6.1 Objective Information to be Collected

In due consideration of the major issues on present and future river basin management in the Perak river basin, the necessary hydrological information to be collected by the system are preliminarily proposed as follows.

Objective Information	Real-time Information	Non real-time Information	Digitization of Non real-time Information	Present Competent Agency for the Information
Hydrological Information (rainfall, river stage/ discharge, river suspended sediment load and tidal level)	yes	yes	Completed	DID
Dam reservoir Information (inflow/outflow discharge and reservoir level)	yes	yes	-	TNB
Meteorological Information (monthly statistical values)	-	yes	-	MMS

As shown above, hydrological information is classified into real-time and non real-time information. The real-time information is in principle used for disaster management such as flood forecasting and warning. On the other hand, the non-real-time information could be used, for instance, for the clarification of the long-term relationship between the hydrological conditions of the river and the impacts of basin land development (the logging activities in the upper reaches, the urban and industrial development in the basin).

The recent technology on hydrological gauging and telecommunication devices would improve the gauging function as well as the data transmission speed. The radar gauge, as an example, would cope with the inadequate coverage of point rainfall gauging stations and uselessness for urgent activities due to the delay of data transmission. In view of these developed technologies, a radar rainfall gauge is proposed as a part of the objective hydrological information system.

6.2 Objective Information to be Disseminated

The objective hydrological information to be disseminated to users is proposed, as shown in Table I-9. In principle, all hydrological information should be open to public users. The

dissemination of real-time hydrological information will especially facilitate the evacuation and disaster prevention activities of the public.

6.3 Objective Hydrological Gauging Stations/Devices

The objective hydrological gauging stations/devices are proposed in due consideration of the potential technological development so as to set up the futuristic river basin information system.

6.3.1 Rainfall and Meteorological Gauging

As described in Section 5.3, the average density of the existing DID point rainfall stations in the Perak river basin is 237 km²/station, which may satisfy the standard of $100-250 \text{ km}^2$ /station recommended by the WMO. The rainfall stations are, however, biased to the lower and middle reaches and scarcely distributed in the upper reaches.

There exist no rainfall gauging station in the upper reaches of the Temengor Dam. Thus, fourteen (14) point rainfall gauging stations need to be constructed in accordance with the standard (refer to Table I-10).

Likewise, the point rainfall gauging stations in the upper reaches of Chenderoh Dam need to be increased from the existing eight (8) stations to twenty-six (26) stations. Such drastic increment is judged to be not technically feasible due to the extremely difficult accessibility to the gauging sites located in the deep jungles.

The recent technology would enable wide rainfall gauging coverage by the radar rainfall gauge. When the electric waves radiated from the radar sites impinges raindrops on the way, a part of the electric waves is reflected back to the radar site.

The rainfall depth could be estimated by the strength of reflected wave which has a definitive relationship with the rainfall intensity. The data on the strength of the reflected waves are transmitted by micro radio wave from a radar site to an office and converted to rainfall intensity.

The rainfall area also can be easily displayed on radar terminal equipment. The effective range of radar wave is about 120 km in radius and, therefore, one radar site can cover the entire watershed of the Perak river basin (refer to Fig. I-8). On this concept, about thirteen (13) radar sites can cover the whole of Malaysia; i.e., five (5) radar sites for Peninsular Malaysia, and eight (8) for Sabah and Sarawak (refer to Fig. I-9).

The disadvantage of the radar rainfall gauge is the high investment and operation and maintenance (O/M) cost. The cost for one site of radar is estimated at about RM 12 million at present, while the annual operation and maintenance cost is about RM 1.8 million. However, a dynamic reduction of cost of the radar gauge is expected in the future in view of the present intensive development of technology on the radar itself, the data transmission, and the computer processing.

The radar rainfall gauge is available for both real-time and non real-time rainfall gauge, and will enable the estimation of not only rainfall intensity but also other various factors of rainfall such as extent, movement direction and speed of rainfall area. Such information is quite useful for flood forecasting and warning (FFW) and other disaster management.

From the above viewpoints, a new radar gauge and the existing five (5) DID telemetry point gauging stations for FFW are proposed as the objective stations for the Master Plan, as shown in Table I-11 and Fig. I-8. The proposed stations are divided into two (2) classes.

The radar gauge is proposed as the principal measure for rainfall gauging. The radar site needs to be located on a high ground elevation and, therefore, the proposed site in the Perak river basin is preliminarily placed at the top of Mt. Soh that has an elevation of 1,324 m.

The radar gauge also requires several telemetry point rainfall gauge stations in order to calibrate the rainfall observed by radar based on the actual gauged point rainfall. In this connection, the existing five (5) DID telemetry stations are proposed for the calibration.

The two (2) principal meteorological stations at Ipoh Airport and Lubok Merbau are also proposed as the objective stations for the Master Plan, as shown in Table I-11. These stations could serve to comprehend general meteorological conditions.

No evaporation data is available in the basin except for the meteorological stations. However, it is deemed necessary to gauge basin-wide evaporation for the study on water balance of the basin. Consequently, the installation of new evaporation gauges is also proposed at the existing five (5) DID telemetry rainfall stations.

6.3.2 Stream Gauging

Twenty-one (21) stream gauging stations (river stage and discharge, sediment discharge, dam reservoir information) are proposed as the objective stations for the Master Plan, as shown in Table I-11 and Fig. I-10. The proposed stations are divided into six (6) classes.

The existing gauging stations of the Perak river basin are controlled by DID and rather well distributed in the basin. In due consideration of continuity of gauging data, all of the existing gauging stations of DID are applied as the gauging stations for the river basin information system. Moreover, in due consideration of the existing conditions described in Section 5.4, additional and/or modified gauging points are preliminarily proposed for the river basin information information system, as follows:

(a) The water quality sampling points should be placed at the existing three (3) principal gauging stations of DID to monitor both flow discharge and water quality;

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- (b) The existing two (2) DID telemetry river stage gauging stations for FFW at Parit and Kg. Gajah, located in the middle and lower reaches of the Perak River, should be upgraded to principal gauging stations to gauge the actual water intake volume from the river and the water quality for water intake; and
- (c) A new tidal gauging station should be installed at Bagan Datoh near the estuary to gauge the tidal level as a hydrological boundary condition for the hydraulic calculation such as non-uniform and unsteady flows.

Of the sixteen (16) proposed river stage stations, eight (8) stations are not equipped with a telemetry system at present. The major reason for the non-telemetry gauging method adopted is attributed to two (2) reasons; namely:

- (a) the telemetry gauging station requires a higher investment cost; and
- (b) the telemetry gauging data could be used for the flood forecasting and warning but not as basic data for the study and planning due to low data accuracy.

The river basin management will require a dynamic improvement on data transmission and processing to realize a more effective and quick response in the future, and the telemetry system could meet such future requirement. Also, the reliability of data gauged by the telemetry system will certainly be improved and could even be used as the basic data for the study and planning works. Moreover, as the technology of the telemetry system is progressively improved, the investment cost of the telemetry system will become lower and could be competitive with the operation and maintenance cost of the off-line gauging system. In due consideration of such possible future trend of technology, all stream gauging stations are proposed to be equipped with the telemetry gauging system.

CHAPTER 7 OBJECTIVE INFORMATION FOR OPERATIONAL SYSTEM

7.1 Objective Information to be Collected

Hydrological information is the essential information for the various aspects of river management work such as flood control, water supply, water resources development and watershed management. All hydrological information in the Operational System has to be collected carefully in line with the river management purposes.

The objective hydrological information is classified into the real-time and non real-time information. The detailed contents of both real-time and non real-time gauging items to be collected for the Operational System are summarized in Table I-12, taking into account the considerations mentioned hereinafter.

7.1.1 Real-time Information

(1) Gauging Items

The Operational System will collect the following objective real-time hydrological information to support flood and drought management:

- (a) Hourly rainfall, river stage and outflow discharge from the Chenderoh Dam during a flood for the sake of flood forecasting and warning (FFW); and
- (b) Daily river discharge at the Iskandar Bridge (Sta. No. 4809443) and outflow discharge from the Chenderoh Dam during a drought to support the drought management.

The State DID currently monitors the hourly rainfall and river stage on real-time base through the existing five (5) rainfall and eight (8) river stage telemetry gauging stations. The State DID also monitors the outflow discharge from the Chenderoh Dam through the telephone line from TNB. This existing real-time gauging network covers all key gauging stations, and is applied as the objective gauging source for the Operational System (refer to Table I-13 and Fig. I-11).

All telemetry stations should be applied as objective stations, even though two river stage stations are located very closely like Teluk Sena and Kg. Gajah. The reason is

that all the stations are necessary components of the existing FFW system in terms of the three (3) flood warning levels at the stations.

In the existing real-time monitoring system, particular attention is given to the present off-line (telephone) communication system between DID and TNB. So far, TNB estimates the outflow discharge from the Chenderoh Dam by manual calculation and has no available data server to automatically monitor and transmit the information to DID. Due to lack of available data server at the dam, the Operational System has to follow the current off-line communication system.

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The existing gauging network monitors the rainfall and river stage only during a flood period (October to January) for the sake of flood forecasting and warning. However, the Operational System will expand the gauging period not only for a flood period but also for a drought period (June to August) in order to facilitate both flood forecasting and drought management. The Operational System will have a function to convert the river stage to flow discharge during a drought period so as to clarify whether the river discharge could be sufficient as compared with the water intake capacity.

The real-time gauging data is now monitored only by the State DID in Ipoh, while the dam outflow discharge is determined in principle by the National Load Dispatch Center (NLDC) of TNB in Kuala Lumpur. Such a situation causes difficulties in coordinating the control of dam outflow both for flood and drought management between TNB and DID. To retrieve the issues, the Operational System will expand the data transmission system from Ipoh to Kuala Lumpur so that both the Federal DID and NLDC can monitor the real-time gauging information and coordinate the control of dam outflow during the critical periods.

(2) Data Source and Data Renewal Interval

The data source of the real-time hydrological gauging information is the telemetry data server installed at the Ipoh FFW Terminal Station, State DID. The data can be monitored and displayed at the Terminal Station through the existing software TeleWin32.

The real-time information will be introduced and displayed in the Operational System by online connection, and the existing interface of TeleWin32 will be applied in principle. In the Operational System, gauging for the flood forecasting and warning will be made at one-hour interval, while gauging for the low flow discharge will be made once a day during a drought period.

7.1.2 Non Real-time Information

(1) Rainfall Gauging

In the Master Plan, a new radar rainfall gauge and the existing five (5) DID telemetry rainfall stations for calibration are proposed. However, the radar gauge will be installed as a part of the nationwide radar gauging plan after the year 2011 in line with the 9th Malaysia Plan.

The upper reaches from the Chenderoh Dam are regarded as the hydrological blind areas for rainfall gauging. In order to satisfy the standard, the rainfall gauging stations need to be increased to twenty-six (26) stations.

Such drastic increment is not technically feasible considering the extremely difficult accessibility to the gauging sites in the deep jungle. Moreover, the runoff discharge from the upper reaches from the Chenderoh Dam is regulated by the existing four (4) hydropower dams, and the rainfall in the upper reaches has less significance for the river flow regime in the downstream stretch.

In due consideration of the above circumstances, the Operational System will apply the existing DID gauging network as the hydrological data source without installation of any new gauging station. The inventory and classification of the objective stations are shown in Tables I-14 and I-15 and the locations of the proposed stations are shown in Fig. I-12.

In the Operational System, the gauging stations are classified into Class 1 and Class 2 stations. Class 1 stations include fourteen (14) automatic gauging stations [twelve (12) principal and two (2) secondary stations], while Class 2 stations include the remaining forty-eight (48) manual gauging stations.

The Operational System will collect hourly, daily and monthly rainfall depth in line with the dissemination plan for river management (refer to Table I-12 in details). The information of Class 1 have a relatively long gauging period and high reliability of gauging data, and the stations will be utilized as the key stations to estimate the basin mean rainfall by Thiessen polygon method for the design flood and low flow calculation. On the other hand, the information of Class 2 stations will be utilized in principle to supplement the missing data of Class 1 stations. In addition to the raw gauging data, processed information such as typical isohyetal maps and typical monthly rainfall pattern will also be collected to comprehend general hydrological conditions in the Perak river basin.

(2) Stream Gauging

(a) River Stage and Discharge / Sediment Discharge

In contrast to the rainfall gauge, the existing stream gauging stations are well distributed in the river basin, monitoring all important gauging points on the major tributaries as well as the mainstream. The major gauging stations are: (1) Iskandar Bridge on the Perak River (Sta. No. 4809443); (2) Weir G. Tg. Tualang on the Kinta River (Sta. No. 4310401); and (3) Kg. Lintang on the Pelus River (Sta. No. 4911445). River basin management can be substantially carried out through the stream conditions monitored by such existing gauging network.

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The Operational System will apply the existing DID gauging network (river stage and discharge, sediment discharge) as its hydrological data source. The inventory and classification of the proposed stations are shown in Tables I-14, I-16 and I-17. The locations of the proposed stations are shown in Fig. I-13.

As to the above rainfall gauging stations, the gauging stations are likewise classified into Class 1, Class 2 and Class 3 stations. The following three (3) Class 1 stations (present DID principal stations) are regarded as the key gauging stations to comprehend the hydrological conditions for the river management works:

(i) Iskandar Bridge on the Perak River (Stn. No. 4809443) is regarded as the most important basic control point for the basin. The reasons are:
(1) the station is the only DID Principal gauging station on the mainstream; (2) the location is the most suitable for FFW because of no major tributaries joining until the confluence with the Kinta River;
(3) the station is also important for drought control because most of the water intakes are located downstream of the bridge; and (4) the recorded period is the longest in the basin.

- (ii) Weir G. Tg. Tualang on the Kinta River (Stn. No. 4310401) is regarded as the basic control point for the biggest tributary. The reasons are:
 (1) the station is the only DID principal gauging on the Kinta River; and
 (2) the location is suitable to determine the design flood for the whole Kinta river basin. Moreover, the reliability of the gauging record has already been proved relatively high by the "Kinta River Flood Mitigation and Catchment Area Rehabilitation Project (DID, 1994)".
- (iii) Kg. Lintang on the Pelus River (Stn. No. 4911445) is regarded as the indispensable station to clarify the relationship between sediment discharge and logging activity in the Pelus river basin, where intensive logging has been done, for the watershed management.

Class 2 gauging stations are also placed at seven (7) points on the secondary tributaries such as the Bidor, Cenderiang, and Pari. The gauging items of both Class 1 and Class 2 stations will cover the river stage, river discharge and suspended sediment loads. In addition, two (2) Class 3 stations are proposed for the Operational System to supplement the river discharge data for Class 1 and Class 2 stations.

The storage function method was employed for the upstream basin of Nordin Bridge on the Perak mainstream in the "Lower Perak Flood Mitigation Study (JICA, 1980)". Likewise, the design floods of the Kinta river basin were established through statistical analysis using historical floods in the "Kinta River Flood Mitigation and Catchment Area Rehabilitation Project (DID, 1994)". Further, the integrated flood runoff model for the whole Perak river basin should be developed in the future. The information of the Class 2 and Class 3 stations can be used for the calibration of the runoff model in this study.

The Operational System will collect the hourly, daily and monthly average value at twelve (12) gauging stations. The detailed attributes to be collected are shown in Table I-12 in line with the dissemination plan for river management.

The Master Plan proposes to upgrade the existing two (2) river stage gauging stations to river discharge gauging stations. On the other hand, a new stream gauging device/station is not proposed for the Operational System.

Regarding the new stations proposed in the Master Plan, the minimum guaranteed discharge at Iskandar Bridge is much more than the total water intake capacity at present. Accordingly, as far as the guaranteed discharge is maintained at Iskandar Bridge, the water intake downstream will not suffer from the water shortage. From this viewpoint, the newly proposed stations are not included in the Operational System.

(b) Chenderoh Dam Reservoir Gauging

The Operational System will compile the long term record of outflow discharge from the Chenderoh Dam in order to clarify the contribution of dam regulation on both flood mitigation and river maintenance flow.

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(c) Tidal Level

A new tidal gauging station is also proposed in the Master Plan. The tidal data is to be used as a hydrological boundary condition to estimate the river channel flow capacity by non-uniform flow calculation. The tide table is also to be used as a hydrological boundary condition to estimate the effectiveness of riverbank erosion control measures at Teluk Intan by unsteady flow calculation.

However, the estimation cannot be made without the results of a full-scale river channel survey. Since the river channel survey is not presently available, the tidal gauging data itself has little use for the river management works.

From this viewpoint, a tidal gauging station is not included in the Operational System. Instead, the Operational System will store the following tide levels observed in 1984 at Bagan Datoh near the estuary. The tide table will be used as a boundary condition for various hydraulic simulations.

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Items at Bagan Datoh	Tidal Level	Tidal Level converted
and the second second second second	(m)	by Land Survey Datum (m)
Lowest Astronomical Tide	0.0	-1.7
Mean Low Water Springs	0.4	-1.3
Mean Low Water Neaps	1.2	-0.5
Mean Sea Level	17	0.0
Mean High Water Neaps	2.1	0.4
Mean High Water Springs	2.9	1.2
Highest Astronomical Tide	3.4	1.7

Source: Directorate of Hydrology, Royal Malaysian Navy (1991); "Tide Tables 1992, Volume 1"

(3) Metcorological Gauging

The Operational System will collect and store the long-term monthly mean meteorological data at the two (2) MMS principal meteorological stations at Ipoh Airport and Lubok Merbau (refer to Table I-14). The meteorological information will be utilized not only to study the water balance using evaporation data but also to comprehend the general meteorological condition in the basin.

The attributes of station data to be collected are several monthly meteorological records in line with the dissemination plan for river management. The detailed attributes to be collected are presented in Table I-12.

New evaporation gauges are proposed to be installed at the existing five (5) DID telemetry rainfall stations in the Master Plan stage. However, the evaporation data at two (2) meteorological stations are judged to be practically useful for the moment, since temperature does not vary widely in the basin.

(4) Data Source, Data Format and Input Method

The data source of the objective hydrological items to be collected is summarized in Table I-14. All hydrological gauging data are currently stored by the existing "Hydrological Data Bank System" (the Data Bank) installed at the DID Hydrology Division of Federal DID in Kuala Lumpur. Moreover, the DID Hydrology Division is now developing the "Hydrological Information System" (HIS) to operate the Data Bank.

Upon the completion of HIS, the hydrological data could be transmitted through on-line system from the Data Bank to the Operational System. The completion schedule of HIS is, however, still indefinite and, therefore, the ASCII data stored in the Data Bank have to be supplied to the Operational System in the form of diskette.

On the information other than mentioned above, the data sources are various publications and study reports. Most of the data are compiled in this report. Input method of those data into the Operational System is manual input by typing and/or digitizing.

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(5) Data Renewal Interval

The proposed data renewal interval for the Operational System is shown in Table I-12. The data renewal of the "Hydrological Data Bank System" is conducted monthly at present.

It is desirable that the data renewal in the Operational System would coincide with maintenance work on the Data Bank. However, judging from the actual work volume of manual input through the diskette, the interval in the Operational System is proposed once a year in principle until the online renewal is established.

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So far, it is necessary to submit the designated application form to the DID Hydrology Division to access and use any hydrological data in the Data Bank. The necessary application form is shown in Table I-18.

7.2 Objective Information to be Disseminated

7.2.1 Real-time Information

(1) Objective Information

On the flood forecasting and warning, the Operational System will disseminate the following flood hydrological information, on a real-time base, during floods from October to January:

- (a) Hourly rainfall and stream water level collected from the existing DID telemetry gauging stations;
- (b) Hourly outflow discharge from the Chenderoh Dam informed from TNB; and
- (c) Three (3) levels of warning described in "Inventori Sistem Amaran Banjir (DID, 1997)".

The information, in particular, will be also useful to TNB among the government users. The existing four (4) hydropower dams are used by TNB principally for peak load generation, while in the event of a major flood, the dam reservoir operation is changed to supply the base load generation in order to minimize the dam outflow discharge. Through these reservoir operations, the existing hydropower dams have a substantial flood control effect to the downstream areas. However, such reservoir operation is not always effectively made due to lack of timely flood information to TNB. The Operational System will retrieve such unfavorable conditions through online dissemination of the real-time flood information to TNB in Kuala Lumpur as well as the Dam Control Center in Perak State.

On the drought control, the Operational System will monitor the river discharge at the Iskandar Bridge and the outflow discharge from the Chenderoh Dam once a day. The monitoring will be made during the dry season from June to August. The real-time information will clarify whether the river flow discharge could be sufficient as compared with the intake volume in the downstream areas.

(2) Data Dissemination to Users

All the real-time hydrological information including dam outflow information in the Operational System will be open in principle through the Internet and/or Intranet to the public users as well as the related government agencies. Dissemination of real-time information through the Internet will facilitate emergency activities against floods by public users, and also to inform the drought condition and coordinate with the drought management. As to drought control, the monitored information will be disseminated to various water users such as PWB, DID and TNB to facilitate drought management.

(3) Display Image

With respect to real-time hydrological information, the user interface of the existing TeleWin32 installed in the FFW Terminal Station of the State DID will be applied in principle to the Operational System for dissemination. The TeleWin32 can display the required real-time hydrological information for FFW in the form of: (1) location map of telemetry gauging stations; (2) rainfall hyetograph; (3) river stage hydrograph; and (4) hourly rainfall and river stage tables, as shown in Fig. I-14.

The interface of TeleWin32 is advisable since unfavorable confusion on the actual FFW activity should be avoided by unifying the interface and information source. The information will be disseminated to users in the form of Internet Homepage so that the user can browse the information easily by using widely spread Web browsers on the market such as Microsoft Internet Explorer and/or Netscape Communicator.

However, for opening the information to the Internet, the new TeleWin Transfer software and the Telewin Internet Server Software are required to be developed.

7.2.2 Non Real-time Information

(1) Objective Information

The Operational System will furnish the following hydrological and meteorological features (for details, refer to Table I-12) of the Perak river basin:

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- (a) Inventory and location map of hydrological and meteorological gauging stations;
- (b) Hourly, daily and monthly hydrological data (rainfall, river stage/discharge and suspended sediment);
- (c) Annual minimum and maximum hydrological data (rainfall, river stage/discharge and suspended sediment);
- (d) Discharge and sediment rating tables at river stage stations;
- (e) Monthly average of air temperature, relative humidity, sunshine hours, rainfall and evaporation;
- (f) Isohyetal maps of annual average rainfall, typical monsoon seasons rainfall and monthly average rainfall; and

(g) Tidal levels at Bagan Datoh.

The above hydrological data in the Operational System will be useful as basic data for the hydrological and hydraulic calculation/simulation models. The essential information on river management works such as probable flood run-off discharge and channel flow capacity can be estimated through such models.

(2) Data Dissemination to Users

All non real-time hydrological information in the Operational System will be open in principle to public users as well as the related government agencies. The information will be disseminated to the users through various media such as the Intranet and/or Internet, CD-ROM, diskette and printed paper. However, some of the information analyzed by using the raw hydrological data, for instance, probable flood inundation area (PFIA), will not be open to the public to avoid confusion and unfavorable land speculation.

As a reference to the user charge which will be set up, the current prices of hydrological data of DID are tabulated below.

		For 3 months and below	3 months to 1 year or any part thercof	For any additional year up to 10 years or any part thereof	For any additional year in excess of 10 years or any part thereof
1.	Rainfall Data	RM 50	RM 100	RM 50 per year or part thereof	RM 25 per year or part thereof
2.	Water Level Data	RM 155	RM 310	RM 155	RM 72.5
3.	Discharge Data (Stage-Discharge Curve of Derived Maps)	RM 35	RM 70	RM 35	RM 17.5
4.	Discharge Data (Discharge Readings)	RM 165	RM 330	RM 165	RM 82.5
5.	Evaporation Data	RM 35	RM 70	RM 35	RM 17.5

(3) Display Image

On the "Hydrological Data Bank System", the hydrological information is retrieved in various forms of table as shown Fig. I-15. These original tables will be adopted in principle to the display image in the Operational System.

Regarding the location and inventory of the objective hydrological stations, the tables and figures compiled in Chapter 7 will be adopted to the Operational System. The processed hydrological data such as rainfall intensity curve, isohyetal maps and monthly rainfall graph will be displayed, and those original images are shown in Fig. I-17.

The monthly meteorological information will be input and displayed on the format prepared in Fig. I-17.

(4) Operation and Maintenance

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The raw hydrological gauging data are presently collected by the State DID and forwarded to the DID Hydrology Division in Kuala Lumpur at monthly intervals for centralized processing. On receipt of the data, they are checked, processed and merged into the "Hydrological Data Bank System". In view of the aforesaid present data flow, the source of the statistical hydrological data should always be fixed in the Data Bank to maintain the unification of data. Accordingly, a staff of the DID Hydrology Division will be temporarily assigned to the O/M works when data renewal and compilation are required.

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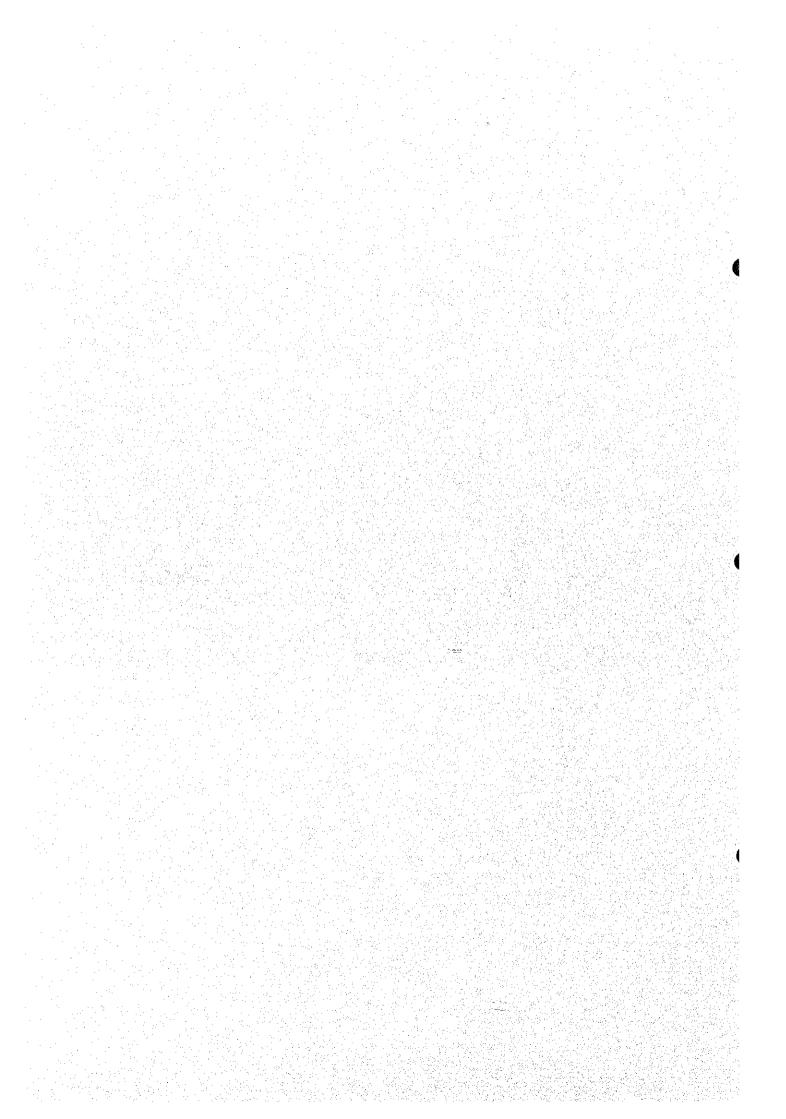
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River Basin	Catchment Area		Rainfal	Statio	n	River \$	Stage and	Discha	rge Station	Evaporation Station	Suspended Sediment
		Non- recording	Record- ing	Total	Density	Non- recording	Record- ing	Total	Density (km²/stations)	(nos.)	Station (nos.)
	(km²)	(nos.)	(nos.)	(nos.)	(km ¹ /stations)	(nos.)	(nos.)	(nos.)	(kill /stations)	(1105.)	(105.)
Peninsular M	alaysia										
West Coast A	(rea)							 			
Perlis	790	10	3	13	61	2	3	5	158	· 1	
Kedah	3,695	23	4	27	137	0	0	0	0	0	
Muda	4,210	16	4	20	211	0	3	3	1,403	1	
Perak	15,180	49	13	62	245	0	12	12	1,265	0	1
Bernam	3,335	18	2	20	167	2	3	5	667	1	
Klang	1,288	14	9	23	56	0	3	· 3	429	2	
Linggi	1,420	14	2	16	89	1	2	3	473	1	
Melaka	1,010	10	i	11	92	0	2	2	505	0	
Muar	6,595	37	7	44	150	3	4	7	942	2	
Subtotal	37,523	191	45	236	159	8	32	40	938	8	2
East Coast A	rea)										
Pahang	29,300	69	16	85	345	2	9	11	2,664	2	
Terengganu	4,650	11	6	17	274	0	2	2	2,325	0	
Kelantan	13,100	26	10	36	364	0	3	3	4,367	3	<u>_</u>
Subtotal	47,050	106	32	138	341	2	14	16	2,941	5	
Total	84,573	297	77	374	226	10	46	56	1,510	13	
Sabah and S	arawak										
Kinabatangar	16,800	0	8	8	2,100	C C) 3	3	5,600	1	
Rejang	51,315	12	10	22	2,333	1	2	2 3	17,105	4	
Sarawak	3,398	5	1	6	566	2	2	3	1,133	4	
Total		1	19	36	1,666	3	6	i 9	7,946	9	

Table I-1 INVENTORY OF DID HYDROLOGICAL STATIONS FOR MAJOR RIVER BASINS

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Source :

DID (1991) "Hydrological Data - Rainfall and Evaporation Records for Malaysia, 1986-1990"
 DID (1995) "Hydrological Data - Streamflow and River Suspended Sediment Records, 1986-1990"

INVENTORY OF EXISTING DID FLOOD FORECASTING AND WARNING SYSTEM (DID Gauging Stations and Relating Facilities for FFW) Table I-2

GAUGING STATIONS

GAUGINC	GAUGING STATIONS														
Number	Station Name	River	Gaug	Gauging Item	Discharge		Location	- .	Year F	Year Radio Frequency	sency	Water I	Water Level for hhw	 ≯	Kemarks
100mm v T)	Rating			In	Installed	(MHz)			(EL, m)		
			Rainfall	Rainfall! River stage	Curve	Latitude	<u> </u>	de l		XT	RX	Alert IV	<u> Warnine Danger</u>	Danger	
Telemetry Station	Station												-+		
	K alano	Perak	×				15 101 04	50		75.475 7	11.900				Sth. No. 3010003
	V		; >			25	00 101 00	15		7.475 7	006.1	1		1	Stn. No. 5411066
7	Vuala Nelluciulis			<u>^</u>		041 56		0	19/4	72.125 75.625		53.64	54.25 1	54.25	Stn. No. 4911445
m 	Kg. Lintang	reus		<					ľ	201 0	1	-	25 1	36.2	Sm No 4800442
	liam lekandar	Perak		×	×		10 100 DV			C70°C/ . C71°7/	c70°C	-	+	0.00	041-140-1001-140
	Dout	Derek		X								19.8	21.3	22.3	
0	רמוו			·····						Telenhone circuit	vironit -	11 0	11.6	12.8	
6	Telok Sena	Perak	1	<	_				•	Anordana		+			والمراجع المراجع
	1 Co Catab	Perak	1	×	,				EUO1			0.4	0.4 -	0.7	
	The Column	1	<u> </u>	X	X	04 19	20 101:04	80		72.125 1 7	75.625		••••	ı	Stn. No. 4310401, #
×	lig. Iualang	I VIIIIA					Ę		ľ	70 105 7	367 32				Stn No 4611463 #
6	Tg. Rambutan	Kinta	×	×	X				<u> </u>				-		
10	l Kuala Pari	Kinta	×	×	•					1 czo.c/	C71.7/	i I	•	•	ŧ
Non-telem	New talemetry Station (Flood Monitoring Station	Monitor	ring Static	(ut											
TTOTAL-TONT										-		15.5	17.1	8.3	
	Bota Kanan	FCTAK	-	<					1974 -			K-Se			و هم الله الله الله الله الله الله الله ا
2	Telok Intan	Perak	ł	X	•									-	
									•						

Legend X : available, - : not available

	Nos.	Ţ	2	0	4	0	0	, 11	4
LITTES	Name	Terminal Station	Repeater Station	Flood Warning Board	Flood Warning Siren	VHF (permanent)	VHF (mobile)	Boat (engine)	Boat/small boat (no engine)
FFW FACILITIES	Number		2	3	4	5	6	<u> </u>	8

: Data logger

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Station	ion	Station Name	Grid		Location	ion		Location Date Equipment	uipment	No Operation	cration	Current	Current Equipment	Operation
Index	lex		Reference	latitude		longitude	ıde	manual a	auto	from	20	manual	auto	
VQ.		IDC Talab Inten	VD380445	041 01	100	1001 00	021 10	01/50	09/10			M8	HW,#	SAL
	1	G. ICON IIIGH	VD674480	I	Ļ	1	18 00	01/12	03/64			M8	HL.#	JPS
ξď		Deishat Daerah Kamnar Deishat Daerah Kamnar	VD515765	1	ł.	i	09 20	07/74	07/74			M8	HW, #	JPS
2 d		Rejavat Pactur Amiren Ritmah Pam Kubang Haij	VD233937		7 40	100 5	54 05	11/54	04/65			M8	HW,#	JPS
PA	1	Politeknik Uneku Omar, Ipch	QY482079	04 35	5 20	i i	07 30	04/72	04/72	-		M8	OTAW, #	Sar
E A	T	Ldg. Kuda Keb. Ulu Kinta	QY530180	04 40	0 50	101	10 10		07/74			M8	HW,#	Sal
Ρd	Τ	Thu Bekalan Talang, Kuala Kangsar	OY225284	04 46	6 30	100 5	53 40	10/59	10/59			M8 M8	WH	Sdf
. Vd	T	Ranc. Belia Perlop Sc. Siput	OY538414	٤	3 34	101	10 30	08/69	07/74			M8	HL.	IPS
14	Τ	Stn Pemereksaan Hutan Lawin	OY411863	05 17	7 55	101 0	03 30	09/L0	08/71			M8	HW,#	IPS
1	Τ	Disnensari Kroh	OT348315	05 42	2 30	101 0	00 00	11/80	08/71			M8	IHL	JPS
Δ	T.	Kijala Kenderong	OY517994	05 25	8	101 0	09 15	06/72	06/72			- 1	HL	SAL
. ▲	- E.	Ke. Lalane	QT435200	05 36	6 15	101 0	04 50	01/72	08/71			. Į	HL	Sql
6		w Rekalan So Manik	VD490557	041 07	71 051	101 0	08 05	12/35	06/62	02/77	02/77	M8	įKW.	Sql
50		IDS Telck Sena	VD231712	04 15	1	1001 5	54 00	12/61	06/77	01/73	03/75	M8	OTAW, #	JPS
	1001	DID (1997) "Inventory of Hydrolovical Stations in Malaysia – 25th. Edition"	in Malavsia -	- 25th. Ec	lition"		.			Equipment	ent			
				•						Daily Re	ead Mar	Daily Read Manual Raingauges	gauges	
T.m.	Turne of Station									M5:	5 inch	M5: 5 inch (127 mm) orifice) onfice	
Ĭ			÷							M8:	: 8 inch	M8: 8 inch (203 mm) orifice	() orifice	
	7	r: rincipal stauon								Ture of	Automs	atic Grant	Ture of Automatic Granhical Recorders	ST.
	ŝ	S: Secondary station								5		1-1-1		
Man	rual or	Manual or Automatic Recording									HD: Hattori Gally	azuy		
	M: M	M: Manual		1				•		MH	: Hattor	HW: Hattori weekly		
	A: Y	tic (It is assumed that	manual observation are also taken)	e also takt	en)					HL	: Hattor	HL: Hattori long-term	e	
Othe	Other Details			•		•				ΚW	KW: Kent weekly	veekly		
	L i	T. Telemetric								OTAW	OTAW: Ota weekly	eekly		
										#	#- Data Incoer	CODE		

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	Operation Authorities		SqL	LDG	LDG	LDG	501	LDG	LDG	LDG	SH.	LUG.	KS KS	SH	Sat	SAL	LDG	Sdf	SdI	Sdr	Sdf	LDG	Sdf	JKR	JKR	RS				•	<u>ers</u>					·		
	Current Equipment	auto																										zauges) onfice) orifice	Type of Automatic Graphical Recorders	•		F				
	Current	manual	8W	8M	8W	8M	W8	8W	8W	8W	8W	8W	WS	M8	W8	8W	M8	8W	8W	M8	W8	-8W	88 M	8W	MS	M5		Daily Read Manual Raingauges	M5: 5 inch (127 mm) orifice	M8: 8 inch (203 mm) orifice	atic Graph	n daily	n weekly	HL: Hattori long-term	weekdy	cekly	ogger	
	No Operation Period	1 to									-+																Equipment	Read Ma	15: 5 inch	48: 8 inch	of Autom	HD: Hattori daily	HW: Hattori weekly	IL: Hattoi	KW: Kent weekly	OTAW: Ota weekly	#: Data logger	
ł		o from				_						_			-	_					-						Equip	<u>Daily</u>	2		Type	ц	H	, 1	×	OTA		
Ő	e Equipmer Installed	auto							_																-				÷			-			•			
INVENTORY OF DID RAINFALL STATIONS	Date Equipment Installed	manual	09/32	01/26	01/13	01/01	01/14	01/13	01/18	04/11	02/64	01/14	1888	02/35	01/19	11/54	01/09	01/60	01/60	01/53	12/63	11/63	04/35	09/36	10/25	1889				÷	.'			. •				
INFA		le		02				_						\$	01	20	01			35	3	55	45	45	1 20	5 35	÷ .			•	•		•			·		
DRA	_	longitude	100 47	100 52	00 59		101 07	101 19	101 18	00 48				01 04	101 08	101 10	101	100 56	00 59	101 01	101 05	101 08	101	100 54	101 14	101 15										•		
OF DI	Location	-			[]				I5](15 1(35 1(30 1(20 16	50 1(15 - 1(05	30 1	35 1	05 1	35 1	10	20 1	00	80	ŕc			•	•		:			1.0		
DRY	ĭ	latitude	58 55	56 30	57 45	54 40	59 40	57 45						03 3	00	02 5		0		06 3	0. 80	60	07 1	15 2	16 0	12 0	25th. Edition						:	(ken)				
ENT		latit	8	8	03		3	63	3	8				8	8	8	8	8	8	8	8	8	Я	8	8	8	25th.							also ta				
(2/3)	Grid Reference		VD108408	VD194363	VD324385	VD301330	VD482422	VD698385	VD673394	VD119488	VD260510.	VD348437	VD364460	VD428492	VD493434	VD533478	VD600523	VD276632	VD329584	VD370548	VD451576	VD506594	VD670557	VD245712	VD607721	VD630648	cal Stations in Malaysia-	-	-			** . ** .		observation are				
Table I-3	Station Name		IPS Bagan Datoh	I no New Coconut. Bagan Datoh		Ldg. Jendarata Telok Intan	Ldg. Susex	Lde. Se. Klah	Lde. Se. Sungkai	Ldg. Arcadia	JPS. Sg. Dedap	Ldg. Sabrang	Hospital Telok Intan	Perinekat 1 Sg. Manik	Rumah IPS. Se. Meekuang	Rumah Kerajaan JPS. Chui Chak		Ko Gajah	Ke. Pulau Besar	Peringkat IV Sg. Manik	Rumah JPS. Labu Kubong	I de Tai Sent	I de Gedone Bidor	Rumah Pam Telok Sarek	ISRK Sri Kiniane Chendriang	Hosnital Tapah	if Hydrologi		Station	Princinal	s. Secondary	Manual of Antomatic Recording	M- Manual	A: Automatic (It is assumed that manual observation are also taken)	tails	T: Telemetric		
	Station	Index	WS	. WS	WS	SM	SM	SM	WS	SM	SM	SM	SM	WS	WS	NS	NS N	NS	SM	NS.	WS	MS	NS	WS	NS.	WS	DID (19		Type of Station			leine M	M		Other Details	T		
	Station	Number	3007103	1018002	3000100	3939104	3911149	3013146	3013147	4008102	4009096	4010097	4010098	4010138	4011130	4011144	4012142	100004	4109095	4110129	4110136	411135	1110111	4209001	4212128	1212124	Source:					•.				-		

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Current Equipment Operation Authorities	manual auto	M8 JPS	M8 RS	M8 LDG								M5 RS							M8 LDG						M8 JPS		al Raingauges	M5: 5 inch (127 mm) orifice	M8: 8 inch (203 mm) orifice	Type of Automatic Graphical Recorders	lajiy	veekly	ong-term	
No Operation -	from to n																									Equipment	Daily Read Manual Raingauges	M5: 5 inch (1	M8: 8 inch (2	Type of Automati	HD: Hattori daily	HW: Hattori weekly	HL: Hattori long-term	
Date Equipment Installed	manual auto	3/53	1897	11/11	01/26	1888	01/27	06/47	05/13	10/12	06/14	1891	01/16	01/12	01/19	01/26	15/47	02/10	01/13	01/48	01/26	03/63	06/68	01/14	12/62									
tion	longitude	100 54 10	Į –	100 55 50		101 02 00	101 02 10	100 52 15		8	8	101 05 20	101 09 15	100 49 30	101 04 10	101 07 50	101 00 15	101 03 45	101 06	100 58 45	100 55 10	101 05 30	101 06 10	58	100 59 00									
Location	latitude	04 22 40	ł	27	04 24 50	04 28 10	04 25 40	04 31 20	04 31 35	04 31 50	04 40 50		04 40 30	04 45 45	04 47 50	04 44 10	04 51 20	04 49 40	04 53 20	04 57 40	04 55 15	04 54 40	04 56 15	05 03 40	05 07 10	- 25th. Edition"					÷		: also taken)	
Grid Reference		1 VD234847	VD515773	VD265936	VD294886	VD381948	VD383900	QY199006	QY241010	QY423014	QY432179	QY442094	QY515173	QY150289	QY420308	QY488242	QY350373	QY411343	OY460409	QY321490	QY254446	QY447434	QY459464	QY315601	QY326665	ical Stations in Malaysia -	•						ll observation are	
Station Name		Rumah Pam Bota	Hospital Kampar	I do. Glenealv	Ldg. Nalla, Tronoh	Hospital Batu Gaiah	Ldg. Hill Rise, Batu Gajah	Ldg. Sadang	Ldg. Parit	Ldg. Pinji	Ldg. Strathisla, Jelapang	Hospital Ipoh	Taman Bahagia, Tg. Rambutan	I.de. Bukit Berapit	Kolam Air JKR, Sg. Siput	Ldg. Chemor	Ldg.Changkat Salak	Ldg. Kemuning, Sg. Siput	lt.de Elahill	Kolam Takongan Air Chendroh	Lde. Kati. Kuala Kangsar	Ldg. Sg. Krudda, Sg. Siput	Balai Polis Kg. Lintang	Ldg.Kota Lima	Pekan Lenggong	Hydrolog		Station	P: Principal	S: Secondary	Manual or Automatic Recording	M: Manual	A: Automatic (It is assumed that manual observation are also taken)	
Station Index		MS	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	MS	SM	SM	SM	SM	WS	SM	SM	SM	SM	SM	SM	DID (19		Type of Station	P P	S OF	Manual	W	¥	
Station	TANTITAL	130000	11117	4409090	4409121	4410120	4410122	4508087	4509088	4510117	4610112	4610116	4611115	4708082	4710081	471113	4810079	4810080	4811078	4909072	4909073	4910077	4911076	5009071	5109070	Source:								

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Table 14 INVENTORY OF DID RIVER STAGE AND DISCHARGE STATIONS	Date Equipment No Operation Current Equipment Operation Catchment Location Installed Period Authorities Area	itude longitude manual auto from to manual auto (km ²)	19 20 101 04 30 09/73 09/73 1 S OTFL JPS 1.700		56 15 101 06 10 1936 12/64 07/65 12/73 S ISEFL JPS 1.090	59 15 101 18 50 1930 11/67 S OTFL JPS 289	04 30 101 14 40 02/80 02/80 8 22/80 S OTFW JPS 210	08 05 101 08 50 1930 12/62 S OTFL JPS 445	55 101	101	36 20 101 04 00 1915 06/64 04/70 11/72 S OTFW JPS 245	36 10 101 03 45 02/87 02/87 1 S SEFL, # JPS 352	101 06 05 1930 07/69 S OTFL JPS	40 10 101 09 30 1930 07/60 S OTFW, # JPS 246
Y OF DID RIVER STA	Grid Reference Locati	latitude		04 49	04 56	03 59	04 04	04 08	04 13	04 32	04 36	05 36	VD456798 04 20 10	Y518166 04 40 10
Table 1-4 INVENTOR	Station Name Ref		DAHDSO So Kinta at Weir G. Ts. Tualang VD	1-	+-		idor Bhd	F	dene	+				
	Station Index		USUHVa	TUSULA	PAUDSOT	COULD S	1		Dentre o	1.	1		1	- 1
	Station Number		10401	4010401	4007445	012450	1010101	4012401	4111400	4212407	9041104	4010400	1040105	4041144

DID (1997). "Inventory of Hydrological Stations in Malaysia-25th. Edition" Source:

Type of Station

P: Principal

S: Secondary Manual or Automatic Recording

A: Automatic

Other Details

OTFL: Ott float-type long-term SEFL: SEBA float-type long-term #: Data logger

C

S: Stick type manual gauge

Equipment

Type of Automatic Graphical Recorder OTFW: Ott float-type weekly

H: If stages are taken D: If discharge observation are taken

S: If suspended sediment observation is taken
 Q: Water quality other than suspended sediment is taken
 T: Telemetric

I-T-6

	Catchment Area	(ktm ²)	1,700	7,770	1,090	289	210	445	119	192	245	352
	Operation Authorities	-	SAL	JPS	Sql	Sdf	SAI	JPS	JPS	JPS	JPS	Sdf
SNOL	Date Sample No Operation Started	from to			01/65 12/73						04/70 11/72	
MENT STAT	Date Sample Started		08/77	10/77	08/77	02/79	02/80	02/79	10/77	02/79	11/79	01/80
SEDI		le.	04 30	55	-10	18 50	40	50	10	20	8	45
ED		longitude	1 04	0 57	1 06		1 14	1 08	1 13	1 08	1 4	1 06
ENI	Location	Po	10	100	101	101	101	101	101	101	101	101
SUSE	Loc		20	10	15	59 15	30	05	55	8	50	2
ER.		latitude	19	49	56		4	03	13	33	1 36	05 36
RIV			04	8	\$	60	64	ą	8	8	8	8
RY OF DID	Grid Reference		VD423785	QY304333	QY458463	VD688414	VD615510	VD504576	VD586683	QY497018	QY418097	QT419200
Table I-5 INVENTORY OF DID RIVER SUSPENDED SEDIMENT STATIONS	Station Name		Sg. Kinta at Weir G. Tg. Tualang	Sg. Perak at Jam. Iskandar	Sg. Plus at Kg. Lintang	Sg. Sungkai at Sungkai	Se. Bidor at Malayan Bidor Bhd	Se. Batang Padang at Tg. Keramat	Sg. Cenderiang at Bt. 32 Jln Tapah	Se. Raia at Keramat Pulai	Se. Pari at Jln. Silibin Ipoh	Sg. Rui at Jam. Jalan Raya
	Station		٩	Ь	A	S	S	S	S	S	S	S
	Station		4310501	4809543	4911545	3913558	4012501	4111555	4212567	4511568	4610566	5610501

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, telev

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DID (1997). "Inventory of Hydrological Stations in Malaysia - 25th. Edition" Source:

Type of Station P: Principal S: Secondary

*Regular suspended sediment measurements are carried out at river stage and discharge stations in conjunction with discharge measurement at least once a month by using US DH48, DH59 or D49 suspended sediment samplers.

INVENTORY OF TNB HYDROLOGICAL GAUGING STATIONS Table I-6

Station Number	Station Name			Location			Date Equipment Installed	uipment Iled	Date Closed	sed	Current Equipment	unt nent	Operation Authorities
1		latit	latitude	lo	longitude		manual	auto	manual	auto	manual	auto	
Rainfall S	Rainfall Station <daily measurement=""></daily>												
	Temengor Dam		25	101	1 19		1978				Σ		INB
	Bersia Dam	t -	29	10	1 14		1983				X		TNB
	Kenering Dam	05	13	101	1 05		1984				Σ		INB
River Flo	and Discharge)	n <ho< td=""><td>urly N</td><td>Station <hourly measurement=""></hourly></td><td>ment</td><td> <u> </u></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></ho<>	urly N	Station <hourly measurement=""></hourly>	ment	<u> </u>							
6020	6059 ISo Rui below Highway Bridge	05	1			27		05/91				AUS	TNB
6029	6029 Sg. Piah @ Kuala Chenderoh	•	05 2	23 101	1 05	20		.05/81				ST	INB
River Sta	River Stage Station <hourly measurement=""></hourly>												**************
6066	6066 Sg. Perak at Kg. Perah	05	27 4	40 101		50	07/86	05/94	09/94		S	AUS	TNB
6067	6067 Sg. Perak at Kg. Bandariang	05	27 0	00 101		40	07/86	07/94	09/95		S	AUS	TNB
6069	Sc. Perak at Kc. Air Kala	05	<u> </u>	30 101		40		05/94				AUS	TNB
6070	Sg. Perak at Kg. Bukit Sapi	05	08	20 101	1 01	40		05/94				ST	TNB

Equipment Rainfall

M: Daily read manual gauge

River Flow and River Stage

S: Stick type manual gauge

Type of Automatic Graphical Recorder AUS: AUS recorder - Depth pressure sensor ST: Steven recorder - Float

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Station	Station Name		Loc	ation		Height	Date of
Number		latitı	ıde	longit	ude	(m, MSL)	Commencement
Principal M	leteorological Station						
48623	Lubok Merbau	04	48	100	54	77.2	03/1993
48625	Ipoh Airport	04	35	101	06	39.0	1930
Climatolog	ical Station						
43505	Hospital Lenggong	05	06	100	58	61.0	1930
43445	Bukit Larut	04	52	100	48	1037.0	1941
43447	Hopital Kuala Kangsar	04	46	100	56	39.0	1939
43448	MARDI Kuala Kangsar	04	46	100	55	66.0	09/1979
43419	Hospital Ulu Kinta	04	40	101	10	70.1	1930
43418	Bukit Kledang	04	35	101	01	240.0	08/1979
43416	MARDI Parit	04	26	100	54	4.6	07/1969
43417	Hospital Batu Gajah	04	28	101	02	33.5	1930
43353	Pusat Pertanian Titi Gantong	04	22	100	51		09/1974
43414	Hospital Kampar	04	18	101	09	37.5	1930
43413	Hospital Tapah	04	12	101	16	35.1	1930
43402	Hospital Teluk Intan	04	02	101	01	3.1	1930
43403	Rusa Sungkai	04	01	101	21	61.0	05/1986
Rainfall St		+					
43514	Pos Kemar	05	12	101	23	250.0	02/1974
43507	Pos Poi	05	06	100	13	1524.0	12/1974
43506	Pos Sulleh	05	04	100	17	153.0	12/1974
43456	FELDA Lasah	04	.56	101	04		03/1974
43437	Pos Legap	04	51	101	17	107.0	09/1972
43436	Pos Landap (Kuah)	04	47	101	16	411.0	10/1972
43411	Chenderiang Intake	04	16	101	14	-	07/1974
43412	Sungai Who Intake	04	13	101	22		07/1974
43401	Sabrang Estate	04	01	101	00	-	08/1979
43395	Rubana Estate	03		Lunnaaa	58	-	01/1976
43356	Nova Scotia Estate	03	4				01/1970

Table 1-7 INVENTORY OF MMS METEOROLOGICAL STATIONS

Source: The Malaysian Mcteorological Service Homepage (http://www.kjc.gov.my/people/agromet/station/43/perak.htm)

Meteorological Elements Observed

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<Principal Meteoroligical Station> Daily and Hourly Rainfall Hourly Air Temperature Hourly Relative Humidity Maximum Temperature Minimum Temperature Hourly Wind Sunshine Hour Solar Radiation Evaporation Atmospheric Pressure <Climatological Station> Daily Rainfall Air Temperature Relative Humidity Maximum Temperature Minimum Temperature

<Rainfall Station> Daily Rainfall Table I-8 (1/2) DATA AVAILABILITY OF DID PRINCIPAL STATIONS

		Year	
Station Number	Station Name	30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59	59
Rainfall Stations]#
4010001	IPS. Telok Intan		= @
4012143	l dg. Bikam		9
4311001	Peiabat Daerah Kampar	(1974-)	
4409091	Rumah Pam Kubang Haji	(1954-)	T
451111	Politeknik Ungku Omar, Ipoh	(1972-)	
4611001	Ldg. Kuda Keb. Ulu Kinta.		ľ
4708084	Ibu Bekalan Talang, Kuala Kangsar	(1959-)	
4811075	Ranc. Belia Perlop Sg. Siput		Ĺ
\$210069	Stn. Pemereksaan Hutan Lawin		
5710061	Dispensari Kroh		
5411066	Kuala Kenderong	(1972-)	
5610063	Kg. Lalang		1
River Stage and J	River Stage and Discharge Stations		T
4310401	Sg. Kinta at Weir G, Tg. Tualang		T
4809443	Sg. Perak at Jam. Iskandar		
4911445	Sg. Plus at Kg. Lintang]
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		Life in the state common common of the state	

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Figures in brackets, e.g.(1915-) denotes commencement of observation

@: perfect

#: 6 ~ 11 months

+: 1 ~ 5 months

-: data missing

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Table I-8 (2/2) DATA AVAILABILITY OF DID PRINCIPAL STATIONS

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				S	IPS Telok Intan	I de Bikam	Peiahat Daerah Kampar	Rumah Pam Kuhang Haii	Doliteknik Iln	I de Kuda Keh Illu Kinta	The Debelon T		Kanc. Bella P	Stn. Pemereks	Dispensari Kroh	Kuala Kenderong	Ke. Lalane	Diver Stage and Discharge Stations	See Kinta at W	See Darak at Iam Ickandar	So Phie at Ko Lintano
	Station Number	DOMININ' HOUSE		Rainfall Stations	4010001	4012143	4311001	100001	151111	1001124	1001104	4/00/04	4811075	5210069	5710061	5411066	5610063	River Stage and	1010101	4010401	5446004

<availability>

note: This table was prepared based on the digitized data in "Hydrological Data Bank System"

@: perfect
#: 6 ~ 11 months
+: 1 ~ 5 months
-: data missing

I-T-11

Category of Management	Information to be Disseminated
General	1. Hydrological Information
	(1) Inventory of gauging stations
	(2) Location of gauging stations
	(3) Rainfall data (hourly, daily and monthly, annual max.)
	(4) River stage data (hourly, mean daily and monthly, annual max
	and min.)
	(5) River discharge data (rating curve, hourly, mean daily and
	monthly, annual max. and min.)
	(6) River suspended sediment (rating curve, mean daily and
	monthly, annual max. and min.)
	(7) Processed hydrological information (isohyetal map, typical
	monthly rainfall pattern, rainfall intensity curve)
	(8) Tidal level
	2. Meteorological Information
· ·	(1) Inventory and location of meteorological stations
	(2) Monthly statistical values
Flood Management	1. Real-time Flood Gauging Information
	(1) Inventory of gauging stations
	(2) Location of gauging stations
	(3) Flood hydrological gauging information
	(4) Dam reservoir gauging information
Water Supply and Water	1. Real-time Low Flow Gauging Information
Resources Management	(1) Inventory of gauging stations
2 (1)	(2) Location of gauging stations
	(3) Low flow discharge gauging information
	(4) Dam reservoir gauging information during a drought period

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Table I-9 OBJECTIVE HYDROLOGICAL INFORMATION TO BE DISSEMINATED

River	Reference Point	Catchment	Distance from	Number of R	ainfall Gauging Stations
		Area (km2)	River Mouth (km)	Existing	Minimum Requirement *
Perak	Temengor	3,420	327	0	14
	Chenderoh	6,553	208	8	26
	Iskandar	8,188	184	15	33
	Bagan Datoh	14,743	4	62	59
Pelus	Kg. Lintang	1,090		1	4
Kinta	Weir G. Tg. Tualang	1,700		12	7

Table I-10 NUMBER OF EXISTING AND REQUIRED MINIMUM RAINFALL GAUGING STATIONS

Note: *; The minimum requirement for number of gauging stations is based on the gauging density recommended by WMO (250 km2/station).

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6666674443335555555555555555555555555555		Table I-11	INVENTORY OF HYDROLOGICAL GAUGING STATIONS FOR MASTER PLAN	DROLOGI	CAL GAUGIN	IG STATIO	NS FOR MAST	TER PLAN	
Io be Cauged In ster Plan Stage No. Name No. by DID River System Latitude Longitude Authority all by redar 1-1 (Mt. Soh, 1234 m) 561005 Perak 05 35 00 01 04 50 01 04 15 00 101 04 30 31			Station			Location		Competent	ŝ
all by radar 1-1 (Mr. Soh, 1,324 m) Perak 05 36 13 101 04 50 all by radar 2-1 Kg. Lanlar 5610063 Perak 05 36 13 101 04 30 ation 2-3 Tg. Tualang (Weir G) 4310401 Kinta 04 49 20 101 09 30 ation 2-4 Tg. Rambutan 4611463 Kinta 04 49 20 101 09 30 STATION 2-4 Tg. Rambutan 4611463 Kinta 04 49 100 54 MMS necorological 1-1 Tg. Tualang (Weir G) 4310401 Kinta 04 49 100 54 MMS nage by telemetry 1-1 Tg. Tualang (Weir G) 4310401 Kinta 04 49 100 55 55 D1D at a by telemetry 1-1 Tg. Tralang (Weir G) 430443 Perak * 64 50	ation fication		2	No. by DID	River System	Latitude	Longitude	Authority	Kemarks
all by radar 1-1 (Mt. Soh, 1,324 m) - Perak (0) 30 15 (10) 90 15 and by radar 2-1 Kg. Lahang 5610063 Perak 05 25 00 101 90 15 ation 2-3 Ty. Talang (Weir G) 4511463 Kinna 04 19 20 101 06 30 2-4 Tg. Ramburan - Perak 04 32 100 06 30 2-4 Tg. Ramburan - Perak 04 32 101 06 30 2-4 Tg. Ramburan - Perak 04 34 30 34 STATION 1-1 Tg. Talang (Weir G) 4310401 Kinna 04 30 31 STATION 1-2 Luon Kerton 4310401 Kinna 04 30 30 31 STATION 1-2 Luon Kerton 4310401 Kinna 04 30 30		TTA TION							
2-1 Kg. Lalang 5610063 Perak 05 36 15 101 04 50 2-3 Tg. Tanlang (Weir G) 4310401 Kinta 04 40 101 09 30 2-4 Tg. Tanlang (Weir G) 4310401 Kinta 04 40 101 09 30 2-4 Tg. Tanlang (Weir G) 4310401 Kinta * 04 40 101 09 30 2-5 Kuala Pari 4611453 Kinta * 101 04 30 30 1-1 Tg. Lubok Merbau Ferak 04 49 100 57 MMS netry 1-1 Tg. Lubok Merbau 4510401 Kinta 04 49 10 57 51 101 64 50 55 </td <td>LALL'</td> <td>ALLON Area rainfall by radar</td> <td>i(Mt. Soh,</td> <td></td> <td>Perak</td> <td></td> <td></td> <td></td> <td>Newly proposed radar site</td>	LALL'	ALLON Area rainfall by radar	i(Mt. Soh,		Perak				Newly proposed radar site
Partial Kenderong 541066 Perak 05 25 00 101 09 15 2-3 Tg. Tualang (Weir G) 4310401 Kinta 04 19 20 101 09 30 2-4 Tg. Tualang (Weir G) 4310401 Kinta 04 40 10 06 30 2-4 Tg. Rambutan 4611463 Kinta 04 49 100 06 30 2-5 Kuala Pari - Ereak 04 49 100 06 30 1-2 Lubok Mertbau Perak 04 49 100 06 30 netry 1-3 Lubok Mertbau Perak 04 49 100 06 30 netry 1-3 Rightar 4911445 Petus 64 49 101 06 30 D1 netry 1-3 Standar 4911445 Petus * 5101 14 40 1-4	1 000	many for timiling month	iKe Lalan		Perak	36	101 04		- - -
Comparison Comparison <thcomparison< th=""> Comparison Comparis</thcomparison<>			Kuala Ken		Perak	25	101 09		Existing DID rainfall stations
2.4 T.g. Rambutan 4611463 Kinta * 401 101 091 50 2.5 Kuala Pari - kinta * 101 06 MMS 1 1-1 Ipoh Airport Perak 04 48 100 54 MMS netry 1-2 Lubok Merbau Perak 04 49 101 05 55 netry 1-3 Kg. Lintang 4911443 Perak * 04 49 10 04 30 1 1-3 Kg. Lintang 4911445 Pelas 04 49 10 61 60 55 55 55 55 55 55 55 56 <t< td=""><td>ass 2</td><td>1) Point rainfall by telemetry</td><td>2-3 Tg. Tualang (Weir G)</td><td>ş I</td><td>Kinta</td><td>61</td><td>101 04</td><td>CIIC</td><td>for FFW</td></t<>	ass 2	1) Point rainfall by telemetry	2-3 Tg. Tualang (Weir G)	ş I	Kinta	61	101 04	CIIC	for FFW
2-5 Kuala Pari - Kunta - Kunta - Kunta 1 1-1 Ipoh Airport Perak 04 34 101 06 MMS netry 1-2 Lubok Merbau Perak 04 39 101 06 30 netry 1-1 Tg. Lunang (Weir G) 4310401 Kinta 04 39 101 04 30 netry 1-3 Kg. Lintang 4911445 Perak 04 30 101 06 10 07 35 netry 1-5 Kg. Lintang 4911445 Perak * 64 30 101 10 06 10 10 06 10 </td <td></td> <td>2) Evaporation</td> <td>2-4 Tg. Rambutan</td> <td>4611463</td> <td>Kinta</td> <td>₹</td> <td></td> <td></td> <td></td>		2) Evaporation	2-4 Tg. Rambutan	4611463	Kinta	₹			
all 1-1 Ipoh Airport Perak 04 34 101 06 MMS 1-2 Lubok Merbau Perak 04 48 100 54 MMS netry 1-2 Lubok Merbau Perak 04 19 20 101 06 30 netry 1-3 Kg. Lintang 4809443 Perak 04 49 10 06 10 06 30 netry 1-3 Kg. Lintang 4911445 Petak * 64 101 06 10 06 30			2-5 Kuala Pari	'	Kınta	ļ			
al 1-1 Ipoh Airport Perak 04 34 101 05 MMS netry 1-2 Lubok Merbau Perak 04 48 100 54 MMS netry 1-2 Lubok Merbau Perak 04 49 10 06 30 netry 1-3 Kg. Lintang 4809443 Perak * 04 49 10 06 30 netry 1-5 Kg. Lintang 4101445 Perak * 04 30 101 106 75 55 DID DID nt 1-5 Kg. Lintang 4012401 Bidor 04 30 101 14 40 nt 1-5 Keramat 4111455 Btg. Padang 04 35 101 13 10 30 30 nt 2-5 Malayan Bidor Bhd. 4012401 Bidor 04 35 101 14 0 30 31	EOROI	OGICAL STATION				- 1			Fultring MMAC Bringle
1-2 Lubok Merbau Perak 04 48 100 34 emetry 1-1 Tg. Tualaang (Weir G) 4310401 Kinta 04 19 20 101 04 30 ent 1-2 Jam. Iskandar 4809443 Perak * 04 19 20 101 04 30 ent 1-3 Kg. Lintang 4911445 Petak * 04 50 101 06 10 06 55 55 56 56 101 06 10 07 55 56 56 15 101 14 40 56 56 101 13 10 56 56 101 13 10 56 56 101 10 56 56 101 14 40 56 56 101 13 10 56 56 101 10 56 56 101 56 56 101 56 56 101 56 </td <td></td> <td>General meteorological</td> <td>1-1 Ipoh Airport</td> <td></td> <td>Perak</td> <td>1</td> <td></td> <td>SMIM</td> <td></td>		General meteorological	1-1 Ipoh Airport		Perak	1		SMIM	
Interty 1-1 Tg. Tualang (Weir G) 4310401 Kinta 04 19 20 101 04 30 ent 1-2 Jam. Iskandar 4809443 Perak 04 9 10 05 55 51 101 06 10 ent 1-3 Kg. Lintang 4911445 Pelus 04 55 101 06 10 ent 1-5 Kg. Gajah - Perak * 04 30 101 14 40 ent 2-1 Sungkai 3913458 Sungkai 03 59 101 14 40 2-1 Sungkai 3913458 Sungkai 04 35 101 14 0 20 101 04 30 2-1 Sungkai 4111455 Sug. Padang 04 35 101 03 45 ent 2-5 Bt. 32 Jalan Tapah 4211468 Ramia 04 35 101 </td <td>ass I</td> <td>information</td> <td>1-2 Lubok Merbau</td> <td></td> <td>Perak</td> <td></td> <td></td> <td></td> <td>mercorological stations</td>	ass I	information	1-2 Lubok Merbau		Perak				mercorological stations
II-I T.g. Tualang (Weir G) 4310401 Kinta 04 19 20 101 04 30 ent 1-2 Jam. Iskandar 4809443 Perak 04 49 10 06 57 55 ent 1-3 Kg. Lintang 4911445 Petrak * 04 49 10 106 57 55 ent 1-5 Kg. Gajah - Perak * 51 101 06 10 14 40 2-1 Sungkai 3913458 Sungkai 04 35 101 18 50 2-1 Sungkai 3913458 Sungkai 04 35 101 18 50 2-2 Malayan Bidor Bhd. 4012401 Bidor 04 32 101 03 45 ent 2-5 Keramat Pulai 451466 Raina 04 32 101 06 35 D1 26 101 04	EAM G	AUGING STATION							
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3) Suspended sediment $1-4$ Parit - Perak * - Perak * 4) Water quality $1-5$ Kg. Gajah - Perak * -	1 220	2) Discharge	1-3 Kg. Lintang		Pelus	56	101 06		stations for FFW
4) Water quality 1-5 Kg. Gajah - Perak * 2-1 Sungkai 3913458 Sungkai 03 59 15 101 18 50 2-1 Sungkai 3913458 Sungkai 03 59 15 101 18 50 2-1 Sungkai 3913458 Sungkai 03 59 15 101 14 40 2-2 Malayan Bidor Bhd. 4012401 Bidor 04 30 101 14 40 2) Discharge 2-4 Bt. 32 Jalan Tapah 421465 Raia 04 35 101 10 00 30 DID 2) Discharge 2-5 Keramat Pulai 4511468 Raia 04 35 101 101 03 45 2.5 Jism. Raya 5610401 Rui 45 20 101 04 40 01 01 04 45 101 101 04 45 101 </td <td>1 000</td> <td>3) Suspended sediment</td> <td>1-4 Parit</td> <td></td> <td>Perak</td> <td>*</td> <td></td> <td></td> <td>Existing DID FFW river stage</td>	1 000	3) Suspended sediment	1-4 Parit		Perak	*			Existing DID FFW river stage
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		4) Water quality	1-5 Kg. Gajah	•	Perak	*		-	stations to be upgraded
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			2-1 iSungkai		Sungkai	59	101 18		
			2-2 Malavan Bidor Bhd.		Bidor	04	101 14		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1) River stage by telemetry	2-3 Tg. Keramat	4111455	Btg. Padang	80	101 08	:	
3) Suspended sediment 2-5 Keramat Pulai 4511468 Raia 04 32 00 101 08 20 2-6 Jin. Silibin, Ipoh 4610466 Pari 04 36 101 04 00 2-7 Jam. Jalan Raya 5610401 Rui 05 36 101 04 00 2-7 Jam. Jalan Raya 5610401 Rui 05 36 101 03 45 20 Discharge 3-1 Kg. Lamjut 4511463 Kinta 04 20 101 03 45 20 Discharge 3-1 Kg. Lamjut 4611463 Kinta 04 40 10 101 09 30 20 Discharge 3-2 Tg. Rambutan 4611463 Kinta 04 40 10 09 90 Discharge 21 Tidal level by telemetry 4-1 Ferak 8 4 20 101 09 37 100	200	() Discharge	2-4 Bt. 32 Jalan Tapah	4212467	Cenderiang	13	101 13		Existing DID Secondary
	1 000	3) Suspended sediment	2-5 Keramat Pulai	4511468	Raia	32	101 08		stations (Tg. Rambutan is a
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			2-6 Jln. Silibin, Ipoh	4610466	Pari	ŝ	101 04	-	river stage station for FFW)
			2-7 Jam. Jalan Raya	5610401	Rui	36	101 03		
		1) River stage by telemetry	3-1 Kg. Lamjut	4311464	Kampar	20.	101 06		
River stage by telemetry4-1Tclok Sena-Perak*DIDRiver stage by telemetry4-2Kuala Pari-Kinta*03593510047101 idal level by telemetry5-1Bagan DatohPerak0359351004710-Dam reservoir hydrological6-1Chenderoh DamPerak04571005910114Dam reservoir hydrological6-3Bersia DamPerak05131010510114gauging information6-4Temengor DamPerak052910119	ass 3	2) Discharge	3-2 Tg. Rambutan	461.1463	Kinta	40	101 09		
River stage by telemetry 4-2 Kuala Pari - Kinta * 1 Idal level by telemetry 5-1 Bagan Datoh - Perak 03 59 35 100 47 10 - 1 Idal level by telemetry 5-1 Bagan Datoh Perak 03 59 35 100 47 10 - Dam reservoir hydrological 6-1 Chenderoh Dam Perak 05 13 101 05 101 14 TNB Dam reservoir hydrological 6-3 Bersia Dam Perak 05 29 101 14 Gauging information 6-4 Temengor Dam Perak 05 25 101 19			4-1 Tclok Sena	1 1 1	Perak	*			Existing DUD river stage
Tidal level by telemetry 5-1 Bagan Datoh Perak 03 59 35 100 47 10 - Dam reservoir hydrological 6-1 Chenderoh Dam Perak 04 57 100 59 70 710 - Dam reservoir hydrological 6-2 Kenering Dam Perak 05 13 101 05 70 TNB gauging information 6-3 Bersia Dam Perak 05 29 101 14 6-4 Temengor Dam Perak 05 25 101 19	ass 4	River stage by telemetry	4-2 Kuala Pari	1	Kinta				stations for FFW
Dam reservoir hydrological6-1Chenderoin DamPerak045710059Dam reservoir hydrological6-2Kenering DamPerak051310105G-3Bersia DamPerak052910114G-4Temengor DamPerak052510119	100 5	I lidal level by telemetry	5-1 Bagan Datoh		Perak	5	801	•	Newly proposed station
Dam reservoir hydrological6-2Kenering DamPerak051310105gauging information6-3Bersia DamPerak0529101146-4Temengor DamPerak052510119	0 000		6-1 Chenderoh Dam		Perak		_		
gauging information6-3Bersia DamPerak0529101146-4Temengor DamPerak052510119		Dam reservoir hydrological	6-2 Kenering Dam		Perak			TNB	
6-4 Temengor Dam Perak 05 25 101	lass 6	eauging information	6-3 Bersia Dam		Perak		1		
)))	6-4 Temengor Dam	,	Perak				

*: According to interview survey, the coordinates of newly installed stations in 1997 are not measured yet by DID.

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$ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	-				1		-	attantors of 63 stations*		Inventory table	Location map				•••	
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$ \frac{1}{10} + \frac{1}{10}$									Numerical value	Monthly table			,		Ę	Districted
No housing statistical structure and structure an					-			recording gauges in monacast monacour					Manual input	Hydrological Data	Ulu	A SCTI Ann
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$							T		- шах.ж9999.0			Annuary	uguoini	Bank System	Disting	and the second
$ \frac{1}{10000000000000000000000000000000000$	<u></u>							· · · ·	- min.=0.0				diskette		INISIAIO	TI MOYCHE
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$ \frac{1}{10000000000000000000000000000000000$				- · ·		Ipoh	1-1-5	Rainfall intensity	•	•	Printed Graph	•	by digitizing	Evaporation Records (1991)	DID library	Publication
				Statistical	Ι		1-2-1	Inventory of 12 stations*		Inventory table	Location map					
				hydrological			Ţ	fourly values of	•							
DD Operating DD Annual DD An				information of all the			1-2-2	in northeast monsoon	Numerical value	Monthly table						:
Principal service		-		operating DID	:			period (Oct Jan.)					Manual input	Hydroloeical Data		Digitized
DD Secondary rational 1.3 Frincipal stational 1.3 Frincipal stational <th< td=""><th></th><td>-</td><td></td><td>Principal and</td><td></td><td></td><td></td><td>Daily, monthly and annual mean values</td><td>- max.= 999.00</td><td></td><td></td><td>Annually</td><td>through</td><td>Bank System</td><td>Hydrology</td><td>ASCIL Gala</td></th<>		-		Principal and				Daily, monthly and annual mean values	- max.= 999.00			Annually	through	Bank System	Hydrology	ASCIL Gala
$ \frac{1}{10000000000000000000000000000000000$		•	Non Real-time	Secondary stations		- 3 Principal stations		of 12 stations	- min.# -9.00	Annual table			diskette		Division	in diskette
$ \frac{1}{12} \frac{1}{10000000000000000000000000000000000$						- 9 Secondary stations		Annual maximum and minimum values	- 2nd decimal place					£ 2. 3. 4		
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$ \frac{13}{100} = \frac{12}{1000} 1000000000000000000000000000000000000$					Γ		1-3-1	stations*		Inventory table	Location map					
$ \frac{1}{1000} + \frac{1}{1000} + \frac{1}{10000} + \frac{1}{10000000000000000000000000000000000$						10 Suspended sediment		uni total values of 10	Numerical value	•.	· ·				ç	Distriction
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$ \frac{1}{12} - 3 \ \text{findered} $						- 3 Principal stations			- min.= 0.0				diskette		LIVISION	III DISKCHC
$ \frac{1}{1000} = \frac{1}{10000} = \frac{1}{10000} = \frac{1}{10000} = \frac{1}{100000} = \frac{1}{1000000} = \frac{1}{10000000} = \frac{1}{10000000000000000000000000000000000$:	- 7 Secondary stations			- 1st decimal place	Rating table						
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General hydrological information L42 Manual tyninstalls at sub-regions* L42 Manual tyninstalls at sub-regions* Manual tynins Manual tynins FFW interviol (IICA, 1980) Keal-time Rainfall and river stage information 1-42 sub-regions* Numerical value Inventory table Location Manual typins FFW inventory in (IICA, 1980) Real-time Rainfall and river stage information 1-51 Inventory of 10 stations* 1-51 Inventory of 10 stations* Location Manual typins FFW inventory in (IICA, 1980) Real-time Rainfall and river stage stage information 1-51 Inventory at the information Location map Pionty (flooding) Manual typins FFW inventory in Station station MMS Non Real-time Dam reservoir 2-12 Howry dam outflow in flooding period -max.= 999.0 Monthy table -paint (flooding) Manual typins Station control devices of MMS Non Real-time Dam reservoir 2-12 Howry dam outflow in flooding period -max.= 999.0 Monthy table -paint (flooding) Dam at ever in point MMMS Non Real-time Dam reservoir<							<u>4</u>	lsohyetal maps*			Contour map		by digitizing	Publication No. 19		To be the second se
Information 1-4-2 Mean monthy rantals at sub-regions* 1-4-2 Mean monthy rantals at sub-regions* Numerical value Sick graph Manual typing Manual typing Manual typing Manual typing Rah-fine Rah-fine Rah fill and river 1-5 Rundrial and river stations 1-5-1 Inventory of 10 stations* Numerical value Inventory table Location Manual typing FFW inventory in Distance Rash-fine Rash-fine Station -5 Rundry tanifal and river state -1 Manual typing FFW inventory in Distance Manual typing FFW inventory in Distance Rash-fine Rash-fine Rash-fine Rash-fine Plouty rainfal and river state -1 Manual ryping FFW inventory in Distance TMB Rash-fine Rash-fine Rash-fine Plouty rainfal -1 Banual ryping Plouty rainfal Rash-fine Rash-fine Rash-fine Plouty rainfal -1 -1 Distance -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1				Ceneral hydrological	_					•	:	•		Lower Penk Plood		Luopherson
Real-time Internation 10 Telemetry autions 1-5-1 Inventory of 10 stations* Numerical value Inventory table Location Manual typing FFW inventory in DID Real-time stage information 1-5 5 Rainfail and river stage 1-5-1 Inventory of 10 stations* Inventory table Inven				information			14-2	Mean monthly rainfalls at sub-regions*	:		Stick graph		Manual input	Mitigation Study (JICA, 1980)		
Real-time Rainfail and river for Perak FFW system 1.5-1 Inventory of 10 stations* Numerication 1.5-1 Inventory table Manual typing DID Real-time Rainfail and river 1.5 Rainfail and river stage 1.5-1 Inventory of 10 stations* Inventory table Inventory table Inventory table Inventory table Inventory table Inventory table Information 1.5 Station Data server in John Real-time Real-time Dam reservoir 2.1-1 Coordinates of the dam Numerical value Inventor table Information 2.1-2 Data server Data server in John Station Station Station Non Real-time Dam reservoir 2.1 Coordinates of the dam Numerical value Inventory table Inventory table Dainy (deoding) Manual typing Station Non Real-time Dam reservoir 2.1 2.1-1 Coordinates of the dam Numerical value Inventory table Dainy (deoding) Manual typing Din Non Real-time Dam reservoir 2.1-1 2.1-1 Coording period<					-				Mundael and					FFW inventory in	QIQ	
Real-time Rantan and Over stage information 1-5 Rainfail gauges 1-5 Rainfail gauges - 5 Rainfail gauges - 2 Rainfail gauges						10 Telemetry stations for Perak FFW system	1-2-1	Inventory of 10 stations*		Inventory table	dem	•	Manual typing	QIQ	Hydrology Division	Publication
TNB Real-time -5 Rainfail gauges 1-5.2 Flority rainfail and river stage -1 and decimal place Hourly table -1 and vertical Compatibility Control Station Control Station TNB Real-time 2 micromation -5 Rainfail gauges 1-5.2 information -1 and vertical -5 Rainfail 0nite FFW Terminal TNB Real-time Dam reservoir 2-1 Condinates of the dam Numerical value Location map -1 and daily outflow in flooding period max.= 999.0 Monthly table -1 Hourly (flooding) Manual typing Station Station MMS Non Real-time 2-11 2 Principul 3-1-1 Condinates of 2 stations* Numerical value -1 Location map -1 Annual typing Annual typing Annual typing Annual typing Annual typing Meteorological MMNS Non Real-time Tridal level 4-1 Condinates of 2 stations* -1 and daily outlow in dought period -1 annual typing Annual typing Annual typing Annual typing -1 annual typing Annual typi			Real-time	kaintail and river state information					- mix.= 999.0		1	Houster (Rooding)		Data server in Ipoh	DID. Perk	Dicitized
Real-time Dam reservoir 2-1-1 Coordinates of the dam Numerical value Location map Hourly (flooding) Manual typing Station control TNB & information 2-1 Coordinates of the dam Numerical value Location map - Hourly (flooding) Manual typing Station control MNS Non Real-time 2-1 and daily outflow in drought period max.= 999.0 Monthly table - Dam/reservoir Chenderoh dam MNS Non Real-time 2-1-1 Coordinates of 2 stations* Numerical value - Location map - Dam/reservoires Chenderoh dam MNS Non Real-time 7-1 Coordinates of 2 stations* Numerical value - Location map Manual typing Annual sumary of MMS Non Real-time Tidal level 4-1 Coordinates of 2 stations* - - Location map - Dam/reservations MMS Non Real-time Tidal level 4-1 2-1 Coordinates of 2 stations* - - Location map <t< td=""><th></th><td></td><td></td><td></td><td></td><td>- 5 Rainfall gauges - 8 River stage gauges</td><td>1-5-2</td><td>Hourly rainfall and river stage information</td><td>- Ist decimal place</td><td>Hourly table**</td><td></td><td>-Daily (drought)</td><td></td><td>FFW Terminal Station</td><td>State</td><td>data</td></t<>						- 5 Rainfall gauges - 8 River stage gauges	1-5-2	Hourly rainfall and river stage information	- Ist decimal place	Hourly table**		-Daily (drought)		FFW Terminal Station	State	data
TNB Real-time Dam reservoir 2-1 Chenderoh dam 2-1-2 Hourly dam outflow in flooding period max.= 999.0 Monthly table Hourly (flooding) Manual typing Sation control A information 2-1 2 Principal 2-1-1 Zordining of control -min.= 0.0 -min.= 0.0 <t< td=""><th></th><td></td><td></td><td></td><td>-</td><td></td><td></td><td>Coordinates of t</td><td>Numerical value</td><td>•</td><td>Location map</td><td>-</td><td></td><td></td><td></td><td>•</td></t<>					-			Coordinates of t	Numerical value	•	Location map	-				•
TNB & Information 2-1 Chemotering turnowing t			Real-time	Dam reservoir								-Hourly (flooding)	Manual typing	Station control	Chenderoh	Telephone
MMS Central 2. Principal 3-1-1 Coordinates of 2 stations* Numerical value Location map - Annual Synmary of Manual Synmary of Information Annual Synmary of Manual Synmary of Information Annual Synmary of Manual Synmary of Information Annual Synmary of Manual Synmary of Information Annual Synmary of Manual Synmary of Synmary of Manual Synmary of Manual Synmary of Information Annual Synmary of Manual Synmary of Information Annual Synmary of Manual Synm	6	Ê	هد Non Real-time		2	Chenderoh dam	2-1-2		- max.= 999.0 - min.= 0.0	Monthly table	*	-Daily (drought)		devices of Chenderoh dam	dam	call or Fax
MMS Non Real-time General meteorological stations Monthly meteorological values Monthly meteorological values Montal table Annual table Annual table Annual typing Meteorological meteorological values Meteorological survive Meteorological values Meteorological val	1				┞	12 Principal	3-1-1	Coordinates of 2	Numerical value	•	Location map	-		Annual Summary of		
MMS Non Real-time meteorological 3-1 (Ipoh Airport and Lubok 3-1-2 (temperature, relative humidity, sumshine, rainfall and evaporations) - min.s 0.0 Annual table - Annualy Observations Royal Methau) Methau) - annualy - min.s 0.0 - min.s 0.0 <th></th> <td></td> <td>Manual typing</td> <td>Meteorological</td> <td>DID library</td> <td>Publication</td>													Manual typing	Meteorological	DID library	Publication
Royal Tidal level 4-1 Bagan Datoh (tidat 4-1-1 Coordinates of Bagan Datoh* Numerical value Location map Manual typing Tidat levels 1 1 1 1 1 1 Manual typing Tidat levels 1 1 1 1 1 1 Manual typing Tidat levels 1 1 1 1 1 1 Navy ** : The interface of existing "TeleWin"in FFW Terminal Station, DID Perk will be basical ** : The interface of existing "TeleWin"in FFW Terminal Station, DID Perk will be basical	n	SMM	Non Real-time		H			(temperature, rel sunshine, rainfal	- max.= 9999.0 - min.= 0.0	Annual table	-	Annually		Observations		
Malaysian Non Real-time Tidal level 4-1 Bagan Jaton (1024) 4-1.2 Tidal levels (1st decimal place) Table - Manual Sping 1106 130108 1401 1408 130108 1406 130108 140 140 130108 140 140 140 140 140 140 140 140 140 140	Ι	loved			╀		4	Coordinates of I	Numerical value	-	Location map					
	4	Malaysian			4	bagan Daton (ndat observation in 1984)	41-2	Tidal levels*	(1st decimal place)	Table	•		Manuai typing	FIGE LIDICS		Laoucation
		Navy			-			frank temperative temperature ties work		** : The interfac	c of existing "T	sleWin"in FFW Ter	minal Station, D	ID Perak will be basic	ally applied.	

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INVENTORY OF REAL-TIME HYDROLOGICAL GAUGING STATIONS FOR OPERATIONAL SYSTEM (DID Gauging Stations and Relating Facilities for FFW) Table I-13

GAUGING STATIONS

ノーシンマシ	OVIDITUTO DUTIDINO											ŀ				
Number	Station Name	River	Gaug	Gauging Item	Discharge		Location	Ĕ		Year	Year Radio Frequency	squency	Water.	Water Level for FFW	FFW	Remarks
					Rating		•	н 20		Installed	(MHz)	(Z)		(EL, m)		
			Rainfall	River stage	Curve	Latitude		Longitude	ude		TX RX	RX	Alert	Alert Waming Danger	Danger	
Telemetry Station	Station															
	IKe. Lalang	Perak	×	•	•	05 36 15		101 0	4 50		75.475	71.900	'		1	Stn. No. 5610063
2	Kuala Kenderong	┿═	×			05 25 0	100	101 0	09 15	1074	75.475 71.900	71.900	•	•	1	Stn. No. 5411066
	Ko Lintano	Pelus		X	×	041 561	15	00100	61 10		72.125	75.625	53.64	54.25	54.25	Stn. No. 4911445
4	Jam. Iskandar	Perak	•	×	×	04 49	10	1001 5	7 55		72.125	75.625	34.8	35.4	36.3	Stn. No. 4809443
	Parit	Perak	,	X									19.8	21.3	22.3	
2	Telok Sena	Perak	1	X							Telephone circuit	e circuit	11.0	11.6	12.8	
·····	Ke Galah	Perak		X					_	1007			6.4	6.4	7.0	
8	Te Tualang	Kinta	X	X	X		20	101 04	14 30	1261	72.125	75.625		,	1	Stn. No. 4310401, #
6	Te. Rambutan	Kinta	X	X	X	04 40	10	0 101	9 30		72.125	75.625	1		t	Stn. No. 4611463, #
10	Kuala Pari	Kinta	×	×			-				75.625	72.125	. •	,	-	#
Non-telem	Non-telemetry Station (Flood Monitoring Station)	Monitor	ing Statio	(E												
	Bota Kanan	Perak		X	1		÷			1074	••••	•	15.5	17.1	18.3	
2	Telok Intan	Perak		X		-				1214		•	2.4	2.6	2.7	

Legend X : available, - : not available

FFW FACILITIES

Number	Name	Nos.
	Terminal Station	1
2	Repeater Station	2
3	Flood Warning Board	0
4	Flood Warning Siren	4
5	VHF (permanent)	0
9	VHF (mobile)	0
L	Boat (engine)	11
80	Boat/small boat (no engine)	4

and the second

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: Data logger

		Station			Location		Present	
Station Classification	Present Gauging Items	No. Name	No. by DID	River System	Latitude	Longitude	Competent Authority	Remarks
PAINFALL STATION	STATION							
Class 1	Point rainfall (Automatic)	Operating DID 12 Principal and 2 Secondary stations	pu	Re	Refer to Table 7-4	4-1	DID	Existing DID Principal and Secondary stations
Class 2	Point rainfall (Manual)	Operating DID 48 Secondary stations	stations					
ETEOROI	METEOROLOGICAL STATION					- 1		
	General meteorological	1-1 Ipoh Airport		Perak	04 34		MMS	Existing MMS Principal
Class 1	information	1-2 Lubok Merbau		Perak	04 48	100 54		meteorological stations
FREAM G	STREAM GAUGING STATION					- 1		
	1) River stage (Automatic)	1-1 Tg. Tualang (Weir G)	4310401 Kinta	Kinta	04 19 20			Existing DID Princinal
Clace 1	2) Discharge	1-2 Jam. Iskandar	4809443 Perak	Perak	04 49 10	100 57		stations
	3) Suspended sediment	1-3 Kg. Lintang	4911445 Pelus	Pelus	04 56 15	15 101 06 10		
		2-1 Sunekai	3913458 Sungkai	Sungkai	03 59 15	5 101 18 50		
		2-2 Malayan Bidor Bhd.	4012401 Bidor	Bidor	04 04 30	0 101 14 40		
	1) River stage (Automatic)	2-3 Tg. Keramat	4111455	4111455 Btg. Padang	04 08 05	5 101 08 50		
Class 2	2) Discharge	2-4 Bt. 32 Jalan Tapah	4212467	4212467 Cenderiang	04 13 55	101 13	DID	Evicting DID Secondary
	3) Suspended sediment	2-5 Keramat Pulai	4511468 Raia	Raia	04 32 0(00 101 08 20		etations
		2-6 Jln. Silibin, Ipoh	4610466 Pari	Pari	04 36 2(20 101 04 00		
		2-7 Jam. Jalan Raya	5610401 Rui	Rui	05 36 1(10 101 03 45		
	1) River stage (Automatic)	3-1 Kg. Lamiut	4311464 Kampar	Kampar	04 20 1(10 101 06 05	UIU	
Class 3	2) Discharge	3-2 Tg. Rambutan	4611463 Kinta	Kinta		101		
Clace 4	Dam outflow information	4-1 Chenderoh Dam	I.	Perak	04 57	100 59	TNB	

 Table I-14
 INVENTORY OF NON REAL-TIME HYDROLOGICAL GAUGING STATIONS FOR OPERATIONAL SYSTEM

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	Operation Authorities		Sdſ	JPS	JPS	Sdf	Sql	Sdf	Sar	SAL	Sdf	SAL	Sql	JPS	JPS	JPS					2	I						
	Current Equipment	auto	HW,#	HL,#	HW,#		OTAW, #	HW, #	MH		HW, #	HL	IHL	HL	КW	OTAW, #		ngauges	M5: 5 inch (127 mm) orifice	M8: 8 inch (203 mm) orifice	Type of Automatic Graphical Recorders				E			
TEM	Ситтел	manual	M8	M8	M8	M8	M8	8W W8	W8	W88	W8 W8	M8	M8	M8	M8	M8		ual Rai	(127 mr	(203 m	tic Grat	daily		weekly	long-te	/eekly	ekly	gger
L SYST	ration od	to													02/77	03/75	snt	ad Man	5 inch	8 inch	Automa	HD. Hattori daily	TICHER	HW: Hallon weekly	HL: Hattori long-term	KW: Kent weekly	Ota we	Data logger
LIONA	No Operation Period	from													02/77	01/73 03/75	Equipment	Daily Read Manual Raingauges	M5:	M8:	Type of			Š	H	KW	OTAW: Ota weekly	ŧ
OPERAJ	iipment lled	auto	01/60	03/64	07/74	04/65	04/72	07/74	10/59	07/74	08/71	08/71	06/72	08/71	06/62	06/77				•	•	•		:			-	
IS FOR	Date Equipment Installed	manual	01/50	01/12	07/74	11/54	04/72	07/74	10/59	08/69.	03//0	08/71	06/72	01/72	12/35	12/61								•				
ATION			0	8	20	05	90	10	- I	30	1 30	00	15	1 50	08 05	8							· .				-	
TL ST	E	longitude	1001 021	101 18	101 09	100 54	101 07	101 10	100 53	101 10	101 03	101 00	101 09	101 04	101	100 54		•					•					
AINFA	Location		8	55	20	40	20	50	30	34	55	30	8	15	05	·	tion	:		• •				÷	ি			
DDR		latitude	041 01	94 02	04 18		04 35	04 40	04 46	04 53	05 17	05 42	05 25	05 36		·ŧ	Sth. Edi			;					lso take:			
TIME	e e e	. .	445	480	765	937	079	180	284	414	863	315	994	200	557	712	vsia – 2	•							on are a		۔ د ا	· · ·
REAL	Grid Reference		VD380445	VD674480	VD515765	VD233937	OY482079	QY530180	QY225284	QY538414	OY411863	OT348315	OY517994	OT435200	VD490557	VD231712	in Mala			•	. `		· .		bservati		· . 	
5 (1/3) INVENTORY OF NON REAL. TIME DID RAINFALL STATIONS FOR OPERATIONAL SYSTEM	Station Name		TDC Talob Inteo	I do Rikam	Peiahat Daerah Kampar	Rumah Pam Kubang Haji	Politeknik Ungku Omar, Ipoh	I de Kuda Keb. Ulu Kinta	Ibu Bekalan Talang, Kuala Kangsar		Stn Pemereksaan Hutan Lawin	Dispensari Kroh	DAT Kijala Kenderono	Valation Contraction	Ng. Latang	IDU DEKAIAII JE, MAIIIN	2A JJ.S. ICON.Scim			Di-roinel storion	r. rillicipal station	S: Secondary station	Manual or Automatic Recording	M: Manual	A: Automatic (It is assumed that manual observation are also taken)	tails	T: Telemetric	
Toble 1,15 (1/3)	Station Trates	Vanili	VQ	Т	Т		T	1	PA	ΡA	ΡA		ΔT		- 1	AN N			Town of Conton			ŝ	Manual c	Ä	A	Other Details	Ë	. * * *
£		Number	1000101	4010001	1311001	1000007		1001197	4708084	4811075	501040	1900125	2000110	0001140	conn10c	411113/	2	Source.	و ب	•	-					•	•	•
	Station	Classification								Class 1											:				- - -	-	-	•••

IPS. Bagan Datoh VD108408 03 58 55 100 31 30 IPS. Bagan Datoh VD108408 03 58 55 100 51 35 36 30 101 35 36 30 101 31 30 35 40 101 30 35 40 101 30 30 30 30 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 40 00 35 <t< th=""><th>Station</th><th>Station</th><th>Station Name</th><th>Reference</th><th></th><th></th><th>Location</th><th></th><th>Ins</th><th>Installed</th><th>Period</th><th></th><th>mandinker warma</th><th>Authorities</th></t<>	Station	Station	Station Name	Reference			Location		Ins	Installed	Period		mandinker warma	Authorities
3971103 SM IPS. Bagen Datoh VD108408 03 55 51 50 73 50 73 50 73 50 75 55 76 76 75 75 76 76 75 76 76 75 76 <t< th=""><th>ISOUTINE</th><th>1</th><th></th><th>بر الم</th><th>latituc</th><th>- </th><th>longi</th><th>tude</th><th>manual</th><th>auto</th><th>from to</th><th>manual</th><th>auto</th><th></th></t<>	ISOUTINE	1		بر الم	latituc	- 	longi	tude	manual	auto	from to	manual	auto	
300100 SM Lig. New Exercises VD193455 Of 55 30 100 57 50 100 101 101 101 101 101 101 101 101 101<	5012000	e M	IDS Barran Datoh	VD108408		1	<u>8</u>		09/32			M8		JPS
3999104 SM UE Action	101000	NO.	I no New Coconit Bagan Datch	VD194363	<u>.</u>	1	L	L	5 01/26			M8		LDG
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9391149 SM Ldg. Stename reconstruction VD462422 Gi S9 40 101 07 40 3911149 SM Ldg. Stename VD698385 Gi 57 45 101 19 20 3913147 SM Ldg. Stename VD698385 Gi 57 45 101 19 20 3913147 SM Ldg. Stenem VD698385 Gi 57 45 101 19 20 3913147 SM Ldg. Stenem VD560510 64 00 35 101 93 26 4000095 SM Hospial Teok Intan VD260513 64 00 30 101 01 12 20 40 12 20 <	3909100	N/	DL J LUK, 11074 SCOUA I. dr. Tandarata Telak Intan	VD301330	<u> </u>	1	0	<u> </u>	01/07			M8		LDG
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SM Hospital Tapah VD630648 04 12 00 101 15 DID (1997). "Inventory of Hydrological Stations in Malaysia – 25th. Edition" Type of Station 25 26 27 25 25 25 25 25 25 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 26 27 27 26 27 27 26 27	4212128	WS	SRK Sri Kiniang Chendriang	VD607721			101		0 10/25			MS		JKR
DID (1997). "Inventory of Hydrological Stations in Malaysia – 25th. Type of Station P: Principal S: Secondary <u>Manual or Automatic Recording</u> M: Manual M: Manual A: Automatic (It is assumed that manual observation are also t Other Details T: Telemetric	4212133	SM	Hospital Tapah	VD630648		_	101		5 1889		 -	M5		RS
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A: Automatic (It is assumed that manual observation are also taken) <u>Other Details</u> T: Telemetric	l	Ŭ	: Manual								HW: Hatt	HW: Hattori weekly		
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T: Telemetric		Other D	etails	•							KW: Kent weekly	nt week⊔y		
	I	H	: Telemetric			·					OTAW: Uta weekly	weekly		
				•			•	•			#: Dat	#: Data logger		

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Operation	Authorities		Sql	RS	LDG	LDG	RS	DQJ	DQ	LDG	LDG	LDG	RS	RS	LDG	JKR	JKR	LDG	DQJ	LDG	JPS	LDG	LDG	POLIS	LDG	Są					501							
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No Onerstion 101	Period	to																								2	ment	Read Mar	15: 5 inch	[8: 8 inch	of Automa	HD: Hattori daily	HW: Hattori weekly	L: Hattor	KW: Kent weekly	OTAW: Ota weekly	#: Data logger	
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		manual	3/53		11/11	01/26	1_	Ľ		1.		1		<u> </u>		1	01/26	1	02/10	01/13	01/48	01/26	03/63	06/68	5 01/14	0 12/62												
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, SYSTEM	No Operation Current Equipment Operation Catchment		manual auto (km²)	S OTFL J JPS 1,700	S SEFL JPS 7,770	S SEFL JPS 1,090	S 10TFL JPS 289		CJL	S OTFL JPS 445	S 10TFW, # JPS 119	S INTEL JPS 192			S SEFL, # JPS 352	S INTEL IPS 432		S [UIFW, #] JES] 440]
VATION	o Operation	renoa	from to			07/65 12/73					10/91 06/93			4/70 11/72		 	-	
OR OPEI	ment No	9	auto fr	69/73	09/62	12/64 07	11/67	00,00	02/80	12/62	05/67 10	0000	1 1 1	06/64 04/70	02/87	03/20	222.20	0//0
ATIONS F	Date Equipment	installed	manual	61/60	1915	1936	10201		02/80	1930	1964	0070		1915	02/87	1020	0027	1930
RIVER STAGE AND DISCHARGE STATIONS FOR OPERATIONAL SYSTEM		tion	iongitude	101 04 30	100 57 55				101 14 40	101 08 50	101 13, 10	4	-+	101 04 08	101 03 45	101 06 06		101 09 30
AGE AND DI		Location	latitude	04 19 20	04 49 10	1	0.4	5	04 04 30	04 08 05	04 13 55	ŝ		04 36 20	02 36 10	ġ	्	04 40 10
D RIVER SI	Grid	Reference		VD423785	07304333	07458463	100011	4140001A	VD615510	VD504576	7D586683	01020114	V149/U10	OY418097	OY419200	0012111	06/0CHMV	QY518166
TABLE LIK INVENTORY OF NON REAL-TIME DID	Station Name			Ser Vinta et Weir G. To Tualano	TARDOU 38. Milled at 101 C. 45. Lunio	38. Felak al Jaill. Ishailwa	FAHDOUL DB. FIUS AL NE. LIIIUAIE	SAHDSQ Sungkai at Sungkai	SAHDSO So Bidor at Malavan Bidor Bhd.	CALINCO Co. Bac Dadang at To Keramat	08. Dig. 1 august at 16. twinner	bg. Cenucitating at DL. 22 Jaiatt 1 april	Sg. RAIA at Keramat Pulat	CAHDSO IS Pari at Iln. Silibin. Ipoh	C. Dui of form John Pava	og. Nui di Janii. Jalan Naju	Sg. Kampar at Kg. Lamjut	Sg. Kinta at Tg. Rambutan
1-16 INVE	Station Index			Counta	L'ANUOT	LUSCHAY	LUCUHA	SAHDSO	CNUH AN	Caditya	Donuvo		SAHDSO	USUHVS	Coon to		SAHDQ	SAHDO
Table	Station	Number		1010101	4310401	4809443	4911445	3913458	1012101	3371114	+ 11400	4212467	4511468	1610466	1010101	1040100	4311464	4611463
	Station	Classification				Class I					 , ;	Class 2		<u> </u>			•	Class 3

DID (1997). "Inventory of Hydrological Stations in Malaysia - 25th. Edition" Source:

<u>Type of Station</u> P: Principal

S: Secondary

Manual or Automatic Recording

A: Automatic

Other Details

H: If stages are taken D: If discharge observation are taken

S: If suspended sediment observation is taken
Q: Water quality other than suspended sediment is taken
T: Telemetric

Equipment

OTFL: Ott float-type long-term SEFL: SEBA float-type long-term S: Stick type manual gauge Type of Automatic Graphical Recorder OTFW: Ott float-type weekly

#: Data logger

	Catchment Area	(km²)	1,700	7,770	1,090	289	210	445		119	192	245	352	
YSTEM	Operation Authorities		JPS	JPS	JPS	SAL	Sdf	Sdl		JPS	JPS	JPS	Sdf	
LATIONAL S	Date Sample No Operation Started	from to			01/65 12/73							04/70 11/72		
IS FOR OPER	Date Sample Started		08/77	10/77	08/77	02/79	02/80	0000	0412	10/77	02/79	11/79	01/80	
NT STATION	ion	longitude	101 04 30	100 57 55	101 06 10	101 18 50		17	101 00 101	101 13 10	101 08 20	101 04 00	101 06 45	
ED SEDIME	Location	latitude	04 19 20	04 49 10	04 56 15	03 59 15			ich ich ith	04 13 55	04 32 00	04 36 20	05 36 10	1
ID SUSPEND	Grid Reference	L	VD423785	OY304333	OY458463	VD688414	VD615510		VD504576	VD586683	OY497018	OY418097	OT419200	
Table 1-17 INVENTORY OF NON REAL-TIME DID SUSPENDED SEDIMENT STATIONS FOR OPERATIONAL SYSTEM	Station Name		So Kinta at Weir G. To. Tualane	Co Derat at lam Tckandar	Sc. Dine at Ko I intang	Oc. Curding at Sunabai	DE, DUIRAAI AL DUIRAAI	Sg. Bigor al Malayan Diuol Duu	Sg. Batang Padang at Tg. Keramat	So Conderiano at Bt. 32 Jln Tapah	See Daia at Keramat Pulai	Co Dari at Ila Silihin Inch.	Ser Dui at Jam Jalan Paus	og. Kui ai Jaili, Jalali Naya
INVEN	Station	Vanit	٩	-		-	o o	n	S	v	20	20		0
Tahla I-17	Station	12011111AT	1310501	1000104	4009040	C+C174+	3005165	4012501	4111555	CASCICK	10/7174	0001104	0000104	1000100
	Station	Liassification		- : ;	Class I					روالر	C1455 4		· ·	

Source: DID (1997). "Inventory of Hydrological Stations in Malaysia – 25th. Edition"

Type of Station

P: Principal S: Secondary *Regular suspended sediment measurements are carried out at river stage and discharge stations in conjunction with discharge measurement

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at least once a month by using US DH48, DH59 or D49 suspended sediment samplers.

Table I-18 (1/4) APPLICATION FORM FOR HYDROLOGICAL DATA RENEWAL

Details of Data Required (1/4)

RAINFALL DATA (1)

Type and units of data required	Station Number	Station Name		Che	ck	Period requ		Proposed use of data
			1			from	to	
and the second	4010001	JPS. Telok Intan						
	4012143	Ldg. Bikam						
	4311001	Pejabat Daerah Kampar					~~~	
	4409091	Rumah Pam Kubang Haji			1			
	4511111	Politeknik Ungku Omar, Ipoh						Data Renewal
	4611001	Ldg. Kuda Keb. Ulu Kinta						for the River
Hourly rainfall (mm) from	4708084	Ibu Bekalan Talang, Kuala Kangsar						Basin
Octover to January (4 months)	4811075	Ranc. Belia Perlop Sg. Siput						Information
	5210069	Stn. Pemereksaan Hutan Lawin				_		System
	5710061	Dispensari Kroh						-,
· .	5411066	Kuala Kenderong	1	Ц				
	5610063	Kg. Lalang						- -
	4111137	Ibu Bekalan Sg. Manik						1
	4209093	JPS, Telok Sena						<u>]</u>

Type and units of data required	Station Number	Station Name		Ch	eck		of data ired	Proposed use of data
	Itumoor		Π	2	3	from	to	
	4010001	JPS. Telok Intan						
	4012143	Ldg. Bikam		Ŀ	LL.			
	4311001	Pejabat Daerah Kampar		i_				
<manual and="" automatic<="" or="" td=""><td>4409091</td><td>Rumah Pam Kubang Haji</td><td></td><td>L</td><td></td><td></td><td></td><td></td></manual>	4409091	Rumah Pam Kubang Haji		L				
gauges>	4511111	Politeknik Ungku Omar, Ipoh						Data Renewal
1	4611001	Ldg. Kuda Keb. Ulu Kinta			NG.			for the River
Daily rainfall (mm)	4708084	Ibu Bekalan Talang, Kuala Kangsar					l	Basin
2	4811075	Ranc. Belia Perlop Sg. Siput					L	Information
Monthly total rainfall (mm)	5210069	Stn. Pemereksaan Hutan Lawin]				System
3	5710061	Dispensari Kroh						- Oystein
Annual maximum daily rainfall	5411066	Kuala Kenderong						1
(mm)	5610063	Kg. Lalang	1.]
	4111137	Ibu Bekalan Sg. Manik	T				<u> </u>]
	4209093	JPS. Telok Sena		Ι			<u> </u>	<u> </u>

Table I-18 (2/4) APPLICATION FORM FOR HYDROLOGICAL DATA RENEWAL

Details of Data Required (2/4)

é

RAINFALL DATA (2)

Type and units of data required	Station No.	Station Name		Ch	eck	5	Period requ		Proposed use o data
	ļ .		ī	2			from	to	1
· · · · · · · · · · · · · · · · · · ·	3907103	JPS. Bagan Datoh		~~~					
Daily rainfall (mm)	3908101	Lpg. New Coconut, Bagan Datoh					 		1
any famian (min)	3909100	Bt. 5 Ldg. Nova Scotia	1						1
ر		Ldg. Jendarata Telok Intan							1 .
Monthly total rainfall (mm)		Ldg. Susex	1						1
		Ldg. Sg. Klah	1	-	1		1		
		Ldg. Sg. Sungkai	1	1	t.		1		1
		Ldg. Arcadia							1
		JPS. Sg. Dedap			1	Γ	1		-
		Ldg. Sabrang	<u> </u>		1		1		1 .
		Hospital Telok Intan			1		1		1
		Peringkat 1 Sg. Manik	1	†	1.	1-	1	l	1
		Rumah JPS. Sg. Megkuang	-	1-	\uparrow	t-	1		1
		Rumah Kerajaan JPS. Chui Chak	+-	┢	\mathbf{t}	t	1		1
		Ldg. Bidor Bahru, Bidor	+-	1	1	t	1	<u> </u>	1
· · · · ·		Kg. Gajah	+	+-	╋╌	┢	1	t	1
		Kg. Pulau Besar		†	+	† –	<u> </u>	<u> </u>	1 .
		Peringkat IV Sg. Manik		1	1	t.		1	1
		Rumah JPS, Labu Kubong		t		1-	1	1	-
		Ldg. Tai Seng			1	┢	+	1	-
		Ldg. Gedong, Bidor	-	+-	╉━	┢	<u> </u>		-1
1						╀	1		
· · · ·	4209001			+	+	┢			- Data Renew
· .		SRK Sri Kinjang Chendriang	-	-	-+	╋		ł	for the Rive
· ·	4212133			+	+-	╉┈			Basin
<u>.</u>	4309092			÷	+	╀╴		 	Information
	4311127				+-	╀		<u> </u>	System
	4409090			+	╋	╉			-
	4409121				+-	+	+	1	n a second
	4410120			╞	-	+-		<u> </u>	
	4410122		-+-	+	╶┼╼	╉	·	-l	-1
	4508087			+	+-	╋	<u> </u>	<u> </u>	
	4509088			+	╧╋	╉			
	4510117			╇	╋	╋	<u> </u>		_
	4610112			+-	+	╀		1	{
	4610116			╇	╉	+-		+	
	4611115			┢	+	╀		- 	
	4708082			╉	+	╋	- `		
	4710081		+	╇		+			
	4711113			4	+	╇	╧┨═╧╌╌╸		
		Ldg.Changkat Salak		╇	╇	+		+ +	-
		Ldg. Kemuning, Sg. Siput		╇	+	+			
	4811078	Ldg. Elphill		\downarrow	4				
	4909072		4	1		-		+	
	4909073			_	-	4			
		Ldg. Sg. Krudda, Sg. Siput		\downarrow	<u> </u>	4		- 	
	4911076				4	_			
	5009071		·						_
]	5109070	Pekan Lenggong	1	ł	1				

Table I-18 (3/4) APPLICATION FORM FOR HYDROLOGICAL DATA RENEWAL

Details of Data Required (3/4)

RIVER STAGE AND DISCAHRGE DATA

Type and units of data required	Station Number	Station Name		Ċhe	ck	Period requ		Proposed use of data
			1	2		from	to	
	4310401	Sg. Kinta at Weir G. Tg. Tualang						_
	4809443	Sg. Perak at Jam. Iskandar						
	4911445	Sg. Plus at Kg. Lintang						j
1	3913458	Sg. Sungkai at Sungkai						Data Renewal
Hourly river stage (m) from	4012401	Sg. Bidor at Malayan Bidor Bhd.						for the River
Octover to January (4 months)	4111455	Sg. Btg. Padang at Tg. Keramat						Basin
2	4212467	Sg.Cenderiang at Bt. 32 Jalan Tapah	1					Information
Hourly discharge (m3/s) from	4511468	Sg. RAIA at Keramat Pulai	<u> </u>	\square				System
Octover to January (4 months)	4610466	Sg. Pari at Jln. Silibin, Ipoh				· ·		
• ·	5610401	Sg. Rui at Jam. Jalan Raya		\square	_		·	4
	4311464	Sg. Kampar at Kg. Lamjut	1.	\square				4
	4611463	Sg. Kinta at Tg. Rambutan					L	1

Type and units of data required	Station Number	Station Name	ľ	Ch	eck			of data iired	Proposed use of data
			Π	2	3		from	to	
	4310401	Sg. Kinta at Weir G. Tg. Tualang	L						
	4809443	Sg. Perak at Jam. Iskandar							
1	4911445	Sg. Plus at Kg. Lintang							
Daily mean river stage (m)	3913458	Sg. Sungkai at Sungkai							Data Renewal
2	4012401	Sg. Bidor at Malayan Bidor Bhd.	 	L	ļ				for the River
Monthly mean river stage (m)	4111455	Sg. Btg. Padang at Tg. Keramat		L	<u> </u>				Basin
3	4212467	Sg.Cenderiang at Bt. 32 Jalan Tapah	1.						Information
Annual maximum and minimum	4511468	Sg. RAIA at Keramat Pulai							System
river stage (m)	4610466	Sg. Pari at Jln. Silibin, Ipoh			<u> </u>		<u> </u>		
	5610401	Sg. Rui at Jam. Jalan Raya	1_		L				
	4311464	Sg. Kampar at Kg. Lamjut		L	1_		<u> </u>		1
	4611463	Sg. Kinta at Tg. Rambutan					<u> </u>	<u> </u>	<u> </u>

Type and units of data required	Station	Station Name		Ch	eck		Period requ		Proposed use of data
	Number		$\overline{1}$	2	3	4	from	to	
	4310401	Sg. Kinta at Weir G. Tg. Tualang	I						
1	4809443	Sg. Perak at Jam. Iskandar			·				
Daily mean discharge (m3/s)	4911445	Sg. Plus at Kg. Lintang							
2	3913458	Sg. Sungkai at Sungkai	1_						Data Renewal
Monthly mean discharge (m3/s)	4012401	Sg. Bidor at Malayan Bidor Bhd.							for the River
3	4111455	Sg. Btg. Padang at Tg. Keramat	1	L			L		Basin
Annual maximum and minimum	4212467	Sg.Cenderiang at Bt. 32 Jalan Tapah		_			ļ	ļ	Information
discahrge (m3/s)	4511468	Sg. RAIA at Keramat Pulai		 					System
4	4610466	Sg. Pari at Jln. Silibin, Ipoh		ļ	1_		ļ		
Dischrge rating curve of each	5610401	Sg. Rui at Jam. Jalan Raya			L.,	ļ	ļ		-
station	4311464	Sg. Kampar at Kg. Lamjut	1		 		1	 	4
· · · · · · · · · · · · · · · · · · ·	4611463	Sg. Kinta at Tg. Rambutan		1_	L		<u> </u>	<u> </u>	<u> </u>

Table I-18 (4/4) APPLICATION FORM FOR HYDROLOGICAL DATA RENEWAL

Details of Data Required (4/4)

SUSPENDED SEDIMENT DISCHARGE DATA

Type and units of data required	Station	Station Name		Ch	eck		Period	of data	Proposed use o
V.	Number						requ	ired	data
			1	2	3		from	to	
	4310501	Sg. Kinta at Weir G. Tg. Tualang							
1	4809543	Sg. Perak at Jam. Iskandar]
Monthly mean sediment discharge	4911545	Sg. Plus at Kg. Lintang		<u> </u>					Data Renewal
(tonnes)	3913558	Sg. Sungkai at Sungkai		ļ					for the River
2	4012501	Sg. Bidor at Malayan Bidor Bhd							Basin
Annual maximum and minimum	4111555	Sg.Batang Padang at Tg. Keramat							Information
sediment discharge (tonnes)	4212567	Sg. Cenderiang at Bt. 32 Jln Tapah		L					System
3		Sg. Raia at Keramat Pulai			_				
Sediment-discharge rating curve	4610566	Sg. Pari at Jln. Silibin Ipoh				Ľ			1
	5610501	Sg. Rui at Jam. Jalan Raya		1	ĺ				

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