36)			0	•		

Legend 1 : Type 1: Vacant area as national domain (not deeded yet), Type 2: Land deeded or to be deeded such as Concession Land without occupation, Type 3: Subdivision designated, planned or under implementation, Type 4: Existing Built-up Areas developed with Occupation (around over 60% of plots)

Legend 2: • = compulsory to manage and control \bigcirc = possible control and management partially if necessary, -- = not applicable

PLU: Local Urban Plan, PAD: Detailed Development Plan, PL: Subdivision Plan, ZAC: Concerted Development Zone, RU: Urban Renewal Plan, RBU: Urban Land Consolidation Plan

*: This planning measure is workable as binding plan.

Source: JICA Study Team reviewing in consideration with Urban Code (Law 2008-07)

Note: Procurement for the Airport City Development Planning Services (2017/2018)

The Government has embarked the urban development surrounding of Nouakchott-Oumtounsy International Airport in order to enable it to be an economic center as high potential area capable of stimulating the sustainable urban development of the future city. MHUAT as one of the responsible authorities for urban development has scheduled

³³ PAD: Plans d'Aménagement de Détail

³⁴ ZAC: Zone d'Aménagement Concerné

³⁵ LT: Lotissement

³⁶ RU: Rénovation Urbaine, RBU: Remembrement Urbain

the procurement of consultancy services for the study to develop the International Airport area as an airport city development in the year of 2018.

The study aims to formulate a master plan for the airport city including defining the target area (study area ranging 10-15km radius) in Phase I and to draw architectural development in Phase II, of which developments include economic activity center, commercial business center (hotel, shopping center, etc) taking account of environmental open space creation.

In this status, MHUAT has decided that the target area for PLU planning should be excluded, although the model PLU plan would treat essential zoning measures for conservation and urbanization area in association with trunk roads alignment.



Source: Several authorities (MHUAT, MET, SOMELEC, MOF-Domain) arranged by JICA Study Team Figure 2.2: Land Development Status in the PLU Planning Area

(2) Planning scope for the model PLU

Based on the examination of current status and the on-going development planning aforementioned, the target area for the model PLU is defined as following Table 2.5, and also defined as a kind of the scope of work of PLU planning. In principle, the planning area for Airport City ranging 10-15 km radius from the Nouakchott-Oumtousy International Airport is excluded for the model PLU planning area, although key planning intervention is proposed in that area.

 Table 2.5: Planning Scope for the Target Planning area for the Model PLU

A noo Trino hu	DLL		PLU	J Planning Measu	ires	
Development Status	Planning Area	Urbanized Area/Reserved Area	Conservation Areas	Land Use Zoning	Key Road Network Designation	Key Public Area Designation
TYPE-1	•	0	•		•	•

TYPE-2	•	•	•	0	0	
TYPE-3	•	•	0	•	•	
TYPE-4	•	•		•	•	
TYPE-5		0	0	0	•	
TYPE-6		•	•		•	

Legend 2: • = compulsory to manage and control \circ = possible control and management partially if necessary, -- = not applicable Source: JICA Study Team

CHAPTER 3: EXISTING CONDITIONS OF THE PLU PLANNING AREA

3.1 Natural Environmental Conditions

3.1.1 Topographic condition

A topographic condition in the target area for the Model PLU are identified in Figure 3.1, where the urban blocks can be introduced into the target area in consideration with the character of existing and future urbanization. Low lands causing inundation or flood-prone areas in the target area can be defined as unsuitable urban development areas, of which this natural condition is examined for "land availability assessment" in the section of 4.1.2 (3).



Source: JICA Study Team, Topographic data is based on the Digital Elevation Model (2016) data. Figure 3.1: Existing Topographic Condition in the Target Area for the Model PLU

		Lands a	bove 0 m ł	neight (ha)					The share
Urban Block	12.1 to 21.0 m	8.1 to 12.0 m	4.1 to 8.0 m	2.1 to 4.0 m	0.1 to 2.0 m	Total	Under 0 m	Total Area (ha)	of Under 0 m Lands
Urban Center East (UCE)	0.0	1.5	247.6	192.0	485.7	926.8	12.1	939.0	1.3%
Urban Center West (UCW)	0.0	0.1	13.5	28.9	410.9	453.4	105.5	558.9	18.9%
Suburban East (SUE)	0.7	9.3	229.1	389.5	1,079.2	1,707.8	238.1	1,945.9	12.2%
Suburban Coast (SUC)	0.0	1.2	55.0	116.3	1,144.9	1,317.4	195.5	1,512.9	12.9%
Airport Front East (AFE)	0.2	37.0	286.1	825.5	6,040.1	7,188.8	2,645.9	9,834.7	26.9%
Airport Zone (APZ)	0.0	0.0	11.7	362.8	2,935.4	3,309.9	4,093.7	7,403.5	55.3%
Airport Front Coast (AFC)	0.0	10.1	1,088.3	2,088.9	1,904.6	5,091.8	181.2	5,273.0	3.4%
Northern East (NTE)	0.0	1.1	49.7	1,225.5	3,129.3	4,405.7	14,709.9	19,115.6	77.0%
Northern Coast (NTC)	0.0	18.5	797.5	2,598.8	1,714.7	5,129.5	40.9	5,170.4	0.8%
Total	0.9	78.8	2,778.5	7,828.2	18,844.7	29,531.1	22,222.9	51,754.0	42.9%

 Table 3.1: Topographic Conditions by Urban Blocks

Source: JICA Study Team

3.1.2 Plants and trees

In the target area, natural bare lands including Sebkha (salty low lands), dune, and desert plants as low diversity of flora (e.g. low shrubs with Euphorbia, Zygophyllum) are predominantly shared by over 80% out of the total area. On the other hand, there are large artificial planting areas as recognized by "Green Belts" in the target area by a reforestation project which is managed by the Mauritanian Authorities in order to prevent desertification.

3.1.3 Coastal area

In the target area, the coastline spreads more than 40 km, where the urbanized area in southern part of the coast only shares 5 % out of total length. According to the report of Banda Field development - Gas Project Environmental Impact Assessment, various and large marine mammals were identified in this coastal marine area such as whales, dolphins, and turtle. On the other hand, it describes that the beachside has very scarce vegetation, and the main living species of seabirds, some small mammals.

On the other hand, coastal erosion along the coast has recently become one of the considerable issues in association with sea level increase as a result of climate change. The frequency and intensity of these storms have affected urbanized areas in the southern part of the target area.

3.1.4 Seashell distribution

Seashell is distributed in the northern part of the target area, where they are the only aggregate available within a few hundred kilometers from Nouakchott as one of the basic building materials in the area.

3.2 Existing Land Use Conditions and Characteristics

According to the land use survey on planning area for the Model PLU in May 2017, the composition of existing land use was identified as shown in Figure 3.2.



Figure 3.2: Existing Land Use of the Planning Area for the Model PLU

The survey result reveals that the total land of the planning area is around 51,763 ha, and its predominant land use is a natural area including desert, other natural arid lands, Sebkha (salty flat wetland) and quarry lands (mainly sand and shellfish) by 81.7% out of the planning area. On the other hand, another major land use in the urbanized land use is "Road and Transport" (8 %) because of the large occupation of the Nouakchott-Oumtounsy International Airport. Composition of the existing land use in the planning area is shown in Figure 3.3 below.



Figure 3.3: Composition of Existing Land Use

This land use composition differs according to defined urban areas characterized by nine blocks as 1. Urban Center East (UCE), 2. Urban Center West (UCW), 3. Suburban East (SUE), 4. Suburban Coast (SUC), 5. Airport Zone, 6. Airport Front East (AFE), 7. Aiport Front Coast (AFC), 8. Northern East (NTE), and 9. Northern Coast (NTC), as shown in Table 3.2 and Figure 3.4. As distinct land use characters of the planning area apart from residential use include: public use (22%) by the Governmental facilities is predominant in the UCE, vacant use in the subdivisions of the SUE, and Sebkha land in the NTC by 46%.

Urban Block	Desert Land	Sebkha	Quarry Land	Tree	Gree-belt	Farm land	Residentia 1	temporal Residentia 1	MixedUs e	Commerc ial	Industrial	Public Facilities	Road/ Transport	Lot not occupied	Vacant Land	Pond	Others	total
UrbanCenterEast (UCE)	0.0	0.0	0.0	0.0	0.0	26.5	231.3	18.7	44.1	87.3	2.0	210.2	293.8	4.1	44.1	0.0	0.0	962.2
UrbanCenterWest (UCW)	25.4	0.0	0.0	0.0	0.0	0.0	125.7	25.1	12.7	32.7	5.6	4.9	180.5	23.6	117.5	5.8	0.0	559.5
SuburbanEast (SUE)	313.1	0.0	51.9	0.0	0.0	0.0	172.7	52.2	10.4	12.5	8.9	199.5	525.6	122.6	461.7	0.3	0.0	1,931.4
SuburbanCoast (SUC)	210.0	0.0	0.0	0.8	5.7	0.0	90.2	41.7	9.1	32.1	1.1	3.1	167.1	768.8	177.8	4.6	0.0	1,512.4
Airport Zone (APZ)	3,951.4	407.1	138.6	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.3	2,817.2	59.2	28.0	0.0	0.0	7,403.5
Airport Front Eaast (AFE)	6,194.8	92.8	2,479.4	0.0	262.1	0.0	9.2	17.5	0.6	0.1	0.0	7.4	159.2	395.9	210.1	5.8	0.0	9,834.7
Airport Front Coast (AFC)	4,000.5	15.8	229.6	1.4	0.0	0.0	1.0	0.8	26.2	10.9	0.0	10.4	98.9	849.9	18.9	6.1	2.7	5,273.0
Northern East (NTE)	7,846.1	8,722.8	2,490.6	0.0	0.0	0.0	0.0	2.8	0.0	3.1	0.0	0.3	40.2	9.6	0.0	0.0	0.0	19,115.6
Northern Coast (NTC)	4,735.1	0.0	379.6	0.0	0.0	0.0	0.0	25.9	0.0	0.0	0.0	0.0	28.0	0.0	1.8	0.0	0.0	5,170.4
Total	27,276.4	9,238.5	5,769.6	2.2	267.8	26.5	630.0	184.8	103.1	180.4	17.6	436.1	4,310.7	2,233.8	1,059.9	22.6	2.7	51,762.7

Table 3.2: Composition of Existing Land Use by Urban Blocks



Source: JICA Study Team



3.3 Current Status and Trends of Urban Development

3.3.1 Building height conditions in the Planning Area

Building height is one of the important elements to be addressed by urban form control and management, because it is fundamental to the capacity of urban activities (numbers of floors), and is a key index of safety and comfortable environmental conditions. In the planning area, low-rise buildings (GF,1-2F) occupies 92% share of the total building areas. It is observed that the 3-floor buildings accounted for 6% in the Urban Center East (UCE) which is one of the city centers of Nouakchott. The buildings with "over 9-floor" are limited to the area of UCE block. Table 3.3 and Figure 3.5 shows the number of buildings by height and by location.

Urban Black Nama				Build	ling Area	per Buildi	ing Height	t (ha)			
UIDAII DIOCK IVAIIIC	GF	1F	2F	3F	4F	5F	6F	7F	8F	over 9F	Total
UrbanCenterEast (UCE)	28.75	97.20	86.09	14.27	3.83	0.70	0.57	0.51	0.14	0.24	232.31
UrbanCenterWest (UCW)	8.59	24.96	35.62	1.59	0.32	0.15	0.30	0.06	0.03	0.00	71.62
SuburbanEast (SUE)	14.46	60.18	55.62	8.61	0.37	0.25	0.30	0.00	0.01	0.00	139.80
SuburbanCoast (SUC)	5.65	11.51	19.25	1.04	0.28	0.01	0.07	0.07	0.00	0.00	37.88
Airport Zone (APZ)	0.18	0.00	0.02	0.10	6.19	0.00	0.00	0.00	0.00	0.00	6.48
Airport Front East (AFE)	2.40	0.60	0.03	0.77	0.00	0.01	0.00	0.00	0.00	0.00	3.80
Airport Front Coast (AFC)	0.65	1.07	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67
Northern East (NTE)	0.10	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Northern Coast (NTC)	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
Grand Total	61.44	195.58	197.58	26.37	10.99	1.13	1.24	0.65	0.18	0.24	495.40

 Table 3.3: Composition of Existing Buildings by Height and by Urban Blocks



Source: JICA Study Team

Figure 3.5: Composition of Existing Buildings by Height and by Urban Blocks

3.3.2 Current trend of urban development

In the planning area, there are various types of plans and projects. These including land subdivision projects which is a predominant urban development method practiced in Mauritania, tourism-related development in the coastal area, and several large-scale infrastructure projects. Major projects in the planning area are described below. Figure 3.6 shows the overall condition of the current urban development in the planning area.

(1) Land subdivision projects

The land subdivision is a primary method to provide housing plots to the citizens by the government. Land parcels are equipped with space for infrastructure (access roads, public facilities areas, necessary utility stations) although not fully completed at the time of delivery (unpaved secondary roads, unbuilt public facilities, etc.). Although it is envisaged in the Law that upper plans (PLU or PAD should be prepared before implementing the land subdivision projects, many subdivision projects have been authorized and implemented in the decade. In the planning area, there are over 2,500 plots allocated through the past subdivision projects.

Many of these land plots have been still vacant as the average occupancy indicates only 37% out of a total number of plots. This is not relative to when the subdivisions were implemented; in old-time or recent days; although Article 80 of the Law stipulates return of the plot to the seller as a pre-emptive right in case of no usage of the land within three years.

Table 3.4 shows the condition of existing land subdivision areas in the planning area.

Ref No.	Number of	No of Plot	OCR	А	verage Area		Subdivision Area (ha) in PLU			
(Fig2.5)	Plot	Occupied	(%)	(sqm/plot)	Max	Min	Total	Road Area	Share	
1	949	654	69 %	912	15,012	211	123.2	40.2	33 %	
2	1,336	561	42 %	375	3,780	24	70.2	21.8	31 %	
3	964	603	63 %	177	4,884	98	24.2	7.7	32 %	

Table 3.4: Condition of Subdivision Areas in the Planning Area

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4*	197	04	50.9/	1 247*	11.027	96	25.2	11.5	22.0/
4.	18/	94	30 70	1,247	11,027	80	55.2	11.3	33 70
5	79	36	46 %	909	2,116	436	12.4	5.1	41 %
6	53	6	11 %	623	974	420	4.2	0.9	21 %
7	1,018	864	85 %	702	6,000	145	106.7	35.4	33 %
8	1,639	1,047	64 %	714	24,365	300	185.6	66.0	36 %
9	270	53	20 %	330	2,008	239	13.4	4.0	29 %
10	757	211	28 %	791	49,998	150	88.3	25.1	28 %
11	995	509	51 %	561	19,093	286	90.0	35.7	40 %
12	543	467	86 %	951	23,614	91	119.0	51.7	43 %
13	2,491	896	36 %	790	22,150	187	312.4	120.8	39 %
14	1,031	905	88 %	707	6,573	294	118.3	46.9	40 %
15	755	0	0 %	515	28,988	100	46.6	18.7	40 %
16	200	122	61 %	660	800	500	22.2	8.7	39 %
17	1,088	0	0 %	612	1,920	589	47.0	16.2	35 %
18							460.0		
19	2,408	33	1 %	736	19,800	450	288.0	107.7	37 %
20*	23	4	17 %	28,410*	64,811	2,800	81.2	18.4	23 %
21	2,545	932	37 %	379	16,280	56	160.0	60.5	38 %
Total/Av	19,331	7,997	41 %				2,408.0	703.0	29 %

Note: *= This plot is for industry use. Other plots include other non-residential uses such as public facilities, park. Source: JICA Study Team (GIS estimation) based on the CAD drawings (MHUAT, MET)

(2) Large-scale land concessions

There are several large-scale land concessions in the Planning Area. These are large national land properties deeded by the concessions to private sector entities, including the Foreign Direct Investments (FDIs). Although information is limited, boundaries for some of the major concessions are identified especially in the newly extended northern areas as listed in Table 3.5.

T 1	Concessio	on & Subo	livision A	reas (ha)		Developed	l or Under	Developing Property
Code	Within PI	LU Planni	ng Area	Outside	Total	Project	Occup	Pafaranaa ta Prajaat Araas
0000		Others	Total	of PLU		Area (ha)	ancy	Reference to Project Areas
А	669	0	669	0	669	200	30%	Ribat Al Bahr Development
В	200	0	200	0	200	4	2%	
С	542	0	542	0	542	25	5%	Resort Hotel Development
D	501	0	501	0	501	0	0%	
Е	649	0	649	0	649	0	0%	
F	30	0	30	0	30	30	100%	International Convention Center
G	2,880	6,437	9,317	3,590	12,907	360	3%	Power Plant, Subdivision 21
	0	7,480	7,480	970	8,450	1,990	24%	Nouakchott Airport Airforce
Н	12,550	6,170	18,720	2,090	20,810	0	0%	
Total	18,021	20,087	38,108	6,650	44,758	2,609	6%	

Table 3.5: List of Large-scale Concession Areas in the Planning Area

Source: JICA Study Team (GIS estimation), Note: F (conb&sub), F'(Others), F"(Outside of PLU)

The coastal area proximity to Nouakchott-Oumtounsy International Airport has been deeded and implemented by the resort or housing projects including the Ribat al Bahr development financed by the Islamic Corporation for the Development of the Private Sector (ICD), a development financial institution of Saudi Arabia.

Nouakchott City Urban Master Plan Development Project Final Report



Figure 3.6: Overall Condition of the Current Urban Development in the Planning Area.

(3) Infrastructure projects

Two energy sector projects are planned and expected to be implemented. The Banda GAS Project seeks implementation of a power plant expansion, gas pipeline, and a high-voltage power line construction (225 kV) in the planning area. It also seeks construction of the ring road and a road linking the Presiden Palace located at the International Airport to the city center.

(4) Greenbelt project (1992, 1995, 2000, 2007)

Although the construction of Greenbelt is the past projects supported by international organizations (Belgium, FAO, WEP), there is a strong demand to expand the area of the project. The greenbelt is considered as an important element to prevent the sand encroachment to the urban area of Nouakchott. However, many parts of the greenbelts have been encroached by the new urbanization, including official subdivisions by the government. This is largely caused by the lack of consensus among the government bodies.

(5) Airport city development project (2018)

The Government has embarked the urban development surrounding of Nouakchott-Oumtounsy International Airport in order to enable it to be an economic center as high potential area capable of stimulating sustainable urban development of the future city. MHUAT as one of responsible authorities for urban development has scheduled the procurement of consultancy services for the study to develop the International Airport area as an airport city development in the year of 2018.

The study aims to formulate a master plan for the airport city including defining the target area in Phase I and to draw architectural development in Phase II, of which developments include an economic activity center, commercial business center (hotel, shopping center, etc) taking account of environmental open space creation.

3.3.3 Opinions from relevant stakeholders (Tevragh Zeina Commune)

According to the workshop as a part of public consultations held in the commune of Tevragh Zeina on May 2nd, 2018. The followings were key opinions in the workshop.

- <u>Mobility and transportation</u>: They suggested necessary improvement of the quality of services of public transportation for bus and taxi which would boost ridership of them.
- <u>Green and recreational spaces:</u> They indicated current demand of recreational and greenery space, especially suggested necessary development of coastal area public spaces with walkway.
- <u>Flooding issues:</u> They suggested the importance of flood management by the government by certain measures whether the site prone flooding should be improved properly for settlement or prevented from urbanization by certain regulation.
- <u>Densification</u>: They emphasized the importance of densification in combination with green area creation and social diversity formulation of the community.

3.4 Issues to be Addressed

The following issues are identified in the light of the planning of the model PLU in terms of physical development conditions, as well as the institutional situations.

3.4.1 Physical issues

(1) Effective application of land uses classes to realize urban functions proposed by SDAU

- Scrutinizing the spatial development framework shown by SDAU for density of urban activities,
- Enhancing/managing the existing land use pattern represented by the current urbanization trends by determining whether they should be promoted or controlled,
- Introducing effective land uses classes for contemporary urban function and activities to be promoted into appropriate areas (Urban Center, Sub-urban Center, etc.)

(2) Formulation of hierarchical road network to link arterial roads proposed by SDAU

- Introducing effective road network in the urbanized areas including those disordered subdivisions and densely built-up areas,
- Formulating appropriate road-side land use to maximize the potential urban activities (commercial and business), especially along the public transport corridors,
- Securing land and use for large transportation facilities (bus terminals, logistics centers, workshops for public transportation, etc.), and
- Securing appropriate parking space by both on-street and off-street types in accordance with the land use.

(3) Ensuring the land for public use

• Identifying lands for basic public facilities in appropriate places with certain capacities (primary and secondary schools, hospitals, parks, etc.) to meet the future demands.

(4) Ensuring protection of environmentally vulnerable areas

• Securing protection of lands/areas environmentally vulnerable identified and/or designated by SDAU through biding power of PLU, and

- Introducing appropriate spatial planning measures taking account of vulnerable lands/areas such as the coastal area, hazard-prone areas with Sebkha lands and desert areas potentially affected by climate change
- (5) Enhancing implementation measures of urban development
 - Application of available tools such as PAD and ZAC by designating the areas for them in order to promote formulation of attractive and competitive urban cores through appropriate public and private partnerships, and
 - Introducing appropriate measures for infrastructure provision in new urban development areas.

A matrix of major physical issues is presented in Table 3.6.

		Spatial Planning Issues to be Addressed								
PLU Planning Area	SDAU Function by Appropriate Land Use	Local Road Network Formulation	Public Use Land Provision	Environmental Vulnerable Area	Enhancing Implementation Measures					
Urban Center Blocks	•	0	0	0	•					
Suburban Blocks	0	•	•	0	•					
Airport-front Blocks	•	Ø	0	•	0					
Northern Blocks	0	0	0	•	0					

 Table 3.6: Major Physical Issues to be Addressed by PLU in the Planning Area

Legend: \bullet = primary subject to be addressed \odot = secondarily subject, \bigcirc = tertiary subject Source: JICA Study Team

3.4.2 Institutional issues

(1) Rational application of regulations to address various levels of urban issues

- Sharing appropriate role and range of regulations among General Urban Regulation (RGU), SDAU, PLU, and PAD to cover various levels of urban issues (urban growth control, urban activities' volume, urban form, etc.), and
- Sharing appropriate role and range of regulations by areas, among common regulations applied to all jurisdictive area of Nouakchott, area-based regulations in and across communes, and specific regulations dedicated to specific areas reflecting local contexts
- (2) Enhancement of urban growth and management tools to materialize urban development goals proposed by SDAU
 - Introduction of effective measures to promote urban growth in order to prevent disordered urban sprawl and to achieve efficient public services, and
 - Promotion of desirable measures for densification of urban areas in order to achieve formation of the "Compact City".

(3) Introduction of appropriate land use zoning classification and it's regulations to address local socio-economic needs

- Adequate composition of land use classes in consideration of contemporary use classes (e.g. mixed use as an essential use for "compact city") and local trend of land uses (e.g. street-based commercial and business), and
- Consideration of use regulations addressing prevention of contemporary urban nuisances expected to take place in the near future, as well as local and conventional urban nuisances.

(4) Formulation of appropriate form regulations

- Provision of effective regulations and incentives to guide required density through control of CUF, COS, and height control, and
- Formulation of attractive landscape in relevant areas through specific regulations such as height, color, materials control.

(5) Enhancement of regulations in other sectors for synergy effects of urban development control and management

- Strengthening urban sector legal instruments (e.g. building code, land or property transaction regulation, rent-house regulations, environment assessment regulation, infrastructure easement, traffic control, and regulations, etc.), and
- Strengthening other sector legal instruments (e.g. coastal management and protection, agricultural land promotion and protection, hazard protection, etc.).

A matrix of major physical issues is presented in Table 3.7.

	-			=		-				
PLU Planning Area		Control and Management Issues to be Addressed								
	Urban C Management	Browth and Control	Use Regulation	Urban Form	Enhancement of Relevant Sector Regulations					
	Growth Boundary	Density	by Zoning Class	Regulation	Urban Sector	Other Sectors				
Urban Center Blocks	0	•	•	•	•	0				
Suburban Blocks	O	•	•	0	•	0				
Airport-front Blocks	•	•	•	0	O	•				
Northern Blocks	•	0	0	0	0	•				

 Table 3.7: Major Institutional Issues to be Addressed by PLU in the Planning Area

Legend: \bullet = primary subject to be addressed \odot = secondarily subject, \bigcirc = tertiary subject Source: JICA Study Team

CHAPTER 4: DEVELOPMENT FRAMEWORK AND STRATEGIES

4.1 **Development Framework**

4.1.1 Demand-side framework for PLU

(1) Target year

The planning of PLU is required to set a target year for its development, as Urban Code (Law N°2008-07) does not stipulate the range of planning target year for PLU. The planning target year can be set by 2030 years as 10 years frame taking account of the following considerations.

- PLU by mid-term range (10 years) as one of the implementation plans of SDAU as a long-term plan (20 years)
- Zoning as one of the main outputs of PLU requiring appropriate modification to fit with altered circumstances by urban socio-economy and environment change

(2) **Population framework for PLU**

Table 4.1 indicates a future population of the target area of PLU, 142.5 thousand population for the year 2030 in accordance with the population framework of SDAU. The population distribution for PLU into each Urban Block is set in specific consideration with the followings as policies of the population distribution of SDAU.

- Population distributions in PLU would be given the priority to the area within Outer Ring Road by 2030, except developments without population such as tourism or industries
- The subdivisions with vacant plots or underdeveloped within Outer Ring Road would be key pacemaker of population distributions by 2030.

	Existing	g 2017	2030 (Targ	get Frame)	204	2040		
Urban Block	Population Density* (pop/ha)		Population	Density* (pop/ha)	Population	Density* (pop/ha)		
Urban Center East (UCE)	21,942	22.8	19,160	19.9	51,610	53.6		
Urban Center West (UCW)	15,835	28.3	20,440	36.5	31,730	56.7		
Suburban East (SUE)	12,778	6.6	35,110	18.2	68,450	35.4		
Suburban Coast (SUC)	3,875	2.6	34,090	22.5	70,580	46.7		
Airport Front East (AFE)	3,126	3,126	26,740	2.7	56,400	5.7		
Airport Zone (APZ)	0	0.0	0	0.0	0	0.0		
Airport Front Coast (AFC)	0	0.0	7,000	1.3	24,270	4.6		
Northern East (NTE)	0	0.0	0	0.0	0	0.0		
Northern Coast (NTC)	0	0.0	0	0.0	0	0.0		
Total	57,556	1.1	142,540	2.8	303,040	5.9		

Table 4.1: Target Population for Target Area for PLU

Density indicates "Gross Density" including public facilities, roads, open space and all land area within each Urban Block. Source: JICA Study Team

(3) Employment framework for PLU

1) Target employment in 2030

The targeted employment in 2030 is set based on the development framework of SDAU, and the employment distribution for PLU into each Urban Block is set in specific considerations with the followings as policies of employment distribution of SDAU.

• Employment distributions in PLU are considered by potential economic developments in the northern part of the target area of PLU beyond Outer Ring Road where tourism development in

the coastal area and new industry or business development surroundings of the Oumtounsy International Airport are expected.

• Those developments would generate employees who would be able to commute from existing urban settlements, where new town developments with a residential function would be followed after 2030 except minimum settlement close to working areas.

	Existing	2017	2030 (Target	Frame)	2040		
Urban Block	Employment	Density (emp/ha)	Employment	Density (emp/ha)	Employment	Density (emp/ha)	
Urban Center East (UCE)	19,080	19.8	86,280	89.7	94,500	98.2	
Urban Center West (UCW)	22,858	40.9	26,280	47.0	27,750	49.6	
Suburban East (SUE)	4,450	2.3	9,420	4.9	11,910	6.2	
Suburban Coast (SUC)	4,634	3.1	8,370	5.5	10,640	7.0	
Airport Front East (AFE)	0	0	13,470	1.4	25,480	2.6	
Airport Zone (APZ)	0	0.0	610	0.1	5,390	0.7	
Airport Front Coast (AFC)	0	0.0	7,970	1.5	32,710	6.2	
Northern East (NTE)	0	0.0	0	0.0	0	0.0	
Northern Coast (NTC)	0	0.0	0	0.0	0	0.0	
Total	51,022	1.0	152,400	2.9	208,380	4.0	

Table 4.2: Target Employment for Target Area for PLU

Density indicates "Gross Density" including public facilities, roads, open space and all land area within each Urban Block. Source: JICA Study Team

2) Target employment distribution by sector in 2030

According to the existing employment in 2017 by the JICA Study Team estimation, the majority of employment is shared by the tertiary sector called as service industries. Although some factories are dispersed in the target area, a certain amount of other sector employment has not appeared except fishery employment surroundings of the fishery port. Taking account of expected urban development as Airport City and coastal tourism, employment in future (2030) is expected by the gradual change of composition of employment.

Unken Disek	Exisiting Employment by Sector (2017)		Em	ployment b	y Sector 2	.030	Employment by Sector 2040					
Urban Block	Primary	Secondary	Tertiary	total	Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary	Total
UrbanCenterEast (UCE)	0	191	18,890	19,080	0	0	86,280	86,280	0	0	94,500	94,500
UrbanCenterWest (UCW)	1,829	457	20,572	22,858	1,580	0	24,700	26,280	1,110	0	26,640	27,750
SuburbanEast (SUE)	0	445	4,005	4,450	0	750	8,670	9,420	0	1,190	10,720	11,910
SuburbanCoast (SUC)	0	93	4,541	4,634	0	420	7,950	8,370	0	850	9,790	10,640
Airport Front Eaast (AFE)	0	0	0	0	0	670	12,800	13,470	0	2,550	22,930	25,480
Airport Zone (APZ)	0	0	0	0	0	60	550	610	0	1,080	4,310	5,390
Airport Front Coast (AFC)	0	0	0	0	0	0	7,970	7,970	0	0	32,710	32,710
Northern East (NTE)	0	0	0	0	0	0	0	0	0	0	0	0
Northern Coast (NTC)	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,829	1,186	48,008	51,022	1,580	1,900	148,920	152,400	1,110	5,670	201,600	208,380

 Table 4.3: Target Employment Distribution by Sector for Target Area for PLU

Source: JICA Study Team

4.1.2 Supply-side framework

(1) Environment vulnerability for urbanization

Taking account of the strategic orientation of the SDAU describing "prohibit, control and support urbanization in risk areas", vulnerable lands with potential natural hazards should be considered in sustainable urbanization manner. Environment vulnerability analysis aims to identify inappropriate lands as inundation prone areas (or Sebkha) to be avoided by urban development and to also clarify supply-side land capacity.

Low land areas in the target area of PLU area were identified and quantified as shown in Table 4.1.3. The topographic condition by contour lines (ground level) indicates the distribution of lower lands under 0 meter (altitude above the sea level). Large low lands are spread in the northern part of the target area, especially surroundings in the north-east part and spotted area in the south part of Oumtounsy

International Airport. On the other hand, linear low lands like rivers in the target area are stretched from the north-east part to south-west close to the coastal area, where the low land at the end of the linear low land is considered by the site plan of Ribat al Bahr new town introducing a lake.

Another environmental consideration is "Green Belt" in the target area where two long-term projects from 1975 (17 years) and from 2000 (7 years) by plantation by shrubs for sand dune stabilization were implemented and trees have grown partially as mature trees. Theses green belt should be protected as non-urbanized areas.

Coastal Protection Area (CPA): The coastal area of the entire country in Mauritania was designated by the coastal protection zone (minimum 100 m to 200 m) in order to protect shoreline natural environment and consider littoral erosion by ocean waves.

(2) Other spatial elements as constraints for urbanization

Other spatial elements in the target area of PLU of which natural environmental protection or man-made facilities' controls are considered as follows.

- Airport Safety Overlay Zone³⁷ (ASOZ): The surrounding areas of Oumtounsy International Airport is designated by several surfaces (approach, takeoff, conical and others) for safety access by aircraft, where land use and buildings are regulated by this zone. However, these land could allow urbanization if building height is within regulation and building use allows noise condition.
- Easement of energy infrastructure-1 (HVLP): High-voltage overhead lines (225 kV) were planned by SOMELEC in the target area with easement width of them, to which buffer area (60 m width) along lines could be applied as an international standard.
- Easement of energy infrastructure-2³⁸ (GL): The gas pipeline with 120 m buffer easement was planned from the Banda offshore oil field to the onshore gas processing plant in the target area.
- Built Up Area: This area covers not only existing built-up area (all building uses) but also planned or under construction subdivisions.

(3) Land availability assessment for new urbanization

Land availability assessment examines lands enabling to urbanize without environmental constraints or man-made activities controls (large infrastructure easement, etc) above mentioned. In case of the lands in the target area without any constraints, the net available lands without occupations including subdivision plans and other development plans are estimated as 12,175 ha as a whole. On the other hand, the gross available lands with the condition of the conical surface as the widest zone in Airport Safety Overlay Zone are estimated as 22,468 ha.

			Land w	vith Constraints								
Urban Block	Environ	onment Vulnerability (ha)		Airport	(ASOZ)	Energy Infra	Built Up Area	Multi-factors	Availab	le Land		
	Under 0 m level	CPA	Green Belt	Aiport/ Approach/ Takeoff	Other Control Areas	HVL/GPL	Subdivision/ Others	Area	With Conditions	Without Constraints	Total	Total Target Area
Urban Center East (UCE)	12.1	0.0	0.0	0.0	0.0	0.0	882.6	0.0	0.0	44.3	44.3	939.0
Urban Center West (UCW)	105.5	19.3	0.0	0.0	0.0	4.3	375.7	30.9	0.0	23.2	23.2	558.9
Suburban East (SUE)	238.1	0.0	0.0	0.0	0.0	4.7	1,489.2	45.6	0.0	168.3	168.3	1,945.9
Suburban Coast (SUC)	195.5	94.4	0.0	0.0	0.0	39.5	255.6	3.1	0.0	924.8	924.8	1,512.9
Airport Front East (AFE)	2,645.9	0.0	243.6	309.2	2,566.2	152.3	72.2	205.4	2,566.2	3,640.0	6,206.2	9,834.7
Airport Zone (APZ)	4,093.7	0.0	0.0	1,206.5	1,841.0	61.9	0.0	5.5	1,841.0	194.9	2,035.9	7,403.5
Airport Front Coast (AFC)	181.2	231.7	0.0	280.86	2,312.7	13.4	33.0	130.7	2,312.7	2,089.5	4,402.2	5,273.0
Northern East (NTE)	14,709.9	0.0	0.0	473.1	1,073.6	148.4	0.0	20.4	1,073.6	2,690.2	3,763.8	19,115.6
Northern Coast (NTC)	40.9	158.7	0.0	27.7	2,499.3	0.0	0.0	44.2	2,499.3	2,399.6	4,898.9	5,170.4
Total	22,222.9	504.1	243.6	2,297.4	10,292.9	424.4	3,108.2	485.8	10,292.9	12,174.8	22,467.6	51,754.0

³⁷ Air space protection plan, Nouakchott New International Airport Construction 2015 / MET

³⁸ Banda Field Development - Gas Project / Environmental Impact Assessment 2013 /SOMELEC

According to the strategic orientation of SDAU, the urban blocks of NTE and NTC in the northern part of the target area beyond APZ (airport zone) are defined as non-urbanization areas for natural environmental protection and/or reserved development areas. In this condition, potential areas for urbanization are examined as 7,085 ha where population absorption capacity would be around 425,000 population in case of density by 60 population per hectare.

4.2 Development Strategy and Land Requirements

(1) Spatial development strategy in accordance with SDAU

Based on the urban blocks defined in Chapter 3, spatial development strategies in the target area are set by each urban block in accordance with the strategic orientations of SDAU giving urban functions and roles with environmental considerations. Table 4.5 shows SDAU strategic orientations as the spatial development strategies of the target area applied to the urban blocks.

	A		SD	AU Stra	ategy app	plied to I	Urban B	locks of Pl	LU	
SDAU Strateg	gic Orientation	Urban	Center	Subu	ırban	Airpor	rt Front	Airport	Airport Northe	
		UCE	UCW	SUE	SUC	AFE	AFC	APZ	NTE	NTC
	1-1 Controlled urbanization in risk area			•	0	•	0			
1. Limit	1-2 Intense City	•	0	0	0	•				
Urban Sprawl and Intensify	1-3 Public transit-led urban development	•	•	•	•	•	•			
Urban Area	1-4 Metropolitan gateway					•				
	1-5 Polarization of urban extensions				0	•	0			
	2-1 Reinforce green belt			0		٠				
	2-2 Promote coaster area (public spaces)		•		•		•			0
2. Build a New	2-3 Create green and blue network	0	0	0	0	0	0		0	0
with Nature	2-4 Four green poles	0				٠				
	2-5 Small scale green and public spaces	0	0	0	0	0	0			
	2-6 Leisure place in desert									
	3-1 Promote and secure economic poles with public transit	•	•	•	•		0			
	3-2 Economic network with Outer-ring Road					•				
3. Promote Economic Radiation	3-3 Support economic growth of sectoral poles				•	•	•	•		
Kadiation -	3-4 Promote local employment within neighborhoods		0	0						
	3-5 Promote economic diversification									

Table 4.5: Spatial Development Principle by Urban Block in PLU Target Area

Legend: \bullet = primary strategy to be addressed O = strategy as supplemental or partial subject, -- = strategy not applied Source: JICA Study Team

4.3 Future Land Requirement by Land Use Category for the Target Area

(1) Residential areas

1) Current settlement status examined

The land requirement for residential areas in the target area should be based on two measures of land intensification of the target area. In other words, the residential land needs to be provided by "densely urbanized newly" and "existing density improvement".

Table 4.6 also indicates existing net population densities within lands of residential use and mixed-use residential. Average net density (in residential areas including infrastructure, open space, others) is 117 populations per hectare, while the highest density in residential use is 218 pop/ha in Urban Center West Block and 17 pop/ha in Suburban East (Meti Aut) as the lowest.

Density distribution is one of fundamental planning element in PLU future urbanization in accordance with the SDAU basic policy of "Densification" to accommodate future population demand by the compact urban form. From this point of view, higher density allocation is required inevitably to be set appropriately in each urban bock except vulnerable areas by natural hazard-prone areas and artificial control areas for the population distribution in the target area.

	0						<u> </u>		
	Popula	Existi	ing Settleme	ent (includin	Sub	Subdivisions*2			
Urban Block	tion 2017	Residen-	Temp- oral (ha)	Mixed	total (ba)	Density (pop/ha)	Occupied* ³	Populatio	Density (pop/h
Listen Conton Foot (LICE)	21.042	221.2	10.7	0.50 (IIII)	204.1	(pop/ma)	1 optitution	11 20 10	a)
Urban Center East (UCE)	21,942	231.3	18.7	44.1	294.1	/4.0	0	0	
Urban Center West (UCW)	15,835	125.7	25.1	12.7	163.5	96.9	11,675	16,290	50.8
Suburban East (SUE)	12,778	172.7	52.2	10.4	235.3	54.3	9,656	32,817	21.8
Suburban Coast (SUC)	3,875	90.2	41.7	9.1	141.0	27.5	7,732	12,026	38.8
Airport Front East (AFE)	3,126	9.2	17.5	0.6	27.3	114.3	3,860	8,331	34.4
Airport Zone (APZ)	0	0.0	0.0	0.0	0.0	0.0	0	0	1.0
Airport Front Coast (AFC)	(n.a)*1	1.0	0.8	26.2	28.0		0	11,853	17.1
Northern East (NTE)	(n.a) *1	0.0	2.8	0.0	2.8		0	0	
Northern Coast (NTC)	(n.a) *1	0.0	25.9	0.0	25.9		0	0	
Total	57,556	630.0	184.8	103.1	918.0	62.7	32,923	81,317	26.5

Table 4.6: Existing Settlement by Several Types of Residential Areas in the Target Area

Note: *1 There is no population statistical data, although there are some settlements. *2 Subdivisions include existing and planned sites. *3 Occupied population was estimated based on occupied lots by buildings in each subdivision site with the average number of household (4.7). *4 Population in 2040 was estimated by the number of expected lots of each planned subdivision in 2040 (70 % occupancy out of total lots). Source: JICA Study Team

It is also observed that existing subdivision areas including plans regard their density as lower density settlement development $(30 \sim 50 \text{ pop/ha})$ in comparison with an international standard, where these developed or underdeveloped areas occupy a large portion of existing settlements in the target area within the Outer-ring road.

2) Proposed settlement distribution and additional requirement

The residential areas are estimated and set as shown in Table 4.7, based on the desirable future density target range by according to two degrees by medium-density, low-density, other settlements by mixed-use settlement. The land requirement of land use is defined by two types of the requirement by 1) new additional land requirement and 2) conversion from other existing land uses to residential use, of which this method is applied to all other Tables for land use requirements.

Mixed residential use is considered by existing land use distribution pattern in the target area, where commercial and business activities have been observed in many residential areas as mixed-use (residential with commercial, business and small-scale shops, restaurants, etc) by vertical or horizontal building use. In addition, mixed-use will play an important role in absorbing future population demand through conversion of existing mono-type residential areas potential for future mixed use.

Table 4.7. Dand Requirement for Residential Area (na)										
	2017		Residential Areas (ha) 2030							
Urban Block	Total	Low- density	Medium	High	Mixed	Total	Requirement (ha)			
Urban Center East (UCE)	294.1	0.0	71.9	25.5	159.7	257.1	-37.0			
Urban Center West (UCW)	163.5	76.7	115.0	6.8	119.2	317.7	154.2			
Suburban East (SUE)	235.3	219.4	219.4	11.7	117.0	567.6	332.3			
Suburban Coast (SUC)	141.0	426.1	170.5	0.0	56.8	653.4	512.4			
Airport Front East (AFE)	27.3	133.7	167.1	35.7	44.6	381.0	353.7			
Airport Zone (APZ)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Airport Front Coast (AFC)	28.0	119.0	0.0	0.0	17.5	136.5	108.5			
Northern East (NTE)	2.8	0.0	0.0	0.0	0.0	0.0	-2.8			
Northern Coast (NTC)	25.9	0.0	0.0	0.0	0.0	0.0	-25.9			
Total	918.0	974.9	743.8	79.7	514.8	2313.3	1395.3			
Note: Target density assumption for a residential area										

Tal	ble 4.7	: Land Rec	quirement	for R	esidential	Area ((ha)

Type of residential area	Population/ha	Reference
Low-density Residential	40-50	Referring existing density + addition
Medium-density Residential	80-100	Ditto
High-density Residential	150 - 300	Collective housing to be introduced
Mixed Use Residential	60 - 80	Multi-story with 2-3 floor residential

Source: JICA Study Team

(2) **Tertiary sector area**

The employment framework of tertiary sector involves the employment of commercial, business, public administration and institution as service industry sector. Area requirements for the tertiary sector are estimated based on the existing land use types of "Commercial and Business", "Mixed Use" and "Public Facilities" as shown in Table 4.8. This is based on the desirable future density target range of relevant uses.

It should be noted that there are some gaps between available statistics including the household survey data and existing land use where small settlement and commercial business land uses are identified in the northern part of Nouakchott. The figures of existing employment indicate that area and employment by assumptions.

II.b. Dlada	Land Area (ha) 2017		Emplo	Employment		Employme Land R		irement (ha)	Addition		
Urban Block	C&B	Mixed	Public	total	2017	Emp/ha	nt 2030	C&B	Mixed	Public	Total	al (ha)
Urban Center East (UCE)	87.3	44.1	210.2	341.6	18,890	55.3	86,280	151.0	129.4	196.1	476.5	134.9
Urban Center West (UCW)	32.7	12.7	4.9	50.3	20,572	408.9	24,310	82.7	34.0	6.1	122.8	72.5
Suburban East (SUE)	12.5	10.4	199.5	222.3	4,005	18.0	8,670	46.2	29.5	200.0	275.7	53.4
Suburban Coast (SUC)	32.1	9.1	3.1	44.4	4,541	102.4	7,950	42.4	15.1	4.0	61.5	17.1
Airport Front East (AFE)	0.1	0.6	7.4	8.1	(162)		12,800	68.3	19.2	9.1	96.6	88.5
Airport Zone (APZ)	1.8	0.0	0.3	2.0	(200)		550	3.3	0.0	4.4	7.7	5.7
Airport Front Coast (AFC)	10.9	26.2	10.4	47.4	(237)		7,970	39.9	31.9	13.3	85.0	37.6
Northern East (NTE)	3.1	0.0	0.3	3.5	(17)		0	0.0	0.0	0.0	0.0	-3.5
Northern Coast (NTC)	0.0	0.0	0.0	0.0	0		0	0.0	0.0	0.0	0.0	0.0
Total	180.4	103.1	436.1	719.6	48,008	66.7	148,530	433.7	259.1	433.0	1,125.8	406.2
Total including assumption			(439.1)	(719.6)	(48, 624)	67.6						

Table 4.8: Land Requirement for Tertiary Sector Area (ha)

Note: Target employment density assumption

Existing Land Use Type for Tertiary Sector	Employment/ha
Commercial and Business	$250 \sim 100$
Mixed Use (residential & commercial business)	$50 \sim 100$
Public Facilities	$20 \sim 220$
a	

(3) Industrial area

The industrial areas are estimated and set according to the spatial framework and employment framework of SDAU and detailed employment framework of the target area based on the assumption of unit employment by existing land use condition examination. Target land requirements are shown in Table 4.9 based on the desirable future density target range by industrial type. Especially Airport City development is expected to introduce new industrial areas.

- INZ: Industrial Zone: This area is expected to be introduced in order to accommodate industrial investment needs targeting mainly Foreign Direct Investment where institutional arrangement such as Special Economic Zone (SEZ) needs to be considered.
- QIN: Quasi-industrial area: This area as planned areas to be concentrated by industries includes not only industrial use but also other use by residential, commercial & business and other land use category. Industrial type is targeting to promote small-medium scale industry for local or domestic investment.

	Existing Er	nploymer	ıt (2017)	Industrial	Land Requ	irement 20	30 (ha)	Additional
Urban Block	Land (ha)	Emp (S)	Emp (S) /ha	Sector Employment 2030	Industrial Zone	Quasi- industry	Total	Additional (ha)
UrbanCenterEast (UCE)	2.0	191	97.5	0	0	0	0	-2
UrbanCenterWest (UCW)	5.6	457	81.1	390	0	4	4	-2
SuburbanEast (SUE)	8.9	445	50.3	750	0	8	8	-1
SuburbanCoast (SUC)	1.1	93	81.4	420	0	4	4	3
Airport Front Eaast (AFE)	0.0	0	0.0	670	13	0	13	13
Airport Zone (APZ)	0.0	0	0.0	60	1	0	1	1
Airport Front Coast (AFC)	0.0	0	0.0	0	0	0	0	0
Northern East (NTE)	0.0	0	0.0	0	0	0	0	0
Northern Coast (NTC)	0.0	0	0.0	0	0	0	0	0
Total	17.6	1,186	310.2	2,290	15	16	30	13

Table 4.9: Land Requirement for Industry Area (ha)

Note 1: Existing employment 2017 for the secondary sector is assumed by the existing land use and the household survey results.

Note 2: Emp (S) = Secondary sector employment Note 3: Target employment density assumption

Type of industry	Employment/ha	Reference
Industrial Zone	50-80	Newly developed
Quasi-industrial Area	100-200	Including existing area

Source: JICA Study Team

(4) Key public facilities

The areas for key public facilities are defined as major facilities for public use occupying large lands in general necessary to be estimated. This category includes facilities for education, key health facilities, utilities (water supply plants, sewerage plant), transportation (public transportation and/or logistic terminal).

The land use requirement for key public facilities is estimated by assumption basis referring to each proposed Sector Plan of SDAU with available numerical frameworks. Due to insufficient existing data and information in general, key public facilities of education, health, park, and others are necessary to address the demand based on the population increase. Also, the land requirement of only key plants for water supply and sewer plant described in relevant Chapters is roughly estimated.

1) Education facilities

Based on the Social Infrastructure Development Plan of SDAU, the land requirement for elementary school (EL: grade 1-6) and secondary school (SS: grade 7-13) education facilities are estimated as shown

in Table 4.10 with some assumptions described in the note of the table. The key assumption is considered by the expansion of existing school capacity due to limited land by multi-story building provision in existing sites of schools or low occupancy school site utilization without new land acquisition. This land requirement for elementary and secondary schools is included by the key public facilities as an aggregated land requirement.

And "Higher Education" by universities and colleges are envisaged that the future land demands could be accommodated by more flexible operation and management of new campus of Nouakchott Al Aasriya University (UNA) in the target area.

Lisher Diash	Enrollment 2017		Number of CR		Enrollment 2030*		ES 2030 (CR)		SS 2030 (CR)		Land Requirement (ha)	
Urban Block	ES	SS	ES	SS	ES	SS	Improve**	Develop**	Improve	Develop	ES	SS
UrbanCenterEast (UCE)	3,511	3,291	79	136	3,066	2,874	79	0	136	0	0.0	0.0
UrbanCenterWest (UCW)	2,534	2,375	0	0	3,270	3,066	0	65	0	61	2.2	2.0
SuburbanEast (SUE)	2,044	1,917	6	0	5,618	5,267	6	106	0	105	3.5	3.5
SuburbanCoast (SUC)	620	581	0	0	5,454	5,114	0	109	0	102	3.6	3.4
Airport Front East (AFE)	500	469	0	0	4,278	4,011	0	86	0	80	2.9	2.7
Airport Zone (APZ)	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Airport Front Coast (AFC)	0	0	0	0	1,120	1,050	0	22	0	21	0.7	0.7
Northern East (NTE)	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Northern Coast (NTC)	0	0	0	0	0	0	0	0	0	0	0.0	0.0
Total	9,209	8,633	85	136	22,806	21,381	85	389	136	370	13.0	12.3

 Table 4.10: Land Requirement for Education Facilities 2030

Note1: ES: Elementary School, SS: Secondary School, CR: Classroom,

Note2: School requirement is estimated by the following conditions:

- Net enrollment rate: 100 % in 2030 (SCAPP 2016-2030)

- Existing school capacity could be expanded by multi-story facilities (double capacity). (Imp: expansion of capacity)

- A number of schools to be built with area 4000 m², two floors, 24 classrooms per school.

- One classroom accommodates 50 pupils.

Source: JICA Study Team

2) Health facilities

According to the sector plan of SDAU, health facilities of 1) hospital, 2) health center A, 3) health center B, 4) health post are listed in the report in order to achieve health access to all citizens. The land areas of new facilities are considered by the aggregated land requirement for existing and additional health facilities by Urban Blocks based on the estimated number of health facilities as shown in Table 4.11.

Urban Block	Existing 2017 (unit)				Health	n Faciliti	ies 2030	(unit)	Additional Requirement (ha)			
Croan Block	HPT	HCA	HCB	HP	HPT	HCA	HCB	HP	PHT	HCA	HCB	HP
Urban Center East (UCE)	5	1	1	1	0	0	0	2	0.0	0.0	0.0	1.0
Urban Center West (UCW)	0	0	0	1	0	0	0	5	0.0	0.0	0.0	2.5
Suburban East (SUE)	0	0	0	0	0	0	3	6	0.0	0.0	3.0	3.0
Suburban Coast (SUC)	0	0	0	0	0	1	2	6	0.0	2.0	2.0	3.0
Airport Front East (AFE)	0	0	0	0	0	1	2	2	0.0	2.0	2.0	1.0
Airport Zone (APZ)	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Airport Front Coast (AFC)	0	0	0	0	0	0	0	3	0.0	0.0	0.0	1.5
Northern East (NTE)	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Northern Coast (NTC)	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Total	5	1	1	2	0	2	7	24	0.0	4.0	7.0	12.0

Table 4.11: Land Requirement for Health Facilities 2030

Note

Administrative Catchment	Type of Health Facilities	Ref.	Unit: Area (ha/site)		
Level II (Wilaya)	Hospital	HPT	2.00		
Level III	Health Center A	HCA	1.25		
(Moughataa)	Health Center B	HCB	0.4		

Health Post	HP	0.02
•		

Source: JICA Study Team

(3) Park, sports, and open spaces

The park, sports, and open space consist of urban public park and garden, field sports facilities (e.g. stadium, gymnasium) and public park and open spaces for citizens and tourists except for the private green facilities such as golf course and sports club for private ownership and operation. According to the Social Infrastructure Development Plan of SDAU, land requirement of these public facilities is estimated as follows.

1) Sports and recreational facilities

Taking account of insufficient sports and recreational facilities in Nouakchott, where mono-tone facilities by stadium with youth center are predominant, it is proposed that hierarchical facilities by administrative area are introduced to each level of Commune. Land requirements for sports facilities in 2030 in the target area are estimated by unit requirement for standard open space.

Urban Block	Existing 2017	Number Playgrou	of Sports and Facil	s and ities 2030)	Additional Land Requirement (ha)						
Croan Block	Stadium	PSTD	DP	NP	PP	PSTD	DP	NP	РР	total		
Urban Center East (UCE)	1	0	1	4	19	0.0	0.6	1.5	1.9	4.1		
Urban Center West (UCW)	0	0	1	4	20	0.0	0.7	1.6	2.1	4.4		
Suburban East (SUE)	0	0	2	7	35	0.0	1.2	2.8	3.5	7.5		
Suburban Coast (SUC)	0	1	2	7	34	1.2	1.1	2.7	3.4	8.5		
Airport Front East (AFE)	0	1	2	5	27	1.2	0.9	2.1	2.7	6.9		
Airport Zone (APZ)	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0		
Airport Front Coast (AFC)	0	0	0	1	7	0.0	0.2	0.6	0.7	1.5		
Northern East (NTE)	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0		
Northern Coast (NTC)	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0		
Total	1	2	10	29	143	2.4	4.8	11.4	14.3	32.9		
Note												

 Table 4.12: Land Requirement for Sports and Recreational Facilities 2030

Type of Facilities	Ref	Standard Requirement (Population per facilities)	Unit Area (s.q.m)
Public Stadium Center	PSC	100,000	12,000
District Center	DC	15,000	5,000
Neighborhood Center	NC	5,000	4,000
Pocket Place	РР	1,000	1,000

Source: JICA Study Team

2) Park and open spaces

Park and open space as one of desirable improvement or development for urban area in Nouakchott was pointed out by community stakeholders through the consultation workshops in March 2017. Although there are issues of park development in Nouakchott which peoples pointed out security problem and/or insufficient use, park development could play significant role in not only providing attractive place of living environment, but also contributing to climate change adaptation including natural hazard mitigation.

Taking account of insufficient park and open space in the target area, it is proposed that hierarchical facilities by administrative area are introduced to each level of Commune. Land requirements for sports facilities in 2030 are estimated by unit requirement for standard open space.

Table 4.15. Land Requirement for Tark and Open Spaces 20.

Urban Block	Existing 2017		Numb	er of Park	s by Typ	e 2030	Additional Land Requirement (ha)					
Orban Block	GP	GB	СР	DP	NP	PP	СР	DP	NP	PP	Total	

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Urban Center East (UCE)	39.7	0.0	0	1	4	16	0.0	0.6	1.5	1.3	3.5
Urban Center West (UCW)	12.4	0.0	0	1	4	17	0.0	0.7	1.6	1.4	3.7
Suburban East (SUE)	0.0	0.0	1	2	7	29	5.0	1.2	2.8	2.4	11.3
Suburban Coast (SUC)	0.0	5.7	1	2	7	28	5.0	1.1	2.7	2.3	11.2
Airport Front East (AFE)	0.0	262.1	1	2	5	22	5.0	0.9	2.1	1.8	9.8
Airport Zone (APZ)	0.0	0.0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Airport Front Coast (AFC)	0.0	0.0	0	0	1	6	0.0	0.2	0.6	0.5	1.3
Northern East (NTE)	0.0	0.0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Northern Coast (NTC)	0.0	0.0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Total	52.1	267.8	3	10	29	119	15.0	4.8	11.4	9.5	40.8

Note: GP = Green Open Space, GB = Green Belt

Type of Park	Ref	Standard Requirement (Population per facilities)	Unit Area (s.q.m)	
City Park	СР	50,000	50,000	
District Park	DP	10,000	5,000	
Neighborhood Park	NP	5,000	4,000	
Pocket Park	PP	1,200	800	

CHAPTER 5: SECTOR DEVELOPMENT

5.1 Road Network and Transportation

5.1.1 Development strategy

In accordance with the Transport Infrastructure Development Plan of SDAU, the following development strategies for road network and transportation are adopted to the target area of PLU.

- Formulating efficient and effective road network to support each land use zone by 1) convenient access and parking for commercial business area, 2) safe, quiet and comfortable access for residential area, 3) heavy traffic access and capacity for industrial area, etc.,
- Promote public transport with combination of pedestrian and bicycle use by comfortable network and inter-modal systems especially in association with higher density zones, and
- Promotion of parking space by on-street, off-street (site area parking, parking building with roadside land use and road capacity taking account of zoning regulations for parking system.

5.1.2 Road network in the Target Area

(1) Road networking

While SDAU deals with entire road networks consisting the future urban structure for 2040, PLU would follow also the road network 2040 in the target area in spite of PLU target years by 2030. This is because of importance of securing right of ways of the proposed network in association with land reserve or expropriation.

Detailed analyses for road and transportation is required in further stage after PLU planning to determine road standards, urban block-based traffic management, parking system and other mobility modes such as pedestrian network and bicycle network. Followings are employed for the planning.

- Concretize the major road networks as statutory roads by designation of alignments on the ground in accordance with proposed network by SDAU taking account of land acquisition and regulation of development for future urbanization toward 2040
- Complementing SDAU road network system to the local level, taking account of the wider role of the network such as inter-commune, linkage of important public facilities, and equal access to commercial and business areas from all the communities, and
- Detailed road network such as distribution roads connecting to inter-commune roads, access roads to each land plot is considered as elements at more detailed planning levels such as PAD, ZAC and PL (subdivision plan).
- Formulation of "inter-commune or inter-subdivision network" taking account of securing wide area accessibility beyond entity of each subdivision or Commune and coping with current discontinuous road network

Category of Road Network and Facilities to be considered in Statutory Plans		Referable Guide (example)					Land Use Category			
		Traffic Volume/day	Travel Lanes	Signal Intersectio n	Traffic Calming	CB	IND	PU	R	
		Arterial Road-I	Over 20,000	4 to 6	•		٠	٠		0
Road Network concerned mainly PAD, ZAC, PL	Arterial Road-II	4,000-20,000	2 to 4	•		٠	•		0	
	DLU	Secondary Road with parking	4,000-20,000	2	•	0	٠		٠	
	PLU	Secondary Road	1,500~4,000	2	A		٠	0	•	٠
	PAD, ZAC, PL	Tertiary Road	500 ~ 1,500	2	A		٠	0	•	٠
		Access Road to plot	> 500	1 to 2	0	•				•
Parking System	Parking System PAD, ZAC,	On-street parking system	TCR < 0.70	with shoulde r					0	0
concerned PL mainly	PL	Off-street parking area	TCR > 0.70	With conditio n			•	•	•	•
Other MODE I concerned I mainly		Pedestrian way			•*		•		•	
	PAD, ZAC, PL	Bicycle way			•*		0		•	
		Green Footpath			° *		0		•	•

 Table 5.1: General Role and Function for Road Network considering Land Use

Lgend: \bullet = desirable, \blacktriangle = possible with conditions, \bigcirc = not desirable or with conditions, -- = not applicable, CB=Commercial & Business, IND = Industry, PU = Public Use, R = Residential, TCR = Traffic Capacity Ratio (TCR = Actual traffic per day / Design Traffic Capacity per day), \circ * = crossing point with traffic road Source: JICA Study Team

(2) Applied road classification of SDAU

The road network in the target are defined by their road classifications according to the road classification of SDAU. The target area involves all road classifications from arterial road to tertiary road as shown in Table 5.2 and Figure 5.1. The allocation of road classifications is based on the road network of SDAU of which key road capacities are analyzed by traffic forecast according to the future land use plan of SDAU.

Road Classification		Width of	No. of	BRT	On-street	Side-	Poforonco
	Sub-class	Road (m)	(no.)	(no.)	(no.)	(m)	Kelelence
	A1: Urban Road 1	38.0	6	2	0 (shoulder 2)	3.0	NR1 / NR2
	A2: Urban Road 2	31.5	4 / 6		0 (shoulder 2)	3.0	
Arterial	A3: Urban Road 3	31.0	4	2	0 (shoulder 2)	3.0	NR2
Road	A4: Urban Road 4	24.5	4		0 (shoulder 2)	3.0	Ring Roads/Airport Link road, Airport City Road
	A5: Rural Road 1	16.0	2		0 (shoulder 2)	3.0	
Sacandami	S1: Urban Road 1	33.5	4		2	3.0	45°angle parking
	S2: Urban Road 2	27.5	4		2	3.0	Parallel parking
Road	S3: Urban Road 3	24.5	4		0 (shoulder 2)	3.0	
	S4: Urban Road 4	16.0	2		0 (shoulder 2)	3.0	
	S5: Rural Road 5	16.0	2		0 (shoulder 2)	3.0	
Tertiary Road	T1: Urban Road 1	10.0	2		0 (shoulder 2)	3.0	
	T2: Rural Road 1	10.0	2		0 (shoulder 2)	3.0	

Table 5.2: Road Classifications (SDAU) to be applied to the Target Area

Note: NR = National Road Source: JICA Study Team



Figure 5.1: Proposed SDAU Road Network in the Target Area 2040

(3) BRT system in the target area

The proposed BRT system of the Public Network Plan of SDAU would play a significant role in formulating one of essential urban spines of Nouakchott in the target area where the concept of transit oriented urban development (TOD) could be introduced to the target area. The followings are principles for development BRT system in conjunction with urban land use and urban development.

1) Station

BRT station is one of essential infrastructures of BRT not only from urban mobility point of view but also urban planning and development for TOD concept, where function of stations play a considerable role in becoming transportation nodes linking to other modes (taxi, walk, paratransit, etc) and/or destinations. The followings are considerations of station developments for the BRT route on the National Road No.2.

• Key station: Four key stations with terminal function can be formulated on the route of BRT at 1) City Center Station at Garden Market, 2) Inter-modal Transfer Station at proposed Metropolitan Gateway, 3) University Station at Nouakchott Al Asriya University and 4) Secondary Pole Station at proposed location of the pole in the midway between 1) and 2).

- Standard station: This station as an ordinal station of BRT can be set by desirable interval of stations taking account of station's catchment area by walkable distance (400 ~ 600 m) and well-known destinations for relevant local socio-economic activities by citizen.
- 2) Depot / Workshop

Depot/workshop serves bus-parking areas, refueling facilities, vehicle washing and cleaning, maintenance and repair areas, administrative offices for operators, and employee facilities. The public transport development plan of SDAU proposes to locate the depot/workshop for this BRT route at the large property site of Nouakchott Al Asriya University.



Source: JICA Study Team

Figure 5.2: BRT System Development in the Target Area

(4) Parking system in the Target Area

In line with the traffic management system development plan of SDAU, appropriate parking system should be introduced into the target area, where there are various demands for parking by various land use types from the city center to rural area in the target area.

Also, parking system should be developed by two measures in parallel of physical provision of parking spaces (e.g. on-street parking, on-site parking including obligated parking lot) as supply-side measure and demand control-side as a part of traffic management (e,g, parking control or restrict zone, etc). Although it is not based on certain level of surveys and analyses, parking system can be illustrated by conceptual scheme in the target area.

1) On-street parking

According to the road classifications of SDAU, there are three types parking system by 1) S1: Urban Road-1 with 45° angle parking, 2) S2: Urban Road-2 with parallel parking, 3) all other roads with their shoulders for emergency parking or short-time parking and another potential parking area in the right of ways in case of their wider ROW with enough vacant area for parking spaces. Based on the certain zone classification, two types of on-street parking (S1/S2 and another type) should be promoted in the commercial and business area and corridor type commercial business area.

2) On-site parking (and/or off-street parking)

On-site parking consists of two measures of 1) obligated parking lot for all buildings in their sites and 2) exclusive car parking spaces horizontally and vertically. This parking system

- Obligated parking lot: This is described in detail in the PLU Guideline which standard requirements based on the building use or scale of demand by them are shown, where all types of land use or buildings are required to apply this system.
- Exclusive parking space: This space is provided by public or private sectors outside of roads where certain number of parking lots on the ground or multi-story carpark building can be prepared in especially commercial and business land use area in combination with parking control area designation
- 3) Parking control and management

Parking control and management should be introduced to the target area by two measures of 1) designation of parking restriction area or streets and 2) designation of on-site parking area to be promoted by exclusive carparks in consideration with commercial business land use.



Figure 5.3: Conceptual Parking System Development in the Target Area

5.2 Other Infrastructure Developments in the Target Area

5.2.1 Trunk energy lines

(1) High-voltage power lines

SOMELEC has the program for national high-voltage (225kv) power lines'(HVPL) construction in Nouakchott by 2030, where the planned on-shore gas processing plant next to the existing thermal power plant close to Nouakchott Al Aasriya University (UNA) distributes three power lines as parts of the national grids penetrating the target area by three directions to the north-east, the north-west and south-west. Appropriate urban development needs to consider the planned alignments of HVPL avoiding negative impacts on surroundings of and their infrastructure security. The easement of HVPL may require buffer by 60 m at least certain in both sides.

(2) Gas pipe line

Banda Field Development Gas Project has proposed the gas pipeline construction in combination with off-shore infrastructure (75 km) and on-shore infrastructure in Nouakchott, where the planned on-shore

gas pipeline (5.6 km) is expected to connect with a planned gas processing plant next to the existing thermal power plant close to Nouakchott Al Aasriya University (UNA). Appropriate urban development needs to consider the pipeline alignment to secure safety of the pipeline. The easement of gas pipeline may require certain buffer by 60 m at least in both sides. Table 5.3 shows the high-voltage power lines in the target area.

	Trunk Energy I	Lines (km)
Urban Block	High-voltage Power Line (225kv)	Gas Pipeline (km)
Urban Center East (UCE)		
Urban Center West (UCW)	1.4	
Suburban East (SUE)	4.8	
Suburban Coast (SUC)	4.0	
Airport Front East (AFE)	15.5	3.7
Airport Zone (APZ)	5.6	
Airport Front Coast (AFC)	1.9	1.9
Northern East (NTE)	14.5	
Northern Coast (NTC)		
Total	47.7	5.6

Table 5.3. Trunk Energy	Infrastructure Develo	nment in the Target Area
Table 5.5. Hunk Energy	min asti ucture Develo	pinent in the farget Area

Source: JICA Study Team

5.2.2 Utilities System

(1) Water supply system

Water supply system development for the target area will be programmed based on the water supply development plan of SDAU indicated in the section 6.1.3.

(2) Sewerage system and drainage system

Sewerage system development for the target area will be programmed based on the sanitation and wastewater treatment development plan of SDAU indicated in the section 6.2.2. Drainage system for the target area will be programmed based on the rainwater drainage network development plan of SDAU indicated in the section 6.3.3.

CHAPTER 6: ZONING PLAN

6.1 Urban Growth Management

As an essential function of PLU to bind socio-economic activities, urban growth management is critical to be defined and designated in the zoning plan of PLU to materialize the spatial structure or land use plan of SDAU. The following measures should be incorporated into the zoning plan of the target area. Table 6.1 illustrates concrete measures as the urban growth management tools.

(1) Urban growth boundaries

The plan of PLU requires to designate certain boundaries as tools of binding power of which the urbanization area as a fundamental element of the plan should be defined. According to the development framework of the target area in line with the land use plan of SDAU, urban growth boundary-1 for urbanization by 2030 will play an inevitable role in controlling and managing the urbanization limit, while growth boundary-2 for future urbanization by 2040 should be also defined by the certain boundary in the zoning plan.

(2) Natural environment protection

The area outside of the urban growth boundaries could be defined by the natural environmental protection area including natural desert land, bush areas, coastal area and low lands (Sebkha) in the norther part of Nouakchott. In this area any change of the lands and its development is not allowed in principle.

Growth			Urban Growth Control Measure					
Control Measure	Purpose	Target Year	Land Use Zoning Application	Development Permit /Planning Certificate	Infrastructure Development			
Urban Growth Boundary-1	To control and manage urbanization within designated boundary	2030	• Applicable and inevitable to designate zones	• Permit and certificate within the boundary	• Infrastructure to be promoted within the boundary			
Urban Growth Boundary-2	To reserve lands for future urbanization	2040	• Not required	• No permit and issuing planning certificate	• Not allowed by any development before 2030			
Conservation Area	To protect and conserve vulnerable environmental areas	2040	• Not applicable except specific overlay zoning for environmental protection areas	• Strict control and regulation are required in combination with environmental sector regulation	Prohibited except national level infrastructure			

Table 6.1: Urban Growth Measures in the Target Area

6.2 Land Use Zoning and Control Measures

6.2.1 Zoning classifications

The zoning system for PLU aims to materialize the elements proposed by SDAU. The advantage of using the zoning system is quick and easy operation of judging the application of buildings largely due to the check list style assessment enabled by zoning regulations associated with each zone class. The classifications proposed for the model PLU consist of six broad classes covering 17 sub-classes shown in Table 6.2. A brief description follows.

(1) CLASS I: Rural (+2 sub-classes)

The PLU planning area covers a wide range of land uses not only for the urban area to be developed in the future but also for other lands including desert and agriculture land. The Class-I of "Rural" consists of "Desert and arid area (DA) and "Agriculture (AG)" to be retained and developed.

- DA would be a target of greening works.
- AG will be designated to the areas where agricultural production is possible by existence of easier access to water for agricultural use.

(2) CLASS II: Residential (+4 sub-classes)

Class-II consists of "Low-density Residential (RL)", "Medium-density Residential (RM)", "High-density residential (RH)", and "Mixed-use (MX)". The Class-II also allows grocery shops, etc. and cottage style industries.

- RL is to retain low density settlement to secure favorable living environment areas.
- RM will be applied in principle to settlements to be densified with multi-story residential buildings.
- RH is also aiming at densification of the area located especially in the urban centers which have larger potential for development of taller buildings.
- MX is also categorized at CLASS II as it is a residential area in combination with commercial and business floors or part of a land parcel in medium density settlements.

(3) CLASS III: Commercial and Business (+3 sub-classes)

Class-III consists of "Urban Center Commercial & Business (UCB)" and "Neighborhood Commercial & Business (NCB)".

- UCB is to be developed and improved as a dominant area for high-medium density commercial and business activities typically called as CBD (Central Business District) in the capital city.
- NCB is for areas such as the sub-centers of Nouakchott with medium density commercial and business activities to accommodate local markets and small-scale cottage industries.
- CCB (Corridor Commercial & Business) is for areas along primary urban roads allows medium dense development within a certain width in both sides from the road center (e.g. 50- 100m).

(4) CLASS IV: Public Use

Class-IV consists of "Key Public Facilities" with a code abbreviation for public use and "Key Higher Education (KHE)".

- Coding for Key Public Facilities in the existing and future areas represented by annotation of major facilities which identifies types of the facility. These include basically large- scale public facilities such as government offices, institutions, transportation terminals, airports, utilities stations, and cemeteries based on the necessity to designate them.
- KHE is also included in this class as it requires large-scale land block and provides large impact on the activities of surrounding areas as well as traffic conditions.

(5) CLASS V: Industry (+2 sub-classes)

The Class-V consists of "Industrial Zone (INZ)" and "Quasi-Industrial (QIN)".
- INZ is to be designated for development or improvement of areas for industrial purposes, allowing heavy or light industries uses only. The area needs to be equipped with adequate infrastructure at a suitable location with certain distance from other purposes.
- QIN is another type of industrial land use class, allowing mixed use with others such as commercial and business. Typical facilities include logistics, and research and development (R&D) facilities of industries. it also aims to promote local small-medium scale enterprises (SMEs).

(6) CLASS VI: Green and Open Spaces (+4 sub-classes)

Class VI consists of "Tourism and Recreation Leisure (TRL)", "Park, Sports and Open Space (PSO)", "Nature, Forest and Green (NFG)", and "Water Surface (WS).

- TRL aims to encourage and promote attractive tourism area where facilities and infrastructure should be carefully developed to avoid deterioration of natural environment which is a source of attraction for sustainable tourism and leisure activities.
- PSO will be designated for parks and sports recreation uses. At the same time, PSO will be utilized to raise the level of urban amenity typically brought by landscape and environmental control. (e.g. river-side green, seafront green, etc.). PSO will be designated at the areas where green buffer should be introduced typically at the areas where living environment needs to be secured.
- NFG aims at protection of green environment which is expected to bring favorable effects to moderate climate of the city, typically by the green belt to prevent entering of sandy wind to the city and easing the desertification of the fringe of the built-up areas.
- WS is to protect natural water surface areas including wetlands where inundation takes place frequently or water is ponded permanently.

It should be noted that these classifications are applicable to other planning areas for PLU in Nouakchott, as the planning area of the model PLU contains almost all the zoning classification from the city center to rural and natural area.

Zanina Class	Zanina Sakalara	Code		Deferme
Zoning Class	Zoning Sub-class	No./Abbre	color	Reference
Class I: Rural	1.Desert / Arid Land	110: DA		Including bush, grass, coast
(100)	2.Agriculture land	120: AG		
	3.Low-density Residential	210: RL		Refer to Table 2.x (height)
Class II: Residential (200)	4.Medium-density Density Residential	220: RM		Refer to Table 2.x (height)
	5.High-density Density Residential	230: RH		Refer to Table 2.x (height)
	6.Mixed Use	240: MX		C&M with Residential
Class III:	7.Urban Center Commercial&Business	310: UCB		
Commercial and	8.Neighborhood Commercial&Business	320: NCB		
Business (300)	9.Corridor Commercial&Business	330: CCB		
Class IV: Industry	10.Industrial Zone	410: INZ		Industrial Park, High-tech Park
(400)	11.Quasi-Industrial Area	420: QIN		Light industry + (R, C&B)
Class V: Public	12.Key Public Facilities	510: code	KG	See code list in below
Use (500)	13.Key Higher Education	520: KHE		
	14.Tourism and Leisure Area	610: TRL		
Class VI: Recreation & Open Space (600)	15.Park, Sports, and Open Space	620: PSO		Including "Green Belt"
	16.Nature, Forest Area and Green	630: NFG		
	17.Water Surface	640: WS		Including wetland (Sebkha)

Table 6.2: Proposed Zoning Classification for the Target Area

Class/Sub-	Code	Description
	KG	Key Government / Institutions / Administration / Embassy / Security / Military by large site
	KS	Key compulsory schools (elementary / secondary)
Key Public	KH	Key health sector facilities with large site (national and referral hospital, specific hospital)
Facilities	KU	Key utilities (large site for plant facilities for water supply, sewerage treatment, disposal)
(510)	KSC	Key socio-cultural facilities (large mosque, large cemetery, etc)
	KTF	Key transportation facilities with large site (terminal, large depot, other transport facilities)
	AP	Airport facilities

Note: Each code is shown in each Zone on the map of PLU Source: JICA Study Team

6.2.2 Land use regulations by zone class

One of the essential functions of zoning system is to regulate urban activities of private sector by guiding or promoting to invest in a manner to create appropriate living and working environment in accordance with the concept and urban structure of the proposed SDAU. This is achieved by grouping compatible land uses together in zoning districts stipulated by the classification, while separating or buffering incompatible uses.

The use regulation consists of three categories as follows.

(1) **Permitted use**

Permitted uses are those buildings or building complexes in a lot property allowed to construct as a matter of right in the designated zoning classification and would be authorized by a simple check in the regulatory administration offices. The authorization work involves no discretionary parts if the applied project complies with design standards of building or construction codes.

(2) Conditional use permit

Conditional uses would be listed in the zoning regulations for each zoning classification. Conditional uses shall be authorized on discretionary basis; only authorized if the applied project is compatible with neighboring land uses, tailored to meet the capacity of infrastructures at the site, and does not violate the objectives of the zoning regulations. Conditions may be attached to the approval documents issued for permission. The procedure for the assessment of conditions would be an essential part in scrutinizing the permission process.

(3) **Prohibited use**

Prohibited uses consist of those which are not allowed to build in the designated land use class. These are specified in the zoning regulations.

Table 6.3 shows the composition of use regulations with three categories mentioned above. Further discussion will be required to reflect local perceptions on nuisance or annoying type of activities at each land use classes, along with their scale.

T.	Urban Activities by Type of Land use / Building Use			τ	Use R	egula	tion b	y Zon	ing C	lassif	icatio	n		
UI	ban Activities by Type of Land use / Building Use	110	120	210	220	230	240	310	320	330	410	420	520	610
ntial	Detached house, Semi-detached house													
ider	Apartment, collective housing			В										
Res	Detached house with small shop/office		Α	A	Α	Α								
ness	General retail shop, restaurant, coffee shop					В	В							
3usi	Business and service office						В				В			
&]	Wholesale/storage with office or without office						В							
rcial	Traditional/modern market (fresh food, fish, etc)													
Hotel, guest house, other business accommodation														
Entertainment facilities (bar, nightclub, game, etc)							В							

Table 6.3: Land/Building Use Regulation by Zoning Classification (tentative)

	Theater movie convention hall			R				
re	Craft shop / small factory without toxicity, chemical			 2				
cultu	Factory with noisy, malodorous production							
Agric	Factory with toxicant production							
V / /	Car repair workshop/garage							
lustr	Transportation terminal / logistic terminal							
Inc	Livestock barn, slaughterhouse, agro-workshop							
	Large hospital, large laboratory, and institution							
	Vocational center, university or college							
ن د	Cultural facilities (library, museum, gallery, etc)							
ubli	General school (nursery, primary, secondary)							
Р	Sports facilities (gymnasium, club-house, etc.)							
	Religious facilities (mosque, church, etc)							
	Health and social welfare (health-post, clinic, etc)							

Legend: ______bhibited use, con interference of the content of the

Note: A<50 sqm, B < 500 sqm, C > 500 sqm

110: Desert/arid land, 120: Agriculture land, 210: Low-density residential, 220: Medium-density residential, 230: Highdensity residential, 240: Mixed-use, 310: Urban Center Commercial & business (C&B), 320: Neighbourhood C&B, 330: Corridor C&B, 410: Industrial Zone, 420: Quasi-Industrial area, 520: Higher-education, 610: Tourism and leisure area Source: JICA Study Team

6.2.3 Urban form regulations

Another essential scope of the zoning system is to regulate urban form through regulating the shape of buildings, such as height, volume, materials and colors, in order to formulate favorable streetscape in terms of safety, aesthetic, and micro-climate aspects. This is achieved by dimensional requirements for building design in the designated zoning class. This will also contribute to regulating the density of the area.

The building form regulations in the Law 2008 stipulates two elements: 1) lot coverage coefficient (COS³⁹), and 2) floor area coefficient (CUF⁴⁰). There are supplemental physical regulations provided by exiting General Urban Regulation 1987 and Titane City PLU, including setback lines, fences, and parking space requirements. The followings show the policy of model PLU to adopt urban form regulations, namely: CUF, COS and height control for each zoning classification.

This section illustrates the principle of urban form regulations in association with proposed standards of the regulations to apply to the target area, and details of regulations by each land use zoning classification are indicated in Appendix: Draft Zone Development Controls and Regulations for PLU.

(1) Urban form control system

Urban form control in combination with building form and site form is achieved effectively by two tier control measures of 1) control and regulation for each building unit and 2) overlay form control or development control for area-wide building ensemble in certain harmonious urban or rural areas. These two control measures are applied to the target area taking account of urban characters to be promoted or conserved by them. Table 6.4 illustrates the urban form control system.

Urban Form Control Target	Control Measure	Applied Measure	Reference
	- ·	1.1 Lot Coverage Coefficinet (COS)	
1. Single Building Unit	By zoning	1.2 Floor Area Coeffcient (CUF)	Standard control and
Building Offic	classification	1.3 Building Height Control (BHC)	regulation measures

 Table 6.4: Proposed Urban Form Control System and its Measures

³⁹ Coefficient d'Occupation des Sols (COS)

⁴⁰ Coefficient d'Utilisation Foncière (CUF)

		1.1 Property Lot Size	by each zoning	
		1.5 Building Lines Control (BLC)	classification	
2. Building		2.1 Significant historical cultural urban or rural scenery control and regulation	Specific or exclusive control and	
Ensemble /	By overlay	2-2 Coastal scenery control and regulation	regulations based on	
7 Hou	zoning	2-3 Airport safety overlay control and regulation	Overlay Zoning	
No relation to		2-4 Natural hazard control and regulation	relevant zoning	
urban form control		2-5 Nature environment protection control and regulation	classification	

Source: JICA Study Team

(2) Lot coverage coefficinet (COS)

COS aims to regulate buildable area on the ground within a lot by allowable range of ground floor area of the building. According to examinations of existing occupancy condition of the target area, under 30% of occupancy ratio in each lot is predominant (98%) followed by very little share (0.3%) by the higher ratio of $40{\sim}49\%$ and $50{\sim}59\%$. Taking account of a role of COS as one of the tools for densification of settlement, it is proposed to increase the ratio of COS in necessary locations (zoning) where the SDAU density frame requires more densification. Table 6.5 indicates proposed COS by each zoning classification. It should be noted that the followings are taken account of specific conditions when COS is applied to each zoning classification with desirable urban form formation.

- Sufficient open space (low rate COS) in case of high-rise building on "Residential High-density" zone.
- High rate COS in case of "Commercial and Business" zone should be allowed by the conditions of "corner lot", "fire-resistance building structure and treatment" and provision of "parking space" such as underground carpark

Zoning		Cont	rol Range o	f Lot Coverage	Coefficient	(COS) by Z	lones		
Classification	30%	40%	50%	60%	70%	80%	90%	100%	
	R	L							
II Residential		RM							
	RH: (high-	rise building	w/Cond1)	RH (other	height of bui				
				MX					
III Commercial					UCB				
and Business					NCB				
(C&B)					CCB		w/C	ond2	
IV Industrial		INZ							
			QIN						

 Table 6.5: Proposed Standard Lot Coverage Coefficient (COS)

Note 0: RL = Low-density residential, RM = Medium-density residential, RH = High-density, MX = Mixed use, UCB = Urban center commercial and business, NCB = Neighborhood commercial and business, CCB = Corridor commercial and busines, INZ = Industrial Zone, QIN = Quasi-Industrial

Note 1: w/Cond1 = In cases of COS (30/40%) are applied to the case of high rise residential building.

Note 2: w/Cond2= The indicated rate of COS is allowed by the conditions in case of "Corner Lot" and provision of "Parking Space" (e.g. underground carpark) or "fire-resistance building structure and treatment"

Note 3: COS = Lot Coverage Coeffcient

Source: JICA Study Team

(3) Floor area coeffcient (CUF)

CUF as one of the essential tools for density control aims to regulate volume of building space (floor) by allowable range of total floor area of the building. According to examinations of existing building height condition of the target area, lower buildings are majority in the target area by two floors (41%) and only ground floor (33%), although number of floors is not equivalent to CUF. CUF as essential densification tool of settlement is proposed to increase the ratio of CUF in necessary locations (zoning) based on the SDAU density framework. Table 6.6 illustrates proposed CUF by each zoning classification.

	Table	. 0.0. 1 10p	oseu stanu	a a 1 1001 .			1)	
Zoning		C	Control Rang	e of Floor A	rea Ratio (C	UF) by Zone	es	
Classification	60%	80%	100%	200%	300%	400%	500%	800%
	R	ĽL						
II Residential				RM				
III Commercial						UCB		
and Business					NO	СВ		
(C&B)					CO	СВ		
IV Industrial		INZ					-	
		Q	IN					

Table 6.6: Proposed Standard Floor Area Coefficient (CUF)

Note: RL = Low-density residential, RM = Medium-density residential, RH = High-density, MX = Mixed use, UCB = Urban center commercial and business, NCB = Neighborhood commercial and business, CCB = Corridor commercial and busines, INZ = Industrial Zone, QIN = Quasi-Industrial Source: JICA Study Team

Source: JICA Study Team

(4) Building height control

Building height control as one of the most visible controls in urban form controls aims to regulate absolute building height by allowable range of number of floors of the building. As mentioned in the previous section, lower buildings are majority in the target area by two floors (41%) and only ground floor (33%).

Although building height is relating to CUF control measure, this measure would play a more considerable role in securing strict building height within desirable urban areas where specific town scape is required to be formulated or maintained. And also building height control is proposed generally to increase the height in necessary locations (zoning) based on the SDAU density framework. Table 6.7 illustrates proposed CUF by each zoning classification.

It should be noted that the followings are taken account of specific conditions when the building height is applied to each zoning classification with desirable urban form formation.

- Higher building more than R+ 4 floor should consider conditions of lifts provision in the building in accordance with Decree 205-2007, while lower building without the lift is defined by the R+4 floor buildings (ground floor included) as walk-up building
- Higher building than R+ 4 floor should consider conditions of fire-fighting, especially availability of reachable fire-fighting ladder truck to the upper floors of the building.
- Higher building in the specific area where the environment is required to conserve its town scape or scenery or to regulate buildings in terms of safety of specific infrastructure such as airport surface areas.

		Range of Building Height (by Floor, absolute height is as reference)												
No. of Floor	R+1F	+2F	+3F	+4F	+5F	+6F	+7F	+8F	+9F	+10F	+11F	+12F	+13F	+14F
(Building height m)	6.0	9.0	12.0	15.0	18.0	21.0	23.0	25.0	29.0	32.0	35.0	38.0	41.0	43.0
	RL													
II Pagidantial			RM			-	1	-					-	
II Kesidelitiai		-				R	Н						-	
			MX			-	-	-	-				1	
III Communication d					U	СВ				w/C1		w/	C2	
III Commercial and Business $(C\&B)$			N	СВ		-	1	-					-	
Dusiness (C&D)			CCB			-	-	-					-	
IV Inductrial	IN	νZ												
IV Industrial		QIN												
Reference				A*	B*	C*				D*		E*		F*

Table 6.7: Proposed Standard Building Height Control

Note: RL = Low-density residential, RM = Medium-density residential, RH = High-density, MX = Mixed use, UCB = Urban center commercial and business, NCB = Neighborhood commercial and business, CCB = Corridor commercial and business, INZ = Industrial Zone, QIN = Quasi-Industrial

Note1: $A^*=A$ walk-up building applies to under 4th floor. *B=A building over 4th floor is required by the lift. (Decree 205-2007). C*= A building more than a 20 m height is treated by the high-rise building in combination with necessary equipment for fire-fighting. (Decree 205-2007), *D= Height of the minaret of Saudi Mosque (around 30m) or other famous mosques, *E = standard fire ladder truck (35m~40m).

Note 2: w/Cond1= The range of building height considers to harmonize cultural land scape of the Saudi Mosque of the minaret (D*).

Note 3: w/Cond2 = The range of building height considers difficulties to cope with fire in high-rise buildings by ordinal fire-fighting ladder truck (E^*)

F = The highest existing building height in Nouakchott in the city center. (R + 14F)

Source: JICA Study Team

(5) Lot size and building lines control

Land lot size plays also one of the important roles in formulating settlement density. Existing conditions in the target area shows that average lot size in case of the subdivisions areas ranges from around 170 m^2 to 1,300 m^2 . Standard range of plot size for each zone classification is proposed to be widen by introduction of smaller lot size taking account of the SDAU density framework. Table 6.8 proposes to set standard lot size to apply to each zoning classification in consideration with existing standard of the General Urban Regulation 1987 (RGU) and international standards.

Building lines as building setback measures within a property lot aims to be reasonably constructed, occupied and used for building purposes without danger to the health, safety of the occupants, security, and considering fire-resistance and micro-climate ventilation. Table 6.8 shows proposed CUF by each zoning classification.

			B	uilding Line	s by Standar	d Range of	Land Lot Si	ze	
Typical Lo	ot Size	200 m ²	350 m ²	500 m ²	700 m ²	1000 m ²	1500 m ²	3000 m ²	5000 m ² over
Road from	tage (m)	3.0	3.0	4.0	4.0	4.0 5.0 6.0		7.0	9.0
Setback: Rear (m)		1.0	1.5	1.5	2.0	2.0	3.0	3.0	5.0
Selback:	Side (m)	1.0 (0.0)*	1.5	1.5	2.0	2.0	3.0	3.0	5.0
ир 1. <i>с</i> . 1					R				
II Kesiden	uai	RH (low-rise	RH (low-rise building.) RH:(high-						
шо	· 1 1				UC	СВ			
Business (C&B				NCB				
Dusiness (Cab)			CC	СВ				
								INZ	
i v maustr	IV Industrial			Q	IN				
Reference A* B* C*									

Table 6.8: Proposed Standard Lot Size and its Building Lines

Note 0: RL = Low-density residential, RM = Medium-density residential, RH = High-density, MX = Mixed use, UCB = Urban center commercial and business, NCB = Neighborhood commercial and business, CCB = Corridor commercial and busines, INZ = Industrial Zone, QIN = Quasi-Industrial

Note1: In case of common wall building, side building line is no interval or buffer between two different properties. Note2: A* as minimum lot size is stipulated in the General Urban Regulation 1987 (RGU) for ordinal dwelling zone.

Note3: B* as minimum lot size in RGU for medium dwelling zone

Note4: C* as minimum lot size in RGU for industrial and commercial zone Source: JICA Study Team

6.3 Zoning Application to the Target Area

6.3.1 Principles for zoning application to the PLU target area

According to the zoning measures and elements described in the previous section, the following principles are taken when these measures apply to the target area in order to achieve desirable urban activities based on the spatial framework of SDAU, taking account of existing physical conditions and the development framework and sector developments of PLU.

- Appropriate zoning measures are applied to certain areas of the target area in consideration with types of control measures (growth boundary, land use zone, key road designation, key public facilities designation and others) excluding the airport city planning area where designation of important urbanization elements (urban growth boundaries, key roads, conservation area) are applied.
- Potential areas (e.g. airport city, coastal concession areas) could be managed by other applicable statutory plans (PAD, ZAC, etc) by designation of these area
- Land use zoning plan is mainly applied to the area within Outer Ring Road in line with strategy of SDAU implementation program of urban development by 2030.
- The planning for Airport City is expected to follow the proposed zoning plan of the target area when they formulate the master plan and detailed plan as expected ZAC or PAD schemes.
- The urban blocks of Norther East and Northern Coast are defined as non-development areas by conservation of natural and coastal environment.

6.3.2 Overlay zoning application to specific areas in the target area

Overlay zones aim to formulate specific standards and regulations for specified areas, by adding exclusive or additional regulations on the designated base zones. Whenever a requirement of an overlay zone conflicts with a requirement of the underlying base zone, the overlay zone requirement will be superior to base zone controls. These controls sometimes are based on the other sector regulations such as environment protection, security and infrastructure. The following key overlay zonings in the target area are proposed to apply to the specific areas.

(1) Urban Center Townscape Control Zone

- **Purpose:** to protect and promote attractive cultural and social townscapes consisting of the surrounding area of Saudi Mosque and Presidential Palace
- **Applicable measure:** Specific height control zone can be introduced into certain influenced areas by the height regulation under the target monuments of the mosque and the palace.



Source: JICA Study Team

Figure 6.1: Proposed Urban Center Townscape Control Zone in the Target Area

(2) Coastal Area Landscape Control Zone

- **Purpose:** to protect and enhance attractive natural landscapes of the coastal area along all coastal lines in the target area, and to secure access to the coast for public (citizen).
- **Applicable measure:** Specific height control zone can be introduced into certain influenced areas along the coast by the height regulation in combination with the regulation of coastal protection by the law of Ministry of Fishery and Maritime Economy⁴¹.



Source: JICA Study Team

Figure 6.2: Proposed Urban Center Townscape Control Zone in the Target Area

(3) Natural Hazard Prone Area

- **Purpose:** to prohibit settlement or urban development for safe and sustainable urbanization and to avoid potential natural hazard (flood, inundation, etc) in lower lands or wetlands.
- **Applicable measure:** Strict development control in this zone for any type of construction and land alteration.

(4) Natural Environment Protection Zone

- **Purpose:** to protect natural environment as a part of environmental measures coping with climate change adaptation, biodiversity protection, and other environmental issues.
- **Applicable measure:** Strict development control in this zone for any type of construction and land alteration.

(5) Airport Safety Overlay Surface Zone

- **Purpose:** to secure and protect safety of airspace and to avoid negative impact (noise pollution) or accident of aircraft of the air surface on the settlement at the ground.
- Applicable measure: Specific height and land use control zone based on the existing airport safety overlay surface zone of Nouakchott-Oumtounsy International Airport.

⁴¹ Law of Loi N° 95-009 Code of Commercial Maritime, Decree n° 2006-92 public maritime domain

Zone	Height	Control	Land Use Zone Classification							
Туре	minimum	maximum	100	200	300	400	500	600		
А	R+3F (12m)	14 m*				Δ	Δ			
В	140m*	over 140m			Δ	٠	Δ			
С		R+14F(43m)			Δ	٠	Δ			

Note1: • = permitted, \triangle = conditional permit, --= prohibited

Note2: Maximum height for A zone is at the place just outside of the Aiport property, therefore, far distant from the airport becomes larger height maximum value upto the end point of the A zone (140 m maximum) Note3: 100: Rural, 200: Residential, 300:

Commercial Business, 400: Industrial, 500: Public Use, 600: Recreation & Open Space



Source: New International Airport Construction Project of Nouakchott/MET 2005 edited by JICA Study Team Figure 6.3: Airport Safety Overlay Surface Zone of Nouakchott-Oumtounsy International Airport in the **Target Area**

6.4 **Proposed Zoning Map to Target Area**

Legend

Based on all elements mentioned in the previous sections for zoning measures, the zoning map can be illustrated in Figure 6.4 as the report version, while the original size of map will be drawn at 1/5000 scale. The element of the zoning map to be delineated shows in Table 6.9.

Category	Legend	Note	Category	Legend	Note
Urban	UGB 2030	Urban growth boundary 2030		TRL	Tourism and Leisure
Growth Management	RA 2040	Reserved area by 2040	Land Use Zone	PSO	Park, Sports, & Open Space
	DA	Desert / arid land	Classification	NFG	Nature, Forest Area & Green
	AG	Agriculture land		WS	Water Surface
	RL	Low-rise residential		UCTC	Urban center townscape control zone
	RM	Medium-rise density residential		CALC	Coastal area landscape control zone
	RH	High-rise density residential	Orienteri	NHPA	Natural hazard prone area
Land Use	MX	Mixed use	Control Zone	NEP	Natural environment protection zone
Zone Classification	UCB	Urban Center Commercial&business		ASOS	Airport safety overlay surface zone
	NCB	Neighborhood commercial & business		Road	Statutory road alignment
	CCB	Corridor commercial & business	Linkow	(PAD)	(PAD proposed area)
	INZ	Industrial zone	Development	ZAC	ZAC proposed area
	QIN	Quasi-Industrial	and Infractmusture	(PIF)	(Development action area)
	(code)	Key public facilities with code	mirastructure	(RU/RBU)	(Redevelopment area)
	HE	Higher Education			

Table 6.9: Proposed Elements (legend) to be delineated in the Zoning Map

Note: PAD, PIF and RU/RBU are to be designated in case of necessity. Source: JICA Study Team,



Source: JICA Study Team

Figure 6.4 Proposed Land Use Zoning Plan for the Target Area

CHAPTER 7: FURTHER CONSIDERATIONS TOWARD IMPLEMENTATION

7.1 Effective Implementation of PLU Plan

(1) **Provision of Statutory Plan of PLU for Approval**

This Chapter 7 for PLU is required to be edited by legitimate form of the report of PLU for approval by the government authority as the statutory plan. The official document of the PLU plan based on the document of Chapter 7 will be arranged and provided in cooperation with counterparts of Taskforce Members.

(2) Awareness promotion of zoning regulation

Effective implementation of zoning regulations would require both side efforts of administration and citizen. In case of citizen side, effective implementation would depend on sufficient understandings and cooperative activities by citizen in the target area covering all of stakeholders, especially private companies in construction sectors by planners, designers, engineers and other experts. Once the zoning is approved and promulgated, awareness program of zoning regulation would be inevitable especially for the relevant area of the regulation.

(3) Monitoring and evaluation, modification of PLU

Zoning regulations, especially designated areas of zones or overlay zoning should cope appropriately with rapid socio-economic changes. Monitoring is one of the important activities to implement effectively regulations through necessary evaluation and its modification including public announce of the modification.

7.2 Institutional Enhancement for PLU Implementation

(1) Effective organizational arrangement and human resource development

Number of works for permission, inspection and monitoring for building construction would be incremented in conjunction with increase of population and socio-economic activities. Organizational arrangement including skilled experts development and establishment of taskforce units would be required to enhance those activities for effective implementation of development regulations and controls.

(2) Model PLU applicability to other areas (Communes)

This PLU plan is expected to be a good model for other area or communes without PLU plan to manage and control urban developments through its application of methodology, technique and regulations. And the PLU plan for the target area should also be made efforts to improve and upgrade the function and role of the model plan.

(3) Updating Urban General Regulation

The plan for zoning controls and regulations for the target area considers physical and socio-economic characters of the target area. Therefore, regulations and control measures may need some modification to apply to different areas, while some regulations and controls in similar area to the target area could be applicable.

On the other hand, existing General Urban Regulation 1983 applied to entire areas of Nouakchott involves mixed measures by not only common regulations enabling to apply others but also different regulations not to be able to apply to other areas. Therefore, this regulation requires to be updated and reorganized as more common and standardized regulations and controls enabling to apply every areas or communes.

PART III: PARTICIPATORY PLANNING AND CAPACITY DEVELOPMENT

CHAPTER 1: PARTICIPATORY PLANNING IN THE FRAMEWORK OF SEA

The project applied participatory planning approach in the framework of Strategic Environmental Assessment (SEA), a relatively new approach adopted in a growing number of countries. SEA is an iterative process dedicated to the integration of environmental considerations at the upstream phases of the formulation process of a project or a planning document. The SEA approach benefits both project promoters and the administration on the follow-up to be given to the project with regard to the environmental issues of the concerned area, and is also useful to collect the opinions from the population through participatory approach. SEA shall evaluate potential or proven effects on the environment of the project, plan or program and make it possible to analyze and justify the choices made with regard to the issues identified in the concerned area. To effectively meet all these requirements, SEA should be initiated as early as possible in the project, involving a wide range of stakeholders.

1.1 SEA Methodology

(1) General outline of the methodology

Due to the absence of national legal and institutional framework for SEA in Mauritania, an original methodology, comprehensive and adapted to the context, had to be defined for the formulation of the SDAU of Nouakchott. This methodology is based on the multiple theoretical foundations of JICA guidelines, OECD guidelines, and Eurpoean SEA Directive, as explained below. Furthermore, the originality of this methodology lies on the important focus given to the participation of the inhabitants during the whole process of formulation of the SDAU.

This innovative methodology was introduced to all stakeholders during the preparatory phase and its implementation will enable the inhabitants of each of the 9 municipalities to:

- i) Promote a shared vision of environmental issues on the future of their commune by 2040;
- ii) Evaluate and enrich the work of urban planners throughout the development of the SDAU.

The implementation of this participatory methodology contributes to good urban governance and reinforces the sustainability of the city planning.

(2) SEA implementation process

A step-by-step process is adopted for the implementation of the SEA. The 4 main stages of the implementation process of the SEA are the following.

Stage 1: Environmental diagnosis;

Stage 2: Environmental analysis of development alternatives;

Stage 3: Assessment of the effects of the SDAU on the environment;

Stage 4: Monitoring and evaluation of SDAU implementation based on SEA.

Figure 9.1 below summarizes the main stages in the SEA process, the purpose of the tasks of each stage, the input from the participatory approach, and their relationships to the formulation of the SDAU.

(3) Theoretical foundations of the methodology: various guidelines

As explained above, multiple sources of theoretical foundation, such as the following guidelines, has been used to develop the SEA methodology.

1) JICA Guidelines

The ten following components required by JICA Guidelines for Confirmation of Environmental and Social Considerations (hereinafter referred to as "JICA guidelines") dated 2010, will be integrated in the different stages of the SEA, as shown in Table 1.1 below.

Components of JICA Guidelines		Stages of the SEA			
		2	3	4	
Review of alternatives to achieve the objectives of the project					
Review of the content of policies and elaborated plans					
Implementation of scoping					
Confirmation of natural and social conditions as a reference line					
Confirmation of environmental regulations and institutions					
Prediction of environmental impacts					
Assessment of the impact on the environment and review of the alternatives					
Confirmation of mitigation measures					
Confirmation of monitoring method					
Attendance at meetings with stakeholders					

Table 1.1: Integration of the Components of JICA Guidelines in the SEA Process

Source: JICA guidelines and JICA Project Team

2) OECD Guidelines

OECD Guidelines untitled "Applying Strategic Environmental Assessment: good practice guidance for development co-operation" (hereinafter referred to as the "OECD Guidelines") of 2006, are considered as a major reference in the establishment of the SEA legal framework in several countries. For spatial development projects, OECD indicates that "SEA applied to spatial/regional plans or programmes provides an important opportunity to integrate sustainable development approaches within the decision-making process" and encourages the formulation of the strategic questions shown in Table 1.2 below.

Table 1.2: Integration of the Strategic Questions from OECD Guidelines in the SEA Process

Strategic questions from OECD Guidelines		Stages of the SEA			
		2	3	4	
What are the priority environmental problems in the area in question? Is there a danger that these problems could be exacerbated by the proposed programmes/plans?					
Have any relevant cumulative issues been taken into account?					
Are the proposed developments likely to be vulnerable to the impacts of climate change?					

Source: OECD guidelines and JICA Project Team

3) European SEA Directive

Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (hereinafter referred to as "European SEA directive") and its explanatory guidelines, are considered as a proved international reference and a major knowledge base regarding various aspects of strategic assessment. The implementation process through different clear stages, the setting of SEA objectives and other aspects recommended in this directive will be implemented in the SEA.

(4) **SEA implementation process**

Based on the theoretical foundations explained above, a step-by-step process is adopted for the implementation of the SEA. The 4 main stages of the implementation process of the SEA are the following.

Stage 1: Environmental diagnosis;

Stage 2: Environmental analysis of development alternatives;

Stage 3: Assessment of the effects of the SDAU on the environment;

Stage 4: Monitoring and evaluation of SDAU implementation based on SEA.

Figure 1.1 below summarizes the main stages in the SEA process, the purpose of the tasks contained in each stage, the input from the participatory approach, and their relationships to the formulation of the SDAU.



Figure 1.1 Outline of SEA implementation process

1.2 Process and Major Results of the First Round Public Consultation

1.2.1 Public consultation process in the framework of SEA

(1) Objective of public consultation workshops

The objective of the SEA public consultation is to integrate a shared vision of environmental issues into the SDAU. These consultation workshops constitute a central part of the environmental study of the SDAU and support the formulation of the urban planning document throughout its whole process. Public consultation is a basis for any urban planning document that is conceived to achieve the sustainable development of a city.

(2) Framework of public consultation workshops

The consultation framework chosen to hold the SEA public consultation workshops is set up at the commune level, in order to be able to grasp as much as possible the diversity of the expectations of Nouakchott inhabitants.

In 2012, major planning and capacity development efforts has been carried out at the commune level, with the formulation of Commune Development Plans (PDC: Plan de Développement Communal) in each commune of Nouakchott. At this occasion, Commune Consultation Committee (CCC: Comité de Concertation Communale) have been created in each commune as a dedicated body for public consultation. As stated in Article 8 of the MIDEC Order 680 dated 17 April 2011, "The CCC is a structure of orientation, monitoring and evaluation that ensures good implementation of public action and development projects at the commune level". Each CCC is composed of 15 to 25 people such as representatives of the municipal council, representatives of the deconcentrated services, moral and / or traditional authorities, civil society organizations and representative of ordinary citizen. Each year 1/3 of the CCC members change.

In the perspective of pursuing the previous efforts in terms of decentralization and of capacity building of the communes of Nouakchott, and in order to promote a bottom-up approach in city planning through an already created structure dedicated to public consultation, the CCC has been chosen as the framework to implement the public consultation workshops of the SEA.

(3) Consultation process

In the course of the formulation of the SDAU, public consultation process is structured around 3 rounds of consultations in each of the nine communes of Nouakchott, as described in the Figure X.X above.

The first round of public consultations have been held in March and April 2017. The main objective of this first round of workshops was, in addition to spreading information about the project to people, was to carry out a collective identification of environmental issues in each of the 9 communes of Nouakchott. The first round of workshops was composed of the 3 following steps.

Step 1: Collective brainstorming on the concept of "environment";

Step 2: Collective identification of the environmental issues of the commune;

Step 3: Participatory mapping of environmental issues of the commune.

(4) Participatory approach tools and techniques: Supporting the expression of a shared vision

The participatory approach techniques used during the workshops aim at encouraging the individual expression of each person (one idea = one card) but also facilitating exchanges between participants (group work for participatory mapping). The methodology used at each step is explained in detail in stages in Annex. Participants are invited to express themselves in the language of their choice (Arabic or French). At the end of the workshop, results (maps and pin-boards) are discussed before being validated as representative of a shared vision of the environmental issues of the commune.

(5) Workshop facilitation: an opportunity to strengthen the capacities of MHUAT and CUN

The workshops held in the 1st round of public consultation were organized and facilitated with the help of a group of 4 urban planners including 3 from CUN (2 women, 1 man) and 1 from MHUAT (1 woman). This team of volunteers, supervised by a dedicated JPT expert, was trained on this occasion to implement a consultation process from the concepts to the restitution of the data. Their motivation and their proficiency in the various usual languages of Mauritania were appreciated by participants. Positive results were observed in terms of capacity building of the team.

(6) Data processing and presentation of results

Full workshop reports (see Annex) show the accurate transcription of the results of the work on pin boards. Those results were compiled and then the themes developed at each workshop were harmonized so that the results could be compared from one commune to another. 11 themes were thus defined. In order to retain the ideas provided by the participants, these themes were subdivided into 37 sub-themes. While this type of grouping has the advantage of allowing a cross-analysis of results of all the communes, it nevertheless has the limit of simplification or transformation of qualitative subjective information (perception of the inhabitants) into quantitative data.

The maps shown in Section below summarize the results of the participatory mapping exercise conducted during the public consultation workshops. The raw maps handwritten by the participants are shown in Annex. These maps propose a necessarily subjective vision (perceptions) of the environmental issues of the commune. The representation of areas of vulnerability to flooding and silting problems has been enriched by layers of information from workshops conducted in 2014 with CCCs in the framework of "Adaptation to climate change" project of the MDEDD / MHUAT / GIZ. The public space information is derived from the results of the "public space module" which was proposed at the end of the workshop (see workshop methodology shown in Annex).

1.2.2 General results of the 1st round of public consultations at the scale of Nouakchott

As explained above, the results of all the workshops of the 1st round of public consultation have been compiled and analyzed into various common themes at the scale of Nouakchott. Those global results are shown in the Figure 1.2 below and by theme throughout the following diagrams.



Figure 1.2: Compiled results environmental issues in all the communes of Nouakchott

Struggle against pollution (ranked 1st environmental issue with 138 opinions)



Pollution is the main concern of the inhabitants of Nouakchott. Struggling against pollution means first of all having a clean city, without wild dumps. It has been expressed that cleanliness of the city will be achieved thanks to the establishment of an efficient waste management and treatment system.

The problem of air pollution has been picked up in El Mina because of the areas affected by discharges from the industrial zone (north-east of the commune), but also in central communes where intense car traffic leads to a saturation of air by exhaust gases.

New public spaces (ranked 2nd environmental issue with 90 opinions)



One of the most important wish expressed is the creation of new public spaces, including green spaces. These public spaces are seen as new places of leisure and relaxation, but also as meeting places for young people and elderly. The desired spaces are:

- Public parks with benches, fenced and supervised;
- "Green paths" for the practice of walking, located both in the city and its periphery.

A better society (ranked 3rd environmental issue with 83 opinions)



It has been strongly expressed that taking into account environmental issues in the future city must necessarily be accompanied by changes in society. Those changes include:

- A society that respects the rules and applies the laws (the urban planning code in particular). A city where people show civility;
- A society where development conditions are met. (Education, fight against poverty and conflicts, equality ...).

Coherent and functional urbanism (ranked 4th environmental issue with 76 opinions)



The people no longer want to see the city grow in "disorder" or "piece by piece". The city of tomorrow must develop in a coherent way and through a shared vision of the future (urban planning). The following aspirations of overall improvement of the urban space have also been expressed:

- A well-designed city with more pedestrian areas and organized urban services;
- More adapted, robust and reliable public infrastructure and facilities;
- Harmonization of architecture.

Mitigate vulnerability to natural hazards (ranked 5th ex aequo environmental issue with 73 opinions)



By 2040, one of the biggest challenges identified by the CCC members for Nouakchott is to reduce the city's vulnerability to the natural risks of flooding and to a lesser extent silting. The solutions recommended by the inhabitants are to prevent construction on floodplain, to build rainwater retention ponds, and to protect the coastline from the risk of sea submersion. To combat sandblasting, the identified solution consists of planting large amount of trees throughout the city and in its periphery (green belt).

It is important to note that all communes are affected by the risk of flooding, whether or not they are located on the coastline (Dar Naim, Teyarett).

An operational sewerage network (ranked 5th ex acquo environmental issue with 73 opinions)



The absence of a functional sanitation system is one of the major concerns shared by the inhabitants of all the communes of Nouakchott.

Problems linked to the lack of sanitation are particularly affecting the lower parts of the city also affected by flooding, particularly the densely populated neighborhoods in the municipalities of Sebkha and El Mina. The recommended solutions are to put in place a collective sanitation system and to regulate individual sanitation, in particular by prohibiting open pits.

Improve mobility (ranked 6th environmental issue with 69 opinions)



Inhabitants of Nouakchott have generally pointed out the problem of transportation and mobility. The following improvement in mobility are expected by the population:

- Improve road network (road asphalting and widening);
- Improve traffic flow (eliminate congestion, usage and practices).
- Improve means of transportation by eliminating old cars and developing public transport.

Improve housing (ranked 7th environmental issue with 53 opinions)



The issue of housing is primarily linked to the presence of slums (kebbe) in Nouakchott. The inhabitants advocate for putting an end to slums and to provide decent housing conditions for the occupants, but also to free up illegally occupied land.

In addition, it has been expressed the wish to improve the quality of housing (more space, more privacy and calm).

Improve public health (ranked 8th environmental issue with 51 opinions)



Access to water and electricity (ranked 9th environmental issue with 34 opinions)



It has been expressed that, by 2040, access to water and electricity for all shall be improved. Water supply system needs to be improved to eliminate pipeline leakage and to end up water trade by cart (expensive and poor quality water).

The needs evoked in terms of electrification of the city concern both the connection of houses to electricity network but also the lightening of public spaces and roads.

A modern and attractive capital city (ranked 10th environmental issue with 31 opinions)



Inhabitants wish that the image of the city shall be improved, and that, by 2040, Nouakchott would look like a modern, high-tech and nonetheless sustainable city, with cultural facilities and tall buildings. In short, a great and attractive capital that radiates internationally "like Dubai, New York or Tokyo".

1.2.3 Detailed results of the 1st round of public consultations commune by commune

(1) Dar Naim

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Dar Naim on March 13, 2017. Outline and major results of the workshop are detailed in Table 1.3 below.

Date	March 13, 2017		
	09: 00-13: 00		
Venue	Meeting room in Dar Naii	n city hall	
Participants	13 members of Dar Naim	CCC	
General information	Wilaya: Nouakchott Nord		
on the commune	Area: 2,647 ha	Population: 144,043	Density: 340 pop/ha
Results of the shared id	entification of environment	al issues for the comm	une at the horizon 2040:
Struggle N Coherent and fun Mitigate vulnerability tr An operational s Impr Access to wa A modern and attr	against pollution ew public spaces A better society ctional urbanism o natural hazards ewerage network Improve mobility Improve housing ove public health ter and electricity active capital city	9 9 9 4 6 4	16

Table 1.3: Outline of the 1st round of public consultation workshop in Dar Naim

Source: JICA Project Team

2) Summary of discussions

In Dar Naim, the focus was initially on the issue of pollution and waste treatment.

The participatory mapping exercise allowed to identify a flood band that runs in the urban fabric along the former airport from South to North. This unsanitary area concentrates a large part of the environmental problems of the municipality and its proper drainage is a priority for the inhabitants. Nevertheless, sanitation problems are not confined to this area only and all inhabitants of densely built areas wish to benefit from an operational network.

The issue of the redevelopment of the site of the former airport has been mentioned several times. This freed space represents an opportunity to open up the commune of Dar Naim by connecting it directly to the business center located in the southern part of Tevragh Zeina. The new roads to be proposed should make it possible to release the traffic burden of the main axes of the commune which are saturated today.

The site of the former airport has also been designated as having a great potential for creating public spaces dedicated to sport and leisure as well as green areas.

The northern part of the commune constitute the limit of urbanization of Nouakchott and its expansion is confronted with the constraints linked to the implantation of buildings in dunes (construction constraints and problems of access to water). This peripheral area is also proposed to be set up as a public space dedicated to the promenade.

3) Collectively produced map of environmental issues

During Dar Naim workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.3 below.



Figure 1.3: Map of the participatory diagnosis of environmental issues (Dar Naim)

(2) Teyaret

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Teyaret on March 15, 2017. Outline and major results of the workshop are detailed in Table 1.3 below.

Date	March 15, 2017					
	09: 00-13: 00					
Venue	Meeting room in Teyaret of	city hall				
Participants	15 members of Teyaret CO	CC				
General information	Wilaya: Nouakchott Nord					
on the commune	Area: 2,500 ha	Area: 2,500 ha Population: 78,828 Density: 493 pop/ha				
Results of the shared id	lentification of environment	al issues for the commune at	the horizon 2040:			
Struggle	e against pollution		16			
Ν	New public spaces 7					
Coherent and fu	Coherent and functional urbanism					
Mitigate vulnerability t	o natural hazards	3				
An operational s	An operational sewerage network 13					
Improve mobility 6						
	Improve housing	4				
Improve public health						
A modern and attr	ractive capital city					

Table 1 4. Outline of the 1 ^s	^t round of nubl	ic consultation	workshon in Tevaret
Table 1.4. Outline of the I	Tound of publ	ic consultation	workshop in regaret

Source: JICA Project Team

2) Summary of discussions

In addition to the need of addressing the problem of soil pollution from waste dispersal, the representatives of the inhabitants have put the emphasis on the problem of air pollution associated with transportation problems.

Teyaret is currently expanding around its south-western boundary, along the new road linking it to the north of Tevragh Zeina via the Sukuk area. This "bypass" road is utilized by the motorists of all the communes of the North East, which causes traffic congestion at the crossroads, at the crossing with the road of Atar. CCC members stressed out the significant air pollution caused by exhaust gases in this area.

The northern part of the commune is composed of several zones of mobile dunes which complicate the urban development and the construction of urban infrastructures (water and electricity in particular). The participants in the workshop propose to set up recreational areas and walks in these peripheral areas.

The problems of sanitation particularly affect the unhealthy floodplains in the South-East of the commune.

3) Collectively produced map of environmental issues

During Teyaret workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.4 below.



Figure 1.4: Map of the participatory diagnosis of environmental issues (Teyaret)

(3) Toujounine

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Toujounine on April 4, 2017. Outline and major results of the workshop are detailed in Table 1.5 below.

Date	April 4, 2017					
	10: 00-14: 00					
Venue	Meeting room in Toujoun	ine city hall				
Participants	9 members of Toujounine	CCC				
General information	Wilaya: Nouakchott Nord					
on the commune	Area: 7,434 ha	Population: 144,041	Density: 247 pop/ha			
Results of the shared id	Results of the shared identification of environmental issues for the commune at the horizon 2040:					
Struggle against pollution						
New	/ public spaces	8				
Coherent and funct	ional urbanism	7				
Mitigate vulnerability to r	natural hazards	7				
An operational sew	verage network	5				
In	prove housing	g	0			
Improv	ve public health		0			
Access to water	and electricity	1	0			
A modern and attrac	tive capital city 3	3				

 Table 1.5: Outline of the 1st round of public consultation workshop in Toujounine

Source: JICA Project Team

2) Summary of discussions

Situated at the extreme East of Nouakchott, the commune of Toujounine is surrounded to the North and South by sand dunes that constrain the development of urban services (access to water and electricity). The participants in the workshop put the emphasis on the importance of continuing the work of combating desertification initiated with the planting of the green belt.

The inhabitants always express the need to permanently eliminate slums located in the outskirts of the city, particularly North of the route de l'Espoir.

In a similar way to other communes, the emphasis has been put on the importance of combating pollution from household waste. CCC members recalled that all domestic waste transported to the landfill go through route de l'Espoir main axis, which makes Toujounine particularly vulnerable to illegal garbage dumping (Tounwaych area in particular).

The crossroads located on route de l'Espoir are zones of congestion at certain hours of the day and this phenomenon is amplified in the months following the wintering. Indeed, the southern edge of route de l'Espoir constitutes a flooding zone causing the concentration of all traffic on this main axis.

Participants to the workshop proposed the creation of new public spaces located both in the center (green spaces) and in the outskirts of the municipality (walking routes).

3) Collectively produced map of environmental issues

During Toujounine workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.5 below.



Figure 1.5: Map of the participatory diagnosis of environmental issues (Toujounine)

(4) Tevragh Zeina

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Tevragh Zeina on March 9, 2017. Outline and major results of the workshop are detailed in Table 1.6 below.

Date	March 9, 2017						
	09: 00-13: 00	09: 00-13: 00					
Venue	Meeting room in Te	vragh Zeina (city hall				
Participants	9 members of Tevra	gh Zeina CC	С				
General information	Wilaya: Nouakchott	Ouest					
on the commune	Area: 2,966 ha	Popu	lation: 48,093	Density:	134 pop/ha		
Results of the shared id	Results of the shared identification of environmental issues for the commune at the horizon 2040:						
Struggl	e against pollution			10			
1	New public spaces	2					
	A better society				14		
Coherent and fu	nctional urbanism		6				
Mitigate vulnerability	to natural hazards				14		
An operational	sewerage network		<u> </u>	10			
	Improve mobility		6				
	Improve housing	3					
Imp	prove public health		6				
Access to wa	ater and electricity	2					

Table 1.6: Outline of the 1st round of public consultation workshop in Tevragh Zeina

Source: JICA Project Team

2) Summary of discussions

Participants at the Tevragh Zeina Workshop stressed out the need to solve waste management problem, particularly in the southern and western areas of the municipality, which are regularly affected by floods. In addition, the intense circulation of cars (around Avenue Abdel Nasser) and trucks (around the markets) leads to significant air pollution at peak times. The representative of inhabitants therefore put the emphasis on the importance of improving road network and limiting the traffic flow of polluting vehicles.

Central and western parts of the commune are highly vulnerable to flooding, and according to the CCC, some of these areas are not expected to be constructible (for example West Sebkha areas). In addition, the problem of flooding also arises in the town center (ilot K) where the drainage of stagnant water remains a priority.

The urgent need to improve the sanitation system concerns the entire commune area, and especially western and southern parts, which are also the most vulnerable zones in terms of public health (mosquitoes and water-related diseases).

Many public spaces were proposed on the commune's territory. The inhabitants wish to see the seafront soon equipped with leisure and sports facilities. Urban trails connecting different green spaces have also been proposed, as well as routes for walking (towards the university area).

According to the members of the CCC of Tevragh Zeina, taking environmental issues into account by 2040 shall necessarily be accompanied by a change in society towards greater sustainability, but also towards greater equality and respect (civility, respect of the rules).

3) Collectively produced map of environmental issues

During Tevragh Zeina workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.6 below.



Figure 1.6: Map of the participatory diagnosis of environmental issues (Tevragh Zeina)

(5) Ksar

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Ksar on March 20, 2017. Outline and major results of the workshop are detailed in Table 1.7 below.

Date	March 20, 2017 09: 00-13: 00					
Venue	Meeting room in Ksar ci	ty hall				
Participants	8 members of Ksar CCC					
General information	Wilaya: Nouakchott Oue	est				
on the commune	Area: 3,300 ha	Area: 3,300 ha Population: 47,233 Density: 392 pop/ha				
Results of the shared id	Results of the shared identification of environmental issues for the commune at the horizon 2040:					
St	ruggle against pollution		6			
	New public spaces		6			
A better society 7						
Coherent and functional urbanism			6			
An operational sewerage network						
Improve mobility						
	Improve housing	2				
	Improve public health	4				
A modern a	nd attractive capital city	∎ 1				

Source: JICA Project Team

2) Summary of discussions

The main concern expressed by the inhabitants of Ksar commune is the vulnerability towards flooding and the problems related to the lack of sewage network. While the urgency of setting up an operational sanitation network concerns the entire territory of the commune, the need to fight flooding is especially located in the Socogim PS district, in the south of the commune and in the districts of "upper-Ksar" and "lower-Ksar".

The Socogim PS district has remained largely flooded since 2013, concentrating the problems related to stagnant water (sanitation, habitat degradation, problems of access to drinking water and mobility).

Another source of concern for the members of the CCC of Ksar is the "upper-Ksar" district, where car repair shops are invading public spaces, polluting and obstructing mobility in the heart of a densely populated area.

The northern part of the commune has been rapidly expanding during the last 5 years in areas of sharp dunes that have been flushed, which has reduced the risk of silting. The Sukuk area remains on the margins of some urban services (access to water and electricity). The areas occupied for a long time are handicapped by this situation, as the housing that expands to the northern zones is essentially made of cozy villas which are almost not affected by the absence of these services.

The participants advocated for a quality environment, including the creation of new public spaces. The area of the former airport (located in Dar Naim commune) is thus envisaged as a potential area for the creation of green space located near densely populated areas. In addition, the inhabitants proposed the establishment of new green areas and walking routes in the North.

3) Collectively produced map of environmental issues

During Ksar workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.7 below.



Figure 1.7: Map of the participatory diagnosis of environmental issues (Ksar)

(6) Sebkha

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Sebkha on March 16, 2017. Outline and major results of the workshop are detailed in Table 1.8 below.

Date	March 16, 2017					
	09: 00-13: 00					
Venue	Meeting room in Sebkha	city hall				
Participants	13 members of Sebkha C	CC				
General information	Wilaya: Nouakchott Oue	Wilaya: Nouakchott Ouest				
on the commune	Area: 1,386 ha	Area: 1,386 ha Population: 72,245 Density: 103 pop/ha				
Results of the shared id	entification of environmen	tal issues for the commune	at the horizon 2040:			
Struggl	e against pollution		11			
	New public spaces		12			
Coherent and fu	A better society		10			
Vitigate vulnerability	to natural hazards		3			
An operational	sewerage network		9			
	Improve mobility 3					
Im	Improve nousing	5				
Access to w	ater and electricity	7				
A modern and at	tractive capital city	3				

Table 1.8: Outline of the 1st round of public consultation workshop in Sebkha

Source: JICA Project Team

2) Summary of discussions

The participants in the Sebkha workshop has expressed the aspiration to a more welcoming urban development and attached great importance to the creation of new public spaces, whether inside the existing urban fabric (playgrounds and green spaces, in particular in the gardening area) and in the periphery (recreational development of the waterfront with sport activities).

It has been expressed that the need for renewal of urban space should directly be linked to an aspiration of "going out of the city". Indeed, the commune of Sebkha is characterized by its high vulnerability to floods (Kouvah and Basra areas) and by the dilapidation of its housing conditions. Moreover, the absence of a sanitation system in the densely populated area (5th, 6th) regularly leads to a deterioration of the health situation. The CCC members therefore want to address this problem by improving housing conditions (less density) and by introducing an operational collective sanitation system.

In addition, flooding also greatly affects commercial areas (market of 5th) and impedes the mobility of the inhabitants both within the commune and in its periphery. The level of pollution by domestic waste is critical throughout the whole municipality.

According to the participants of the workshop, the improvement of environmental conditions in the municipality of Sebkha will also involve a reduction of poverty, more civism and better governance (respect of rules at all levels).

3) Collectively produced map of environmental issues

During Sebkha workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.8 below.



Figure 1.8: Map of the participatory diagnosis of environmental issues (Sebkha)

(7) El Mina

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of El Mina on April 6, 2017. Outline and major results of the workshop are detailed in Table 1.9 below.

Date	April 6, 2017					
	09:00-13:00	09: 00-13: 00				
Venue	Meeting room in El Mina	city hall				
Participants	20 members of El Mina C	CC				
General information	Wilaya: Nouakchott Sud					
on the commune	Area: 9,025 ha	Population: 132,674	Density: 118 pop/ha			
Results of the shared id	Results of the shared identification of environmental issues for the commune at the horizon 2040:					
Struggle against pollution 20						
	New public spaces	13				
	A better society		16			
Coherent a	nd functional urbanism	14				
Mitigate vulnera	bility to natural hazards	9				
An operati	onal sewerage network	5				
	Improve mobility 11					
Improve housing 6						
Improve public health 5						
Access to water and electricity 4						
A modern and attractive capital city 4						

Table 1.9: Outline of the 1 st	round of public	consultation	workshop in	El Mina
	round or public	consultation	normonop m	ET TATING

Source: JICA Project Team

2) Summary of discussions

The members of the CCC of El Mina have identified the implementation of a garbage collection system as a priority for the municipality. Air pollution is also a concern, since it particularly affects the northeastern part of the municipality where various polluting factories are located.

The relocation of these plants in areas far from the housing zones was proposed in the perspective of establishing a coherent and operational urban planning.

The issues raised by the inhabitants of El Mina concern the social evolution of the municipality. They aspire to better education and a significant reduction in poverty.

The municipality of El Mina is largely flooded, which, besides the severe problems related to sanitation, leads to the isolation of certain districts (Dar El Beida and Samaa) where urban services need to be improved (access to water and electricity).

The most densely populated area of the municipality is located in the north of the commune. It is a highly flooded area where CCC stressed the importance of rainwater draining and establishing an operational network of sanitation. Housing improvement in this area is also desired such as the eradication of slums and of any form of precarious housing, but also to increase the available space.

Several ideas for the creation of new public spaces have been put forward by the members of the CCC, and especially on the coastal area (sports and leisure circuits), but also in the city (green space and space for relaxation and conviviality). The improvement of the connection between coastal and urban areas was also mentioned as a way to improve the quality of life of the inhabitants.

3) Collectively produced map of environmental issues

During El Mina workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.9 below.


El Mina Participatory diagnosis of environmental issues

Figure 1.9: Map of the participatory diagnosis of environmental issues (El Mina)

(8) Riyad

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Riyad on March 14, 2017. Outline and major results of the workshop are detailed in Table 1.10 below.

Date	March 14, 2017		
	09: 00-13: 00		
Venue	Meeting room in El Mina	a city hall	
Participants	16 members of El Mina (CCC	
General information	Wilaya: Nouakchott Sud		
on the commune	Area: 8,101 ha	Population: 117,030	Density: 609 pop/ha
Results of the shared id	lentification of environmen	tal issues for the commune at	t the horizon 2040:
Stru Coherent and Mitigate vulnerabil An operation Access to A modern and	ggle against pollution New public spaces A better society d functional urbanism lity to natural hazards hal sewerage network Improve mobility Improve housing Improve public health o water and electricity attractive capital city	2 10 2 9 5 6 2 4 7	13

Table 1 10. Outline of the 1^{st} round of	nublic consultation workshop in Rivad
Table 1.10. Outline of the 1 Tound of	public consultation workshop in Riyau

Source: JICA Project Team

2) Summary of discussions

A strong urban expansion has been experienced during the last 10 years in the commune of El Mina (neighborhoods of Tarhil). The members of the Riyadh CCC stressed the gravity of this booming expansion and emphasized the mobility problems arising from the more and more remote areas newly established. Moreover, access to urban services remains limited in these peripheral areas, where the housing is often dilapidated.

The inhabitants of El Mina wish to mitigate the natural risks of floods and silting (progression of the dunes). They also stress the importance of planning a sanitation system on all existing and future urban areas.

The creation of recreational parks, green spaces and sports areas was proposed in the periphery and in the heart of the commune.

Workshop participants also made the wish that Riyadh municipality, as well as the entire city of Nouakchott, will improve its image so that it becomes the showcase of a sustainable and modern Mauritania.

3) Collectively produced map of environmental issues

During Riyad workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.10 below.



Figure 1.10: Map of the participatory diagnosis of environmental issues (Riyad)

(9) Arafat

1) Outline of the public consultation workshop

The first round of public consultation has been held in the commune of Arafat on April 11, 2017. Outline and major results of the workshop are detailed in Table 1.11 below.

Date	April 11, 2017		
	09:00-13:00		
Venue	Meeting room in Ara	afat city hall	
Participants	19 members of Arafa	at CCC	
General information	Wilaya: Nouakchott	Sud	
on the commune	Area: 1,224 ha	Population: 175,969	Density: 149 pop/ha
Results of the shared id	entification of enviror	nmental issues for the commune	e at the horizon 2040:
Str	uggle against pollution		31
	New public spaces		24
	A better society		23
Coherent ar	nd functional urbanism		21
Mitigate vulnerat	oility to natural hazards	8	
An operation	onal sewerage network	9	
	Improve mobility 17		
	Improve housing	13	
	Improve public health	12	
Access	to water and electricity	6	
A modern an	d attractive capital city	8	

Table 1.11: Outline	e of the 1 st round o	of nublic consultation	workshon in Arafat
Table 1.111. Outline	contine i round (f public consultation	workshop maratatat

Source: JICA Project Team

2) Summary of discussions

The participants of Arafat workshop are primarily concerned about the level of grubbiness in the municipality and hopes that an effective garbage collection system will be implemented quickly. Air pollution is also a cause for concern, particularly as it is linked to the proximity of the El Mina industrial zone, but also to the exhaust gases from the many vehicles passing through the Arafat crossroads and the road of Rosso.

The commune of Arafat, located in the heart of the city of Nouakchott, has densified over the years and the members of the CCC aspire to an improvement of the urban space intended to mitigate the negative effects of the isolation and of densification. In terms of mobility, it has been highlighted that the recurring problems posed by congestion and the proposals are aimed at expanding the road network and electrifying the main roads.

The south-east of the commune is characterized by a precarious housing zone where there is a deficit in urban services (access to water and electricity).

The municipality of Arafat is subject to a certain vulnerability to flooding: different areas are affected and during flood periods stagnation of rainwater causes many troubles (unhealthy environment, odors, and lack of accessibility). In addition, the participants stressed the importance of equipping the municipality with an effective collective sanitation system.

According to the participants, the harmonious future of the city must also go through a change in behavior: the rules (in particular those of town planning) must be respected. The development of new public spaces, small parks for children and walking itineraries also been proposed.

3) Collectively produced map of environmental issues

During Arafat workshop, a participatory mapping exercise has been carried out. The result of this participatory mapping exercise, a collectively produced diagnosis map of environmental issues, is shown on Figure 1.11 below.



Figure 1.11: Map of the participatory diagnosis of environmental issues (Arafat)

1.3 Process and Major Results of the Second Round Public Consultation

1.3.1 Background of the second round of Public Consultation

(1) **Overview of the consultation process**

In the course of the formulation of the SDAU, public consultation process is structured around the 3 following rounds of consultations in each of the nine communes of Nouakchott.

- 1) The objective of the first workshop round (March April 2017) was to conduct a shared identification of environmental issues in each of Nouakchott's 9 communes;
- 2) The second round (January February 2018) is devoted to the evaluation of the scenarios developed by the JICA Study Team (strengths and weaknesses). The results of these workshops will serve to better guide the strategic choices of the final version of the SDAU;
- 3) The third round of public consultation (spring 2018) will be devoted to a critical evaluation of the first draft of SDAU 2040.

(2) Methodology of the workshops of the second round of public consultation

The workshops implemented during the second round of public consultation followed the following methodology.

1) Review of the results of the first round of public consultation

The results of the first workshop in the concerned commune were explained, and then compared with the overall results at the scale of Nouakchott. The results posters of the first workshop, presented as an exhibition during the Seminar of July 2017, were given away to the commune.

2) Participatory playful exercise to grasp the issues of urban growth

The issue of the control of urban growth is introduced through the realization of a short fun exercise. Following a brief presentation on past and forecasted evolution of the population of Nouakchott, participants were invited to stick some stickers on a large map of the city where they think the million-population expected by 2040 will settle. Once the exercise has been carried out, the collective analysis of the results makes it possible to address the issues related to densification, usage of existing land reserves and urban sprawl (since the stickers were placed at 95% at the periphery, along existing roads).

3) Presentation of Business as Usual scenario

The discussion then focused on the available tools to avoid the negative effects of the "Business as Usual" scenario. The discussion concludes on the role of urban planning and on the necessity to respect the urbanism regulations.

4) Presentation of the different development alternatives

Each development alternative (A and B) is presented, and after each presentation, participants are asked to evaluate the strengths and weaknesses of the scenario. A commonly-agreed synthesis close each of the stages.

5) Group working

Ultimately, participants were invited to gather in small groups, to discuss and propose their ideas to feed the reflection on the development of SDAU 2040.

(3) Limits and constraints

The implementation of the second round of public consultation faced the following constraints.

- 1) Lack of time: workshops in most of the communes begin with an average of 1 hour 30 minutes of delay. Due to lack of time, workshops were interrupted at stage (4) in most of communes;
- 2) Change of scale: The CCCs have a territorial vocation that is limited to the commune. The objective of this workshop was to make them speak while thinking of both of commune level and the Nouakchott level. The shift to planning considerations at the city level has sometimes been confusing for the participants. Prior explanation has often been conducted on a case-by-case basis to ensure the understanding of all participants.

(4) Participatory approach facilitation: an opportunity for capacity building

As a continuation of the process initiated in round 1 of public consultation, round 2 workshops were prepared and facilitated with the support of a group of 4 young urban planners including 2 agents from CUN (one woman, one man), 1 agent from the Direction of Urbanism of the MHUAT (woman) and 1 agent from ADU (man). This team of volunteers, supervised by an expert from the JICA Study Team, has then pursued and consolidated its training with practical experiences of facilitation and presentation. Their motivation and their mastery of the usual languages of Mauritania were highly appreciated by the participants.

1.3.2 Detailed results of workshop by commune

(1) Dar Naim

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Dar Naim on February 1st, 2018. The outline of the workshop and its main results are shown in Table 1.12 below.

Date	February 1 st , 2018		
	09: 00-13: 00		
Venue	Meeting room in the city hall of Dar Naim		
Participants	12 members of the CCC of Da	r Naim	
General information on the	Wilaya: Nouakchott Nord		
commune	Area: 2,647 ha	Population: 144,043	Density: 340 pop/ha
Photos of the workshop			

 Table 1.12: Outline of the 2nd round of public consultation workshop in Dar Naim

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

• Satellite cities will help to relieve the center of Nouakchott from the flow of cars, but only if well-dimensioned **public transport infrastructures** are put in place (highways, trains, trams,

etc.). Moreover, with the centralization of administrations and economic activities, mobility in the city center may still be saturated;

- Satellite cities, if well planned and well realized, will be better able to provide urban services to the inhabitants than the current Nouakchott (access to basic services). But it will be necessary to set up **attractive prices** to convince Nouakchott people to settle there;
- CCC members wonder about the **administrative status** of these new satellite cities: will they be part of Nouakchott administrative area or not? In pursuing the logic of "relocation", the inhabitants raise the question of decentralization: before creating new cities, should not we support existing cities in the interior of the country to accommodate their inhabitants decently? This would prevent a significant new rural exodus;
- The presence of an **industrial pole** in the close vicinity of the commune of Dar Naïm worries the members of the CCC. Indeed, the construction of more and more factories risks to alter the quality of life of the commune (pollution, noise, traffic). Housing area must be kept far from the industrial zone;
- According to Dar Naim CCC, Scenario A ensure a better **security** to the inhabitants. Indeed, it allows to circumscribe perimeters and thus better protect against delinquency (this remark concerns housing areas but also the sections of highways that will be highly secure).
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- Densification of the proposed city must **facilitate access to basic services** and make it possible to supply water, electricity and a sanitation network to all the inhabitants of the city;
- This scenario keeps the **administrations close to the inhabitants**, which is a good thing, but it will be necessary to better distribute the administrative representations in the capital;
- The idea of creating a **new development pole in Tarhil** is very welcome: it is an opportunity to open peripheral neighborhoods, promote a more equal society and generalize development;
- Densification proposed in scenario B requires the introduction of a **new urban mobility** (metro in particular), otherwise traffic problems will be further amplified;
- Dar Naim CCC suggests to improve scenario B by proposing the creation of another core of development in the center of the Wilaya Nord, which may include a university campus.
- 4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

- In both scenarios (scenarios A and B), the construction of sewerage network must be carried out before any new construction. Current works undergone by Chinese cooperation is causing considerable damage and discomfort to urban life: it is necessary to avoid repeating the same kind of errors;
- A part of the residents proposed to divide Nouakchott into 2 rather than 3 Wilayas.

(2) Toujounine

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Toujounine on January 16, 2018. The outline of the workshop and its main results are shown in Table 1.13 below.

Date	January 16, 2018 09: 00-13: 00			
Venue	Meeting room in the city hall of	Meeting room in the city hall of Toujounine		
Participants	10 members of the CCC of To	ujounine		
General information on the	Wilaya: Nouakchott Nord			
commune	Area: 7,434 ha	Population: 144,041	Density: 247 pop/ha	
Photos of the workshop implementation				

Table 1.13: Outline of the 2nd	round of public consultation	workshop in Toujounine
	The second secon	in the second

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- Satellite cities can help to accommodate the poorest populations in more decent conditions (access to housing and public services). But it shall be studied if this configuration does not marginalize these populations even more. After moving to satellite city, the residents will remain **away from the decision centers** of the city and it will be expensive to reach city center and labor pools;
- The **construction of satellite cities** and access roads may be **too expensive** for the Mauritanian State. It is not certain that they can offer all basic services to their inhabitants;
- The "breaking-up" of the city into one city and peripheral cities will provoke the attraction of new dwellers and will **amplify rural exodus**. Nomads might settle along the roads;
- Security of this complex ensemble (Nouakchott and satellite cities) is more difficult to ensure.

3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- Spatial unity of the city of Nouakchott makes it possible to better guarantee the **safety** of the inhabitants. But densification may lead to new forms of insecurity;
- This scenario **limits** the probability of developing **gazras** and improves the quality of housing;
- With densification, **access to urban services** will be more **equitable**. Nevertheless, in this city, the cost of living will probably be higher. It must be ensured that housing prices (rents) remain accessible to avoid marginalizing the most deprived people;
- The city will be **easier to manage** (transport and garbage collection), however, the risk is high that the transportation system is not performant enough to channel these new flows.
- 4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

• Before thinking of welcoming new residents to Nouakchott, we must do everything possible to prevent them from leaving their villages or cities of the interior of the country. We must make sure to fix the people in their lands and limit the rural exodus.

(3) Teyarett

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Teyarett on January 31, 2018. The outline of the workshop and its main results are shown in Table 1.14 below.

Date	January 31, 2018 09: 00-13: 00			
Venue	Meeting room in the city hall of	Meeting room in the city hall of Teyarett		
Participants	10 members of the CCC of Te	yarett		
General information on the	Wilaya: Nouakchott Nord			
commune	Area: 2,500 ha	Population: 78,828	Density: 493 pop/ha	
Photos of the workshop implementation		Contraction of the second seco		

 Table 1.14: Outline of the 2nd round of public consultation workshop in Teyarett

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- Satellite cities will allow to **channel urban expansion** of Nouakchott and to avoid the "arbitrary settlement" and anarchic urbanization. The organization of the city must limit the expansion of precarious neighborhoods and allow the installation of a real sanitation network;
- Small satellite cities must make **urban services** accessible to citizens;
- Relocation of inhabitants ensures access to a less polluted environment in satellite cities;
- The distance between peripheral cities and Nouakchott will be a handicap to development:
- It will accentuate transport problems for people without vehicles;
- It will create new traffic jams at city entrances and even inside.
- Security will be easier to establish in new satellite cities, but not necessarily in the old city;
- It is a very expensive solution that does not correspond to the idea that one has of life in a capital.
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- The creation of several poles should help boost **inclusive economic development** in Nouakchott. This will help peripheral areas like Tarhil to develop;
- Intensification allows to reduce the cost of installing basic services for all residents. It is a rational solution that allows for a more egalitarian city where people have to learn to live together;
- However, densification is not in line with the customs of Mauritanians. In addition, the construction of high-rise buildings will lead to higher rents.

4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

- The development of Nouakchott between Tevragh Zeina and the pole of Tarhil must be balanced by the creation of a **third economic pole in the eastern part of the city**;
- There is a need to find solutions to flood problems that affect not only coastal communes but many other areas.

(4) Ksar

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Ksar on January 23, 2018. The outline of the workshop and its main results are shown in Table 1.15 below.

Date	January 23, 2018		
	09: 00-13: 00		
Venue	Meeting room in the city hall	of Ksar	
Participants	9 members of the CCC of Ksa	r	
General information on the	Wilaya: Nouakchott Ouest		
commune	Area: 3,300 ha	Population: 47,233	Density: 392 pop/ha
Photos of the workshop implementation			

Table 1.15: Outline of the 2nd round of public consultation workshop in Ksar

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- Relocation of inhabitants to satellite cities will **increase the quality of life** (people will live far from the pollution and noise of Nouakchott);
- The construction of motorways will give a **modern aspect** to the city and will allow good mobility. However, can Mauritanian State bear the cost of these infrastructures? If these works remain unfinished, the result will be counterproductive to good urban growth management;
- Specialization of spaces both in the city center and through the creation of new satellite cities might lead to **community distancing** of populations. The absence of social mix may eventually lead to tensions between the inhabitants;
- Scenario A does not propose a long-term vision of urban development; it will accentuate the current problems by causing an ever greater spread of the city and attracting more and more inhabitants.
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

• Scenario B proposes a veritable vision of "living together":

- Densification leads people to meet easily and to live in harmony, even if this can cause new difficulties;
- Access to basic services is provided for all; the city is more **equitable**;
- Public services are easily accessible;
- Construction of large recreational infrastructures promotes **social cohesion** (cultural centers, swimming pools, stadiums, etc.).
- Densification of urban area and creation of new leisure areas will give a modern aspect to the city. But does Nouakchott really have enough free space for Scenario B?
- The cost for this change will be high, and it will be necessary to regulate price increase of land to avoid a price explosion that would increase the vulnerability of the poorest people by leading them to live in marginal housing areas.

(5) Tevragh Zeina

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Tevragh Zeina on January 29, 2018. The outline of the workshop and its main results are shown in Table 1.16 below.

	-	-	0
Date	January 29, 2018		
	09: 00-13: 00		
Venue	Meeting room in the city hall of Tevragh Zeina		
Participants	10 members of the CCC of Te	evragh Zeina	
General information on the	Wilaya: Nouakchott Ouest		
commune	Area: 2,966 ha	Population: 48,093	Density: 134 pop/ha
Photos of the workshop implementation			

Table 1.16: Outline of the 2nd round of public consultation workshop in Tevragh Zeina

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- This scenario will considerably **reduce traffic congestion in the city** center but will nevertheless pose mobility problems at busy rush hour in the city center;
- A **rational use of space** is proposed, which prevents the uncontrolled expansion of the city and should allow to develop a welcoming city (more recreational areas in particular). But the dispersion of socio-economic infrastructures in the satellite cities will entail very significant costs;
- Specialization of spaces saves a lot of time but requires **constant mobility**, sometimes over great distances: the cost of transport will be high for inhabitants of satellite cities;
- Satellite cities will find themselves **isolated** from each other, it is not a good thing for the social cohesion of the city. We must plan to build roads to connect them together;
- Specialization of spaces risks leading to a form of territorial communitarianism.

3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- Scenario B strengthens **social cohesion**. Densification promotes the mixing of populations in a context of access for all to public services;
- The dwellings area will be smaller, but the inhabitants will be able to benefit from more green areas and leisure areas near their homes;
- Decrease in the living area of housing units will lead to the **division of families** into several households. This might lead to a de-structuration of Mauritanian society that may have negative consequences for future generations;
- Densification gives a **modern image** to the city and leads citizens to behave better, to adopt a more **responsible behavior**. However, it can also lead to more individualistic behaviors;
- Densification must be well **managed**, otherwise it will lead to the deterioration of the living conditions of the poorest populations (precarious housing, health problems resulting from confinement, social problems, insecurities).

4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

- Scenarios presented assume that the growth of Nouakchott is a "fatality" while there is the possibility of stemming the rural exodus by conducting an effective decentralization policy from now on. Territorial planning must be carried out at different scales;
- Tevragh Zeina CCC warns against any urban planning that would favor identitarian closure. For the residents, Scenario A embodies what must be avoided at all costs: located along the main roads of the country, the satellite cities would naturally be "dominated" by the communities from the territories located further upstream along the road. These satellite cities may slow down the construction of a national identity based on diversity and social cohesion;
- In order to build a sustainable city, energy-efficient shall be applied, as well as building durability. Thus, it is necessary to start respecting the international standards of construction;
- Flood-prone areas should be considered as such. We must deal with them and transform them into zones of nature and leisure, especially if they are frequented by birds;
- The shoreline must be protected, and the dune cordon consolidated;
- Interchanges must be created at each junction between the ring road and main roads.

(6) Sebkha

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Sebka on January 30, 2018. The outline of the workshop and its main results are shown in Table 1.17 below.

Date	January 30, 2018		
	09: 00-13: 00		
Venue	Meeting room in the city hall of Sebkha		
Participants	12 members of the CCC of Sebkha		
General information on the	Wilaya: Nouakchott Ouest		
commune	Area: 1,386 ha Population: 72,245 Density: 103 pop/ha		

Table 1.17: Outline of the 2nd round of public consultation workshop in Sebkha

Photos of the workshop



Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- The creation of satellite cities should allow inhabitants to benefit from more space. Greater and better-quality recreation areas and green spaces will be available (this is one of the recurring demands of the CCC of Sebkha commune);
- The remoteness of peripheral cities will pose security problems: it is more difficult to ensure security over such great distances;
- Travel will be long and costly to reach his place of work, but also to access administrations, University, public spaces, etc.;
- The distribution of the population in these satellite cities will weaken the Mauritanian society:
 - "It is always the poorest families that we send the farthest": spatial inequalities will further increase social inequalities;
 - Families will divide, this may pose social and economic problems; _
 - There is a real risk of **identitarian closure** with this kind of specialization of spaces, because communities will come together around their interests and seek to create their own dynamics rather than fit into a collective dynamic.
- Access to health and education is likely to become reserved to the wealthiest.
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- Scenario B is based on the opening up of neighborhoods and the fluidification of trade within Nouakchott. This is good for the economy, but we must make sure that transportation is not going to be a major constraint before we start this work;
- It is indeed necessary to rebalance urban economic cores: this will make possible to give • everyone the opportunity to take part in the development;
- Sociability in the city is reinforced by densification. But this may also pose new problems related to **security** (increase of delinquency);
- Densification must be controlled, or it may further lower the **public health level** of the city.
- 4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

- Scenarios A and B propose to densify, but to what extent is it possible to build high-rise buildings on the salty and flood-prone lands of Nouakchott?
- Interchanges must be created at each junction between ring road and the main roads

(7) Riyad

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Riyad on January 15, 2018. The outline of the workshop and its main results are shown in Table 1.18 below.

Date	January 15, 2018		
	09: 00-13: 00		
Venue	Meeting room in the city hall	of Riyad	
Participants	13 members of the CCC of Ri	yad	
General information on the	Wilaya: Nouakchott Sud		
commune	Area: 8,101 ha	Population: 117,030	Density: 609 pop/ha
Photos of the workshop implementation	States Adres		

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- Scenario A makes it possible to welcome new inhabitants without continuing to extend the urbanization in an anarchic way. Satellite cities can provide more effective access to health and education;
- Satellite cities will become "**bed towns**" but no real places of urban life. The inhabitants will constantly need to come to Nouakchott city, it will cause a very important use of transport. This solution is expensive for the State and for the inhabitants (transport cost);
- Centralization of administrations and of economic activity in downtown is a major obstacle to the development of the current peripheries of the city. Moreover, this **hyperpolarization** will further contribute to pose mobility problems and increase pollution;
- Roads connecting Nouakchott to satellite cities will be difficult to secure;
- This development will cause the **extension** of the city to the satellite cities, because it is an extension of the current situation: it encourages newcomers to settle along the road that leads them to their homeland.
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- Proximity of dwellings, administrations and workplaces is the foundation for **inclusive development**. But public transport infrastructures will have to be adapted to this development;
- The defined city limits must ensure the **security** of Nouakchott;
- Scenario B offers a **more equitable access** to basic infrastructure and easier access to public spaces;
- The creation of a **development core in Tarhil** is an excellent thing:

- It will **boost the economy** of the entire South of the city;
- It will give a **modern image** to the city;
- We must associate a **university** and consider decentralizing some administrations so that people from the South are not obliged to move from one pole to another permanently.
- 4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

• There is a need to find a solution to make it easier for people in the southern part of the city to access the new airport at the new university (Tevragh Zeina).

(8) El Mina

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of El Mina on January 17, 2018. The outline of the workshop and its main results are shown in Table 1.19 below.

	=	-			
Date	January 17, 2018				
	09: 00-13: 00				
Venue	Meeting room in the city hall	of El Mina			
Participants	13 members of the CCC of El	Mina			
General information on the	Wilaya: Nouakchott Sud				
commune	Area: 9,025 ha Population: 132,674 Density: 118 p				
Photos of the workshop implementation					

Table 1.19: Outline of the 2nd round of public consultation workshop in El Mina

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- The relocation of the inhabitants makes it possible to **provide decent housing** to the inhabitants of satellite cities, far from the flood-prone districts of the coast. It shall also help relieve congestion in the overcrowded poor neighborhoods of El Mina commune;
- The remoteness of satellite cities will provoke **transportation problems** to residents. Transport will necessarily be expensive for the user if the goal is to create high-frequency transport lines;
- Satellite cities must be able to provide access to basic services such as water and electricity;
- This scenario must make it possible to **better secure** populations living in satellite cities;
- With the proposed plan it will be difficult to control urban growth, since it will encourage people to settle along the roads and thus will foster **urban sprawl**.
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- Scenario B proposes a developed and sustainable city worthy of an international capital. It is a **city to be proud of**, and of which one takes care;
- Densification allows **access to all urban services**, it is a solution that allows all citizens to live in Nouakchott decently (especially through the sanitation network);
- Densification should make it possible to **develop more equitably the economy** of the city, especially around the pole of Tarhil;
- The city will be **easier to control and secure** if people are grouped together within a single city;
- Population flows will become increasingly dense and an adapted transport will have to be introduced to channel them.
- 4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

• It is urgent to **create a junction** between the different extremities of the city in order to be able to access the university and the airport from anywhere.

(9) Arafat

1) Outline of the public consultation workshop

The workshop of the second round of public consultation was held in the commune of Arafat on January 25, 2018. The outline of the workshop and its main results are shown in Table 1.20 below.

Date	January 25, 2018				
	09: 00-13: 00				
Venue	Meeting room in the city hall	of Arafat			
Participants	13 members of the CCC of Ar	afat			
General information on the	Wilaya: Nouakchott Sud				
commune	Area: 1,224 ha Population: 175,969 Density: 149 pop/ha				
Photos of the workshop implementation					

Table 1.20: Outline of the 2nd round of public consultation workshop in Arafat

Source: JICA Study Team

2) Summary of discussions regarding scenario A

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario A made possible to highlight the following points.

- Satellite cities will help to **relieve the urban congestion** of Nouakchott. This is urgent especially in the commune of Arafat, where it is necessary to reduce the population density to avoid problems of health and safety;
- It is a solution that **allows the poor to live in satellite cities** and to benefit from all the public services they need;
- It will be imperative to put in place an efficient and subsidized public transportation system between satellite cities and Nouakchott. In all cases transport will cause considerable loss of time for the inhabitants of the new cities;

- On newly built roads, **security** will be difficult to ensure;
- This solution will cost the Mauritanian State excessively while increasing **social inequalities**. In fact, downtown Nouakchott will become the rich city, and the satellite cities will be the "bed town" for the poor;
- The risk of seeing the city spreading between the city center and outlying cities is very important.
- 3) Summary of discussions regarding scenario B

The discussion with the citizens regarding the results of the analysis of the strengths and weaknesses of scenario B made possible to highlight the following points.

- We must develop the **densification** of the city in a **sustainable way**, that is to say that we must ensure that people want to continue to live in the center even if they have more reduced private areas. For this we must develop recreation infrastructure and green spaces, and make the city culturally dynamic;
- This scenario is more **equitable**, it allows everyone to access to basic services, but it will cause an increase in land prices, rent prices and construction prices. This might lead to the marginalization of the poorest people who cannot afford home ownership;
- Scenario B gives a modern image to Nouakchott, but **security** will be difficult to establish: parks and the green belt are places that encourage delinquency. In addition, densification will cause problems of cohabitation between the different communities;
- Tarhil development core will help to integrate peripheral neighborhoods into the **economic development** of the city, but will the inhabitants of Tarhil be able to work in an office hub?
- This scenario might provoke, despite all the efforts, serious problems of **mobility** for the inhabitants.
- 4) Other remarks and suggestions

Finally, the discussion with the inhabitants opened on the following remarks and suggestions.

- First of all, there is some land to be freed in the center of Nouakchott (factories, military bases, administrations, etc.). Those lands must be returned to the people;
- Sanctions must be toughened on all those who cheat with the rules of city planning.

1.3.3 Synthesis of the results of the second round of public consultation

During the workshops implemented in the framework of the 2nd round of public consultation, the residents of each commune presented their opinions, which were all well-argued and structured. The results of these workshops are interesting because they show points of convergence but also points of divergence between the different communes. A summary of the major structuring ideas and concerns that emerged during this round of workshops devoted to the evaluation of urban planning scenarios for Nouakchott in 2040 is presented below.

A) Consolidate spatial balance and diversity

For the residents of Nouakchott, spatial balance of urban development and community diversity are the two bases for building a peaceful and pleasant city. It is necessary to avoid at all costs any planning which aims at specializing or over-functionalizing spaces, at dividing and relocating populations; this would lead to phenomena of identitarian closure and to conflicts between the inhabitants. Instead, concepts of "living together" (vivre ensemble in French), but also "working together" shall be fostered.

B) Ensure the security of urban areas

From the point of view of the resident / user of the city, the issue of individual security is crucial. Thus, the following three questions emerges from the analysis of the presented scenarios.

- (1) How can be ensured security in public spaces and green spaces?
- (2) How can order and security be achieved in denser city with more and more inhabitants?
- (3) How can be ensured security in urban fringes (ring road and road surroundings)?
- C) Consider density at the human-scale

The densification of the city, proposed by some of the development alternatives, raises the following questions from the inhabitants, who will be the first to suffer the effects of space reduction.

- (1) Financial aspect: How to prevent real estate market prices to rise? How ensure that housing remain affordable to all?
- (2) Public health related aspect: Densification provoke an afflux of population and therefore a significant increase of health risk. Can we really ensure sufficient health improvement to prevent the development of epidemics and diseases?
- (3) Technical feasibility related aspect: The city is experiencing more and more problems with flooding. High-rise buildings can really be built on unstable and salty grounds of Nouakchott?
- D) Get the city prepared for high public mobility

Before 2040, major efforts will have to be implemented to establish an effective public urban mobility for all the inhabitants of Nouakchott, since a significant proportion of the population does not own a private car.

1.4 Process and Major Results of the Third Round Public Consultation

1.4.1 Background of the third round of Public Consultation

(1) **Overview of the consultation process**

In the course of the formulation of the SDAU, public consultation process is structured around the 3 following rounds of consultations in each of the nine communes of Nouakchott.

- 1) The objective of the first workshop round (March April 2017) was to conduct a shared identification of environmental issues in each of Nouakchott's 9 communes;
- 2) The second round (January February 2018) is devoted to the evaluation of the scenarios developed by the JICA Study Team (strengths and weaknesses). The results of these workshops will serve to better guide the strategic choices of the final version of the SDAU;

The third round of public consultation (May 2018) is devoted to a critical assessment of the Strategic Orientations of SDAU Nouakchott 2040 at the level of each commune with the dual objective of (1) better integrate the vision of the citizens of each commune in the SDAU and (2) to initiate the linkage with the elaboration of each PLU in the future.

(2) Methodology of the workshops of the third round of public consultation

The workshops implemented during the third round of public consultation followed the following methodology.

1) Review of the consultation process and the results of the two previous cycles

A short explanation was done to bring the same level of knowledge to the participants on the development project of the SDAU. The results of the first and second rounds for the concerned commune were explained and then compared with the development alternative and the selected alternatives (Alternative B).

2) Presentation of the outline of the Strategic Orientations of SDAU 2040

The three strategic orientations were first presented and justified on the basis of the development alternative B. The objective was to open a discussion with the citizens on the impacts of these strategic orientations (1) at the scale of Nouakchott, then (2) at the scale of their commune.

3) Critical analysis of the Strategic Orientations at the level of the commune

Under the supervision of the facilitator, the CCC members were asked to identify 4 themes from which they will evaluate the strategic orientations. These themes were identified according to (1) the environmental issues identified during round 1 of public consultation and to (2) the analysis of the main impacts of the SDAU on the territory of each municipality.

Each theme was presented in 5 minutes using the 3 strategic orientations with a focus on the concerned commune. For each theme, participants were invited to evaluate and comment regarding the impacts of these strategic orientations. At the end of each theme, the synthesis of the contributions is read, analyzed collectively and then discussed before being validated as the shared vision of the CCC members.

4) Conclusions on the planning approach of the SDAU and introduction of the PLU

After the overall summary of the results, the citizens were invited to give their opinion on the public consultation process that accompanied the SDAU. Subsequently, the definition and concepts of PLU are introduced and CCC members were invited to get involved in this key future phase of urban planning. The recommendations of the citizen representatives on the formulation and implementation processes of SDAU 2040 and future PLU are shown in below part (3) of details results by commune.

(3) Limits and constraints

The implementation of the second round of public consultation faced the following constraints.

- 1) Lack of time: workshops in most of the communes begin with an average of 1 hour 30 minutes of delay. Discussion time was limited and as a result some valuable questions have not always been developed as they deserve.
- 2) Less important mobilization of the CCC members: The consultation framework in three rounds of workshops is quite binding for volunteers who take on their working time to come to participate in these meetings without any remuneration. The third round of consultation experienced a slight decrease in participants number during the workshops.

(4) Participatory approach facilitation: an opportunity for capacity building

As a continuation of the process initiated in the 2 first rounds of public consultation, round 3 workshops were prepared and facilitated with the support of a group of 3 young people from CUN and JICA Study Team staff. The facilitation team formed during rounds 1 and 2 was unfortunately not able to be fully available for the third round. Nevertheless, a staff of the CUN was able to acquire solid competence throughout the 3 cycles. This team of volunteers, led by an expert from the JICA Study Mission, has thus consolidated its training in participatory approach planning and facilitation through concrete field experiences. Their motivation and their mastery of the usual languages of Mauritania were highly appreciated by the participants.

1.4.2 Detailed results of workshop by commune

(1) Dar Naim

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Dar Naim on May 3rd, 2018. The outline of the workshop and its main results are shown in Table 1.21 below.

	1	1			
Date	May 3, 2018				
	09: 00-13: 00				
Venue	Meeting room in the city hall of	of Dar Naim			
Participants	13 members of the CCC of Da	r Naim			
General information on	Wilaya: Nouakchott Nord				
commune	Area: 2 647 ha	Population: 144 043	Density: 340 pop/ha		
Photos of the workshop					

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

Strengths of propositions		Suggestions and recommendations			
•	Citizens approve the measures	•	CCC members recommend accompanying the measures		
	which help to likely improve		proposed by:		
	access for the northern	0	Develop dedicated lanes for pedestrians, handicapped and		
	neighborhoods of the commune:		bicycle;		
0	The establishment of a bus	0	Decide the schedule for goods delivery and avoid that traffic of		
	network will be useful for the		heavy trucks occur during daily commuting peaks of traffic;		
	neighborhoods located inside	0	To build sanitation networks before building roads;		
	the commune;	0	To create formal car parking in the city.		
0	The construction of the ring	•	CCC member suggest to:		
	road that will connect the	0	Study the possibility of creating overpasses and interchanges		
	commune to the rest of the city.		to improve urban traffic situation;		
•	The opening and requalification	0	Study the possibility of building a LRT / train network.		
	of the old airport is an	•	The CCC emphasizes the importance of improve accessibility		
	opportunity for Dar Naim to		of the neighborhoods of M'kheity Teissir Tahril (resettlement		
	streamline car traffic in the		area for displaced people of flood-prone areas near the		
	commune: the formalization of		airport).		
	these new transport routes	•	The construction of roads and various utilities shall be well		
	shall be promoted.		planned and scheduled so that the comstruction works do not		

planned and scheduled so that the comstruction works do
hinder traffic.

Theme 2: Green and recreation spaces

Strengths of propositions	Suggestions and recommendations
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waters.

•	Citizen of the CCC	•	Generalizing the requalification of flood-prone areas into recreational
	approve the propositions		spaces, particularly near the airport. (propositions include golf
	of development of new		course, horse racing);
	green space and of	•	Playgrounds for children should always be planned in all
	regreening of the city		neighborhoods of the commune;
	either in new urbanized	•	Planting trees along the widest roads, especially fruit trees (lemon
	areas, within the old		and mango trees);
	airport or around the	•	Entrusting the management of the land to the commune so that it
	future Grand Mosque.		can itself create green spaces and recreation.

Theme 3: Flooding

Strengths of propositions		Weakness of propositions / obstacle		Suggestions and recommendations	
•	CCC members	•	The problem of flooding seems to	•	The CCC members recommends
	strongly approve		be underestimated in these		that the State shall organize
	the establishment		proposals. In fact, more than 80%		the relocation of the poorest
	of construction		of the current dwellings are located		families living in flood zones in
	prohibited zoning		in flooding zone and some areas are		decent housing.
	and the mandatory		affected by permanent floods as	•	Mauritanian State shall ensure
	application of		important as those which affect the		in the future that building
	building standards		communes of El Mina or Sebkha.		standards and zoning are
	in certain areas.		(neighborhoods that are adjacent to		respected.
			the eastern boundary of the old	•	It is recommended that
			airport).		reconstruction in flood zones
		•	Lack of concrete proposals for		can be done by the State or by
			sanitation related to flood		competent companies.
			management.	•	The redevelopment of flood-
					prone areas into green space
					should be explored as a solution
					to absorb and manage flood

Theme 4: Densification

Strengths of propositions	Weakness of propositions / obstacle		Suggestions and recommendations		
• Dar Naim CCC	• Is the construction of high	•	The CCC recommends that		
members welcome	buildings realistic knowing that		densification is accompanied by		
the fact that	the land can be flooded?		the following rigorous policies:		
Nouakchott will	• Current inhabitants are too poor to	0	Monitoring the compliance with		
have a modern face	be able to live in the city that is		building standards.		
with high towers.	proposed.	0	Accompanying the population		

•	Using the green		in the access to property
	belt to limit urban		(rental, sale).
	sprawl is a good	0	Apply ceiling (theresholds) on
	idea.		rents to avoid the
			marginalization of the weakest
			populations.

(2) Toujounine

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Toujounine on May 10th, 2018. The outline of the workshop and its main results are shown in Table 1.22 below.

Table 1.22:	Outline of the 3	ord round of	public consu	ltation work	kshop in '	Touiounine
14010 11221	outility of the t	i a i o ana oi	public collou	intertion work	ionop m.	roujounne

	Tuote 11221 O utilite of the offu found of public constitution (for ishop in fougeuine							
Date	May 10, 2018							
	09: 00-13: 00							
Venue	Meeting room in the city hall	of Toujounine						
Participants	6 members of the CCC of Tou	jounine						
General information on	Wilaya: Nouakchott Nord	-						
commune	Area: 7 434 ha Population: 144 041 Density: 247							
Photos of the workshop								

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

		We	eakness of				
Strengths of propositions		pro	positions / obstacle	Su	Suggestions and recommendations		
•	The CCC members emphasize the	•	Toujounine CCC	•	Improvement of mobility in the		
	importance of transportation issues for		members		commune represents an		
	the commune of Toujounine which is		remind that 75%		opportunity to create jobs and		
	located far from major economic		of the		reduce unemployment.		
	centers of the city.		inhabitants of	•	Urban services could be better		
•	The ring road project will help to		the commune		distributed in the city. This		
	improve the accessibility of the		are poor. The		would limit the needs in terms		
	commune and make the traffic of		propositions		of mobility.		
	vehicles more fluid.		presented here	•	Taxi organization should be		
•	Widening of the road network is a		do not seem to		better structured and better		

positive action for the traffic but will also have a beneficial impact for the economy of the stores located along the main road axis.

• The improvement (widening and construction of sidewalks) of Hope road is now encouraged by all inhabitants of the commune.

exposed to the advance of the dunes in Nouakchott.

economic reality: the bus service will probably be too expensive to be used by most of the inhabitants.

consider this

controlled so that it is not too competitive with public transport.

• New linkage with activity centers of other communes could help to open up the ecoomy of Toujounine.

			eakness of		
Str	engths of propositions	propositions / obstacle		Su	ggestions and recommendations
٠	The rehabilitation and	•	Green spaces	•	Toujounine's environment needs to be
	creation of green spaces is		which are not		improved:
	an urgent matter to deal		maintained	0	By moving poultry farms outside the
	with because remaining		become dump		commune and outside of Nouakchott;
	natural spaces are now		areas, and areas	0	By relocating factories under construction
	colonized by economic		prone to		in the northern part of the commune;
	activities: industries		delinquency.	0	By improving the environmental quality
	(foundry and others) and	•	Currently there		of existing farms (Zaatar gardens and
	battery chickens farms in		is no respect for		other gardens nearby).
	the districts of Essweyla,		public reserves	0	By removing the stagnant water ponds
	Tenweich and El Rabaa we		dedicated to		from the commune.
	el ouchroun.		green areas,	•	Multiply the proposals of development of
•	The creation of green space		they are all		green space in the commune.
	in non-buildable areas is a		occupied by	•	The management of public spaces can be
	positive thing, it will		buildings.		entrusted to civil society organizations
	contribute to beautify the		Realization of		and could help generate employment.
	commune.		green spaces		
•	The reinforcement of the		shall be		
	green belt is important		enforced.		
	because the commune of				
	Toujounine is the most				

Theme 2: Green spaces and quality of environment

Strengths of		Weakness of propositions /					
propositions		obstacle		Sug	ggestions and recommendations		
•	Vertical	• Living in highrise building •		•	Densification of the commune shall be carried		
	densification is		is not made for the		out in a logic of economic development:		
	a positive		Mauritanians because it	0	The construction of the buildings must		
	prospect for		deprives the inhabitants of		contribute to generate employment, training		
	the		the city of their freedom of		and qualification for the inhabitants of the		
	municipality		movement, which		commune;		
	because it will		constitutes one of the	0	New economic poles need to be planned at		
	allow more		foundations of the		neighborhood level.		
	equitable		Mauritanian culture.	•	Housing must be better regulated by Law:		
	access to basic	•	CCC members are		rent prices must be regulated, and a real		
	services		concerned that		social policy must be undertaken to promote		
	(water,		densification will drive up		social mix.		
	electricity,		land costs and will push	•	Densification can be avoided if Nouakchott		
	sanitation).		the poorest people to move		population growth is halted by developing		
•	Apartment life		to remote or unhealthy		cities in the interior of the country (health		
	is positive		areas. Densification can		equipment, university) but also by helping		
	because:		lead to negative social		rural areas to maintain their inhabitants.		
0	It allows to		impacts in the commune.	•	Densification of the commune of Toujounine		
	pay affordable	•	The densification will		will be acceptable to the inhabitants only if it		
	rents.		contribute to increase		is accompanied by the establishment of new		
0	It allows a		pollution in Toujounine		green spaces and new recreational areas.		
	better respect		while it is already strongly	•	Planning and development of the commune		
	of the private		affected by pollution from		(PLU) must take into account the aspirations		
	life.		factories located north of		of its inhabitants.		
			the commune.				

Theme 3: Densification

(3) Teyarett

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Teyarett on May 9^{th} , 2018. The outline of the workshop and its main results are shown in Table 1.23 below.

	1	1	•				
Date	May 9, 2018						
	09: 00-13: 00						
Venue	Meeting room in the city hall of Teyarett						
Participants	15 members of the CCC of Teyarett						
General information on	Wilaya: Nouakchott Nord						
commune	Area: 2 500 ha Population: 78 828 Density: 493 pop						

Table 1.23: Outline of the 3rd round of public consultation workshop in Teyerett



Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Flooding

Strengths of		Weakness of propositions /						
pro	positions	obstacle		Suggestions and recommendations				
•	Teyarett CCC	•	The identification of	•	The establishment of a sewage network after			
	members		non-constructible		technical studies should allow to solve the			
	encourage the		areas will cause		flooding problems. The zoning shall be done			
	implementation of		tensions between the		after the improvement of water drainage			
	flood control		inhabitants of the		situation.			
	proposition by		commune and will	•	Salt-proof construction techniques can			
	SDAU. Flood risk		marginalize the		overcome flood problem, but only in some areas			
	management is a		poorest inhabitants		with low flooding.			
	prerequisite for		who live in the	•	The most severe flooding areas shall be turned			
	any proposal for		riskiest areas.		into public parks or farming areas.			
	the development	•	The proposed	•	Relocation of the poorest families should be			
	of the commune.		construction		financially supported and close to their original			
			prohibited zoning will		neighborhood.			
			make the land to lose					
			value.					

Theme 2: Mobility and transportation

Strengths of propositions			tacle	Suggestions and recommendations			
•	The diversification of	• The implementation of		•	Transport service must be		
	activity centers will		public transport will be		structured and organized, and		
	facilitate mobility in		complicated because the		transport infrastructure must be		
	Teyarett.		inhabitants lack confidence		modernized.		
•	The ring road will help		in public service.	•	Walking and road crossing by		
	avoid traffic jams in	•	The implementation of the		pedestrian is problematic on major		
	the city center to reach		propositions will be very		roads (such as the Akjoujt road).		

other communes.

• The CCC members of Teyarett encourages the establishment of a public transit service with affordable rates. expensive, and the cost of transport will probably be unaffordable for the inhabitants of the municipality.

• The risk of a road accident will always be higher if transport is faster. The CCC members propose to study the feasibility of setting up a footbridge so that pedestrians can cross the road.

- The bus service must also extend inside the neighborhoods otherwise the competition with informal taxis will continue.
- Trucks must have specific lanes or schedules so as not to interfere with other means of transport.

Theme 3: Green and recreational spaces

Weakness of propositions /	
abataala	

Strengths of propositions		obstacle		Sug	gestions and recommendations
•	The inhabitants of	•	It is difficult to find land	•	The safety of green spaces must be
	Teyarett need green		available to develop parks		given special attention by the
	spaces within the		because all the land is now		public authorities.
	commune because they		distributed.	•	Construction prohibited wetlands
	are important places of	•	Green spaces are usually		would benefit from being
	conviviality that		dangerous areas for		requalified in public spaces.
	promote living together		delinquency.	•	Carefully diversify vegetation in
	and allows to reconnect				green spaces to improve urban
	with the nature.				landscape.

Theme 4: Densification

Strengths of propositions		obstacle		Suggestions and recommendations		
•	The densification proposed by	•	Densification of housing	•	Teyarett CCC members	
	the SDAU will help to save		area is not appropriate		suggest that ressettlement of	
	public reservces that can be		for the lifestyle of		people under a zoning that	
	transformed into public parks.		Mauritanians who		results in the destruction of	
•	The construction of high-rise		traditionally need space,		single-family house for	
	buildings must allow the		independence and be free		construction of collective	
	establishment of a collective		of their movement.		housing shall be carefully	
	sanitation system that will help	•	The poor inhabitants of		studied.	
	mitigate the problem of flooding		the municipality will not	•	Construction of high-rise	
	and pollution.		be able to assume the		buildings must be regulated	
•	The image of the commune will		rents of these modern		by Law and construction	

•

be improved, the buildings giving a modern and dynamic image that will encourage investors to set up in Teyarett.

• In a dense city with mastered urban planning, security control is more effective. housing programs. They might instead want to settle on the fringe of the city or in the areas qualified as inconstructible. Presence of high rise building increases the risk of accidents and fires. companies must be selected according to their skills.

Densification must be accompanied by an awareness campaign led by public authorities and relayed by civil society organizations of the commune.

(4) Ksar

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Ksar on May 30th, 2018. The outline of the workshop and its main results are shown in Table 1.24 below.

Date	May 30, 2018						
	09:00-13:00						
Venue	Meeting room in the city hall	of Ksar					
Participants	11 members of the CCC of K	sar					
General information on	Wilaya: Nouakchott Ouest						
commune	Area: 3 300 ha	Population: 47 233 Density: 392 pop/ha					
Photos of the workshop							

Table 1.24: C	Dutline of the 3rd	round of public	consultation v	vorkshop in Ksar
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Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

Strengths of propositions		obstacle			Suggestions and recommendations			
•	Ksar CCC members	•	The propositions do not	•	The place of pedestrian in the city			
	approve the		sufficiently consider the		needs to be upgraded. Ksar CCC			
	propositions made		disorder that exists in the		suggests generalizing sidewalks and			
	in the SDAU		traffic in Nouakchott. This		pedestrian crossings to all existing			
	regarding mobility		disorder is the result of the		roads in Nouakchott. Public lighting			
	improvment. The		bad behavior of the drivers,		must also be generalized in order to			

est	ablishment of a	but also constant changes of		secure pedestrian traffic at night.
pul	olic transport	road shapes related to the	•	Vehicle parking locations must be
ser	vice is a priority,	multiplication of building		planned and secured by the SDAU.
as	the construction	sites on the road.	•	The planned construction of
of t	he ring road. •	The strict use of the car is		interchanges at the Madrid junction
The	ese measures	not a solution for the future		and the Ksar junction could improve
\mathbf{shc}	ould allow to	in Nouakchott.		traffic at the city scale.
sm	ooth the •	The maintenance of the	•	The citizens propose to set up
mo	vement of people	proposed infrastructure is		awareness campaigns on mobility in
in t	the commune of	not clearly proposed, yet it is		the city in order to change the cultural
Ks	ar, but also	essential for proper		importance of the private car towards
bet	ween the	operation and sustainability.		a diversification of means of transport,
con	nmunes of			in particular collective.
No	uakchott.			

Str	engths of	We	akness of		
pro	positions	propositions / obstacle		Sug	ggestions and recommendations
٠	The strategic	•	The	•	The establishment and management of future public
	orientations		maintenance of		spaces could be optimized by:
	respond well to		green spaces is a	0	The granting of new responsabilities to the communes
	the issues		crucial aspect		to enable them to concretely implement park projects;
	identified by the		that does not	0	The implementation of PPP to ensure the realization
	CCC during the		seem to be		and management of projects;
	first round of		concretely	0	Promotion of private investment in parks and
	consultation		envisaged by the		recreation areas.
	workshop:		propositions.	•	The construction of new leisure areas should be the
0	Green and	•	Wetlands, even		subject of prior technical studies and shall consider
	recreational		equipped and		the aspirations of the inhabitants of Ksar.
	spaces are		transformed into	•	Current wetlands can potentially become areas for
	designed for		green areas,		biodiversity protection and recreation if solutions are
	everyone to		may contribute		found for:
	gather;		to the	0	Containing the expansion of Tiffa (invasive aquatic
0	The city must be		multiplication of		plant);
	re-greened: it is		mosquitoes in	0	Exterminating mosquitoes.
	important to		the city. This	•	Ksar CCC members suggest to conduct nature
	leave a place for		health risk is		conservation awareness campaigns prior to the
	nature in the		real, but the		installation of new planted parks.

Theme 2: Green and recreational spaces

city.

proposals do not seem to take it into account.

Theme 3: Flooding

Strengths of

propositions	Weakness of propositions / obstacle	Suggestions and recommendations		
• The proposed	• The citizens recall that flood	• CCC members suggest studying the		
zoning is a	problem significantly affects the	results of the urban drainage		
necessary	commune of Ksar especially in	improvement works undergone in		
step in the	the area of Socogim PS. The	Socogim PS before making the zoning.		
development	impact of a construction	• It is suggested to explore all existing		
of the	prohibited zoning on the value of	technical solutions to struggle against		
commune of	land are important.	floods and of building in flood-prone		
Ksar, it will	Establishment of zoning risks to	areas in order to avoid as much as		
finally stop	devaluate the value of all the	possible displacing populations.		
building	land in the area, even though	• Population ressetllement will have to be		
construction	only a small part of the commune	a fair, transparent and sufficiently		
in the flood	is concerned.	endowed process so that existing social		
zones and	• The problem of wastewater	cohesion is not altered.		
will open the	management remains	• The CCC members proposes to set up		
discussion	unresolved.	actions to raise awareness on current		
about their	• The displacement and relocation	and future projects to resolve flooding		
requalificatio	of populations will pose many	problems.		
n.	problems and cause conflicts			
	among inhabitants.			

Theme 4: Densification

Strengths of propositions		obstacle		Su	Suggestions and recommendations		
•	Densification	•	This change of lifestyle	٠	The foreseeable rise in rents must be		
	generally means		may be financially		regulated by Law, rents must be		
	access to a modern		inaccessible to most of the		capped otherwise there will be no		
	and organized way of		citizens.		social mix in Ksar.		
	life.	•	Densification of housing is	•	Densification of the city shall be		
•	The densification		contrary to the values of		accompanied by incentives that would		
	approach is		the Mauritanian culture,		encourage people to invest and to help		
	pragmatic and		which traditionally needs		them become homeowners. A sale / $\!\!\!$		
	contributes, in the		space and freedome of		rental dual system such as in Socogim		

	long run, to lowering	movement.	could be considered.
	the cost of living for $ \bullet$	In a dense urban area, •	Ksar CCC members suggest that real
	the inhabitants.	sanitation management	estate projects shall be framed by Law,
•	Densification will	may become even more	but that urban development shall be
	help reduce rents and	problematic.	carried out by private companies
	thus promote social		rather than by the State.
	diversity.		

(5) Tevragh Zeina

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Tevragh Zeina on May 2^{nd} , 2018. The outline of the workshop and its main results are shown in Table 1.25 below.

Date	May 2, 2018 09: 00-13: 00						
Venue	Meeting room in the city hall of	of Tevragh Zeina					
Participants	9 members of the CCC of Tevr	ragh Zeina					
General information on	Wilaya: Nouakchott Ouest						
commune	Area: 2 966 ha	Population: 48 093	Density: 134 pop/ha				
Photos of the workshop							

 Table 1.25: Outline of the 3rd round of public consultation workshop in Tevragh Zeina

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

		We	akness of		
		pro	positions		
Strengths of propositions		/ obstacle		Sug	ggestions and recommendations
•	Tevragh Zeina CCC	•	Seconda	•	CCC members suggest the use of modern,
	members encourage the		ry roads		comfortable, and high-capacity bus service so that
	implementation of these		of		they prefer to use them rather than their own cars
	strategic orientations since		Tevragh		and taxis.
	they will contribute to		Zeina	•	CCC members propose that the State establish a
	solve mobility problems in		may		national taxi company to boost employment of young
	Nouakchott, including the		still be		people and provide a quality service.
	problem of traffic jams.		saturat	•	The promotion of use of bicycle can improve the

• The reduction of the use of private car resulting from the implementation of clean public transport should help reduce pollution in downtown area. ed.

Weakness of

• These propositions are also hopeful as they will help create new jobs. fluidity of transport as well as the health of the inhabitants. It is necessary to envisage the creation of bicycle tracks in Nouakchott.

- Bus stations must be more numerous than presently, better served and equipped with large parking.
- Citizens emphasizes the importance of putting in place a robust training program to learn to drive. The obtention of a driving license must be accompanied by real theoretical and technical learning.

	pr	opositions /				
Strengths of proposition	ns ob	obstacle		Suggestions and recommendations		
• Tevragh Zeina CO	• CC	Not any	•	Before creating new green spaces, it is		
welcomes the fact	that the	reliable		suggested starting with protecting and		
ideas developed b	y the	and		maintaining existing green spaces:		
mayor have been	retained	ecological	0	Sebkha Market gardens can be protected and		
during the develo	pment of	solution		developed as public spaces;		
strategic orientat	ions.	has so far	0	The coastline would benefit from being		
(reference to the p	project	been		landscaped with a tree-planted walk.		
"Nature in Tevrag	gh Zeina"	proposed to	•	Green and recreation areas shall be defined		
which proposes th	ne	prevent the		rapidly in Sukuk area, because this part of the		
requalification of	an urban	spread of		commune is growing rapidly but if no land		
wetland into a spa	ace for	mosquitoes		policy is applied, all the land will be occupied		
leisure and relaxa	ation).	in		by villas of businessmen.		
• These proposals a	are positive	requalified	•	Tevragh Zeina CCC members suggest		
because they will	create	floodplains.		generalizing the creation of public toilets.		
employment both	for the •	Creating	•	Implementation of an awareness campaign to		
establishment of	these	new green		ensure the good performance of public spaces.		
spaces and for the	eir future	spaces will				
management (ma	intenance	bring				
and related activi	ties of	delinquenc				
restoration and re	ecreation).	У				

Theme 2: Green and recreational spaces

Theme 3: Vulnerability to flooding

Strengths of propositions

Weakness of propositions / Suggestions and recommendations

		obs	tacle		
•	Tevragh Zeina CCC	•	The articulation of	•	Establishment of recreation areas in
	encourages the		SDAU strategies and		requalified flood zones.
	implementation of urban		China-funded	٠	About flood area zoning, CCC members
	planning based on a		rainwater drainage		emphasizes the importance of relying on
	long-term vision as it is		improvement works		reliable and independent expertise
	the only viable solution		should be effective.		before any proposal.
	to ensure the	•	If the floods	٠	Continue researching new flood control
	sustainability of the city		disappear thanks to		solutions.
	against the risk of		China-funded work,	٠	The State must play a central role with
	flooding.		it might be not		regard to the risk of flooding: if land is
•	The proposed relocation		necessary to proceed		declared constructible then the State
	of displaced populations		with the		must take responsibility for it in the
	is indeed a priority.		establishment of		short and medium term in case of
•	It is importance to have		construction		damage.
	accurate mapping of		prohibited zoning	٠	Establish an alert system to ensure the
	flood zones prior to any		risk areas since it		safety of people and property.
	zoning proposal.		will penalize the		

owners.

Theme 4: Densification

Strengths of

propositions		We	eakness of propositions / obstacle	Suggestions and recommendations		
٠	Densification	•	Tevragh Zeina is already experiencing	•	The CCC members emphasize	
	will contribute		growing problems of mobility (traffic		the importance of supporting	
	to give a new		jams) and densification of the		the evolution of the city and its	
	attractive image		commune might contribute to		densification with a real	
	to the city of		aggravate these problems.		ecological vision. The	
	Nouakchott with	•	Increasing density may increase the		densification will be positive for	
	new buildings		crime rate in the commune.		the municipality only if it is	
	and a new	•	Densification is perceived by citizens		accompanied by the creation of	
	coherence of		as a vector of promiscuity that will		green spaces and recreational	
	urbanism.		have negative consequences on:		areas for all (young people as	
٠	The	0	The health of the inhabitants who will		the elderly).	
	multipolarity		be threatened by the increased risk of	•	Densification must be	
	associated with		contamination by diseases;		accompanied by a real social	
	densification of	0	The quality of life of households who		policy whose objective must be	
	secondary poles		will then be more frequently disturbed		to preserve and encourage	

how to live together).

should allow the	by the life of the neighborhood (noise	social diversity in the commune
boost of the	and odors, lack of privacy).	of Tevragh Zeina.
economy of the •	New buildings are going to be •	Development of the city will
commune.	expensive and this will lead to higher	only be sustainable if it is
	rents. The middle classes risk not	carried out in accordance with
	being able to assume these rents and	international construction
	will be forced to move outside the city.	standards.
	These dynamics may affect the social $ \bullet$	Accompany the implementation
	mix that is at the root of the social	of the SDAU by raising
	cohesion of the commune.	awareness program on the
		"savoir vivre ensemble" (know

(6) Sebkha

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Sebkha on April 26th, 2018. The outline of the workshop and its main results are shown in Table 1.26 below.

Date April 26, 2018					
	09:00-13:00				
Venue	Meeting room in the city hall of Sebkha				
Participants	13 members of the CCC of Sebkha				
General information on	Wilaya: Nouakchott Ouest				
commune	Area: 1 386 ha	Population: 72 245	Density: 103 pop/ha		
Photos of the workshop					

Table 1.26: Outline of the 3rd round of public consultation workshop in Sebkha

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

Weakness of					
Strengths of		propositions /			
propositions		obstacle		Suggestions and recommendations	
•	Sebkha CCC	•	Secondary roads	•	CCC members suggest the use of modern,
	welcomes all the		of Tevragh Zeina		comfortable, and high-capacity bus service so that
	propositions		may still be		they prefer to use them rather than their own cars

	concerning the	saturated.	and taxis.
	development of	•	CCC members propose that the State establish a
	public bus		national taxi company to boost employment of young
	transport in the		people and provide a quality service.
	commune but also	•	The promotion of use of bicycle can improve the
	throughout the		fluidity of transport as well as the health of the
	city.		inhabitants. It is necessary to envisage the creation
•	The ring road		of bicycle tracks in Nouakchott.
	must improve	•	Bus stations must be more numerous than
	accessibility of		presently, better served and equipped with large
	Sebkha commune		parking.
	by connecting the	•	Citizens emphasizes the importance of putting in
	commune to the		place a robust training program to learn to drive.
	airport but also to		The obtention of a driving license must be
	different economic		accompanied by real theoretical and technical
	development		learning.
	poles.		

Theme 2: Green and recreation spaces

Strengths of

propositions		Weakness of propositions / obstacle		Su	Suggestions and recommendations	
•	The prospects	•	The creation of a canal, even if it	•	Free lands to create green spaces	
	given by the		is well designed, will pose the		are rare: illegally occupied land	
	proposals of the		following problems:		could be freed in order to make	
	SDAU are	0	High risk of falls and accidents in		space available.	
	positive,		the canal, especially for children;	•	Recreational areas and walks	
	especially the idea	0	A health problem related to the		proposed must be secured and	
	of reconnecting		presence of mosquitoes in		illuminated at night.	
	the town to the		stagnant water;	•	Management of green spaces and	
	coast and to	0	A high risk that the canal will		recreational areas can be entrusted	
	develop a planted		turn into a landfill, which will		to neighborhood committees.	
	promenade.		increase the two problems		Maintenance by users will be more	
			mentioned above.		effective and it will help to raise	
		•	Dispertion of the livstock in the		awareness of the importance of	
			city poses a real threat to the		nature in the city.	
			sustainability of green spaces.	•	The CCC members propose that	
					the current Sebkha Gardens of $5^{\circ me}$	

be developed into a large park for

nature and recreation.

Strengths of		Weakness of propositions /					
pro	propositions		obstacle		Suggestions and recommendations		
٠	The construction	•	Densification may lead to		Densification might become a positive		
	of high rise		increasing hygiene and		evolution of Sebkha commune only if the		
	buildings shall		health problems, especially		following conditions are applied:		
	improve the living		during flooding of winter	0	It considers the social reality of the		
	conditions of the		season.		commune, that is to say that the new		
	inhabitants of	•	High rise building requires		housing is financially accessible to		
	Sebkha because		constant maintenance		purchase or rent even for disadvantaged		
	they will be less		especially if they are located		families.		
	directly exposed		in flooding areas.	0	It helps struggling against		
	to the risk of	•	Poorest people will not be		communitarianism by promoting social		
	flooding.		able to pay for the rental of		and cultural diversity.		
•	Densification will		an apartment; thus, they	0	It improves the living conditions of the		
	improve security		will have to settle in the		inhabitants by offering basic services		
	in Sebkha		outskirts of the town. This		such as water and electricity.		
	neighborhoods, as		phenomenon will contribute	•	Construction of high rise buildings		
	control will be		to creating ghettos and		should be done in accordance with		
	facilitated.		increasing social and spatial		international construction standards to		
			inequalities.		guarantee tenants and buyers the		
					quality of the property.		
The	Theme 4: Flooding						
Str	Strengths of propositions		Weakness of propositions / obs	tacle	Suggestions and recommendations		
•	Sebkha is particular	ly	• Rain water drainage and	l sew	age • Establishment of a		
	affected by the flood	floods, are two issues that need to		to be	e sanitation network is a		
	so any proposal that		addressed together.		priority action.		
	alleviate the problem	ns	• The canal may be a risk	beca	use: • Alongside with the zoning,		
	is welcome, as long a	ıs	• It will contribute to degr	ade t	the CCC members stress the		
	it is actually		sanitary environment wi	th th	importance of implementing		
	implemented.		multiplication of mosqui	toes.	and publicizing a policy of		
•	Establishment of		• It represents a danger fo	r the	compensation and rehousing		
	zoning is essential		population, for the child		h that is as transparent and		
	because it is necessa	ry	particular, who risk fallin	ng in	to it. effective.		
	to prevent the	• It may become a garbage			np. • Launch awareness raising		

Theme 3: Densification
	inhabitants from	•	Zoning risks provoking social	program and popularize the
	building in the flood		tensions:	challenges of urbanization
	zones.	0	It will financially penalize the	in flood zones in order to
•	The construction of the		owners having already built in the	better support the actions
	canal is a good idea		commune;	undertaken within the
	because it allows to	0	It will penalize poorest families	framework of the SDAU.
	drain the rainwater		who have no other means of	These awareness-raising
	and also serves as a		settling than in flood zone to	actions can be effectively
	dam against sea		remain close to their jobs;	carried out by NGO of
	incursion.	0	The relocation of displaced people	Sebkha commune.
			is problematic because the	
			inhabitants of Sebkha will hardly	
			find their place elsewhere.	

(7) Riyad

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Riyad on April 23rd, 2018. The outline of the workshop and its main results are shown in Table 1.27 below.

Date	April 23, 2018					
	09: 00-13: 00					
Venue	Meeting room in the city hall of	of Riyad				
Participants	11 members of the CCC of Riv	yad				
General information on	Wilaya: Nouakchott Sud					
commune	Area: 8 101 ha	Population: 117 030	Density: 609 pop/ha			
Photos of the workshop						

Table 1.27: Outline of the 3rd round of public consultation workshop in Riyad

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

Strengths of		Weakness of propositions /						
propositions		obstacle		Suggestions and recommendations				
•	The creation of	•	The many construction	•	It is also necessary to improve access to			
	the new Tahril		sites that will accompany		some small existing neighborhoods in Tahril			
	development pole		the development of new		by setting up a local public transport			

not go through the current city center but

by the ring road or by train.

linked with the	pole of Tarhile will	network that serves the whole of the
city and the	become obstacles to the	commune well (and not only activity poles
construction of	traffic of local residents.	between them).
the ring road will	(as we can see today in $\hfill \bullet$	Mobility problems will be mitigated by
help to open up	Tevragh Zeina with the	developing urban services locally (compact
the whole	many traffic jams from	city).
neighborhood.	the current construction $ \bullet$	The connection to the airport must
	sites).	overcome the problems of traffic. It should

Theme 2: Densification

Weakness of propositions /

Str	engths of propositions	obs	stacle	Su	ggestions and recommendations
•	Densification is the	•	Densification will lead to	•	For the poorest to participate and
	only way to save		higher rents that will		benefit from the development of the
	space in the city and		marginalize the poorest.		city, a real social housing policy must
	improve quality of	•	Apartment life is hardly		be set up in Tahril.
	life (access to		compatible with the habits	•	Living in apartment can be possible
	electricity, water and		of Mauritanian families		and accepted by everyone:
	sanitation).		(variety of family	0	If residents are made aware of the
•	The presence of high		structures). Promiscuity		associated benefits (pooling of
	rise buildings gives a		limits movement and		expenses, security, sanitation, cost of
	modern and		restricts individual liberties.		rent compared to a villa);
	attractive image of	•	The volume of garbage will	0	If inhabitants have access to public
	the city which is		be very important which will		spaces (green spaces and leisure
	important to give a		cause serious pollution		areas) close to their dwelling.
	positive image to		problems.		
	outermost and poor				
	neighborhoods like				
	Tahril.				

Theme 3: Employment and economic development

		We	eakness of				
Strengths of propositions			positions / obstacle	Su	Suggestions and recommendations		
٠	The "New Tahril" pole is widely	•	Propositions	•	Riyadh citizens suggest at first to		
	acclaimed by the CCC members. It		requires heavy		improve the image of Tarhil		
	will contribute to give a new		investments		neighborhood to make them viable		
	radiance to Tahril throughout		both for "New		and attractive.		

Nouakchott while creating local jobs and boosting the neighborhood (shops and services associated with the pole).

The development of a network of small industries within Tahril urban fabric (in connection with the port) is very relevant to the Riyadh context as there are currently many professional skills to be valued within these new neighborhoods. New residents, especially migrants, are often qualified and this can be an opportunity to boost local economic development in the heart of Riyadh. Tahril" pole itself (offices, workshops, small industries) as well as for the infrastructure and urban services associated with it. CCC members wonder about investment prospects: Who will invest in Tahril? Is there a real political will to create a new pole in Tahril?

Creating a wholesale supply market around the ring road that would replace the current Moroccan market (Socim market). Its new location on the outskirts of the city and near the port would allow a better regulation of flows between wholesale arrivals and traders. The move of the current Moroccan market would significantly relieve city center now regularly paralyzed by truck deliveries and the influx of buyers. This idea of creating a new wholesale market has already been considered during exchanges between CUN and the municipality.

Theme 4: Green and recreation spaces

		Weakness of propositions			Suggestions and		
Strengths of propositions		/ ol	bstacle	recommendations			
•	Riyadh citizens agree that it is indeed	•	Sustainable	•	Riyadh CCC members		
	urgent to revitalize the commune by re-		development of a		suggest creating a		
	greening the streets and squares in order to		leisure park or		specific system to clean		
	mitigate the concreteization of the		green space will		up parks and		
	neighborhood of Tahril, improve the quality		only be possible if		recreation areas. This		
	of life and restore a positive image of the		the land is		system can potentially		
	commune to Nouakchott.		available. By today		be set up and managed		
•	Some flood pond in the commune (close to		the obstacles to		by a neighborhood		
	Arafat in particular) can indeed be		clarify land tenure		association or NGO.		
	converted into green spaces.		situation seem	•	Awareness raising of		
•	The idea of a park south of the city is		numerous.		the environment		

positive for the image of the town especially	•	The deplorable	should systematically
if it is an opportunity to introduce		health situation of	accompany the
Mauritanian typical fauna and flora. Such a		the wetlands makes	development of nature
park can encourage the emergence of urban		it doubtful whether	and recreation areas.
tourism and thus be a source of revenue		they are compatible	
and jobs for the commune.		with recreational	
		activities for	

children.

(8) El Mina

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of El Mina on April 25th, 2018. The outline of the workshop and its main results are shown in Table 1.28 below.

Date	April 25, 2018					
	09: 00-13: 00					
Venue	Meeting room in the city hall of	of El Mina				
Participants	16 members of the CCC of El	Mina				
General information on	Wilaya: Nouakchott Sud					
commune	Area: 9 025 ha	Population: 132 674	Density: 118 pop/ha			
Photos of the workshop						

 Table 1.28: Outline of the 3rd round of public consultation workshop in El Mina

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

Strengths of		Weakness of propositions				
propositions		/ obstacle		Suggestions and recommendations		
•	The propositions	•	Increasing traffic of	•	Road tarring must be generalized and specific	
	will improve the		residents may		lanes for each means of transport (trucks, cars,	
	daily life of the		increase the risk of		buses, bicycles and pedestrians) shall be planned	
	inhabitants of El		accidents.		in order to smooth the traffic. Public transport	
	Mina. The ring				(bus) must first benefit from dedicated lanes.	
	road must notably			•	Public transport must be qualitative, and the	
	allow to improve				routes of the buses must be well considered	
	the accessibility of				according to the needs of the inhabitants inside	

southern districts

of the commune.

de commune.

- The cost of public transport must be very accessible otherwise people will continue to use taxis all the way.
- One solution to improve mobility is to open administrative branches within neighborhoods. This will make it possible to carry out administrative procedures while staying in the commune and thus limit travel to the city center.

Theme 2: Densification

Strengths of propositions		Weakness of propositions / obstacle		Suggestions and recommendations	
٠	Densification allows a	•	It will be difficult for the inhabitants	٠	Densification is likely to
	simpler and cheaper		to accept to live in an apartment		lead to higher rents and
	access to water and		since Mauritanians families are		thus marginalize the
	electricity; it will		large and necessitate to have plenty		poorest. It is therefore
	improve the living		of room.		advisable to accompany it by
	conditions of the	•	The prospect of living in high rise		the establishment of social
	inhabitants,		building does not suit the		housing policies.
	especially poor		inhabitants because they feel more	•	Establishment of
	families. Collective		vulnerable to the risk of collapse of		infrastructure and reliable
	sanitation will be		houses built on floodplains.		urban services must
	easier to implement.	•	The CCC members warns of the		necessarily accompany the
•	Housing densification		increased risk of spreading diseases		densification of the city.
	should improve		because of densification.	•	The citizens recommend
	neighborhood safety	•	The poorest people will not be able to		enhancing the image of the
	as people watch over		access either property or rent as land		commune to encourage
	each other.		prices and rents will be out of their		investors to build (multi-
			reach.		storey apartment buildings).

Strengths of		We	akness of			
propositions		propositions / obstacle		Suggestions and recommendations		
•	CCC members	•	Valorization of	•	Regarding green spaces to be developed in wetlands	
	welcome the		current flood		(canal and stagnant water ponds) proposed in the	
	inclusion in		zones implies a		Strategic Orientations 2, the CCC recommends to:	
	Strategic		significant	0	Ensure security against delinquency in these places;	
	Orientation 2 of		health risk with	0	Install of a barrier to prevent falling in the canal;	

Theme 3: Green and recreational spaces

	their suggestions	the increase of	0	Carry out preliminary studies to understand at
	for creating green	malaria		what condition these floodplain areas could become
	spaces in El Mina.	(mosquitoes).		salubrious;
•	The idea of a •	The canal shall	0	Find ways to eradicate mosquitoes as a prerequisite
	canal / dyke as a	be well secured		for any development work.
	greenway for	because the risk	•	In order to guarantee their sustainability, leisure
	walking and	of falling is very		and recreation areas can be managed by local
	leisure is very	important		associations or neighborhood committees as soon as
	well received by	(especially for		they are created. A NGO can indeed be in charge of
	the members of El	children).		their maintenance, their supervision and possibly
	Mina CCC.			the management of their programming as space of
•	Proposed			culture and leisure (organization of cultural events).
	connections			
	between			
	neighborhoods			
	and the coast are			
	hoped by all the			
	inhabitants of the			
	town.			

Theme 4: Vulnerability to flooding

Strengths of

propositions		eakness of propositions / obstacle	Su	Suggestions and recommendations		
• The	•	The priority is to solve problems		Financial assistance of displaced		
propose	d	related to sanitation as this amplifies		families is necessary.		
zoning		and complicates the problem of floods	•	Relocations should be carried out		
(constru	uctio	with a major health factor.		near original areas to prevent social		
n possil	ole/•	Since it is the poorest inhabitants who		problems (separation of families).		
possible	è	live in the flood-prone areas, their	•	The application of zoning and other		
under		resettlement might marginalize them		urban planning rules is a		
conditio	ons /	even more.		prerequisite for any project		
prohibi	ted) •	The displacement of populations may		implementation.		
asnwer	s	cause social tensions among residents.	•	To avoid conflicts and blockages, an		
well to	the •	The proposition of canal is good but:		awareness campaign led by the		
reality	of o	It presents a risk for residents (danger		associations of the commune must be		
the		of falling).		conducted to support the		
commu	ne. o	It will probably reject dirty and		establishment of the zoning.		
• It is		polluted water that will drift to the	•	Water discharged into the sea must		

imperative	beaches of El Mina.	be treated and monitored regularly.
to find a •	The conditional construction in a flood $ \bullet$	Flood areas can be sanitized and
solution to	zone might be difficult since the	transformed into pleasant nature
the	techniques of construction under these	spaces (as proposed by the Strategic
problem of	conditions are out of reach for the	Orientation 2).
floods as	Mauritanians.	
soon as		
possible.		

(9) Arafat

1) Outline of the public consultation workshop

The workshop of the third round of public consultation was held in the commune of Arafat on May 8th, 2018. The outline of the workshop and its main results are shown in Table 1.29 below.

Date	May 8, 2018 09: 00-13: 00							
Venue	Meeting room in the city hall of Arafat							
Participants	20 members of the CCC of Ar	afat						
General information on	Wilaya: Nouakchott Sud							
commune	Area: 1 224 ha	Population: 175 969	Density: 149 pop/ha					
Photos of the workshop								

 Table 1.29: Outline of the 3rd round of public consultation workshop in Arafat

Source: JICA Study Team

2) Results of the discussions and synthesis by theme

Theme 1: Mobility and transportation

Strengths of

propositions		Weakness of propositions / obstacle		Sug	Suggestions and recommendations	
•	Arafat CCC	•	• Arafat's road network needs to		The CCC members are asking to benefit	
	reminds that		be reconsidered and adapted		from more proposals concerning the	
	during the		before considering the		improvement of the internal mobility of	
	first public		implementation of the proposed		the commune.	
	consultation		strategies, because:		The planned ring road should be	
	on	0	There is no escape route to		connected to at least one main axis of	
	environmental		connect Arafat to the ring road;		Arafat commune.	
	issues, the	0	Most existing roads are too	•	The circulation of goods trucks and	

issue of		narrow;		garbage collection trucks must be
mobility was	0	Some roads are dangerous for		limited in time (night traffic hours) and
identified as a		traffic, such as the roads that		in space (prohibited areas where the
priority.		connects the Arafat crossroad to		road is too narrow). The people from
Indeed,		the commune of Riyadh.		Arafat also encourages the
because of its	•	In the propositions, the internal		establishment of shops on the outskirts
central		mobility and parking needs of		of the city (particularly south of Riyadh)
location in the		the municipality are not		to relieve congestion in the city center.
heart of		sufficiently taken into account.	•	Public transport services must be
Nouakchott,	•	The precondition for any action		offered at affordable rates for the
the commune		on mobility is to enforce the		inhabitants, otherwise informal low-cost
of Arafat is		existing rules: the respect of the		transport may persist.
particularly		Traffic Laws, the prohibition of	•	Pedestrian traffic must be secured by
affected by		dilapidated vehicles, but also		installing bridges over the main axes of
mobility		the illegal occupation of the		the city and by prohibiting fast traffic
problems. The		road, in particular by		near schools.
proposals		construction sites which	•	The CCC members suggests
related to the		constitute significant obstacles		requisitioning (pre-emption) spaces to
improvement		to the movement of vehicles.		create parking spots within the
of mobility are				commune.
thus				

welcomed.

Theme 2	2:	Green	and	recreational	spaces
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Strengths of		Weakness of				
propositions		propositions / obstacle		ggestions and recommendations		
•	Arafat CCC	• For Arafat CCC,	٠	There is not much space available in Arafat. Thus, in order		
	members	the development		to develop new public spaces, it shall be considered to:		
	reminds	of a recreation	0	Move polluting infrastructures to clean up the		
	that the	parc in the		environment and requalify some lands into parks;		
	creation of	vicinity of the	0	Evacuate and recover illegally occupied land, including		
	green	future Grand		land already built-up;		
	spaces	Mosque is not	0	The disputed area near the Lekbeid market can be taken		
	within the	appropriate.		over by the State and transformed into a green space.		
commune			•	The greening of the city should not only concern future		
is a strong				parks, but also should cover all the road sides and squares		
expectation				of the city with planting trees to improve the quality of the		
	of the			environment.		

inhabitants

.

The area near the Madrid junction is very crowded, it could be equipped with several small parks and playgrounds for children.

Theme 3: Flooding

Strengths of propositions		Weakness of propositions / obstacle			Suggestions and recommendations		
•	• SDAU propositions		• Specific solutions for the		CCC members stress the		
	seems realistic to		following vulnerable areas shall		importance of the flood problem		
	struggle about		be found out:		that concerns the areas mentioned		
	flooding problems,	0	Between pole 18 and pole 13;		and invites the experts to propose		
	but actions shall be	0	Near the pole 1;		technical solutions quickly.		
	implemented	0	Areas A1, S3, P11 and SM;	•	Flooding issues will be partially		
	quickly.	0	Zone of pole 4.		resolved if the government puts in		
•	More and more	•	The establishment of a sewage		place a robust city-wide sewerage		
	residential areas		network is not proposed as a		system.		
	are abandoned in		Strategic Orientation.				
	Arafat due to the						
	floods.						

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Theme 4: Densification

Strengths of

propositions		Weakness of propositions / obstacle		Suggestions and recommendations		
Arafat is alrea	dy •	Gazra phenomenon is still very		Although densification does not		
concerned by		present in Nouakchott and this will		seem to be currently compatible		
densification		continue to slow down the		with Mauritanian culture, it is the		
dynamics.		development of the city.		only solution to ensure a		
Residents	•	Densification may have many		sustainable future for the city. To		
mention that		negative consequences:		support this change and prepare		
densification is	8 O	Increase of population may lead to		the inhabitants to live in a compact		
often positive		an increase of crime and a decrease		city, the Arafat CCC propose to:		
because it allo	ws	of security in Arafat;	0	Establish economic incentives to		
to reduce the	0	Pollution will increase		promote the purchase of		
cost of charges		proportionally with the number of		apartments and sale / rent		
and provides		inhabitants;		(progressive purchase at the price		
better access to	0 0	Sanitation problems will be more		of rent).		
water and		and more important;	0	Frame real estate programs to		
electricity.	0	Quality of the environment is likely		guarantee the quality of		
• Densification		to deteriorate and the risk of		construction of buildings		
allows a better		spread of disease will increase.	0	Provide financial assistance to the		

social mix and	•	Social mix is not necessarily only		poorest families so that they can
facilitates		positive:		continue to live in their
security because	0	It risks causing conflicts between		neighborhoods of origin in better
the neighbors		inhabitants, especially between		conditions.
watch over each		rich and poor populations;	0	Conduct awareness-raising
other. This helps	0	With promiscuity, moral and good		activities on the benefits of
to develop the		manners risk to degrade.		densification for individuals and
civic sense of the	•	The densification is not suitable for		the community. These sensitization
inhabitants.		the Mauritanian population, it is		actions could be effectively carried
Densification		contrary to its habits of space and		out by the NGO active in the
gives a modern		freedom of movement.		commune of Arafat.
face and value to				
the commune.				

1.4.3 Synthesis of the results of the third round of public consultation

During the workshops implemented in the third round of public consultation, the inhabitants represented in the CCC in each commune presented their opinions, which were well-argued and structured, about the Strategic Orientations of the SDAU. The results of these workshops, backed up by the results of the previous consultations, make it possible to highlight the living conditions, the concerns and the hopes of Nouakchott citizens in all their communal specificities. The major results of the third round of public include the following points.

1) Sensibilization about the importance of the PLU

Moreover, during this third and final phase round of public consultation on the SDAU, the citizens members had the opportunity to learn about the issues and objectives of the formulation of a PLU. It has been well explained and understood that the formulation of the PLU, as a city planning document binding to all public and private persons, is a process of major importance for the citizens. Thus, the workshops were the occasion to emphasize the importance of making the PLU of each commune consistent with the SDAU orientations.

2) Refining of Strategic Orientations

Unlike the two first rounds of public consultation, which constited in establishing real framework qualitative recommendations for planning the SDAU, the third round of public consultation helped to refine the proposed Strategic Orientations, especially in its details and technical aspects. Thus, the Strategic Orientations contained in the current DFR are taking into account the opinions of CCC members expressed during the third round of public consultation.

Nevertheless, all the opinions will not be necessarily integrated, since some of them are not directly related to urban planning spehere of influence, and others are based on extrapolations of SDAU propositions. A good example is the reference to the "high rise buildings" when discussing about a higher density of urban fabric. SDAU has never proposed any urban form and density can be obtained through several types of urban forms.

3) Conclusions and suggestions about the implementation of SDAU

CCC members of all communes have mentioned that the public consultation process allowed them for the first time to comment on a Nouakchott urban planning document. The various workshops allowed them to see that their opinions were integrated into the proposals as the process progressed.

- CCC members wish to be kept regularly informed of the progress of the project and recommend the establishment of a Monitoring Committee led by civil society representatives from CCC members. The Monitoring Committee would have for mission:
 - To learn about the progress of the project with the relevant authorities (MUHAT / CUN);
 - Inform the inhabitants of each commune of the progress of the SDAU project and the implications that this planning could have on the development of their commune;
 - Inform and explain to the new elected officials and the new municipal teams the objectives and the stakes of the implementation of the SDAU;
 - Ensure the good implementation of SDAU 2040 (respect of a future action plan);
- The members of the CCCs of the 9 communes invite public authorities to be as transparent as possible regarding the application of the SDAU.
- To ensure a good understanding of the SDAU by all Nouakchott residents, the CCC members encourage the implementation agency to communicate regularly on the issues of urban planning for the future of the city.
- Finally, all CCC members, at some point in the SDAU consultation process, were concerned that the opinions they have provided at the workshops will not be integrated and that the SDAU will never be implemented. As a result, the different actors and decision makers of the city are asked to give a concrete follow-up in order to give them full confidence in the role of CCC.
- 4) Suggestions about the future formulation of PLU

According to the CCC of the different communes of Nouakchott, the formulation of the PLU as a binding urban planning document, will constitute a major step towards a sustainable development of the commune. In view of the importance of this document, the CCC members suggest:

- ➢ To strengthen the power and responsaibilities of communes and provide them with real resources to ensure the elaboration and implementation of their PLU.
- To develop urban planning in an inclusive way, based in particular on an extended consultation of the actors of each commune. Based on their knowledge of the public consultation process of the SDAU, the CCC members proposes to be in charge of implementing the consultation process on urban planning at the commune level during the development of the PLU.
- A real involvement of the civil society organizations of the commune in the facilitation process of elaboration of the PLU and in the popularization and sensitization around the issues of the urban planning.

CHAPTER 2:

CAPACITY DEVELOPMENT

2.1 Institutional Status and Directions for Improvement

2.1.1 Current urban planning and management with problems in Nouakchott

(1) Existing legal framework and problems for urban planning formulation

The Urban Code (Law 2008-07) promulgated in 2008 has played an essential role in urban planning and management at present, after several modifications of ordinances, decrees, resolutions for urbanization and management by the governments. This Urban Code 2008 as the most essential and overall legal framework stipulates the procedures and rules for urban planning.

1) Three tier planning system by Urban Code 2008 without achievement of binding plans

According to the Urban Code 2008, three urban plans are required by key planning tasks and outputs summarized in Table 2.1 taking account of their role and functions as a non-binding plan or binding plan. The following points and problems can be briefed in conjunction with the Urban Code 2008.

- MHUAT has become the <u>responsible planning authority</u> to formulate urban plans by this Urban Code 2008, after the Law 2001.51 stipulated that CUN for Communes had the competence to formulate urban plans including land use plan, subdivision, etc. Planning authority would be an essential problem how to devolve its power to local governments gradually in mid-long term view.
- <u>Three tier urban planning system</u> in combination with non-binding and binding plans (SDAU: Development and Urbanization Master Plan as non-binding, PLU: Local Urban Plan as binding, PAD: Detailed Development Plan as binding) are mandated to be formulated and authorized (Decree) by the planning authorities (MHUAT). Revision of SDAU 2003 before Urban Code 2008 and provision of PLUs would be problems to be solved by immediately in the entire area of Nouakchott and Mauritania.
- <u>The development controls, development measures, administrative process (planning certificate and construction permit) and sanctions as mandated works in the Urban Code 2008</u> have not been providing properly and are needed to set regulations in binding plans (PLU, PAD, ZAC, and others).
- There is a considerable Article 54 for "<u>subdivision plan</u>" authorized by Order that <u>is mandated</u> <u>by a planning formulation by PAD or other urban plans</u>, in which the subdivisions have been predominant urbanization of Nouakchott without PAD, unfortunately.

This project covers SDAU and PLU as a demonstration plan for the target area within the SDAU plan. Table 2.1 illustrates three-tier planning system and current achievements of statutory urban plans and other planning measures stipulated in Urban Code 2008.

Legal Status	Statutory	Plan as mandated for Planning Authority Ad Hoc Plan				
Function	Non-binding	Binding Plan with Regulations				
Category	SDAU	PLU	PAD	ZAC/LM/RNU/RMU*		
Key Role &	 Medium-long term planning to guide 	 Implementation of SDAU plan by 	 Implementation of PLU plan with subdivision 	 Implementation of SDAU plan by controls 		

Fur	nction	future urban structure	controls and regulations	plan by infrastructure plans controls and regulations	 and regulations LM/RNU/RMU should be under ZAC or other upper plans.
Tar	get Year	• 10 to 20 years	Not mentioned Not mentioned		• Not mentioned
Key and Rec	y Tasks I Planning quirements	 Perimeter for urbanization Urban structure and land use plan including natural area and agricultural lands Sector network plans including ROW, etc 	 Land use and zoning regulations Designating public facilities and public utilities and ROW Designating natural historical areas to be protected Regulations (building form, a land lot, etc) 	 d use and zoning lations d use and zoning lations e Framework for all subdivision's operation e All detailed plan including utilities, plots, network ROW e Regulations (building form, a land lot, etc) e Tramework for all subdivision's operation e ZAC: Land Interventi Perimeter (PIF) d esignation is require e All detailed plan including utilities, plots, network ROW e Regulations (building form, a land lot, etc) e Implementation program for public investment e ZAC: Land Interventi Perimeter (PIF) d esignation is require e All detailed plan including utilities, plots, network ROW e Regulations (building form, a land lot, etc) e Implementation program for public investment 	
Apj Pro	Approval Process • Council minister's approval initiated Minister through public consultation by Commissioner for opinions of Mayors, Regional Administration public		Same approval process as SDAU	• Same approval process as SDAU	 ZAC: same as approval process of SDAU RNU: the Minister' decision with people's agreement under ZAC RMU the Minister' decision
	Status	By Decree	By Decree	By Decree	By Order (LM), By Decree (ZAC/RNU/RMU) unless upper plans are stipulated
Cur Acl in N	rrent hievement Nouakchott	SDAU 2003 not in line with Urban Code 2008 and without General Urban Regulation covering Nouakchott	No plan	No plan	No plan except subdivision implementation without upper urban plans

Note1: ZAC = Concerted Development Zone, LM = Subdivision, RNU = Urban Renewal, RMU=Urban Consolidation Note2: ROW = right of way for roads, utility network with certain easements.

Source: Urban Code (Law 2008-07)

2) Inappropriate formulation and operation for the approval process of plans

In order to formulate and get an approval for statutory plans, Urban Code 2008 stipulates necessary administrative procedure and responsible authorities. Although MHUAT has primary responsibility for plan formulation and its approval procedure, several authorities are involved in the formulation of the plan in conjunction with its public inquiry by relevant stakeholders and in the approval process of which required time would take six months as minimum duration.

The urban sprawls mainly by subdivisions in peri-urban areas including potential hazard risk areas (e.g. inundation) in Nouakchott have not been controlled and prevented by the effective process and measures due to lack of necessary control measures by SDAU 2003, and mandated administrative operation of two legal development approval processes by planning certificate and construction permit. Also, it is considered that political interventions have been obstacles sometimes for the normal procedure of control and management.

	Relevant	Ce	ntral Governme	ent	Local Level /	Government	Other
Organizations Procedure		Other Ministries /Public Institutions	MHUAT	MIDEC	Wilaya/ Moughadaa	CUN/ Communes	Inquiry Commissioner
Establish	ment		•	▶ ●/● ◀			
Formulation		•	(
Collectio entities	n of comments from public	2 months Comm	ents				
	Preparation		—	Designation of ir	iquiry commissione	r (by Decree)	
Public Inquiry	Recording public comments and drafting a PI report				Kequin		
(PI)	Dissemination of the PI report	1~2 months	Dis to t	semination of PI re he public	port	6	
Collectio documen	n of comments on the ts as amended by the PI	² months		Draft SDAU modifi Comments	ed by the results o		
Approva	l on a plan by Decree	Council of Ministries	— •				

 Table 2.2: Process and Authorities in the Formulation and Approval of SDAU and PLU

Note: Illicision / initiative, Conllation, Designation / request Source: Urban Code 2008

(2) Weak development control and construction management

1) Old dated and insufficient measures for development management and control

Current urban control in Nouakchott is managed by three key legal frameworks of the Urban Code 2008, the Decree 205-2007 for Construction Regulations and the Decree 87-226-1987 (General Urbanization Regulation for Nouakchott). In accordance with three key legal frameworks, two concrete control measures for land use and urban form by 1) the framework by SDAU 2003 and 2) old dated the General Urbanization Regulations 1987 have been administered by MHUAT and Nouakchott to control and manage developments and constructions.

Also, planning certificate stipulated in Urban Code 2008 should play one of the important permission processes in the beginning stage of development permission, although the current process has treated this process simply as the site planning appraisal shown in Table 2.3. This process has never been utilized and issued yet until now. This process of planning certificate should be enhanced as one of the essential tools of development controls whether a planning document submitted is fit with necessary and sufficient conditions without negative environmental impact, lack of access and inadequate use with neighboring uses.

2) Key responsible authorities for development management and control

The MHUAT with ex-DU and ex-DCU (merged into DUT under DGHU at present described in the section 2.1.2) is the responsible authority to issue construction permit involving necessary other agencies' technical appraisal such as land tenure (Domain Direction / Ministry of Finance), fire protection (Directorate of General for Civil Protection/MIDEC) and administrative appraisal by Wali (Wilaya) or Hakem (Moughataa) and CUN or Commune (Mayor).

And "one-window station (Guichet Unique)" for services of construction permit in each Commune has been aborted due to ineffective operation and management and lack of management capacity among relevant offices.

						0				
The procedure of Construction Permission		Minimum	MHUAT		MF	MI	DEC	LC	θU	
			Required	DUT	DE	חח	DBC	WM	CUN	C
Step	Normal Building	Large Bld.*1	Days	DUI	DL	DD	DIC	** 111	CON	C
STEP-1	Applicant Documentation		1-3							
STEP-2	Documents Confirmation		1							•
STEP-3	Site Planning Appraisal		1-2	•						
STEP-4	Certification of Establishment		3					•		
STEP-5	Documents Confirmation		1	-		-		•		•
STEP-6	Building Design Appraisal	Detailed	2-4*2	●	●*2	-	•	-	● *2	•
STEP-7	Verification by Director's Sign		1	●	-			-		-
STEP-8	Property Appraisal and Signature		2-3	-		•		-		-
STEP-9	Issuing Building Permit		2	•	•*2	•		•	•*2	•
		Total days	13-21							

Table 2.3: Current Procedure of Construction Permit without Planning Certificate Process

Note: MHUAT: Ministry of Housing, Urban Planning and Territorial Development, DGHU-DUT: ex-DU(Department of Urban Planning), DE: ex-DBET (Department of Building and Public Facilities), MF: Ministry of Finance, DD Direction of Domain, MIDEC: Ministry of Interior and Decentralization, DPC: Department of Civil Protection, WM: Wilaya or Moughataa Office, CUN: Nouakchott Urban Communes office, C: Commune office

*1: the Large building is applied to more than five (5) stories, *2: In case of the large building appraisal Source: JICA Study Team based on the interview to MHUAT

3) Insufficient land tenure management as one of the fundamental management tools

The land tenure management on both of public and private sectors has faced difficulties for desirable urbanization in Nouakchott. The urban sprawls as one of the considerable urban management issues of Nouakchott have been accelerated mainly by inadequate land distributions with cheap prices in combination with the weak land registration system in the past decades. These land distributions also have generated land speculations in association with higher prices land transaction of which market conditions for ordinal citizen and public land acquisition have not been affordable.

On the other hand, public facilities and services have not been provided well due to lack of land acquisition for them without competence of local government (Commune) to acquire or expropriate public lands from high-priced private lands as major occupations in the built-up areas of Nouakchott. As the central government has remained the jurisdiction to handle with land provisions, Communes have not been able to manage their public lands even though under decentralization programs.

In 2015 the Government designated the new jurisdiction area of Nouakchott without autonomous administration designation expanded from the previous area by 386 km2 to 1,132 km2 toward the northern direction mainly and the southern, western directions. This expansion has generated already some land subdivisions and concessions especially in the northern areas where the new international airport (Nouakchott-Oumtounsy International Airport) has opened and touristic facilities have operated along the coastal areas without any statutory plans.

On the other hand, as the technical administrative basis of urban planning and management, the cadastral maps in paper media has not been completed yet for both relevant authorities by MF (DD)⁴² and MHUAT. This situation has brought essential problems such as duplication of property right by two different ownership. A simplified address system using subdivision names and lot numbers shall be considered. For relocation and redevelopment, an address will be a condition indispensable.

⁴² MF (DD): Ministry of Finance, Direction of Domain under Directorate of General for Domain and Land Treasure (DGDPE)

4) Insufficient property taxation in association with weak land tenure management

In conjunction with land and property administration and taxation as a part of urban management, there is an annual tax on only built properties as fixed and immovable. There is no land tax and the official land price (recording) system has not been applied to entire areas of Nouakchott including illegal settlement areas. On the other hand, the residential tax is another relevant tax for urban land-related taxation, of which criteria on due are not liable data source and determined by local governments.

The property evaluation administration needs to be enhanced by equipping surveyors and property appraisal professionals in order to gain possible revenue as resources for public investment such as public facilities or infrastructure development and improvement.

(3) Government-led urban developments with subordinate agencies of MHUAT in Nouakchott

From the 1990s to 2000s, several the government-led urban developments were implemented, especially for housing, land development, and infrastructure through establishing the governmental organizations such as AMEXTIPE⁴³ in 1992 and ISKAN⁴⁴ in 2010 at the national level, and ADU⁴⁵ for Nouakchott in 2001 at the local level. Those public agencies under MHUAT have played important roles till now in urban development as predominant implementation bodies in Mauritania.

Especially TWIZE program by GRET in 1998 for the upgrading of informal settlements (Kebba as shanty town) and urban land tenure planning involving ISKAN, ADU and during 2002~2012 funded by World Bank was one of the largest subdivision projects in several Communes such as Sebkha, El Mina, Teyaret, Dar Naim and Arafat.

VAINCRE as one of the action programs in the PRSP for integrated land use management programs (2005~2017) founded AFD excluding Nouakchott. Recently, the Government established the new public institution of TADAMOUN (Decree2013-048) for the poverty alleviation of minority groups in Nouakchott by which social infrastructure projects including social housing are taken in the country.

2.1.2 Centralized organizations for urban planning and management

The Ministry of Housing, Urban Planning and Territorial Development (MHUAT) as the counterpart of this Project has played main roles in elaboration, implementation, and monitoring of the Government's policy in the areas of housing, urban planning and town and country planning in Mauritania. On the other hand, the Urban Community of Nouakchott (CUN) as the representative authority for nine autonomous local governments (Communes) equivalent to nine Moughadaa in parallel within the jurisdiction of Nouakchott City equivalent to three Wilaya⁴⁶ as a supervisory agency in parallel. Policy formulation and planning in CUN and nine communes have been given by the legitimacy of urban development and management (e.g. PDC⁴⁷) by the Law No 2001.51, however urban spatial planning authority has been brought back to MHUAT by Urban Code 2008. The CUN including the OSPUN under DEPAEC department (mentioned later) is taken place as the coordination counterpart also for the Project.

⁴³ AMEXTIPE: Mauritanian Agency for the Execution of Public Works for Employment as a part of the network organization of African Association of Public Execution Agencies (AFRICATIP).

⁴⁴ ISKAN: National Society for Land Development, Habitat Development, Promotion and Real Estate Management by two previous organization mergers of ANAT (National Land Management Authority) and SOCOGM (Real Estate and Construction Company)

⁴⁵ ADU: Urban Development Agency

⁴⁶ Three Wilaya: Nouakchott Nord, Nouakchott Sud, Nouakchott West

⁴⁷ PDC: Community Development Plan as an five year's investment plan under MIDEC

(1) MHUAT as core administration for urban planning and management

1) Organization as newly reorganized

Ministry of Housing, Urban Planning and Territorial Development (MHUAT) consists of the central administration units including subordinate organizations by six (6) Departments and five (5) affiliate agencies of ISKAN, ADU, AMEXTIPE, ERRT, and ETR-ML. In the central administration units, the Directorate General for Housing and Urbanism (DGHU) as one of the counterpart organizations is the biggest Department with 50 staff in MHUAT having around 46% share of the total number of personnel. The organization chart can be illustrated in Figure 2.1 according to the Decree 0104-20017.

DGHU has been established recently on April 2017 by the Decree 0104-2017 for the MHUAT reorganization program, of which new DUT instead of ex-DU as the main Counterpart of the Project as shown in Figure 2.1 and 2.2. Ex-DCU with urban control function as one of the considerable organization for urban controls was merged into DUT, in which four divisions by DDNU and DERU for planning standard and documentation.



Source: JICA Study Team based on the Decree 0104-2017

Figure 2.1: Organization 2017 of MHUAT

2) DGHU reorganized as a responsible unit for urban planning and management

As the new organization of MHUAT has not been fixed in detail in terms of numbers of staff and positions, the previous organization of DU and DCU equivalent to DUT (Directorate of Urban Planning and Topography) under the new DGHU is only described by the information of DU and DCU at the beginning 2017 before the Decree 0104-2017. The ex-DU is the largest numbers (32 staffs) of personnel in MHUAT, while the officials are composed of regular staff (60%) and temporal staff (40%) with the contract.



Source: MHUAT arranged by JICA Study Team



3) Annual budget 2017

The budget for the year of 2017 of MHUAT is 16,972,740,726 MRO (44,937,095 euro) although the breakdown of the budget has not been matched with the new organization. The investment budget (16,287,390,000 MRO) in the total budget shares 95.6% out of the total. Figure 2.3 shows the compositions of the budget of MHUAT for operation and investment in this year 2017.



Source: The State Budget for the Year of 2017/MEF arranged by JICA Study Team Figure 2.3: Budget 2017 of MHUAT

(2) ADU as an implementation organization for Nouakchott urban development

The Urban Development Agency (ADU) as one of the public establishments under MHUAT was established by the Ordinance No. 2001-02 of 19 April 2001 in association with its implementing Decree No. 2001-061 of 19 April 2001. The mandate organization was stipulated by the Decree 2001-061 for ADU, however, some management functions have been abolished. ADU having 227 staffs consists of three types of the organization by the management, three (3) Departments, two (2) technical Units in which the Resettlement and Social Welfare Unit (CROMOS) is predominant staffs in ADU sharing around 77% of the total staffs of ADU. The ADU is managed by the General Assembly chaired by the President of the Urban Community of Nouakchott (CUN) and the Director-General appointed by the General Assembly based on the proposal of MHUAT.

According to the Ordinance 2001-02, Article 2 stipulates the function and role and responsibility to achieve the following tasks within the boundary of Nouakchott Municipality and according to the framework of the State programs or Nouakchott's development strategy and investment priorities.

• To prepare SDAU, subdivision plans, environmental impact mitigation plans, and all other documents related to urban planning in Nouakchott.

- To supervises the regulation and control of urban development by ensuring coherence and coordination between the various actors and urban development projects
- To carry out all the study operations, renovation, rehabilitation or construction, which are entrusted to it by convention or mandate, or by the State, or by the municipality, relating to urban development in Nouakchott

(3) ISKAN as an implementation organization for urban development in Mauritania

The National Society for Land Development, Housing Development and Real Estate Promotion and Management (ISKAN) as one of the public implementation bodies under MHUAT was established by the Decree No. 2010-079 of 23 March 2010. The ISKAN having 100 staffs consists of three types of the organization by the management, three (3) Departments, one (1) technical unit for project coordination and supervision. The ISKAN is managed by the Board of Directors and management sections.

The ISKAN aims at realizing the government's policy in the urban development sector in order to eradicate urban poverty and improve living conditions through studies and implementations of necessary actions and operations in relation to land development, habitat improvement and development, and promotion and property management. The ISKAN has the responsibility to achieve the following goals in the country of Mauritania. In case of Nouakchott, ISKAN has a minor role in urban development such as some market developments.

- To improve the quality of urban life by increasing the offers on the market housing and serviced plots
- To ensure the implementation of public policies in urban planning, housing management, and property development
- To contribute to the implementation of national programs for construction of housing and the construction of community amenities;
- To discourage land speculation.

2.1.3 CUN with OSPUN as a public service provider for nine communes of Nouakchott

The Urban Community of Nouakchott (CUN) was established in accordance with the Law-2001-51 of 19 July 2001. The administrative services were regrouped by CUN for nine (9) communes situated within the boundaries of the Wilaya of Nouakchott as the capital city of Mauritania. On the other hand, under the memorandum no.060 of 17 June 2012 and 079 of 23 July 2012, the Observatory of Services and Urban Heritage of Nouakchott (OSPUN) was established under the jurisdiction of CUN.

(1) **Overview of the organization**

The CUN having 286 members and staffs consists of three types of the organization by the Commune Council, administrative management, six (6) Departments, one (1) special institution (OSPUN) for the data management and research. Taking account of the representative administrative organization of nine Communes in the Nouakchott Wilaya, the CUN is organized under policy directions by the Commune Council members delegated from each Commune and managed by the administrative management headed by the President of CUN.

Under CUN, the Department of Studies and Projects and Community Spatial Planning (DEPAEC) including OSPUN as one of the key counterpart of the Project (Project Coordinator at Commune level) could play an important role in urban planning and management in future, although current activities are limited to a part of urban development planning and management activities on the urban issues of Nouakchott.



Source: JICA Study Team based on the information of CUN

Figure 2.4: Organization of DEPAEC 2017 under CUN

(2) Urban service responsibilities for nine communes

The CUN has played considerable roles in serving citizen for the nine (9) Communes not only by inter-communal services such as waste collection and management or traffic management services covering all communes, but also services and development for each commune. The demarcation of mandatory public services between CUN and Commune is not stipulated in the legal documents such as the Law-2001-51 for CUN's functions and the Ordinance 87-289-1987 for commune's competence. The following role and function shown in Table 2.4 can be illustrated briefly based on the interview with CUN.

According to the Local Finance Status Report, the operational revenue for CUN in 2013 was allocated by around 1,692 million MRO (around 4,480 thousand euro), while the expenditure was 844 million MRO (around 2,235 thousand euro). In this year 2013, CUN could save around 848 million MRO (50 % of total revenue).

		Servi	ces by C	UN		
Category	Competence in Public Services	Manage- ment	Assist - ance	Finance	Note	
Planning Management	Policy formulation, urban development, spatial planning and land use planning, etc	(●*)			MHUAT is the responsible authority in accordance with Urban Code 2008 currently.	
	Community Development Plan		•			
Transmontation	Local road construction	•				
Service	Traffic equipment maintenance (street lighting, signal control)	•	•	•		
Utility Services	Water supply facilities specifications for concession	•	•	•	SNDE is the responsible agency to supply potable water	
	Construction, maintenance for basic education school building		•			
Public	School transport service					
Facilities Services	Health clinics for child & maternity construction and maintenance		•			
	Communal sports and cultural facilities		•			
	Parks and gardens	•				
Other Public Services	Fire-fighting,	•				
	Waste disposal and hygiene management	•				
	Cemeteries, slaughterhouses,	•				
	Support for the indigent	•				

Table 2.4: Range of Responsibility of CUN for Commune's Public Services

Source: JICA Study Team based on the relevant documents and the interview to CUN

Table 2.5: Annua	l Fiscal S	Status for	CUN in	2013
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Annual Fiscal Status 2013	Unit: euro	per Capita (euro)
Operational Revenue	4,480,421	4.7
Operational Expenditure	2,235,418	2.3

Source: General Report on Local Finance in 2013 / DGCT-MIDEC

(3) OSPUN for urban information and analyses services for policy decision making

The CUN has strengthened the function of data management for urban management such as the establishment of the information document center, consolidation of georeferenced data for urban management. In line with such past development, the CUN set up a permanent organization as a tool for the data collection, processing and dissemination of information by the Observatory of Services and Urban Heritage of Nouakchott (OSPUN). Table 2.6 shows the current organization of the OSPUN as one of the research and study posts in association with the external advisory body.

Table 2.6: Organi	ization and Key	Functions of OSPUN
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Function	Organization	Description	
Management	Management Board	Decision-making body for operation and management of OSPUN	
Advisory	Technical Committee	The committee aims at building consensus among relevant authorities as an inter-institutional advisory organization.	
	General Service	Services for drivers, secretariat responsible for logistics, and administrative and accounting services	
Thematic Technical	Information Service	Responsible for the management of GIS and statistics. This section was integrated with the Information and Documentation Center of the CUN	
Operation	Study and Analysis Service	Responsible for the conduct of studies, research, and analysis for urban management	
	Communication and Partnership Service	Responsible for external relations (facilitation and monitoring of partnerships), dissemination of materials and external events.	

Source: OSPUN

The OSPUN aims at supporting integrated urban development and management by becoming a platform for understanding land issues and socio-economic development issues, and at supporting decision-making for the CUN's public policies and actions. The followings are key objectives of OSPUN's activities.

- To initiate a dialogue process for the production of information and decision support.
- To provide reliable and relevant information to decision-makers in association with social actors, for effective coordination and decision support.
- To make use of OSPUN in steering and monitoring the action decided and strengthen the visibility of relevant information for public actions

2.1.4 Communes in Nouakchott

(1) The composition of Organizations for Commune

The organization of commune consists of two organizations of a municipal council and a Municipal Consultation Committee (CCC). The municipal council has the functions of administrative operation and management for its jurisdictional area except activities delegated to the CUN. The municipality council composes of two organizations of the municipal council by elected members for the mayor and councilors for the thematic committees and the executive bureau by employed personnel for sector administrative services.

On the other hand, the CCC is composed of representatives of the municipal council, traditional authorities, socio-economic and cultural civic organizations, the deconcentrated technical services, technical and financial partners, local cooperatives and associations. The following Figure 2.5 shows a typical organization of commune in the case of Ksar Commune. Other communes have also similar structures of their organizations in accordance with the legal frameworks



Organization

Source: JICA Study Team based on the documents on the legal frameworks and the interview to Ksar Commune

Figure 2.5: Typical Organization of Commune in case of KSAR Commune

(2) Role and function of Commune

The commune aims at serving local communities and developing a project for the socio-economic sectors in their jurisdictions of the own commune. The relevant organizations of the commune aforementioned make decision-making of public policies, budgeting and formulate the Communal Development Plan (PDC) and projects for mandatory public services except services delegated to CUN through discussion and coordination works between the Municipal Council and the CCC. The followings are key matters for the deliberations of public services and other relevant matter by the municipal council.

- To examines and approve the administrative budget and revenue and expenditure account
- To fix the rates of local taxes and the tariffs of royalties, national and service fees
- To formulate and approve plans and the development actions and classify and decommission, allocate public communal property
- To provide the public services defining their management measures

(3) Imbalance distributions of the annual budget for nine Communes

According to the Local Finance Status Report, the operational average revenue for nine (9) communes in 2013 was allocated by each 89.7 million MRO (around 237,430 euro), while the expenditure was each 94.9 million MRO (around 251,350 euro). In this year 2013, the expenditure exceeded the revenue while CUN could save 50 % out of total revenue. Each financial status of nine communes in 2013 is indicated in Figure 2.6, in which Tevragh Zeina Commune shows the largest amount out of all communes' operating budgets.



Source: General Report on Local Finance in 2013 / DGCT

Figure 2.6: Financial Status of Nine Communes in 2013

On the other hand, more detailed figures in 2016 are illustrated in the case of Ksar Commune shown in Figure 2.7. The total amount of budget including operational and investment budget was around 125 million MRO (around 333,482 euro), in which the major item of revenue was the taxes by 55% share while the major item of expenditure was the payroll cost by 83% share. As a reference, the taxes as major sources of revenue of communes, elements are described in general as follows.

- Municipal taxes: the land tax on the built and unfurnished properties, buildings, the land tax on agricultural land, the tax on housing, the municipal contribution, the patent and refunds on arbitrated charges
- Communal tax, taxes maintained provisionally by landed tonnage and on export fish
- Levies and Charges by the municipalities by "Royalties" by the amount paid for services rendered or rendered by users in commune, "Domestic Charge" corresponding to the amounts paid for use of communal equipment or the use of communal public property, "Penalty" as



the amount paid for a violation of the police, and "Service Revenue" paid by service provider merchants

Source: Financial Status of Ksar Commune in 2016



2.1.5 Challenges to institutional improvement

Current and past urban plans and its management have not been workable well due to multiple weakness of organizational capacity, planning techniques, insufficient multi-legal effects with relevant regulations. However, one of the essential problems is lack of required plans, especially binding plans (PLU, PAD, etc) and weak implementation in Nouakchott, in spite of certain requirements stipulated in the Urban Code 2008.

Challenges to institutional improvement for urban planning and management system have to be considered not only to normalize planning and management environment in accordance with Urban Code 2008 but also to achieve effectively the development concept of SDAU are identified as follows.

(1) Enhancing binding mechanism to manage and control toward "Compact and Resilient Urban Structure" formulation

In spite of the existence of SDAU 2003, urbanization was unfolded and inconsistent with the land use plan of the SDAU by spontaneous urban development in undesirable areas, many subdivisions were built without compliance with process and legitimate plans in accordance with urban laws and regulations. The followings are challenges for enhancement of binding mechanism to manage and control toward "Compact and Resilient Urban Structure".

- 1) Hierarchical enhancement with certain binding roles in the urban planning system
 - Appropriate development control and management system to be incorporated into each hierarchical planning system of General Urban Regulation (RGU) in association with SDAU, PLU, PAD and other plans (ZAC, subdivision plan, urban renewal plans, etc)
 - Adequate management and control by growth boundaries and conservation areas and common norms and standards for control and regulations (e.g. parking requirement, setback, use regulation, etc) to fit with characters of Nouakchott and contemporary urbanization requirements by RGU covering the whole entity of Nouakchott in order to have binding forces urban growth limitation and natural conservation in the SDAU.
 - Management and control for PLU by local regulations to fit with local character including some general regulations treated by RGU
 - Adequate specific management and control planning (e.g. use zoning, density, building height, etc) tailored to fit local needs by lower hierarchical planning level (e.g. PAD, ZAC, subdivision plan, etc)
 - Enhancement of planning compatibility and mutual endorsement among urban plans by designation of the planning area (e.g. PLU to be designated in SDAU, PAD, ZAC in PLU)

- 2) Enhancement of effective binding power implementation in management and control system
 - Enhancement of operating system for development control and construction permit through procedural improvement of permission
 - Formulation of appropriate organizations with sufficient skilled staff equipped tools and budget for a development permit and inspection system on desks and in fields in responsible authorities (MHUAT, etc)
 - Strengthening monitoring and evaluation activities and enforcement of developments and construction including illegal activities by effective sharing role and responsibilities among relevant authorities (MHUAT, Wilaya-Moughataa, CUN/commune,)
 - Development of capacity of experts to embody institutional system for development and construction permits in combination with an understanding of urban planning system
 - Encouraging synergy effects as integrated development control and management in association with another institutional system such as land legislation and transaction control, environmental protection, cultural heritage conservation, investment control, infrastructure easement, etc.

(2) Addressing urban planning and management needs to formulate "Sustainable and Equitable Socio-economic Development" of Nouakchott

Nouakchott has faced various urban needs to be addressed in parallel not only for basic urban services with disparity among communities but also contemporary issues such as increased traffic management, climate change adaptation, sustainable development requirements as a part of SDGs, participatory planning with stakeholders and others.

Urban planning skills and methods are required to cope effectively and urgently with that complexity of urban needs in Nouakchott, in spite of essential weakness in planning capacity of relevant authorities and experts. The followings are challenges for addressing increased urban planning needs to formulate "Sustainable and Equitable Socio-economic Development" of Nouakchott.

- 1) Enhancement of urban planning capacity in relevant urban planning authorities
 - Improvement of technical skills and techniques in urban planning addressing socio-economic (land allocation, social, educational, health, infrastructure and its disparities) and environmental (natural hazard and climate change adaptation, etc) issues through continuous training and/or workshops
 - Strengthening of planning organization with appropriate sub-functions by issue-oriented units with an appropriate number of staffs and equipment in relevant authorities
 - Enhancement of adequate knowledge and skills for contemporary planning and management tools (e.g. participatory planning, strategic environmental assessment, transportation and land use integration, GIS planning), especially for planning management for consultant procurement and terms of reference
 - Enhancement externally by urban planning education in the higher education system and introduction of accreditation or certification system for securing a certain level of skilled urban planners
- 2) Establishment of an urban information system for rational planning and management
 - Strengthening of effective urban planning and management based on scientific and rational analyses utilizing and sharing sufficient baseline data (natural and socio-economic conditions and opinions of local communities by quantitative and spatial data-GIS) of Nouakchott
 - Establishment of sustainable urban information system in terms of periodical update and monitoring of socio-economic and development conditions with necessary budgeting and responsible bodies including data sharing system
 - Development of intra- and inter-agency data sharing system of an urban information system through the e-management system with IT infrastructure and website utilization

- 3) Long-term sustainable planning and management in line with decentralization direction
 - Empowerment of urban planning and management in CUN and Communes who would have capabilities to address local needs and effective solutions for effective socio-economic development and spatial management

(3) Enhancing urban planning and management system for "Integrated Urban Growth Management" in Nouakchott

One of the reasons for inadequate planning and its insufficient implementation of the previous plan of SDAU 2003 for Nouakchott was indicated by the lack of coordination with relevant stakeholders as sector responsible bodies for implementation of the plan and insufficient involvements local stakeholders to incorporate their needs.

For ensuring implementation of an urban plan and its effective management, successful urban planning and management would require inevitably sufficient involvement and cooperation of relevant stakeholders. The followings are challenges of planning and management for addressing increased and expanded development needs to incorporate "Integrated urban growth management" into Nouakchott.

- 1) Enhancement of coordination and integration mechanism for urban planning & management
 - Establishment of a standing committee for urban planning and management including relevant stakeholders and experts to discuss periodically urban issues and possible solutions in association with a technical advisory function for authorization of statutory plan formulation (as a horizontal mechanism)
 - Strengthening of administrative protocol and agreement for planning information sharing, policy exchange and implementation among relevant Ministries, Institutions and CUN/Communes in terms of responsibility and cooperation (as a horizontal mechanism)
 - Enhancement of intra-organization coordination for planning and management by both directions of top-down and bottom-up by certain administrative protocols (as a vertical mechanism)
- 2) Promotion of involvement and cooperation by a citizen, local communities, and private sectors
 - Sensitization of relevant stakeholders in urban planning and management through disseminating statutory urban plans and regulations or rules including construction permit system, public consultation, and public relations
 - Promotion of participatory approach for urban planning and cooperative management by local monitor partner or self-improvement of urban community
- 3) Enhancement of effective implementation measures in planning and management
 - Strengthening of appropriate and viable measures for statutory urban development or redevelopment system to improve the existing living environment or commercial business area through the provision of financing, incentives, partnership and guidelines
 - Promotion of new urban management systems such as Transit Oriented Development, mixeduse development as attractive and livable settlement achieving convenient location between living and working place, multi-function of the public service center

2.1.6 Roadmap for strategic enhancement of urban planning and management

Urban planning and management could be taken by strategic enhancement measures by gradual shift from MHUAT and Wali/Hakem to CUN/Communes in long-term horizon in order to achieve effectively and efficiently the development concept of SDAU for socio-economic development activities within the wide administrative jurisdiction of Nouakchott, taking account of desirable role of the central government and expected decentralization of the government in future. The followings illustrate the roadmap for strategic enhancement for urban planning and management by stage-wise approaches in Nouakchott.

- 1) STAGE 1 (short-term)
 - Enhancement of core competency of "policy-making and standardization" and "authorization" for urban planning and management in MHUAT
 - Fulfillment of central function of urban planning and management of MHUAT through the strengthening of development control system and human resource capacity development
- 2) STAGE 2 (mid-term)
 - Maintaining and strengthening core competence of MHUAT through functional shift giving the priority to policy-making and standardization of planning and management, while planning formulation also shifting to plans for a significant theme on national urban issues
 - Starting promotion and shift of development control and experts capacity development from practitioners to mentors for local government experts
- 3) STAGE 3 (long-term)
 - Enhancing core competence of MHUAT by enlarging the function and role of policy making and standardization.
 - Accelerating role shift of development control and management to CUN/Commune while MHUAT becomes the center for training of urban planning and management for



Source: JICA Study Team

Figure 2.8: Roadmap for Strategic Enhancement for Urban Planning and Management System by

Gradual Shift to Local Government

2.2 Capacity Development Program and Achievement during the Project

As one of the two objectives of the Project, capacity development activities were planned and implemented.

The objectives of the Project:

- 1) To formulate an SDAU for the entire administrative area of Nouakchott City and a PLU for the administrative area of one Commune to be selected in the course of the Project; and
- 2) To enhance capacity of related agencies responsible for urban planning and realization.

The objective 2) has two components: 1) capacity development activities during the Project; 2) Capacity Development Plan to be implemented after the Project. This section discusses both the capacity development activities and the capacity development plan.

2.2.1 Capacity development program implemented during the Project

Through out of all the planning phases of the project, the members of the counterpart interact with the JST members. The selected members, the taskforce members, work with the JST members, as they periodically report the progress to the managers. Also, the taskforce members inform and coordinate the progresses of the project to other stakeholders. The public consultation is designed to including members of communes. JCC and seminars are designed to report the progress of work and coordinate project directions as inviting all the stakeholders. Training in Japan is scheduled to enhance understandings of urban management which includes operation, development control and project implementation.



Source: JICA Study Team

Figure 2.9: Conceptual Structure of Capacity Development Program

In March 2017, the capacity development program was prepared to be implemented during the project. Following is the content of the capacity development program. The organization name of DCU and DU in the program to indicate both sections were considered as the core target in the beginning of the project. They are to be read as DUT for both directions were merged during the project.

(1) **Objectives**

In the first phase of the project, a task force was formed and members were selected. A capacity development program was prepared. The overall objectives of capacity development were set as reflecting an initial assessment of interviews and questionnaire survey. The objectives are:

- I. To enhance planning capacity of MHUAT-DGHU and CUN-DEPAEC in formulating SDAU and draft PLU in Nouakchott City;
- II. To enhance coordination capacity for administering SDAU and PLU; and
- III. To enhance capacities for implementing SDAU and PLU Nouakchott City
- IV. Improvement of building permission system and processes

The objective IV was not conducted during the project. It was intended for an item of the capacity development plan.

(2) **Operation Principles**

Role of Core Member of DU and OSPUN

- The counterpart, representatives (hereinafter the C/P) from DU and CUN-OSPUN, shall <u>take</u> <u>initiatives on coordinating</u> all the capacity development activities at all times with advises and consultation with the members of the JICA Study Team (herein after JST).
- All the <u>records of attendance and meeting records</u> shall be kept by the C/P in French and submitted to the JST to be translated to English. The attendance shall be kept in the Excel sheet.
- <u>Participation of the members</u> of the counterpart agencies to <u>the planning works</u> is essential for the plans to be managed and updated by the counterpart the in the future after the project.
- The activities in the capacity development <u>program may be flexible to meet the needs</u> of the participants; changes of activities shall be discussed based on availability of participants and the project members.

Role of JICA Study Team

- <u>Monitoring and evaluation</u> are important to gauge achievement; On-the-Job-Training (hereinafter OJT) activities will be monitored and evaluated by both sides. The capacity development program will be amended when necessary based on the results of the evaluation.
- Capacity development <u>activities</u> are conducted <u>within the project period</u>. <u>A mid-to-long term</u> <u>capacity plan</u> will be formulated for the C/P to implement after the project.

Considerable Activities of Capacity Development

- <u>The statutory documents for SDAU and PLU</u> shall <u>be prepared by the C/P</u>, while the JST will support preparation as SDAU and PLU will be prepared.
- The contents of the Urban Planning Guidelines shall be discussed in early stage of the Project with selected representatives from the C/P.

Corresponding Activities and Target Organizations

The major activities are: Structured interviews, Informal Interviews, OJT-Cooperative Work, Lecture, Case Studies, Regular Meetings, Stakeholder Meeting, and Site Visits. As Table 2.7 describes each content of activity, the regular meetings composed of three elements of "Debriefing Activities", "Technical Working Group Meetings" and "Public Consultations" are expected to be essential routine activities for capacity development program.

Activities	Explanation
Structured Interview	A structured interview uses a specific form when an interviewer interview. The form is filled by the interviewer.
Informal Interview	Informal interviews are generally conducted by experts. An expert may change topic of interview as he or she judges significance of conversation through dialogues of interviewees.
OJT-Cooperative Work	OJT is a practical training provided by superiors. Subordinates conduct their work, and superior's advice and correct errors on the way of conducting the work. Cooperative work is a method of learning of subordinates work together with their superiors. In planning situation, such as land use and/or transportation planning, the method is effective for subordinates to learn ways of going about solving planning issues.
Lecture	Lecture is an effective method of teaching to reach a large audience. The communication tends to become one way. When question and answer time is sufficiently allocated, audience would comprehend the subject more.
Case Studies (Japan)	Case studies are used to seek similar solutions in similar situations. The training in Japan will become case studies with site visits.

Table 2.7: Types of Capacity Development Activities

Activities		Explanation
	Debriefing for Coordination & Management	During the project, the key counterpart members from DU and OSPUN would be developed by their skills and knowledge through the activities of debriefing (meeting coordination, data collection, arrangement, reporting to the management group of the project) as one of the essential capacity to be acquired for coordinating and management in urban planning.
Regular Meetings	Technical Working Group Meetings	The members of counterparts and other members of relevant authorities and agencies would learn from discussions between JICA Study Team members and them to seek solutions on by each thematic and sectoral urban planning issue.
	Public Consultations	The public consultation will give significant opportunity to learn appropriate organization and operation of the participatory planning approach as a consensus building process with relevant local stakeholders. The target is the facilitators who will be capacitated.

Source: JICA Study Team

The **target organizations** and their members are classified into two: primary group and secondary group

- Primary Group: The **primary group** members participate in the structured questionnaire survey, OJT activities, and major discussion/coordination.
- Secondary Group: The secondary group members participate in discussions.

To the primary group members, more intensive capacity development activities will be provided. On the other hand, the **taskforce** by members of the target organizations selected by the MHUAT is established **to facilitate and coordinate** activities with Mauritanian sides for the SDAU and PLU planning formulation. This taskforce will be also one of the important activities of the capacity development program.

	Relevant Organizations for Urban Planning and Management			Capacity Assessment						
Target Group			Task- force	Human Resource and Organization Functions	Structured Interview	Informal Interview				
	MHUAT	DU* <u>C/P</u>	0	O	O	O				
PRIMARY Group	minorii	DCU		Ô	\odot	0				
	CUN	OSPUN	0	\bigcirc	\odot	0				
		DH		0	0	0				
	MHUAT	DAT		0	0	0				
		DCIG		0	0	0				
SECONDARY Group		ADU	0	0	\bigcirc	0				
		ISKAN		0	0 0					
	MEF	DRS		0		0				
	Commune	Nine coms		0		0				

Table 2.8: Capacity Development Targets and Corresponding Capacity Development Activities

Note:

MHUAT = Ministère de l'Habitat, l'Urbanisme et l'Aménagement du Territoire,

DU = Direction de l'Urbanisme,

DCU = Direction du Contrôle Urbain,

DH = Direction de l'Habitat,

DAT = Direction de l'Amenagement du Territoire,

DCIG = Direction de la Cartographie et de l'Information Géographique,

MEF = Ministère de l'Economie et des Finances,

DRS = Direction du Registre Social

ADU = L'Agence de développement urbain mauritanienne,

ISKAN = Société Nationale d'Aménagement de Terrains de Développement de l'Habitat de Promotion et de Gestion Immobilières,

CUN = Communauté Urbaine de Nouakchott,

OSPUN = Observatoire des Services et du Patrimoine Urbains de Nouakchott,

Legend: \bigcirc = mandatory, \bigcirc = upon request, -- = no involvement, C/P = Counter Part, ST = Structured Interview, SHM = Stakeholders Meeting (Public Consultation)

Source: JICA Study Team

(3) Technical Working Groups, Planning Phases, Participants and Methods

For the operational and administrative purpose of capacity development activities, four technical working groups are proposed: Land Use/GIS, Transportation and Infrastructure; Social and Natural Environment; and Implementation. The general planning phases are: situational analysis/issue identification; policy directions (vision, framework, etc.), and plan preparation (land use plan, transportation plan), and implementation (project selection, project implementation measures, and development control. The methods are: OJT-Cooperative work; Regular Meetings; Lecture: and Case Studies. Case studies are mainly the cases of Dakar and Japan. The Japanese cases will be presented during the training in Japan which is planned in August, 2017.

There shall be two types of participants from the C/P: junior planners and senior planners. The junior planner will take part in the initial phases of the project and the senior planners will take part in more policy-oriented matters. The junior planners who have less experiences will support data and information collection activities and record keeping—attendance and meeting records. The following table shows the relations of the technical working groups, planning phases and items, targets (participants to the activities) and method of capacity development.

		Target (D OSPU	U, CUN- JN)	Method					
Technical Working Group	Planning Stage (Item)	Junior Planner	Senior Planner	OJT	Regular Meeting	Lecture	Case Studies Dakar, Japan		
	Data and Information Collection	Ø		Ø					
Land Use / GIS	Situational Analysis Issue Identification	0	Ø		Ø				
	Visioning and Strategy	0	O		Ø	0	Ø		
	Planning (SDAU, PLU)	0	Ø	Ø	Ø		Ø		
	Data and Information Collection	Ø		Ø					
Transportation and	Situational Analysis (survey) Issue Identification	0	Ø	0	0	0			
Infrastructure	Demand Forecast, Facility Needs	0	Ø			0	Ø		
	Planning (SDAU, PLU)	0	Ø		Ø		Ø		
Social and Natural	Data and Information Collection (Social Survey)	Ø		Ø		0			
Environment	SEA/Stakeholder Meetings	○1/	©1/	0	O	0			
	Socio-Economic Framework		O		0	0	Ø		
Implementation	Data and Information Collection		©2/						
Implementation	Situational Analysis Issue Identification		©2/				Ø		

Table 2.9: Targets and General Methods of Capacity Development

1/ Facilitation techniques are supposed to be capacity development for the planners. The activities are not targeted to stakeholders or residents.

2/ The participants include persons from DCU. Source: JICA Study Team

Table 2.10: Groups for Capacity Development

Thematic		HCA State Trans	Counterpart Team					
Taskfor	ce	JICA Study Team	Leader	Supporters				
Land Use	SDAU	Takashi Koyama, Antoine Saurat	Fatimetou (DU)	Mint Den, Abdelhay, Aminata, Sellem				
	PLU	Makine Kusano	Mint Den (DU)	Fatimetou, Malick, Abdelhay, Aminata, Tijani				
Social S Socio-e	Survey / conomic	Manabu Fujikawa, Midori Yamamoto, Antoine Saurat	Abdelhay,(ADU)	Fatimetou, Malick, Sellem				
Transportation		Ryuichi Ueno, Takahiro Miyazaki	Aminata (CUN/OSPUN)	Fatimetou,Mint Den, Abdelhay				
Infrastructure		Kazumi Matsuda, drainage expert	Tijani, (CUN/OSPUN)	Mint Den, Abdelhay				
Public Facilities		Sawaan Maysoun	Tijani, (CUN/OSPUN)	Fatimetou, Mint Den, Sellem				
Environment		Hirohumi Miyoshi, Simon Nancy	Malick (DCIG)	Fatimetou, Abdelhay, Tijani				
GIS Analysis		Daikichi Nakajima, Antoine Saurat	Malick (DCIG)	Abdelhay, Tijani, Sellem				
Capacity Development / Institution		Makine Kusano, Kazunobu Kamimura	Fatimetou	All members of Taskforce				

Public Consultation Unit (SEA)	Fatimetou, Sellem, Aminata, Cheikh Bahayde (CUN)
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Public Relations Unit	Antoine Saurat, Simon Nancy	Fatimetou, Sellem, Aminata, Cheikh Bahayde (CUN)	
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Source: JICA Study Team

The members from the JICA Study Team are assigned tentatively. Mr. Kusano is assigned for both Land Use/GIS and Implementation. When it is necessary, the team members may take part in the activities of other technical working groups. The members from the C/P are being selected.

(4) Capacity Assessment

The capacity assessment will be conducted twice during the project. The purpose of the capacity assessment is to identify technical capacities of individuals and management/implementation capacity of organizational units. The capacity assessment will be conducted using a form with an interviewer from the JICA Study Team members. If there is a capacity of the C/P is found to be sufficient, the work may be delegated to the C/P so that the capacity assessment work may be conducted in the future after this project.

As one of the JST members accompanied by the C/P member shall visit each agency to conduct an informal interview as they collect basic personnel information, organizational structure, position descriptions and organizational functional description. The results of the basic data and informal interview will be reflected to preparation of the structured interview survey form. Especially, vacancies in an organizational structure shall be identified not to overestimate the functionality of to the organizational units.

- General information (organization, number of officials/experts, annual budget, annual programs, projects handled by organization, etc) of MHUAT (DU, DCU, DH, DCIG, DAT, DPNRLRQP, ADU, ISKAN), CUN & 9 Communes, CUN-OSPUN, MEF (DRS)
- Job descriptions for key offices and officers (DU, DCU, OSPUN) in conjunction with urban planning and management
- Qualification system for urban planning in Mauritania (accreditation, association, etc)

The informal interviews would be extended to the members from the institutes of higher learning and professional associations such as architects, planners, engineers or surveyor.

1) Initial Capacity Assessment

The initial capacity assessment will be conducted. Following items are included in the initial capacity assessment:

- Observation of present capacity briefly
- Setting expected target of capacities for urban planning and management
- Preparation of a questionnaire form for the structured interview survey
- Interview with questionnaire for individual and organization assessment
- Evaluation of present capacity of organization and officers
- Target: Primary Group (MHUAT-DU, DCU, ADU, ISKAN), CUN-OSPUN
- Collection, data-input, data analysis and evaluation

2) Final Capacity Assessment

The final capacity assessment will be conducted using the same structured interview form in principle. The target shall the same organizational units what were targeted during the initial capacity assessment.

- Interview with questionnaire at the ending stage of the project
- Collection, data-input, data analysis and evaluation

(5) Role of C/P:

The roles of C/P are:

- Assisting a coordinator to support capacity assessment activities--arranging appointment and meetings. Organizing the results of structured interview surveys.
- Keeping attendance and meeting records;
- Attending all the assigned capacity development activities: OJT-Cooperative Work: Lecture: Meetings/discussions; Case studies by Training Course in Japan.
- Assisting evaluation activities by distributing, collecting and analyzing the evaluation forms after the lecture type capacity development activities.

(6) Taskforce

The purposes of establishing the taskforce given the overall objectives states are to enhance planning capacity of MHUAT-DU and CUN-OSPUN in formulating SDAU & draft PLU in Nouakchott City, following purposes corresponding to the objectives were proposed:

- I-1 The Taskforce members can collect and organize all the data and information for planning;
- I-2 The Taskforce members understand basic methods and contents of the project;
- I-3 The Taskforce members understand the procedures of SDAU and PLU preparation.

To enhance the coordination capacity for SDAU and PLU administration, following purposes are proposed:

- II-1 The Taskforce members can administer meetings in a timely manner with appropriate participants and stakeholders in all the process of SDAU and PLU formulation;
- II-2 The Taskforce members can record all the contents of all the meetings;
- II-3 The Taskforce members can explain contents of meetings and outputs to the members of other agencies and citizens;

To enhance capacities for implementing SDAU and PLU, following purposes are proposed:

III-1 The members of the Taskforce can research and analyze current implementation operations.

The activities to achieve the purposes were:

- I-1 The Taskforce members can collect and organize all the data and information for planning:
 - I-1-1 Communicate with the data and information holders to arrange meetings or permission to receive the data and information;
 - I-1-2 Organize and store the data and information in appropriate media and locations.
- I-2 The Taskforce members understand basic methods and contents of the project:
 - I-2-1 Attend briefing meetings of activities conducted by the JST members;
 - I-2-2 Explain the activities and report the contents of activities to the secondary group members;
 - I-2-3 Attend OJT sessions conducted by the JST members.
- I-3 The Taskforce members understand the procedures of SDAU and PLU preparation:
 - I-2-1 Attend lecture sessions provided by the JST members;
 - I-2-2 Attend the Guidelines preparation meetings.
- II-1 The Taskforce members can administer meetings in a timely manner with appropriate participants and stakeholders in all the process of SDAU and PLU:
 - II-1-1 Select participants to meetings with consultation with superiors and the JST members;
 - II-1-2 Schedule and organize meetings with consultation with superiors and the JST members.
- II-2 The Taskforce members can record all the contents and participants of all the meetings:

- II-2-1 Use the attendance template to record all the attendance in paper media signed by the participants; use an Excel template record the attendance;
- II-2-2 Prepare a meeting records describing the contents of the meeting;
- II-2-3 Make observation of the meetings and write comments to the meeting records prepared by the JST members.
- II-3 The Taskforce members can explain contents of meetings and outputs to the members of other agencies and citizens:
 - II-3-1 Facilitate meetings to identify issues and building consensus among the members of the government and other stakeholders;
 - II-3-2 Prepare presentation materials and present the contents of activities to the members of other agencies and citizens as the Taskforce members consult the contents with the superiors and the JST members.
- III-1 The members of the Taskforce can research and analyze current implementation operations.
 - III-1-1 Support data collection, analysis and improvement proposal activities conducted by the JST members.

(7) **Planned Activities**

At the beginning of the Project, 134 activities were planned.

English	Consultation - Coordination	CP Presentation	CP Site Visit	Facilitation	Lecture	Lecture (Briefing for Data and Info. Collection)	OJT-Cooperative Work	Total
Preparation of Capacity Development Program						1	1	2
Review of Existing SDAU		2				1		3
Selection of PLU target commune	2					1		3
Preparation of Geo-Information						1	3	4
Collection and Analyses of Information through Visiting Related Agencies						9	9	18
Site Investigation on Problems, condition of Infrastructure, etc.			1					1
Conducting of Social Survey						1	2	3
Conduction of Traffic Survey					1		1	2
Integrated Analyses of Existing Conditions, and Development Issues					1			1
Establishment of Socioeconomic Framework	2	1			1			4
Establishment of Future Vision of Nouakchott	1	1			1			3
Establishment of General Directions	1	1				1		3
Planning of Development Strategies (as Policy Packages)		1				1		2
Generation of Alternatives for Land Use Plan	1	1				1	1	4
Land Use Plan Preparation	1	1				1	1	4
Transport Network Planning	2					1		3
Planning of Socio-Economic Infrastructure Development Policies	1	1				1		3
Establishment of SDAU Maps		1					4	5
Collection and Analyses of Information on the Target Commune						8	8	16
Preparation of Alternative Land Use Plans	1	1				1	2	5
Holding the 1st Public Meeting on PLU in the Target Commune						1	1	2
Establishment of Land Use Plan	1	1				1	1	4
Road Network Planning	1	1				1	1	4
Planning of Infrastructure Development Policies						1		1
Preparation of the PLU Guidelines	2	1				1		4
Obtaining of Agreement from Related Agencies	1					1		2
Assistance for Formulation of Official Documents for SDAU and PLU						1		1
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The Environmental Strategy Study Cycle 1				9				9
The Environmental Strategy Study Cycle 2				9				9
The Environmental Strategy Study Cycle 3				9				9
Total	17	14	1	27	4	36	35	134

2.2.2 Results

(1) Result of Capacity Assessment Questionnaire Survey

At the beginning of the project, in December 2016, a capacity assessment questionnaire survey was conducted to the members of DGHU and DEPAEC. The result showed that there was no person who had involved in the process of the SDAU of 2003. Planning capacities of comprehensive nature did not exist both in DGHU and DEPAED. Most members in DGHU had received GIS training, and it was found that there was sufficient capacity to manage land related information using GIS.

In April 2017, the final capacity assessment was conducted using the same questionnaire form. The gaps are the needs minus capacities. The negative scores at the "Improve" are the difference between the final gaps and the initial gaps. The general tendencies of improvement are seen through the OJT works during the project; however, other than those who were selected as the Taskforce members, the effects of the OJT work during the project was limited.

No	Itom	Description		Initial			Final		Improvo
NO	llem	Description	Needs	Capacity	Gap	Needs	Capacity	Gap	Improve
2-3	Inception Work	Preparation of Capacity Development Program	3.33	2.61	0.73	4.20	3.10	1.10	0.37
2-9	Inception Work	Preparation of Geo-Information	4.15	3.54	0.62	4.10	3.22	0.88	0.26
3-2	Analyses of Existing Conditions	Site Investigation on Problems, condition of Infrastructure, etc.	4.24	3.64	0.60	3.70	4.10	-0.40	-1.00
3-3	Analyses of Existing Conditions	Conducting of Social Survey	3.62	3.35	0.27	3.50	4.10	-0.60	-0.87
3-4	Analyses of Existing Conditions	Conduction of Traffic Survey	3.42	2.70	0.71	3.89	3.56	0.33	-0.38
3-7	Analyses of Existing Conditions	Integrated Analyses of Existing Conditions, and Development Issues	3.50	2.48	1.02	4.40	2.60	1.80	0.78
4-1	Conception Work	Establishment of Socioeconomic Framework	3.52	2.65	0.87	4.20	2.70	1.50	0.63
4-2	Conception Work	Establishment of Future Vision of Nouakchott	3.84	2.93	0.91	4.20	3.20	1.00	0.09
4-3	Conception Wor¥fk	Establishment of General Directions	3.84	2.67	1.17	3.50	2.70	0.80	-0.37
4-4	Conception Work	Planning of Development Strategies (as Policy Packages)	3.48	2.89	0.59	3.30	2.60	0.70	0.11
5-1	Formulation of SDAU	Generation of Alternatives for Land Use Plan	3.84	2.50	1.34	4.20	2.50	1.70	0.36
5-3	Formulation of SDAU	Land Use Plan Preparation	4.16	3.00	1.16	3.50	2.60	0.90	-0.26
5-4	Formulation of SDAU	Transport Network Planning	4.17	2.88	1.28	3.30	2.10	1.20	-0.08
5-5	Formulation of SDAU	Planning of Socio-Economic Infrastructure Development Policies	4.17	2.50	1.67	3.70	2.20	1.50	-0.17
5-6	Formulation of SDAU	Establishment of SDAU Maps	4.04	2.62	1.43	3.67	2.56	1.11	-0.32
6-1	Formulation of PLU	Collection and Analyses of Information on the Target Commune	4.13	3.00	1.13	3.60	2.60	1.00	-0.13

 Table 2.12: Capacity Development Meetings by Type

6-2	Formulation of PLU	Preparation of Alternative Land Use Plans	3.83	2.58	1.25	3.50	2.40	1.10	-0.15
6-4	Formulation of PLU	Establishment of Land Use Plan	4.04	2.71	1.33	3.20	2.30	0.90	-0.43
6-5	Formulation of PLU	Road Network Planning	4.21	2.58	1.63	3.20	2.40	0.80	-0.82
6-9	Formulation of PLU	Preparation of the PLU Guidelines	4.08	2.54	1.54	3.30	2.00	1.30	-0.24

(2) Results of overseas training in Japan

1) Objectives of the Training

The participants will learn urban planning systems and urban development projects in Japan as reference to an image of Nouakchott City. To do so, the participants visit institutions and sites. Especially, the participants learn possible application to the Nouakchott situations through seeing development and land use control cases.

2) Themes

Theme 1: Institutional Arrangement of Urban Planning in Japan

Master plan, zoning; district planning and others as the City Planning System in Japan and institutional arrangement for projects and programs will be introduced. The participants are expected to learn the cases as fundamental knowledge to be applied to the situations in Nouakchott.

- Comparison of the Japanese City Planning System and Mauritanian Planning System
- Case Studies and Site Visits

Theme 2: Sustainable Urban Development and Management

There are government policies for sustainable urban development and management in Japan:

- Future Urban Environment (Cabinet Office); and
- Promotion of Low Carbon Emission, Compact City, Location Rationalization Plan Support (the Ministry of Land, Infrastructure, Transport and Tourism).

The participants will learn these policies and practical application of the policies. For the plan preparation of the Nouakchott City, the appropriate topics would be:

Integration of various urban environmental elements; and formulation of a public transportation network.

Theme 3: Urban Rejuvenation and Urban Functionalities

The area of the old airport has its potential of development. Already developed residential areas without necessary infrastructure may be a challenge for the City of Nouakchott. In Japan, there are cases of large-scale development of an area used for large scale facilities such as former train station sites, and other redevelopment projects to strengthen urban functions in Japan. By learning institutional arrangement and the cases as the participants visit the sites, they will be able to envision development activities for the City of Nouakchott. The topics would be:

- Development of an abandoned site, such as former train stations or depot, of large facilities;
- Land Readjustment and Urban Redevelopment Projects for improving residential environment

• Higher density development projects

The training in Japan was conducted from December 4, 2017, to December 13, 2017. Nine persons participated shown in Table 2.13. The purposes of the training were 1) to understand Japanese urban planning and development systems, and 2) to examine possible application of the Japanese urban planning and development systems. Based on the purposes, the training program indicated as Table 2.14 was prepared and implemented

Name	Title	Direction
Mr. Wele Abdoulay	Director General, DGHU Project Director	DGHU
Ms. Ennahoui Fatimetou Meimouna	DUT Urban planner	DGHU
Ms. Mint den Mohameden	DUT Civil Engineer	DGHU
Mr. Malick Vall Mahmoud Messa	DCIG Division Director	DGHU
Mr. Mohamed Abd El Haye Cheikh	GIS Specialist	ADU
Mr. Saleck Moulaye Ahmed Cherif	Urban Planner, Director of DEPAEC/OSPUN	DEPAEC/OSPUN
Mr. Cheikh Tijani Ould Cheikh Mohamedou	OSPUN Civil Engineer	CUN/OSPUN
Ms. Fatimetou Boukreiss	OSPUN Urban Planner	CUN/OSPUN
Mr. Dramane Souleyman	Minister Cabinet Technical Advisor, General Secretary	MET

Those Prior I all the parties of o resound in an and the	Table 2.13:	Participants	of Overseas	Training	in Japan
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Source: JICA Study Team

The participants understood the meaning of the concept of the compact city; significance of securing mobility of elders and handicapper persons is one of the major subjects they have to learn through discussion on bus public transport in Japan. The administration system of urban planning and development, especially on land readjustment and urban renewal, was another subject they have learned. Capacity development at the organizational level and human resources were raised to be enhanced in Mauritania during the reflection meeting. As they have experience with the GIS systems, they became more interested in the utilization of such system in Nouakchott.

The issues in Nouakchott raised by the participants are 1) lack of regulations and administrative procedures; 2) urban management; 3) land information management; 4) urban information management; 5) decentralization of government, and 6) simplification of the Japanese system to apply them in Mauritania. All the participants attended all the planned lectures and mobile workshops.

Date	Start Time	End Time	Lecture/Workshop Title
2017/12/4	10:00	12:00	The orientation of formation / Explanation of rules
2017/12/4	12: 50	13:20	The orientation of the program
2017/12/4	14:00	14: 30	A visit of courtesy in the JICA
2017/12/4	15:30	17:00	Initiatives for the environment of the ministry of the territory, the infrastructures, the transportation and the Tourism
2017/12/5	10:00	11:30	Presentation of the project of urban development of Japan
2017/12/5	13:30	14: 15	The relation between the capital and the townships, and feature
2017/12/5	14:30	16:00	Urban development and statutory scheduling process for GMT
2017/12/5	16:15	17:30	Architectural administration of the city
2017/12/6	9:30	11:00	Promotion of the management of zones in the cities
2017/12/6	13:00	14: 15	Urban development in Tokyo (Seen of the urban readjustment project)

 Table 2.14: Program of the Overseas Training in Japan

2017/12/6	14:20	15:30	Zone of Shiodome
2017/12/6	16:30	17:30	A case of urban development: public-and-private partnership for town planning at Shiodome
2017/12/7	9: 30	11:00	History of the bus (system of operation of public buses and efforts of revitalization)
2017/12/7	13:00	13: 45	Politics of transportation in Tokyo
2017/12/7	13: 55	14: 50	Presentation of the Transportation Toei 2016
2017/12/8	10:00	12:00	The system of integrated geographical information (SIG)
2017/12/8	14:00	15:30	The SIG activities of Yokohama
2017/12/9	10:00	10:40	A trial tour of a bus operated by Toei
2017/12/9	10:40	15:00	A visit to urban facilities (a market and park)
2017/12/11	10:00	12:00	The urban scheduling of the Kashiwa-no-ha campus through the partnership public-private- university I
2017/12/11	13:00	15:00	The urban scheduling of the Kashiwa-no-ha campus through the partnership public-private- university II
2017/12/12	10:00	11:30	Makuhari" New Urban Center"
2017/12/12	13:00	14: 20	Seen of the plan of the district of the new center city of Makuhari
2017/12/12	14:30	17:00	A visit to the site in the Makuhari new center city
2017/12/13	9: 30	12:30	Preparation of the Presentation on the Results of the Training in Japan
2017/12/13	13:30	16: 30	Reporting the Results of the Training in Japan
2017/12/13	16:45	17: 30	Evaluation

(3) Results from quizz practices

Quizzes were given to acquire objective indicator of comprehension of the project. The multiplechoice quizzes are the fill-in-the-blank type--all the questions were extracted from exact sentences from the reports and Urbanization Code 2008. Since Mr. Cheikh Tijani Ould Cheikh Mohamedou and Mr. Malick Vall Mahmoud Messa were occupied with other works, they did not take the quizzes in the JST office. They have taken the question sheets back to their offices and aswered the sheets. Others were requested to take the quizzes without looking at the Progress and Interim Reports. Other taskforce members did not take the quizzes. The scores are relatively low, but the experience of taking the quizzes would be a call to review the reports and the law as they are instructed to do the same to others to proliferate the learning the contents of the project which means to enhance planning capacities to others and themselves.

Туре	Name	Percentage Correct
	Mr. Mohamed Abd El Haye Cheikh	50.0%
	Ms. Ennahoui Fatimetou Meimouna	60.9%
Progress Report	Mr. Malick Vall Mahmoud Messa	50.0%
	Ms. Mint den Mohameden	41.3%
	Mr. Cheikh Tijani Ould Cheikh Mohamedou	89.1%
Progress Report Average	58.3%	
	Ms. Ennahoui Fatimetou Meimouna	56.1%
Interim Report	Ms. Mint den Mohameden	32.6%
	Mr. Cheikh Tijani Ould Cheikh Mohamedou	69.6%
Interim Report Average	52.8%	
	Ms. Ennahoui Fatimetou Meimouna	47.8%
Urbanization Code 2008	Ms. Mint den Mohameden	35.9%
	Mr. Cheikh Tijani Ould Cheikh Mohamedou	84.6%
Urbanization Code 2008 Average	56.1%	
Overall		56.2%

Table 2.15: Quiz Scores

(4) Overall Achievement Capacity Development Activities During the Project

The taskforce members were selected and the first phase of the data collection was conducted with an assistance from the JST members. Mr. Dramane Souleyman, from MET, was added to enhance transportation part of planning.

The public consultation unit conducted public consultation at all the communes three times. The taskforce members facilitated consultation meetings and workshops at the communes. The stakeholders in communes at in the meetings actively involved in the process of SDAU and PLU and contributed to the plan formulation identifying issues and general development directions of their communities.

Technical working group meetings were held in conjunction with the consultation meetings to confirm policy directions especially during formulation of socio-economic framework and water demand projection.

Capacity development on technical methods by lecture was difficult especially on transportation since educational background and work experiences were different. The goal of capacity development was set not to the level of understating technical methods, but at the level of conceptual understanding of the outputs of the JST members.

DGHIU and DEPAEC-OSPUN were the major targets of capacity development. As there is one taskforce member from ADU, the contents of the capacity development was conveyed to ADU through the taskforce member. For ISKAN and other stakeholders of planning in the public sector, consultation meetings, seminars and JCC meetings were the opportunities of capacity development as planned.

During the project, a couple of members were on leaves. Except for those who were on the leaves, the Taskforce counterpart members took part in technical meetings on land use and transportation. Among seven members, Ms. Fatimetou Ennahoui, MHUAT-DGHU, and Mr. Cheikh Tajani Ould Cheikh Mohameden showed enthusiastic involvement to the project. Mr. AbduleHay from ADU. has been involved, and his attitude toward learning new matters was respected, also. Other members were preoccupied with their daily tasks and level of understanding of the project, SDAU and PLU, have not achieved to the expected level. Ms. Fatimetou, DGHU and Mr. Tijani in CUN-DEPAEC are the persons who will lead preparing and revising SDAU and PLU in the future; we expect that they will take leadership in human resources development.

The total number of activities conducted reached 168. The number of activities exceeded the planned activities shown in Table 2.16. On the other hand, the number of OJT work for transportation indicated in Table 2.17 was small because there was no counterpart personnel assigned for transportation at the beginning of the Project.

Year	Month	Mm	No
2016	March	Capacity Development	1
2017	January	ary Environment	
	February	Environment	6
	March	Capacity Development	3
		Infrastructure	5
		Land Use SDAU	1
		Public Consultation Unit	6

 Table 2.16: Program Activities on Capacity Development during the Project

		Public Facilities	26
		Social Survey, Socio-Economic	1
		Environment	5
	April	Land Use PLU	7
		Public Consultation Unit	3
	Mari	Land Use PLU	3
	May	Social Survey, Socio-Economic	6
		Capacity Development	16
	Testes	Infrastructure	1
	July	Public Facilities	15
		Social Survey, Socio-Economic	1
		Land Use PLU	1
	August	Social Survey, Socio-Economic	3
	G (1	Land Use PLU	4
	September	Social Survey, Socio-Economic	2
	October	Land Use SDAU	5
	November	Land Use SDAU	4
	December	Transportation	2
		Land Use SDAU	2
2018	January	Public Consultation Unit	9
		Public Facilities	6
		Capacity Development	13
	March	Land Use PLU	1
		Transportation	4
	April	Capacity Development	2
Total			168

CategoryType of ActivityNoCapacity DevelopmentConsultation28Capacity DevelopmentLecture2OJT5EnvironmentConsultation2Lecture2OJT11InfrastructureOJT4Technical Working Group Meeting1Land Use PLUConsultation15Land Use SDAUConsultation11Public Consultation UnitCMC18Public FacilitiesLecture1	-	• • •	
Capacity DevelopmentConsultation28Capacity DevelopmentLecture2OJT5OJT5EnvironmentLecture2OJT11InfrastructureOJT11InfrastructureOJT4Technical Working Group Meeting1Land Use PLUConsultation15Land Use SDAUConsultation11Public ConsultationCMC18Public FacilitiesLecture1	Category	Type of Activity	No
Capacity DevelopmentLecture2OJT5OJT5EnvironmentLecture2OJT11InfrastructureOJT11InfrastructureOJT4Technical Working Group Meeting1Land Use PLUConsultation15Land Use SDAUConsultation11Public Consultation11LecturePublic ConsultationCMC18Dublia EasilitiesLecture1		Consultation	28
OJT5EnvironmentConsultation2EnvironmentLecture2OJT11InfrastructureOJT4Technical Working Group Meeting1Land Use PLUConsultation15Land Use SDAUConsultation11Public Consultation11UnitCMC18Public FacilitiesLecture1	Capacity Development	Lecture	2
EnvironmentConsultation2EnvironmentLecture2OJT11InfrastructureLecture1OJT4Technical Working Group Meeting1Land Use PLUConsultation15Land Use SDAUConsultation11Land Use SDAUConsultation11Public Consultation11LectureUnitCMC18Public FacilitiesLecture1		OJT	5
EnvironmentLecture2OJT11InfrastructureLectureInfrastructureOJT4Technical Working Group MeetingLand Use PLUConsultationLand Use SDAUConsultationPublic Consultation11Lecture1Public ConsultationCMCUnitConsultationLand Use SDAUConsultationLecture1Lecture1Lecture1Lecture1Lecture1Lecture1Lecture1Lecture1		Consultation	2
OJT11InfrastructureLecture1OJT4Technical Working Group Meeting1Land Use PLUConsultation15Land Use SDAUConsultation11Land Use SDAUConsultation11Public Consultation UnitCMC18Public FacilitiesLecture1	Environment	Lecture	2
InfrastructureLecture1OJT4OJT4Technical Working Group Meeting1Land Use PLUConsultation15Lecture1Land Use SDAUConsultation11Public Consultation11Lecture1Public Consultation18OMC18Public Facilities1		OJT	11
InfrastructureOJT4Technical Working Group Meeting1Land Use PLUConsultation15Lecture1Land Use SDAUConsultation11Public Consultation UnitCMC18Public FacilitiesLecture1		Lecture	1
Technical Working Group Meeting1Land Use PLUConsultation15Lecture1Land Use SDAUConsultation11Public Consultation UnitCMC18Public FacilitiesLecture1	Infrastructure	OJT	4
Land Use PLUConsultation15Lecture1Land Use SDAUConsultation11Lecture1Public Consultation UnitCMC18Public FacilitiesLecture1		Technical Working Group Meeting	1
Land Use FLO Lecture 1 Land Use SDAU Consultation 11 Public Consultation Lecture 1 Public Consultation CMC 18 Consultation 41 Public Facilities Lecture	Lond Lize DI Li	Consultation	15
Land Use SDAU Consultation 11 Public Consultation Unit CMC 18 Consultation 41 Public Facilities Leasture		Lecture	1
Land Use SDAC Lecture 1 Public Consultation Unit CMC 18 Public Facilities Lecture 1	Land Use SDAU	Consultation	11
Public Consultation Unit CMC 18 Consultation 41 Public Excellition 1	Land Use SDAU	Lecture	1
Consultation 41 Dublic Excilition 1	Public Consultation Unit	СМС	18
Public Excilition Lecture 1		Consultation	41
rubic racinites Lecture I	Public Facilities	Lecture	1
OJT 5		OJT	5

Table 2.17:	Capacity	Develop	oment M	eetings	by T	vpe
					~ ,	

	Consultation	10
Cooid Current Cooid	Lecture	1
Economic	OJT	1
	Technical Working Group Meeting	1
Turnen detien	Consultation	5
Transportation	OJT	1
		168

Source: JICA Study Team

2.3 Capacity Development Planning Approach

The capacity plan is prepared based on the general direction of governance and the limiting factors using the results of the capacity assessment as gauging receptive capacities of the target organizations.

2.3.1 Basic directions of governance

Generally, the central government governs national matters of significance. It plans and implements national development policies. Local governments govern local matters. A national plan is prepared by the central government, local plans shall be prepared by local governments. National projects shall be conducted by the central government, and local projects shall be conducted by the local government draft laws and regulations and local governments prepare local plans and implement the local plans. This shall be the principle of governance.

As discussed in the challenges, a compact urban form as enhancing socio-economy is a challenge. Urban control administration will have to be enhanced, also. The capacity development plan in this section focuses what to be done to encounter the challenges as enhancing institutional capacities mainly for MHUAT-DGHU and DEPAEC-OSPUN. Those challenges can be operationally summarized in enhancing capacities of technical and administrative capacities of urban planning and urban control.

2.3.2 Limiting external factors

Observable issues of urban planning and development control have been stated as challenges in 2.1, but there are underlying issues that cannot be observed as direct phenomena. Underlying conditions will have to be satisfied to tackle the identified issues of development and control.

(1) Financial limitation

When there is an abundance of resources, simple solutions to urban control problems are to increase the number of parties to patrol. Allocating human resources and equipment will become a financial burden to the government. Capacity development planning needs to consider the limitation of financial resources to become practical.

(2) Human resources

Human resource development needs to be discussed comprehensively together with members of universities and vocational schools for planning, development, and protection for the country. It is unrealistic for the government to provide all the basic education and training required for planning and development. Universities and vocational schools need to provide fundamental inter-disciplinary education on public administration and professional education on statistics, economics, engineering, and surveying. Environmental planning is another significant area of discipline to be included in the urban development. Political economy is a significant discipline to be learned for policymakers for the capital city of Nouakchott. Within the government sector, there shall be training programs. The training programs will not be the ones that are to be taught at universities and vocational school. The contents of the training are directly related to laws, regulation and administration procedures as the public servants are to implemented policies decided by policymakers or elected officials. OJT can be conducted and some seminar budget may be available, but training programs with sufficient budget cannot be decided in DGHU or DEPAEC alone.

There shall be technocrats who make policy advice to those elected officials; weaknesses in policy making and writing regulations have been observed. In other words, there shall be policy-making personnel who can think of strategies of urban development and management. Strategic thinking and policy design are hard to come by. Ones need to study cases of other cities in the world to think of a possible application to Nouakchott.

Allocation and transfer of personnel shall be flexible so that scarce human resources will be utilized to the maximum extent. A human resource database with records of educational backgrounds, skills and training records will have to be needed. It is a general matter of human resources management in the government, human resource management section of the government will have to be involved.

2.3.3 Capacity development planning approach--receptive capacity

The capacity assessment using the questionnaire was conducted at the beginning of the Project to understand the academic background, computer skills and understandings of SDAU and PLU. Other than the results from the questionnaire survey, JST members learned capacities of the Taskforce members through discussions in the consultation meetings and questions raised during the lectures in Nouakchott and even in Japan. The JST members have conducted an individual interview to the members in DGUS and DEPAEC-OSPUN. As visiting their offices, facilities, and sites, the JIST members observed their activities. All these activities are the foundations of capacity assessment not only the questionnaire surveys conducted at the beginning and end of the Project. The results of the comprehension quizzes on the Progress and Interims Reports and the Urbanization Code 2008 were other indicators to assess their level of comprehension. All those factors are sources of information to make a tangible capacity development plan.

Interviews with the members of the counterparts were conducted as questions were focused on immediate issues. In this process, their needs were heard and requirements as items of capacity development actions were identified.

- An issue of "overlapping and duplication of functions" was raised. Public facilities have been developed by two or more organizational units, and subdivision development projects have been conducted by two or more organizational units. While there are overlapping and duplicated functions of administration, there are voids of urban control in ADU and ISKAN developed areas.
- Resettlement and Social Welfare Unit of ADU, at the beginning of the project, was informed to have 174 persons. As the number of resettlement projects is coming to the end, the persons in CROMOS need to be transferred.
- MHUAT-DGHU has three urban planners. The three urban planners who actually do plan subdivision plans are shaping the overall urban grid patterns in Nouakchott. Since there are no standardized documents for planning, they have been using a template of the subdivision to plan a subdivision development.
- The urban control work is conducted mainly by MHUAT-DGHU with only three vehicles and seven full-time employees. The capacity is by far too limited to cover the entire city area.
- The urban control work on site was a simple method to identify possession of the permit document. The records are kept in a word processor format. The results are not shared with other government agencies.
- There is no record, file or drawings of building permits kept in DGHU; development control activities for a dimensional violation such as floor areas cannot be possible.

- There is similar urban control function in CUN-Urban Control Unit. Information sharing is a key to more efficient implementation of urban control.
- There is no person who could draft a legal document; no regulation has been drafted for 10 years since the enactment of the Urbanization Code of 2008.
- Décret N 0109-2017 states functions of DGHU. The works associated with the functions in the décret are enthusiastic. But since it has limited human and financial capacities, their resources have been focused on subdivision development projects and urban control work with land-related conflict coordination.
- Overall, under the limitation of financial and human resources, directors are interested in ICT solutions for more efficient urban management.
- The number of persons in DEPAEC was substantially reduced unlike the following figures reported at the beginning of the Study. There are five or six full-time persons in DEPAEC and only two persons in OSPUN.

2.4 Capacity Development Plan

2.4.1 Target organizations

As discussed in the challenges, a compact urban form as enhancing socio-economy is a challenge. Urban control administration will have to be enhanced, also. The capacity development plan in this section focuses what to be done to encounter the challenges as enhancing institutional capacities mainly for MHUAT-DGHU and DEPAEC-OSPUN. Those challenges are operationally summarized to enhance capacities of technical and administrative capacities of urban planning and urban control.

An organization restructuring DGHU was taking place in 2017. The major revision of DGHU was the merge of DU and DUC. Under the DGHU, there are two working directions: DUT and DHPI. Currently, the organizational structure has not been rigid; without the functional differentiation of DUT and DHPI, the organization has been functioning as DGHU. Current organizational functions are to implement subdivision projects and urban control in the Nouakchott city area other than the areas developed by ADU and ISKAN.

The current Urbanization Code 2008 states that the ministry in charge is the entity of preparing SDAU and PLU. It is interpreted that MHUAT-DGHU is the planning body. For the City of Nouakchott, the capital city of Mauritania is an area of national significance; therefore, spatial development policies, SDAU, shall be drafted and maintained by DGHU and coordinated among the members of the Council of Ministries. PLU has more local nature; therefore, the function of DGHU shall be mainly coordination overlooking consistencies among PLUs to be prepared in different communes in Nouakchott in the future.

DGHU continues to conduct urban control work as it improves operations. The work shall cover the entire city area including areas developed by other government or private entities. As the current urban control work will be improved, the work shall be gradually delegated to regional and local governments. The role of DGHU will be shifted more towards overlooking urban control activities conducted by local and regional governments.

Under the budgetary constraints of DGHU, "hire more people and do the work" is not practical. Rather, the organizational development strategy is to think of efficiency and effectiveness by improving current operations without expanding DGHU. For planning, the general direction of organizational development is not to do all the planning work by themselves. Outsourcing is thought of as an option. Management roles in the process and outcomes will be more important.

A role of CUN-DEPAEC in planning will become significant in coordinating plans and development activities as planning and development data and information are collected and organized in OSPUN. It shall coordinate and resolve inter-commune issues on mobility that may have inter-commune issues.

As decentralization of government will be expected, DEPAEC shall function as a technical advisor for PLU preparation as it coordinates the work with DGHU. DEPAEC will have to assess capacities of the communes so that functions of urban planning and management will be delegated to the communes according to their capacities.

OSPUN's major function is spatial data and information management for DSE, Division of Study Service. Division of Urban Management Service and Division of Urban Mobility Service are under DEPAEC. The target organizational unit, therefore, is DEPAEC with OSPUN as data and information manager and provider.

2.4.2 Objectives and target years

The objectives of the capacity development plan are for DGHU and DEPAEC-OSPUN to:

- (1) Enhance planning capacities; and
- (2) Urban control capacities.

In this capacity development plan, the immediate action target means 2020; the short-term means the target year of 2025; the mid-term means the target year of 2030.

2.4.3 Strategies

Basic strategies to tackle issues on urban planning and development control in Nouakchott have been designed. The following table shows relations among policies and issues:

	1)	Clarify Roles in Administration
The strategy I: No Void, No Overlap	2)	Design Regulations with Standards and Procedures
	3)	Strengthen Urban Control Tools (MHUAT)
Strategy II: Make Planning Regular	1)	SDAU Cycle
Activities	2)	PLU Cycle
	1)	SDAU
Strategy III: Share Data and Information and Coordinate	2)	PLU
	3)	Urban Control

Table 2.18: Strategies of Capacity Development Plan and the Identified Issues

Source: JICA Study Team

(1) The strategy I: No Void, No Overlap

"No Void, No Overlap" means that in urban development and development control: 1) do not leave any unplanned or uncontrol areas in development and development control; 2) do not conduct same or similar activities in the same area by different government agencies.



Source: JICA Study Team

Figure 2.10: Strategy I: No void, No Overlap

I-1 Clarify Roles in Development Administration

Duplication of administrative functions has been reported. If subdivision projects and public facility development projects are managed, there will not be a substantial problem. When the administration costs are to be considered, it will be preferred that one function of administration shall be managed by one entity of government.

I-2 Design Regulations on Development and Urban Control

Regulations and guidelines stipulated in the Urbanization Code 2008 shall be prepared so that all the entities involved in planning, development and urban control will be able to comprehend details of actions required. The PLU guideines were drafted by JST. Other regulations or guidelines are to be prepared are: 1) RGU; 2) ZAC (Zone d'Aménagement Concertée); 3) Subdivision (Lottismment); 4) Urban Redevelopment (Rénovation Urbaine); 5) Land Readjustment (Remembrement Urbain); 6) PAD (Le Plan d'aménagement de détail-Detailed Plan). Since a revision of the Urbanization Code of 2008 has been discussed, the elements for regulation preparation need to be discussed to be consistent with the revised Urbanization Code.

I-3 Strengthen Urban Control Tools

For the permit processing work, the system is already intact. The inspection work has been conducted. But the administration process is an analog process. To make the procedure more efficient, utilization of information and communication technologies are called for. The cost-effectiveness of introducing information and communication technologies will have to be examined to reduce total costs.

(2) Strategy II: Make Planning Regular Activities

Planning is not a single activity to be done once in ten years or so. The plans and activities associated with the plans need to be monitored and updated so that the administrative procedures associated with SDAU and PLUs will be settled in the organizations of DGHU and DEPAEC.



Source: JICA Study Team

Figure 2.11: Planning Cycle for Strategy II

II-1) SDAU-Cycle

SDAU has a planning period of 10 to 20 years. The SDAU prepared has the target year of 2040. During the planning period, the SDAU needs to be reviewed and revised. DGHU needs to monitor SDAU so that activities of different sectors will be coordinated according to the general development direction set in SDAU. DGHU shall monitor activities of other sectors as updating SDAU periodically as socio-economic and transportation data will have been updated. One minor revision in 2024 and major revision in 2029 are recommended when those socio-economic and transportation survey data will be available. Other updates in infrastructure and protection areas will have to be incorporated to the revised SDAU. The revision process continues as a cycle.

II-2) PLU-Cycle

For PLU a rotation of plan preparation is proposed--a review of a PLU shall be scheduled in a way that no two communes or more will not be reviewed in the same year. The shifting the period of preparation shall make the planning work continual activities with a consistent annual budget.

A conceptual cyclical schedule is shown in the following chart. The numbers from 1 to 9 are the communes in Nouakchott. The order of plan preparation shall be discussed among communes. The communes that are centrally located with higher density shall be prioritized.

		2018			2019		2020		2021		2022			2023		2024			4	2025										
	1	2	3 4	- 1	2	3	4	1	2	3	4	1	2	3	1	1 2	2	3 4	4	1 2	2	3 4	1 1	. 2	3	4	1	2	3	4
CUN-DEPAEC, OSPUN																														
Socio-eco (data update)																			(Cen	su	S								
Spatial (inter-govt coord)																														
Situational Analysis and Goals			1	2		3		4		5		6		7	8	3	1	9				1	2	2	3		4		5	
P.W.&P.C. (Land Use & Zoning)			1		2		3		4		5		6		7	8	}	(9			1	L	2	!	3		4		5
P.W. & P.C. (Mobility & Public Facilities)				1		2		3		4		5		6		7	1	8		9			1		2		3		4	_
Development Program					1		2		3		4		5		6	7	7	8	3	9)			1		2		3		4
MHUAT-DGHU & CUN-DEPAEC, OSPUN																														
SDAU-PLU Consistency Review					2		3		4		5		6		7	8	3		9			1	L	2		3		4		5
P.W. & P.C.: Planning Workshop & Public Co	nsul	tatio	on																											

 Table 2.19: PLU Activity Schedule (Conceptual)

Source: JICA Study Team

(3) Strategy III: Share Data and Information and Coordinate

"Lack of coordination" has been an identified issue in urban planning and development. The underlying issue is lack of information sharing mechanism. Planning information for SDAU and PLU will have to be shared in the process of preparation using a Web system. The urban control data and information will have to be shared among DGHU, OSPUN, and MIDEC.

OSPUN under DEPAEC shall continue to collect and organize spatial data and information for planning, development and urban control. It shall coordinate with DIGATAR to collect and organize data and information for infrastructure and public facilities in the City of Nouakchott.

DIGATAR is the government unit that provides topographic data and information. It shall coordinate with other national agencies to collect and organize spatial information necessary for SDAU and PLU and another development project. The major role does not have to be changed.

For all aspects of planning and urban management, the private sector and citizens need to be informed and involved. During this project, public consultation meetings were held in each commune. The effort shall be continued after the project to inform planning information shall be shared. Information on development projects and regulations will have to be shared; public meetings will become necessary.

III-1) For SDAU

The data and information shall be open to the all the government agencies and stakeholders in the private sector. Simply the contents shall be open through a Web site. Other than those major data and information, public facility data and land use data shall be updated in a timely manner. Data and information from MET, MEDD, ONS, ONAS, MHA, SNDE, MIDEC, MEF and project information from ADU and ISKAN shall be shared and organized in the database of DGATAR. Annual plans or another development plan in those sectors shall be shared and coordinated not to cause any conflict

against SDAU. It is the job of a planner of DGHU to examine consistencies of different sectors. When potential conflicts are found, a coordination meeting shall be held and the conflict shall be resolved at an early stage of planning.

III-2) For PLU

For PLUs, OSPUN shall organize all the spatial information, until such time a commune will be capacitated to have its own geographic data management system. The texts and zoning map of PLU shall be open to the public.

When a PLU is being prepared, a coordination meeting shall be held with adjacent communes especially on land uses at boarders of the commune boundaries.

A PLU shall be consistent with the basic direction of SDAU. When a potential inconsistency is found, the matter shall be coordinated with stakeholders. Initially, such coordination meeting shall be held by DGHU, DEPAEC, and representatives from the commune where a PLU is being prepared.

III-3) For Urban Control

The construction permit data and information and the results of inspection work shall be recorded using a GIS and associated database and shared among the members of the public administration. It involves personal information; therefore, when they are shared, appropriate data security measures shall be taken.

The inspection work shall be coordinated with CUN-Urban Control which checks business licensing of a commercial establishment. When a major conflict is expected, representatives from MIDEC-Civil shall be called to resolved issues. By sharing the data and information, among those involved in urban control, the efficiency of administration will be improved substantially.

2.4.4 Human resources development

(1) Human Resources for Planning

According to a survey, DGHU has 18 planning related persons and 7 urban control related persons. Three persons are selected as the Taskforce members, but other 13 have not received sufficient training on SDAU. The Taskforce members shall take leadership in SDAU planning and coordination in the future. Even when the major work of SDAU will be outsourced, coordination work and organization of data and information are to be done internally within DGHU.

• Socio-Economic Analysts and Data Management

Aside from the national census, he or she shall design various surveys related to planning or organizing results of surveys conducted in different sectors of different targets.

• Land Use Planner

A land use planner is a person who checks consistencies between SDAU and PLUs. As a socio-economic analyst examines consistencies of population and employment allocations, a land use planner examines the spatial elements of SDAU and PLU.

As examining characteristics of a commune, he or she allocates population, employment, and public facilities spatially. Full knowledge of the PLU guidelines is required. Planning works may be outsourced, but a land use planner needs to examine the outputs of planning consultants. A land use planner in DGHU and DEPAEC need to have knowledge of transportation planning also since land use and transportation are closely related.

• GIS Engineer

A GIS engineer organizes all the spatial data available and acquired. He or she, in collaboration with a land use planner, a GIS engineer shall prepare generalized land use maps that indicate areas for development and protection for SDAU. At the PLU level, zoning maps for communes until the communes will be capacitated to do their own mapping.

• Planning Coordinator

A planning coordinator works for consensus building of plans among stakeholders both in the public and private sectors in a planning process of SDAU and PLU. He or she needs to have facilitation capacities to manage meetings. A planning coordinator shall be general knowledge on urban planning including public facility planning and transportation planning.

(2) Human Resources for Urban Control

• Zoning Officer

The largest number of human resources required is for urban control. As the quick assessment shows that 14 parties will be required. If three persons from DGHU and two persons from MIDEC-Civil, 42 persons from DGHU and 28 persons from MIDEC-Civil will be required every day for the task. Since new recruitment will be difficult under the budgetary constraints, a transfer from Resettlement and Social Welfare Unit (CROMOS) in ADU is proposed. According to an interview about 90% of the resettlement work has been completed. When it was studied, the number of employees in CROMOS was 174. The human resource could be trained to work as zoning field officers.

Building Officer

It was proposed that the construction applications are to be prepared by an architect. If a licensed architect is the one to prepare the construction drawing, the only thing that DGHU needs to check is the validity of architect's license. There are 42 architects in the Association of Architects in Mauritania. The number of architects is too small to handle the number of application each year as the quick analysis showed the approximate number of dwelling units as about 10,000, given a possibility of architects who are not in the Association.

One of the solutions to the problem is to divide the construction permit review process into two to have a faster lane for a block structure that has the number of floors equal to or less than R+2. The process should be handled by a building officer who understands a low-rise-block structure. Tentatively, it is named a building officer license. The building officer license will accelerate the construction permit procedure. The requirement and application need to be discussed further.

(3) Human Resources for Development Projects

• Landscape Architect

A landscape architect would be necessary for streetscaping and neighborhood design as giving a sense of place in communes. Other than the grid pattern of blocks, different type of neighborhood streets and block types could be designed by a landscape architect. Landscape architects lead the development of landscape design guidelines for residents, streets, parks, and other recreational facilities.

• Special Planning Coordinators

Coordinating urban redevelopment projects and land readjustment projects is difficult since it involves land ownership and transfer of rights on the land. Planning coordinators specialized for urban redevelopment and/or land readjustment will be necessary.

2.4.5 Road Map and action plan for Capacity Development

A general schedule of capacity development activities is summarized in the following table. Details will be discussed in the following sections.

Strategy	Outcome	Item	Immediate	Short-term	Mid-term
	Development	Coverage expansion of urban control	Х		
	administration Clarified	Development project coordination	Х		
		Regulation Preparation			
		-RGU	Х		
	Regulations	-Subdivision	Х		
The strategy I: No void, no	designed	-ZAC	Х		
		-Urban Redevelopment		Х	
overlap		-Land Readjustment		Х	
		Construction permit recording system	Х		
	Urban control	Inspection activity recording system	Х		
	tools	Revision of inspection form	Х		
	improved	Introduction of the database for permit and inspection work		Х	
	mprovea	A web-based permit and inspection recording and			x
		management system			
Strategy II:	SDAU cycle	A revision of SDAU			Х
Make planning	established	A review of SDAU		Х	
regular	PLU cycle	PLU prepared incapacitated communes		Х	
activities	established	PLU preparation in all the communes			Х
		Sensitization meetings for SDAU and PLU	Х		
		Promotion material development and dissemination for	x		
	Planning info	SDAU and PLU			
Strategy II:	shared	Coordination meetings with other sectors	Х		
Share data and	Sharea	A spatial information serer installation at DGATAR			
information		A web-based spatial information sharing system			Х
		Uploading plan information to the web	Х		
	Urban control	Construction sign board enforcement	Х		
	info shared	A web-based permit and inspection recording and			x
	millo. Shured	management system			11

Table 2.20: General Schedule of Capacity Development Activities

Source: JICA Study Team

(1) SDAU

Immediate Actions (2020)

According to the generalized land use map of SDAU, MEDD shall confirm protection areas on a map. Also, in accordance with the transportation elements of SDAU, the right of ways for primary, secondary and tertiary roads shall be confirmed with MET. The spatial information which includes right of ways of primary, secondary and tertiary roads shall be shared with the Domain of MFE, MHUAT, CUN, ADU, ISKAN to prevent possible conflicts with development projects against the policy of SDAU.

A seminar for the project was conducted in July 2018; the promotion work of the SDAU of Nouakchott shall be continued as documents and plans will be uploaded to appropriate web site. Promotion materials such as brochures will have to be prepared and distributed. A map of the generalized land use and transportation plan in a large format shall be printed and distributed to the communes and involved government agencies for display so that the SDAU will be known to the public and to the members of the public sector.

Short-term (2025)

Since the last census was conducted in 2013, it is expected that another census will be conducted in 2023. There shall be a sample survey on population and commercial activities every five years. SDAU shall be reviewed for the first time in 2025. When it will be revised, citizen opinion surveys and traffic surveys shall be conducted, and the results shall be reflected SDAU.

DGHU shall follow up infrastructure development in different sectors for consistency. DGATAR shall develop an inter-minister data sharing system so that the consistency examination work will become efficient. If resources allowed, a web-based portal site shall be developed.

<u>Mid-term (2030)</u>

Another review and revision shall be conducted by 2030. Investment environment and other factors such as natural environment may be changed by then. The socio-economic framework shall also be reviewed. When it needs to be adjusted, the PLU framework shall be adjusted as well.

(2) PLU

Immediate Actions

The immediate action to be taken is holding a sensitizing meeting with stakeholders on the PLU in Tevraph Zeina. The trained Taskforce members shall lead in the efforts to make the plan and zoning known. As far as zoning, trained zoning officers shall hold seminars and meeting with the private sector. The PLU documents and maps shall be uploaded to appropriate website so that citizens and the members in the private sector will be able to view the PLU.

Short-term (2025)

By 2025, a couple of PLU shall be available in Nouakchott. The leading agency for the work still is DGHU. As DEPAEC coordinates the work with the communes and DGHU. Major work of PLU shall be delegated gradually to the communes as assessing their capacity of PLU preparation. Planners in DGHU would act as advisors for the communes by then. For those communes without planning capacity, DGHU will continue to prepare PLUs as it collaborates the efforts with DEPAEC. Graphics works shall be conducted or supported by OSPUN by 2025.

Mid-term (2030)

By 2030, PLU will become available in most communes. The first communes that had prepared PLU will have time for revising PLU to meet to changes that were not expected. DGHU and DEPAEC shall continue to monitor consistency among PLUs in adjacent communes. They shall examine the validity of framework against the SDAU, also.

(3) Development Projects

Immediate Actions (2020)

A major tool of development has been a subdivision project. The effort shall be continued as different development organizations shall coordinate their development under the minister, as DGHU overlook the consistency of such development projects to the policy of SDAU. With the PLU development activities in Tevraph Zeina need to conform to the zoning regulation. Road development plans and other infrastructure plans need to be reviewed for consistency.

For those areas with development concerns such as the old airport area and the new airport and surrounding areas, ZAC shall be declared not to allow unplanned development. By this time ZAC designation procedure shall be drafted by DGHU and approved.

Short-term (2025)

By 2025, road development and other infrastructure projects will be commenced. When planned roads go through existing residential areas, land readjustment projects would be useful. The regulation for land readjustment will have to prepare by DGHU. As the procedure will be defined, a planner in DGHU shall be trained for coordination works.

For a development project to take place in already built-up areas, land purchase or exchange will take place. A mechanism of real property evaluation shall be in place to minimize possible conflicts with landowners. Just compensation will be to be paid to property owners.

Mid-term (2030)

Urban redevelopment projects may become necessary as densification will be progressing the central part of Nouakchott. The regulation for urban redevelopment will be written, the training program shall be conducted for planners in DGHU. A condominium ownership system shall be developed to accommodate resident-owners in the mid-to-high rise buildings for residential uses. Parking requirement shall be defined to minimize on-street parking.

(4) Urban Control

To figure out amounts of administration work on the construction permits and inspection work, an estimate was conducted using the SDAU framework. The total number of dwelling units in 2017 is subtracted from the number in 2040; then, the balance was divided by 23 to acquire the number of dwelling per year. The number is multiplied by two assuming that there will be the middle inspection and completion inspection. In addition to the general visits to the site, possible violation dispatches were added. It is assumed that about 20% of the total number of construction would require a violation dispatch. Then, the general visits and violation visits per day were added assuming that general working days per year is about 200. The total number was divided by eight (8), which was the general number of a visit by one party per day. Column 7 is the rounded-up number of parties required by a commune.

	Communa	Dwelling Unit (DU)		Dalanca	1)	2)	2)	4)	5)	6	7)
	Commune	(2017)	(2040)	Balance	1)	2)	3)	4)	3)	0)	7)
1	Tevragh Zeina	11,488	71,173	59,685	2,595	519	5,190	26	3	29	4
2	Ksar	9,360	25,999	16,639	723	145	1,447	7	1	8	1
3	Teyarett	15,595	36,052	20,457	889	178	1,779	9	1	10	2
4	Dar Naim	25,126	46,811	21,685	943	189	1,886	9	1	10	2
5	Sebkha	10,820	15,995	5,175	225	45	450	2	0	2	1
6	Arafat	33,947	45,744	11,797	513	103	1,026	5	1	6	1
7	Toujounine	25,585	57,812	32,227	1,401	280	2,802	14	1	15	2
8	El mina	30,312	38,018	7,706	335	67	670	3	0	4	1
9	Riyadh	29,710	94,254	64,544	2,806	561	5,613	28	3	31	4
10	TOTAL	191,943	431,858	239,915	10,431	2,086	20,862	104	10	115	14

 Table 2.21: Analysis of Required Construction Inspection Parties by Commune s

1) Dwelling per year (/23 years), 2) Violation (20 % of total), 3) No. of inspection per unit, 4) Inspection/Working day/year, 5) Violation Dispatch per working day/year, 6) Capacity of a party/day, 7) Required No of Parties Source: JICA Study Team

The quick analysis shows that about 14 parties will be required if the number of dwelling units will be about the same until the year 2040. Currently, DGHU has three parties are in operation; therefore, about 11 parties will be required for the inspection work alone.

More vehicles and inspectors allocated to communes is a simple solution but is a difficult solution under budgetary constraints. Efficient work is called for using information and communication technologies.

Immediate Actions (2020)

DGHU shall include all the areas in Nouakchott as the area of urban control regardless of development entities. There are areas where ADU and ISKAN have developed in Nouakchott are without inspection activities--conversion and expansion of residential or commercial units have not been monitored.

Another issue is there are areas without SDAU nor PLU. For those areas, according to the Urbanization Code 2008, RGU is supposed to be applied, but details of RGU is not been prepared; therefore, currently, the clauses in the Urbanization Code 2008 are the only ones to be applied to those areas. RGU will have to revise as soon as possible.

The recording system of a construction permit shall be improved. The recording system of the permit shall be improved with additional scanners to keep all the application processed in DGHU. Design a filing system and procedure, so that different secretary will be able to conduct the construction permit record keeping. Initially, database installation for the construction permit may be difficult. At least design a file name so that a permit can be searched with a unique file name. Save the file in a pdf format.

When the permit scanning system will be in operation, the zoning inspectors will be able to bring a copy of drawings on-site in a paper media or digitally using a tablet or large-size smartphone. With the plan of construction, the zoning officers shall inspect, frontage, depth and setback measurements. At a completion inspection, the height needs to be measured and recorded. For this purpose, a tape measure shall be carried for the inspection work.

The inspection work has been functioning with three parties working every day. The three forms are used to indicate "go"; "warning" and "stop." The activities will have to improve as zoning inspectors will be able to examine dimensions of development using tape measures. The setback requirement will have to be enforced. For this purpose, the existing inspection forms will have to be redesigned. After redesigning the form, a training shall be provided so that all the inspectors will be able to fill up the forms in the same way.

After the inspection work, the zoning officers keep records in a word processing format. The word processing format can be changed to a spreadsheet format to summarize the work. The list of contractors can be prepared from the data, and violation data can be analyzed.

A signboard of construction notice is not enforced. It shall be enforced to make the inspection work more efficient. Simply for those that do not display the signs would become potential violators without the presence of site managers. An example of such signboard is shown:

Construction Notice										
Construction Permit No)	Struct	ure							
Address		No. FI								
Coordinates	X=	Floor a	area							
	Y=	Use								
Subdivision Name		Zoning]							
Lot Number		Height	i i							
Lot area		Fronta	ge							
Construction Period	from	Depth								
	to	Setba	ck							
Contractor's name	•		·							
Contractor's phone nur	nber									
Date of sign installation	1									
The sign installation No).									

Source: JICA Study Team Figure 2.12: Construction Notice (an example of the signboard)

For those residents who may not have the capacity to construct a sing board, only a display of a construction permit number shall be displayed using a simplified board or spray paint on a wall of on-going construction structure. For this purpose, the construction permit number shall be designed as a unique number that the related documents or information can be managed using the unique numbers. The same type of sign board shall be installed at a demolition site to show valid demolition permit number.

Demolition Notice										
Demolition Permit No		Structure								
Address		No. FI								
Coordinates	Х=	Floor area								
	Y=	Use								
Subdivision Name		Zoning								
Lot Number		Height								
Lot area		Frontage								
Demolition Period	from	Depth								
	to	Setback								
Contractor's name										
Contractor's phone n	umber									
Date of sign installati	on									
The sign installation I	No.									

Source: JICA Study Team

Figure 2.13: Demolition Notice (an example of the signboard)

Following is an example of a schema of the inspection activity database. When the data will be shared among the inspectors, duplication of work, multiple visits to the same site, could be avoided.

Category	Туре	Category	Туре
Permit Type	Text	Floor area	Number
Permit No	Text	Use	Text
Address	Text	Zoning	Text
Coordinate X	Number	Height	Number
Coordinate Y	Number	Frontage	Number
Subdivision Name	Text	Depth	Number
Lot Number	Number	Setback	Number
Lot area	Number	Contractor's name	Text
Period From	Date	Contractor's phone number	Text
Period To	Date	Date of sign installation	Date
Structure	Text	The sign installation No.	Text
No. Floor	Number		

 Table 2.22: Analysis of Required Construction Inspection Parties by Communes

Source: JICA Study Team

The list of construction projects shall be posted at a town hall of communes so that neighbors will be able to view and identify possible illegal construction activities. Initially, the data shall be organized in a spreadsheet of a file stored in a file server. If a website is available, with appropriate viewing restriction with an ID and password, the inspection activities can be shared with all the members of public authorities such as MIDEC and CUN. Using a relational database, additional table of

inspection activities can be added. It is recommended that such database will be utilized internally within DGHU until security policies and procedures will be established and exercised.

Permit Permi	Permit	it Address	Coor	dinates	Per	riod	Stanotina	No.	Contractor's	Phone
Туре	No		Х	Y	From	То	То		name	number

 Table 2.23: Data to be listed at a Town Hall (example)

Source: JICA Study Team

An internal training session will be required so that zoning officers will be able to enter the data in a spreadsheet.

As the procedure of urban control work will be in place, there shall zoning officers' training, since more development activities will be expected as shown in the quick analysis in Table An Analysis of Required Construction Inspection Parties by Commune. Transfer persons from Resettlement and Social Welfare Unit (CROMOS) in ADU for the inspection work and provide training. Initially, OJT will be conducted by those have experienced. Gradually, the training shall be systematically conducted with operation and training materials. Such operation manual and/or training materials will have to develop by the leader of urban control in DGHU.

Short-term (2025)

A spreadsheet or file system of the construction permit and inspection work shall be upgraded to a data management system. When the data and information will be shared as the urban control section of CUN will be allowed, the total cost of inspection and fee collection work will have been reduced.

Mid-term (2030)

By 2030, the information and communication infrastructure will have been advanced, as more system engineers will be available in MHUAT and CUN. A full-fledged web application integrated with the GIS including parcel data shall be developed.

2.4.6 Capacity Development Packages

The following action plans prepared to improve the problem situations to facilitate securing budgets domestically and internationally. The actions shall start as soon as possible. Except for the regulation writing support which will require time for consensus building and approval, the actions, activities, those programs are targeted at 2020.

(1) PLU Preparation Support for Communes

The PLU administration system needs to be established and internalized in DGHU and DEPAEC. The Taskforce members from DGHU and DEPAEC had opportunities to interact with the JST members, but the OJT especially in the planning phase, the involvement of the Taskforce members was limited because of their regular tasks and the schedule of the JST members.

An explanatory meeting on the PLU guidelines was held but it was not sufficient to explain all the contents written in the PLU guidelines because of a time constraint. Since the contents of the guidelines are new to most of the members of DGHU and DEPAEC, training will be required.

Sensitization work will have to need as the trained Taskforce members will have various seminars and workshops explaining the new concept of PLU and zoning system. A model workshop program will be developed with workshop materials for citizens and the public. To make the public known, promotion materials need to be prepared.

The activities are:

- 1. Land use planning--allocating population and employment
- 2. Preparation of a training program and certified zoning and building officers programs
- 3. Training on the PLU guidelines;
- 4. A model workshop program with promotional materials and brochures on PLU;

(2) Urban Control Data and Information Management in DGHU and OSPUN

There is no record keeping mechanism for construction permit; the inspection work has been recorded in a word processor format. The situation needs to be improved when a database is introduced. A proposed system development shall have the following functions: 1) Permitting; 2) Inspection. The permitting and inspection system shall be installed in DGHU.

The design of a permitting and inspection system needs to carefully conduct to meet the needs and capacity of users. The requirement of information and communication infrastructure needs to be studied.

Initially, an intranet system, a server-client system, will be installed in the premise of DGHU and OSPUN. After training will have been completed, the system will be upgraded to a web-based system to be shared with MIDEC. The web-based system will have a groupware function to make a tracing of the application possible. The application form will become online, and the submission of drawings will in a form of a CAD file or pdf.

Domestic or international IT consultants with knowledge of urban control shall conduct the work as collaborating with personnel in DGHU and OSPUN.

Activities are:

- 1. Needs assessment and system design;
- 2. Prototype development and test (intra-net) and user training;
- 3. A web-based system development integrated with GIS.

(3) Urban Control Personnel Training and Licensing System

About 30 more trained zoning field will have to be trained in the middle and completion inspections will be implemented. Installation and enforcement of a construction project signboard and demolition notice sign board are proposed. Operation and administration procedure has not been designed yet. With the written administration procedure, training for zoning officers needs to be conducted.

The activities for zoning officer training program will be:

- 1. Development of a zoning officers' operation manual;
- 2. Training implementation;
- 3. Development zoning officers' certification program.

There is no professional architect licensing system in Mauritania. Those who graduated with a degree of architecture overseas are architects in Mauritania. It is very urgent that to review the validity of construction drawings in the process of issuance of construction permit. When a licensed architect prepared, the construction application form, the process of the permit will become faster. Since there is no architect program in universities in Mauritania, it is proposed to establish Building Officer License that is limited to design R+2 block structures. In collaboration with the Association of Architects, the licensing program shall be established. Activities will be:

The activities for building officer training program will be:

- 1. Development of a building officers' operation manual: how to deal with PLU;
- 2. Training implementation;
- 3. Development zoning officers' certification program.

The person-in-charge of urban control in DGHU shall be the one to lead the training project with technical support from the Association of Architect in Mauritania.

(4) Construction Sign Enforcement and Neighborhood Watch Program

The builders are obligated to display the construction permit at the site, but the display of the construction permit at the sites is rarely seen. By enforcing the display, a public official or even neighbors can identify if the developers have the construction permit. And when a list of construction permits is displayed in town halls of communes, the validity of the construction permit can be identified easily.

Activities are:

- 1. Signboard design;
- 2. Signboard installation administration procedure design;
- 3. A model sign board development;
- 4. Development of neighborhood watch program;
- 5. Procedure design on reporting and responding on violations.

The work shall be lead by the urban control person in charge of DGHU and representatives from DEPAEC.

(5) Regulation Document Writing Support

The basic policies were promulgated as in Urbanization Code 2008, but regulations (Text d'Application) have not been prepared; in other words, detailed procedures have not been written since 2008. In a precedent, a text application has been prepared for CUN, but it was a compilation of law and decrees. The regulations to be prepared for the Urbanization Code shall not be a compilation of decrees, but rather they shall be close to guidelines and manuals so that the different interpretation shall not take place.

Since subdivision projects have been implemented without written regulation; new standards with sufficient open space may be needed. R.G.U. will become necessary to generally control development activities in areas without PLU nor SDAU. Other development projects mentioned in the Urbanization Code 2008 are urban redevelopment and land readjustment. There shall be regulations on those development methods. ZAC (Zone d'Aménagement Concertée) will need its designation guidelines and standards, also.

Regulations to be written are:

- 1. R.G.U.;
- 2. Subdivision (Lottismment);
- 3. Urban Redevelopment (Rénovation Urbaine);
- 4. Land Readjustment (Remembrement Urbain);
- 5. ZAC (Zone d'Aménagement Concertée).

There shall be training programs for each regulation. A person who completes the training program shall be certified. The activities will be:

6. Development of training programs for all regulations;

7. Development of certification programs on laws and regulations.

International consultants that have experiences in drafting laws and regulations shall be hired. There will be two phases considering the urgency of regulations: The first phase shall cover RGU, Subdivision Regulation, and ZAC. The second phase shall cover urban redevelopment and land readjustment.