

Technical Report Series: D

No: 28/2013-14



Ground Water Information Booklet

Imphal West District, Manipur



Central Ground Water Board
North Eastern Region
Ministry of Water Resources
Guwahati
September 2013

GROUND WATER INFORMATION BOOKLET
IMPHAL WEST DISTRICT, MANIPUR

DISTRICT AT A GLANCE

Sl. No	Items	Statistics
1.	General information i) Geographical area (sq. km.) ii) Administrative Divisions as on 31 March 2013 Number of Tehsils/CD Blocks Number of Panchayat/Village iii) Population as per 2011 census iv) Average annual rainfall in mm	558 3 2 1/117 5,14,683 1632.40
2.	Geomorphology i) Major physiographic units ii) Major drainages	i) Imphal west plain, marshy land and low to high altitude structural hills. ii) Imphal, Nambul Rivers and its tributaries.
3.	Land use in sq. km. i) Forest area ii) Net area sown iii) Cultivable area	57.00 Undivided Imphal District : 834.01 Undivided Imphal District : 861.91
4.	Major soil types	Alluvial soil
5.	Area under principal crops in sq. km as on March 2011	Data not available
6.	Irrigation by different sources a) surface water b) ground water	Data not available
7.	Numbers of monitoring wells of CGWB as on 31.03.13	3 National Hydrograph Stations of CGWB in Imphal West that are regularly monitored prior to 1991. No monitoring work is carried out since 1991 due to disturbed law and order situation in the state.
8.	Predominant geological formations	Quaternary formation followed by Tertiary deposits.
9.	Hydrogeology i) Major water bearing formations ii) Pre-monsoon water level iii) Post monsoon water level iv) Long term water level trend in 10 years in m/year	i) Intermontane alluvial formation of river borne deposit along the rivers followed by Tertiary formation (structurally weak zones).
.	Ground water exploration by CGWB as on 31.03.2013 i) No of wells drilled	No new exploration work in the district Existing EWs : 3 EWs (CGWB)

	ii) Depth range in meters iii) Discharge in lps iv) Transmissivity(m ² /day)	91.50 to 173.66 1.66 17.86
11.	Ground water quality i) Presence of chemical constituents more than permissible limit (i.e. EC, F, Fe, As)	Ground water is fresh and potable.
12.	Dynamic ground water resources in mcm (as on March 2009) i) Annual replenish able ground water resources ii) Gross annual ground water draft iii) Projected demand for domestic and industrial use up to 2025 iv) Stage of ground water development	86.55 1.35 12.75 2.00%
13.	Awareness and training activity Mass awareness programmes organized	Nil
14.	Efforts of artificial recharge and rainwater harvesting i) Projects completed by CGWB(no and amount spent) ii) Projects under technical guidance of CGWB(numbers)	Not applicable. No such project taken up. -do-
15.	Ground water control and regulation i) Numbers of OE blocks iii) Numbers of critical blocks iv) Numbers of blocks notified	Nil Nil Nil
16.	Major ground water problems and issues	As the district is underlain by approximately 30 to 50 m of clayey formation, construction of shallow tube wells is problematic. The construction of deep tube wells in the Disang formation covering extreme parts and parts of central Imphal may create problem but in the rest of the areas, construction will not be a problem due to existence of alluvial formation followed by Tertiary group of rock.

GROUND WATER INFORMATION BOOKLET IMPHAL WEST, MANIPUR

1.0 INTRODUCTION

Imphal West district of Manipur bifurcated from old Imphal district forms a part of the small intermontane valleys of Manipur state and covers an area of 558 sq. km within the North Latitudes $24^{\circ} 30'$ & $25^{\circ} 00'$ and East Longitudes $93^{\circ} 45'$ & $94^{\circ} 15'$. The district is bounded on the north by the Senapati district, on the south by Thoubal and Bishnupur districts, on the east by Imphal East and in the west by Senapati and Bishnupur districts. The district with its headquarters at Imphal city has 3 subdivisions, 2 development blocks, 10 towns and 117 villages.

As per 2011 census, the total population of the district is 5, 14,683, out of which 2, 53,628 are male and 2, 61,005 are female population.

The district is having two National Highways, namely NH-39 (Indo-Burma/Myanmar Road) and NH-53 (New Cachar Road). Air-ways and other road communication are also connecting other parts of the state.

2.0 CLIMATE AND RAINFALL

The district enjoys sub-tropical humid climate. Average annual rainfall in the district is 1632.4 mm. About 60 to 65 % of the annual precipitation is received during south-west monsoon from June to September. Annual average temperature of the district is recorded to be 20.4° C and the temperature ranges from 0° C to 36° C. The relative humidity is high.

3.0 GEOMORPHOLOGY AND DRAINAGE

3.1 Geomorphology

Physiographically, the district shows three prominent units i.e. a tiny plain topography, hilly areas in the extreme north, central parts and marshy land in the southern parts of the district. The general elevation of the elevated area is around 790 m above mean sea level.

3.2 Drainage

The rivers Imphal, Nambul, Thoubal and their tributaries mainly drain the district. The Nambul River is made up of number of small streams on its upper course and flows through the Imphal town dividing the town almost into two equal halves. The course of the rivers is short and falls in the Loktak Lake.

4.0 LAND USE AND SOIL TYPE

The valley area of the Imphal West district is found to be very fertile and is mainly underlain by alluvial soil of Recent origin. This valley was once full of swamps and marshy land represented by the places having the word PAT meaning lake, like Lamphelphet, Takyelpat, Sangaipat, Kakwapat and Poiroupat.

5.0 GROUND WATER SCENARIO

5.1 Hydrogeology

Geologically the district is underlain by Quaternary formation comprising Recent alluvium followed by Tertiary group of rocks represented by Disang formation. Quaternary formation comprising younger and older alluvial deposits consisting sand of different grades, pebbles, cobbles, gravel, clay dominate the area. Major parts of the district is underlain by the Recent formation followed by Tertiary formation, while the Tertiary formation alone restricts to the denudation hill ranges comprising hard and compact sandstone, shale and limestone.

Sub-surface geology as evidenced from available data infers that the potential aquifer pertaining to Quaternary formation exists down to explored depth of 50 to 100 m followed by Tertiary deposits. The cumulative thickness of aquifer zones has the tendency to increase towards north and in the south-eastern part, the thickness reverses considerably.

Hydrogeologically the district is proved to be moderately potential where ground water occurs under water table to confined conditions. Depth to water level in major parts of the district varies from 2 to 5 m bgl. In the extreme southern and south-western parts close to hills, the water level is found to be deeper and generally rests within 5 to 7 m. The movement of ground water is from south to north. The water level shows that there is gradual rising of water level in the district (Plate II).

Central Ground Water Board has so far constructed three exploratory tube wells in the district. The details of the deep tube wells are presented in Table 1.

Table-1 Details of the Deep Tube Wells constructed in Imphal West district

Sl no	Location	Depth drilled/ constructed	Aquifer Thickness tapped	SWL	Discharge in m ³ /hr	T m ² /day	Geology	Remarks
1.	Lamsang	127.27	-	-	-	-	Alluvium followed by Tertiary	Abandoned due to poor discharge
2.	Lamphelpat	173.66 /81.00	15	-	6	-	-do-	-do-
3.	Sangaipur	91.50 /50.00	11	0.50 agl	-	17.86	-	-

National Hydrograph Stations of CGWB in the district have monitored regularly prior to 1991. **No monitoring work is carried out since 1991 due to disturbed law and order situation in the state.**

6.0 GROUND WATER RESOURCES

Computation of Dynamic Ground Water Resources of Imphal West district has been carried out in the district as per GEC '97 as on March 2009. **The Administrative district has been considered as the Assessment Unit due to paucity of block –wise data.**

The district possesses moderate potentiality for ground water development. Computation of Dynamic Ground Water Resources has been carried out in the district as per GEC '97 as on March 2009. Annual Replenishable Ground Water Resources is 86.55 mcm. Net Annual Ground Water Draft is 1.35 mcm.

Projected Demand for Domestic and Industrial Use up to 2025 is 12.75 mcm. Stage of Ground Water Development estimated is 2.0% which is under the 'Safe' category.

7.0 GROUND WATER QUALITY

Chemical quality of ground water samples collected from Exploratory Wells reveals that by and large the ground water is suitable for domestic, irrigation and industrial purposes.

8.0 STATUS OF GROUND WATER DEVELOPMENT

The district in general is proved to be moderately potential from ground water point of view by the studies carried out by CGWB. Exploratory wells constructed down to 174 m bgl shows presence of one to two aquifer systems in the area. No major, medium and small irrigation schemes are implemented so far in the district for irrigational purposes.

9.0 GROUND WATER MANAGEMENT STRATEGY

The district has suitable geological formation having one to two aquifer systems down to explored depth of 176 m where deep tube wells in the loose formation and bore wells in the hard massive can be constructed by way of deploying suitable rigs.

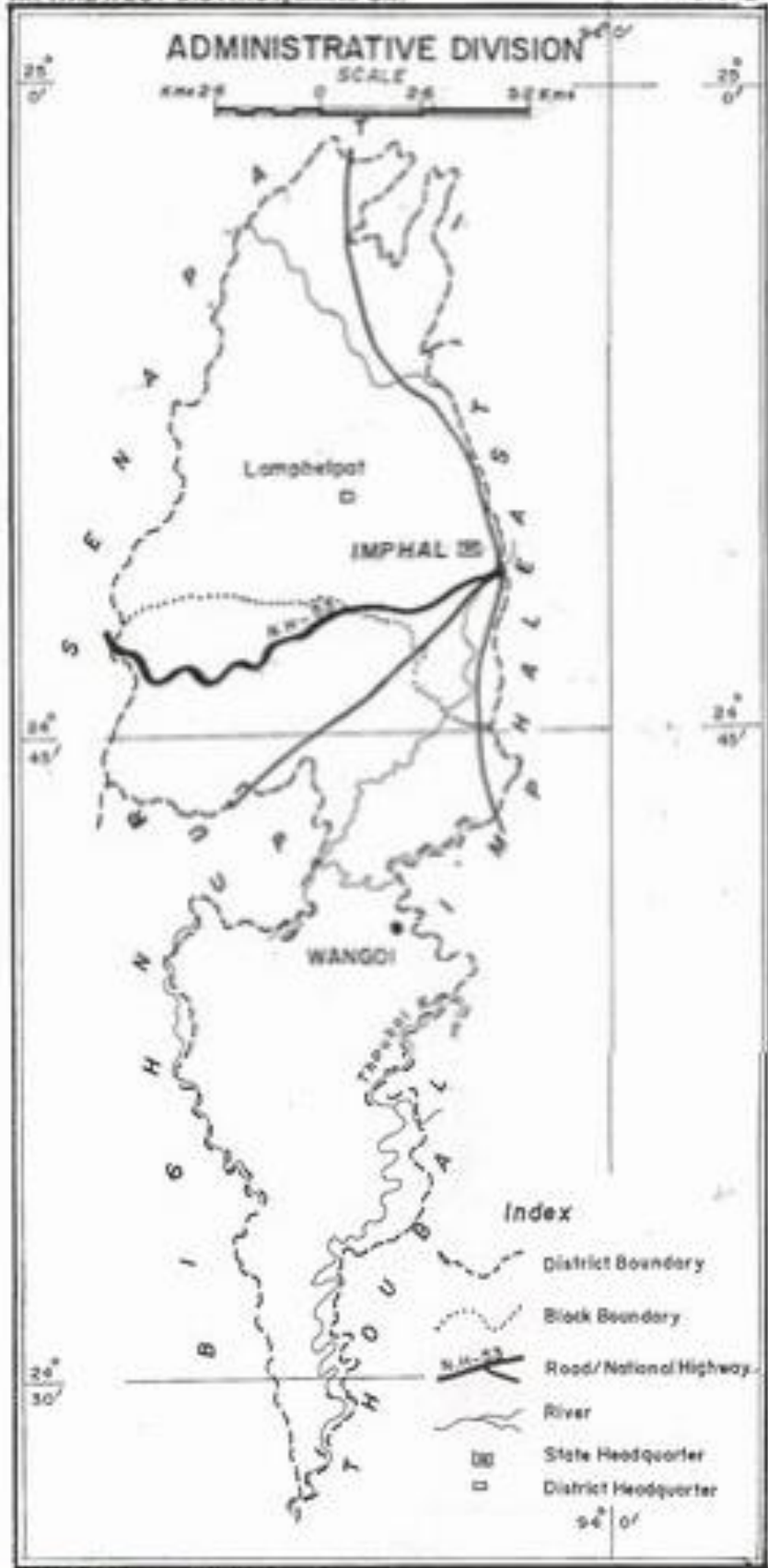
The yield of deep tube wells varies from place to place depending on availability of potential aquifers.

10.0 GROUND WATER RELATED ISSUES AND PROBLEMS

Ground water related problems in the district has so far been identified as emanation of gas while constructing deep tube wells in some places and existence of clayey deposit down to depth range of 30 to 65 m bgl which invites problem for construction of shallow tube wells. As such utmost care has to be taken during construction of deep tube wells so that any untoward incident can be averted. The development of ground water is less 2.64 % as on March 2011. As such, development of ground water by way of constructing deep tube wells for irrigation and as well as drinking water by the state Organization is need of the hour. Iron concentration above permissible limit poses problem, which can be lowered by filtration and as well as aeration method.

11.0 RECOMMENDATIONS

The district possesses moderate ground water potential to the tune of 86.55 mcm and net resource of 77.89 mcm. This moderate resource can be developed for irrigation and other purposes. The draft created by existing tube-wells has been computed to be 1.35 mcm and development is found to be 2.00 %, as such scope exists for development of ground water in the district. Based on the irrigation water requirement, additional medium duty tube well to the tune of 3527 may be constructed, which will be able to generate irrigation potential of 8792 ha. The conjunctive use of surface and ground water may be done for better ecological conditions of the district. As the district is blessed with good amount of rainfall, rain water harvesting structures may also be constructed for storing and artificial recharge of ground water.



HYDROGEOLOGY OF IMPHAL WEST DISTRICT (MANIPUR)

LEGEND

AGE	FORMATION	LITHOLOGY
Unconsolidated	QUATERNARY RECENT ALLUVIUM	Sand, gravel, pebbles, silt and clay.
	DISANG	Hard and compact sandstone, shale and limestone.
Semi-Consolidated	EOCENE	

HYDROGEOLOGICAL CONDITION

Moderately thick unconfined to semi-confined multi-layered aquifer system within the depth of 100 m.



GROUND WATER PROSPECTS

Moderate yield prospects of 10-30 m³/hr. at 10-15 m. drawdown.

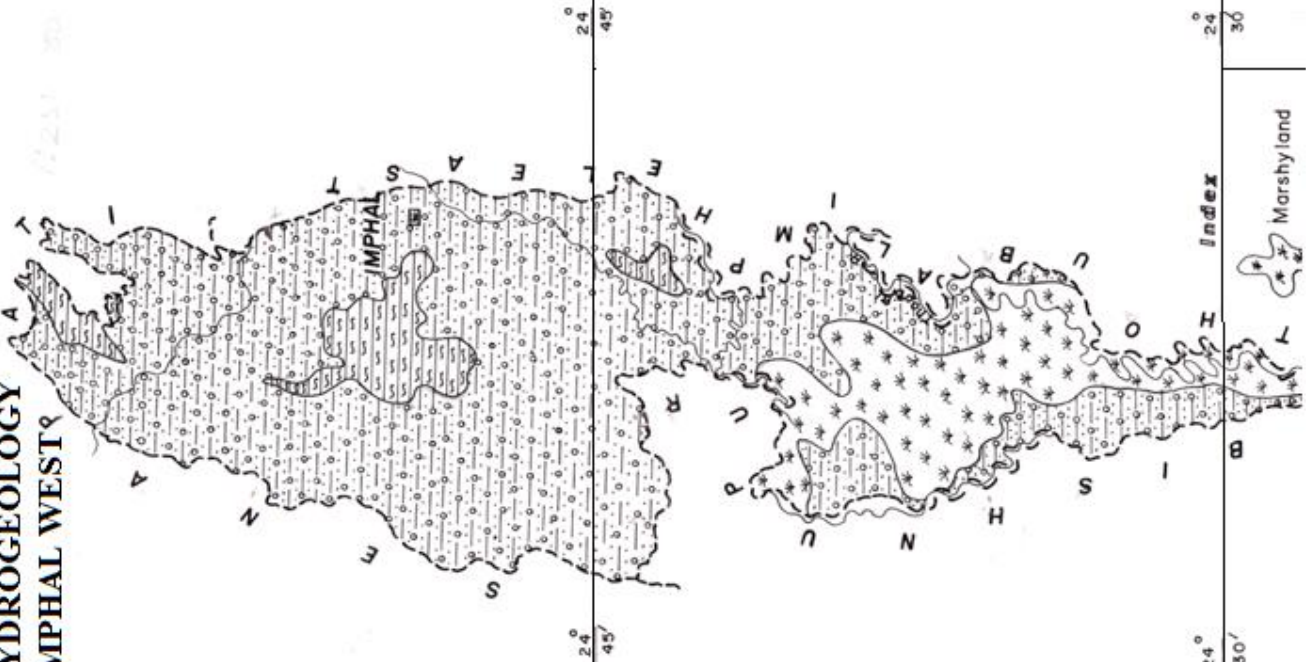
Ground water restricted to secondary porosity in weathered residuum, joints, fractures, fissures etc.



25° 0' 94° 0' 25° 0'

Kms 2-6 SCALE 0 2.6 5.2 Kms

HYDROGEOLOGY IMPHAL WEST



24° 30' 24° 45' 24° 30'

Index Marshy land



IMPHAL WEST DISTRICT, MANIPUR

Legend

AGE	FORMATION	LITHOLOGY	HYDROGEOLOGICAL CONDITION	GROUND WATER PROSPECTS
Quaternary	RECENT ALLUVIUM	Sand, gravel, pebbles, silt and clay.	Moderately thick unconfined to semi-confined multi-layered aquifer system within the depth of 100m.	Moderately yield prospects of 10-30 cu ft/hr. at 10-15 m.
Tertiary	EOCENE			
	DISANG	Hard and compact sandstone, shale and limestone.	Ground water restricted to secondary porosity in weathered residuum, joints, fractures, fissures etc.	Mostly run-off zone. Low yield prospects restricted to intermontane valleys and weaker zone.