Technical Information Management Standard

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Project for Improvement of Comprehensive Management Capacity of Department of Public Health Engineering on Water Supply (PICMaC-DPHE)

Department of Public Health and Engineering (DPHE)

Japan International Cooperation Agency (JICA)

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1. Introduction

1.1 Background

The Government of Bangladesh is addressing the improvement of water coverage from mid and long term viewpoints through implementation of an Action Plans prepared based on the Sector Development Plan for Water Supply and Sanitation Sector (FY 2011-2025) (hereafter referred to as SDP). Moreover, the Government is setting forward decentralization according to the Outline Perspective Plan and National Strategy for Accelerated Poverty II. However, there are various challenges on both national and DPHE levels. The major challenge at the national level is the decrease of available water resources due to the increase of water demand and difficulty in allocation of water resources, while the challenge of DPHE is the various technical difficulty factors of the water source due to the difference of the natural conditions.

Department of Public Health Engineering (DPHE), however, as the lead agency for water supply and sanitation, the role of the department has been constantly evolving to meet the growing demands of rural and urban water supply in Bangladesh. In such circumstance, the importance of the management of information related water supply has been rapidly increasing. As DPHE is responsible for operation and management of water supply database as mentioned in SDP, improvement of information management is one of the important element for better water supply services. Currently, many different databases regarding the water supply have been prepared in DPHE. Moreover, current organization of information management is that different pieces of information such as water supply facility, water quality, geological condition and etc. have been just controlled by isolated work or project in the different department of DPHE.

Under such situation, DPHE therefore, formulated of Technical Information Management Standard in order to create DPHE-wide consensus on the long-term direction, strategy or approach towards data and information management. The Standard was provided by the DPHE under Project for Improvement of Comprehensive Management Capacity of DPHE on Water Supply (PICMaC-DPHE), assisted by the technical cooperation of the Government of Japan.

1.2 Purpose of Preparation of Technical Information Management Standard

The Technical Information Management Standard is provided in order to ensure that data can be effectively used and that databases are managed properly. More specifically, the purposes for Preparation of Technical Information Management Standard are as follows;

- To establish standard parameters, definitions, and units to be used in all DPHE database
- To ensure or check each database system:
- To allow for an internal check to determine the gap between the standard and what occurs in practice

1.3 Existing Databases in DPHE

Currently following 7 databases are operated by DPHE. Main data covered and managing organization of the database are summarized as follow.

No.	Name	Data Items	Year of Establishment	Management Organization	Supported Organization
1	**WPM** (Water Point Mapping)	Information of Water Point (Location, Contractor, Caretaker, Facilities, Water Pump, Platform, Groundwater Level, Water quality, etc.)	2018	DPHE (MIS)	UNICEF
2	**HAWQ** (Hardware and Water Quality)	Water Quality (Arsenic, Iron, Manganese), Depth and Functionality of well)	2013	DPHE (MIS Unit)	UNICEF
3	**WQIMS** (Water Quality Information Management System)	Water Quality	2012	DPHE (Central Laboratory)	JICA
4	**National MIS** (Management Information System)	Water Supply and Sanitation Facilities, Water Quality, Groundwater Level and Functionality of well	2012	DPHE (MIS Unit)	PSU, DANIDA
5	**Functionality Data**	Functionality of Water Point	2010	DPHE (Program and Coordination Division)	-
6	**Aquifer Database**	Geology	2006	DPHE (Groundwater Circle and MIS Unit)	PSU, JICA
7	**NAMIC** (National Arsenic Mitigation Information Center)	Water Quality (Arsenic)	2004	DPHE	World Bank

Considering the contents of the Databases and conditions of the operation, following characteristics were pointed out;

- Very large amounts of data were stored in the databases in DPHE.
- Some new databases use state of arts data device for data entry and it was confirmed that efforts to improve efficiency and accuracy in the data collection system.
- Maintenance and operation of databases are not performed sufficiently due to

problems of securing running cost.

- Almost all databases were built independently and it is difficult or impossible to use the data belong to same water point in different database.
- Mistakes in units, obviously incorrect data, spelling mistakes, and imputing number into text field, or vice versa, were found.

This Technical Information Management Standard was established after detailed investigating of the review result.

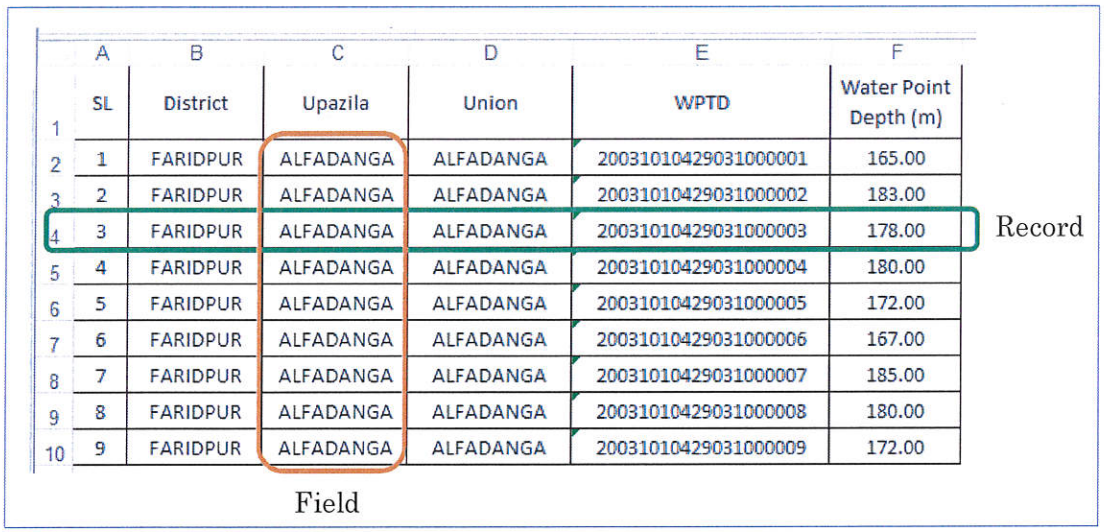
2. Implementation and Use of Technical Information Management Standard

This Technical Information Management Standard is implemented by the Planning Unit. MIS Unit maintains and helps implement the standard in DPHE.

This Technical Information Management Standard applies to all database built in future in DPHE. Present databases exempt from the standard. It is because it requires a great deal of change when applied and it is impossible or not realistic. However, changing the parts that can be changed in the present database contributes to utilize and ensure the present database.

3. Standard Parameter Definitions, Formats and Units

At first the basic terms of database, "record" and "field" are explained. A database table is composed of records and fields as shown in Figure 3.1. Tables are also called datasheets. Each datasheet in a database holds data about a different, but related, subject. Field is the basic element of the data. Field contains a single value, for example district, Upazila, Union, WPID or water point depth in the example shown in Figure3.1. A record is composed of fields and contains all the data about one particular water point.



	A	B	C	D	E	F
1	SL	District	Upazila	Union	WPTD	Water Point Depth (m)
2	1	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000001	165.00
3	2	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000002	183.00
4	3	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000003	178.00
5	4	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000004	180.00
6	5	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000005	172.00
7	6	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000006	167.00
8	7	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000007	185.00
9	8	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000008	180.00
10	9	FARIDPUR	ALFADANGA	ALFADANGA	20031010429031000009	172.00

Figure 3.1 Data Record and Field in Data Sheet

The data fields such as identification of data (ID), time, and location are indispensable in the data records of DPHE database. Other data such as water point facilities, groundwater depth, water quality, and etc. shown in Table 3.4 to 3.9 are not necessarily included in data records. However, if the data are included in the data record, the unit and format of the data must be followed the rules shown in Table 3.4 to 3.9.

3.1 Indispensable data fields in DPHE databases

3.1.1 ID of Water Point

All data originated from water sources must have an identification data (ID) of water source that can distinguish its water source from other sources. Each water source must have ID and the ID must be included in the record of database. The ID can link between the records of the same water source in different database and the data of same water source in different database cannot be used without the link provided by the ID.

Water Point Identification System (WPIS) is used in Water Point Mapping Database (WPM) in DPHE. WPM is a database containing information on water and facilities at the time of water point construction. It is established 2018 and the water point data are currently being registered in WPM. Therefore, WPIS is recommended to be used as an ID of water source. WPIS is 22 digits ID generated from Geo code. Bangladesh Bureau of Statistics changed two digits to three digits for Geo codes of Union and Village in January 2018 and WPIS was also changed accordingly. The field name and definition of WPIS is shown in Table 3.1. Once WPIS is given, it must not be changed. Even though the LGI (local government) which WP locates or the name of the local government changes. WPIS must not be changed.

Apart from water points, observation wells are operated in DPHE and the installation of more

observation wells is planned. Drilling of observation wells is proceeding from the viewpoint of water resource management. WPIS is also applied to the ID of the observation wells and the water point type (WW) code for observation well must be created.

Table 3.1 Definition and format of ID of Water Point

field name	Definition and format
ID for Water Point	Present Water Point Identification System (WPIS): is used 22 digits ID generated from Geo code. It is expressed 22 digit integer of "YYYYROOWWZZTTUUUVVVNNN" generated from GEO-Code and each component is as follows; YYYY: year of installation of water point R: code for land use OO: ownership code of water point WW: code for water point type ZZ: code for District TT: code for Upazila UUU: code for Union VVV: code for Village NNN: serial number for water point in same Upazila in the year of YYYY

3.1.2 Date

The data of water sources are strongly related to time. Time is indispensable data field to show the contents of the record, such as well drilling, water level measurement, sampling for water quality analysis, etc. Hour and minutes are necessary for rapid change like pumping test. However, date is sufficient term of time because the accuracy of hour or minutes is not required except pumping test. The format of Table 3.2 is excellent to display the date without fail. Microsoft Excel is often used for analyzing data. DD/MM/YYYY is commonly used in Bangladesh. DD/MM/YYYY can be misjudged as MM/DD/YYYY by Microsoft Excel and it is not applicable as a database field. Even if the format is decided, the format is specified only in the database. If date is entered separately as DD, MM, YYYY or YYYY, MM, DD in the database and/or data is processed using a function, date can be saved in proper data fields. The most commonly used DD/MM/YYYY can be used for the description of measurement on site with a little ingenuity in database and careful data entry.

Table 3.2 Field name and format of date

field name		format
Date	Year	text (YYYY)
	Month	text (MM)
	Day	text (DD)

3.1.3 Location

As the data field showing location, the field name shown in Table 3.3 can be considered. If WPIS is used as ID, the codes of WPIS can show the District, Upazila, Union, Village but it is necessary to write the location when data is taken on site. The Spelling is used in many ways, but the one specified by Bangladesh Bureau of Statistics (BBS) must be used to avoid confusion. If possible, please do not write down the name but choose a name from the dropdown list.

If there is a landmark such as "ABC school", it is easy to distinguish the water point from other water points in the same village, especially while visiting the site.

Latitude and longitude are indispensable for information fixed in location. Other coordinate systems are also conceivable, but latitude and longitude are most frequently used, so latitude and longitude under the datum of WGS84 is adopted. WGS 84 is most common datum for GPS. Confusion of the unit of latitude and longitude is common. Unit of degree and minutes is complicated as database fields. It must be stored in degree unit with 5 decimals to secure the accuracy of 1 m and to distinguish a water point from other water points. "m" is used as the unit of length. In Bangladesh, "feet" is more commonly used than "m". However, since the frequency of use of "m" is increasing, it is considered that m will be more common in the future, so "m" has been decided to use as the unit of length.

It is difficult to measure latitude, longitude and elevation without using GPS and it is difficult to measure because the usable GPS is limited at present. However, since it is possible to acquire these in future measurement, the data fields of latitude, longitude and elevation are provided in the BD, and the data is input when observation is possible.

Table 3.3 Field name, unit or format of location term

field name		unit, format
Location	District	text. The spelling of the authorized name specified by MIS must be used. The use of drop-down lists of the authorized name is preferable.
	Upazila	
	Union	
	Village	
	Mauza	

field name		unit, format
	Landmark	text
	Latitude	Degree with 6 decimals in WGS84 datum
	Longitude	Degree with 6 decimals in WGS84 datum
	Elevation	m

3.2 Database by category

For the parameters that are likely to be used for DB in DPHE, the formats and units were determined and are shown in Table 3.4 – 3.9 for each category. The parameters shown in the tables and not shown in the tables can be parameters in DB in DPHE. The units and formats shown in the tables must be used for the parameters shown in the tables.

3.2.1 Project

The fields related to project are shown in Table 3.4.

Table 3.4 Field name and format of project information

field name		format
Project Information	Project Name	text
	Consultant	text
	Contractor	text
	Commencement Date of Project	text (YYYY)
		text (MM)
		text (DD)
	Completion Date of Project	text (YYYY)
		text (MM)
		text (DD)

3.2.2 Water point information

Water point information is obtained after or during the construction of water point. The fields related to water points are shown in Table 3.5 and almost same as the fields of WPM. However, fields falling into other categories were excluded in order to avoid duplication.

Table 3.5 Field name, format and unit of water point information

Field name			Unit, Format
Water Point	Date of Installation		text (YYYY)
			text (MM)
			text (DD)
	Water Point Type		text
	Ownership		text
	Landuse		text
	Project	Project Code	code
		Project Name	text
	Contractor	Work Order No	text
		Work Order Date	text (YYYY)
			text (MM)
			text (DD)
		Date of Completion	text (YYYY)
			text (MM)
			text (DD)
		Name of Contractor	text
		Name of Sub-Assistant Engineer	text
		Material Supplied By	text
	Care Taker	CareTaker Male	text
		Male CT Father's/Spouse	text
		Village	text
	Facilities	Water Point Source	text (like pond, groundwater etc.)
		Water Point Depth	m
		Water Point Treatment Unit	text
		Water Point Filtering Unit	text
		Water Point Number of Outlet (for pipe water system)	integer
		Water Point Pipe Length (for pipe water system)	m
		Water Point Diameter (for pipe water system)	m
	Water Pump	Water Pump Platform	text (present/absent)

Field name			Unit, Format
		Water Pump Status	text (functional/not functional)
	Platform	Platform Diameter (if circle)	m
		Platform Length	m
		Platform Width	m
	Water Table Depth (from ground)		m
	Pond Sand Filter	Depth of Pond	m
	Households	Total Households Served	integer
		Hardcore Poor Household	integer
		Poor Household	integer
		Population Served	integer

3.2.3 Well information

Well information is obtained at the construction or rehabilitation of well. The fields related to well are shown in Table 3.6.

Lithology of well is very important information to clarify aquifer structure but cannot be stored in a data field of database. It is recommended to organize the lithological data in a table format and send it to the Groundwater Circle to be kept in the proper place for future data use.

Table 3.6 Field name, unit and format of well information

field name			unit, format
Well Information	Functional or Non-functional		text (functional / not functional)
	Reason for Negative		text
	Functional or Non-functional Water Quality		text (functional / not functional)
	Remarks		text
	New Construction / Rehabilitation		text (new construction / rehabilitation)
	Well Depth		m
	Drilling	Drilling Date	text (YYYY)
			text (MM)

field name				unit, format
				text (DD)
		Bit Type		text
		Drilling Diameter		(inch)" (text +", like 6 1/2")
		Drilling Liquid		text
		Drilling Depth		m
		Drilling Rate		text (present / absent)
		Water Strike Depth or Mud Water Lost Depth		m
		Water Yield by Air Lifting		m^3/h
		Acceptable Yield or not		text (pass / fail)
	Casing	Installation		text (installed / not installed)
		Material		text
		Diameter Size		(inch)" (text +", like 6 1/2")
	Screen	Top Screen	Top	m
			Bottom	m
		2nd Screen	Top	m
			Bottom	m
		3rd Screen	Top	m
			Bottom	m
		4th Screen	Top	m
			Bottom	m
		5th Screen	Top	m
			Bottom	m
		6th Screen	Top	m
			Bottom	m
		7th Screen	Top	m
			Bottom	m
		Total Screen Length		m

field name			unit, format
	Geological Column		text (present / absent)
	Logging	Logging data	text (present / absent)
		Item 1	text (name)
		Item 2	text (name)
		Item 3	text (name)
		Item 4	text (name)
	Static Water Level (from ground)		m

3.2.4 Pumping test

The fields related to pumping test are shown in Table 3.7. The result of the pumping test can be stored in data fields of database. The chronological data of pumping test also important to investigate the water supply capacity of the well but it cannot be stored in a data field of database. It is recommended to organize the pumping test data in a table format and send it to the Groundwater Circle to be kept in the proper place for future use.

Table 3.7 Field name and format of pumping test

field name				unit, format
Pumping Test	Test Starting Date			text (YYYY)
				text (MM)
				text (DD)
	Step Draw Down Test	Static Water Level (from ground)		m
		1st Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm
			Pumping Water Level	m
		2nd Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm
			Pumping Water Level	m
		3rd Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm
			Pumping Water Level	m
		4th Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm

field name				unit, format
			Pumping Water Level	m
		5th Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm
			Pumping Water Level	m
		6th Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm
			Pumping Water Level	m
		7th Step	Discharging Rate	m^3/hr
			Pumping Time	hh:mm
			Pumping Water Level	m
	Constant Rate Test	Static Water Level (from ground)		m
		Discharge Rate		m^3/hr
		Pumping Time		hh:mm
		Pumping Water Level after Pumping (from ground)		m
		Draw Down Level		m
		Specific Capacity		$m^3/day/m$
	Recovery Test	Measured Time		hh:mm
		Recovered Water Level (from ground)		m
	Pumping Test Analysis	Transmissivity		m^2/sec
		Permeability		cm/sec
		Transmissivity		m^2/sec
		Permeability		cm/sec
	Analyzed Data			present/ absent

3.2.5 Water quality

As a representation of water quality, a combination of numbers and text, such as "trace" or "< 0.02", or text is commonly used. The fields for both text and value are provided to express them. The fields related to water quality are shown in Table 3.8.

Table 3.8 Field name, unit and format of water quality

field name			text or value	unit
Water Quality	Sampling Date			text (YYYY)
				text (MM)
				text (DD)
	Analyzing Date			text (YYYY)
				text (MM)
				text (DD)
	Analyzing Laboratory			text
	Sampler (DPHE/requested person)			text
	pH		Value	
	Color		Sign	text (< or trace etc.)
			Value	TCU
	Temperature		Value	degree celsius
	Taste		Text	text
	Odor		Text	text
	Turbidity		Sign	text (< or trace etc.)
			Value	UNT
	Conductivity		Value	μ S/cm (micro siemens/cm)
	Salinity		Sign	text (< or trace etc.)
			Value	%
	Alkalinity		Sign	text (< or trace etc.)
			Value	mg/L
	BOD		Sign	text (< or trace etc.)
			Value	mg/L
	COD		Sign	text (< or trace etc.)
			Value	mg/L
	Dissolved Oxygen	DO	Sign	text (< or trace etc.)
			Value	mg/L
	Total Hardness	TH	Sign	text (< or trace etc.)
			Value	mg/L
	Oxidation-reduction Potential	ORP	Value	mV
	Total Dissolved	TDS	Sign	text (< or trace etc.)

field name			text or value	unit
	Solid		Value	mg/L
	Total Suspended Solid	TSS	Sign	text (< or trace etc.)
			Value	mg/L
	Faecal Coliform		Sign	text (< or trace etc.)
			Value	CFU/100ml
	E-Coliform		Sign	text (< or trace etc.)
			Value	CFU/100ml
	Total Coliform		Sign	text (< or trace etc.)
			Value	MPN/100ml
	Aluminum	Al	Sign	text (< or trace etc.)
			Value	mg/L
	Ammonium	NH3	Sign	text (< or trace etc.)
			Value	mg/L
	Arsenic	As	Sign	text (< or trace etc.)
			Value	ppb
	Barium	Ba	Sign	text (< or trace etc.)
			Value	mg/L
	Boron	B	Sign	text (< or trace etc.)
			Value	mg/L
	Cadmium	Cd	Sign	text (< or trace etc.)
			Value	mg/L
	Calcium	Ca	Sign	text (< or trace etc.)
			Value	mg/L
	Chloride	Cl-	Sign	text (< or trace etc.)
			Value	mg/L
	Chlorine	Cl	Sign	text (< or trace etc.)
			Value	mg/L
	Chromium	Cr	Sign	text (< or trace etc.)
			Value	mg/L
	Copper	Cu	Sign	text (< or trace etc.)
			Value	mg/L
	Fluoride	F	Sign	text (< or trace etc.)
			Value	mg/L
	Iodine	I	Sign	text (< or trace etc.)

field name			text or value	unit
			Value	mg/L
	Iron	Fe	Sign	text (< or trace etc.)
			Value	mg/L
	Lead	Pb	Sign	text (< or trace etc.)
			Value	mg/L
	Magnesium	Mg	Sign	text (< or trace etc.)
			Value	mg/L
	Manganese	Mn	Sign	text (< or trace etc.)
			Value	mg/L
	Mercury	Hg	Sign	text (< or trace etc.)
			Value	mg/L
	Nickel	Ni	Sign	text (< or trace etc.)
			Value	mg/L
	Nitrate	NO3	Sign	text (< or trace etc.)
			Value	mg/L
	Nitrite	NO2	Sign	text (< or trace etc.)
			Value	mg/L
	Phosphorus	P	Sign	text (< or trace etc.)
			Value	mg/L
	Potassium	K	Sign	text (< or trace etc.)
			Value	mg/L
	Selenium	Se	Sign	text (< or trace etc.)
			Value	mg/L
	Sodium	Na	Sign	text (< or trace etc.)
			Value	mg/L
	Sulfate	SO42-	Sign	text (< or trace etc.)
			Value	mg/L
	Sulfide	S2-	Sign	text (< or trace etc.)
			Value	mg/L
	Zinc	Zn	Sign	text (< or trace etc.)
			Value	mg/L

3.2.6 Periodic data

Data records in Table 3.4 to 3.8 are information obtained at the time of water point or well construction and rehabilitation. The items shown in the Table 3.9 are necessary to be measured periodically to monitor the situation of the groundwater and well after the construction. The fields related to periodic data are shown in Table 3.9. The items of water quality shown in Table 3.8 seem to be more than necessary for periodic measurement and necessary item can be selected from Table 3.8.

Table 3.9 Filed name, unit and format of periodic data

field name	text or value	unit, format and remarks
Date of measurement or sampling	text (YYYY)	
	text(MM)	
	text(DD)	
Groundwater Level (depth from ground)	value	m
Parapet Height (from ground)	value	m
Ground Level above Sea Level	value	m a.s.l.
Water Quality (parameter 1)	Sign	text (< or trace etc.)
	Value	mg/L or appropriate unit
Water Quality (parameter 2··· n -1)	Sign	text (< or trace etc.)
	Value	mg/L or appropriate unit
Water Quality (parameter n)	Sign	text (< or trace etc.)
	Value	mg/L or appropriate unit
Functionality	text	(running / clogged)
	text	reason for clogged etc.

Notes: Parameters of water quality are selected from Table 3.8.

4. Standard Measurement Method

The standard measurement methods of latitude/longitude and groundwater level are shown this chapter. A clear improvement in the accuracy of the data is brought about in these two items by the use of appropriate measurement method.

4.1 Latitude/Longitude

Latitude and longitude must be measured by GPS under the datum of WGS84. Degree is used as the unit of the latitude and longitude with 5 decimal places. The 6 decimal places assure the accuracy of 1 m. GPS does not guarantee the accuracy of 1 m but the accuracy of 5 digits can be

distinguished a water point from others. GPS can provide the data of elevation. The elevation is recorded to the order of the meter.

4.2 Groundwater Level

The electric groundwater depth measurement devices must be used for correct measurement. It informs that the tip of the measuring tape has stuck to water, by beep or turning light on and anyone can easily and accurately measure the groundwater level. Only about 20 % of all Upazila offices have the device. They use the rope and measure the length to wet places as the water level. This method cannot provide accurate groundwater level and the accuracy strongly depend on the observer. It is strongly recommended to use the electric measurement devices.

The groundwater level must be based on the ground level. The groundwater level is usually measured as the depth from reference point such as the top of parapet or casing. The ground height of the reference points compensated after the measurement.

The standard unit of length is "m" and common use unit is "feet" in Bangladesh. When measuring the groundwater level, the unit is carefully recognized and described with the measured value. Also, in case of data entry, the unit is recognized. The groundwater depth converted in to "m" is entered in case of measuring with "feet".

5. Operation and Management of Databases

5.1 Managing Organization of Databases in DPHE

The Technical Information Management Standard will be implemented by the Planning Unit. The Planning Unit will give corrective recommendations and guidance to the relevant department in the situation where the management, utilization and security situation of the database does not reach the level of this standard. MIS Unit monitors the operation and maintenance of databases in DPHE. A LGI (local government) is divided and a new LGI is created. Even in this case, WPIS (ID of water point) must not be changed as mentioned in Chapter 3.1.1. Then, water points can exist not in the LGI associated with WPIS and it causes confusion. It is necessary to keep records of the change of the LGI to keep track the change of the LGI where the water point locates for the avoidance of confusion. MIS Unit monitors and records the change or the creation of LGI.

5.2 Database Manager

Each database must have a party and database manager(s) responsible for operation and management of the database. They also have the responsibility of backing up and archiving data, and system security.

5.3 Data Flow

Measurement is made and measured value is recorded on field book or data sheet on site. Data is entered into database on site or in the office of Union or Upazila or District or Pourashava office. There is a possibility that errors may occur due to measuring, writing of data on site and subsequent data entry. The value, unit, significant digit are carefully checked at the measurement, writing and entering data into database. The measured value must be verified each process. Measure again and confirm the measured data and correct measurement method, if the value is out of the acceptable range.

5.4 Standard Operation Procedure (SOP)

Standard operation procedure (SOP) is necessary for correct measurement, accurate data entry, appropriate database operation and effective use of database. Almost all databases were built independently, so different database needs different SOP. Each Database Manager is responsible for preparing a SOP and providing a copy to MIS Unit. The SOP will be stored with MIS Unit and the Database Manager. Before a new database is made, a draft SOP must be submitted to and approved by MIS Unit. The measurement, data entry, data processing, operation and maintenance of the database must follow the SOP. The following items will be included in SOP.

- Clearly describes the purpose of the data and use(s) of the collected information
- Identify the data manager(s)
- Identify clear methods for the measurement, record, input, and verification of data throughout the process
- List of parameters, their units, definitions, significant digits, and measurement frequency
- Frequency of summarization/analysis/sending of information
- Each parameter in each database should have a set range of acceptable values and number of significant digits.
- Identify who checks data validity before summarizing or sending to another level/circle/unit/higher-level or same-level authority.
- Identify the backup system.
- Describe the accessibility of the security system (Who can access? Who can log in? Main computers with original copies have sufficient computer security?)
- How often the data will be archived?
- When is archived data destructed?

5.5 Common Problems to be Described in SOP

Solutions to common problems found during reviewing data processing will be described. These can be avoided by describing them in SOP.

5.5.1 Description of No Data

Numeric data must not be entered in text field in database and text data must not be entered in numeric field. Basically, all data fields in database must be filled with data. "- " or blank or any other is found in the field in case of no data. Since allowable texts or numerical values depend on the database, "-" or a specific number or specific text must be stated as filling data in the case of no data in the SOP. The data stored in the database can be used for various purposes.

5.5.2 Description and Entry of Date

The DPHE date format is set to separate YYYY, MM, DD. The most common date notation in Bangladesh is DD/MM/YYYY and it can be used to write down some measurement values on site but the date is separately entered to database as DD, MM, YYYY or YYYY, MM ,DD with care.

5.5.3 Not overwrite old data record

The facility, caretaker, structure of well are possibly changed after the construction of wells. New data record must be added to the database without overwrite the old data record in order to confirm both present and old information when the information changes.

5.6 Catalogue of existing database, SOPs

MIS updates the catalogue of databases every year and circulates to each Circle to strengthen the recognition and to utilize the information collected in DPHE. The name, parameters of database and number of records collected in a year are included in the catalogue.