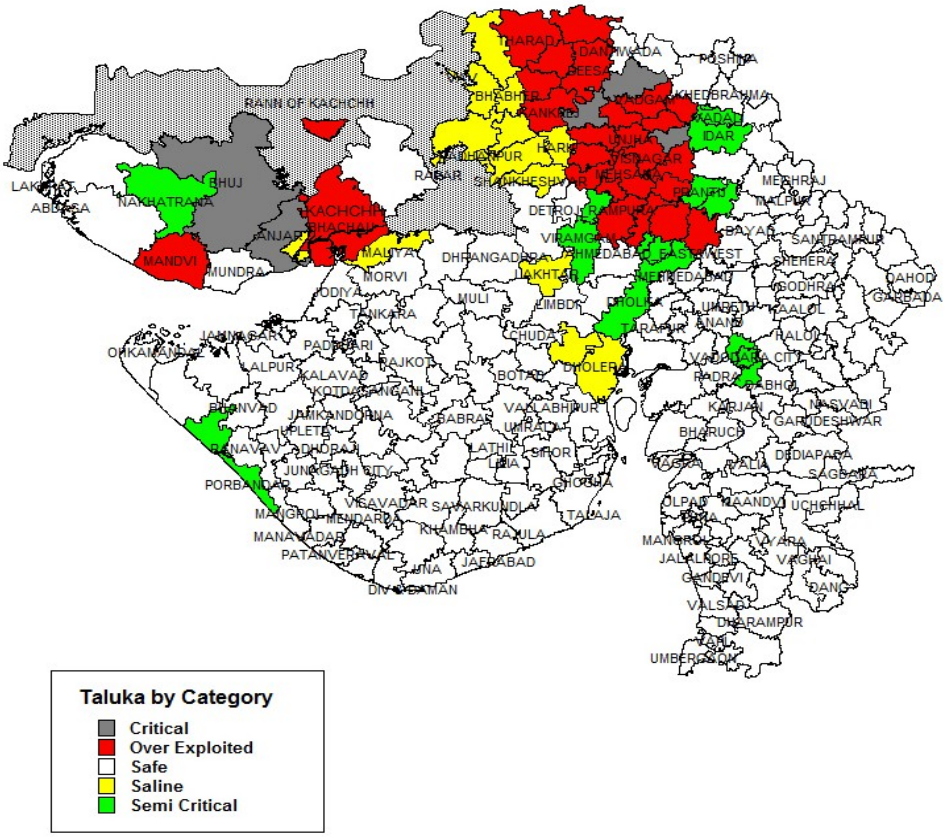
REPORT ON
DYNAMIC GROUND WATER RESOURCES OF GUJARAT STATE

(As on March 2017)



CENTRAL GROUND WATER BOARD
WEST CENTRAL REGION
DEPARTMENT OF WATER RESOURCES, RD & GR
MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA
AHMEDABAD

GUJARAT WATER RESOURCES
DEVELOPMENT CORPORATION LTD
NARMADA, WATER RESOURCES,
WATER SUPPLY & KALPASAR DEPARTMENT
GOVERNMENT OF GUJARAT
GANDHINAGAR

JUNE-2019

Report on
Dynamic Ground Water Resources of Gujarat State as on March 2017

PART – I
Fresh Ground Water Area

PART – II
Saline Ground Water Area

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June 2019

FOREWORD

The State of Gujarat is moving on a fast track in the field of infrastructure development, industrialization, and expansion in agriculture sector. This has in turn put forth a lot of demand on the natural resources and particularly in the water sector. The availability of Groundwater being easy and being widely distributed in space and time makes it preferred commodity over the surface water resources. This warrants us to estimate precisely the ground water resources available for better management of the resources to sustainably meet the ever increase in its demand with the growth of population, increase in agriculture and modernization and enlargement of industrial sectors.

The Dynamic Ground Water Resources of Gujarat State have been computed as per the methodology recommended by "Ground Water Resources Estimation Committee" (GEC-2015) set up by Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India. These computations shall form important component for water resource management of this semi arid State having wide variation in availability of water resources, geology, physiology, landform etc. The present computation clearly brings out regional imbalances in the availability and the extent of development in different parts of the Gujarat State.

The present report is a combined effort of Gujarat Water Resources Development Corporation Ltd. of Government of Gujarat and Central Ground Water Board, West Central Region, Ahmedabad with assistance from other Central and State Government departments like Gujarat Electricity Board, State Water Resources Department and Revenue Department etc. The efforts made by the working group are praise worthy.

The State Government while according approval for these estimates has expressed that since the over exploited talukas fall in the North Gujarat area and Kachchh region, studies should be taken up to identify the area suitable for artificial recharge so that AR projects can be taken up to arrest further decline in water level in these talukas. It was also stressed upon that since the state of Gujarat is characterized by arid to semi-arid climate a large volume of surface water is lost through evaporation. Hence proper planning may be done in order to divert surplus available surface water to recharge ground water so that over exploited areas can be benefited and evaporation loss can be minimized.

I would like to place on record my sincere thanks to the dedicated team of officers of GWRDC Ltd. and scientist of CGWB, WCR for bringing out this report in a presentable manner.

Regional Director
West Central Region
Central Ground Water Board
Dept. Of Water Resources, RD & GR
Ministry of Jal Shakti
Government of India

CONTRIBUTORS PAGE

The Working Group would like to place on record the valuable guidance given by Shri K. A. Patel, Special Secretary (Water Resources), Narmada, Water Resources, Water Supply & Kalpsar Department, Government of Gujarat & also the Chairman of the State Level Committee, Shri A. D. Kanani , Chief Engineer (Panchayat) & Additional Secretary, Narmada, Water Resources, Water Supply & Kalpsar Department, Government of Gujarat, for finalisation of the Report on "Dynamic Ground Water Resources of Gujarat State (As on March 2017)" need a special mention.

The task of assessment of the dynamic resources of Gujarat would have not been possible without the constant support and continued guidance by Dr. R C Jain, Advisor (GW), GWRDC Ltd., Govt. of Gujarat. The contribution of the team of officers of GWRDC Ltd. comprising, Shri V. M. Mehta, Superintending Engineer, Shri H. B. Shelat, Geologist and Shri K. P. Patel, Geologist, GWRDC Ltd., Gandhinagar in the entire process of assessment is commendable. The dedicated and untiring effort of Shri B. Mohapatra, Sr. Hydrogeologist under the able guidance of Shri D P Pati, Regional Director, Central Ground Water Board, West Central Region, Ahmedabad in assessment and compilation of this report is highly appreciable. Sincere acknowledgement is due to Dr. A K Jain for his technical inputs and guidance time to time in assessment of the dynamic resources of the state. The sincere cooperation extended and contribution made by Ms. Monika, Scientist-B in bringing out this report is gratefully acknowledged.

Sincere acknowledgement is extended to the departments like, Gujarat Water Supply & Sewerage Board, Govt. of Gujarat, Directorate of Agriculture and Statistics, Irrigation Department, Water Resources Investigation Circle and GEB for making the data available for completion of this report.

REPORT ON DYNAMIC GROUND WATER RESOURCES OF GUJARAT STATE
(As on March 2017)

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Approved minutes of the State Level Committee Meeting held on 26.02.2019

GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD
WEST CENTRAL REGION
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No.TS/4(9)/WCR/CGWB/GWRE-2017-1168
Date: 02.04.2019

2 APR 2019

To
The Special Secretary (Water Resources)
Narmada, Water Resources, Water Supply & Kalpsar Department
Block No-9,2nd Floor
Sachivalaya
Gandhinagar

Sub: Minutes of the meeting of the State Level Committee on Ground Water Resource Assessment of the State of Gujarat as on March 2017 held in the Committee Room of Narmada Water Resources, Water Supply and Kalpsar Department, Block No 9/4, Secretariat, Gandhinagar on 26.02.2019 at 12.30 Hrs

Sir,

The minutes of the meeting of the State Level Committee on Ground Water Resource Assessment of Gujarat State as on March 2017 held in the Committee Room of Narmada, Water Resources, Water Supply and Kalpsar Department, Block No 9/4, Secretariat, Gandhinagar on 26.02.2019 at 12.30 Hrs. is enclosed for kind perusal and approval.

Yours faithfully

02/04/19

(B. Mohapatra)
Sr. Hydrogeologist

Enclosure: As above

Copy to:

1. The Managing Director, Gujarat Water Resources and Development Corporation Ltd., Near Bij Nigam, Sector-10, Gandhinagar-382043 for kind information.

Approved
3/4

(B. Mohapatra)
Sr. Hydrogeologist

Minutes of the meeting of the State Level Committee on Ground Water Resource Assessment of Gujarat as on March 2017 on 26.02.2019 at 12.30 Hrs in the Committee Room of N, WR, WS & K Department, Block No-9/4, Secretariat, Gandhinagar

A meeting of the State Level Committee of Ground Water Resource Assessment was held under the Chairmanship of the Special Secretary (WR), Narmada Water Resources, Water Supply and Kalpsar Department on 26.02.2019 at 12.30 Hrs in the Committee Room of N, WR, WS & K Department, New Sachivalaya, Block – 9/4, Gandhinagar. Following members of the State Level Committee attended the meeting.

1	Shri K A Patel – Special Secretary(WR), Narmada , Water Resources, Water Supply & Kalpsar Department	**Chairman**
2	Shri A D Kanani, Chief Engineer (Panchayat) & Additional Secretary, Narmada, Water Resources, Water Supply & Kalpsar Department	**Member**
3	Shri J P Parmar, The Managing Director, Gujarat Water Resources Development Corporation Ltd.	**Member**
4	The Director (Agriculture), Directorate of Agriculture, Gandhinagar] Shri R. P. Rajput Joint Director (Agri)	**Member** Representative
5	Shri Barin S Mehta, Joint Secretary, Industries & Mines Department, Gandhinagar	**Member**
6.	Dr.R.C.Jain, Adviser (Ground Water),GWRDC Ltd.	**Special Invitee**
6	Shri D P Pati, Regional Director, CGWB, WCR, Ahmedabad	**Member Secretary**

The list of all officers along with the members of State Level Committee is given in Annexure - I

The minutes of the meeting are as follows.

1. Shri D P Pati, Regional Director, CGWB, WCR, Ahmedabad welcomed all the members present in the meeting. With the permission of the Chair, Shri B. Mohapatra, Sr. Hydrogeologist, made presentation regarding the Assessment of the Dynamic Ground Water Resources of Gujarat as on March 2017 including the methodology adopted (GEC 2015) for computation.
2. As opined by the Managing Director, GWRDC Ltd. during the previous meeting, a comparison between previous assessment i.e GWRA-2013 (based on GEC-97 methodology) and the current assessment i.e GWRA-2017 (Based on GEC-2015 methodology) was presented in view of the change in the methodology adopted for the current assessment, this will be incorporated in the report.
3. The Additional Secretary and Chief Engineer (Panchayat), N, WR, WS & K department, GoG suggested that since the over exploited talukas fall in the North Gujarat area and Kachchh region, studies may be carried out to identify the area suitable for Artificial Recharge so that AR projects can be taken up to arrest further decline in water level in these talukas.

4. Dr. R.C. Jain, informed that such a study was already carried out by the Task Force constituted by the State Govt. in 2009.Final report of the same was submitted in 2011.This may require updating based on the updated ground water scenario and surface water sources considered for recharge. It was decided to have a presentation of the task force report on a convenient date.
5. Dr. R C Jain, Advisor (GW). GWRDC Ltd., stressed on the fact that since Gujarat is characterized by arid to semi-arid climate a large volume of surface water is lost through evaporation. Hence proper planning may be done in order to divert surplus available surface water to recharge groundwater so that over exploited areas can be benefited and evaporation loss can be minimized.
6. He also informed that one pilot study has been taken up for Artificial Recharge Project in the Saraswati River Bed at Madhupavdi near Siddhpur Taluka of Patan District during 2011-12 to divert surplus surface water for ground water recharge particularly in water stressed north Gujarat area. Feasibility of replication of the same in other suitable areas needs to be examined.
7. A presentation was also made on Dynamic ground water resources of the urban areas of Gujarat having more than 10 lakhs population namely, Ahmedabad, Rajkot, Surat and Vadodara, which will be modified in view of the observations made.
8. Assessment of the Dynamic Ground Water Resources of Gujarat state as on March 2017 was approved by the State Level Committee.
9. The Meeting ended with vote of thanks to the Chair by Dr. A K Jain, Scientist-D.

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Report on
Dynamic Ground Water Resources of Gujarat State
(As on March 2017)

PART – I
Fresh Ground Water Area

DYNAMIC GROUND WATER RESOURCES (FRESH GW AREA)

1. GENERAL FEATURES

1.1 Location

Gujarat State covers a total geographical area of 1, 96, 024 Sq. Kms. and is situated between 20° 06' to 24° 42' North Latitude and 68° 10' to 74° 28' East Longitude in the Western part of India. The State has the longest coastline in the country measuring about 1,600 kms along the western part of India, extending from Lakhpat in the North to Valsad in the South. Gujarat State has common borders with Rajasthan, Madhya Pradesh and Maharashtra States in North, East and South and with Pakistan in the North-West **(Fig-1).** For administrative purpose State has 33 Districts & 251 Talukas. However for ground water resources assessment 248 talukas have been considered as assessment unit.

(Fig:1: Administrative Map of Gujarat)

1.2 Physiography

Gujarat State can be divided into five major physiographical zones **(Fig-2)**.

1.2.1 Alluvial plains

Extend from northern border of Banaskantha district upto Valsad district in Southern Gujarat. It covers central parts of North & Central Gujarat & western parts of South Gujarat region. The alluvial plains of Rann of Kachchh are low-lying & saline.

1.2.2 The Eastern Hilly tract

The eastern hilly tract all along the eastern boundary of Gujarat extends from Northeast part of Banaskantha district to Southeast part of Dangs district. The altitude varies from 300 to 1400 m. Above MSL. Except major inter-State rivers like the Narmada and the Tapi, majority of rivers in Gujarat originate from these hilly tracts & flow toward south and south-westward.

1.2.3 Uplands of Saurashtra & Kachchh

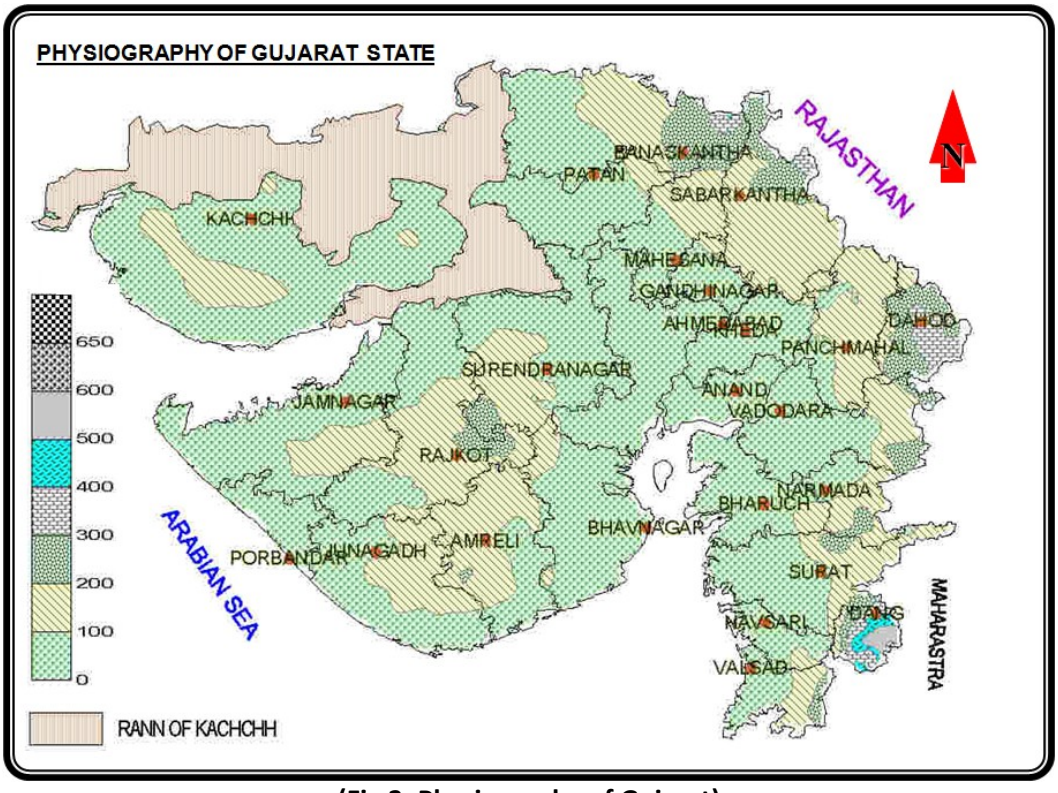
The Saurashtra plateau region is separated from Gujarat main land by Gulf of Cambay & upland of Kachchh is separated from Saurashtra & Gujarat main land by gulf of Kachchh & little Rann of Kachchh. The Mount Girnar in Saurashtra is 1117 m. Above MSL. Both regions being dome shaped, slopping out ward in all direction from the central part.

1.2.4 Coastal alluvial plains

The low-lying coastal alluvial plain about 1600 km long is a narrow strip extending from Lakhpat in NW of Kachchh district to Valsad in Southern Gujarat which ranges in elevation from few meter to about 25 m. Above MSL.

1.2.5 Rann of Kachchh

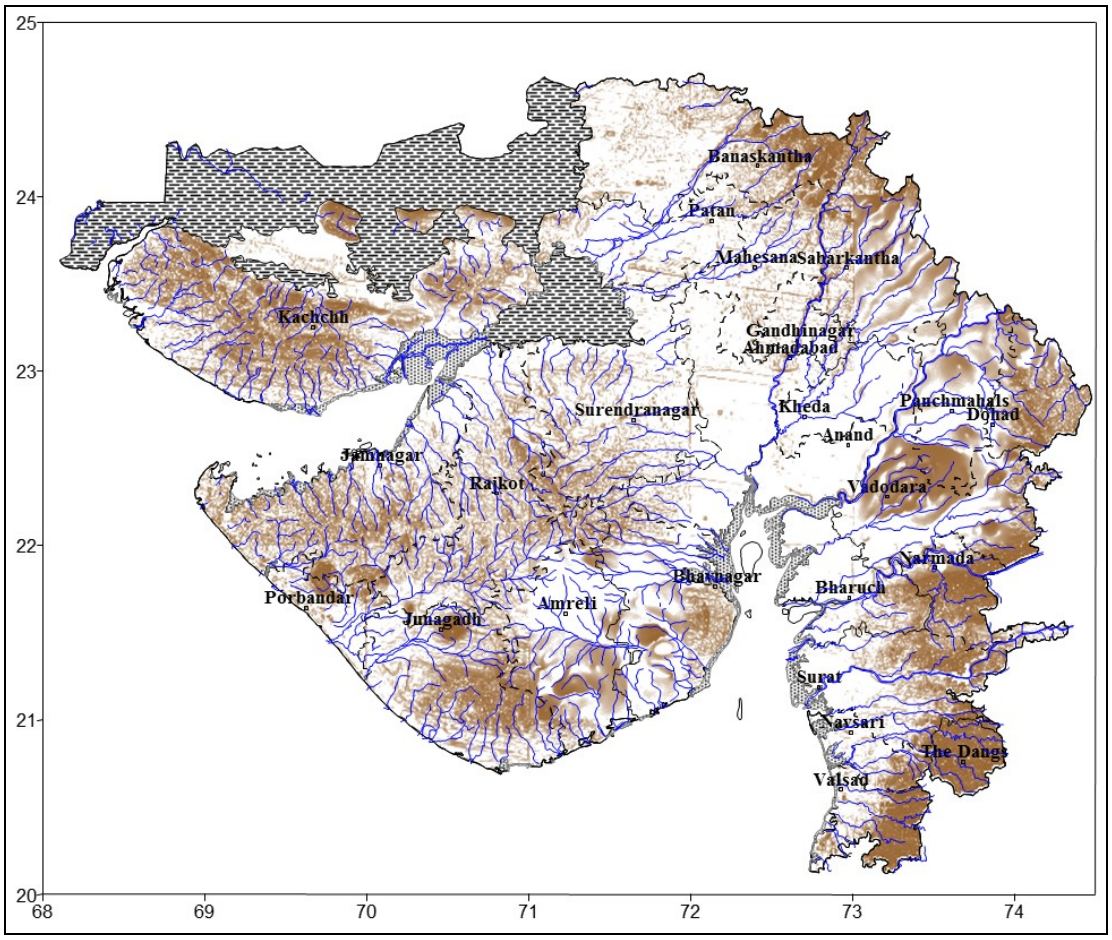
Marshy to saline desert known as Greater & little Rann of Kachchh is situated in northern & south-eastern part of Kachchh district respectively. This vast expanse of salts mixed with clay is devoid of any vegetation or habitation. The general elevation of this tract varies between 1 to 4 m. Above MSL. During high tide period seawater enters in Greater & little Rann through Kori creek and Gulf of Cambay. There are a few local depressions with elevations even below MSL, which give rise to a few small inland saline lakes.



(Fig 2: Physiography of Gujarat)

1.3 Drainage

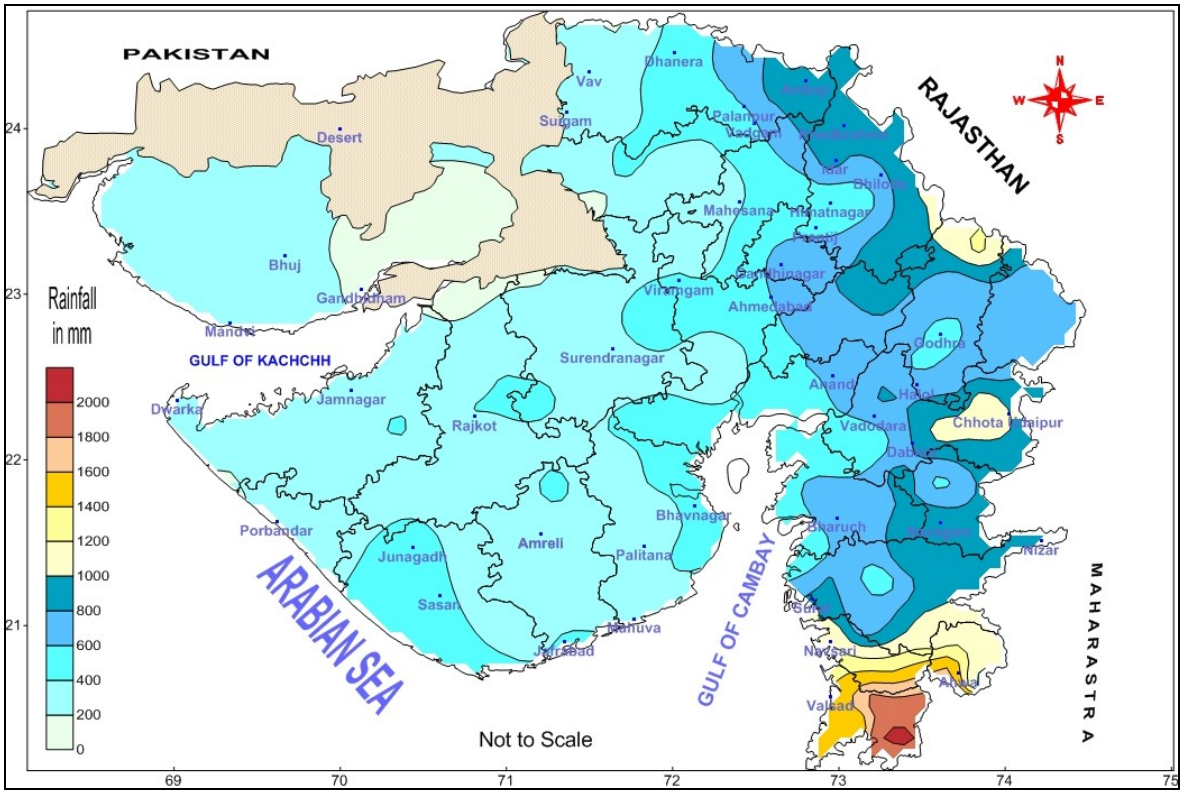
Drainage in all the five physiographical regions of the State has distinct characteristics with the prevailing topographical and physical characteristics of the rock formations. The flow direction of some of the major rivers like Narmada is controlled by a major tectonic fault. Except rivers Tapi, Narmada and Mahi, all other rivers of the State originate from eastern hilly region & flow in west or south-westward. The rivers flow with highly meandering courses in west direction and cut across the alluvial plains. The rivers Narmada and Tapi are long structural trough. The rivers of South Gujarat region are generally perennial. While majority of rivers of North, Saurashtra & Kachchh regions are seasonal. The rivers in upland of Saurashtra & Kachchh are mostly small & represent a radial drainage pattern. **(Fig:3)**



(Fig 3: Drainage Map of Gujarat)

1.4 Climate

The Gujarat State has humid, sub-humid and semi-arid to arid type of climatic conditions with highest rainfall of about 3500 mm in Dang district to lowest about 300 mm in Kachchh district. The intensity of rainfall gradually decreases from SE to NW. (**figure -4**). The summer temperature in many parts of the State rises up to 46° C, while the minimum winter temperature up to 4° C is also recorded at few locations in the State.

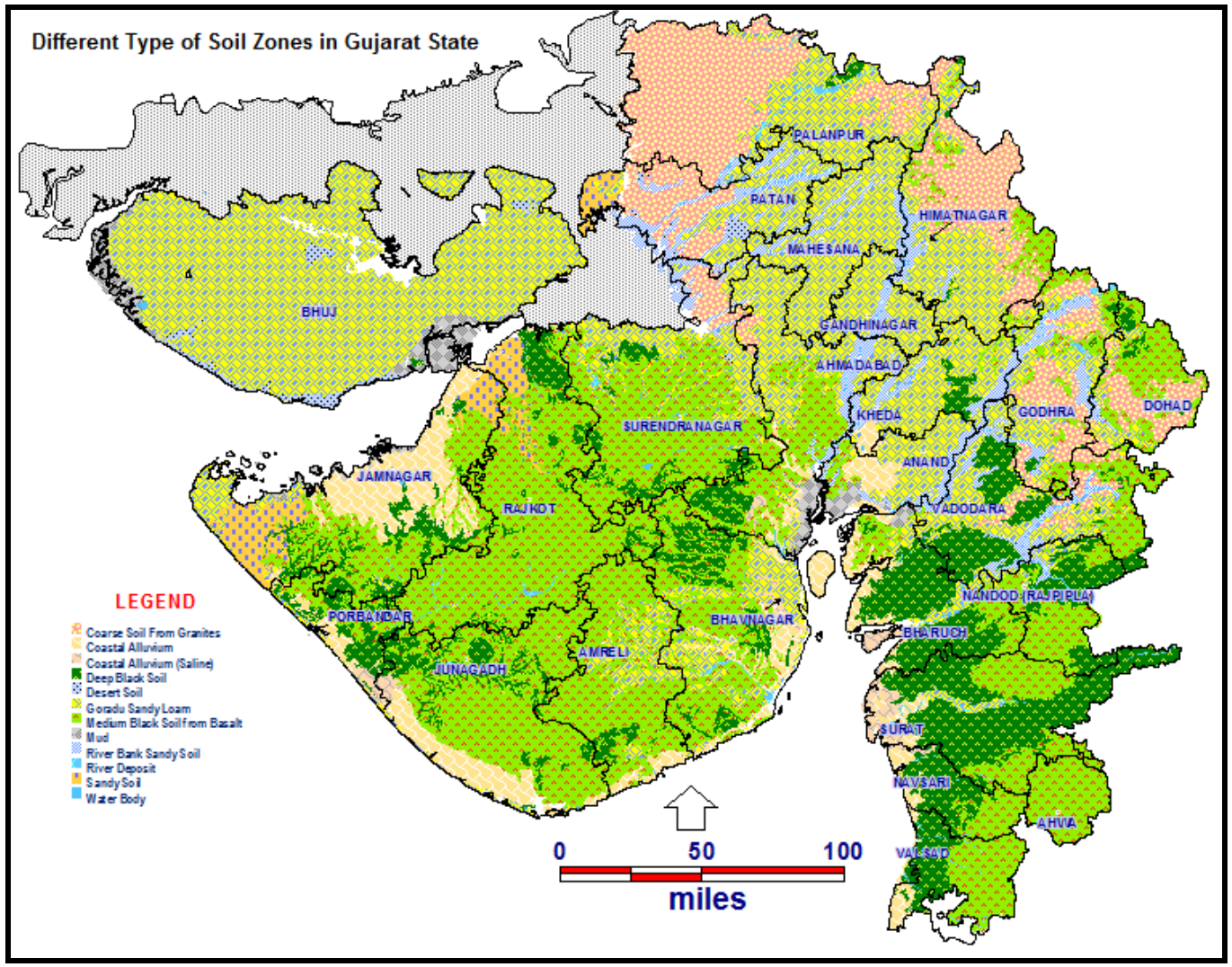


(Figure: 4 – Distribution of Annual Rainfall (Isohyetal Map) Year – 2016)

1.5 Soils

All India Soil & Land Use Survey Organization has classified the soils in Gujarat State **(Fig 5).** Accordingly main soil groups are as under.

a) Goradu Sandy Loam
b) Medium Black Soil
c) Deep Black Soil
d) Coastal alluvium (Saline) soils
e) Desert soils
f) Mud



(Fig 5: Different Soil Zones in Gujarat)

2. HYDROGEOLOGY

Hydrogeologically the State of Gujarat exhibits wide variation. The aquifers are formed by Geological formations of various age varying from Archaean/Precambrians to Recent. The high relief areas in the eastern and north-eastern parts of the state occupied by the Deccan Traps and the Archaeans respectively have steep topographic gradients resulting in high run-off, and therefore, provide little scope for groundwater recharge. The groundwater potential in this terrain is limited. The large alluvial tract extending from Banaskantha district in the north to Surat and Valsad districts in the south constitutes the largest and most potential groundwater reservoir in the state. The aquifers are extensive, thick, hydraulically connected and are moderate to high yielding. Almost the entire Saurashtra and Kachchh regions are occupied by a variety of hard and fissured formations which include basalt and consolidated sedimentary formations with semi-consolidated sediments along the low-lying coastal areas. The compact and fissured nature of rocks gives rise to discontinuous aquifers with moderate yield potential. The friable semi-consolidated sandstone forms an aquifer with moderate yield potential. The coastal and deltaic areas in the state form a narrow linear strip and are underlain by Tertiary sediments and Alluvium. Though highly potential aquifers occur in these areas, salinity is a constraint for groundwater development. Groundwater withdrawal requires to be strictly regulated so that it does not exceed the annual recharge and also that it does not disturb the hydro-chemical balance leading to seawater ingress. The quality of groundwater in both hard rock and alluvial terrain is, by and large suitable except, in the coastal areas, estuarine tract and the Rann where the degree of mineralisation in ground water is rather high and salinity is common. Salinity in groundwater is also noticed in the arid and semi-arid tract. The different conditions of groundwater occurrence in the state have led to divergent groundwater situations in the areas occupied by different geological formations. The hydrogeological map of Gujarat State is shown in **Fig: 7.**

2.1 Archaean and Proterozoic Formation

Rocks of Archaean and Proterozoic age occupy the north-eastern and eastern parts of the state and cover extensive areas in parts of Vadodara, Kheda, Panchmahals, Sabarkantha, Mahesana and Banaskantha districts. These rocks, which include gneiss, schist, phyllite, quartzite and metamorphosed igneous intrusive do not form good aquifers due to their poor porosity and permeability. Dug wells, dug-cum-bore wells and bore wells are feasible only in favourable sites where sufficient weathered mantle and/or fractures and joints occur. The wells tapping these aquifers have maximum depth of 30 to 40 mbgl beyond which groundwater occurrence is not common. The yield of wells in these rocks varies from a few cubic meters to 100 cubic meters per day at minimal drawdown.

2.2 Mesozoic Formation

Jurassic and Cretaceous formations include Pachchham, Chari, Katrol and Bhuj Series in Kachchh, Dhrangadhra and Wadhwan sandstones in northeastern part of Saurashtra, Bagh beds along the Narmada River and Himmatnagar sandstones in Sabarkantha district. Pachchham and Chari Series are predominantly calcareous while Wadhwan sandstones and Bagh beds include some limestone. The rest are arenaceous and consist of inter-bedded sandstone and shale sequences. The most important and productive aquifer among these formations occurs in the Bhuj Series consisting of predominantly friable, soft, medium to coarse grained sandstone occurring at depths of few meters to as much as 300 meters. Tube wells constructed up to 200 mbgl in this formation yield 70 to 170 m^3/hour for drawdown of about 10m. The salinity distribution in groundwater in Upper Bhuj aquifers is generally uniform with low concentration of dissolved solids in the upland and non-irrigated areas. Salinity gradually increases towards area of intensive irrigation and discharge area.

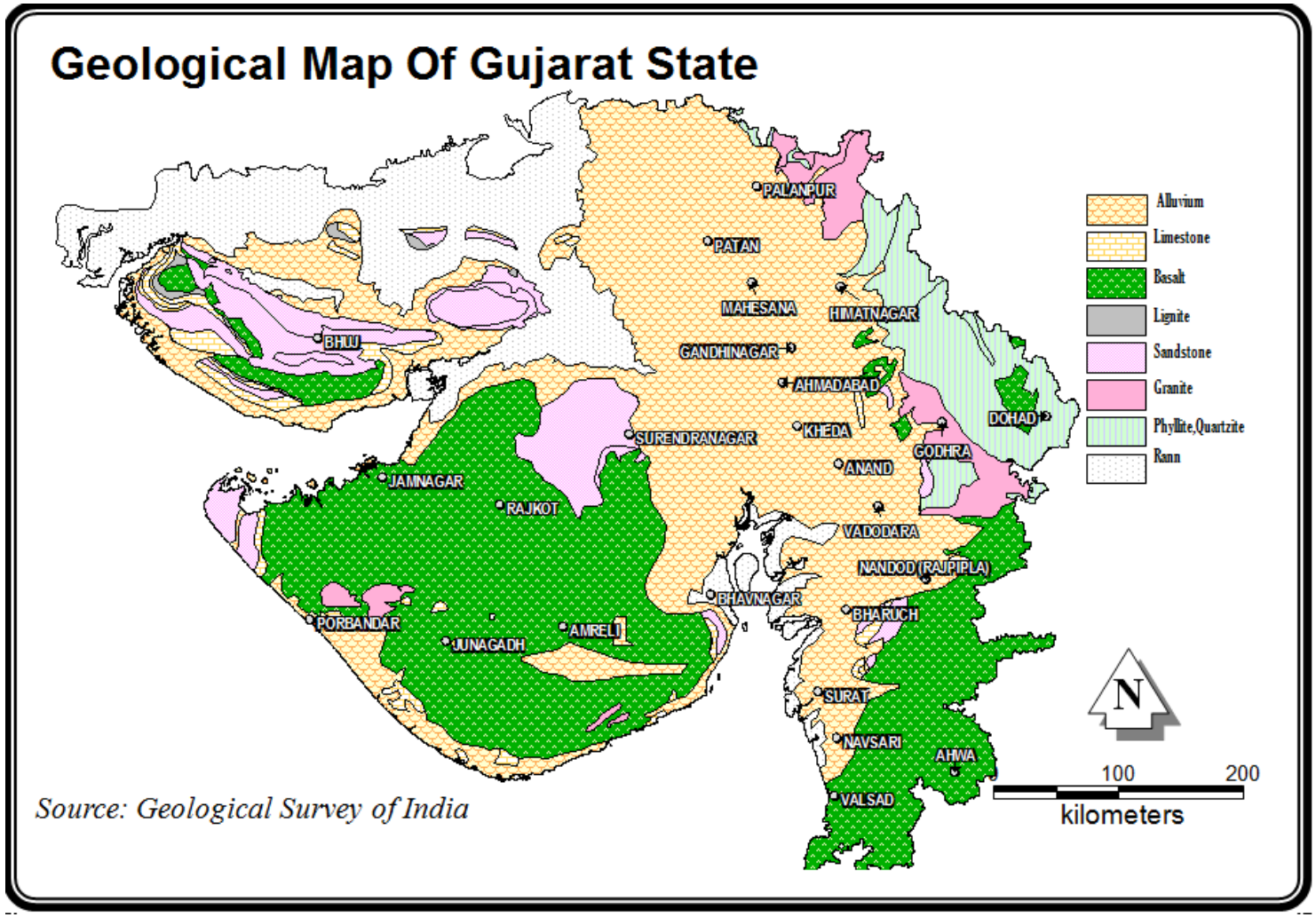
The Dhrangadhra sandstones comprise of about 400 m thick, fine to coarse grained sandstones inter-bedded occasionally with carbonaceous shale. Tube wells tapping about 100 m of aquifer thickness in this formation within a depth of 212 mbgl yield limited to moderate discharge of the order of 14 to 80 m^3/hour. Basic sills of 30 to 50 m thickness are found intruded in the Lower Dhrangadhra formation in the northern part of Surendranagar and Rajkot districts at Gala, Sathapur and Chuli villages. Normally, the sills mark the lower limit of fresh groundwater occurrence. In the northern part of Rajkot district and eastern part of Jamnagar districts, these sandstones have been encountered at depths of 200 – 250 mbgl below Traps, in semi- confined conditions.

The Himmatnagar sandstones are exposed in a narrow belt between Eklara and Ranasan villages in Sabarkantha district. They also occur below the traps near Dhansura (23° 24': 75° 15') at depths of 60 to 100 mbgl. Patches of these sandstones occur under the alluvial cover near Sanseli (22° 42'; 75° 25'), Madhwas (23° 24'; 73° 27') and Gugalpur (22° 15': 73° 28') and on the northern bank of Goma River. Although these sandstones are generally fine grained, hard and compact, coarse friable sandstones are observed at places near Kapadvanj. These sandstones, when saturated to moderate depths, form potential aquifers. Tube wells tapping these aquifers yield up to 50 m^3/hour.

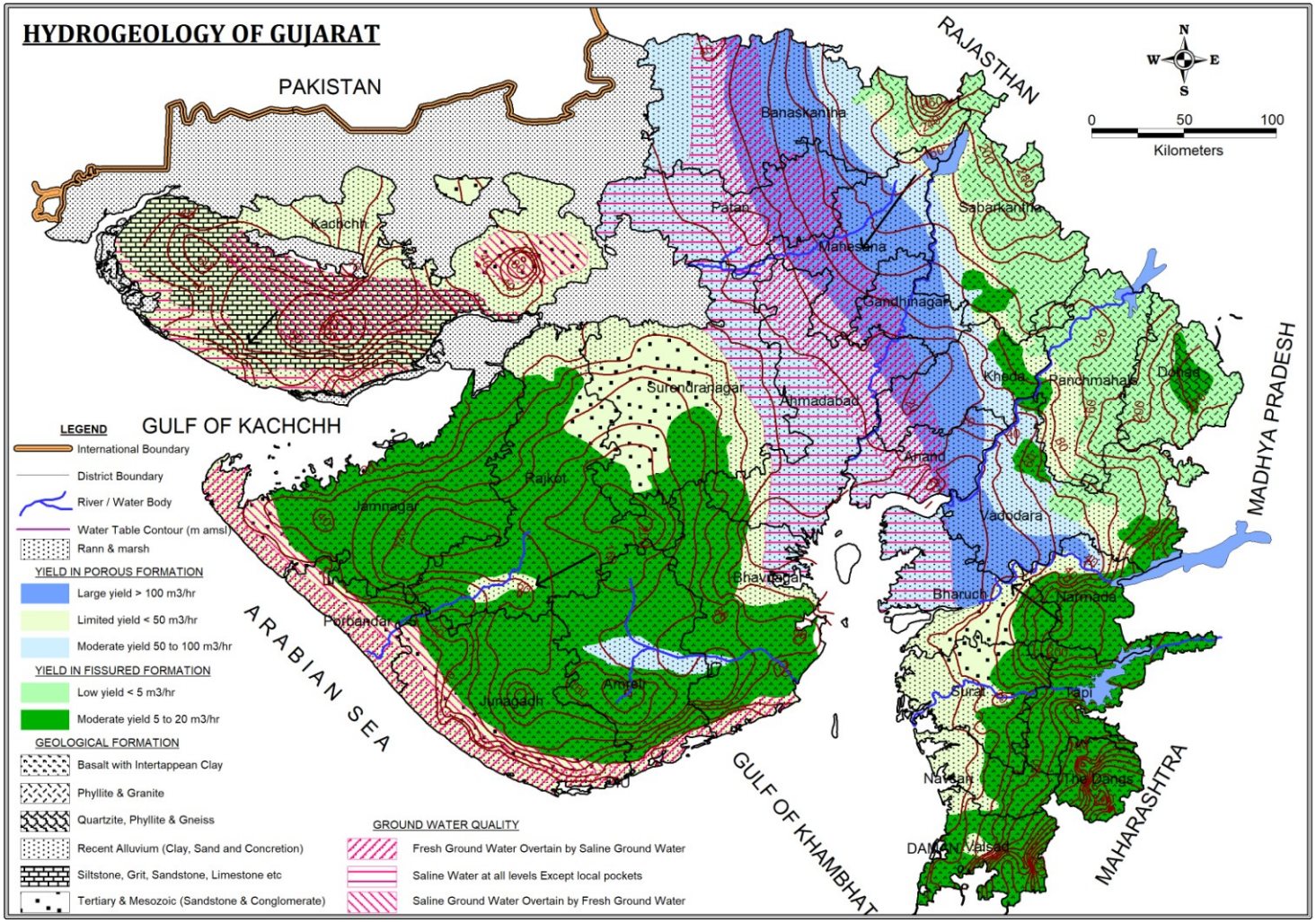
2.3 Deccan Trap

These are essentially basaltic lava flows with a general horizontal to near horizontal disposition over a very wide area. From groundwater potential point of view, these rocks constitute moderately promising aquifers. The jointed and fractured basalts hold and transmit water in moderate quantities. The thickness of traps ranges from 100 to 150 m in Kachchh to more than 1000 m in Cambay basin.

The yields in dug wells tapping the basalts vary from insignificant quantities to 30 m^3/day. Higher yields have been observed at hydrogeologically favourable locations. The yield of the dug wells can be enhanced considerably by lateral and/or vertical borings. The discharge of tube wells is reported to decline at places due to presence of unsaturated porous zones at depth. The quality of groundwater in traps is generally potable.



(Fig 6: Geological Map of Gujarat)



(Fig 7: Hydrogeological Map of Gujarat)

2.4 Tertiary Formation

These rocks are exposed between Narmada and Tapi rivers in parts of Bharuch and Surat districts. They also occur in the coastal tracts of Saurashtra and Kachchh.

Gaj beds belonging to Miocene occur all along the Saurashtra coast. These consist of limestone, clay and grit mostly gypsiferous with thin sand layers. Drilling at Okha (22°28': 69°16') and Veraval (20°54': 70°25') has shown that locally, the Gaj beds extend beyond 300 m depth and the deeper zones yield meagre quantities of saline groundwater.

The quality of groundwater in Gaj beds along Saurashtra coast is slightly inferior on account of intercalated clay bands and inherent salinity of Gaj beds, which were deposited under marine conditions. However, the quality of ground water in the upper Gaj limestone is better. The chloride content in groundwater ranges from 100 to 200 mg/l between Veraval, Sil (21° 11': 70° 03') and around Porbandar.

Dwarka beds, comprising of gypsiferous and calcareous red colour clays and sandy limestone are about 150 m thick. Groundwater in the Dwarka beds is of poor quality with chloride content ranging from 500 to 700 mg/l. Yield of dug wells are of the order of 37 m^3/day and tube wells yield about 22 m^3/day for a drawdown of about 4 m. In the Kachchh region, the sandstones of Manchhar series form good aquifers. Tubewells, ranging in depth from 116 to 169 mbgl, yield between 68 to 136 m^3/hour and the chloride content ranges between 96 and 612 mg/l. However, the Tertiary rocks, in general, do not form promising aquifers for groundwater development because of the inferior quality of groundwater. In southern Gujarat (Narmada-Tapti area), the tertiary rocks comprises of sandstone, shale and limestone intercalated with gravel which locally exceed 100 m in thickness. Ground water in these rocks is mostly brackish to saline and yields are in shallow tube wells.

2.5 Quaternary Formation

The Quaternary formations include milliolite limestone, alluvium and aeolian deposits. The milliolite limestone is of limited thickness and its occurrence is confined to the coastal tract of Saurashtra. The alluvial and aeolian deposits extend as one continuous plain, from north to south and also as valley-fills in the hard rock terrain.

Highly cavernous milliolite limestone is locally a very productive aquifer. Dug wells tapping these limestones are capable of yielding up to 200 m^3/day. These are the repositories of potable groundwater in an otherwise saline coastal belt of Saurashtra. Quaternary sediments occupy an area of about 86,680 sq km. Their thickness in the Cambay Basin is estimated to be of the order of 500 m. However, towards north in the districts of Mahesana Banaskantha and Sabarkantha, the thickness reduces to less than 50 m near the hilly tract. In general, the thickness of the alluvium in north Gujarat ranges from 40 to 500 m. In the southern Gujarat plains, the alluvium mostly overlies the basalts and the tertiary sediments. Its thickness ranges from a few meters near the rock outcrops to over 75 m in the lower reaches. The Quaternary sediments vary in character and composition. In the Cambay basin, these are predominantly composed of clay, silt and sand with "kankar". The proportion of gravels, pebbles and boulders, etc., increases towards the hilly tracts. Such areas, forming the piedmont terrain, extend for 10 to 20 km from the hills into the plains.

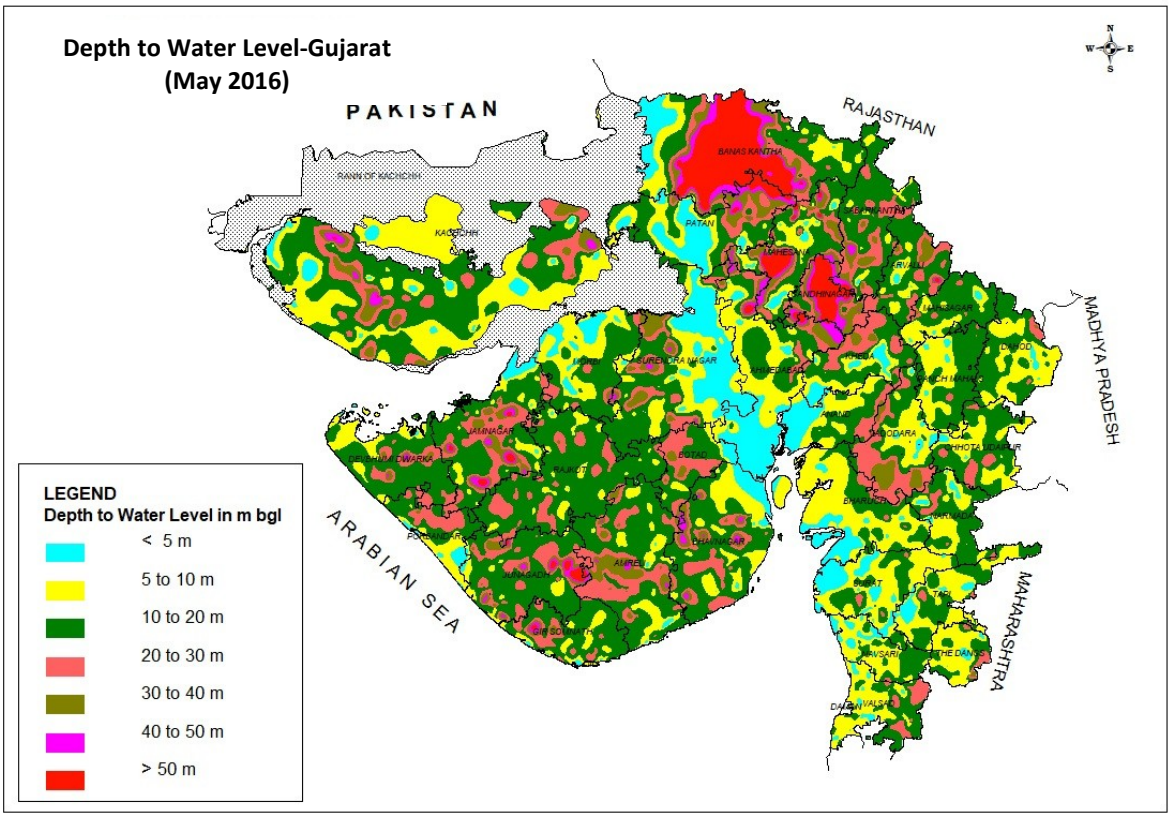
A number of abandoned river channels and valley fills occur in the rocky areas. These are of great significance for the development of ground water in an otherwise less promising terrain.

Groundwater in the alluvium occurs under unconfined conditions at shallow depths. In deeper horizons, it occurs under semi-confined to confined and sub-artesian conditions. Detailed study in Mahesana, Banaskantha, Rajkot, Surendranagar, Kheda, Sabarkantha, Kachchh and Ahmedabad districts has revealed that multiple aquifers exist in major part of the alluvial plains of Gujarat up to a depth of 500 m.

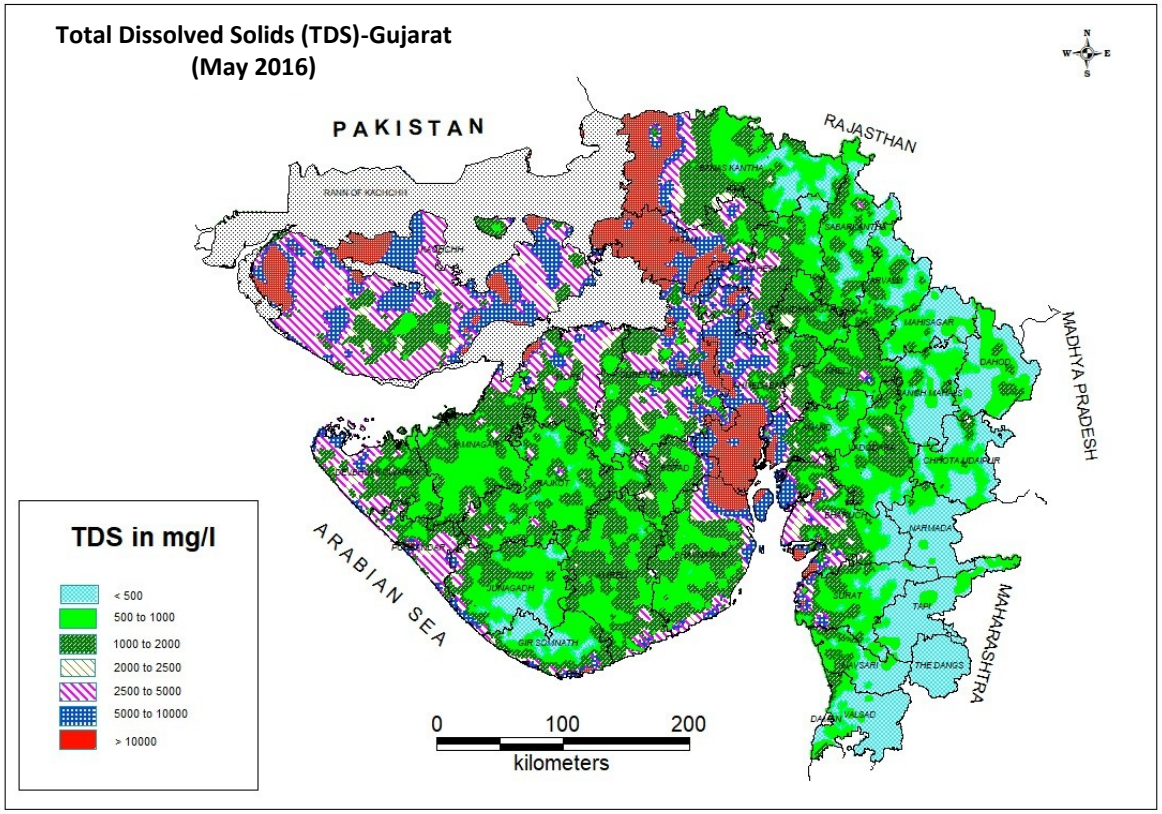
These aquifers have their areas of recharge in the piedmont terrain and the hilly areas towards the east and northeast. Most of the aquifers coalesce into one phreatic aquifer in the recharge area but are identified as separate aquifers occurring under artesian conditions in the central part of the basin and in the discharge areas towards west and southwest. In parts of Mahesana and Banaskantha districts, the quaternary sediments is up to 600 m thick, comprising of 10 to 125 m thick younger alluvial deposits (Pleistocene to Recent) and 100 to 475 m thick older alluvial deposits (Pliocene to Pleistocene). The entire alluvial sequence has been divided into five major aquifers viz., A (up to 125m) or phreatic aquifer and B, C, D and E (between 125 and 600 m depth) or confined aquifers.

Due to over-exploitation, the water levels in the phreatic aquifer have declined alarmingly rendering them almost dry. Presently, first and second confined aquifers are the most exploited. The decline of water level in these aquifers is more than 40 m since 1961at most of the area. The yield of tube wells tapping users confined aquifer vary from 20 to 40 lps.

The depth to water level and ISO TDS Maps for May-2016 are shown below, in **figure -8 and figure 9** respectively.



(Fig 8: Map showing Depth to water level-Gujarat (May 2016)



(Fig 8: ISO TDS map-Gujarat (May 2016)

3. GEC 2015 METHODOLOGY:

Present Groundwater Resource Estimation 2017 (GWRE 2017) has been carried as per revised methodology, known as Groundwater Estimation Committee 2015 (GEC 2015)[10]. The foremost recommendations of revised GEC 2015 methodology are summarized as follows. Detailed report on GEC 2015 is available on CGWB web site (http://cgwb.gov.in/).

3.1 Concept of Aquifer Wise Assessment

GEC 2015 recommends aquifer wise groundwater resource assessment for *Replenishable* ground water resources or *Dynamic* groundwater resources and also for *In-storage* groundwater resources or *Static* groundwater resources for both Unconfined and Confined aquifer. Wherever the aquifer geometry has not been firmly established for the unconfined aquifer, the in-storage groundwater resources have to be assessed in the alluvial areas up to the depth of bed rock or 300m whichever is less. In case of hard rock aquifers, the depth of assessment would be limited to 100m. In case of confined aquifers, if it is known that groundwater extraction is being taken place from this aquifer, the dynamic as well as in- storage resources are to be estimated. If it is firmly established that there is no groundwater extraction from this confined aquifer, then only in-storage resources of that aquifer has to be estimated

3.1.1 Periodicity of Assessment

GEC 2015 methodology recommends that the groundwater resources should be assessed once in every three years as per the present practice such that time lag between assessment and publication of the results be minimized. Hence it recommends to make all out efforts to reduce the time lag and so that groundwater assessment report be issued in the successive water year without delay.

3.1.2 Groundwater Assessment Unit & Sub Units

GEC 2015 methodology recommends aquifer wise groundwater resource assessment. However, until aquifer geometry is established on appropriate scale, it recommends that the existing practice of using watershed in hard rock areas and blocks/ mandals/ firkas in soft rock areas may be continued. It is recommended that wherever spring discharge data is available, the same may be assessed as a proxy for 'groundwater resources' in hilly areas. The assessment of spring discharge would constitute the 'replenishable potential groundwater resource' but it will not be accounted for in the categorisation of groundwater assessment, at least not in the near future.

Like earlier GEC methodology, out of the total geographical area of the assessment unit, hilly areas wherever slope is greater than 20%, are to be identified and subtracted as these areas have more runoff than infiltration.

The groundwater resource beyond the permissible quality limits in terms of the salinity has to be computed separately. The remaining area after excluding the area with poor ground water quality is to be delineated as follows:

Non-command areas which do not come under major/medium surface water irrigation schemes. (Command area <100 Ha should be ignored).Command areas under major/medium surface water irrigation schemes which are actually supplying water (>100 Ha of command area.)

GEC 2015 methodology recommends that after the assessment is done, a quality flag may be added to the assessment unit for parameters salinity, fluoride and arsenic. It is proposed to have all these areas of an assessment unit in integer hectares to make it national database with uniform precision.

3.1.3 Groundwater Resources of Assessment of Unit

The groundwater resources of any assessment unit is the sum of the total groundwater availability in the principal aquifer (mostly unconfined aquifer) and the total ground water availability of semi-confined and confined aquifers existing in that assessment unit. The total groundwater availability of any aquifer is the sum of Dynamic groundwater resources and the In-storage or Static resources of the aquifer.

GEC 2015 advocate that the development planning should be on dynamic resource only as it gets replenished every year. Changes in static or in-storage resources reflect impacts of groundwater mining. Such resources may not be replenishable annually and may be allowed to be extracted only during exigencies with proper recharge planning in the succeeding excess rainfall years.

3.2 Assessment of Annually Replenishable or Dynamic Groundwater Resources

The elementary concept of GEC 2015 methodology for groundwater resources estimation is based on basic principle of water balance as given below –

$$\textbf{Inflow} - \textbf{Outflow} = \textbf{Change in Storage (of an aquifer)} \quad (1)$$

Equation 1 can be further elaborated as -

$$\Delta S = Rrf + RSTR + RC + RSWI + RGWI + RTP + RWCS \pm VF \pm LF - GE - T - E - B \quad (2)$$

Where,

ΔS – Change is storage

Rrf – Rainfall recharge

RSTR- Recharge from stream channels

Rc –	Recharge from canals
RSWI –	Recharge from surface water irrigation
RGWI-	Recharge from groundwater irrigation
RTP-	Recharge from Tanks & Ponds
RWCS –	Recharge from water conservation structures
VF –	Vertical flow across the aquifer system
LF-	Lateral flow along the aquifer system (through flow)
GE-	Groundwater Extraction
T-	Transpiration
E-	Evaporation
B-	Base flow

GEC 2015 has observed that although above mentioned components of water balance equation are imperative, the present status of database available with Government and nongovernment agencies is not adequate in most of the assessment units. Therefore, it is proposed that at present the water budget may be restricted to the major components only taking into consideration certain reasonable assumptions. The estimation is to be carried out using lumped parameter estimation approach keeping in mind that data from many more sources if available may be used for refining the assessment.

3.2.1 Rainfall Recharge

GEC 2015 recommended that monsoon rainfall recharge should be estimated on groundwater level fluctuation and specific yield approach. This, however, requires adequately spaced representative water level measurement for a sufficiently long period. It is proposed that there should be at least three spatially well distributed observation wells in the assessment unit, or one observation well per 100 sqkm. Water level data should also be available for a minimum period of 5 years (preferably 10years), along with corresponding rainfall data. Regarding frequency of water level data, three water level readings during pre and post monsoon seasons and in the month of January/ May preferably in successive years, are the minimum requirements. It would be ideal to have monthly water level measurements to record the peak rise and maximum fall in the ground water levels. In units or subareas where adequate data on ground water level fluctuations are not available as specified above, groundwater recharge may be estimated using rainfall infiltration factor method only. The rainfall recharge during non-monsoon season may be estimated using rainfall infiltration factor method only. These two basic approaches recommended by the GEC - 1984, namely groundwater level fluctuation method and rainfall infiltration factor method, still form the basis for groundwater assessment in GEC 2015 methodology.

Water Level Fluctuation (WLF) Method

Under this method the change in storage is computed by multiplying water level fluctuation between pre and post monsoon seasons with the area of assessment and specific yield.

Change in Storage = **ΔS = h*Sy*A ..... (i)**

Where

h = rise in water level due to monsoon (fluctuation between pre-monsoon and post-monsoon water level),

A = area for computation of recharge, and

Sy = specific yield of aquifer formation

The Specific yield of a soil or rock is the ratio of the volume of water that, after saturation, can be drained by gravity to its own volume (Todd & Mays, 2005). The Specific yield data have either been arrived through field studies, including long-duration pumping tests and dry season groundwater balance (in hard-rock areas) or adopted from the norms recommended by GEC-1997, which were derived from the various water-balance studies carried out by CGWB, SGWDs and academic/research institutions.

Substituting the expression in equation 1 for storage increase ΔS in terms of water level fluctuation and specific yield, rainfall recharge in non-command will be as follow:

RRF = h x Sy x A - RSTR - RSWI - RGWI - RTP - RWCS ± VF ± LF + GE + T + E + B **3**

and considering another term **Rc** as Recharge due to canals, rainfall recharge equation in command will be as follows:

RRF = h x Sy x A - RC - RSTR - RSWI - RGWI -RTP -RWCS ±VF ±LF +GE +T +E + B **4**

The recharge calculated from equation 3 in case of non-command sub units and equation 4 in case of command sub units and poor groundwater quality sub units gives the rainfall recharge for the particular monsoon season. However, it may be noted that in case base flow/ recharge from stream and through flow have not been estimated, the same may be assumed to be zero.

The rainfall recharge obtained by using equation 3 & equation 4 provides the recharge in any particular monsoon season for the associated monsoon season rainfall. This estimate is to be normalised for the normal monsoon season rainfall as per the procedure indicated below.

Normalization of Rainfall Recharge

The recharge from rainfall estimated as per the above is for the particular monsoon season. It should be normalized for estimating recharge corresponding to the normal monsoon rainfall.

GEC 2015 methodology follows the same procedures of earlier GEC 1997 methodology for normalizing monsoon recharge, which is summarized below.

The computational procedure to be followed is as given below:

$$Rrf\,(normal) = \frac{\sum_{i=1}^{N}\left[R_i \times \frac{r(normal)}{r_i}\right]}{N}$$

Where

Rrf (normal) = Normalized Rainfall Recharge in the monsoon season.

R_i= Rainfall Recharge in the monsoon season for the i^{th} year.

r (normal) = Normal monsoon Season rainfall.

r_i = Rain fall in the monsoon season for the i^{th} year.

N = Number of years for which data is available.

Rainfall Infiltration Factor (RIF) Method

Like earlier GEC methodology, GEC 2015 recommended to compare the rainfall recharge obtained from Water Level Fluctuation method with that of the estimated recharge using Rainfall Infiltration Factor Method.

Recharge from rainfall is estimated by using the following relationship –

Rrf = RFIF * A* (R – a)/1000

Where,

Rrf = Rainfall recharge in ham

A = Area in Hectares

RFIF = Rainfall Infiltration Factor

R = Rainfall in mm

a = Minimum threshold value above which rainfall induces groundwater recharge in mm

GEC 2015 suggests that 10% of Normal annual rainfall be taken as Minimum Rainfall Threshold and 3000 mm as Maximum Rainfall limit. While computing the rainfall recharge, 10% of the normal annual rainfall is to be deducted from the monsoon rainfall and balance rainfall would be considered for computation of rainfall recharge. The same recharge factor may be used for both monsoon and non-monsoon rainfall, with the condition that the recharge due to non-monsoon rainfall may be taken as zero, if the normal rainfall during the non-monsoon season is less than 10% of normal annual rainfall. In using the method based on the specified norms, recharge due to both monsoon and non-monsoon rainfall may be estimated for normal rainfall, based on recent 30 to 50 years of data.

Percent Deviation

After computing the rainfall recharge for normal monsoon season rainfall using the Water level Fluctuation method and Rainfall Infiltration Factor method these two estimates have to be compared with each other. A term, Percent Deviation (PD) which is the difference between the two expressed as a percentage of the former is computed as

$$PD = \frac{Rrf(normal,wlfm) - Rrf(normal,rifm)}{Rrf(normal,wlfm)} \times 100$$

Where,

Rrf (normal, wtfm) = Rainfall recharge for normal monsoon season rainfall estimated by the water level fluctuation method

Rrf (normal, rifm) = Rainfall recharge for normal monsoon season rainfall estimated by the rainfall infiltration factor method

The rainfall recharge for normal monsoon season rainfall is finally adopted as per the criteria given below:

If PD is greater than or equal to -20%, and less than or equal to +20%,Rrf (normal) is taken as the value estimated by the water level fluctuation method.

If PD is less than -20%, Rrf (normal) is taken as equal to 0.8 times the value estimated by the rainfall infiltration factor method.

If PD is greater than +20%, Rrf (normal) is taken as equal to 1.2 times the value estimated by the rainfall infiltration factor method.

3.2.2 Recharge from other Sources

Recharge from other sources constitute recharges from canals, surface water irrigation, groundwater irrigation, tanks & ponds and water conservation structures in command areas where as in non-command areas the recharge due to surface water irrigation, groundwater irrigation, tanks & ponds and water conservation structures are possible.

- **Recharge from Canals**

Recharge due to canals is to be estimated based on the following formula:

RC = WA * SF * Days

Where:

RC = Recharge from Canals

WA = Wetted Area

SF = Seepage Factor

Days = Number of Canal Running Days.

- **Recharge from Surface Water Irrigation**

Recharge due to applied surface water irrigation, either by means of canal outlets or by- lift irrigation schemes is to be estimated based on the following formula:

RSWI = AD*Days*RFF

Where:

RSWI = Recharge due to applied surface water irrigation

AD = Average Discharge

Days = Number of days water is discharged to the Fields

RFF = Return Flow Factor

- **Recharge from Groundwater Irrigation**

Recharge due to applied groundwater irrigation is to be estimated based on the following formula:

RGWI = GEIRR*RFF

Where:

RGWI	=	Recharge due to applied groundwater irrigation
GEIRR	=	Groundwater Extraction for Irrigation
RFF	=	Return Flow Factor

- **Recharge due to Surface Water Bodies**

Recharge due to surface water bodies, like tanks & ponds etc is to be estimated based on the following formula:

RTP =AWSA*RF

Where:

RTP	=	Recharge due to Tanks & Ponds
AWSA	=	Average Water Spread Area
RF	=	Recharge Factor

- **Recharge due to Water Conservation Structures**

Recharge due to Water Conservation Structures is to be estimated based on the following formula:

RWCS =GS*RF

Where:

RWCS	=	Recharge due to Water Conservation Structures
GS	=	Gross Storage (Storage Capacity multiplied by number of Fillings).
RF	=	Recharge Factor

3.2.3 Additional Components Effecting Recharge

GEC 2015 methodology has introduced prescribed procedure to estimate additional recharge on account of some natural hydraulic and climatic parameters, which effect overall groundwater recharge of assessment unit. These components are as follow.

- **Lateral flow along the aquifer system (Through flow)**

GEC 2015 prescribes that if the assessment unit area under consideration is a watershed, the lateral flow across boundaries can be considered as zero in case such estimates are not available. If there is inflow and outflow across the boundary, theoretically, the net inflow may be calculated using Darcy law, by delineating the inflow and outflow sections of the boundary. Besides such delineation, the calculation also requires estimate of transmissivity and hydraulic gradient across the inflow and outflow sections. These calculations are most conveniently done in a computer model. It is recommended to initiate regional scale modelling with well-defined flow boundaries. Once the modelling is complete, the lateral through flows (LF) across boundaries for any assessment unit can be obtained from the model and the same should be included in the water balance equation.

- **Base flow and Stream Recharge**

GEC 2015 recommends that if stream gauge stations are located in the assessment unit, the base flow and recharge from streams can be computed using Stream Hydrograph Separation Method, Numerical Modelling and Analytical solutions. If the assessment unit is a watershed,a single stream

monitoring station at the mouth of the watershed can provide the required data for the calculation of base flow. It is further suggested that Base flow assessment and Stream recharge should be carried out in consultation with Central Water Commission in order to avoid any duplicity in the estimation of total water availability in a river basin.

- **Vertical Flow from Hydraulically Connected Aquifers**

This component can be estimated using the Darcy's law if the hydraulic heads in both aquifers and the hydraulic conductivity and thickness of the aquitard separating both the aquifers are known. GEC 2015 suggests that the regional scale groundwater flow modelling is an important tool to estimate such flows.

- **Evaporation and Transpiration**

GEC 2015 recommends that the evaporation component can be estimated for the aquifer in the assessment unit, through field studies or from adjoin areas data, for areas with water level within 1.0 m bgl. If depth to water level is more than 1.0 m bgl, the evaporation losses from the aquifer should be taken as zero. Similarly the transpiration through vegetation can be estimated for the aquifer in the assessment unit, through field studies if water levels in the aquifer are within the maximum root zone of the local vegetation. If water levels are within 3.5m bgl, transpiration can be estimated using the transpiration rates available for other areas. If it is greater than 3.5m bgl, the transpiration should be taken as zero. Further, for estimating evapo-transpiration, field tools like Lysimeters can be used to estimate actual evapo-transpiration. In case where such data is not available, evapo-transpiration losses can be empirically estimated from PET data provided by IMD.

3.2.4 Additional Potential Resources under Specific Conditions

GEC 2015 methodology recommends additional potential recharge estimation under specific conditions, if any, in the assessment unit, as described follows.

- **Potential Resource Due to Spring Discharge**

Spring discharge constitutes an additional source of groundwater in hilly areas which merges at the places where groundwater level cuts the surface topography. The spring discharge is equal to the groundwater recharge minus the outflow through evaporation and evapo- transpiration and vertical and lateral sub-surface flow. Thus Spring Discharge is a form of 'Annual Extractable Groundwater Recharge'. It is a renewable resource, though not to be used for Categorisation. Spring discharge measurement is to be carried out by volumetric measurement of discharge of the springs. Spring discharges multiplied with time in days of each season will give the quantum of spring resources available during that season. The committee recommends that in hilly areas with substantial potential of spring discharges, the discharge measurement should be made at least 4 times a year in parity with the existing water level monitoring schedule.

Potential ground water resource due to springs = Q x No of days

Where,

Q	=	Spring Discharge
No of days	=	No of days spring yields.

- **Potential Resource in Waterlogged and Shallow Water Table Areas**

In the area where the groundwater level is less than 5m below ground level or in waterlogged areas, the resources up to 5m below ground level are potential and would be available for development in addition to the annual recharge in the area. It is therefore, like earlier GEC 1997, GEC 2015 also recommends that in such areas, ground water resources may be estimated up to 5m bgl only assuming that where water level is less than 5m bgl, the same could be depressed by pumping to

create space to receive recharge from natural resources. The computation of potential resource to groundwater reservoir, form such shallow water table areas, can be done by adopting the following equation:

Potential ground water resource in shallow water table areas = (5-D) x A x SY

Where

D = Depth to water table below ground surface in pre-monsoon period in shallow aquifers.

A = Area of shallow water table zone.

SY **=** Specific Yield

The planning of future minor irrigation works in the waterlogged and shallow water table areas as indicated above should be done in such a way that there should be no long term adverse effects of lowering of water table up to 5m and the water level does not decline much below 5m in such areas. The behaviour of water table in the adjoining area which is not water logged should be taken as a bench mark for development purposes.

This potential recharge to groundwater is available only after depression of water level up to 5m bgl. This is not an annual resource and should be recommended for development on a very cautious approach so that it does not adversely affect the ground water potentials in the overall area.

- **Potential Resource in Flood Prone Areas**

Ground water recharge from a flood plain is mainly the function of the following parameters-

- Areal extent of flood plain
- Retention period of flood
- Type of sub-soil strata and silt charge in the river water which gets deposited and controls seepage

GEC 2015 recommends that potential recharge from flood plain may be estimated on the same norms as for ponds, tanks and lakes. This has to be calculated over the water spread area and only for the retention period using the following formula.

Potential ground water resource in Flood Prone Areas = 1.4 x N x A/1000

Where

N = No of Days Water is Retained in the Area

A = Flood Prone Area

3.2.5 Recharge during Monsoon Season

The sum of normalized monsoon rainfall recharge and the recharge from other sources and lateral and vertical flows into the sub unit and stream inflows during monsoon season is the total recharge during monsoon season for the sub unit. Similarly this is to be computed for all the sub units available in the assessment unit.

3.2.6 Recharge during Non-Monsoon Season

The rainfall recharge during non-monsoon season is estimated using Rainfall Infiltration Factor method only when the non-monsoon season rainfall is more than 10% of normal annual rainfall. The sum of non-monsoon rainfall recharge and the recharge from other sources and lateral and vertical flows into the sub unit and stream inflows during non-monsoon season is the total recharge during non-monsoon season for the sub unit. Similarly this is to be computed for all the sub units available in the assessment unit.

3.2.7 Total Annual Groundwater Recharge

The sum of the recharge during monsoon and non-monsoon seasons is the total annual groundwater recharge for the sub unit. Similarly this is to be computed for all the sub units available in the assessment unit.

3.2.8 Annual Extractable Groundwater Recharge (EGR)

The National Water Policy, 2012 stresses that the ecological flow of rivers should be maintained. Accordingly GEC 2015 recommends that groundwater base flow contribution limited to the ecological flow of the river should be determined which will be deducted from Annual Groundwater Recharge to determine Annual Extractable Groundwater Resources (EGR). The ecological flows of the rivers are to be determined in consultation with Central Water Commission and other concerned river basin agencies. In the assessment units, where river stage data are not available and neither the detailed data for quantitative assessment of the natural discharge are available, present practice (GEC 1997) of allocation of unaccountable natural discharges to 5% or 10% of annual recharge may be retained. If the rainfall recharge is assessed using Water Level Fluctuation method this will be 5% of the annual recharge and if it is assessed using Rainfall Infiltration Factor method, it will be 10% of the annual recharge. The balance will account for Annual Extractable Groundwater Resources (EGR).

3.3 Estimation of Groundwater Extraction

Like earlier methodology, GEC 2015 recommends various available methods for estimation of groundwater extraction in each assessment sub unit, as described below. Moreover, GEC 2015 also recommends that the groundwater extraction obtained figures from different methods need to be compared and based on field checks, the seemingly best value may be adopted. At times, groundwater extraction obtained by different methods may vary widely. Moreover unit draft adopted needs to be normalized as per annual rainfall of period for which assessment is being carried out. In general, the value matching the field situation should be considered. It is also suggested that the storage depletion during a season where other recharges are negligible can be taken as groundwater extraction during that particular period.

3.3.1 Components of Groundwater Extractions

Groundwater draft or extraction is to be assessed as follows.

$GE_{ALL} = GE_{IRR} + GE_{DOM} + GE_{IND}$

Where,

GE_{ALL}	=	Groundwater extraction for all uses
GE_{IRR}	=	Groundwater extraction for irrigation
GE_{DOM}	=	Groundwater extraction for domestic uses
GE_{IND}	=	Groundwater extraction for industrial uses

- **Groundwater Extraction for Irrigation(GEIRR**)

Unit Draft Method: – In this method, season-wise unit draft of each type of well in an assessment unit is estimated. The unit draft of different types (eg. Dug well, Dug cum bore well, shallow tube well, deep tube well, bore well etc.) is multiplied with the number of wells of that particular type to obtain season-wise groundwater extraction by that particular structure. It is recommended that a single source of well census should be maintained for resources computation at all India level. Minor Irrigation Census of MoWR, RD & GR would be the preferred option.

Crop Water Requirement Method: – For each crop, the season-wise net irrigation water requirement is determined. This is then multiplied with the area irrigated by groundwater

abstraction structures. The database on crop area is obtained from Revenue records in Tahsil office, Agriculture Census and also by using Remote Sensing techniques.

Power Consumption Method: – Groundwater extraction for unit power consumption (electric) is determined. Extraction per unit power consumption is then multiplied with number of units of power consumed for agricultural pump sets to obtain total groundwater extraction for irrigation.

- **Groundwater Extraction for Domestic Use (GEDOM)**

Unit Draft Method: – In this method, unit draft of each type of well is multiplied by the number of wells used for domestic purpose to obtain the domestic groundwater draft.

Consumptive Use Method: – In this method, population is multiplied with per capita consumption usually expressed in litre per capita per day (lpcd). It can be expressed using following equation.

GEDOM= Population X Consumptive Requirement X Lg

Where,

Lg = Fractional Load on Groundwater for Domestic Water Supply

The data about load factors on groundwater sources can be obtained from the concerned water supply agencies / departments.

- **Groundwater Extraction for Industrial use (GEIND)**

Unit Draft Method: - In this method, unit draft of each type of well is multiplied by the number of wells used for industrial purpose to obtain the industrial groundwater extraction.

Consumptive Use Pattern Method: – In this method, water consumption of different industrial units are determined. Numbers of Industrial units which are dependent on ground water are multiplied with unit water consumption to obtain groundwater draft for industrial use, as suggested below.

GEIND= Number of industrial units X Unit Water Consumption X Lg

Where,

Lg = Fractional load on groundwater for industrial water supply

The load on Groundwater for Industrial water supply can be obtained from water supply agencies in the Industrial belt.

Data Base of Industry: -Other important sources of data on groundwater extraction for industrial uses are - Central Ground Water Authority, State Ground Water Authority, National Green Tribunal and other Environmental Regulatory Authorities.

3.4 Stage of Groundwater Extraction

The stage of groundwater extraction is defined by,

$$Stage\ of\ Ground\ Water\ Extraction\ (\%) = \frac{\text{Existing gross ground water extraction for all uses}}{\text{Annual Extractable Ground water Resources}} \times 100$$

The existing gross groundwater extraction for all uses refers to the total of existing gross groundwater extraction for irrigation and all other purposes. The stage of groundwater extraction should be obtained separately for command areas, non-command areas and poor groundwater quality areas.

3.4.1 Validation of Stage of Groundwater Extraction

Taking into consideration of inherent uncertainties associated with various components of both extracted and extractable groundwater resources, GEC 1997 has recommended validating the "Stage of Groundwater Extraction (SGE)" with long term trend of groundwater levels for a minimum period of 10 years for both pre-monsoon and post-monsoon period. GEC 2015 refine these concept further and suggest that if the pre and post monsoon water levels show a fairly stable trend, it does not necessarily mean that there is no scope for further groundwater development. Such a trend indicates that there is a balance between recharge, extraction and natural discharge in the unit. However, further groundwater development may be possible, which may result in a new stable trend at a lower groundwater level with associated reduced natural discharge. If the groundwater resource assessment and the trend of long term water levels contradict each other, this anomalous situation requires a review of the groundwater resource computation, as well as the reliability of water level data. The mismatch conditions are enumerated below table 7.

Validation Criteria for Stage of GW Extraction (SGWE)

Stage of GW Extraction	Groundwater Level Trend	Remarks
≤ 70 %	Significant decline in trend in both pre-monsoon and post- monsoon	Not acceptable and needs reassessment
>100 %	No significant decline in both pre-monsoon and post-monsoon long term trend	Not acceptable and needs reassessment

In case, the category does not match with the water level trend given above, a reassessment should be attempted. If the mismatch persists even after reassessment, the sub unit may be categorized based on Stage of Groundwater Extraction of the reassessment. However, the sub unit should be flagged for strengthening of observation well network and parameter estimation.

3.4.2 Categorisation of Assessment Units

Present categorisation of assessment units, as per GEC 1997 methodology takes into account long term groundwater level trends and stage of groundwater extraction of period under consideration. The National Water Policy, 2012 emphasis a convergence of quantity and quality of groundwater resources while assessing the groundwater extraction status in an assessment unit so as to aid appropriate management decisions. Therefore, GEC 2015 recommends separate estimation of resources where water quality is beyond permissible limits for the parameter salinity. Moreover, if any of the three quality hazards in terms of Arsenic, Fluoride and Salinity are encountered in the assessment sub unit in mappable units, the assessment sub unit may be tagged with the particular Quality hazard. Accordingly, GEC 2015 recommends that each assessment unit, in addition to the quantity based categorisation (safe, semi-critical, critical and over-exploited) should bear a quality hazard identifier (table 8). Such quality hazards are to be based on available groundwater monitoring data of State Ground Water Departments and /or Central Ground Water Board.

Criteria for Categorisation

Stage of Groundwater Extraction	Category	Quality Tag
≤ 70 %	Safe	Tag for sub unit / unit in terms of Salinity, Arsenic, Fluoride, if any
>70 % and ≤ 90 %	Semi Critical	
>90 % and ≤ 100 %	Critical	
>100 %	Over Exploited	

3.4.3 Allocation of Groundwater Resource for Utilisation

The Annual Extractable Groundwater Resources are to be apportioned between domestic, industrial and irrigation uses. Among these, as per the National Water Policy, requirement for domestic water supply is to be accorded priority. This requirement has to be based on population as projected to the year 2025, per capita requirement of water for domestic use, and relative load on groundwater for urban and rural water supply. The estimate of allocation for domestic water requirement may vary for one sub unit to the other in different states. In situations where adequate data is not available to make this estimate, the following empirical relation is recommended.

Alloc = 22 X N X Lg mm per year Where

Alloc	=	Allocation for domestic water requirement
N	=	population density in the unit in thousands per sq. km.
Lg	=	fractional load on groundwater for domestic and industrial water supply (≤ 1.0)

In deriving equation above, it is assumed that the requirement of water for domestic use is 60 lpd per head. The equation can be suitably modified in case per capita requirement is different. If by chance, the estimation of projected allocation for future domestic needs is less than the current domestic extraction due to any reason, the allocation must be equal to the present day extraction. It can never be less than the present day extraction as it is unrealistic.

3.4.4 Net Annual Groundwater Availability for Future Use

The water available for future use is obtained by deducting the allocation for Domestic use and current extraction for Irrigation and Industrial uses from the annual extractable groundwater recharge. The resulting groundwater potential is termed as the Net Annual Groundwater Availability for future use.

The net annual groundwater availability for future use should be calculated separately for non-command areas and command areas. As per the recommendations of the R&D Advisory committee, the groundwater available for future use can never be negative. If it becomes negative, the future allocation of domestic needs can be reduced to current extraction for domestic use. Even then if it is still negative, then the groundwater available for future uses will be zero.

3.5 Assessment of In-Storage or Static Groundwater Resources

Presently there is no fine demarcation to distinguish the dynamic resources from the static resources. While water table hydrograph could be an indicator to distinguish dynamic resources, at times it is difficult when water tables are deep. Therefore, the GEC 2015 recommends the computation of the static or in-storage groundwater resources be done after delineating the aquifer thickness and specific yield of the aquifer material as follows:-

SGWR = A *(Z2 - Z1) * SY

Where,

SGWR	=	Static or in-storage Groundwater Resources
A	=	Area of the Assessment Unit
Z2	=	Bottom of Unconfined Aquifer
Z1	=	Pre-monsoon water level
SY	=	Specific Yield in the In storage Zone

3.6 Assessment of Total Groundwater Availability in Unconfined Aquifer

The sum of Annual Exploitable Groundwater Recharge and the In-Storage Groundwater Resources of an unconfined aquifer is the Total Groundwater Availability of that aquifer.

3.7 Assessment of Groundwater of Confined Aquifer System

GEC 2015 recommends using groundwater storage approach to assess the groundwater resources of the confined aquifers. The co-efficient of storage or storativity of an aquifer is defined as the volume of water it releases or takes into storage per unit surface area of the aquifer per unit change in head. Hence the quantity of water added to or released from the aquifer (Δ V) can be calculated as follows:

$$\Delta V = S \Delta h$$

If the areal extent of the confined aquifer is A then the total quantity of water added to or released from the entire aquifer is

$$Q = A \Delta V = SA \Delta h$$

Where

Q = Quantity of water confined aquifer can release (m^3)

S = Storativity

A = Areal extent of the confined aquifer (m^2)

Δh = Change in Piezometric head (m)

GEC 2015 points out that most of the storage in confined aquifer is associated with compressibility of the aquifer matrix and compressibility of water. Once the piezometric head reaches below the top confining bed, it behaves like an unconfined aquifer. Hence the resources available under pressure are only considered as the confined groundwater potential. The quantity of water released in confined aquifer due to change in pressure can be computed between piezometric head (ht) at any given time 't' and the bottom of the top confining layer (ho) by using the following equation.

$$Qp = SA\Delta h = SA (ht – h0)$$

If any development activity is started in the confined aquifer, then there is a need to assess the dynamic as well as in storage resources of the confined aquifer. To assess the groundwater resources of the confined aquifer, there is a need to have sufficient number of observation wells tapping exclusively that particular aquifer and proper monitoring of the piezometric heads is also needed.

3.8 Assessment of Groundwater of Semi-Confined Aquifer System

GEC 2015 observes that the Assessment of Groundwater Resources of a semi-confined aquifer has some more complications, apparently uncertainty about its relation with respect to underlying / overlying other aquifers. To avoid the duplication of estimating the same resource by direct computation in one aquifer and as leakage in the other aquifer, GEC 2015 advices not to assess such aquifer resources separately as long as precise data is available. Till then, if any such aquifer system identified as not assessed, its groundwater resources are to be assessed following the methodology similar to that used in assessing the resources of confined aquifers.

3.9 Total Groundwater Availability of an Area

The Total Groundwater availability in any area is the Sum of Dynamic Groundwater Resources, the total Static/ In-storage groundwater resources in the unconfined aquifer and the Dynamic and In-storage resources of the Confined aquifers and semi confined aquifers in the area.

3.10 Groundwater Assessment in Urban Areas

GEC 2015 propose to have a separate ground water assessment for urban areas with population more than 10 lakhs. Taking note of difficulties to have groundwater draft data in most of the urban areas and constraints to natural recharge, by rainfall infiltration and recharge due to other sources on account of urbanization, GEC 2015 has suggested the following few points are to be considered for Urban Areas Groundwater Resources Estimation.

- The difference of the actual demand and the supply by surface water sources as the withdrawal from the ground water resources.
- Consider 30% of the rainfall infiltration factor for urban areas as an adhoc arrangement till field studies are done and documented.
- The 50 % percent losses reported by piped water supply may be taken as recharge to the groundwater system.
- The seepages from the sewerages, which normally contaminate the ground water resources with nitrate, also contribute to the quantity of resources and hence same percent as in the case of water supply pipes may be taken as norm for the recharge on the quantity of sewerage when there is sub surface drainage system.
- Recharge on account of seepage from open drainage system / open channels, (like lined / unlined canal) may be considered, till further documented field studies are done.
- If estimated flash flood data is available, the same percent can be used on the quantum of flash floods to estimate the recharge from the flash floods.

4. PROCEDURE FOLLOWED IN THE PRESENT ASSESSMENT

The Dynamic Groundwater Resource Assessment 2017 (GWRE 2017), Gujarat has been carried out broadly following main aspects of the revised methodology of GEC-2015. In absence of requisites data or inadequacy if any, the constraints and the procedure followed in the present assessment are described below.

4.1 Data Sources and Constraint for Various Data Elements

All-out efforts were made to collect the data from the respective State Government Departments. However, it is felt necessary to mention that due to non availability/constraint of some data, certain assumptions have been made while making the computations. The data sources for the various data elements used in the present exercise are presented in the following table.

Data Sources Used in the Ground Water Resource Estimation 2017

S.No	Data Element	Used in the Computation of	Data Source
1	Areas of Various sub units List and maps of new administrative Units of 33 Districts and 248 assessment units,	Assessment unit wise recharge & draft component	Revenue Dept, Govt. of Gujarat, Gandhinagar.
2	Irrigation Well Census	Groundwater extraction for irrigation	GEB, Gujarat, Irrigation department

3	Population Census	Groundwater extraction for domestic purpose, Future allocation for domestic requirement.	Census of India Data (2011)
4	Load Factor (Lg)	As above	Gujarat Water Supply and Sewerage Board, Govt. of Gujarat
5	Details of Pump sets (HP) used in irrigation wells	Ground water extraction for irrigation purpose	GEB, Gujarat
6	Canal details	Return Seepage Recharge due to Canals / Drains	Narmada, Water Resources, Water Supply and Kalpsar Department
7	Details of Tanks & Ponds, Check dams and other water conservation structures	Recharge due to Tanks & Ponds and water conservation measures ad-hoc basis	State Water Resources Dept., Rural Development Dept, Tribal Development, Irrigation Dept., Forest Department etc, Govt. of Gujarat
8	Rainfall	Recharge due to Rainfall / Normalization of Rainfall Recharge	IMD/State Water Data Centre
9	Evaporation and Transpiration Data	Evaporation and transpiration loss from the aquifer	Agricultural Universities
10	Ground Water Monitoring : Pre-monsoon and Post-monsoon groundwater levels & trends and GW quality monitoring data of last decade (2007-16).	Water Level Fluctuation method and validation of Stage of ground water extraction, GW Quality data for identification of poor quality area.	Central Ground Water Board, WCR, Ahmedabad and Gujarat Water Resources Development Corporation Ltd, Govt. of Gujarat

Long term10 years (2007-16), pre-monsoon (May) and post-monsoon (November) water level data of observation wells monitored by CGWB, WCR, Ahmedabad and GWRDC Ltd are considered for calculating estimating zone of dynamic fluctuation and Water Level Trend. Water level fluctuations between pre-monsoon and post-monsoon have been calculated for hard rock and alluvial terrains separately. The average Pre-monsoon and Post Monsoon water Level and fluctuation is given in **Annexure V**.

Due to insufficient/non availability of data the following components were not considered while estimating the dynamic resources

- Lateral inflow/outflow across boundaries: insufficient data points / Piezometers for determination of the parameters.
- Subsurface inflow/outflow from hydraulically connected streams: sufficient nos. of stream gauge stations is required for determination of the parameters which were not available.
- Evaporation and Transpiration: water level is more than 3.5 mbgl in most of the areas for which data was available. Hence the same was not taken into account

Domestic draft and future allocation for domestic use and Industrial Draft

Ground water draft for domestic use has been estimated and projected based on taluka wise population. Population data of Census 2011 has been considered and has been projected till 2016based on the annual growth rate of population as per Census 2011 data. The average consumption of 70 lpcd and load factor (Lg) as collected from Gujarat Water Supply and Sewerage Board and has been considered while estimating the domestic draft. Similarly future allocation for domestic use has been estimated up to 2025 based on projected population in 2025 using Census 2011 data.

In the absence of data in respect of ground water abstraction structures and their draft used for industrial purpose, 15% of total draft estimated, taking into consideration the population as on 2016 and per capita requirement was booked as Industrial draft.

Irrigation Draft:

Taluka wise ground water extraction for irrigation was estimated based on the number of structures and the unit draft of different structures. As in the state of Gujarat, major irrigation draft is through energized wells, data of HP wise number of irrigation connections in each taluka, average ground water draft based on HP of pump used in alluvial and hard rock formation and duration of pumping were used for estimation the irrigation draft. The details of various structures in each taluka are given in **Table 1** and details of unit drafts considered for each taluka is given in **Table 2.**

4.2 Assessment Unit Area

The groundwater resource assessment of the state of Gujarat has been carried out taking taluka (administrative boundary) as assessment unit. In total there are thirty three (33) districts with 251 talukas. However for the ground water resources assessment purpose 248 assessment units have been considered. Ahmedabad city and Daskroi taluka, Surat city and Choryasi Taluka and Junagarh city and Junagarh Taluka were considered as single taluka each thus reducing the total no. of assessment talukas to 248 from 251. 13 talukas fall under Saline Talukas and hence resources are computed separately as "Poor Quality (Saline GW Resources) for these talukas. The details of ground water assessment units district wise is given as **Annexure-IV**.

4.3 Norms Followed in the Assessment GWRE 2017

The GEC 2015 recommends that the state agencies should be encouraged to conduct field studies for various norms and use such computed norms in the assessment. In absence of such computed norms by the field study, GEC 2015 suggests to use recommended norm values for assessment, unless sufficient data based on field study are available to justify the minimum, maximum or other intermediate values.

Whereas specific yield values based on the field tests conducted by Gujarat Water Resources Development Corporation has been used in assessment, norms as suggested in GEC 2015 methodology like rainfall infiltration factor, canal seepage factor, factors for return flow from surface and ground water irrigation, recharge from water conservation structures, tanks and ponds etc, have been used.

5. Dynamic Ground Water Resources

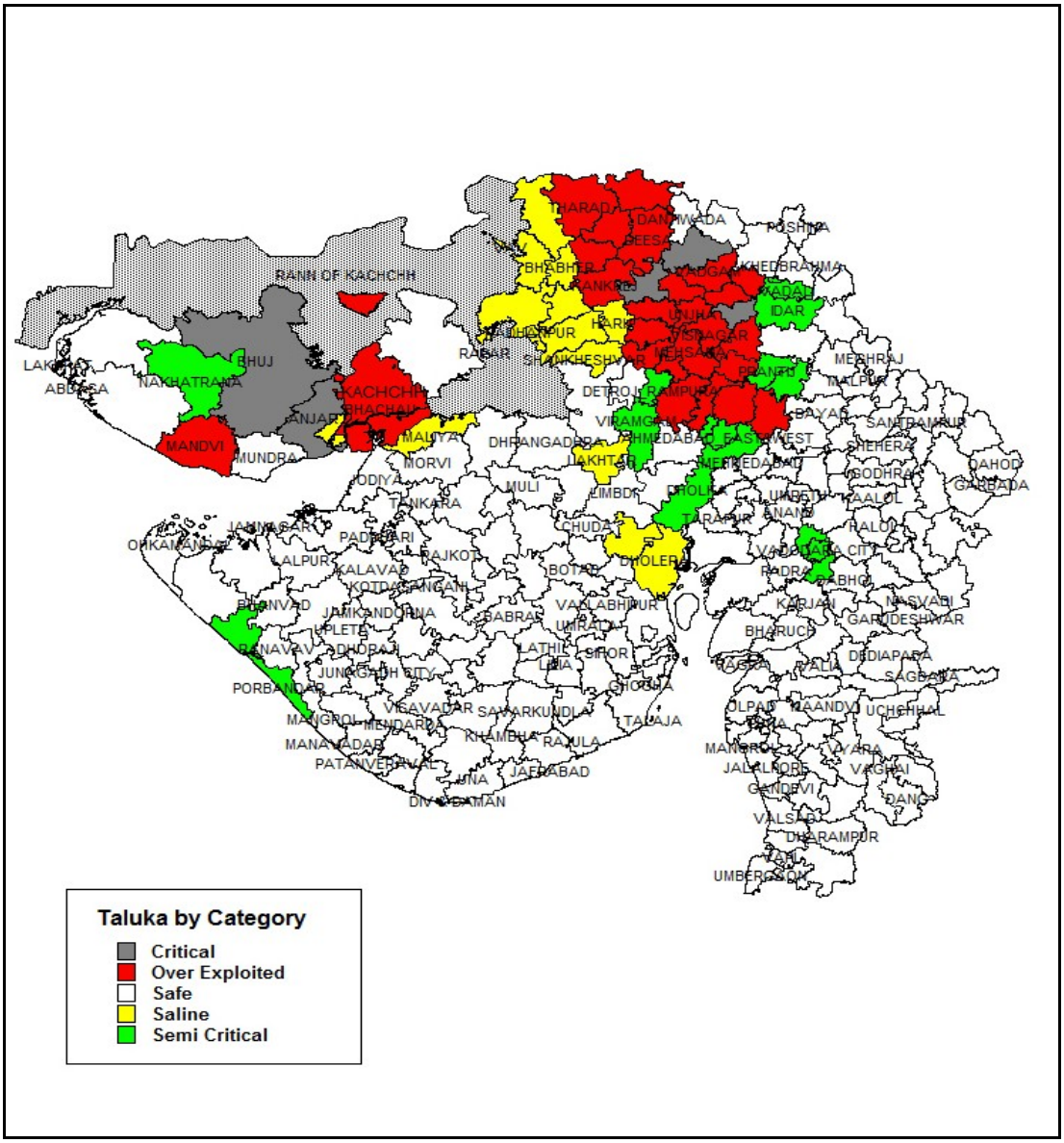
5.1 Ground water Potential

The district wise details of Ground Water Potential are given in **Annexure–I** & taluka-wise details of Ground Water Resources are given in **Annexure - II.** The Total Annual Ground Water Recharge (TAGWR) for Gujarat State is estimated to be 2236858.47 Ham/year and the Annual Extractable Ground Water Recharge (AEGWR) after deducting natural discharge is estimated to be 2125014.21 Ham/year. Ground water extraction for irrigation is estimated at 1284095.05 Ham/year whereas ground water extraction for Industrial and domestic Draft is estimated at 11020.58 Ham/year and 62608.78 Ham/year. Thus the net ground water availability for future use is estimated to be 7,39,663,58 Ham/year. The Stage of Ground water Extraction in the State worked out to be 63.89 % as on March 2017.

Out of 68 partial saline taluka and 13 total saline talukas (Total 81 assessment units), 72 talukas have stage of saline ground water development below 70 % and termed as 'Safe', whereas remaining 9 taluka have stage of saline ground water development between 70 to 90 % and they are categorised as 'Semi Critical'. The Total Annual Ground Water Recharge (TAGWR) for Gujarat State is estimated to be 5141.18 Ham/year and the Annual Extractable Ground Water Recharge (AEGWR) after deducting natural discharge is estimated to be 4838.37 Ham/year. Ground water extraction for all uses (Irrigation + Industrial + Domestic) estimated at 1679.57 Ham/year. Thus the net ground water availability for future use is estimated to be 3036.52 Ham/year.

5.2 Categorization of Talukas

For groundwater resources assessment 248 talukas in 33 district of the Gujarat State were considered. As per the Dynamic Ground Water Resources Assessment as on March 2017, **25 assessment units (talukas)** are categorized as **OVER-EXPLOITED**, **05** as **CRITICAL**, **11** as **SEMI-CRITICAL, 194 units** are categorized as **Safe.** There are **13 talukas** in **SALINE** category where groundwater is saline in entire taluka area and their ground water resources is computed separately along with other saline / brackish areas of the state and presented in Part –II of this report. The list of taluka falling under Over-Exploited, Critical, Semi-Critical, Safe and Saline categories are given as **Annexure-III** & the same has been shown in **Figure 10.**



(Fig 10: Map showing Categorization of Talukas as per GWRA 2017, Gujarat)

6. RECOMMENDATIONS

1. Ground water resources should be **conserved** by aggressive adoption of water efficient Micro Irrigation Practices like Drip/Sprinkler Irrigation techniques.

2. Based on Aquifer Mapping, CGWB should share information on demarcation and delineation of confined aquifers in Alluvial Multi-aquifer system for better assessment of potential of deeper aquifers and formulation of Management Plan.

3. Deeper Aquifers are required to be recharged by adopting suitable Artificial Recharge Techniques in order to arrest further depletion of water levels particularly in water scarce area of North Gujarat and Kachchh regions.

4. Diversion of some surface water may be considered to recharge to ground water in arid to semi-arid areas of Kachchh and North Gujarat, as a large volume of surface water gets lost due to evaporation losses.

5. The report of the Task Force on increasing ground water recharge in Gujarat (2011) may form the basis for undertaking the artificial recharge works, after updating the database. There is urgent need to incentivise recharge works and aggressively promote the same.

6. Further strengthening of the observation network is required in for precise assessment of Ground water Resources.

7. R&D work may be taken up for further refinement of various hydrogeological parameters like Specific Yields, infiltration rate, return seepage from irrigation through ground water and surface water, Unit draft of ground water abstraction structures.

8. Though the Stage of Development has reduced from 67.92% in 2013 to 63.89% in 2017, but there is no significant change in the no. of OE and Critical Talukas. Regulation of ground water abstraction is necessary in these areas to avoid further depletion of the fresh water resources.

Table 1: Details of Ground Water Extraction structures used for irrigation (2017)

Sl No	District	Assessment Unit Name	Predominant Rock formation	No. of Electrified Sets					No. of Diesel Pump Sets	Grand Total(Electric+Diesel)	Open Wells (Without Pumpsets)
				upto 7.5 HP	7.5 to 15 HP	15 to 30 HP	more than 30 HP	Total			
1	Ahmedabad	Ahmedabad City & Daskroi	Alluvium	511	930	1442	508	3391	387	3778	0
		Bavla	Alluvium	772	382	167	44	1365	255	1620	0
		Detroj-rampura	Alluvium	30	36	63	429	558	15	573	0
		Dhandhuka	Alluvium	1154	104	4	52	1314	10	1324	0
		Dholera	Alluvium	1	0	0	6	7	21	28	0
		Dholka	Alluvium	373	502	601	112	1588	81	1669	0
		Mandal	Alluvium	1	37	13	67	118	77	195	0
		Sanand	Alluvium	323	318	322	407	1370	100	1470	0
		Viramgam	Alluvium	10	23	35	76	144	190	334	0
2	Amreli	Amreli	H.R.	8006	3268	651	21	11946	272	12218	0
		Babra	H.R.	9579	2798	658	7	13042	385	13427	0
		Bagasara	H.R.	3251	1517	804	53	5625	166	5791	0
		Dhari	H.R.	5726	4958	1916	99	12699	572	13271	0
		Jafrabad	Alluvium	2748	77	0	0	2825	385	3210	0
		Khambha	H.R.	5579	624	62	3	6268	965	7233	0
		Kunkavav vadia	H.R.	6882	2808	808	33	10531	890	11421	0
		Lathi	H.R.	7136	1971	193	4	9304	78	9382	0
		Lilia	H.R.	2337	549	46	1	2933	765	3698	0
		Rajula	H.R.	4431	1213	349	13	6006	566	6572	0
		Savar kundla	H.R.	7460	3138	1169	54	11821	642	12463	0
3	Anand	Anand	Alluvium	666	2906	908	37	4517	0	4517	0
		Anklav	Alluvium	93	972	931	28	2024	0	2024	0
		Borsad	Alluvium	121	2029	1521	59	3730	0	3730	0
		Khambhat	Alluvium	39	616	854	35	1544	80	1624	0
		Petlad	Alluvium	103	1558	786	42	2489	0	2489	0
		Sojitra	Alluvium	343	971	111	4	1429	0	1429	0
		Tarapur	Alluvium	18	70	4	0	92	155	247	0
		Umreth	Alluvium	1135	1474	266	4	2879	0	2879	0
4	Arvalli	Bayad	H.R./Alluvium	8975	1882	410	31	11298	0	11298	0
		Bhiloda	H.R.	20300	1013	27	10	21350	0	21350	0
		Dhansura	H.R.	5443	936	143	10	6532	0	6532	0
		Malpur	H.R.	5800	192	15	2	6009	0	6009	0
		Meghraj	H.R.	8611	322	84	6	9023	0	9023	0
		Modasa	H.R.	9950	533	27	3	10513	0	10513	0
5	Banaskantha	Amirgadh	H.R.	2428	1069	156	38	3691	400	4091	0
		Bhabhar	Alluvium	44	64	89	1736	1933	0	1933	0
		Danta	H.R.	5852	989	16	4	6861	1950	8811	0
		Dantiwada	H.R.	2557	2847	996	216	6616	25	6641	0
		Deesa	Alluvium	**299**	**1706**	**2591**	**13596**	18192	25	18217	0
		Deodar	Alluvium	12	3	39	1820	1874	0	1874	0
		Dhanera	Alluvium	607	3391	3270	3364	10632	100	10732	0
		Kankrej	Alluvium	66	14	40	2800	2920	0	2920	0
		Lakhani	Alluvium	10	287	1956	5051	7304	0	7304	0
		Palanpur	Alluvium	4901	5307	1730	2358	14296	0	14296	0
		Suigam	Alluvium	15	31	39	80	165	108	273	0
		Tharad	Alluvium	17	682	1009	220	1928	400	2328	0
		Vadgam	Alluvium	4548	4768	1395	1703	12414	70	12484	0
		Vav	Alluvium	**119**	**191**	**138**	**424**	872	162	1034	0
6	Bharuch	Amod	Alluvium	135	1084	342	52	1613	0	1613	0
		Anklesvar	Alluvium	1419	264	31	4	1718	0	1718	0
		Bharuch	Alluvium	915	1433	275	23	2646	0	2646	0
		Hansot	Alluvium	179	27	2	0	208	0	208	0
		Jambusar	Alluvium	18	114	25	2	159	0	159	0
		Jhagadia	H.R.	1898	1922	422	6	4248	0	4248	0
		Netrang	H.R.	1516	615	46	0	2177	0	2177	0
		Vagra	Alluvium	74	80	2	0	156	0	156	0
		Valia	H.R.	2915	722	48	4	3689	0	3689	0
7	Bhavnagar	Bhavnagar	H.R.	2581	1129	121	3	3834	204	4038	0
		Gariadhar	H.R.	6437	1016	42	2	7497	107	7604	0
		Ghogha	H.R.	5510	475	28	0	6013	66	6079	0
		Jesar	H.R.	2868	1662	284	9	4823	74	4897	0
		Mahuva	H.R.	13643	2225	455	4	16327	874	17201	0
		Palitana	H.R.	7714	973	56	0	8743	1645	10388	0
		Sihor	H.R.	8489	2568	505	7	11569	897	12466	0
		Talaja	H.R.	18011	463	44	0	18518	153	18671	0
		Umrala	H.R.	4953	601	51	1	5606	710	6316	0
		Vallabhipur	H.R./Alluvium	2958	235	14	0	3207	66	3273	0
8	Botad	Barwala	H.R.	1241	441	64	16	1762	30	1792	0
		Botad	H.R.	11658	2753	210	6	14627	40	14667	0
		Gadhada	H.R.	12620	2275	188	7	15090	207	15297	0
		Ranpur	H.R.	4782	903	74	1	5760	20	5780	0

Sl No	District	Assessment Unit Name	Predominant Rock formation	No. of Electrified Sets					No. of Diesel Pump Sets	Grand Total(Electric+Diesel)	Open Wells (Without Pumpsets)
				upto 7.5 HP	7.5 to 15 HP	15 to 30 HP	more than 30 HP	Total			
9	Chhota udepur	Bodeli	H.R.	3970	475	25	2	4472	0	4472	0
		Chhota udaipur	H.R.	4191	66	4	0	4261	0	4261	0
		Jetpur pavi	H.R.	5042	178	7	1	5228	0	5228	0
		Kavant	H.R.	2871	643	26	0	3540	0	3540	0
		Nasvadi	H.R.	2333	389	18	6	2746	0	2746	0
		Sankheda	H.R./Alluvium	1598	736	66	5	2405	0	2405	0
10	Dahod	Dahod	H.R.	1493	182	0	0	1675	1650	3325	400
		Devgadh baria	H.R.	3781	10	0	0	3791	850	4641	1200
		Dhanpur	H.R.	650	1	0	0	651	2450	3101	450
		Fatepura	H.R.	3511	12	0	0	3523	200	3723	900
		Garbada	H.R.	880	16	0	0	896	150	1046	900
		Limkheda	H.R.	2153	14	0	0	2167	700	2867	600
		Sanjeli	H.R.	1707	11	0	0	1718	100	1818	900
		Singvad	H.R.	2534	44	0	0	2578	600	3178	400
		Zalod	H.R.	2775	24	0	0	2799	2600	5399	1900
11	Dang	Ahwa	H.R.	214	20	0	0	234	205	439	200
		Subir	H.R.	88	5	0	0	93	150	243	98
		Waghai	H.R.	28	0	0	0	28	150	178	143
12	Devbhumi Dwarka	Bhanvad	H.R.	6950	1293	155	0	8398	361	8759	0
		Kalyanpur	H.R.	6436	330	16	0	6782	852	7634	0
		Khambhalia	H.R.	11781	1388	41	0	13210	128	13338	0
		Okhamandal	Soft Rock	591	25	0	0	616	580	1196	0
13	Gandhinagar	Dehgam	Alluvium	968	1134	866	719	3687	0	3687	0
		Gandhinagar	Alluvium	40	228	484	1912	2664	0	2664	0
		Kalol	Alluvium	53	77	140	1869	2139	0	2139	0
		Mansa	Alluvium	48	16	87	2267	2418	0	2418	0
14	Gir Somnath	Gir Gadhda	H.R.	5419	252	5	0	5676	105	5781	0
		Kodinar	Alluvium	10278	510	18	0	10806	789	11595	0
		Patan-veraval	Alluvium	10173	707	43	0	10923	66	10989	0
		Sutrapada	Alluvium	4990	328	20	0	5338	560	5898	0
		Talala	H.R.	10791	556	35	0	11382	508	11890	0
		Una	H.R.	7597	116	0	0	7713	505	8218	0
15	Jamnagar	Dhrol	H.R.	7654	673	95	5	8427	468	8895	0
		Jamjodhpur	H.R.	8466	3713	633	26	12838	634	13472	0
		Jamnagar	H.R.	15145	2520	341	2	18008	220	18228	0
		Jodiya	H.R.	3419	612	60	1	4092	309	4401	0
		Kalavad	H.R.	14362	3592	903	30	18887	326	19213	0
		Lalpur	H.R.	8537	2298	392	21	11248	289	11537	0
16	Junagadh	Bhesana	H.R.	4414	2885	1029	77	8405	397	8802	0
		Junagadh City & Junagadh	H.R.	7000	4029	710	12	11751	1362	13113	0
		Keshod	H.R.	10193	2646	671	0	13510	444	13954	0
		Malia	H.R.	11821	770	18	0	12609	118	12727	0
		Manavadar	H.R.	6248	1731	153	0	8132	188	8320	0
		Mangrol	Alluvium	7030	483	6	0	7519	504	8023	0
		Mendarda	H.R.	3880	2299	789	12	6980	550	7530	0
		Vanthali	H.R.	7221	2085	171	2	9479	308	9787	0
		Visavadar	H.R.	4845	6554	2765	100	14264	1510	15774	0
17	Kachchh	Abdasa	Soft Rock	129	203	764	900	1996	7	2003	0
		Anjar	H.R./Alluvium	411	387	1100	1940	3838	655	4493	0
		Bhachau	Soft Rock	276	650	700	1200	2826	108	2934	0
		Bhuj	Soft Rock	150	1150	3260	3240	7800	800	8600	0
		Gandhidham	Soft Rock	80	34	32	2	148	10	158	0
		Lakhpat	Soft Rock	14	192	200	20	426	120	546	0
		Mandvi	H.R.	300	1150	2000	500	3950	202	4152	0
		Mundra	H.R.	759	790	850	130	2529	394	2923	0
		Nakhatrana	Soft Rock	150	1400	2831	1000	5381	150	5531	0
		Rapar	Soft Rock	1240	1400	700	100	3440	1215	4655	0
18	Kheda	Galteshwar	H.R.	504	657	22	0	1183	52	1235	0
		Kapadvanj	H.R.	7301	1937	72	0	9310	50	9360	0
		Kathlal	Alluvium	972	1748	412	0	3132	124	3256	0
		Kheda	Alluvium	306	787	452	62	1607	10	1617	0
		Mahudha	Alluvium	787	805	62	0	1654	205	1859	0
		Matar	Alluvium	581	759	67	0	1407	81	1488	0
		Mehmedabad	Alluvium	523	3190	18	0	3731	20	3751	0
		Nadiad	Alluvium	1489	1938	151	0	3578	14	3592	0
		Thasra	H.R./Alluvium	1061	1406	115	0	2582	36	2618	0
		Vaso	Alluvium	298	810	40	0	1148	7	1155	0

Sl No	District	Assessment Unit Name	Predominant Rock formation	No. of Electrified Sets					No. of Diesel Pump Sets	Grand Total(Electric+Diesel)	Open Wells (Without Pumpsets)
				upto 7.5 HP	7.5 to 15 HP	15 to 30 HP	more than 30 HP	Total			
19	Mahesana	Becharaji	Alluvium	5	25	15	243	288	145	433	0
		Jotana	Alluvium	21	65	48	548	682	0	682	0
		Kadi	Alluvium	115	55	159	2330	2659	0	2659	0
		Kheralu	Alluvium	3693	2279	631	361	6964	300	7264	0
		Mahesana	Alluvium	173	232	70	2749	3224	0	3224	0
		Satlasana	Alluvium	3781	1752	80	0	5613	259	5872	0
		Unjha	Alluvium	296	314	204	738	1552	0	1552	0
		Vadnagar	Alluvium	2482	1163	768	435	4848	550	5398	0
		Vijapur	Alluvium	87	148	1152	2861	4248	0	4248	0
		Visnagar	Alluvium	1378	301	67	1667	3413	225	3638	0
20	Mahisagar	Balasinor	H.R.	1803	648	69	7	2527	210	2737	0
		Kadana	H.R.	3448	52	0	0	3500	100	3600	300
		Khanpur	H.R.	3005	51	0	0	3056	550	3606	200
		Lunawada	H.R.	5545	329	0	0	5874	640	6514	2200
		Santrampur	H.R.	6584	22	0	0	6606	300	6906	1600
		Virpur	H.R.	2632	257	34	3	2926	25	2951	0
21	Morbi	Halvad	Soft Rock	165	2053	8532	2113	12863	0	12863	0
		Maliya	Alluvium	207	103	3	2	315	620	935	0
		Morvi	H.R./Alluvium	1395	909	238	12	2554	3920	6474	0
		Tankara	H.R.	7173	1626	522	23	9344	992	10336	0
		Wankaner	H.R./Soft Rock	4594	6025	1626	99	12344	265	12609	0
22	Narmada	Dediapada	H.R.	110	96	11	0	217	77	294	0
		Garudeshwar	H.R.	334	118	23	0	475	16	491	0
		Nandod	H.R./Alluvium	578	412	121	16	1127	24	1151	0
		Sagbara	H.R.	499	32	4	2	537	12	549	0
		Tilakwada	H.R.	120	63	26	0	209	0	209	0
23	Navsari	Bansda	H.R.	3452	3684	10	0	7146	120	7266	19
		Chikhli	H.R.	10372	252	21	0	10645	79	10724	214
		Gandevi	H.R./Alluvium	6225	122	16	0	6363	0	6363	0
		Jalalpore	Alluvium	3561	119	3	0	3683	120	3803	0
		Khergam	H.R.	2072	11	1	0	2084	40	2124	214
		Navsari	Alluvium	4631	340	14	0	4985	30	5015	0
24	Panchmahal	Ghoghamba	H.R.	5016	76	0	0	5092	100	5192	705
		Godhra	H.R.	3433	104	0	0	3537	900	4437	3200
		Halol	H.R.	3307	144	11	2	3464	600	4064	1500
		Jambughoda	H.R.	1243	11	0	0	1254	200	1454	400
		Kalol	H.R.	2732	110	0	0	2842	970	3812	1700
		Morwa hadaf	H.R.	1390	15	0	0	1405	1550	2955	1000
		Shehera	H.R.	2193	46	0	0	2239	500	2739	2200
25	Patan	Chanasma	Alluvium	2	5	1	90	98	50	148	0
		Harij	Alluvium	57	212	161	824	1254	0	1254	0
		Patan	Alluvium	35	309	450	1590	2384	50	2434	0
		Radhanpur	Alluvium	458	116	33	308	915	0	915	0
		Sami	Alluvium	117	48	49	370	584	0	584	0
		Sankheswar	Alluvium	25	18	25	245	313	0	313	0
		Santalpur	Alluvium	3	6	46	266	321	0	321	0
		Sarsvati(Patan)	Alluvium	26	30	71	633	760	50	810	0
		Sidhpur	Alluvium	259	668	780	1303	3010	0	3010	0
26	Porbandar	Kutiyana	H.R.	4892	810	38	0	5740	680	6420	0
		Porbandar	H.R./Alluvium	7581	440	26	0	8047	1022	9069	0
		Ranavav	H.R./Alluvium	3225	521	48	0	3794	1958	5752	0
27	Rajkot	Dhoraji	H.R.	7634	3108	473	5	11220	301	11521	0
		Gondal	H.R.	16022	3866	815	15	20718	1750	22468	0
		Jamkandorna	H.R.	8698	1347	229	2	10276	430	10706	0
		Jasdan	H.R.	12586	1976	355	15	14932	50	14982	0
		Jetpur	H.R.	10362	2692	939	29	14022	345	14367	0
		Kotada sangani	H.R.	6407	1017	108	1	7533	196	7729	0
		Lodhika	H.R.	6631	485	59	0	7175	560	7735	0
		Paddhari	H.R.	9240	1285	161	9	10695	2120	12815	0
		Rajkot	H.R.	12348	2598	820	51	15817	1060	16877	0
		Upleta	H.R.	9491	3391	620	15	13517	460	13977	0
		Vinchchiya	H.R.	4975	883	77	0	5935	550	6485	0

Sl No	District	Assessment Unit Name	Predominant Rock formation	No. of Electrified Sets					No. of Diesel Pump Sets	Grand Total(Electric+Diesel)	Open Wells (Without Pumpsets)
				upto 7.5 HP	7.5 to 15 HP	15 to 30 HP	more than 30 HP	Total			
28	Sabarkantha	Himatnagar	H.R./Alluvium	11690	3388	1152	127	16357	50	16407	0
		Idar	H.R.	12551	3528	472	23	16574	150	16724	0
		Khedbrahma	H.R.	6218	514	26	2	6760	100	6860	0
		Poshina	H.R.	1659	26	2	0	1687	200	1887	0
		Prantij	Alluvium	3204	4491	1532	546	9773	70	9843	0
		Talod	H.R./Alluvium	7213	2473	404	26	10116	200	10316	0
		Vadali	H.R.	6060	1177	329	10	7576	225	7801	0
		Vijaynagar	H.R.	6695	162	12	2	6871	700	7571	0
29	Surat	Bardoli	H.R.	6136	408	16	0	6560	10	6570	0
		Kamrej	Alluvium	7884	484	28	0	8396	36	8432	0
		Mahuva	H.R.	6585	248	19	0	6852	25	6877	0
		Mandvi	H.R./Alluvium	6184	447	21	0	6652	19	6671	454
		Mangrol	H.R./Alluvium	3556	578	38	0	4172	25	4197	229
		Olpad	Alluvium	2350	57	10	0	2417	0	2417	0
		Palsana	Alluvium	4442	193	5	0	4640	0	4640	0
		Surat city & Chorasi	Alluvium	2239	82	0	0	2321	8	2329	0
		Umarpada	H.R.	486	104	6	1	597	0	597	270
30	Surendranagar	Chotila	H.R.	1937	2692	513	11	5153	908	6061	0
		Chuda	H.R.	2714	351	44	3	3112	0	3112	0
		Dasada	Alluvium	109	72	26	299	506	0	506	0
		Dhrangadhra	Soft Rock	192	4269	6353	920	11734	0	11734	0
		Lakhtar	Alluvium	21	5	3	0	29	0	29	0
		Limbdi	H.R.	519	28	6	1	554	0	554	0
		Muli	Soft Rock	383	3891	3324	354	7952	0	7952	0
		Sayla	H.R./Soft Rock	3887	2856	974	151	7868	0	7868	0
		Thangadh	Soft Rock	295	1706	469	21	2491	0	2491	0
		Wadhwan	H.R.	1625	755	937	143	3460	0	3460	0
31	Tapi	Dolvan	H.R.	3955	88	19	0	4062	50	4112	59
		Kukarmunda	H.R.	448	43	3	0	494	3	497	5
		Nizar	H.R./Alluvium	1080	214	15	0	1309	15	1324	46
		Songadh	H.R.	6971	123	14	19	7127	0	7127	33
		Uchchhal	H.R.	1580	40	15	0	1635	9	1644	371
		Valod	H.R.	5271	334	11	5	5621	0	5621	2
		Vyara	H.R.	4454	108	13	14	4589	40	4629	31
32	Vadodara	Dabhoi	Alluvium	300	900	1629	58	2887	0	2887	0
		Desar	H.R.	1136	368	17	0	1521	10	1531	0
		Karjan	Alluvium	48	1396	2509	112	4065	0	4065	0
		Padra	Alluvium	67	1538	1164	32	2801	0	2801	0
		Savli	H.R./Alluvium	1399	883	686	19	2987	0	2987	0
		Sinor	Alluvium	17	304	1431	124	1876	0	1876	0
		Vadodara	Alluvium	277	847	1032	40	2196	220	2416	0
		Vaghodia	H.R./Alluvium	774	173	27	67	1041	90	1131	0
33	Valsad	Dharampur	H.R.	3941	44	1	0	3986	0	3986	72
		Kaprada	H.R.	2044	28	9	0	2081	0	2081	191
		Pardi	H.R.	3074	76	8	0	3158	0	3158	0
		Umbergaon	H.R.	2663	70	7	0	2740	0	2740	0
		Valsad	H.R.	9515	92	7	0	9614	0	9614	0
		Vapi	H.R.	722	25	1	0	748	0	748	0

Table 2: Taluka wise Unit Draft of GW Extraction structures used for irrigation

Sl. No	District	Assessment Unit Name	Estimated Draft of structure in TCM/Year					
			Open well Without Pump Sets	upto 7.5 HP E/M	7.5 to 15 HP E/M	15 to 30 HP E/M	more than 30 HP E/M	Diesel Pump Sets
	3	4						
1	Ahmedabad	Ahmedabad City & Daskroi	0	10	30	70	85	10
		Bavla	0	8	20	50	70	8
		Detroj-rampura	0	8	15	30	50	8
		Dhandhuka	0	5	8	20	30	5
		Dholera	0	10	0	0	45	10
		Dholka	0	12	30	50	60	10
		Mandal	0	10	20	80	85	15
		Sanand	0	10	25	50	60	10
		Viramgam	0	10	20	40	60	8
2	Amreli	Amreli	0	6	9	15	20	6
		Babra	0	6	8	15	20	6
		Bagasara	0	5	7	10	20	5
		Dhari	0	6	8	12	20	6
		Jafrabad	0	6	10	15	0	6
		Khambha	0	6	10	15	20	6
		Kunkavav vadia	0	6	10	15	20	6
		Lathi	0	5	8	10	20	5
		Lilia	0	7	10	15	20	7
		Rajula	0	5	8	15	20	5
		Savar kundla	0	7	12	15	20	7
3	Anand	Anand	0	8	10	20	30	0
		Anklav	0	8	10	15	30	0
		Borsad	0	8	10	20	30	0
		Khambhat	0	8	10	30	50	8
		Petlad	0	8	10	20	30	0
		Sojitra	0	8	10	20	30	0
		Tarapur	0	8	10	20	0	8
		Umreth	0	8	10	20	30	0
4	Arvalli	Bayad	0	5	10	12	20	0
		Bhiloda	0	5	8	12	20	0
		Dhansura	0	5	8	12	20	0
		Malpur	0	5	8	12	20	0
		Meghraj	0	5	8	12	20	0
		Modasa	0	5	8	12	20	0
5	Banaskantha	Amirgadh	0	6	10	15	20	6
		Bhabhar	0	8	10	15	20	8
		Danta	0	6	10	20	30	6
		Dantiwada	0	5	10	15	20	5
		Deesa	0	6	10	20	35	6
		Deodar	0	7	10	15	25	0
		Dhanera	0	5	10	20	25	5
		Kankrej	0	5	8	15	35	0
		Lakhani	0	6	8	15	25	10
		Palanpur	0	6	10	15	30	6
		Suigam	0	8	10	30	50	8
		Tharad	0	7	12	25	35	0
		Vadgam	0	5	8	15	25	0
		Vav	0	8	10	30	50	8
6	Bharuch	Amod	0	6	15	30	40	0
		Anklesvar	0	6	15	30	40	0
		Bharuch	0	6	10	25	40	0
		Hansot	0	8	15	20	0	0
		Jambusar	0	6	10	15	20	0
		Jhagadia	0	6	8	15	20	0
		Netrang	0	5	8	10	0	0
		Vagra	0	6	15	20	0	0
		Valia	0	6	15	20	25	0
7	Bhavnagar	Bhavnagar	0	6	8	10	15	5
		Gariadhar	0	4	6	10	15	4
		Ghogha	0	4	7	10		4
		Jesar	0	4	7	10	15	4
		Mahuva	0	4	6	8		4
		Palitana	0	6	8	10	20	6
		Sihor	0	5	7	10	15	5
		Talaja	0	4	6	8	0	4
		Umrala	0	6	7	10	15	6
		Vallabhipur	0	4	7	10	15	4

Sl. No	District	Assessment Unit Name	Estimated Draft of structure in TCM/Year					
			Open well Without Pump Sets	upto 7.5 HP E/M	7.5 to 15 HP E/M	15 to 30 HP E/M	more than 30 HP E/M	Diesel Pump Sets
8	Botad	Barwala	0	6	8	15	20	6
		Botad	0	5	7	10	15	5
		Gadhada	0	5	8	10	15	5
		Ranpur	0	6	8	15	0	6
9	Chhota udepur	Bodeli	0	5	8	10	20	0
		Chhota udaipur	0	6	10	15	0	0
		Jetpur pavi	0	7	10	15	20	0
		Kavant	0	6	10	15	0	0
		Nasvadi	0	5	8	10	15	0
		Sankheda	0	7	10	15	20	0
10	Dahod	Dahod	1.85	5	8	0	0	5
		Devgadh baria	1.85	5	8	0	0	5
		Dhanpur	1.85	5	8	0	0	5
		Fatepura	1.85	5	8	0	0	5
		Garbada	1.85	5	8	0	0	5
		Limkheda	1.85	5	8	0	0	5
		Sanjeli	0	5	8	0	0	5
		Singvad	1.85	5	8	0	0	5
		Zalod	1.85	5	8	0	0	5
11	Dang	Ahwa	0	7	10	0	0	7
		Subir	0	7	10	0	0	7
		Waghai	0	7	0	0	0	7
12	Devbhumi Dwarka	Bhanvad	0	5	7	15	0	5
		Kalyanpur	0	6	8	15	0	6
		Khambhalia	0	5	8	10	0	5
		Okhamandal	0	8	15	0	0	8
13	Gandhinagar	Dehgam	0	15	25	50	80	0
		Gandhinagar	0	10	20	40	55	0
		Kalol	0	10	20	50	60	0
		Mansa	0	10	20	30	50	0
14	Gir Somnath	Gir Gadhda	0	4	8	15	0	4
		Kodinar	0	6	8	15	0	6
		Patan-veraval	0	4	8	15	0	4
		Sutrapada	0	7	10	15	0	8
		Talala	0	5	8	15	0	5
		Una	0	5	8	15	0	5
15	Jamnagar	Dhrol	0	5	8	10	15	5
		Jamjodhpur	0	5	8	13	15	5
		Jamnagar	0	5	7	12	15	5
		Jodiya	0	7	9	13	0	6
		Kalavad	0	6	8	12	15	5
		Lalpur	0	5	8	12	15	5
16	Junagadh	Bhesana	0	5	8	12	15	5
		Junagadh City & Junagadh	0	5	8	12	15	0
		Keshod	0	5	8	12	0	5
		Malia	0	5	8	12	0	5
		Manavadar	0	6	10	12	0	6
		Mangrol	0	5	9	12	0	7
		Mendarda	0	5	8	12	15	5
		Vanthali	0	4.5	7	12	0	4.5
		Visavadar	0	5	8	12	0	5
17	Kachchh	Abdasa	0	6	10	15	20	6
		Anjar	0	6	10	15	25	6
		Bhachau	0	6	10	20	35	6
		Bhuj	0	8	12	25	40	8
		Gandhidham	0	5	8	10	20	5
		Lakhpat	0	8	10	20	40	6
		Mandvi	0	8	10	20	40	8
		Mundra	0	8	15	20	30	8
		Nakhatrana	0	7	10	15	25	7
		Rapar	0	8	15	25	35	8

Sl. No	District	Assessment Unit Name	Estimated Draft of structure in TCM/Year					
			Open well Without Pump Sets	upto 7.5 HP E/M	7.5 to 15 HP E/M	15 to 30 HP E/M	more than 30 HP E/M	Diesel Pump Sets
18	Kheda	Galteshwar	0	5	7	15	0	5
		Kapadvanj	0	5	8	15	0	5
		Kathlal	0	5	8	15	0	5
		Kheda	0	10	15	30	40	10
		Mahudha	0	7	15	30	0	7
		Matar	0	10	20	40	0	10
		Mehmedabad	0	7	12	30	0	7
		Nadiad	0	8	15	35	0	10
		Thasra	0	8	12	20	0	8
		Vaso	0	8	12	30	0	8
19	Mahesana	Becharaji	0	15	25	70	90	18
		Jotana	0	15	20	65	70	15
		Kadi	0	15	20	70	75	15
		Kheralu	0	12	18	40	65	10
		Mahesana	0	15	25	50	90	0
		Satlasana	0	8	20	30	0	8
		Unjha	0	15	20	40	70	0
		Vadnagar	0	10	15	40	60	10
		Vijapur	0	10	20	30	50	
		Visnagar	0	10	20	50	70	10
20	Mahisagar	Balasinor	0	5	8	15	20	5
		Kadana	0	4	8	0	0	5
		Khanpur	0	5	8	0	0	5
		Lunawada	0	5	8	0	0	4
		Santrampur	0	4	8	0	0	4
		Virpur	0	5	8	15	20	5
21	Morbi	Halvad	0	5	7	9	12	4
		Maliya	0	10	12	15	20	10
		Morvi	0	6	8	15	20	8
		Tankara	0	6	8	15	20	6
		Wankaner	0	6	7	9	15	6
22	Narmada	Dediapada	0	8	15	30	0	8
		Garudeshwar	0	10	15	30	0	6
		Nandod	0	10	20	40	45	10
		Sagbara	0	8	15	20	0	8
		Tilakwada	0	10	15	30	0	8
23	Navsari	Bansda	0	4	7	10	0	4
		Chikhli	0	5	8	10	0	5
		Gandevi	0	5	7	15	0	0
		Jalalpore	0	7	12	15	0	7
		Khergam	0	4	7	10	0	4
		Navsari	0	4	8	15	0	4
24	Panchmahal	Ghoghamba	0	4	10	0	0	5
		Godhra	0	4	10	0	0	5
		Halol	0	6	10	0	0	5
		Jambughoda	0	4	10	0	0	5
		Kalol	0	5	10	0	0	5
		Morwa hadaf	0	5	10	0	0	5
		Shehera	0	5	10	0	0	5
25	Patan	Chanasma	0	15	30	50	80	15
		Harij	0	10	12	35	70	
		Patan	0	15	30	50	75	15
		Radhanpur	0	8	10	30	60	0
		Sami	0	10	15	40	75	0
		Sankheswar	0	10	15	40	75	0
		Santalpur	0	8	15	30	70	0
		Sarsvati(Patan)	0	15	20	50	75	15
		Sidhpur	0	15	20	40	80	0
26	Porbandar	Kutiyana	0	6	10	15	0	6
		Porbandar	0	6	10	15	0	7
		Ranavav	0	6	10	15	0	7

Sl. No	District	Assessment Unit Name	Estimated Draft of structure in TCM/Year					
			Open well Without Pump Sets	upto 7.5 HP E/M	7.5 to 15 HP E/M	15 to 30 HP E/M	more than 30 HP E/M	Diesel Pump Sets
27	Rajkot	Dhoraji	0	6	10	15	20	6
		Gondal	0	6	10	20	20	6
		Jamkandorna	0	6	15	20	20	6
		Jasdan	0	5	7	15	20	5
		Jetpur	0	5	8	15	20	5
		Kotada sangani	0	6	8	15	20	6
		Lodhika	0	6	8	15	0	6
		Paddhari	0	6	10	15	20	6
		Rajkot	0	6	10	18	20	6
		Upleta	0	5	8	15	20	5
		Vinchchiya	0	6	8	15	0	6
28	Sabarkantha	Himatnagar	0	5	8	20	50	5
		Idar	0	6	9	15	20	6
		Khedbrahma	0	5	6	8	10	6
		Poshina	0	6	10	12	0	5
		Prantij	0	6	10	15	45	5
		Talod	0	5	8	15	25	5
		Vadali	0	7	12	25	30	6
		Vijaynagar	0	7	10	20	30	5
29	Surat	Bardoli	0	7	10	15	**0**	7
		Kamrej	0	7	10	15	0	7
		Mahuva	0	5	8	15	0	5
		Mandvi	0	5	10	15	0	5
		Mangrol	0	5	8	20	0	5
		Olpad	0	8	20	30	0	0
		Palsana	0	7	10	20	0	0
		Surat city & Chorasi	0	12	25	0	0	10
		Umarpada	0	6	8	15	0	0
30	Surendranagar	Chotila	0	7	10	18	20	7
		Chuda	0	6	10	12	15	0
		Dasada	0	8	12	15	20	0
		Dhrangadhra	0	5	8	10	15	0
		Lakhtar	0	10	15	30	0	0
		Limbdi	0	10	15	20	0	0
		Muli	0	5	8	10	15	0
		Sayla	0	5	8	15	20	0
		Thangadh	0	6	8	12	20	0
		Wadhwan	0	5	8	10	15	5
31	Tapi	Dolvan	0	8	12	20	0	8
		Kukarmunda	0	8	12	20	0	10
		Nizar	0	7	10	20	0	10
		Songadh	0	6	8	15	20	0
		Uchchhal	0	7	12	20	0	10
		Valod	0	6	8	15	20	0
		Vyara	0	6	12	20	30	8
32	Vadodara	Dabhoi	0	12	25	50	60	0
		Desar	0	10	15	30	0	10
		Karjan	0	10	15	25	30	0
		Padra	0	10	15	50	75	0
		Savli	0	10	15	30	50	10
		Sinor	0	10	15	30	50	0
		Vadodara	0	10	30	70	80	10
		Vaghodia	0	10	15	30	75	8
33	Valsad	Dharampur	0	7	10	15	0	0
		Kaprada	0	7	10	15	0	0
		Pardi	0	6	10	20	0	0
		Umbergaon	0	7	10	15	0	0
		Valsad	0	6	10	20	0	0
		Vapi	0	7	10	15	0	0

Annexure-I

Dynamic Ground Water Resource Assessment 2017, Gujarat

Dynamic Ground Water Resources Assessment, 2017															
Gujarat															
S. No	District	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharges (Ham)	Annual Extractable Ground Water Recharge (Ham)	Current Annual Ground Water Extraction (Ham)				Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-monsoon season					Irrigation Use	Industrial Use	Domestic Use	Total Extraction			
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Ahmedabad	39237.37	8763.67	0.00	9845.43	57846.47	2892.32	54954.15	35902.20	550.56	3121.41	39574.17	3974.00	14527.39	72.01
2	Amreli	104008.67	11261.72	0.00	10873.04	126143.43	6307.17	119836.26	70915.60	351.63	1992.56	73259.78	2600.00	45969.04	61.13
3	Anand	31573.68	16408.41	0.00	19793.63	67775.72	3388.79	64386.93	24645.90	511.28	2899.43	28056.60	3774.00	35455.75	43.57
4	Arvalli	54198.00	6755.21	0.00	5954.55	66907.76	3345.39	63562.37	34789.50	254.94	1444.68	36489.12	1935.00	26582.93	57.41
5	Banaskantha	108741.52	25708.07	0.00	13117.87	147567.45	7378.37	140189.08	153015.90	671.46	3804.92	157492.27	4842.00	11310.77	112.34
6	Bharuch	38578.52	4518.91	0.00	10364.94	53462.37	2673.12	50789.25	15136.70	260.43	1478.09	16875.23	2813.00	32579.11	33.23
7	Bhavnagar	60632.36	12108.87	0.00	9220.02	81961.26	4098.06	77863.20	43098.30	488.03	2765.50	46351.83	4659.00	29617.87	59.53
8	Botad	30879.16	3699.19	0.00	2892.38	37470.73	1873.54	35597.20	21385.10	149.30	846.01	22380.41	1237.00	12825.80	62.87
9	Chhota udepur	19160.21	7323.50	0.00	9142.76	35626.48	1781.32	33845.15	14573.40	253.28	1435.25	16261.93	1991.00	17027.47	48.05
10	Dahod	22691.52	11277.61	0.00	7515.52	41484.65	2074.23	39410.42	14643.20	514.72	2914.28	18072.20	4232.00	20020.50	45.86
11	Dang	5165.87	3371.00	0.00	37.00	8573.87	429.00	8144.87	610.00	58.10	328.70	996.80	455.00	7021.77	12.24
12	Devbhumi Dwarka	25540.11	3310.52	0.00	1593.56	30444.19	1522.71	28921.48	17533.80	159.26	902.46	18595.51	1370.00	9858.42	64.30
13	Gandhinagar	40861.21	5888.93	0.00	2731.67	49481.81	2474.09	47007.72	51114.00	339.56	1924.15	53377.70	2498.00	0.00	113.55
14	Gir Somnath	42519.05	4047.36	0.00	5192.14	51758.55	2587.93	49170.62	28808.80	197.22	1117.57	30123.58	3512.00	16652.61	61.26
15	Jamnagar	65638.79	10361.18	0.00	3283.57	79283.53	3964.18	75319.35	45686.90	295.57	1674.90	47657.37	2561.00	26775.88	63.27
16	Junagadh	87552.00	8136.66	0.00	8463.15	104151.81	5207.59	98944.22	61232.55	350.15	1984.17	63566.86	2733.00	34628.52	64.25
17	Kachchh	58705.32	16242.90	0.00	13220.84	88169.06	4408.46	83760.60	68013.50	335.32	1900.16	70248.98	3918.00	13896.67	83.87
18	Kheda	36371.57	16751.15	0.00	17054.67	70177.39	3508.91	66668.48	29286.40	491.05	2779.09	32556.54	3714.00	33177.03	48.83
19	Mahesana	88305.48	14832.34	0.00	11801.91	114939.73	5746.99	109192.75	122279.10	467.58	2649.81	125396.49	3383.00	900.70	114.84
20	Mahisagar	22394.94	6526.39	0.00	8122.51	37043.84	1852.19	35191.65	11979.50	246.70	1405.00	13631.20	1879.00	21086.45	38.73
21	Morbi	48353.66	4433.05	0.00	5808.70	58595.41	2929.77	55665.64	32588.80	170.35	965.31	33724.46	1713.00	21193.49	60.58
22	Narmada	11503.50	6541.31	0.00	7131.91	25176.72	1258.84	23917.88	3660.70	144.97	826.11	4631.77	1092.00	19020.22	19.37
23	Navsari	42109.58	6218.27	0.00	11908.61	60236.46	3011.82	57224.63	18422.50	318.20	1803.10	20543.80	2272.00	36211.93	35.90
24	Panchmahal	19945.37	11806.93	0.00	10516.55	42268.85	2113.45	40155.39	11934.50	412.30	2330.62	14677.42	3148.00	24660.59	36.55
25	Patan	21368.79	12197.66	0.00	6706.27	40272.71	2013.64	38259.07	37697.50	130.37	738.76	38566.63	968.00	611.05	100.80
26	Porbandar	18217.60	2421.58	0.00	1110.83	21750.01	1087.50	20662.51	14175.00	61.15	501.99	14738.14	1013.00	5413.36	71.33
27	Rajkot	115745.68	23899.65	0.00	16908.43	156553.76	7827.69	148726.07	93071.30	433.12	2451.34	95955.75	3444.00	51777.66	64.52
28	Sabarkantha	64747.17	15500.67	0.00	9100.10	89347.95	4467.40	84880.55	57122.90	349.86	1982.55	59455.31	2655.00	24752.79	70.05
29	Surat	77719.11	22063.19	0.00	26612.30	126394.60	6319.73	120074.87	28865.20	595.00	3381.00	32841.20	4572.00	86042.67	27.35
30	Surendranagar	58510.53	9432.18	0.00	3791.58	71734.29	3586.71	68147.58	38159.00	212.54	1204.86	39576.40	2808.00	26968.04	58.07
31	Tapi	30889.34	6821.91	0.00	6458.35	44169.60	2208.48	41961.12	16672.90	197.56	1115.68	17986.14	1449.00	23641.66	42.86
32	Vadodara	68427.99	12374.88	0.00	21135.10	101937.97	5096.90	96841.08	52570.00	525.91	2980.84	56076.76	2530.00	41215.16	57.91
33	Valsad	35142.63	8833.86	0.00	4173.55	48150.03	2407.97	45742.06	14504.40	523.12	2958.50	17986.02	4491.00	26223.54	39.32
	Total (Ham)	**1595436.30**	**339838.74**	**0.00**	**301583.43**	**2236858.47**	**111844.26**	**2125014.21**	**1284095.05**	**11020.58**	**62608.78**	**1357724.40**	**90235.00**	**739663.58**	**63.89**
	Total (Bcm)	**15.95**	**3.40**	**0.00**	**3.02**	**22.37**	**1.12**	**21.25**	**12.84**	**0.11**	**0.63**	**13.58**	**0.90**	**7.40**	**63.89**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Ahmedabad

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ahmedabad City & Daskroi	18716.45	2998.44	0.00	3652.29	25367.19	1268.36	24098.83	18100.00	362.00	2049.00	20511.00	2049.00	3587.83	85.11	Semi critical
2	Bavla	3050.72	1481.25	0.00	1460.70	5992.66	299.63	5693.03	2728.60	8.10	46.00	2782.70	318.00	2638.33	48.88	Safe
3	Detroj-rampura	2810.06	293.81	0.00	353.04	3456.92	172.85	3284.07	2424.00	21.00	121.00	2566.00	167.00	672.07	78.13	Semi critical
4	Dhandhuka		Saline													
5	Dholera		Saline													
6	Dholka	6240.76	1015.41	0.00	900.79	8156.96	407.85	7749.11	5711.60	63.86	361.87	6137.33	431.00	1542.65	79.20	Semi critical
7	Mandal	1638.33	514.87	0.00	831.05	2984.25	149.21	2835.04	864.00	3.20	18.60	885.80	142.00	1825.84	31.24	Safe
8	Sanand	5537.50	2305.92	0.00	2581.81	10425.23	521.26	9903.97	5270.00	43.00	245.00	5558.00	478.00	4112.97	56.12	Safe
9	Viramgam	1243.55	153.97	0.00	65.74	1463.26	73.16	1390.10	804.00	49.40	279.94	1133.34	389.00	147.70	81.53	Semi critical
District Total		**39237.37**	**8763.67**	**0.00**	**9845.43**	**57846.47**	**2892.32**	**54954.15**	**35902.20**	**550.56**	**3121.41**	**39574.17**	**3974.00**	**14527.39**	**72.01**	**Semi critical**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Amreli

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Amreli	14122.77	1846.29	0.00	1878.26	17847.32	892.37	16954.95	8926.50	57.87	327.92	9312.29	414.00	7556.58	54.92	Safe
2	Babra	13607.46	1394.42	0.00	1182.62	16184.49	809.22	15375.27	9217.80	33.70	190.98	9442.48	241.00	5882.77	61.41	Safe
3	Bagasara	5255.40	502.41	0.00	574.91	6332.72	316.64	6016.08	3680.40	19.92	112.88	3813.20	143.00	2172.76	63.38	Safe
4	Dhari	16630.55	1583.24	0.00	1582.52	19796.31	989.82	18806.49	10242.40	33.53	190.01	10465.94	240.00	8290.56	55.65	Safe
5	Jafrabad	3134.88	368.03	0.00	288.45	3791.36	189.57	3601.79	1956.80	19.43	110.09	2086.31	186.00	1439.56	57.92	Safe
6	Khambha	6815.72	812.38	0.00	636.37	8264.47	413.22	7851.25	4649.40	22.41	126.98	4798.79	160.00	3019.44	61.12	Safe
7	Kunkavav vad	11392.31	1288.59	0.00	1198.90	13879.80	693.99	13185.81	8749.20	23.93	135.63	8908.76	171.00	4241.67	67.56	Safe
8	Lathi	6695.13	1206.34	0.00	836.88	8738.35	436.92	8301.44	5384.80	31.88	180.64	5597.32	228.00	2656.76	67.43	Safe
9	Lilia	4140.09	490.32	0.00	408.48	5038.89	251.94	4786.95	2791.40	14.49	82.12	2888.01	104.00	1877.05	60.33	Safe
10	Rajula	5487.06	884.79	0.00	858.81	7230.67	361.53	6869.14	4018.40	37.08	210.13	4265.61	302.00	2511.66	62.10	Safe
11	Savar kundla	16727.30	884.91	0.00	1426.84	19039.06	951.95	18087.10	11298.50	57.39	325.19	11681.08	411.00	6320.22	64.58	Safe
District Total		**104008.67**	**11261.72**	**0.00**	**10873.04**	**126143.43**	**6307.17**	**119836.26**	**70915.60**	**351.63**	**1992.56**	**73259.78**	**2600.00**	**45969.04**	**61.13**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Anand																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Anand	6474.79	3064.20	0.00	3392.86	12931.84	646.59	12285.25	5365.80	148.94	843.98	6358.71	1099.00	5671.51	51.76	Safe
2	Anklav	3304.13	799.29	0.00	933.89	5037.32	251.87	4785.45	2526.90	35.96	203.77	2766.62	265.00	1957.59	57.81	Safe
3	Borsad	6487.77	2337.88	0.00	2984.39	11810.04	590.50	11219.53	5344.80	92.80	525.87	5963.47	685.00	5096.93	53.15	Safe
4	Khambhat	4061.36	2089.65	0.00	2040.97	8191.99	409.60	7782.39	3448.20	70.00	396.00	3914.20	515.00	3749.19	50.30	Safe
5	Petlad	2102.25	3289.18	0.00	4415.88	9807.31	490.37	9316.94	3338.40	70.38	398.82	3807.59	519.00	5389.16	40.87	Safe
6	Sojitra	2322.13	1614.39	0.00	2013.12	5949.65	297.48	5652.16	1479.40	26.04	147.55	1652.99	192.00	3954.73	29.25	Safe
7	Tarapur	2084.38	1163.05	0.00	1586.24	4833.67	241.68	4591.99	216.40	21.20	123.00	360.60	160.00	4194.39	7.85	Safe
8	Umreth	4736.86	2050.77	0.00	2426.28	9213.91	460.70	8753.21	2926.00	45.96	260.45	3232.41	339.00	5442.25	36.93	Safe
District Total		**31573.68**	**16408.41**	**0.00**	**19793.63**	**67775.72**	**3388.79**	**64386.93**	**24645.90**	**511.28**	**2899.43**	**28056.60**	**3774.00**	**35455.75**	**43.57**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Arvalli																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bayad	11351.42	941.59	0.00	793.88	13086.88	654.34	12432.54	6923.50	51.40	291.26	7266.16	390.00	5067.64	58.44	Safe
2	Bhiloda	15889.29	1712.39	0.00	1431.11	19032.79	951.64	18081.15	11012.80	55.54	314.73	11383.07	421.00	6591.81	62.96	Safe
3	Dhansura	6201.09	647.56	0.00	310.32	7158.97	357.95	6801.02	3661.90	26.58	150.62	3839.10	202.00	2910.54	56.45	Safe
4	Malpur	3861.58	1035.00	0.00	1822.61	6719.19	335.96	6383.23	3075.60	24.37	138.07	3238.03	185.00	3098.27	50.73	Safe
5	Meghraj	8125.56	1152.98	0.00	609.23	9887.77	494.39	9393.38	4675.90	41.62	235.83	4953.35	316.00	4359.87	52.73	Safe
6	Modasa	8769.06	1265.70	0.00	987.40	11022.16	551.11	10471.05	5439.80	55.44	314.17	5809.41	421.00	4554.81	55.48	Safe
District Total		**54198.00**	**6755.21**	**0.00**	**5954.55**	**66907.76**	**3345.39**	**63562.37**	**34789.50**	**254.94**	**1444.68**	**36489.12**	**1935.00**	**26582.93**	**57.41**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Banaskantha

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Amirgadh	4391.45	1453.32	0.00	135.08	5979.85	298.99	5680.86	3075.80	34.15	193.50	3303.45	272.00	2298.91	58.15	Safe
2	Bhabhar															
3	Danta	7618.40	1918.47	0.00	487.83	10024.69	501.23	9523.46	5714.20	58.01	328.72	6100.93	392.00	3359.25	64.06	Safe
4	Dantiwada	10133.02	1334.51	0.00	279.49	11747.03	587.35	11159.67	6064.00	29.73	168.46	6262.18	201.00	4864.95	56.11	Safe
5	Deesa	37906.10	5356.29	0.00	2659.73	45922.12	2296.11	43626.01	54668.40	124.34	704.58	55497.32	841.00	0.00	127.21	Over Exploited
6	Deodar	1254.33	1461.32	0.00	448.02	3163.67	158.18	3005.49	4619.90	36.31	205.77	4861.98	273.00	0.00	161.77	Over Exploited
7	Dhanera	10564.84	2143.09	0.00	2001.00	14708.93	735.45	13973.48	18694.50	59.53	337.35	19091.38	403.00	0.00	136.63	Over Exploited
8	Kankrej	3441.48	2468.71	0.00	2088.46	7998.65	399.93	7598.72	9904.20	46.22	261.92	10212.34	481.00	0.00	134.40	Over Exploited
9	Lakhani	8162.20	1498.98	0.00	1911.41	11572.59	578.63	10993.96	15797.10	38.72	219.43	16055.26	262.00	0.00	146.04	Over Exploited
10	Palanpur	15030.31	4566.21	0.00	1017.65	20614.18	1030.71	19583.47	17916.60	113.21	641.50	18671.30	766.00	787.66	95.34	Critical
11	Suigam															
12	Tharad	1518.68	1110.77	0.00	1557.17	4186.61	209.33	3977.28	4122.80	69.24	392.33	4584.37	532.00	0.00	115.26	Over Exploited
13	Vadgam	8720.71	2396.40	0.00	532.02	11649.13	582.46	11066.67	12438.40	62.01	351.36	12851.77	419.00	0.00	116.13	Over Exploited
14	Vav															
District Total		**108741.52**	**25708.07**	**0.00**	**13117.87**	**147567.45**	**7378.37**	**140189.08**	**153015.90**	**671.46**	**3804.92**	**157492.27**	**4842.00**	**11310.77**	**112.34**	**Over Exploited**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : BHARUCH

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Amod	4687.21	257.03	0.00	1159.06	6103.30	305.17	5798.14	2941.00	22.99	130.26	3094.25	170.00	2664.15	53.37	Safe
2	Anklesvar	4271.95	728.37	0.00	1480.42	6480.74	324.04	6156.71	1356.40	54.00	306.00	1716.40	573.00	4173.31	27.88	Safe
3	Bharuch	6343.75	382.78	0.00	1281.22	8007.75	400.39	7607.36	2761.50	83.00	471.00	3315.50	821.00	3941.86	43.58	Safe
4	Hansot	1236.72	1056.10	0.00	2246.72	4539.54	226.98	4312.56	187.70	8.00	42.00	237.70	111.00	4005.86	5.51	Safe
5	Jambusar	795.82	61.42	0.00	1368.13	2225.37	111.27	2114.11	166.30	5.00	27.30	198.60	357.00	1585.81	9.39	Safe
6	Jhagadia	7757.86	338.71	0.00	802.72	8899.29	444.96	8454.33	3321.40	36.33	205.84	3563.57	269.00	4827.60	42.15	Safe
7	Netrang	4000.70	324.12	0.00	413.70	4738.51	236.93	4501.58	1296.00	21.12	119.69	1436.81	171.00	3013.46	31.92	Safe
8	Vagra	1736.82	81.33	0.00	710.81	2528.96	126.45	2402.51	168.40	7.00	42.00	217.40	181.00	2046.11	9.05	Safe
9	Valia	7747.69	1289.05	0.00	902.15	9938.89	496.94	9441.95	2938.00	23.00	134.00	3095.00	160.00	6320.95	32.78	Safe
District Total		**38578.52**	**4518.91**	**0.00**	**10364.94**	**53462.37**	**2673.12**	**50789.25**	**15136.70**	**260.43**	**1478.09**	**16875.23**	**2813.00**	**32579.11**	**33.23**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Bhavnagar

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bhavnagar	4511.40	920.71	0.00	508.93	5941.04	297.05	5643.99	2679.30	78.39	444.22	3201.91	1486.00	1400.30	56.73	Safe
2	Gariadhar	4844.48	1118.31	0.00	599.91	6562.71	328.14	6234.57	3272.20	29.44	166.83	3468.48	223.00	2709.93	55.63	Safe
3	Ghogha	3612.09	847.83	0.00	435.28	4895.20	244.76	4650.44	2630.90	18.85	106.82	2756.58	191.00	1809.69	59.28	Safe
4	Jesar	3196.97	979.04	0.00	672.48	4848.49	242.42	4606.07	2637.70	18.56	105.19	2761.45	141.00	1808.81	59.95	Safe
5	Mahuva	12447.76	1209.69	0.00	1150.86	14808.31	740.42	14067.90	7185.80	112.51	637.58	7935.90	853.00	5916.58	56.41	Safe
6	Palitana	7197.54	1487.45	0.00	1741.09	10426.07	521.30	9904.77	5729.80	57.32	324.81	6111.93	435.00	3682.65	61.71	Safe
7	Sihor	9257.24	1602.41	0.00	1036.72	11896.38	594.82	11301.56	6606.10	52.83	299.37	6958.30	401.00	4241.63	61.57	Safe
8	Talaja	8765.29	1542.10	0.00	2069.43	12376.81	618.84	11757.97	7517.40	81.07	459.37	8057.84	615.00	3544.50	68.53	Safe
9	Umrala	4881.24	950.15	0.00	687.88	6519.27	325.96	6193.31	3451.00	21.49	121.76	3594.25	163.00	2557.82	58.03	Safe
10	Vallabhipur	1918.35	1451.18	0.00	317.44	3686.96	184.35	3502.62	1388.10	17.57	99.54	1505.21	151.00	1945.95	42.97	Safe
District Total		**60632.36**	**12108.87**	**0.00**	**9220.02**	**81961.26**	**4098.06**	**77863.20**	**43098.30**	**488.03**	**2765.50**	**46351.83**	**4659.00**	**29617.87**	**59.53**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Botad

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Barwala	1878.95	159.10	0.00	56.20	2094.25	104.71	1989.54	1243.40	4.92	27.87	1276.18	143.00	598.22	64.14	Safe
2	Botad	12800.84	1224.65	0.00	1177.26	15202.75	760.14	14442.61	7995.10	71.35	404.29	8470.73	541.00	5835.16	58.65	Safe
3	Gadhada	10205.06	2068.98	0.00	1504.44	13778.48	688.92	13089.55	8432.00	49.90	282.78	8764.68	378.00	4229.65	66.96	Safe
4	Ranpur	5994.31	246.47	0.00	154.48	6395.26	319.76	6075.50	3714.60	23.13	131.08	3868.81	175.00	2162.77	63.68	Safe
District Total		**30879.16**	**3699.19**	**0.00**	**2892.38**	**37470.73**	**1873.54**	**35597.20**	**21385.10**	**149.30**	**846.01**	**22380.41**	**1237.00**	**12825.80**	**62.87**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Chhotaudaipur

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bodeli	1240.40	1271.41	0.00	2196.69	4708.50	235.42	4473.07	2394.00	39.40	223.29	2656.70	310.00	1729.67	59.39	Safe
2	Chhota udaipur	6348.75	845.43	0.00	573.71	7767.89	388.39	7379.50	2586.60	56.47	320.02	2963.09	444.00	4292.42	40.15	Safe
3	Jetpur pavi	4263.94	1365.53	0.00	1503.49	7132.97	356.65	6776.32	3719.90	41.47	234.98	3996.34	326.00	2688.96	58.98	Safe
4	Kavant	4132.64	1013.47	0.00	288.02	5434.13	271.71	5162.42	2404.60	55.01	311.73	2771.34	432.00	2270.81	53.68	Safe
5	Nasvadi	1403.78	1246.42	0.00	1474.53	4124.73	206.24	3918.49	1504.70	36.37	206.08	1747.15	286.00	2091.42	44.59	Safe
6	Sankheda	1770.70	1581.24	0.00	3106.32	6458.26	322.91	6135.35	1963.60	24.56	139.15	2127.31	193.00	3954.19	34.67	Safe
District Total		**19160.21**	**7323.50**	**0.00**	**9142.76**	**35626.48**	**1781.32**	**33845.15**	**14573.40**	**253.28**	**1435.25**	**16261.93**	**1991.00**	**17027.47**	**48.05**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Dohad																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dahod	2747.37	996.11	0.00	1097.27	4840.75	242.04	4598.71	1717.10	93.00	524.00	2334.10	762.00	2026.61	50.76	Safe
2	Devgadh baria	2392.93	2369.41	0.00	901.65	5663.99	283.20	5380.79	2323.50	60.00	342.00	2725.50	496.00	2501.29	50.65	Safe
3	Dhanpur	2517.25	1249.53	0.00	568.66	4335.44	216.77	4118.67	1550.80	48.00	270.00	1868.80	392.00	2127.87	45.37	Safe
4	Fatepura	2763.03	1207.94	0.00	722.45	4693.42	234.67	4458.75	1865.10	63.00	356.50	2284.60	518.00	2012.65	51.24	Safe
5	Garbada	1480.25	669.40	0.00	482.13	2631.78	131.59	2500.19	527.80	52.50	298.00	878.30	433.00	1486.89	35.13	Safe
6	Limkheda	2063.89	1259.53	0.00	1021.52	4344.94	217.25	4127.70	1437.70	50.00	283.00	1770.70	411.00	2229.00	42.90	Safe
7	Sanjeli	340.07	1030.47	0.00	585.91	1956.45	97.82	1858.62	912.30	25.00	141.20	1078.50	205.00	716.32	58.03	Safe
8	Singvad	2071.58	865.62	0.00	1009.14	3946.35	197.32	3749.03	1602.20	31.00	177.00	1810.20	256.00	1859.83	48.28	Safe
9	Zalod	6315.15	1629.60	0.00	1126.78	9071.53	453.58	8617.95	2706.70	92.22	522.58	3321.50	759.00	5060.03	38.54	Safe
District Total		**22691.52**	**11277.61**	**0.00**	**7515.52**	**41484.65**	**2074.23**	**39410.42**	**14643.20**	**514.72**	**2914.28**	**18072.20**	**4232.00**	**20020.50**	**45.86**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : The Dang																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ahwa	2079.55	1347.00	0.00	19.00	3445.55	172.00	3273.55	313.00	26.40	148.00	487.40	205.00	2729.15	14.89	Safe
2	Subir	1071.13	849.00	0.00	11.00	1931.13	97.00	1834.13	172.00	13.70	78.70	264.40	109.00	1539.43	14.42	Safe
3	Waghai	2015.20	1175.00	0.00	7.00	3197.20	160.00	3037.20	125.00	18.00	102.00	245.00	141.00	2753.20	8.07	Safe
District Total		**5165.87**	**3371.00**	**0.00**	**37.00**	**8573.87**	**429.00**	**8144.87**	**610.00**	**58.10**	**328.70**	**996.80**	**455.00**	**7021.77**	**12.24**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Devbhumi Dwarka																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)				Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge		Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bhanvad	5945.00	1320.00	0.00	1078.00	8343.00	417.00	7926.00	4793.00	30.81	174.57	4998.38	229.00	2873.19	63.06	Safe
2	Kalyanpur	6951.11	785.52	0.00	217.56	7954.19	397.71	7556.48	4660.80	43.29	245.30	4949.39	357.00	2495.39	65.50	Safe
3	Khambhalia	10479.00	1068.00	0.00	226.00	11773.00	589.00	11184.00	7106.00	59.19	335.43	7500.62	488.00	3530.81	67.07	Safe
4	Okhamandal	2165.00	137.00	0.00	72.00	2374.00	119.00	2255.00	974.00	25.97	147.15	1147.12	296.00	959.03	50.87	Safe
District Total		**25540.11**	**3310.52**	**0.00**	**1593.56**	**30444.19**	**1522.71**	**28921.48**	**17533.80**	**159.26**	**902.46**	**18595.51**	**1370.00**	**9858.42**	**64.30**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : GANDHINAGAR

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dehgam	11470.10	2268.39	0.00	921.31	14659.80	732.99	13926.81	14369.00	65.52	371.30	14805.82	482.00	0.00	106.31	Over Exploited
2	Gandhinagar	11892.94	1533.32	0.00	598.65	14024.91	701.25	13323.67	12948.00	136.75	774.91	13859.66	1006.00	0.00	104.02	Over Exploited
3	Kalol	10362.35	860.05	0.00	501.05	11723.45	586.17	11137.28	12121.00	86.89	492.36	12700.25	639.00	0.00	114.03	Over Exploited
4	Mansa	7135.82	1227.17	0.00	710.65	9073.64	453.68	8619.96	11676.00	50.40	285.59	12011.98	371.00	0.00	139.35	Over Exploited
District Total		**40861.21**	**5888.93**	**0.00**	**2731.67**	**49481.81**	**2474.09**	**47007.72**	**51114.00**	**339.56**	**1924.15**	**53377.70**	**2498.00**	**0.00**	**113.55**	**Over Exploite**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Gir Somnath																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Gir Gadhda	3079.44	552.92	0.00	575.24	4207.61	210.38	3997.23	2418.70	29.48	167.08	2615.26	1332.00	217.05	65.43	Safe
2	Kodinar	10015.80	839.50	0.00	1236.33	12091.63	604.58	11487.05	7074.80	15.62	88.49	7178.91	410.00	3986.63	62.50	Safe
3	Patan-veraval	6203.16	621.71	0.00	1152.12	7976.99	398.85	7578.14	4725.70	17.99	101.92	4845.60	577.00	2257.45	63.94	Safe
4	Sutrapada	6570.02	416.22	0.00	546.47	7532.71	376.64	7156.07	4299.00	14.88	84.32	4398.20	254.00	2588.19	61.46	Safe
5	Talala	8867.23	909.64	0.00	917.34	10694.20	534.71	10159.49	6146.80	33.08	187.48	6367.36	243.00	3736.61	62.67	Safe
6	Una	7783.40	707.37	0.00	764.64	9255.41	462.77	8792.64	4143.80	86.17	488.29	4718.25	696.00	3866.67	53.66	Safe
District Total		**42519.05**	**4047.36**	**0.00**	**5192.14**	**51758.55**	**2587.93**	**49170.62**	**28808.80**	**197.22**	**1117.57**	**30123.58**	**3512.00**	**16652.61**	**61.26**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Jamnagar

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dhrol	6901.60	1273.76	0.00	473.96	8649.33	432.47	8216.86	4701.90	19.46	110.28	4831.64	144.00	3351.50	58.80	Safe
2	Jamjodhpur	12010.99	1999.79	0.00	444.90	14455.68	722.78	13732.89	8383.10	32.51	184.22	8599.83	241.00	5076.28	62.62	Safe
3	Jamnagar	14987.17	1739.43	0.00	504.98	17231.58	861.58	16370.00	9858.70	165.13	935.76	10959.60	1551.00	4795.17	66.95	Safe
4	Jodiya	3051.76	1998.98	0.00	438.19	5488.93	274.45	5214.48	3207.50	15.18	86.05	3308.73	156.00	1835.80	63.45	Safe
5	Kalavad	19971.04	2044.93	0.00	391.58	22407.55	1120.38	21287.17	12782.40	34.28	194.27	13010.96	254.00	8216.49	61.12	Safe
6	Lalpur	8716.22	1304.29	0.00	1029.96	11050.47	552.52	10497.94	6753.30	29.00	164.32	6946.62	215.00	3500.64	66.17	Safe
District Total		**65638.79**	**10361.18**	**0.00**	**3283.57**	**79283.53**	**3964.18**	**75319.35**	**45686.90**	**295.57**	**1674.90**	**47657.37**	**2561.00**	**26775.88**	**63.27**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Junagadh

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bhesan	8538.34	760.04	0.00	788.49	10086.86	504.34	9582.52	6063.80	19.43	110.10	6193.33	143.00	3356.29	64.63	Safe
2	Junagadh City &	12957.91	986.48	0.00	1170.17	15114.56	755.73	14358.84	8274.20	107.11	606.94	8988.25	787.00	5190.53	62.60	Safe
3	Keshod	11923.28	885.98	0.00	1086.75	13896.01	694.80	13201.21	8240.50	47.47	268.99	8556.96	349.00	4564.24	64.82	Safe
4	Malia	9021.65	1188.62	0.00	959.20	11169.48	558.47	10611.00	6607.10	39.04	221.25	6867.39	287.00	3677.86	64.72	Safe
5	Manavadar	7963.47	705.30	0.00	771.42	9440.19	472.01	8968.18	5776.40	21.04	119.25	5916.70	238.00	2932.73	65.97	Safe
6	Mangrol	6720.81	582.51	0.00	579.77	7883.10	394.16	7488.95	4309.70	41.53	235.33	4586.56	381.00	2756.72	61.24	Safe
7	Mendarda	7109.96	948.87	0.00	807.67	8866.50	443.32	8423.17	5019.00	16.70	94.66	5130.36	123.00	3264.47	60.91	Safe
8	Vanthali	6804.52	666.68	0.00	675.69	8146.89	407.34	7739.54	5053.15	23.69	134.24	5211.08	174.00	2488.70	67.33	Safe
9	Visavadar	16512.06	1412.18	0.00	1623.99	19548.23	977.41	18570.82	11888.70	34.13	193.40	12116.23	251.00	6396.99	65.24	Safe
District Total		**87552.00**	**8136.66**	**0.00**	**8463.15**	**104151.81**	**5207.59**	**98944.22**	**61232.55**	**350.15**	**1984.17**	**63566.86**	**2733.00**	**34628.52**	**64.25**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Kachchh																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Abdasa	3885.97	1447.16	0.00	7.00	5340.13	267.01	5073.12	3307.00	15.68	88.83	3411.51	261.00	1489.44	67.25	Safe
2	Anjar	3749.01	2272.37	0.00	3003.42	9024.79	451.24	8573.55	7526.60	47.12	267.02	7840.74	523.00	476.83	91.45	Critical
3	Bhachau	5128.26	539.70	0.00	389.95	6057.91	302.90	5755.02	6480.40	42.18	239.02	6761.60	413.00	0.00	117.49	Over Exploited
4	Bhuj	20669.47	3207.44	0.00	3352.98	27229.89	1361.49	25868.39	23250.00	100.50	569.51	23920.02	984.00	1533.89	92.47	Critical
5	Gandhidham	**Saline**														
6	Lakhpat	366.03	1266.61	0.00	1243.90	2876.53	143.83	2732.71	755.20	3.34	18.91	777.45	139.00	1835.17	28.45	Safe
7	Mandvi	3399.13	2343.65	0.00	1422.90	7165.68	358.28	6807.40	7551.60	27.12	153.70	7732.43	451.00	0.00	113.59	Over Exploited
8	Mundra	3160.08	2267.92	0.00	2067.57	7495.57	374.78	7120.80	4622.20	26.57	150.54	4799.30	340.00	2132.03	67.40	Safe
9	Nakhatrana	8153.90	1501.42	0.00	737.90	10393.22	519.66	9873.56	8356.50	35.14	199.12	8590.75	325.00	1156.92	87.01	Semi critical
10	Rapar	10193.48	1396.62	0.00	995.22	12585.32	629.27	11956.06	6164.00	37.68	213.51	6415.19	482.00	5272.38	53.66	Safe
District Total		**58705.32**	**16242.90**	**0.00**	**13220.84**	**88169.06**	**4408.46**	**83760.60**	**68013.50**	**335.32**	**1900.16**	**70248.98**	**3918.00**	**13896.67**	**83.87**	**Semi critical**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Kheda

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Galteshwar	1687.30	374.45	0.00	340.42	2402.17	120.11	2282.06	770.90	28.03	158.81	957.73	207.00	1276.13	41.97	Safe
2	Kapadvanj	9084.40	721.81	0.00	596.41	10402.62	520.13	9882.49	5333.10	66.83	378.73	5778.67	494.00	3988.55	58.47	Safe
3	Kathlal	5551.49	221.65	0.00	153.65	5926.79	296.34	5630.46	2514.40	51.04	289.25	2854.69	377.00	2688.01	50.70	Safe
4	Kheda	5957.50	273.00	0.00	48.70	6279.20	314.00	5965.20	3098.50	28.00	156.00	3282.50	232.00	2606.70	55.03	Safe
5	Mahudha	1536.27	1876.77	0.00	2367.61	5780.65	289.03	5491.61	2087.90	32.43	183.79	2304.12	240.00	3131.28	41.96	Safe
6	Matar	680.30	2699.82	0.00	2469.30	5849.42	292.47	5556.94	2448.00	27.50	155.00	2630.50	263.00	2818.44	47.34	Safe
7	Mehmedabad	3559.17	2507.53	0.00	3005.52	9072.22	453.61	8618.61	4262.10	62.63	354.90	4679.63	464.00	3829.88	54.30	Safe
8	Nadiad	3856.88	3345.69	0.00	2512.45	9715.02	485.75	9229.27	4640.70	121.71	689.71	5452.12	899.00	3567.86	59.07	Safe
9	Thasra	3142.64	3006.00	0.00	3386.71	9535.36	476.77	9058.59	2794.80	55.69	315.55	3166.04	411.00	5797.10	34.95	Safe
#10	Vaso	1315.62	1724.42	0.00	2173.90	5213.94	260.70	4953.24	1336.00	17.18	97.35	1450.53	127.00	3473.06	29.28	Safe
District Total		**36371.57**	**16751.15**	**0.00**	**17054.67**	**70177.39**	**3508.91**	**66668.48**	**29286.40**	**491.05**	**2779.09**	**32556.54**	**3714.00**	**33177.03**	**48.83**	**Safe**

RIF Method

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Mahesana																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Becharaji	1585.28	473.55	0.00	545.42	2604.26	130.21	2474.04	2623.00	9.14	51.82	2683.96	66.00	0.00	108.48	Over Exploited
2	Jotana	2753.59	767.85	0.00	764.07	4285.50	214.28	4071.23	4309.50	11.65	66.03	4387.18	84.00	0.00	107.76	Over Exploited
3	Kadi	10981.83	2720.00	0.00	2466.61	16168.44	808.42	15360.01	18870.50	75.08	425.44	19371.02	543.00	0.00	126.11	Over Exploited
4	Kheralu	10784.38	913.02	0.00	337.79	12035.18	601.76	11433.42	13704.30	32.28	182.95	13919.53	234.00	0.00	121.74	Over Exploited
5	Mahesana	19424.80	2177.51	0.00	1581.22	23183.53	1159.18	22024.35	25930.50	115.06	652.02	26697.59	832.00	0.00	121.22	Over Exploited
6	Satlasana	5433.83	1449.64	0.00	365.87	7249.35	362.47	6886.88	6975.80	21.61	122.46	7119.87	156.00	0.00	103.38	Over Exploited
7	Unjha	6006.37	725.79	0.00	687.29	7419.45	370.97	7048.48	7054.00	42.36	240.06	7336.42	306.00	0.00	104.09	Over Exploited
8	Vadnagar	8269.30	2009.60	0.00	1982.48	12261.37	613.07	11648.30	10458.50	35.10	198.90	10692.50	254.00	900.70	91.79	Critical
9	Vijapur	11840.09	1636.33	0.00	1814.05	15290.47	764.52	14525.95	18144.00	62.00	351.50	18557.50	450.00	0.00	127.75	Over Exploited
10	Visnagar	11226.02	1959.06	0.00	1257.11	14442.19	722.11	13720.08	14209.00	63.29	358.63	14630.92	458.00	0.00	106.64	Over Exploited
District Total		**88305.48**	**14832.34**	**0.00**	**11801.91**	**114939.73**	**5746.99**	**109192.75**	**122279.10**	**467.58**	**2649.81**	**125396.49**	**3383.00**	**900.70**	**114.84**	**Over Exploited**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District :Mahisagar

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Balasinor	2962.26	447.86	0.00	106.94	3517.06	175.85	3341.21	1642.40	35.80	202.00	1880.20	264.00	1399.01	56.27	Safe
2	Kadana	3312.79	1724.00	0.00	3083.72	8120.52	406.03	7714.49	1470.80	33.00	184.00	1687.80	248.00	5962.69	21.88	Safe
3	Khanpur	3150.28	790.15	0.00	777.38	4717.81	235.89	4481.92	1568.30	23.60	137.00	1728.90	184.00	2706.02	38.57	Safe
4	Lunawada	3975.91	2421.71	0.00	2760.80	9158.42	457.92	8700.50	3051.70	64.00	365.00	3480.70	493.00	5091.80	40.01	Safe
5	Santrampur	6008.79	700.18	0.00	1289.04	7998.01	399.90	7598.11	2655.20	65.50	378.00	3098.70	509.00	4368.41	40.78	Safe
6	Virpur	2984.90	442.47	0.00	104.64	3532.01	176.60	3355.41	1591.10	24.80	139.00	1754.90	181.00	1558.51	52.30	Safe
District Total		**22394.94**	**6526.39**	**0.00**	**8122.51**	**37043.84**	**1852.19**	**35191.65**	**11979.50**	**246.70**	**1405.00**	**13631.20**	**1879.00**	**21086.45**	**38.73**	**Safe**

District : Morbi																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Halvad	18938.30	807.24	0.00	2093.18	21838.72	1091.94	20746.79	11734.00	21.75	123.26	11879.01	320.00	8671.04	57.26	Safe
2	Maliya		Saline													
3	Morbi	7010.64	895.89	0.00	878.53	8785.07	439.25	8345.81	5081.20	76.61	434.10	5591.91	792.00	2396.01	67.00	Safe
4	Tankara	8981.22	1029.60	0.00	1394.49	11405.31	570.27	10835.04	7028.80	22.14	125.47	7176.41	172.00	3612.10	66.23	Safe
5	Wankaner	13423.50	1700.32	0.00	1442.50	16566.31	828.32	15738.00	8744.80	49.85	282.47	9077.12	429.00	6514.35	57.68	Safe
District Total		**48353.66**	**#VALUE!**	**0.00**	**5808.70**	**58595.41**	**2929.77**	**55665.64**	**32588.80**	**170.35**	**965.31**	**33724.46**	**1713.00**	**21193.49**	**60.58**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Narmada

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dediapada	3300.13	1464.31	0.00	203.33	4967.78	248.39	4719.39	327.00	43.08	244.14	614.22	323.00	4026.30	13.01	Safe
2	Garudeshwar	167.85	1192.16	0.00	2531.07	3891.08	194.55	3696.52	590.00	22.00	127.07	739.07	168.00	2916.52	19.99	Safe
3	Nandod	3870.26	2256.65	0.00	2812.25	8939.17	446.96	8492.21	1982.00	37.11	210.28	2229.39	278.00	6195.10	26.25	Safe
4	Sagbara	2675.88	1091.75	0.00	949.26	4716.88	235.84	4481.04	469.20	27.00	155.23	651.43	205.00	3779.84	14.54	Safe
5	Tilakwada	1489.38	536.43	0.00	636.00	2661.81	133.09	2528.72	292.50	15.77	89.39	397.66	118.00	2102.45	15.73	Safe
District Total		**11503.50**	**6541.31**	**0.00**	**7131.91**	**25176.72**	**1258.84**	**23917.88**	**3660.70**	**144.97**	**826.11**	**4631.77**	**1092.00**	**19020.22**	**19.37**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Navsari

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bansda	6175.62	587.75	0.00	1483.29	8246.65	412.33	7834.32	4017.60	55.00	314.00	4386.60	395.00	3366.72	55.99	Safe
2	Chikhli	8674.16	1597.96	0.00	2869.35	13141.47	657.07	12484.39	5448.10	59.00	336.00	5843.10	423.00	6554.29	46.80	Safe
3	Gandevi	5620.55	1162.96	0.00	2531.21	9314.73	465.74	8848.99	3221.90	59.40	338.00	3619.30	426.00	5141.69	40.90	Safe
4	Jalalpore	14972.32	1028.54	0.00	1841.72	17842.59	892.13	16950.46	2724.00	55.00	309.00	3088.00	390.00	13781.46	18.22	Safe
5	Khergam	2490.10	631.79	0.00	489.92	3611.81	180.59	3431.22	853.50	15.40	84.00	952.90	106.00	2456.32	27.77	Safe
6	Navsari	4176.83	1209.26	0.00	2693.11	8079.21	403.96	7675.25	2157.40	74.40	422.10	2653.90	532.00	4911.45	34.58	Safe
District Total		**42109.58**	**6218.27**	**0.00**	**11908.61**	**60236.46**	**3011.82**	**57224.63**	**18422.50**	**318.20**	**1803.10**	**20543.80**	**2272.00**	**36211.93**	**35.90**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Panchamahals																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ghoghamba	2802.61	2176.74	0.00	1059.64	6038.99	301.95	5737.04	2132.40	55.00	310.00	2497.40	419.00	3130.64	43.53	Safe
2	Godhra	5280.20	2420.84	0.00	1945.73	9646.77	482.34	9164.43	1927.20	116.00	656.62	2699.82	887.00	6234.23	29.46	Safe
3	Halol	5282.88	994.29	0.00	1087.82	7364.98	368.25	6996.73	2428.20	60.00	338.00	2826.20	456.00	4052.53	40.39	Safe
4	Jambughoda	62.00	763.17	0.00	944.22	1769.39	88.48	1680.91	608.20	10.90	60.00	679.10	81.00	980.81	40.40	Safe
5	Kalol	3005.70	1091.81	0.00	1620.22	5717.73	285.89	5431.84	1961.00	54.00	307.00	2322.00	415.00	3001.84	42.75	Safe
6	Morwa hadaf	2882.14	828.89	0.00	903.70	4614.73	230.74	4383.99	1485.00	47.00	265.00	1797.00	358.00	2493.99	40.99	Safe
7	Shehra	629.84	3531.20	0.00	2955.22	7116.26	355.81	6760.45	1392.50	69.40	394.00	1855.90	532.00	4766.55	27.45	Safe
District Total		**19945.37**	**11806.93**	**0.00**	**10516.55**	**42268.85**	**2113.45**	**40155.39**	**11934.50**	**412.30**	**2330.62**	**14677.42**	**3148.00**	**24660.59**	**36.55**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Patan

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Chanasma	399.19	337.35	0.00	45.20	781.74	39.09	742.65	818.00	1.03	5.86	824.90	8.00	0.00	111.07	Over Exploited
2	Harij	**Saline**														
3	Patan	6600.93	4869.32	0.00	4439.28	15909.53	795.48	15114.05	15229.50	33.30	188.72	15451.52	247.00	0.00	102.23	Over Exploited
4	Radhanpur	**Saline**														
5	Sami	**Saline**														
6	Sankheswar	**Saline**														
7	Santalpur	**Saline**														
8	Sarsvati(Patan)	4652.25	2100.43	0.00	996.04	7748.72	387.44	7361.28	6381.50	43.73	247.78	6673.00	325.00	611.05	90.65	Critical
9	Sidhpur	9716.42	4890.56	0.00	1225.74	15832.72	791.64	15041.09	15268.50	52.31	296.40	15617.21	388.00	0.00	103.83	Over Exploited
District Total		**21368.79**	**12197.66**	**0.00**	**6706.27**	**40272.71**	**2013.64**	**38259.07**	**37697.50**	**130.37**	**738.76**	**38566.63**	**968.00**	**611.05**	100.80	Over Exploited

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Porbandar																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)				Total Annual Ground Water Recharge (3+4+5+6)	Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon					Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Kutiyana	5854.87	710.53	0.00	561.24	7126.65	356.33	6770.32	4210.20	14.52	82.26	4306.98	149.00	2396.60	63.62	Safe
2	Porbandar	6246.42	1098.48	0.00	314.79	7659.69	382.98	7276.71	5743.20	31.02	279.19	6053.41	666.00	836.49	83.19	Semi critical
3	Ranavav	6116.30	612.57	0.00	234.80	6963.67	348.18	6615.49	4221.60	15.62	140.54	4377.75	198.00	2180.27	66.17	Safe
District Total		**18217.60**	**2421.58**	**0.00**	**1110.83**	**21750.01**	**1087.50**	**20662.51**	**14175.00**	**61.15**	**501.99**	**14738.14**	**1013.00**	**5413.36**	**71.33**	**Semi critical**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Rajkot

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dhoraji	10195.43	1835.87	0.00	2096.82	14128.13	706.41	13421.72	8588.50	39.16	221.92	8849.58	304.00	4490.06	65.93	Safe
2	Gondal	21764.09	3003.15	0.00	3201.13	27968.37	1398.42	26569.96	16189.20	72.20	409.11	16670.50	560.00	9748.56	62.74	Safe
3	Jamkandorna	9679.13	2025.03	0.00	1443.88	13148.04	657.40	12490.64	7959.30	19.75	111.94	8090.99	153.00	4358.59	64.78	Safe
4	Jasdan	9239.77	2919.05	0.00	1553.68	13712.51	685.63	13026.88	8263.70	79.42	450.05	8793.17	616.00	4067.76	67.50	Safe
5	Jetpur	12425.83	1962.42	0.00	1539.18	15927.43	796.37	15131.06	8973.60	62.48	354.08	9390.16	484.00	5610.98	62.06	Safe
6	Kotada sanga	6030.14	1485.84	0.00	1042.10	8558.08	427.90	8130.17	4939.40	22.87	129.60	5091.87	177.00	2990.90	62.63	Safe
7	Lodhika	5882.23	1432.01	0.00	855.95	8170.19	408.51	7761.68	4791.10	14.52	82.26	4887.87	177.00	2779.06	62.97	Safe
8	Paddhari	8978.78	2378.88	0.00	1830.77	13188.43	659.42	12529.01	8360.50	18.91	107.14	8486.55	147.00	4002.60	67.74	Safe
9	Rajkot	16346.52	2983.14	0.00	1042.81	20372.46	1018.62	19353.84	12220.80	31.57	178.92	12431.29	269.00	6832.46	64.23	Safe
10	Upleta	10879.82	1913.64	0.00	1389.04	14182.50	709.13	13473.38	8648.30	45.23	256.33	8949.86	351.00	4428.84	66.43	Safe
11	Vinchchiya	4323.93	1960.63	0.00	913.07	7197.63	359.88	6837.74	4136.90	27.00	150.00	4313.90	206.00	2467.84	63.09	Safe
District Total		**115745.68**	**23899.65**	**0.00**	**16908.43**	**156553.76**	**7827.69**	**148726.07**	**93071.30**	**433.12**	**2451.34**	**95955.75**	**3444.00**	**51777.66**	64.52	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Sabarkantha																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Himatnagar	15098.77	3722.70	0.00	1562.39	20383.86	1019.19	19364.66	11519.40	84.74	480.22	12084.36	643.00	7117.52	62.40	Safe
2	Idar	12302.36	2690.77	0.00	940.45	15933.58	796.68	15136.90	11549.80	65.79	372.83	11988.43	499.00	3022.30	79.20	Semi critical
3	Khedbrahma	5075.72	1546.54	0.00	338.95	6961.21	348.06	6613.15	3500.20	40.67	230.44	3771.30	309.00	2763.29	57.03	Safe
4	Poshina	2445.72	342.60	0.00	122.39	2910.71	145.54	2765.17	1123.80	32.78	185.73	1342.31	249.00	1359.60	48.54	Safe
5	Prantij	13489.25	1589.89	0.00	730.65	15809.79	790.49	15019.30	11203.40	40.16	227.60	11471.16	305.00	3470.74	76.38	Semi critical
6	Talod	7642.92	1335.75	0.00	289.64	9268.31	463.42	8804.90	6355.90	38.46	217.92	6612.28	292.00	2118.54	75.10	Semi critical
7	Vadali	1621.45	3267.64	0.00	4647.40	9536.49	476.82	9059.66	6641.90	21.39	121.19	6784.48	162.00	2234.38	74.89	Semi critical
8	Vijaynagar	7070.99	1004.77	0.00	468.23	8544.00	427.20	8116.80	5228.50	25.87	146.62	5400.99	196.00	2666.42	66.54	Safe
District Total		**64747.17**	**15500.67**	**0.00**	**9100.10**	**89347.95**	**4467.40**	**84880.55**	**57122.90**	**349.86**	**1982.55**	**59455.31**	**2655.00**	**24752.79**	**70.05**	**Semi critical**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District :SURAT

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bardoli	4534.98	3043.64	0.00	3844.65	11423.27	571.16	10852.10	4734.20	62.00	354.00	5150.20	547.00	5508.90	47.46	Safe
2	Kamrej	7795.92	3571.52	0.00	3959.24	15326.68	766.33	14560.35	6070.00	51.00	291.00	6412.00	450.00	7989.35	44.04	Safe
3	Mahuva	8498.75	2384.48	0.00	2590.06	13473.29	673.66	12799.63	3531.90	40.00	229.00	3800.90	353.00	8874.73	29.70	Safe
4	Mandvi	17198.34	2484.62	0.00	2714.61	22397.56	1119.88	21277.69	3580.00	55.00	309.00	3944.00	478.00	17164.69	18.54	Safe
5	Mangrol	9948.44	1928.98	0.00	1685.63	13563.06	678.15	12884.90	2328.90	58.00	330.00	2716.90	510.00	9988.00	21.09	Safe
6	Olpad	9000.85	3919.76	0.00	6432.31	19352.92	967.65	18385.27	2024.00	55.00	311.00	2390.00	480.00	15826.27	13.00	Safe
7	Palsana	5582.69	1794.52	0.00	2268.80	9646.01	482.30	9163.71	3312.40	40.00	229.00	3581.40	354.00	5457.31	39.08	Safe
8	Surat city & Choras	9451.73	2369.76	0.00	2985.20	14806.68	740.33	14066.34	2899.80	211.00	1196.00	4306.80	1196.00	9759.54	30.62	Safe
9	Umarpada	5707.42	565.91	0.00	131.81	6405.14	320.26	6084.88	384.00	23.00	132.00	539.00	204.00	5473.88	8.86	Safe
District Total		**77719.11**	**22063.19**	**0.00**	**26612.30**	**126394.60**	**6319.73**	**120074.87**	**28865.20**	**595.00**	**3381.00**	**32841.20**	**4572.00**	**86042.67**	**27.35**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Surendranagar

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Chotila	7501.21	2405.88	0.00	779.38	10686.47	534.32	10152.15	5629.30	34.56	195.85	5859.72	261.00	4227.29	57.72	Safe
2	Chuda	3112.48	306.95	0.00	94.57	3514.00	175.70	3338.30	2036.70	8.51	48.21	2093.41	184.00	1109.09	62.71	Safe
3	Dasada	2385.11	388.43	0.00	166.04	2939.59	146.98	2792.61	810.60	4.48	25.41	840.49	339.00	1638.52	30.10	Safe
4	Dhrangadhra	18144.61	1277.09	0.00	525.82	19947.51	997.38	18950.13	11244.20	46.01	260.70	11550.91	409.00	7250.93	60.95	Safe
5	Lakhtar															
6	Limbdi	1279.62	457.65	0.00	330.26	2067.53	103.38	1964.15	573.00	8.70	49.33	631.03	329.00	1053.44	32.13	Safe
7	Muli	11450.21	891.29	0.00	493.11	12834.61	641.73	12192.88	7159.30	19.87	112.58	7291.75	214.00	4799.71	59.80	Safe
8	Sayla	7955.60	2599.69	0.00	359.72	10915.01	545.75	10369.26	5991.30	24.09	136.52	6151.91	260.00	4093.87	59.33	Safe
9	Thangadh	3298.41	318.76	0.00	352.78	3969.95	198.50	3771.46	2146.60	12.80	73.00	2232.40	139.00	1473.06	59.19	Safe
10	Wadhwan	3383.29	786.44	0.00	689.90	4859.63	242.98	4616.65	2568.00	53.52	303.27	2924.78	673.00	1322.13	63.35	Safe
District Total		**58510.53**	**9432.18**	**0.00**	**3791.58**	**71734.29**	**3586.71**	**68147.58**	**38159.00**	**212.54**	**1204.86**	**39576.40**	**2808.00**	**26968.04**	**58.07**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : TAPI

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dolvan	3903.78	1163.20	0.00	809.64	5876.62	293.83	5582.79	3347.60	23.00	127.00	3497.60	166.00	2046.19	62.65	Safe
2	Kukarmunda	2108.99	163.28	0.00	30.35	2302.62	115.13	2187.49	419.00	14.00	83.00	516.00	107.00	1647.49	23.59	Safe
3	Nizar	1507.36	410.47	0.00	77.24	1995.07	99.75	1895.31	1015.00	17.50	97.00	1129.50	126.00	736.81	59.59	Safe
4	Songadh	10051.65	1619.42	0.00	1046.05	12717.12	635.86	12081.26	4340.00	56.06	317.68	4713.74	412.00	7273.20	39.02	Safe
5	Uchchhal	6596.43	557.48	0.00	109.54	7263.45	363.17	6900.28	1193.00	22.00	122.00	1337.00	159.00	5526.28	19.38	Safe
6	Valod	2255.98	1681.96	0.00	2553.49	6491.42	324.57	6166.85	3456.30	22.00	126.00	3604.30	163.00	2525.55	58.45	Safe
7	Vyara	4465.15	1226.10	0.00	1832.05	7523.30	376.17	7147.14	2902.00	43.00	243.00	3188.00	316.00	3886.14	44.61	Safe
District Total		**30889.34**	**6821.91**	**0.00**	**6458.35**	**44169.60**	**2208.48**	**41961.12**	**16672.90**	**197.56**	**1115.68**	**17986.14**	**1449.00**	**23641.66**	**42.86**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Vadodara																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)				Total Annual Ground Water Recharge (3+4+5+6)	Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon					Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dabhoi	12022.39	1953.30	0.00	4758.62	18734.32	936.72	17797.60	11103.00	44.46	251.92	11399.38	332.00	6318.14	64.05	Safe
2	Desar	109.20	1327.19	0.00	2621.24	4057.63	202.88	3854.75	1749.00	25.86	146.55	1921.41	193.00	1886.89	49.85	Safe
3	Karjan	12154.22	757.83	0.00	1821.23	14733.27	736.66	13996.61	8750.50	41.27	233.87	9025.64	308.00	4896.83	64.48	Safe
4	Padra	13499.72	1339.32	0.00	1386.28	16225.32	811.27	15414.05	8434.00	65.49	371.08	8870.57	489.00	6425.57	57.55	Safe
5	Savli	3555.21	2571.97	0.00	3943.22	10070.40	503.52	9566.88	4876.50	62.80	355.88	5295.18	469.00	4158.58	55.35	Safe
6	Sinor	7854.97	1148.09	0.00	815.07	9818.13	490.91	9327.22	5386.00	16.12	91.33	5493.44	120.00	3805.11	58.90	Safe
7	Vadodara	13640.53	1462.79	0.00	1250.74	16354.06	817.70	15536.36	10582.00	233.00	1321.00	12136.00	343.00	4378.36	78.11	Semi critical
8	Vaghodia	5591.75	1814.40	0.00	4538.70	11944.85	597.24	11347.61	1689.00	36.92	209.21	1935.14	276.00	9345.69	17.05	Safe
District Total		**68427.99**	**12374.88**	**0.00**	**21135.10**	**101937.97**	**5096.90**	**96841.08**	**52570.00**	**525.91**	**2980.84**	**56076.76**	**2530.00**	**41215.16**	**57.91**	**Safe**

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Valsad

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dharampur	8879.57	1682.00	0.00	350.00	10911.57	546.00	10365.57	2804.00	55.00	310.00	3169.00	471.00	7035.57	30.57	Safe
2	Kaprada	8126.01	2055.00	0.00	719.00	10900.01	545.00	10355.01	1472.00	66.00	372.00	1910.00	565.00	8252.01	18.45	Safe
3	Pardi	3670.79	1013.57	0.00	796.29	5480.66	274.03	5206.62	1936.40	132.00	746.00	2814.40	1132.00	2006.22	54.05	Safe
4	Umergam	5032.97	952.00	0.00	670.00	6654.97	333.00	6321.97	1945.00	75.42	426.50	2446.92	648.00	3653.55	38.71	Safe
5	Valsad	7887.21	2804.29	0.00	1267.26	11958.76	597.94	11360.82	5815.00	105.00	597.00	6517.00	906.00	4534.82	57.36	Safe
6	Vapi	1546.07	327.00	0.00	371.00	2244.07	112.00	2132.07	532.00	89.70	507.00	1128.70	769.00	741.37	52.94	Safe
District Total		**35142.63**	**8833.86**	**0.00**	**4173.55**	**48150.03**	**2407.97**	**45742.06**	**14504.40**	**523.12**	**2958.50**	**17986.02**	**4491.00**	**26223.54**	**39.32**	**Safe**

Annexure-III (A1)

General description of groundwater assesment unit of District Ahmedabad, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Ahmedabad City & Daskroi	Alluvium	95,627	0	95,627	0
2	Bavla	Alluvium	77,455	0	15,708	61,747
3	Detroj-rampura	Alluvium	35,000	0	16,072	18,928
4	Dhandhuka	Alluvium	72,235	0	0	72,235
5	Dholera	Alluvium	1,04,688	0	0	1,04,688
6	Dholka	Alluvium	1,01,993	0	38,538	63,455
7	Mandal	Alluvium	47,385	0	8,193	39,192
8	Sanand	Alluvium	78,452	0	55,356	23,096
9	Viramgam	Alluvium	89,030	0	13,856	75,174
Total			7,01,865	0.00	2,43,350	4,58,515

Annexure-III (A2)

General description of groundwater assesment unit of District Amreli, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Amreli	Basalt	83,850	0	83,850	0
2	Babra	Basalt	79,320	0	79,320	0
3	Bagasara	Basalt	31,990	0	31,990	0
4	Dhari	Basalt	1,06,000	0	1,06,000	0
5	Jafrabad	Alluvium	35,570	0	26,600	8,970
6	Khambha	Basalt	40,740	0	40,740	0
7	Kunkavav vadia	Basalt	54,590	0	54,590	0
8	Lathi	Basalt	63,275	0	63,275	0
9	Lilia	Basalt	39,500	0	39,500	0
10	Rajula	Basalt	84,760	0	75,191	9,569
11	Savar kundla	Basalt	1,17,950	0	1,17,950	0
Total			7,37,545	0	7,19,006	18,539

Annexure-III (A3)

General description of groundwater assesment unit of District Anand, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Anand	Alluvium	35,036	0	35,036	0
2	Anklav	Alluvium	16,759	0	16,759	0
3	Borsad	Alluvium	41,705	0	41,705	0
4	Khambhat	Alluvium	85,371	0	36,196	49,175
5	Petlad	Alluvium	29,859	0	29,859	0
6	Sojitra	Alluvium	16,560	0	16,560	0
7	Tarapur	Alluvium	33,746	0	17,692	16,054
8	Umreth	Alluvium	23,612	0	23,612	0
Total			2,82,648	0	2,17,419	65,229

Annexure-III (A4)

General description of groundwater assesment unit of District Arvalli, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bayad	Basalt/Alluvium	59,293	0	59,293	0
2	Bhiloda	Basalt	72,045	8,200	63,845	0
3	Dhansura	Basalt	39,106	0	39,106	0
4	Malpur	Basalt	36,536	0	36,536	0
5	Meghraj	Basalt	54,481	3,000	51,481	0
6	Modasa	Basalt	60,506	0	60,506	0
Total			3,21,967	11,200	3,10,767	0

Annexure-III (A5)

General description of groundwater assesment unit of District Banaskantha, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Amirgadh	Basalt	60,970	6,000	54,970	0
2	Bhabhar	Alluvium	42,371	0	0	42,371
3	Danta	Basalt	86,074	17,000	69,074	0
4	Dantiwada	Basalt	41,470	2,500	38,970	0
5	Deesa	Alluvium	1,04,489	0	1,04,489	0
6	Deodar	Alluvium	50,701	0	4,922	45,779
7	Dhanera	Alluvium	84,290	0	84,290	0
8	Kankrej	Alluvium	79,550	0	28,423	51,127
9	Lakhani	Alluvium	55,472	0	55,472	0
10	Palanpur	Alluvium	79,150	2,000	77,150	0
11	Suigam	Alluvium	65,828	0	0	65,828
12	Tharad	Alluvium	1,29,386	0	16,054	1,13,332
13	Vadgam	Alluvium	56,587	0	56,587	0
14	Vav	Alluvium	1,04,194	0	0	1,04,194
Total			1040532	27,500	5,90,401	4,22,631

Annexure-III (A6)

General description of groundwater assesment unit of District Bharuch, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Amod	Alluvium	46,782	0	46,782	0
2	Anklesvar	Alluvium	43,604	0	27,228	16,376
3	Bharuch	Alluvium	64,435	0	48,826	15,609
4	Hansot	Alluvium	39,861	0	21,160	18,701
5	Jambusar	Alluvium	1,09,734	0	7,502	1,02,232
6	Jhagadia	Basalt	61,000	3,000	58,000	0
7	Netrang	Basalt	38,700	12,000	26,700	0
8	Vagra	Alluvium	88,343	0	25,900	62,443
9	Valia	Basalt	31,600	3,000	28,600	0
Total			524059	18,000	2,90,698	2,15,361

Annexure-III (A7)

General description of groundwater assesment unit of District Bhavnagar, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bhavnagar	Basalt	1,13,970	0	43,200	70,770
2	Gariadhar	Basalt	45,580	0	45,580	0
3	Ghogha	Basalt	43,780	0	33,995	9,785
4	Jesar	Basalt & Alluvium	42,658	0	42,658	0
5	Mahuva	Basalt	1,02,059	0	1,02,059	0
6	Palitana	Basalt	62,213	0	62,213	0
7	Sihor	Basalt	72,090	0	72,090	0
8	Talaja	Basalt	86,970	0	86,970	0
9	Umrala	Basalt	40,730	0	40,730	0
10	Vallabhipur	Basalt & Alluvium	59,340	0	51,610	7,730
Total			6,69,390	0	5,81,105	88,285

Annexure-III (A8)

General description of groundwater assesment unit of District Botad, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Barwala	Basalt	48,472	0	12,480	35,992
2	Botad	Basalt	74,940	0	74,940	0
3	Gadhada	Basalt	89,790	0	89,790	0
4	Ranpur	Basalt	42,910	0	42,910	0
Total			2,56,112	0	2,20,120	35,992

Annexure-III (A9)

General description of groundwater assesment unit of District Chhota udepur, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bodeli	Basalt	56,000	7,500	48,500	0
2	Chhota udaipur	Basalt	77,435	8,000	69,435	0
3	Jetpur pavi	Basalt	56,400	5,000	51,400	0
4	Kavant	Basalt	60,475	12,200	48,275	0
5	Nasvadi	Basalt	53,520	7,500	46,020	0
6	Sankheda	Basalt & Alluvium	42,200	0	42,200	0
Total			3,46,030	40,200	3,05,830	0

Annexure-III (A10)

General description of groundwater assesment unit of District Dahod, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dahod	Basalt	62,760	0	62,760	0
2	Devgadh baria	Basalt	58,510	2,907	55,603	0
3	Dhanpur	Basalt	46,640	10,816	35,824	0
4	Fatepura	Basalt	32,380	3,467	28,913	0
5	Garbada	Basalt	26,140	0	26,140	0
6	Limkheda	Basalt	34,252	2,704	31,548	0
7	Sanjeli	Basalt	17,278	1,028	16,250	0
8	Singvad	Basalt	25,467	2,704	22,763	0
9	Zalod	Basalt	61,553	4,426	57,127	0
Total			3,64,980	28,052	3,36,928	0

Annexure-III (A11)

General description of groundwater assesment unit of District Dang, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Ahwa	Basalt	68,412	40,000	28,412	0
2	Subir	Basalt	50,942	30,000	20,942	0
3	Waghai	Basalt	51,471	30,000	21,471	0
Total			1,70,825	1,00,000	70,825	0

Annexure-III (A12)

General description of groundwater assesment unit of District Devbhumi Dwarka, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bhanvad	Basalt	73,195	5,160	68,035	0
2	Kalyanpur	Basalt	1,41,222	0	1,25,289	15,933
3	Khambhalia	Basalt	1,21,425	10,072	99,653	11,700
4	Okhamandal	Soft Rock	71,685	0	38,863	32,822
Total			4,07,527	15,232	3,31,840	60,455

Annexure-III (A13)

General description of groundwater assesment unit of District Gandhinagar, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dehgam	Alluvium	61,926	0	61,926	0
2	Gandhinagar	Alluvium	68,656	0	68,656	0
3	Kalol	Alluvium	48,225	0	48,225	0
4	Mansa	Alluvium	37,777	0	37,777	0
Total			2,16,584	0	2,16,584	0

Annexure-III (A14)

General description of groundwater assesment unit of District Gir Somnath, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Gir Gadhda	Basalt	44,329	0	44,329	0
2	Kodinar	Alluvium	49,826	0	43,633	6,193
3	Patan-veraval	Alluvium	35,860	0	21,990	13,870
4	Sutrapada	Alluvium	33,760	0	14,410	19,350
5	Talala	Basalt	95,150	0	95,150	0
6	Una	Basalt	1,17,370	0	1,03,702	13,668
Total			3,76,295	0	3,23,214	53,081

Annexure-III (A15)

General description of groundwater assesment unit of District Jamnagar, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dhrol	Basalt	56,988	0	56,988	0
2	Jamjodhpur	Basalt	1,09,131	0	1,09,131	0
3	Jamnagar	Basalt	1,16,700	0	92,930	23,770
4	Jodiya	Basalt	86,868	0	63,098	23,770
5	Kalavad	Basalt	1,24,436	0	1,24,436	0
6	Lalpur	Basalt	1,07,828	2,250	1,05,578	0
Total			6,01,951	2,250	5,52,161	47,540

Annexure-III (A16)

General description of groundwater assesment unit of District Junagadh, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bhesana	Basalt	43,860	0	43,860	0
2	Junagadh City & Junagadh	Basalt	66,980	2,400	64,580	0
3	Keshod	Basalt	55,660	0	55,660	0
4	Malia	Basalt	53,970	0	53,970	0
5	Manavadar	Basalt	59,170	0	38,953	20,217
6	Mangrol	Alluvium	57,250	0	40,991	16,259
7	Mendarda	Basalt	36,380	0	36,380	0
8	Vanthali	Basalt	39,320	0	39,320	0
9	Visavadar	Basalt	90,170	0	90,170	0
Total			5,02,760	2,400	4,63,884	36,476

Annexure-III (A17)

General description of groundwater assesment unit of District Kachchh, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Abdasa	Soft Rock	2,40,010	0	1,16,289	1,23,721
2	Anjar	Basalt & Alluvium	1,15,825	0	31,538	84,287
3	Bhachau	Soft Rock	1,99,960	0	31,538	1,68,422
4	Bhuj	Soft Rock	4,52,840	0	3,23,326	1,29,514
5	Gandhidham	Soft Rock	15,335	0	0	15,335
6	Lakhpat	Soft Rock	1,97,200	0	41,959	1,55,241
7	Mandvi	Basalt	1,42,540	0	70,161	72,379
8	Mundra	Basalt	88,820	0	59,618	29,202
9	Nakhatrana	Soft Rock	1,98,360	0	1,77,031	21,329
10	Rapar	Soft Rock	2,99,760	0	99,760	2,00,000
Total			19,50,650	0	9,51,220	9,99,430

Annexure-III (A18)

General description of groundwater assesment unit of District Kheda, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Galteshwar	Basalt	22,542	0	22,542	0
2	Kapadvanj	Basalt	62,296	0	62,296	0
3	Kathlal	Alluvium	34,511	0	34,511	0
4	Kheda	Alluvium	30,063	0	26,563	3,500
5	Mahudha	Alluvium	24,726	0	24,726	0
6	Matar	Alluvium	35,117	0	26,117	9,000
7	Mehmedabad	Alluvium	39,301	0	39,301	0
8	Nadiad	Alluvium	33,282	0	33,282	0
9	Thasra	Basalt & Alluvium	43,808	0	43,808	0
10	Vaso	Alluvium	10,980	0	10,980	0
Total			3,36,626	0	3,24,126	12,500

Annexure-III (A19)

General description of groundwater assesment unit of District Mahesana, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Becharaji	Alluvium	43,390	0	13,397	29,993
2	Jotana	Alluvium	20,174	0	15,775	4,399
3	Kadi	Alluvium	69,287	0	69,287	0
4	Kheralu	Alluvium	33,757	0	33,757	0
5	Mahesana	Alluvium	77,081	0	75,308	1,773
6	Satlasana	Alluvium	30,771	3,500	27,271	0
7	Unjha	Alluvium	31,770	0	31,770	0
8	Vadnagar	Alluvium	30,721	0	30,721	0
9	Vijapur	Alluvium	55,236	0	55,236	0
10	Visnagar	Alluvium	48,770	0	48,770	0
Total			4,40,957	3,500	4,01,292	36,165

Annexure-III (A20)

General description of groundwater assesment unit of District Mahisagar, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Balasinor	Basalt	30,039	0	30,039	0
2	Kadana	Basalt	42,530	7,478	35,052	0
3	Khanpur	Basalt	32,270	6,496	25,774	0
4	Lunawada	Basalt	62,070	0	62,070	0
5	Santrampur	Basalt	57,970	3,789	54,181	0
6	Virpur	Basalt	24,567	0	24,567	0
Total			2,49,446	17,763	2,31,683	0

Annexure-III (A21)

General description of groundwater assesment unit of District Morbi, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Halvad	Soft Rock	1,21,818	0	65,136	56,682
2	Maliya	Alluvium	76,998	0	0	76,998
3	Morvi	Basalt & Alluvium	1,02,927	0	74,907	28,020
4	Tankara	Basalt	66,871	0	66,871	0
5	Wankaner	Basalt & Soft Rock	1,11,757	0	1,00,618	11,139
Total			4,80,371	0	3,07,532	1,72,839

Annexure-III (A22)

General description of groundwater assesment unit of District Narmada, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dediapada	Basalt	1,02,387	55,500	46,887	0
2	Garudeshwar	Basalt	34,603	20,000	14,603	0
3	Nandod	Basalt & Alluvium	77,897	26,500	51,397	0
4	Sagbara	Basalt	36,740	9,200	27,540	0
5	Tilakwada	Basalt	24,441	0	24,441	0
Total			2,76,068	1,11,200	1,64,868	0

Annexure-III (23)

General description of groundwater assesment unit of District Navsari, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bansda	Basalt	60,040	21,000	39,040	0
2	Chikhli	Basalt	45,592	0	45,592	0
3	Gandevi	Basalt & Alluvium	28,430	0	21,540	6,890
4	Jalalpore	Alluvium	48,024	0	33,354	14,670
5	Khergam	H.R.	11,839	0	11,839	0
6	Navsari	Alluvium	26,027	0	26,027	0
Total			2,19,952	21,000	1,77,392	21,560

Annexure-III (A24)

General description of groundwater assesment unit of District Panchmahal, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Ghoghamba	Basalt	49,990	3435	46555	0
2	Godhra	Basalt	75,730	0	75730	0
3	Halol	Basalt	51,700	4630	47070	0
4	Jambughoda	Basalt	12,130	2500	9630	0
5	Kalol	Basalt	39,800	0	39800	0
6	Morwa hadaf	Basalt	32,170	0	32170	0
7	Shehera	Basalt	61,050	0	61050	0
Total			322570	10565	312005	0

Annexure-III (A25)

General description of groundwater assesment unit of District Patan, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Chanasma	Alluvium	45725	0	3644	42081
2	Harij	Alluvium	40712	0	0	40712
3	Patan	Alluvium	47971	0	29891	18080
4	Radhanpur	Alluvium	59562	0	0	59562
5	Sami	Alluvium	90585	0	0	90585
6	Sankheswar	Alluvium	60859	0	0	60859
7	Santalpur	Alluvium	135026	0	0	135026
8	Sarsvati(Patan)	Alluvium	55186	0	24775	30411
9	Sidhpur	Alluvium	37478	0	37478	0
Total			573104	0	95788	477316

Annexure-III (A26)

General description of groundwater assesment unit of District Porbansar, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Kutiyana	Basalt	55635	0	40741	14894
2	Porbandar	Basalt & Alluvium	111760	0	53000	58760
3	Ranavav	Basalt & Alluvium	58800	0	51029	7771
Total			226195	0	144770	81425

Annexure-III (A27)

General description of groundwater assesment unit of District Rajkot, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dhoraji	Basalt	48494	0	48494	0
2	Gondal	Basalt	119362	0	119362	0
3	Jamkandorna	Basalt	56029	0	56029	0
4	Jasdan	Basalt	83342	0	83342	0
5	Jetpur	Basalt	62758	0	62758	0
6	Kotada sangani	Basalt	44700	0	44700	0
7	Lodhika	Basalt	37323	0	37323	0
8	Paddhari	Basalt	59933	0	59933	0
9	Rajkot	Basalt	100488	0	100488	0
10	Upleta	Basalt	83924	0	83924	0
11	Vinchchiya	Basalt	51030	0	51030	0
Total			747383	0	747383	0

Annexure-III (A28)

General description of groundwater assesment unit of District Sabarkantha, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Himatnagar	Basalt & Alluvium	77322	0	77322	0
2	Idar	Basalt	80732	482	80250	0
3	Khedbrahma	Basalt	38930	4000	34930	0
4	Poshina	Basalt	36056	4500	31556	0
5	Prantij	Alluvium	39956	0	39956	0
6	Talod	Basalt & Alluvium	42852	0	42852	0
7	Vadali	Basalt	33886	0	33886	0
8	Vijaynagar	Basalt	45605	12200	33405	0
Total			395339	21182	374157	0

Annexure-III (A29)

General description of groundwater assesment unit of District Surat, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Bardoli	Basalt	37910	0	37910	0
2	Kamrej	Alluvium	37930	0	37930	0
3	Mahuva	Basalt	35430	0	35430	0
4	Mandvi	Basalt & Alluvium	67373	0	67373	0
5	Mangrol	Basalt & Alluvium	58448	0	58448	0
6	Olpad	Alluvium	68710	0	42970	25740
7	Palsana	Alluvium	20996	0	20996	0
8	Surat city & Chorasi	Alluvium	58270	0	49900	8370
9	Umarpada	Basalt	26047	8000	18047	0
Total			411114	8000	369004	34110

Annexure-III (A30)

General description of groundwater assesment unit of District Surendranagar, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Chotila	Basalt	80345	0	80345	0
2	Chuda	Basalt	50076	0	17265	32811
3	Dasada	Alluvium	163011	0	17135	145876
4	Dhrangadhra	Soft Rock	136978	0	117626	19352
5	Lakhtar	Alluvium	74176	0	0	74176
6	Limbdi	Basalt	121299	0	22032	99267
7	Muli	Soft Rock	90198	0	63208	26990
8	Sayla	Basalt & Soft Rock	97291	0	97291	0
9	Thangadh	Soft Rock	28860	0	20454	8406
10	Wadhwan	Basalt	79578	0	47686	31892
Total			921812	0	483042	438770

Annexure-III (A31)

General description of groundwater assesment unit of District Tapi, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dolvan	Basalt	36981	5000	31981	0
2	Kukarmunda	Basalt	16561	4000	12561	0
3	Nizar	Basalt & Alluvium	23479	4000	19479	0
4	Songadh	Basalt	109375	35337	74038	0
5	Uchchhal	Basalt	62150	29790	32360	0
6	Valod	Basalt	20230	0	20230	0
7	Vyara	Basalt	44279	5800	38479	0
Total			313055	83927	229128	0

Annexure-III (A32)

General description of groundwater assesment unit of District Vadodara, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dabhoi	Alluvium	63260	0	63260	0
2	Desar	Basalt	23200	0	23200	0
3	Karjan	Alluvium	60190	0	60190	0
4	Padra	Alluvium	53460	0	53460	0
5	Savli	Basalt & Alluvium	56700	0	56700	0
6	Sinor	Alluvium	29250	0	29250	0
7	Vadodara	Alluvium	67000	0	67000	0
8	Vaghodia	Basalt & Alluvium	56550	0	56550	0
Total			409610	0	409610	0

Annexure-III (A33)

General description of groundwater assesment unit of District Valsad, Gujarat State						
Type of groundwater assesment unit : Taluka						
S. No	Name of GroundWater Assessment Unit	Type of Formation	Areal Extent (Area in Hactare)			
			Total Geographic Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)	Poor Ground Water Quality (Ha)
1	Dharampur	Basalt	71329	21000	50329	0
2	Kaprada	Basalt	93134	41500	51634	0
3	Pardi	Basalt	60026	30000	30026	0
4	Umbergaon	Basalt	36198	0	36198	0
5	Valsad	Basalt	52010	0	44695	7315
6	Vapi	Basalt	12990	0	12990	0
Total			325687	92500	225872	7315

Annexure-IV

Average Water Level & Fluctuation Data					
District	**Taluka**	**Category**	**Average Pre-monsoon Water Level (m bgl)**	**Average Post Monsoon Water Level (m bgl)**	**Water Level Fluctuation (m)**
Ahmedabad	Ahmedabad City & Daskroi	Semi critical	10.92	8.88	2.04
	Bavla	Safe	8.36	6.43	1.94
	Detroj-rampura	Semi critical	19.46	17.74	1.72
	Dhandhuka	Saline	3.64	2.28	1.36
	Dholera	Saline	2.90	1.04	1.86
	Dholka	Semi critical	13.58	11.96	1.62
	Mandal	Safe	6.20	3.95	2.26
	Sanand	Safe	3.78	1.94	1.84
	Viramgam	Semi critical	8.76	6.93	1.83
Amreli	Amreli	Safe	17.69	8.22	9.47
	Babra	Safe	19.71	9.50	10.21
	Bagasara	Safe	15.19	8.84	6.34
	Dhari	Safe	15.94	7.64	8.30
	Jafrabad	Safe	13.91	6.45	7.46
	Khambha	Safe	15.38	7.68	7.70
	Kunkavav vadia	Safe	23.77	9.65	14.12
	Lathi	Safe	8.68	4.04	4.64
	Lilia	Safe	11.33	5.40	5.93
	Rajula	Safe	11.28	5.32	5.96
	Savar kundla	Safe	13.25	6.79	6.46
Anand	Anand	Safe	9.57	7.85	1.72
	Anklav	Safe	18.82	17.05	1.77
	Borsad	Safe	15.94	14.56	1.39
	Khambhat	Safe	7.54	5.30	2.24
	Petlad	Safe	6.60	5.00	1.60
	Sojitra	Safe	4.71	1.89	2.82
	Tarapur	Safe	4.80	2.49	2.31
	Umreth	Safe	11.46	9.49	1.97
Arvalli	Bayad	Safe	12.01	6.23	5.78
	Bhiloda	Safe	14.48	5.40	9.08
	Dhansura	Safe	10.53	4.79	5.74
	Malpur	Safe	16.88	5.52	11.36
	Meghraj	Safe	16.35	6.20	10.15
	Modasa	Safe	14.55	6.21	8.34

Banaskantha	Amirgadh	Safe	13.70	10.68	3.02
	Bhabhar	Saline	42.48	39.96	2.52
	Danta	Safe	12.17	8.06	4.11
	Dantiwada	Safe	22.32	19.20	3.12
	Deesa	Over Exploited	55.97	53.40	2.57
	Deodar	Over Exploited	110.15	90.75	19.40
	Dhanera	Over Exploited	48.30	46.87	1.43
	Kankrej	Over Exploited	16.92	14.91	2.01
	Lakhani	Over Exploited	60.56	58.81	1.75
	Palanpur	Critical	27.93	25.67	2.26
	Suigam	Saline	5.69	4.20	1.49
	Tharad	Over Exploited	34.71	33.84	0.87
	Vadgam	Over Exploited	35.85	34.30	1.55
	Vav	Saline	9.48	8.03	1.45
Bharuch	Amod	Safe	13.92	12.08	1.84
	Anklesvar	Safe	8.42	6.11	2.31
	Bharuch	Safe	7.60	4.98	2.63
	Hansot	Safe	5.43	3.75	1.67
	Jambusar	Safe	8.06	6.16	1.91
	Jhagadia	Safe	13.72	7.57	6.15
	Netrang	Safe	8.50	4.18	4.33
	Vagra	Safe	6.72	5.16	1.57
	Valia	Safe	8.56	5.20	3.36
Bhavnagar	Bhavnagar	Safe	21.64	9.03	12.61
	Gariadhar	Safe	13.74	5.66	8.08
	Ghogha	Safe	11.12	5.40	5.72
	Jesar	Safe	15.60	6.92	8.68
	Mahuva	Safe	15.14	6.84	8.31
	Palitana	Safe	14.70	5.84	8.86
	Sihor	Safe	18.15	8.91	9.24
	Talaja	Safe	9.52	4.51	5.01
	Umrala	Safe	16.44	9.27	7.17
	Vallabhipur	Safe	8.83	5.38	3.45
Botad	Barwala	Safe	11.88	7.11	4.77
	Botad	Safe	18.18	10.65	7.53
	Gadhada	Safe	12.68	7.14	5.54
	Ranpur	Safe	8.88	5.28	3.60
Chhota udepur	Bodeli	Safe	6.40	3.63	2.77
	Chhota udaipur	Safe	8.72	4.89	3.83
	Jetpur pavi	Safe	8.60	4.66	3.94
	Kavant	Safe	9.39	5.34	4.05
	Nasvadi	Safe	8.80	5.30	3.50
	Sankheda	Safe	15.48	13.61	1.86
Dahod	Dahod	Safe	6.43	3.24	3.19
	Devgadh baria	Safe	9.26	5.18	4.08
	Dhanpur	Safe	8.66	4.90	3.76
	Fatepura	Safe	11.46	5.37	6.09
	Garbada	Safe	6.16	3.01	3.15

	Limkheda	Safe	8.22	4.49	3.73
	Sanjeli	Safe	3.58	1.46	2.12
	Singvad	Safe	8.77	3.69	5.08
	Zalod	Safe	7.02	3.39	3.63
Dang	Ahwa	Safe	22.31	16.79	5.52
	Subir	Safe	9.14	4.80	4.34
	Waghai	Safe	10.77	5.19	5.58
Devbhumi Dwarka	Bhanvad	Safe	14.25	7.60	6.65
	Kalyanpur	Safe	12.99	6.48	6.51
	Khambhalia	Safe	15.77	7.70	8.07
	Okhamandal	Safe	5.35	1.75	3.60
Gandhinagar	Dehgam	Over Exploited	38.61	37.12	1.49
	Gandhinagar	Over Exploited	41.82	40.84	0.98
	Kalol	Over Exploited	43.47	41.64	1.83
	Mansa	Over Exploited	43.07	41.61	1.46
Gir Somnath	Gir Gadhda	Safe	9.06	5.57	3.49
	Kodinar	Safe	9.93	4.69	5.24
	Patan-veraval	Safe	16.88	6.24	10.64
	Sutrapada	Safe	12.24	4.38	7.86
	Talala	Safe	13.08	6.64	6.44
	Una	Safe	16.06	8.33	7.73
Jamnagar	Dhrol	Safe	12.10	5.79	6.31
	Jamjodhpur	Safe	15.55	7.78	7.77
	Jamnagar	Safe	13.40	7.82	5.58
	Jodiya	Safe	11.93	5.10	6.83
	Kalavad	Safe	15.85	5.55	10.30
	Lalpur	Safe	13.76	7.01	6.75
Junagadh	Bhesana	Safe	15.90	6.70	9.20
	Junagadh City & Junagadh	Safe	16.04	6.71	9.33
	Keshod	Safe	15.63	5.43	10.20
	Malia	Safe	12.90	4.46	8.44
	Manavadar	Safe	13.21	5.25	7.96
	Mangrol	Safe	8.90	5.79	3.11
	Mendarda	Safe	15.38	5.34	10.04
	Vanthali	Safe	14.85	5.62	9.23
	Visavadar	Safe	17.03	9.01	8.02
Kachchh	Abdasa	Safe	8.62	7.11	1.51
	Anjar	Critical	11.34	8.75	2.59
	Bhachau	Over Exploited	12.12	10.12	2.00
	Bhuj	Critical	13.55	11.55	2.00
	Gandhidham	Saline	6.19	5.12	1.07
	Lakhpat	Safe	21.06	19.92	1.14
	Mandvi	Over Exploited	8.61	6.16	2.46
	Mundra	Safe	7.49	5.50	1.99
	Nakhatrana	Semi critical	23.19	21.68	1.51
	Rapar	Safe	17.31	15.12	2.19

Kheda	Galteshwar	Safe	15.63	14.30	1.33
	Kapadvanj	Safe	20.00	14.93	5.06
	Kathlal	Safe	17.54	15.91	1.63
	Kheda	Safe	11.44	8.21	3.24
	Mahudha	Safe	7.12	5.31	1.82
	Matar	Safe	4.72	3.16	1.56
	Mehmedabad	Safe	14.02	11.55	2.47
	Nadiad	Safe	9.55	6.72	2.84
	Thasra	Safe	11.34	9.48	1.86
	Vaso	Safe			0.00
Mahesana	Becharaji	Over Exploited	17.47	13.91	3.56
	Jotana	Over Exploited	51.29	49.58	1.71
	Kadi	Over Exploited	20.81	19.50	1.31
	Kheralu	Over Exploited	24.98	22.56	2.42
	Mahesana	Over Exploited	31.14	29.57	1.57
	Satlasana	Over Exploited	16.27	13.46	2.81
	Unjha	Over Exploited	11.64	9.69	1.95
	Vadnagar	Critical	11.77	9.76	2.01
	Vijapur	Over Exploited	21.72	20.64	1.08
	Visnagar	Over Exploited	7.88	5.63	2.25
Mahisagar	Balasinor	Safe	7.50	4.57	2.93
	Kadana	Safe	12.13	5.99	6.14
	Khanpur	Safe	12.28	5.49	6.79
	Lunawada	Safe	8.89	6.02	2.87
	Santrampur	Safe	10.66	5.04	5.62
	Virpur	Safe	6.63	3.87	2.76
Morbi	Halvad	Safe	14.90	11.67	3.23
	Maliya	Saline	3.36	1.97	1.39
	Morvi	Safe	4.38	2.42	1.96
	Tankara	Safe	8.70	3.85	4.85
	Wankaner	Safe	10.21	4.55	5.66
Narmada	Dediapada	Safe	9.06	5.16	3.90
	Garudeshwar	Safe	6.89	4.82	2.07
	Nandod	Safe	11.48	6.55	4.94
	Sagbara	Safe	10.95	5.65	5.30
	Tilakwada	Safe	14.53	12.31	2.23
Navsari	Bansda	Safe	10.59	5.82	4.77
	Chikhli	Safe	7.48	2.93	4.55
	Gandevi	Safe	7.97	4.64	3.33
	Jalalpore	Safe	7.91	3.57	4.34
	Khergam	Safe	7.96	3.54	4.42
	Navsari	Safe	4.50	2.17	2.33
Panchmahal	Ghoghamba	Safe	9.32	4.89	4.43
	Godhra	Safe	8.10	4.57	3.53
	Halol	Safe	8.71	4.14	4.57
	Jambughoda	Safe	5.76	4.23	1.53
	Kalol	Safe	6.77	3.95	2.82

	Morwa hadaf	Safe	12.37	7.22	5.15
	Shehera	Safe	4.65	2.23	2.42
Patan	Chanasma	Over Exploited	20.14	18.73	1.41
	Harij	Saline	9.98	8.61	1.37
	Patan	Over Exploited	17.91	13.47	4.45
	Radhanpur	Saline	5.12	3.84	1.28
	Sami	Saline	4.32	2.63	1.69
	Sankheswar	Saline	5.45	3.55	1.90
	Santalpur	Saline	7.53	6.46	1.07
	Sarsvati(Patan)	Critical	28.56	26.15	2.41
	Sidhpur	Over Exploited	36.63	35.02	1.62
Porbandar	Kutiyana	Safe	14.79	5.71	9.08
	Porbandar	Semi critical	10.01	5.13	4.88
	Ranavav	Safe	12.29	6.40	5.89
Rajkot	Dhoraji	Safe	16.36	6.62	9.74
	Gondal	Safe	12.98	5.47	7.51
	Jamkandorna	Safe	13.17	6.20	6.97
	Jasdan	Safe	13.10	6.04	7.06
	Jetpur	Safe	14.35	5.03	9.32
	Kotada sangani	Safe	10.96	4.62	6.34
	Lodhika	Safe	14.12	4.29	9.83
	Paddhari	Safe	11.22	4.13	7.09
	Rajkot	Safe	12.92	5.30	7.62
	Upleta	Safe	11.42	5.26	6.16
	Vinchchiya	Safe	11.97	6.94	5.03
Sabarkantha	Himatnagar	Safe	14.32	9.46	4.86
	Idar	Semi critical	16.56	8.12	8.44
	Khedbrahma	Safe	15.65	6.81	8.84
	Poshina	Safe	11.67	6.90	4.77
	Prantij	Semi critical	41.86	36.94	4.92
	Talod	Semi critical	10.39	8.15	2.24
	Vadali	Semi critical	15.86	9.12	6.74
	Vijaynagar	Safe	15.77	7.52	8.25
Surat	Bardoli	Safe	6.75	3.61	3.14
	Kamrej	Safe	7.72	5.19	2.53
	Mahuva	Safe	8.53	4.62	3.91
	Mandvi	Safe	8.09	3.40	4.69
	Mangrol	Safe	7.54	2.89	4.65
	Olpad	Safe	3.89	2.13	1.76
	Palsana	Safe	9.79	7.03	2.76
	Surat city & Chorasi	Safe	5.95	3.27	2.68
	Umarpada	Safe	9.90	3.26	6.64
Surendranagar	Chotila	Safe	13.49	8.84	4.65
	Chuda	Safe	11.15	5.96	5.19
	Dasada	Safe	14.04	12.09	1.95
	Dhrangadhra	Safe	15.51	13.04	2.47
	Lakhtar	Saline	4.61	2.79	1.82

	Limbdi	Safe	3.02	1.60	1.42
	Muli	Safe	10.18	5.06	5.12
	Sayla	Safe	6.31	4.35	1.96
	Thangadh	Safe	19.41	15.14	4.27
	Wadhwan	Safe	11.91	7.71	4.20
Tapi	Dolvan	Safe	8.60	2.85	5.75
	Kukarmunda	Safe	5.87	3.69	2.18
	Nizar	Safe	10.72	4.96	5.76
	Songadh	Safe	10.80	4.96	5.84
	Uchchhal	Safe	13.54	6.43	7.11
	Valod	Safe	4.42	2.28	2.14
	Vyara	Safe	8.07	2.87	5.20
Vadodara	Dabhoi	Safe	9.05	6.15	2.91
	Desar	Safe	11.38	8.28	3.10
	Karjan	Safe	34.77	32.89	1.88
	Padra	Safe	22.14	19.18	2.97
	Savli	Safe	7.71	5.23	2.49
	Sinor	Safe	23.83	20.77	3.06
	Vadodara	Semi critical	13.25	10.66	2.59
	Vaghodia	Safe	5.72	3.67	2.05
Valsad	Dharampur	Safe	14.60	5.93	8.67
	Kaprada	Safe	12.77	6.93	5.84
	Pardi	Safe	6.92	2.92	4.00
	Umbergaon	Safe	7.03	2.71	4.32
	Valsad	Safe	9.59	3.81	5.78
	Vapi	Safe	6.48	2.49	3.99

Annexure-V

Categorization of Assessment Units, 2017													
Gujarat													
S. No	**District**	**S. No**	**Semi-Critical**	**S. No**	**Critical**	**S. No**	**Over Exploited**	**S. No**	**Fluoride**	**S. No**	**Arsenic**	**S. No**	**Saline**
1	**Ahmedabad**	1	Ahmedabad City & Daskroi									1	Dhandhuka
		2	Detroj-rampura									2	Dholera
		3	Dholka										
		4	Viramgam										
2	**Banaskantha**			1	Palanpur	1	Deesa					1	Bhabhar
						2	Deodar					2	Suigam
						3	Dhanera					3	Vav
						4	Kankrej						
						5	Lakhani						
						6	Tharad						
						7	Vadgam						
3	**Gandhinagar**					1	Dehgam						
						2	Gandhinagar						
						3	Kalol						
						4	Mansa						
4	**Kachchh**	1	Nakhatrana	1	Anjar	1	Bhachau					1	Gandhidham
				2	Bhuj	2	Mandvi						
5	**Mahesana**			1	Vadnagar	1	Becharaji						
						2	Jotana						
						3	Kadi						
						4	Kheralu						
						5	Mahesana						
						6	Satlasana						
						7	Unjha						
						8	Vijapur						
						9	Visnagar						
6	**Morbi**											1	Maliya
7	**Patan**			1	Sarsvati(Patan)	1	Chanasma					1	Harij
						2	Patan					2	Radhanpur
						3	Sidhpur					3	Sami
												4	Sankheswar
												5	Santalpur
8	**Porbandar**	1	Porbandar										
9	**Sabarkantha**	1	Idar										
		2	Prantij										
		3	Talod										
		4	Vadali										
10	**Surendranagar**											1	Lakhtar
11	**Vadodara**	1	Vadodara										
ABSTRACT													
Categorization		**Semicritical**		**Critical**		**Over Exploited**		**Fluoride**		**Arsenic**		**Saline**	
Total	**248**	**13**		**5**		**25**		**Nil**		**Nil**		**13**	

Annexure-VI

OVER EXPLOITED, CRITICAL, SEMI-CRITICAL, SAFE AND SALINE TALUKAS (GWRE-2017)										
District		**Over Exploited**		**Critical**		**Semi-Critical**		**Safe**		**Saline**
Ahmedabad					1 2 3 4	Ahmedabad City & Daskroi Detroj-Rampura Dholka Virmagam	1 2 3	Bavla Mandal Sanand	1 2	Dhanduka Dholera
Amreli							4 5 6 7 8 9 10 11 12 13 14	Amreli Babra Bagasra Dhari Jafrabad Khamba Kukavav Lathi Liliya Rajula Savarkundla		
Anand							15 16 17 18 19 20 21 22	Anand Anklav Borsad Cambay Petlad Sojitra Tarapur Umreth		
Arvalli							23 24 25 26 27 28	Bayad Bhiloda Dhansura Malpur Meghraj Modasa		
Banaskantha	1 2 3 4 5 6 7	Deesa Deodar Dhanera Kankrej Lakhni Tharad Vadgam	1	Palanpur			29 30 31	Amirgarh Danta Dantiwada	3 4 5	Bhabar Suigam Vav
Bharuch							32 33 34 35 36 37 38 39	Amod Ankleswar Bharuch Hansot Jambusar Jhagadia Netrang Vagra		

							40	Valia		
Bhavnagar							41	Bhavnagar		
							42	Gariadhar		
							43	Ghogha		
							44	Jesar		
							45	Mahuva		
							46	Palitana		
							47	Sihor		
							48	Talaja		
							49	Umrala		
							50	Vallabhipur		
Botad							51	Barwala		
							52	Botad		
							53	Gadhda		
							54	Ranpur		
Chhota Udeipur							55	Bodeli		
							56	Chhota Udeipur		
							57	JetpurPavi		
							58	Kawant		
							59	Nasvadi		
							60	Sankheda		
Dahod							61	Dahod		
							62	Devgarhbaria		
							63	Dhanpur		
							64	Fatepura		
							65	Garbada		
							66	Limkheda		
							67	Sanjeli		
							68	Singvad		
							69	Zalod		
Dangs							70	Ahwa		
							71	Subir		
							72	Waghai		
Devbhoomi Dwarka							73	Bhanvad		
							74	Kalyanpur		
							75	Khmabalia		
							76	Okha Mandal		
Gandhinagar	8	Dahegam								
	9	Gandhinagar								
	10	Kalol								
	11	Mansa								
Gir Somnath							77	Gir Gadhda		
							78	Kodinar		
							79	Patan-Veraval		
							80	Sutrapada		
							81	Talala		
							82	Una		
Jamnagar							83	Dhrol		
							84	Jamjodhpur		
							85	Jamnagar		

							86 87 88	Jodiya Kalavad Lalpur		
Junagadh							89 90 91 92 93 94 95 96 97	Bhesan Junagadh city & Junagadh Keshod Maliya Manavadar Mangrol Mendarda Vanthli Visavadar		
Kachchh	12 13	Bhachau Mandvi	2 3	Anjar Bhuj	5	Nakhatrana	98 99 100 101	Abdasa Lakhpat Mundra Rapar	6	Gandhidham
Kheda							102 103 104 105 106 107 108 109 110 111	Galteshwar Kapadvanj Kathlal Kheda Mahudha Matar Mehmedabad Nadiad Thasra Vaso		
Mahesana	14 15 16 17 18 19 20 21 22	Bechraji Jotana Kadi Kheralu Mahesana Satlasna Unjha Vijapur Visnagar	4	Vadnagar						
Mahisagar							112 113 114 115 116 117	Balasinor Kadana Khanpur Lunawada Santrampur Virpur		
Morbi							118 119 120 121	Halvad Morbi Tankara Wankaner	7	Maliya
Narmada							122 123 124 125 126	Dediapada Garudeshwar Nandod Sagbara Tilakwada		

Navsari							127 128 129 130 131 132	Bansda Chikhli Gandevi Jalalpore Khergam Navsari		
Panchmahals							133 134 135 136 137 138 139	Ghoghamba Godhra Halol Jambhugoda Kalol Morva Hadaf Shehra		
Patan	23 24 25	Chanasma Patan Siddhpur	5	Sarasvati					8 9 10 11 12	Harij Radhanpur Sami Sankheswar Santhalpur
Porbandar					6	Porbandar	140 141	Kutiyana Ranavav		
Rajkot							142 143 144 145 146 147 148 149 150 151 152	Dhoraji Gondal Jamkondarna Jasdan Jetpur Kotda sangni Lodhika Paddhari Rajkot Upleta Vinchiya		
Sabarkantha					7 8 9 10	Idar Prantij Talod Wadali	153 154 155 156	Himmatnagar Khedbrahma Poshina Vijaynagar		
Surat							157 158 159 160 161 162 163 164 165	Bardoli Kamrej Mahuva Mandvi Mangrol Olpad Palsana Surat city & Choryasi Umarpada		
Surendranagar							166 167 168 169 170 171	Chotila Chuda Dasada Dhrgandhra Limdi Muli	13	Lakhtar

							172 173 174	Sayla Thangadh Wadhwan		
Tapi							175 176 177 178 179 180 181	Dolvan Kukarmunda Nizar Songadh Ucchal Valod Vyara		
Vadodara					11	Vadodara	182 183 184 185 186 187 188	Dabhoi Desar Karjan Padra Savli Sinor Vaghodia		
Valsad							189 190 191 192 193 194	Dharampur Kaprada Pardi Umargam Valsad Vapi		
		Over Exploited		**Critical**		**Semi-Critical**		**Safe**		**Saline**
		25		**5**		**11**		**194**		**13**

Report on
Dynamic Ground Water Resources of Gujarat State
as on March 2017

PART – II
Saline Ground Water Area

DYNAMIC GROUND WATER RESOURCES (SALINE GW AREA)

1. BACKGROUND & METHODOLOGY

Being coastal state having extensive coast line of 1600 km and proximity to saline front all along north west to south part, saline ground water occurs all along coastal areas of the State. Moreover, geogenic saline zone exist all along fringe area of eastern and southern tract of Rann of Kachchh and along low laying north-western margin of Saurashtra region, covered by alluvium on ancient sea connecting Rann of Kachchh and Gulf of Camby. There are 13 talukas having brackish to saline groundwater in major part of the taluka area and they are termed as 'Saline' taluka. Moreover, in the State there are other 68 talukas having 10 % to more than 40 % area underlain by brackish to saline groundwater. This salinity, in terms of TDS more than 2,500 ppm, can be attributed to inherent geogenic nature and salinity due to sea water ingress along coastal areas or up-conning from deep aquifer system on account of overexploitation of overlying fresh ground water resources.

It is observed that groundwater having TDS beyond 2500 ppm, up to 4000 to 5000 ppm is developed in various part of the state for both agriculture and other uses, mostly to cater the need of livestock (cattle, sheep, etc). Details of groundwater abstraction structures from saline groundwater area and its unit draft data is presented **in table 3 & 4** respectively. Groundwater resource assessment of such area is attempted as per the norms of GEC-2015. As most of the saline area does not have any monitoring network, in absence of water table fluctuation (WTF) data, rainfall infiltration (RIF) method has been adopted. The replenishable saline groundwater resource computed for such saline areas is presented in **Annexure - VII.**

Out of 68 partial saline taluka and 13 total saline talukas (Total 81 assessment units), 72 talukas have stage of saline ground water development below 70 % and termed as 'Safe', whereas remaining 9 taluka have stage of saline ground water development between 70 to 90 % and they are categorised as 'Semi Critical'.

Table 3 : Ground water Abstraction Structures used for irrigation (Partly Saline Area)-2017

Sl. No	District	Assessment Unit Name	Predominant Rock formation	No. of Electrified Sets					No. of Diesel Pump Sets	Grand Total(Electric+Diesel)	Open Wells (Without Pumpsets)
				upto 7.5 HP	7.5 to 15 HP	15 to 30 HP	more than 30 HP	Total			
	Ahmedabad	Bavla	Alluvium	549	1036	190	18	1793	55	1848	0
		Detroj-rampura	Alluvium	14	12	47	179	252	30	282	0
		Dholka	Alluvium	214	263	240	34	751	90	841	0
		Mandal	Alluvium	27	50	42	262	381	0	381	0
		Sanand	Alluvium	71	320	422	65	878	30	908	0
1		Viramgam	Alluvium	97	69	87	180	433	100	533	0
	Amreli	Jafrabad	Alluvium	59	0	0	0	59	10	69	0
2		Rajula	H.R.	345	7	0	0	352	22	374	0
	Anand	Khambhat	Alluvium	61	351	306	0	718	0	718	0
3		Tarapur	Alluvium	234	152	0	0	386	0	386	0
	Banaskantha	Deodar	Alluvium	32	6	70	5036	5144	0	5144	0
		Kankrej	Alluvium	181	274	214	2688	3357	0	3357	0
4		Tharad	Alluvium	441	1672	2905	3715	8733	100	8833	0
	Bharuch	Anklesvar	Alluvium	760	53	4	0	817	0	817	0
		Bharuch	Alluvium	80	339	53	0	472	0	472	0
		Hansot	Alluvium	328	116	2	0	446	0	446	0
		Jambusar	Alluvium	280	138	10	0	428	0	428	0
5		Vagra	Alluvium	286	69	0	0	355	0	355	0
	Bhavnagar	Bhavnagar	H.R.	2127	144	13	0	2284	35	2319	0
		Ghogha	H.R.	1333	52	2	0	1387	80	1467	0
6		Vallabhipur	H.R./Alluvium	344	156	10	0	510	28	538	0
7	Botad	Barwala	H.R.	485	402	18	0	905	10	915	0
	Devbhumi Dwarka	Kalyanpur	H.R.	1325	85	9	0	1419	16	1435	0
		Khambhalia	H.R.	242	79	1	0	322	25	347	0
8		Okhamandal	Soft Rock	1802	24	0	0	1826	17	1843	0
	Gir Somnath	Kodinar	Alluvium	590	27	0	0	617	50	667	0
		Patan-veraval	Alluvium	1825	82	0	0	1907	22	1929	0
		Sutrapada	Alluvium	2863	54	0	0	2917	54	2971	0
9		Una	H.R.	1818	21	0	0	1839	25	1864	0
	Jamnagar	Jamnagar	H.R.	253	48	0	0	301	96	397	0
10		Jodiya	H.R.	1444	240	13	0	1697	40	1737	0
	Junagadh	Manavadar	H.R.	2493	309	18	0	2820	20	2840	0
11		Mangrol	Alluvium	4995	229	0	0	5224	10	5234	0
	Kachchh	Abdasa	Soft Rock	201	210	750	898	2059	45	2104	0
		Anjar	H.R./Alluvium	410	90	163	810	1473	455	1928	0
		Bhachau	Soft Rock	250	269	277	244	1040	201	1241	0
		Bhuj	Soft Rock	208	512	1037	914	2671	330	3001	0
		Lakhpat	Soft Rock	10	180	425	48	663	66	729	0
		Mandvi	H.R.	342	608	1514	460	2924	66	2990	0
		Mundra	H.R.	850	664	716	119	2349	20	2369	0
		Nakhatrana	Soft Rock	61	277	850	66	1254	25	1279	0
12		Rapar	Soft Rock	852	1224	1016	314	3406	284	3690	0
	Kheda	Kheda	Alluvium	25	215	43	0	283	0	283	0
13		Matar	Alluvium	64	75	10	0	149		149	0
	Mahesana	Becharaji	Alluvium	2	24	14	393	433	50	483	0
		Jotana	Alluvium	1	5	4	95	105	0	105	0
14		Mahesana	Alluvium	0	2	6	29	37	0	37	0
	Morbi	Halvad	Soft Rock	180	895	487	28	1590	0	1590	0
		Morvi	H.R./Alluvium	2434	926	466	28	3854	94	3948	0
15		Wankaner	H.R./Soft Rock	878	787	307	13	1985	0	1985	0
	Navsari	Gandevi	H.R./Alluvium	384	2	0	0	386		386	0
16		Jalalpore	Alluvium	1397	28	6	0	1431	0	1431	0
	Patan	Chanasma	Alluvium	19	66	26	937	1048	10	1058	0
		Patan	Alluvium	195	108	132	1012	1447	15	1462	0
17		Sarsvati(Patan)	Alluvium	23	38	73	950	1084	50	1134	0
	Porbandar	Kutiyana	H.R.	1034	27	0	0	1061	0	1061	0
		Porbandar	H.R./Alluvium	3823	76	0	0	3899	0	3899	0
18		Ranavav	H.R./Alluvium	1314	63	0	0	1377	0	1377	0
	Surat	Olpad	Alluvium	85	6	0	0	91		91	0
19		Surat city & Chorasi	Alluvium	6	0	0	0	6	0	6	0
	Surendranagar	Chuda	H.R.	1526	234	23		1783		1783	0
		Dasada	Alluvium	267	109	205	511	1092		1092	0
		Dhrangadhra	Soft Rock	177	1712	1088	95	3072		3072	0
		Limbdi	H.R.	412	30	0		442		442	0
		Muli	Soft Rock	672	740	276	33	1721	0	1721	0
		Thangadh	Soft Rock	83	424	204	0	711		711	0
20		Wadhwan	H.R.	2348	710	110	34	3202		3202	0
21	Valsad	Valsad	H.R.	547	11	0	0	558	0	558	0

Table 4: Taluka wise unit draft of Ground water Abstraction Structures used for irrigation (Partly Saline Area)-2017

Sl. No	District	Assessment Unit Name	Estimated Draft of structure in TCM/Year					
			Open well Without Pump Sets	upto 7.5HP E/M	7.5 to 15 HP E/M	15 to 30 HP E/M	more than 30 HP E/M	Diesel Pump Sets
1	Ahmedabad	Bavla	0	8	20	30	50	8
		Detroj-rampura	0	8	15	30	50	8
		Dholka	0	8	20	30	50	8
		Mandal	0	10	20	30	50	0
		Sanand	0	10	20	25	45	10
		Viramgam	0	10	20	30	50	10
2	Amreli	Jafrabad	0	6	0	0	0	6
		Rajula	0	5	8	0	0	5
3	Anand	Khambhat	0	8	10	25	0	0
		Tarapur	0	8	20	0		0
4	Banaskantha	Deodar	0	7	10	15	25	0
		Kankrej	0	5	8	12	20	0
		Tharad	0	5	10	15	35	5
5	Bharuch	Anklesvar	0	6	12	25	0	0
		Bharuch	0	8	10	25	0	0
		Hansot	0	8	15	25	0	0
		Jambusar	0	8	15	25	0	0
		Vagra	0	8	15	0	0	0
6	Bhavnagar	Bhavnagar	0	4	6	8	0	6
		Ghogha	0	4	6	10	0	4
		Vallabhipur	0	4	6	10	0	4
7	Botad	Barwala	0	4	6	9	0	4
8	Devbhumi Dwarka	Kalyanpur	0	4	6	8	0	4
		Khambhalia	0	5	8	10	0	5
		Okhamandal	0	4	6	0	0	5
9	Gir Somnath	Kodinar	0	6	8	0	0	6
		Patan-veraval	0	6	8	0	0	5
		Sutrapada	0	6	8	0	0	6
		Una	0	5	8	0	0	5
10	Jamnagar	Jamnagar	0	5	8	0	0	6
		Jodiya	0	5	9	10	0	5
11	Junagadh	Manavadar	0	4	6	8	0	4
		Mangrol	0	4	6	0	0	4
12	Kachchh	Abdasa	0	7	10	15	25	7
		Anjar	0	6	10	15	25	6
		Bhachau	0	8	10	15	25	8
		Bhuj	0	7	10	15	25	6
		Lakhpat	0	8	10	15	25	8
		Mandvi	0	6	10	15	25	6
		Mundra	0	6	8	15	25	6
		Nakhatrana	0	6	8	12	25	6
		Rapar	0	6	10	15	25	6
13	Kheda	Kheda	0	8	20	30	0	0
		Matar	0	10	15	30	0	0
14	Mahesana	Becharaji	0	15	25	50	70	15
		Jotana	0	15	20	45	60	15
		Mahesana	0	0	20	30	50	0
15	Morbi	Halvad	0	6	8	10	12	0
		Morvi	0	6	8	15		6
		Wankaner	0	5	7	9	15	6
16	Navsari	Gandevi	0	6	10	0	0	0
		Jalalpore	0	8	10	15	0	0
17	Patan	Chanasma	0	10	25	45	65	10
		Patan	0	15	20	40	65	15
		Sarsvati(Patan)	0	15	20	40	70	15
18	Porbandar	Kutiyana	0	4	6	0	0	0
		Porbandar	0	5	7	0	0	0
		Ranavav	0	4	6	0	0	0
19	Surat	Olpad	0	8	10	0	0	0
		Surat city & Chorasi	0	10	0	0	0	0
20	Surendranagar	Chuda	0	5	8	10	0	0
		Dasada	0	8	12	15	20	0
		Dhrangadhra	0	4	5	6	8	0
		Limbdi	0	10	15	0	0	0
		Muli	0	6	8	10	15	0
		Thangadh	0	6	8	10	0	0
		Wadhwan	0	5	8	10	15	0
21	Valsad	Valsad	0	8	15	25	50	8

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Ahmedabad (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Dhandhuka	81.83	2.80	0.00	0.49	85.12	4.26	80.87	8.29	0.27	1.51	10.07	2.10	70.21	12.46	Safe
2	Dholera	113.13	0.53	0.00	0.12	113.78	5.69	108.09	0.49	0.10	0.59	1.18	0.82	106.67	1.09	Safe
3	Detroj_Rampura	30.93	1.92	0.00	2.94	35.79	1.79	34.00	10.89	0.11	0.65	11.66	1.67	21.32	34.29	Safe
4	Bavla	118.07	2.18	0.00	1.33	121.59	12.16	109.43	32.15	0.32	1.83	34.31	3.18	73.77	31.35	Safe
5	Dholka	117.62	1.36	0.00	0.82	119.79	5.99	113.80	16.59	0.40	2.24	19.23	4.31	92.51	16.90	Safe
6	Mandal	79.05	1.16	0.00	0.68	80.88	4.04	76.84	15.63	0.15	0.84	16.61	1.42	59.64	21.62	Safe
7	Sanand	37.24	3.35	0.00	1.75	42.34	2.12	40.22	20.89	0.18	1.00	22.06	4.78	14.38	54.84	Safe
8	Viramgam	74.57	1.07	0.00	0.63	76.27	3.81	72.46	14.96	0.41	2.35	17.73	3.89	53.19	24.46	Safe
Total		**652.43**	**14.36**	**0.00**	**8.77**	**675.56**	**39.86**	**635.70**	**119.89**	**1.94**	**11.02**	**132.85**	**22.17**	491.70	20.90	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Amreli (Saline Area)																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Jafarabad	11.98	0.36	0.00	0.09	12.43	0.62	11.81	0.41	0.13	1.17	1.71	0.00	11.26	14.47	Safe
2	Rajula	13.56	1.35	0.00	0.29	15.20	1.52	13.68	1.89	0.03	0.30	2.23	0.00	11.76	16.29	Safe
Total		**25.54**	**1.70**	**0.00**	**0.38**	**27.63**	**2.14**	**25.49**	**2.31**	**0.16**	**1.47**	**3.94**	**0.00**	**23.02**	15.45	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Anand (Saline Area)																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Cambay	36.39	28.69	0.00	31.44	96.52	4.83	91.69	11.65	0.42	2.37	14.44	4.42	75.20	15.75	Safe
2	Tarapur	4.14	15.62	0.00	19.94	39.71	1.99	37.72	4.91	0.11	0.61	5.63	1.37	31.33	14.93	Safe
Total		**40.53**	**44.31**	**0.00**	**51.38**	**136.23**	**6.81**	**129.41**	**16.56**	**0.53**	**2.99**	**20.07**	**5.79**	**106.54**	15.51	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Banaskantha (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bhabhar	35.92	9.66	0.00	9.17	54.75	5.47	49.27	37.05	0.31	1.77	39.13	2.12	9.79	79.42	Semi critical
2	Wav	94.67	7.53	0.00	63.25	165.45	19.85	145.59	29.50	0.42	2.39	32.31	2.86	112.81	22.19	Safe
3	Deodar	129.36	14.97	0.00	7.62	151.95	7.60	144.35	127.23	0.36	2.06	129.65	2.73	14.02	89.82	Semi critical
4	Kankrej	47.39	16.09	0.00	19.39	82.87	4.14	78.73	59.43	0.25	1.41	61.08	4.81	14.24	77.59	Semi critical
5	Suigam	60.30	5.07	0.00	10.05	75.41	7.54	67.87	6.83	0.22	1.23	8.29	1.47	59.35	12.21	Safe
6	Tharad	189.49	16.57	0.00	17.25	223.31	11.17	212.14	193.03	0.69	3.92	197.64	5.32	13.11	93.16	Critical
Total		**557.14**	**69.88**	**0.00**	**126.71**	**753.73**	**55.78**	**697.96**	**453.06**	**2.26**	**12.79**	**468.11**	**19.31**	**223.33**	67.07	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Bharuch (Saline Area)																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ankleshwar	28.95	0.53	0.00	0.27	29.75	1.49	28.26	5.30	0.23	1.31	6.84	0.00	22.73	24.21	Safe
2	Bharuch	22.53	1.35	0.00	6.05	29.93	1.50	28.44	5.36	0.28	1.57	7.20	0.00	22.80	25.33	Safe
3	Jambusar	92.65	0.36	0.00	0.57	93.58	4.68	88.90	4.56	0.43	2.46	7.46	0.00	83.90	8.39	Safe
4	Hansot	17.82	0.42	0.00	0.57	18.81	0.94	17.87	4.41	0.08	0.43	4.91	0.00	13.38	27.51	Safe
5	Vagra	43.08	0.38	0.00	0.44	43.91	2.20	41.71	3.32	0.17	0.97	4.47	0.00	38.22	10.71	Safe
Total		**205.03**	**3.04**	**0.00**	**7.90**	**215.97**	**10.80**	**205.17**	**22.95**	**1.19**	**6.75**	**30.88**	**0.00**	**181.04**	15.05	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Bhavnagar (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Bhavnagar	80.91	2.29	0.00	1.59	84.78	4.24	80.54	9.69	0.78	7.06	17.53	0.00	70.07	21.76	Safe
2	Ghogha	12.99	1.01	0.00	0.88	14.88	0.74	14.14	5.98	0.04	0.38	6.40	1.91	6.20	45.29	Safe
3	Vallabhipur	6.33	0.63	0.00	0.40	7.36	0.37	6.99	2.52	0.02	0.14	2.68	0.00	4.45	38.38	Safe
Total		**100.22**	**3.93**	**0.00**	**2.87**	**107.02**	**5.35**	**101.67**	**18.19**	**0.84**	**7.58**	**26.61**	**1.91**	**80.72**	26.17	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Botad (Saline Area)																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Barwala	48.16	0.65	0.00	0.26	49.07	4.91	44.16	4.55	0.14	0.79	5.49	1.43	38.04	12.43	Safe
Total		**48.16**	**0.65**	**0.00**	**0.26**	**49.07**	**4.91**	**44.16**	**4.55**	**0.14**	**0.79**	**5.49**	**1.43**	**38.04**	12.43	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Devbhumi Dwarka (Saline Area)																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Kalyanpur	12.56	0.97	0.00	0.16	13.69	1.37	12.32	5.95	0.03	0.29	6.27	3.57	2.77	50.87	Safe
2	Okhamandal	16.41	0.82	0.00	0.10	17.34	0.87	16.47	7.44	0.14	0.79	8.37	2.96	5.93	50.82	Safe
3	Khambhalia	12.41	0.12	0.00	0.02	12.55	0.63	11.92	1.98	0.04	0.39	2.42	4.88	5.02	20.27	Safe
Total		**41.39**	**1.90**	**0.00**	**0.28**	**43.57**	**2.86**	**40.71**	**15.36**	**0.22**	**1.48**	**17.05**	**11.41**	**13.72**	41.89	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Gir Somnath (Saline Area)																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Kodinar	7.92	1.05	0.00	0.54	9.50	0.95	8.55	4.06	0.07	0.38	4.50	4.10	0.33	52.63	Safe
2	Sutrapada	39.21	1.26	0.00	2.20	42.67	2.13	40.54	17.93	0.20	1.12	19.25	2.54	19.87	47.49	Safe
3	Una	23.33	2.21	0.00	1.19	26.73	1.34	25.39	9.38	0.09	0.48	9.95	6.96	8.96	39.19	Safe
4	Veraval	26.69	1.86	0.00	1.47	30.03	1.50	28.53	11.72	0.11	0.65	12.48	5.77	10.93	43.76	Safe
Total		**97.14**	**6.39**	**0.00**	**5.40**	**108.93**	**5.92**	**103.01**	**43.09**	**0.46**	**2.63**	**46.18**	**19.37**	**40.08**	44.84	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Jamnagar (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Jodiya	21.77	0.87	0.00	0.09	22.73	2.27	20.46	9.71	0.06	0.33	10.10	1.56	9.13	49.39	Safe
2	Jamnagar	11.00	0.60	0.00	0.19	11.79	1.18	10.61	2.23	0.44	2.49	5.15	4.51	3.44	48.55	Safe
Total		**32.77**	**1.47**	**0.00**	**0.28**	**34.52**	**3.45**	**31.07**	**11.94**	**0.50**	**2.82**	**15.26**	**6.07**	**12.56**	49.11	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Junagadh (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Manavadar	22.11	1.76	0.00	1.59	25.46	1.27	24.19	12.05	0.11	0.64	12.81	2.38	9.64	52.94	Safe
2	Mangrol	36.27	2.77	0.00	2.75	41.79	2.09	39.70	21.39	0.10	0.59	22.09	3.81	14.40	55.63	Safe
Total		**58.38**	**4.53**	**0.00**	**4.35**	**67.25**	**3.36**	**63.89**	**33.44**	**0.22**	**1.23**	**34.89**	**6.19**	**24.04**	54.61	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Kachchh (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Abdasa	93.21	10.21	0.00	3.28	106.70	5.34	101.37	28.87	0.16	0.89	29.92	2.61	69.73	29.51	Safe
2	Anjar	145.37	5.37	0.00	2.04	152.78	7.64	145.14	27.70	0.16	0.89	28.75	5.23	112.05	19.81	Safe
3	Bhachau	69.66	7.10	0.00	2.16	78.92	3.95	74.98	15.33	0.07	0.42	15.83	4.13	55.44	21.11	Safe
4	Bhuj	77.10	6.70	0.00	2.74	86.54	4.33	82.21	42.39	0.18	1.01	43.57	9.84	29.80	53.00	Safe
5	Gandhidham	4.38	0.21	0.00	0.15	4.74	0.24	4.50	1.05	0.07	0.38	1.50	3.06	0.33	33.27	Safe
6	Lakhpat	55.69	1.78	0.00	0.70	58.17	2.91	55.26	9.98	0.13	0.76	10.87	1.39	43.75	19.68	Safe
7	Mandvi	65.68	7.29	0.00	2.89	75.86	3.79	72.06	42.74	0.27	1.54	44.55	4.51	24.55	61.81	Safe
8	Mundra	22.54	2.82	0.00	1.17	26.53	1.33	25.20	18.54	0.14	0.81	19.49	3.40	3.12	77.34	Semi critical
9	Nakhtrana	11.36	3.45	0.00	1.12	15.93	0.80	15.14	10.49	0.04	0.22	10.75	3.25	1.36	71.02	Semi critical
10	Rapar	96.98	2.00	0.00	1.29	100.27	10.03	90.24	31.57	0.20	1.15	32.92	4.82	53.65	36.48	Safe
Total		**641.98**	**46.94**	**0.00**	**17.52**	**706.44**	**40.34**	**666.11**	**228.66**	**1.42**	**8.06**	**238.15**	**42.24**	**393.78**	35.75	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Kheda (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	**Kheda**	4.26	3.34	0.00	3.93	11.53	0.58	10.95	5.79	0.04	0.21	6.04	0.00	5.12	55.16	Safe
2	**Matar**	0.74	6.16	0.00	6.61	13.52	0.68	12.85	2.07	0.08	0.46	2.61	0.00	10.70	20.32	Safe
Total		**5.00**	**9.50**	**0.00**	**10.55**	**25.05**	**1.25**	**23.80**	**7.86**	**0.12**	**0.68**	**8.65**	**0.00**	**15.82**	36.35	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Mahesana (SALINE AREA)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Mahesana	2.65	0.13	0.00	0.07	2.85	0.28	2.56	1.67	0.02	0.09	1.77	0.09	0.79	69.10	Safe
2	Becharaji	41.28	6.12	0.00	9.10	56.50	2.82	53.67	29.59	0.15	0.85	30.59	0.92	23.01	56.99	Safe
3	Jotana	9.18	0.43	0.00	0.25	9.86	0.49	9.37	6.00	0.03	0.15	6.17	0.16	3.19	65.85	Safe
District Total		**43.92**	**6.25**	**0.00**	**9.17**	**59.34**	**3.11**	**56.24**	**31.26**	**0.16**	**0.93**	**32.36**	**1.01**	**23.80**	57.54	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Morbi (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Maliya	128.06	3.28	0.00	0.58	131.92	13.19	118.73	9.59	0.20	1.13	10.92	1.54	107.40	9.20	Safe
2	Morbi	60.73	2.28	0.00	3.82	66.83	3.34	63.49	29.57	0.26	1.45	31.27	6.79	26.87	49.25	Safe
3	Halvad	160.19	1.21	0.00	0.54	161.94	8.10	153.85	13.45	0.21	1.17	14.83	3.20	136.99	9.64	Safe
4	Wakaner	11.85	4.04	0.00	4.72	20.60	1.03	19.57	12.86	0.06	0.31	13.23	4.29	2.37	67.57	Safe
Total		**360.84**	**10.80**	**0.00**	**9.66**	**381.30**	**25.66**	**355.64**	**65.46**	**0.72**	**4.06**	**70.24**	**15.82**	**273.64**	19.75	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Navsari (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Gandevi	15.56	9.70	0.00	20.76	46.02	2.30	43.72	2.32	0.18	1.02	3.52	4.26	36.95	8.05	Safe
2	Jalalpore	67.13	5.28	0.00	9.14	81.55	4.08	77.47	11.55	0.22	1.25	13.02	3.90	61.81	16.80	Safe
Total		**82.69**	**14.98**	**0.00**	**29.89**	**127.57**	**6.38**	**121.19**	**13.87**	**0.40**	**2.27**	**16.54**	**8.16**	**98.76**	13.65	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Patan																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Chansma	63.54	22.68	0.00	6.40	92.62	4.63	87.99	64.02	0.31	1.76	66.09	2.31	21.35	75.11	Semi critical
2	Patan	36.69	22.15	0.00	36.74	95.58	4.78	90.80	76.37	0.33	1.86	78.56	2.44	11.66	86.52	Semi critical
3	Harij	57.08	25.08	0.00	18.14	100.30	5.02	95.29	66.43	0.26	1.46	68.15	1.92	26.68	71.52	Semi critical
4	Sami	122.28	15.79	0.00	18.69	156.75	7.84	148.91	31.60	0.36	2.03	33.99	1.97	114.98	22.82	Safe
5	Radhanpur	84.12	17.62	0.00	19.53	121.27	6.06	115.20	24.29	0.35	2.01	26.65	0.00	90.56	23.14	Safe
6	Santalpur	148.02	17.64	0.00	21.42	187.07	9.35	177.72	20.11	0.31	1.73	22.15	2.27	155.03	12.46	Safe
7	Shankheswa	77.47	12.07	0.00	11.95	101.48	5.07	96.41	19.90	0.17	0.95	21.01	1.24	75.11	21.79	Safe
8	Saraswati	62.83	21.27	0.00	44.50	128.60	6.43	122.17	71.28	0.29	1.62	73.18	2.12	48.49	59.90	Safe
Total		**652.02**	**154.28**	**0.00**	**177.37**	**983.67**	**49.18**	**934.49**	**373.99**	**2.37**	**13.42**	**389.78**	**14.27**	**543.86**	41.71	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Porbandar (Saline Area)																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Kutiyana	10.07	1.83	0.00	0.24	12.14	1.21	10.93	5.33	0.06	0.35	5.75	1.49	4.05	52.58	Safe
2	Ranavav	7.21	2.12	0.00	0.30	9.62	0.96	8.66	5.63	0.04	0.23	5.91	1.98	1.01	68.22	Safe
3	Porbandar	45.61	6.25	0.00	1.02	52.88	5.29	47.59	19.65	0.46	2.61	22.71	3.66	23.83	47.72	Safe
Total		**62.89**	**10.20**	**0.00**	**1.56**	**74.65**	**7.47**	**67.19**	**30.61**	**0.56**	**3.19**	**34.37**	**7.13**	**28.88**	51.16	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Surat (Saline Area)																
Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Chorayasi	5.05	14.95	0.00	20.44	40.43	2.02	38.41	0.06	0.10	0.59	0.75	5.59	32.66	1.95	Safe
2	Olpad	5.89	29.35	0.00	44.35	79.59	3.98	75.61	0.74	0.22	1.25	2.21	4.80	69.85	2.93	Safe
Total		**10.94**	**44.30**	**0.00**	**64.78**	**120.02**	**6.00**	**114.02**	**0.80**	**0.32**	**1.84**	**2.96**	**10.39**	**102.51**	2.60	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)

District : Surendranagar (Saline Area)

Sr. No.	Taluka	GROUND WATER RECHARGE (Ham)					Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)	Annual Extractable Ground Water Recharge (Ham) (7- 8)	CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)				Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)	Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}	Stage of Ground Water Extraction (%) (13/9) * 100	Category
		Monsoon		Non Monsoon		Total Annual Ground Water Recharge (3+4+5+6)			Irrigation Use	Industrial uses	Domestic Use	Total (10 + 11 + 12)				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Thangadh	12.02	0.85	0.00	0.74	13.62	0.68	12.93	5.93	0.09	0.49	6.50	1.39	5.53	50.26	Safe
2	Chuda	43.52	0.90	0.00	0.39	44.80	2.24	42.56	9.73	0.16	0.90	10.79	1.84	30.83	25.34	Safe
3	Dasada	169.37	1.40	0.00	0.70	171.47	8.57	162.90	16.74	0.04	0.25	17.04	3.39	142.72	10.46	Safe
4	Dhrangadhra	30.87	1.52	0.00	0.66	33.06	1.65	31.41	16.56	0.08	0.46	17.10	4.09	10.68	54.44	Safe
5	Lakhtar	72.90	3.11	0.00	2.84	78.85	3.94	74.91	0.38	0.19	1.06	1.63	1.42	72.93	2.17	Safe
6	Limbdi	41.17	0.99	0.00	0.19	42.34	2.12	40.23	4.57	0.09	0.49	5.15	3.29	32.28	12.80	Safe
7	Wadhwan	30.35	2.31	0.00	0.76	33.42	1.67	31.75	19.03	0.36	2.02	21.41	6.73	5.63	67.42	Safe
8	Muli	32.84	1.83	0.00	0.53	35.20	1.76	33.44	13.21	0.09	0.48	13.77	2.14	18.01	41.19	Safe
Total		**400.21**	**11.07**	**0.00**	**6.28**	**417.56**	**20.88**	**396.69**	**72.93**	**1.00**	**5.67**	**79.61**	**22.15**	**300.60**	20.07	Safe

Taluka Wise Ground Water Resources, Availability, Utilization and Stage of Ground Water Development (2017)																
District : Valsad (Saline Area)																
Sr. No.	**Taluka**	**GROUND WATER RECHARGE (Ham)**					**Total Natural Discharge (Ham) (5 % of 7 WTF & 10 % RIF)**	**Annual Extractable Ground Water Recharge (Ham) (7- 8)**	**CURRENT ANNUAL GROUND WATER EXTRACTION (Ham)**				**Annual Ground Water Allocation for Domestic uses upto 2025 (Ham)**	**Net Ground Water Availability for future use (Ham) {(9)-(10+11+14)}**	**Stage of Ground Water Extraction (%) (13/9) * 100**	**Category**
		Monsoon		**Non Monsoon**		**Total Annual Ground Water Recharge (3+4+5+6)**			**Irrigation Use**	**Industrial uses**	**Domestic Use**	**Total (10 + 11 + 12)**				
		Recharge from rainfall	**Recharge from other sources**	**Recharge from rainfall**	**Recharge from other sources**											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Valsad	21.41	3.58	0.00	1.10	26.09	1.30	24.78	4.54	0.16	0.89	5.58	0.00	20.08	22.53	Safe
Total		**21.41**	**3.58**	**0.00**	**1.10**	**26.09**	**1.30**	**24.78**	**4.54**	**0.16**	**0.89**	**5.58**	**0.00**	**20.08**	22.53	Safe