CHAPTER 6 : PHYSICAL INFRASTRUCTURE

6.1 Water Supply System

Availability of potable water in rural areas is strongly interlinked with rural development and growth and display direct, positive results for human health and well being, especially for women and children (*India Infrastructure Report, 2007*). This statement has great relevance for DNH conditions; since the region is predominantly rural in nature along with the limitations of topographical challenges as well as habitation spread.

6.1.1 Domestic use

In this section, the status of rural and urban domestic water supply system in Dadra & Nagar Haveli is described. The scenario of the studied physical infrastructure facility is analyzed and categorized at Patelad level, while the villages are highlighted where the water supply availability is critical. The existing water supply source and its availability to the people of Dadra & Nagar Haveli is analyzed from primary and secondary information. The primary data collected as part of the socio-economic survey on sample household's basis conducted in 2008 is analyzed such that it supports/updates the secondary data and wherever the analysis based on secondary data is limited, the analysis is done on the basis of primary data.

6.1.1a Water Supply Source

The major water supply source in UT of Dadra & Nagar Haveli is Ground Water, which is extracted from the Wells, Tube Wells and Hand Pumps. According to the Census of India, 2001 data, most of the settlements have an access to and are dependent on ground water.

As per Census of India, 2001 data, 37% of the households in the urban areas have access to drinking water through tap, out of this 68% of the households has drinking source within premises and 29% of the households has drinking source near premises i.e. within 100 m. While, 25% of the households in the rural areas have the access to the drinking water through tap, and of this 25% of the households has drinking source within premises and 71% of the households has drinking source near premises i.e. within 500 m of travel.

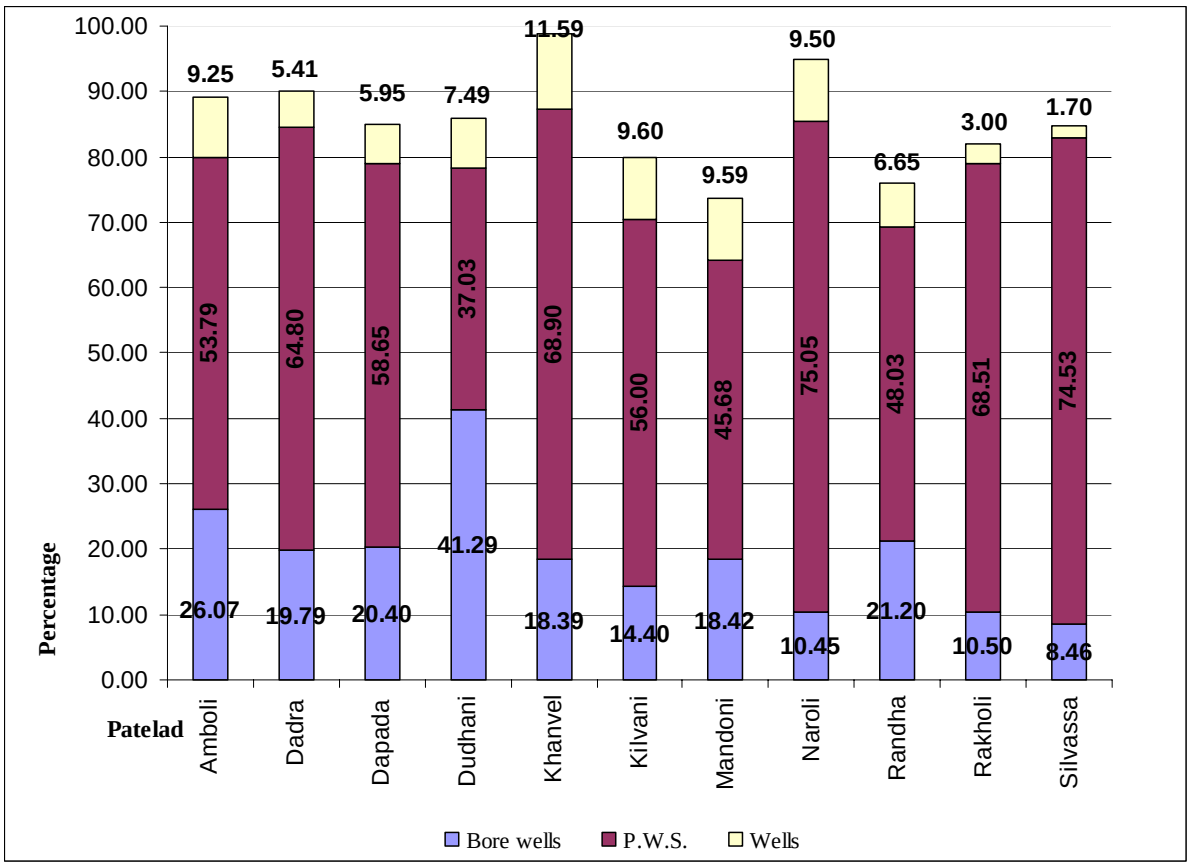
As per Census of India, 2001 data, 63% of the households in the urban areas depend on the ground water of which 43 % use hand pumps, 16% use tube wells and 4% use wells as water source. Where as 71% of the households in the rural areas are

dependent on ground water as source out of which 44% use hand pumps, 2% use tube wells and 25% use wells as source of drinking water.

In general, as per Census of India, 2001 data with respect to distance of accessibility to water source, 37% of the households in the urban areas have the drinking water source within premises and 60% of the households have water source near premises i.e. within 100 m distance. Only 8 % of the households in the rural areas have drinking water source within premises while 78% of the households have source near premises i.e. within 500m distance of travel.

Damanganga Reservoir is major surface water source for the Dadra & Nagar Haveli region, which is located across the river Damanganga near village Madhuban in Dharampur Taluka of Valsad District of State of Gujarat. The capacity of the reservoir is adequate to cater to the domestic water supply demand. An untapped source of water supply in the region is the River Damanganga, a seasonal river which has it source in the Ghats sixty four kilometres from the coast. The river passes through DNH where its three tributaries Pipariya, Golak and Sakartod merge with it, before discharging in the Arabian Sea at the port of Daman. The construction of Madhuban dam has ensured the water security of the region throughout the year.

There are 76 water supply schemes till present, executed in Dadra & Nagar Haveli Region. Under these schemes, 34 out of 70 villages (i.e. about half of it) and 2 urban settlements of Silvassa & Amli census towns are covered. Out of these 76 schemes implemented, 4 are in the urban settlements, and the rest are in village settlements. At present 27 villages do not get piped water supply, and thus are dependent on ground water. The Patelad-wise details of the water supply sources and its beneficiaries receiving the water through well, bore wells and public water supply are given in Figure 0-1: below.



Source: PWD, E.E.–III Division (DP / Village Roads / Irrigation), DNH

Figure 0-1: Patelad-wise Beneficiaries (%) receiving Water through Various Sources

From the figure above it can be seen that some of the Patelads have an access to sufficient water through pumps, wells, stand-posts and tap water. While some of the villages or some of the population do not receive water through these means and thus have to travel to certain distance to fetch water. The population in Khanvel Patelad has the maximum access to a reliable water supply source throughout the year while the Mandoni Patelad has the least percentage of the beneficiaries having access to drinking water. In Mandoni the water demand for the domestic use suffice through bore wells, hand pumps, and community stand posts – supplied for 2 hours a day as reported in the socio-economic survey, 2008. In case of scarcity tankers are used, almost 7-8 tankers of water are supplied per day in summer.

6.1.1d Brief Patelad-wise Analysis on Water Supply

To identify the percentage household's dependent on various drinking water sources, distance to the drinking water source and quality of water, analysis was done on the basis of sample household based socio-economic survey, 2008 and the focus group discussion at Patelad level with the Sarpanch/other village representatives. Aspects covered in the following analysis are given for various Patelads, which highlights the

water supply source scenario and various proposed water supply schemes at Patelad level.

Water demand of domestic uses is catered by bore wells, hand pumps and community stand posts from which water is supplied by the administration generally for an average period of 2 hours for two times a day in the DNH region. Apart from above said sources secondary sources like water tankers, community wells, personal wells, lakes and rivers to name a few suffice the water demand.

Silvassa Town has the highest percentage of households with individual water connections that include both bore-wells and individual piped connections at 84% followed by Dadra with 76% and Naroli with 73% individual water connections. Dependence on ground water is very high in Rakholi Patelad, followed by Naroli. Other Patelads with high dependence on ground water are Dapada, Dudhani and Kilavani. Amboli and Khanvel Patelads have overhead tanks, one with a capacity of 15000 liters & 3 OH tanks with a capacity of 40000 liters and 1.5 lakh liters capacity respectively. In Khanvel Patelad the household's dependent on other sources like tanker supply and river / lake water is high and contributes 9% of the total households. This could be contributed to the fact that these villages have lesser availability of reliable and continuous water supply source. Maximum percentages of households that travel more than 500 mts to fetch water are from Randha Patelad. Rakholi is the only Patelad other than Silvassa town where almost no household has to travel more than 500 mts to fetch drinking water.

Critical villages in terms of poor water supply were identified based on certain parameters that looked into aspects like ground water, community source, other sources, maximum distance travelled to fetch water and time period for which water is supplied per day. A total of 23 villages which is about 32 percent (7 villages in Khanvel and Mandoni, 6 in Randha, 4 in Dapada and Amboli, 3 in Dudhani, 2 in Kilvani, Naroli and Rakholi and 1 each in Dadra, and Silvassa) have been identified as critical in terms of potable water supply in the region. Refer Table 6-1. However, the ideal scenario in a planned water supply system is of access to piped water service for all preferably at tap level at each house or where not feasible due to spatial spread / difficult access / congested areas at community tap / stand post level, with water supplied at desirable levels of urban standards, and treated water quality, that needs to be addressed, and when done so critical conditions of poor water supply would either cease to exist or would get minimized.

Table 0-1: Critical Villages on the basis of Potable Water Facilities required

Patelad	Villages
Amboli	Dolara, Kala, Karachgam, Kherdi
Dadra	Demani
Dapada	Apti, Chinchpada, Dapada, Surangi
Dudhani	Dudhani, Gunsa, Kherarbari
Khanvel	Goratpada, Khanvel, Khutali, Rudana, Shelti, Talavali, Umbervarni
Kilavani	Kilavani, Umarkui
Mandoni	Bedpa, Bensda, Chinsda, Khedpa, Mandoni, Sindoni, Vansda
Naroli	Kharadpada, Luhari
Rakholi	Karad, Rakholi
Randha	Bonta, Morkhal, Mota Randha, Nana Randha
Silvassa	Samarvarni

Source: Consultant's Analysis on Socio-Economic Survey Data, 2008

Water supply proposals for the Patelads of Dudhani & Mandoni, and augmentation at Silvassa/Amli are already in consideration at present by the PWD E.E.-III and E.E.-II Divisions respectively, which have been detailed out in the following paragraphs.

Dudhani

With a view to improve the water supply and distribution in Dudhani Patelad, a water supply scheme in various villages of Dudhani Patelad is prepared and presently considered for an approval. The project design period is 20 years. The said scheme will have rising main in 3-Zones:

1. Zone A – Clear water Sump to ESR Tokarpada
2. Zone B – Clear water Sump to Ghodbari
3. Zone C – Clear water to Paraspada ESR

The project will have RCC overhead tanks of following specifications:

Capacity	Height	No.
1.5 Lakh Litres	20 M	1
0.6 Lakh Litres	20 M	3
0.26 Lakh Litres	6 M	6

Along with this UG Sumps of following specifications are proposed:

Details	Capacity	No.	Pump
UG Sump	0.20 Lakh Litres	7	With pump
UGSR at Zone B	0.20 Lakh Litres	1	Without pump

Mandoni

A water supply scheme is planned and being implemented in Mandoni Patelad, to solve the problem of water shortage in this Patelad. The scheme is designed up to year 2039 and for 21,376 persons of population. The scheme will be implemented in two parts or phases. The said water supply project for Mandoni Patelad is based on Madhuban dam situated at about 13 km. from Mandoni Patelad. Under this scheme it is proposed to construct Intake Well in upstream of Madhuban Dam near Dudhani jetty and distribute to the villagers through network of rising main and distribution system. Rate of water supply considered while designing the said system is 40 lpcd for rural area.

Distribution network based on High Ground Level Reservoir (HGLR) is proposed to be developed. HGLR is also constructed at RL 368.42 m. The details of components of water supply scheme are given in Table 0-2 below.

Table 0-2: Details of Water Supply Scheme Proposed at Mandoni Patelad

S. No.	Details	Remarks
1.	Intake well near Dudhani Jetty	
1a.	Pumping machinery on intake	VT Pump of discharging 45000 LPH against the head of 107 m and 20 KW – 2 sets (1 stand by)
2.	Rising Main	200 mm dia. Rising Main of 8585 m long from Dudhani Jetty to Ch. 8585 (Intermediate Pumping Station No.1) at GL 152.49 193.7 mm. dia. MS Rising Main of 1528 m long from Intermediate pumping station No.1 to intermediate Pumping Station No.2 at Ch.10180 and GL 270.44 193.7 mm. dia. MS Rising Main of 2687 m long from Intermediate Pumping Station No.2 to Filter plant on one local hillock near HGLR at GL 368.42 and filter inlet at GL 373.42

S. No.	Details	Remarks
3.	Intermediate Pumping Station No.1 and 2	2.70 lakh litres capacity UG Sump and Pump House of 7.5 m x 5.0 m size – total 2 Nos.
4.	Pumping Machinery on Intermediate pumping station No.1	VT pump of discharging 45000 LPH against the head of 114 m and 20 KW - 2 sets (1 stand by)
4a.	Pumping Machinery on Intermediate Pumping Station No.2	VT pump of discharging 45000 LPH against the head of 114 m and 20 KW -2 sets (1 stand by)
5.	Filter Plant	1.0 MLD Capacity filter plant is proposed to be constructed on local hillock at Ch.13000 near existing HGLR.
6.	HGLR	5.0 Lakh liters Capacity HGLR is recently constructed by water supply department.
7.	Gravity Main Distribution System	Gravity main distribution system connecting seven villages and 56 hamlets is being laid by water supply department, as per detailed design.

Silvassa and Amli Water Supply Scheme for Augmentation of Water Supply

A water supply scheme already exists in Silvassa and Amli for the design population of 40,000 persons. The scheme needs augmentation and modifications owing to fast development and increase in population to provide sustainable source to meet the gross water requirement along with treatment facility. Source of water and pressure problem as well as inadequacy of drinking water etc. prevails at present.

The water supply scheme for augmentation is designed for Silvassa and Amli census towns which covers area of 1718.68 ha. The scheme is designed for the year 2035 considering the final population as given below:

Year	Population
2005	55,000
2020	1,24,000
2035	1,66,000

Source: DPR for Water Supply Project for Silvassa & Amli Towns by Enviro Consultants, 2001

The entire area is divided in 3-Zones, as Zone 1 – is central part, Zone 2 - is area between proposed ring road, and Zone 3 - is area beyond proposed ring road. The water requirement of 135 lpcd is considered, and the net water demand and gross water demand estimated is given below:

Year	Net Water Demand (MLD)	Gross Water Demand (MLD)
2005	7.43	8.54
2020	16.74	19.25
2035	22.41	25.77

Source: DPR for Water Supply Project for Silvassa & Amli Towns by Enviro Consultants, 2001

The said scheme covers the following features:

Intake Well: R.C.C. Intake well with ancillary structures will be constructed in the right hand side of river Damanganga in down stream of existing intake well at a distance of 500 m.

Pumping Machinery: Pumping Machinery of rated capacity is proposed in accordance with the rated capacity of water treatment plant (WTP) and peak demand supply from the respective elevated service reservoir (ESR).

Water Treatment Plant: The capacity of the existing WTP is 4 MLD which will be used for zone 1 and additional WTP of 15 MLD is proposed for Zone 2 and 3.

Storage: An existing elevated and under ground storage shall be utilized for zone 1 and therefore storage capacity for Zone 2 and Zone 3 are proposed as below:

Particulars	Capacity in Lakh litres				Remarks
	Balancing	UGS	ESR	Total	
At WTP	43	-	-	43	Proposed
Zone 1	-	6	11	17	Existing
Zone 2	-	-	26	26	Proposed
Zone 3	-	-	12	12	Proposed
Total	**43**	**6**	**49**	**98**	

Source: DPR for Water Supply Project for Silvassa & Amli Towns by Enviro Consultants, 2001

Distribution Network: A distribution network is proposed along either side of the major roads to avoid number of road crossing and easy operation and maintenance, as well as to have smaller but workable size of distribution.

Further in order to mitigate the water supply problems and to tap the potential water resources available from the Daman Ganga water Reservoir a separate and detailed Water Management Plan study has been undertaken, the proposals and policies of which has been integrated with the ODP 2031.

6.1.2 Irrigation System

Only 7408.40 Ha of cultivable land is irrigated by different sources such as river, wells, canals etc. This forms 37.65% of the net cultivable area. The net irrigated area as provided by Department of Planning & Statistics, DNH is 5981 Ha. (i.e. 30.40% of the net sown area). The net irrigated area of DNH is less when compared to that of Punjab (84.50%) but is comparable to Gujarat (31.56%), Maharashtra (16.78%) and to that of India (40.53%) as described earlier.

Irrigation schemes in DNH are implemented both by the government and the private sectors. The government schemes include canals, tube wells, wells, and river and private schemes include wells and river. The distribution of government irrigation schemes and private irrigation schemes is as shown in Figure 6-2 below.

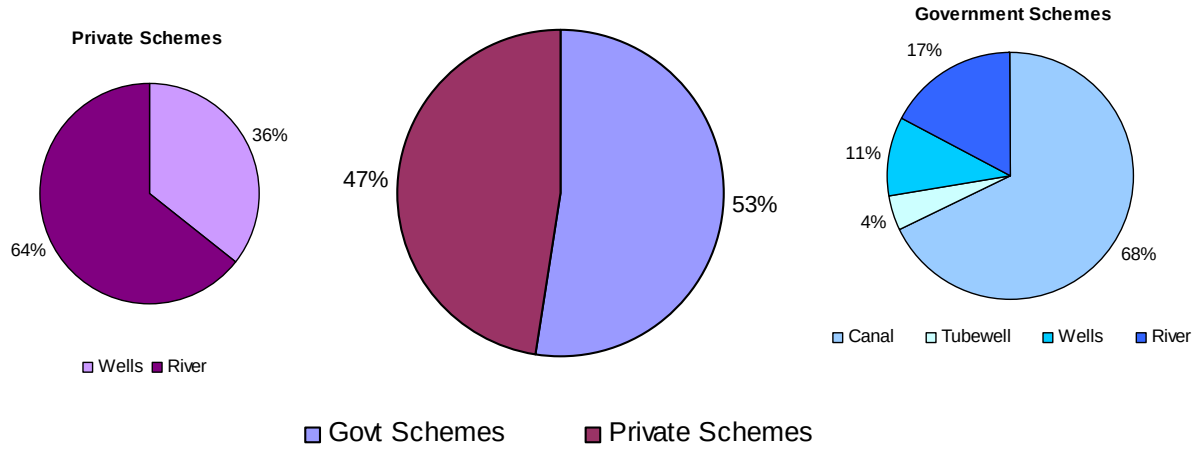


Figure 0-2: Area under different Irrigation Schemes

The irrigated area is unevenly distributed among various Patelads. Silvassa and Naroli constitute the maximum irrigated area, when compared to other Patelads.

Damanganga Reservoir is a surface reservoir with canal grid and is a reliable source for the domestic and irrigational demand of DNH. The project is major multi-purpose irrigation project developed as a joint venture of Govt of Gujarat, Union Territory of Dadra & Nagar Haveli and Government of Goa, Daman & Diu. A composite dam is constructed on Damanganga River near Village Madhuban in Dharampur Taluka of Valsad District. **From this multi-purpose project, an area of about 51,924 Ha.is irrigated annually. It is also planned to supply 58 million gallons per day of water for industrial and domestic use.** The Water Management Plan also identified watersheds and specific locations for providing minor and medium check dams for irrigation purposes. The same is integrated with ODP 2031.

6.2 Sewerage / Sanitation System

Dadra & Nagar Haveli lacks the facility of sewerage system in rural as well as urban areas.

6.2.1 Availability of Latrine Facilities

The Census of India, 2001 states that 67% of the total households in DNH do not have access to latrines.83% of the total households in the rural areas do not have access to the latrine facilities. When compared to urban areas, the scenario is relatively better and only 23% of households do not have access to latrine facilities. About 98 % of the total households having latrine facilities have water closet facilities, and very few households have other latrine formats and pit latrine types. Refer Table 6-6 below.

Table 0-3: Details of Household with Latrine Facilities (2001)

Total Households		Households having Latrine Facilities				Households without Latrine Facilities
		Pit Latrine	Water Closet	Other Latrine	Total	
Rural	32783	74	5538	67	**5679**	27104
Urban	11190	388	8010	241	**8639**	2551
Total	**43973**	**462**	**13548**	**308**	**14318**	**29655**

Source: Census of India, 2001

As per the socio-economic survey, 2008 conducted in DNH, the facilities of the latrine within the houses are much better in urban areas as compared to rural areas. 63% of the total households in urban areas have the facilities of latrine within the house and 25% of households used community latrine facilities. Only 19% of the households in the rural area had facilities of latrine within the house where as 71% of the households lack the facilities of latrine. However, overall in DNH the sample

analysis indicates a nominal improvement considering the access to in-house latrine facility as well as community latrine facilities from 33% in 2001 to 41% in 2008 as per primary survey analysis in 2008.

From the area of sanitation concern perspective based on the sample survey, 2008 analysis it was observed that none of the households in the following villages had latrine facilities within the house: Bindrabin, Dolara, Apti, Chinchpada, Pati, Surangi, Vasona, Ambabari, Bildhari, Ghodbari, Gunsa, Jamalpada, Karchond, Kherarbari, Kothar, Vaghchauda, Chauda, Goratpada, Shelti, Umbervarni, Galonda, Bensda, Chinsda, Mandoni, Sindoni, Vansda, Luhari, Bonta, Morkhal i.e. a total of 29 villages (i.e. 40% of total 72 villages in DNH).

6.2.2 Underground Sewerage System Scheme for Silvassa & Amli

Currently no piped sewerage system exists in urban areas of DNH. However an underground piped sewerage system project have already been prepared and the same is integrated with ODP 2021.

Total length of sewer line in the entire project area is 24.46 km. Based on the topography, nine pumping stations have been planned in the project area to convey sewage flows from various zones to STP located on north-west side of the project area. Total length of rising mains is 4650 m.

At STP, facultative aerated lagoons along with screening chamber and maturation pond have been proposed for treatment of sewage.

As far as industrial effluent treatment facilities are concerned, at present none exist as common effluent treatment plant (CETP) facility. This situation is due to the fact that industries have come up in scattered pockets along the border of DNH. As in the RP-2021 distinct industrial use based zoning has been demarcated for gradual growth of industries in consolidated manner, during the ODP draft planning proposals a suitable consideration would needed to be made for proper disposal of industrial effluents be covered as part public & semi-public land use.

6.2.3 Wastewater Disposal Facilities

As per the Census of India, 2001 data, 78% of the total households do not have waste water drainage facilities in DNH. 88% of the total households in the rural areas and 48% of households in urban areas do not have facilities for the waste water disposal. Refer Table 6-7 for details of households with and without drainage facilities.

Table 0-4: Details of Households with Waste Water Drainage Provisions (2001)

Total Households		Household with Drainage Provisions			Household without Drainage Provisions
		Closed Drainage	Open Drainage	Total	
Rural	32783	1097	2885	3982	28801
Urban	11190	3810	2029	5839	5351
Total	**43973**	**4907**	**4914**	**9821**	**34152**

Source: Census of India, 2001

6.2.4 Availability of Bathroom Facilities

As per Census of India, 2001 data, only 32% of the total households have facilities of a bathroom within the house in DNH. The situation is slightly better in the urban areas with 69% of household having bathroom facilities inside the house, while only 19% of households in rural areas had facilities of bathroom (refer Table 6-8 below).

Table 0-5: Details of Household with Bathroom Facilities (2001)

Total Households		Households having Bathroom Facility within the House	Household without Bathroom Facilities
Rural	32783	6168	26615
Urban	11190	7722	3468
Total	**43973**	**13890**	**30083**

Source: Census of India, 2001

As per the socio-economic survey conducted in DNH in 2008, 48% of the total households have facilities of bathroom within the house. 78% of the households in urban areas had access to the bathroom within the house and 11% of households used community bathroom facilities, while 40% of the households in the rural area had access to the bathroom within the house with 5% of the households in the rural area using community bathroom facilities. This shows improvement of the facilities like bathroom both in the rural and urban areas based on the sample survey in 2008 compared to secondary analysis of 2001 census data. Refer Table 0-6: for the said percentage distribution and locational distribution at Patelad level for access to bathroom facilities.

From the survey analysis it was observed that none of the household in the following villages had bathroom facilities within the house: Ambabari, Bensda, Bildhari, Bindrabin, Bonta, Galonda, Ghodbari, Goratpada, Gunsa, Jamalpada, Karchond, Kherarbari, Kothar, Medha, Sindoni, Surangi, Vaghchauda, and Vansda i.e. 18 villages (i.e. 25% of the total 72 villages in DNH).

Table 0-6: Details of Households with Bathroom Facilities (2008)

Total Households	Percentage of Households having Bathroom within the House	Percentage of Households using Community Bathroom	Percentage of Households without Bathroom Facilities
Rural	40	5	55
Urban	78	11	11

Source: Consultant's Analysis on Socio-Economic Survey Data, 2008

6.2.5 Waste Management

a.) Solid Waste management

At present the solid waste is disposed off in the conventional method of dumping. DNH do not have facilities of proper sanitary landfill site, and currently one temporary site of 1 Ha. area in Khadoli village (in Survey No. 121 part area) over an existing quarry site adjoining wildlife sanctuary boundary is being used. The facilities of solid waste collection and disposal are managed by Silvassa Municipal Council (SMC) in and around the council area covering the urban area of Silvassa & Amli census towns. The activities undertaken by the sanitation department are as follows:

- Road sweeping both side of road : 30 km. daily
- Road brushing both side of road : 2.5 km. daily
- Collection of garbage daily : 30 km. daily i.e. 33 tons

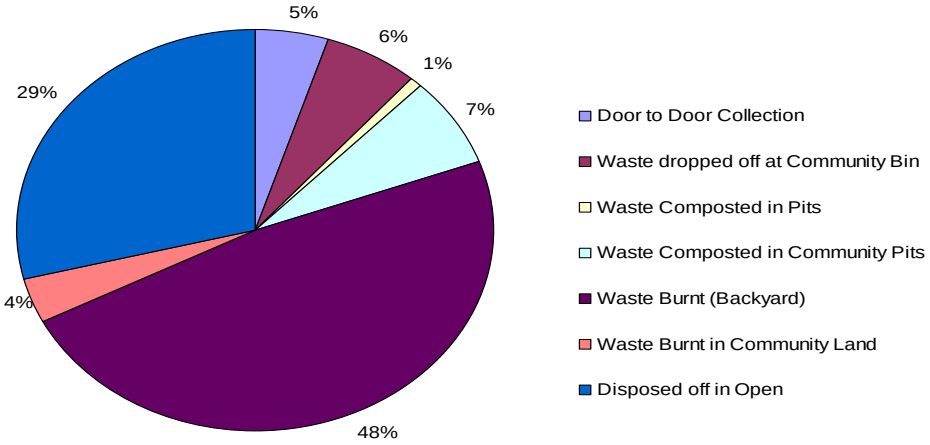
The garbage collection and sweeping is done on the daily basis by issuing the following vehicles:

- 2 Trucks : 2 trip of 4 tons each = 16 tons daily
- 1 Tractor : 2 trip of 2 tons = 4 tons daily
- 2 Tempos : 2 trip of 2 tons = 8 tons daily
- 1 Hydraulic Truck : 7 Trip of 800 kgs = 5 tons daily
- 1 Auto Remover

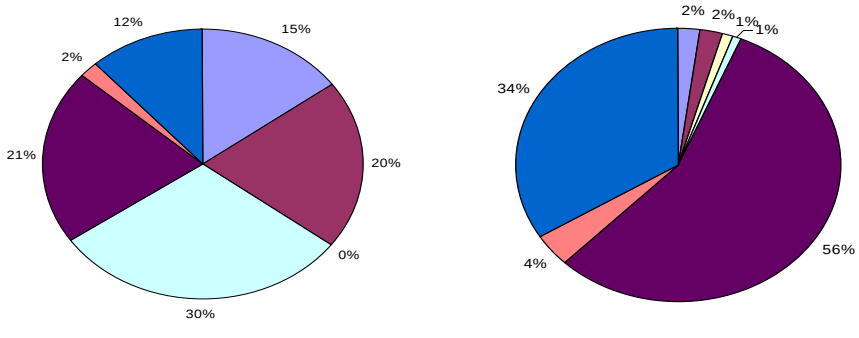
There are 110 no of employees engaged in the Sanitation department at present, but adequate capacity building is required. As mentioned earlier, the collected garbage is being dumped and disposed at village Khadoli in Survey No. 121 part area where 1 Ha. of land is allotted for disposal of garbage on landfill basis in an existing quarry. This site is about 15 km. from Silvassa i.e. 30 km. to and fro travel for the disposal trucks. The garbage is dumped and burnt daily. Considering an urban average of 0.30 kg. of solid waste generated, the domestic solid waste load generated in DNH urban

area of Silvassa & Amli only itself at present in 2008 would be about 51 tons daily. Thus adequate capacity building for this disposal system is necessary.

As per the primary survey conducted in 2008 to understand the solid waste disposal method in DNH as part of the responses recorded in sample socio-economic survey, 48% of the total households disposed the solid waste by burning it in back yard, followed by 29% of households who disposed the solid waste in open. While, 15% of the households in the urban area have the facility of door to door solid waste collection and about 30% of the household in urban area dispose the waste in community pits. In rural areas 56% of the rural household burn the waste in the backyard, and around 34% of the household dispose off the waste in open. Normally, the better considered habits of composting in pits including those at the community level are areas that need to be encouraged for waste disposal & contribution to economy by generation of organic fertilizers through composting, as sustainable practices. Refer Figure 6-3 for the distribution of method of solid waste disposal as per primary survey in 2008, in DNH.



Household of Dadra & Nagar



Urban Household **Rural Household**

Source: Consultant's Analysis on Socio-Economic Survey Data, 2008

Figure 0-3: Method of Solid Waste Disposal (2008)

b.) Hazardous Waste Collection and Disposal Facility

During the initial period of industrialisation since 1978 until the present times there has not been any facility for collecting and disposing the solid waste form the industrial areas. An Integrated Common Hazardous Wastes Treatment, Storage and Disposal Facility (ICHWTSDF) for the UT of Daman and Dadra & Nagar Haveli has been developed at village Mota Randha recently (i.e. north-eastern part of DNH) by GEPIL, under the SPV named "Gujarat Enviro Protection and Infrastructure (D & NH) Pvt. Ltd." This facility is authorized to collect, transport, treat and dispose off hazardous wastes generated by the industries of Daman and Dadra & Nagar Haveli. The facility is developed on the plot which admeasures 33 acres (i.e. 13.36 Ha.) located in the northern-most part of Mota Randha village and has the following facilities:

- Secured landfill cell
- Incineration facility
- Solidification and stabilization plant
- Transportation fleet
- Hazardous Wastes Analytical and R&D Facility (Environmental Laboratory)
- CETP
- Common Biomedical Wastes
- Wastes Plastic to Diesel
- E- Wastes Management Facility
- Computerized Weigh Bridge
- Vehicle Cleaning (Wheel Wash) Facility
- Intermediate Storage Facility
- Leachate Treatment Facility
- Administration building comprising of office and training centre
- Computerized Hazardous Waste Tracking System
- Green Belt
- Vehicle Parking facility
- Leachate Treatment Plant
- Workshop
- Boundary Wall and Main Gate
- Network of Approach Roads
- Surface Water Drainage System
- Wastes handling and compacting vehicles (inside) and many more supporting facilities.

6.3 Storm Water Drainage

Dadra & Nagar Haveli does not have any comprehensive drainage systems for carrying and discharging storm water data. DNH region receives an average rainfall between 200 and 250 cm. Most of the region has natural drainage system mainly due to the hilly and sloping terrain. The storm water flows towards valleys where a number of meandering rivulets develop to form natural drainage pattern in the predominant rural area. But unlined open drains are also observed along the main roads in some parts of the DNH region.

The DNH region normally does not face flooding problem, but in the year 2004 flooding occurred due to unprecedented release of water in very large volume from Madhuban Dam to the downstream of Damanganga River.

As far as the drainage system in urban areas is concerned, some channel type drain/gutters exist, but now the piped underground storm water drainage system for the towns of Silvassa and Amli is proposed to be developed. The detailed project report to develop the storm water drainage system for these two census towns was prepared for the ultimate year of 2033, keeping the base year as 2002-2003. The project area covered under this proposal is about 17.55 sq.km. The entire project area for the purpose of planning of the underground storm water drainage system have been divided in four major zones depending upon the topography, natural slope, configuration and shape of catchments, land use, natural drainage courses, rivulets, drains, river etc. the areas demarcated for the settlement and residential zones in the plan for Amli & Slivassa census towns are taken up as built-up area for the purpose of estimation of quantity of storm run-off.

However, the concept of "complete street" development from one end of ROW (build-to-line) to other as a policy initiative with "green infrastructure" facilitates much in terms of sustainable streetscape development with controlled storm water management (as being adopted in advanced nations as well as propagated in India for example Master Plan for Delhi – 2021 provides "As a matter of general policy, it is proposed that for all categories of roads, the full cross section should be developed in future and no encroachments will be permitted on the existing road network. Further, the development of roads should start from the extremes of the designated ROW").

6.4 Electricity Supply

Dadra & Nagar Haveli does not have its own power generation plant / capacities and the entire power demand is met from Central Sector Generating Stations of Western

and Eastern Region. The present allocation to this territory is 385.66 MW during off-peak hours and 380.20 MW during peak hours.

The power is being taken to DNH through power networks of Power Grid Corporation of India Ltd and Gujarat Energy Transmission Company Ltd (GETCO) and received from Bhilad and Vapi 220/66 KV sub-stations of Gujarat Electricity Board. Currently, the supply is provided through a combination of 66 KV trunk lines and 11 KV distribution lines spread over different parts in DNH region. Also, there are eight sub-stations installed in DNH, and the location-wise installed capacity of the sub-stations is given below.

Table 0-7: Location and capacity of Sub-stations installed in DNH

S. No.	Name of 66/11 KV Sub-station	Installed Capacity MVA	
1	Amli	3x15 + 1x20	= 65
2	Masat	1x15 + 2x20	= 55
3	Rakholi	1x15 + 1x20 + 2x10	= 55
4	Khadoli	3x10 + 2x15	= 60
5	Dadra	3x20 + 1x15	= 75
6	Kharadpada	2x16 + 1x15	= 47
7	Silli	2x15	= 30
8	Khanvel	2x15	= 30
		Total	= **417 MVA**

Source: Electricity Department, Dadra & Nagar Haveli, 2008

The present maximum demand is about 40 MW mainly on account of industrial loads, as per secondary data. Number of consumers and consumption of electricity according to users given in Table 0-8 clearly indicates that industries are consuming about 96% of the electricity to the total supplied units' consumption.

Table 0-8: Category-wise Number of Consumers and Electric Consumption

S. No.	Category	No. of Consumers	Energy Consumption (MVA)	
			Rural	**Urban**
1	Domestic/LIG	46876	14.06	31.95
2	Commercial	5381	17.89	40.89
3	Irrigation / Agriculture	1194	2.56	5.11

S. No.	Category	No. of Consumers	Energy Consumption (MVA)	
			Rural	Urban
4	L.T. Industry	3394	146.38	228.74
5	H.T. Industry	736	1535.27	678.54
6	Public Lighting	251	3.83	7.67
7	Public Water Works	199	1.28	3.83
		58031	**1721.27**	**996.73**

Source: Electricity Department, Dadra & Nagar Haveli, 2008

The actual power withdrawal of the territory is in the range of 370 MW to 400 MW, however the daily scheduled availability of power under the ABT regime ranges from 225 MW to 300 MW only. Due to this shortage in availability of power, DNH has to do heavy load shedding under low frequency regime and pay un-scheduled interchange (UI) charges, because of which lots to be suffered by consumers. This is ironic, since DNH Administration provides so much central incentives for increased industrialization. A Master Plan is prepared for improvement and strengthening of power supply system of DNH for 2012 horizon by the Central Electrical Authority (CEA), New Delhi.

The power purchase agreement for additional power from the generations of NTPC and other Central Sector Power Stations has been signed, and the additional power of 165 MW would be allocated to DNH vides this agreement in phased manner. Refer Table 0-9 for the name of the project and allocation of additional power.

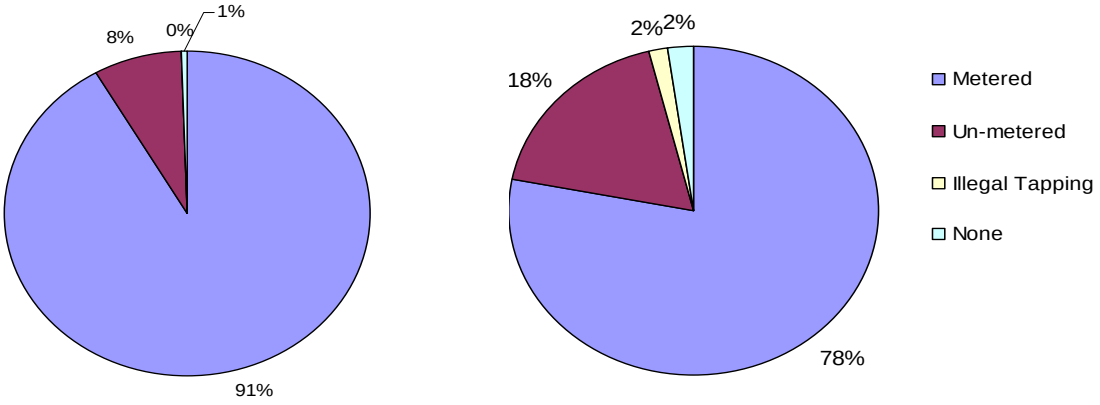
Table 0-9: Name of Power Project & Additional Allocation of Power to DNH

S. No.	Name of the Project	Allocation of Power (MW)
1	Bhilai Expansion Project	100
2	Sipat power project of NTPC, Stage-I	9
3	Sipat power project of NTPC, Stage-II	4
4	Kahalgaon Super Thermal Power station	3
5	North Karanpura Super Thermal Power Station	8
6	Kawas and Gandhar power project	20
7	Ratnagiri (Dabhol) power plant	21
TOTAL		**165 MW**

Source: Electricity Department, Dadra & Nagar Haveli, 2008

Meanwhile, a GoI proposal for own electricity generation for UTs of DNH and Daman & Diu with a capacity of 500 MW / 1000 MW project as feasible in Gujarat (Vansi-Borsi, in Navsari district) as per the guidelines of CEA is in pipeline.

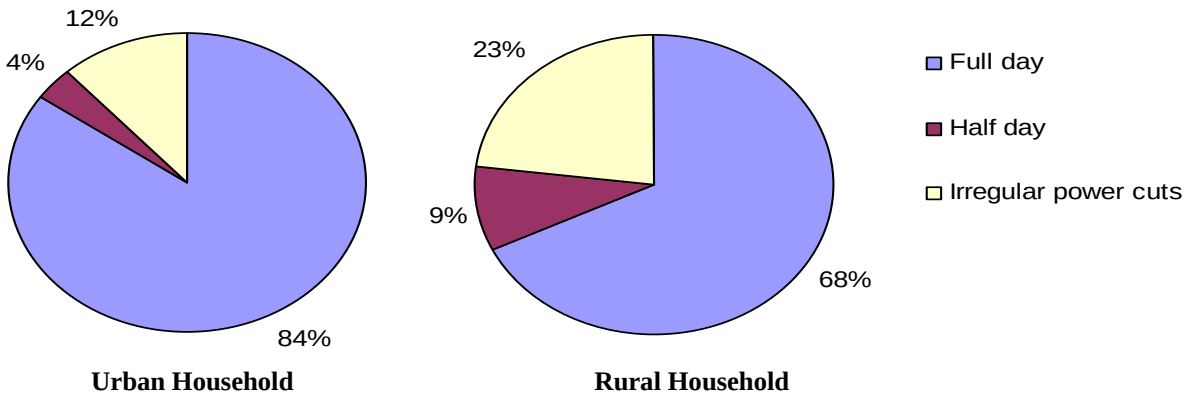
All the villages are electrified in the DNH region. The socio-economic survey of households on sample basis was conducted to analyse the accessibility to electric connection, availability of electric supply and level of voltage fluctuation in the area. As per the primary survey conducted in 2008, 91% households in the urban areas and 78% of the rural households have metered connections (refer Figure 0-4:). 2% of the households in the rural areas have no access to electric connection. 9% of the population in Mandoni Patelad have reported no access to the electric connection in this primary survey.



Source: Consultant's Analysis on Socio-Economic Survey Data, 2008

Figure 0-4: Distribution of Electricity Connection within DNH Houses

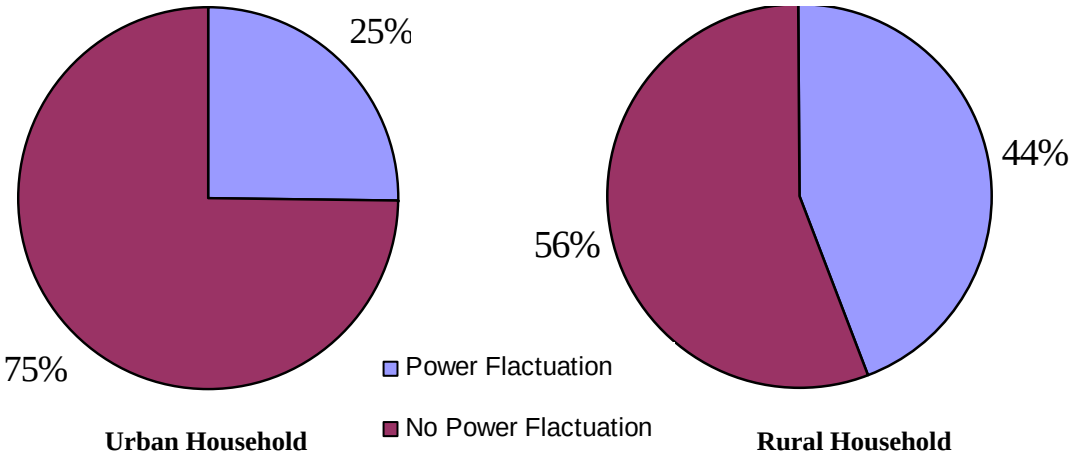
84% of the households from urban areas and 68% of households in rural area have no complaints about availability of electricity supply as the power is available for the full day. 23% households from the rural area there are irregular power cuts (refer Figure 0-5:).



Source: Consultant's Analysis on Socio-Economic Survey Data, 2008

Figure 0-5: Availability of Electricity Supply

75 % of the households in the urban area and 56% of the households in rural had no complaints about voltage fluctuations (refer Figure 0-6:).



Source: Consultant's Analysis on Socio-Economic Survey Data, 2008

Figure 0-6: Voltage Fluctuation reported in DNH (2008)

6.5 Telecommunications

As per the data till 2007-08 on the telecommunication facilities in DNH region, refer Table 0-10 below on the existing capacities available for this infrastructure and Table 0-11 indicating the existing proposals as well to come up in future, since the DNH region is spread over a vast geographic area to be effectively covered (even though the population to be served is not very large in DNH total area i.e. about gross density of about 775 persons per sq.km.).

It can be seen that for a population assessment of about 4 lakhs as estimated for 2008, the overall telecommunication facility capacities (i.e. about 4 lines per 100 persons) is much less when compared with the spatial planning norms of UDPFI Guidelines, 1996 (i.e. 10 lines per 100 persons). Moreover, since the working lines available at present is reported partial (about 47% of total capacity of the 1 main and 5 small telephone exchanges), the achievement of said norm presently stands out further low as about 1.89 lines per 100 persons overall.

Table 0-10: No. of Telephone Exchanges with Location, Area, Working Connections

S. No.	Name of Exchange	Lines Capacity	Working Lines	Area	Pending Waiting list	Remarks
1	Silvassa	10000	4500	2 Acres (87155 sft)	Nil	BSNL Site
2	Dadra	2000	1100	1000 sft	Nil	Non-BSNL site
3	Naroli	1400	800	700 sft	Nil	Non-BSNL site
4	Khanvel	1000	450	1000 sft	Nil	Non-BSNL site
5	Kilavani	184	75	1000 sft	Nil	Non-BSNL site
6	Dapada	720	270	1000 sft	Nil	Non-BSNL site
	Total	**15304**	**7196**	**91855sft**		

Source: Office of the Divisional Engineer, BSNL (A GoI Enterprise), Silvassa

Table 0-11: Proposed Small Telephone Exchanges with Location, Area, Cost Proposed

S. No.	Name of Exchange	Total lines	Area	Cost Approx. (Rs in Lakhs)	Remarks
1	Athal, Silvassa	200	400 sft	80	Non-BSNL
2	Rakholi, Silvassa	200	800 sft	80	Non-BSNL
3	Surangi, Dapada	100	400 sft	70	Non-BSNL
	Total	**500**	**2000 sft**	**230**	

Source: Office of the Divisional Engineer, BSNL (A GoI Enterprise), Silvassa

Since telecommunication service is vital to the day to day functioning, an adequate and efficient telecommunication network ensures better efficiency. Access to telecommunications is of utmost importance for achievement of the country's social and economic goals.

Considering the portion of urban area under Silvassa City (covering census towns of Silvassa & Amli) and the capacity of the Telephone Exchange, Silvassa the planned capacity situation seems to meet the norm. While, when considering the working lines capacity as reported below in the said urban area, the achievement of norm would be low as nearly 5 lines per 100 persons. Thus, scope of improvement exists in provision of such infrastructure of the landline communication needs, even if it is integrated with mobile communication systems (in the modern times of communication technology).

While, as per the guidelines for Rural Telecom Sector Policy, the telecommunication facilities in rural areas should be provided such that no person will have to travel more than 1 km. The National Telecom Policy (NTP) 1994 had a target of providing 1 PCO per 500 people in urban areas and to achieve telecom coverage of all villages by the year 2002.

The new Telecom Policy, 1999 aims at increasing telephone density[1] in rural areas to 4 and in urban areas to 15 by the year 2010. The current telephone density for the rural areas works out to be 0.9 and that for the urban areas is 5.1 (calculations are based on 2008 projections). With the present day capacities, a density of 11.4 can be achieved for urban areas and 2.1 for rural areas.

Dudhani, Ghodbari, Medha, Ambabari, Gunsa, Jamalpada, Kauncha, Karchond, Bildhari, Vaghchauda, Bensda, Vansda, Bedpa, Sindoni and Khedpa do not have a telephone within a 10 km. radius. Kherarbari, Goratpada, Talavali, Shelti, Mandoni, Chinsda, Velugam, Dolara, Luhari, Bonta and Kothar have to travel somewhere between 5 to 10 km. for nearest telephone. However, this analysis is based on 2001 data and excludes connectivity through mobile phones.

Almost 49% of the rural population in Dadra & Nagar Haveli does not have access to telephone. However, the penetration of mobile phones in the rural areas is significant (refer Figure 0-7: below).

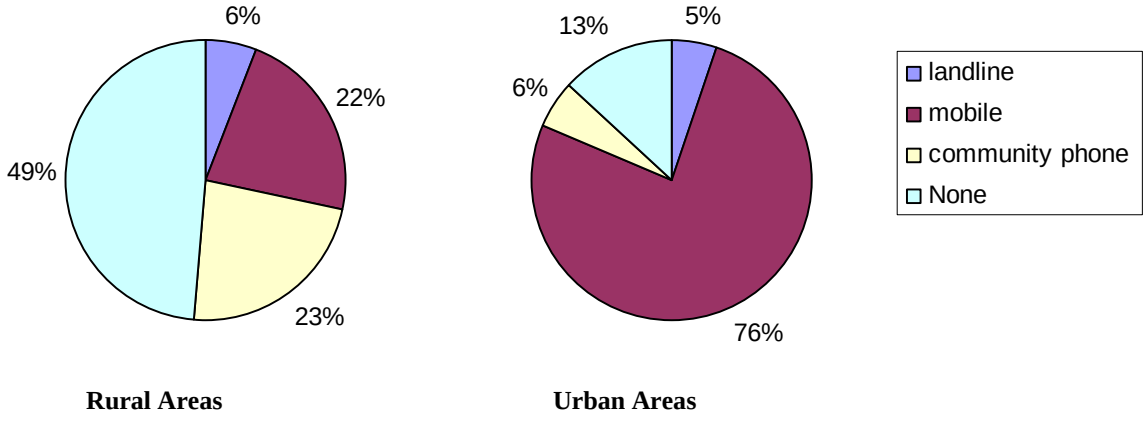


Figure 0-7: Penetration of Telephone Facility in DNH

[1] The number of landline telephones in use for every 100 individuals living within an area. The present telephone density[1] in India is about 0.8 per 100 persons, as against the world average of 10 per 100 persons.

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