## PAKISTAN

WATER AND DEVELOPMENT AUTHORITY



## DFAT-CSIRO Indus Sustainable Development Investment Portfolio (SDIP)-Australia



## FOR ANALYSIS OF DISCHARGE DATA

## SWHP-WAPDA

January 2018







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## Some important Codes used in Hydstra

100.0	Gauge heights-Computed daily in meters
100.01	Gauge heights-Computed hourly in meters
100.02	Computed gauge heights with joined gaps in meters
140	Stream discharge in cumecs
151	Missing data for gauge
145	For gauges remains dry. Used for non-perennial streams
232	Gauge Height in Feet
262	Discharge in cusecs

#### 1. Introduction

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) and, its subcontractor, KISTERS, of Australia have been supporting SWHP-WAPDA through the capacity building of the staff in the implementation of the HYDSTRA software since 2016 to improve time series hydrological data processing and management.

The CSIRO of Australia, is helping Pakistan to build modern water management and assessment tools for the Indus Basin (<u>https://research.csiro.au/sdip/projects/indus/</u>) under Sustainable Development Investment Portfolio (SDIP) of Australian Government. This work was undertaken in the context of a Subsidiary Arrangement (established in 2016) and a Memorandum of Understanding (established in 2018) between the Government of Australia and the Government of Pakistan (<u>http://mowr.gov.pk/index.php/press-release/</u>).

Because the software has capability to process, archive and distribution of flow, climate, water quality and groundwater data sets (<u>http://kisters.com.au/hydstra.html</u>). Therefore, Software was modified to analyse and reporting the discharge and climate data according to the requirement of SWHP WAPDA. Discharges computed were also compared with the DBHYDRO (the software already being used in SWHP-WAPDA). The results of the HYDSTRA were more reliable than the DBHYDRO as presented in the meeting held at WAPDA House on November 30, 2018.

Because the software has capability to process the climate and ground water data. Therefore, the WAPDA staff from GMRC and IWASRI involved in the trainings/ workshops on Hydstra to process their data. Mr. M. Majid Sarwar Wattoo, S.E., Mr. Mirza Shoaib, SRO, Mr. Muhammad Afzal, J.E form SWHP extensively used the software during the contract period. Moreover, Mr. Kabir Nawaz, J.E and Mr. Haziq from (H&R) Engineers from Hydrology and Research Directorate (H&R) and Mian Waqar Ali Shah, J.E from GMRC also got trainings to analyse the discharge data.

Owing to its compatibility with latest machines, friendly user interface, handling of multiple data sets, availability of multiple options for printing and exporting data, HYDSTRA is ideal to implement in WAPDA to support the vision of Pakistan National Water Policy for Centralized data management.

The purpose of manual is provided the users to sufficient details about the procedures to carry out discharge data processing using HYDSTRA.

### 2. Discharge Measurement and Gauge data collection

For time series calculations of discharge, discharge measurements and the hourly or daily observed gauge height for gauging station is required. SWHP field team carry out the discharge measurements on weekly basis, at most of the sites, using the current meter and observe the gauge heights on hourly basis. Gauge heights data is collected on daily basis for eight hours and 24 hours depending upon the staff at the site.





Figure 1: Sample discharge measurement proforma

#### 2.1. Discharge measurement and gauge data collection Procedure

Mean section method is used to calculate the discharge measurement. Figure 1 shows the sample proforma that is filled by the hydrographer during discharge measurement at site.

Gauge is observed on half hourly basis during discharge measurement and averaged at the end of discharge measurements that sometime differs from the average of the hourly gauge observations.

#### 2.2. General mistakes in data measurement/observation and entry

- a) Gauge is observed on half hourly basis during discharge measurement and sometimes average gauge height is calculated incorrectly.
- b) Gauges in decimal places are sometimes not recorded accurately e.g., see the record of Kaghan/ Naran 2016.
- c) Sometime discharge is not collected correctly in the field or calculated the proforma.
- d) Discharge measurement data contains typing mistakes that needs to be corrected before developing rating curve.
- e) Wrong gauges may be entered in the proforma and the digital record as well.

Errors in gauge height and discharge measurement can be assessed after importing the data into HYDSTRA using the newly imported time series file and hyrated option, respectively. Detail of the time series data and development of rating is given in the subsequent sections.

#### 3. Importing Discharge and gauge data into HYDSTRA

The gauge and discharge data can be directly entered in hydstra by creating new time series file using workbench.

• Select file/ Create New File



• Select the Site, data source and other required parameters

	Create New File ×
Site	35749301 Lookup
Data Source	С 🗸
Variable	[ 232] Gauge Height (feet) 🛛 🗸 🗸
SubVar	1
Timing	Regular 🗸
Start Time	00:00:00_01/01/2018 🗸
EndTime	00:00:00_31/12/2018 🗸
Increment	1 🖶 Hour 🗸
DataTrans	1: Instantaneous 🗸 🗸
Start Value	0.0
End Value	0.0
Total	0.0 (For Datatrans 5/6)
Initial Quality	1 Good continuous records
	✔ Use Text Editor to Input Data?
Edited Quality	1 Good continuous records
	V OK X Cancel

- Click Ok. A window will open where gauge height can be entered.
- After entering the data work file can be saved.

However, Hydstra is not available for all the staff, therefore, an excel format is available to enter both gauge and discharge data in it. Therefore, following methodology is helpful to calculate discharges accurately.

### 3.1. Excel Template for entry of Gauge and Discharge data

Although there is option to add the gauge data entry directly in Hydstra and import the data downloaded from data logger. However, the available template can be used to enter the data manually in it and then import the file into hydstra.

• Double Click on the file available at following path to open the template Company Favourities/ By Function/ Importing/ Excel Templates/ Gauge Height and Discharge Template



### The data entry templates are also available at following location: C:\hydstra\prod\HYD\dat\ptmp\Data Entry Templates

Template contains two sheets; one for entry of gauge height in feet and other for discharge data (in cusecs) measured at gauge location. Enter the data and complete the other details e.g, site name and year etc. Note that the date format should be in dd/mm/yyyy as shown in figure 3.

**Note**: Data entry sheets can be placed in a folder for particular year to be saved as a backup e.g., E:\Gauge Height and Discharge measurement SWHP\2018\Besham Qila.xls.

## Implementation of HYDSTRA at SWHP-WAPDA using latest data management software (SDIP-Indus Basin project)

XI 🔒 5 -	ð - 🐶	<del>-</del> -						Template -	Gauge Hei	ght and Disc	harge.xlsx	- Excel						?
FILE HOME	INSE	RT	PAGE LAYOUT	FORMUL	AS DAT	A RE	VIEW	VIEW TEA	M									
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Α	в	С	D	E	F	G	н		J	К	1	M	Ν	0	Р	Q	R	S
1	-	-				-			-		Si	teName						_
2											(	Gauge H	leight in	Feet				
3 <b>DATE</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4 01/01/2013									9.80	9.90	9.90	9.80	9.70	9.70	9.70	10.50	10.60	
5 02/01/2013									9.90	9.80	9.60	9.50	9.40	9.40	9.80	10.60	10.70	
6 03/01/2013									9.80	9,70	9.50	9.30	9.20	9.20	9.60	10.50	10.60	
7 04/01/2013									9,70	9.60	9.50	9.40	9.40	9.70	0 10.30	10.50	10.65	
8 05/01/2013									9.80	9,70	9.60	9.50	9.40	9.40	9,70	10.30	10.50	
9 06/01/2013									9.60	9.50	9.30	9.20	9.20	9.20	0 10.50	10.90	11.10	
10 07/01/2013									9.80	9,60	9.40	9.35	9.30	9.30	9,70	10.60	10.80	
11 08/01/2013									9.70	9.50	9.40	9.30	9.20	9.20	9.38	10.50	10.60	
12 09/01/2013									9.60	9.50	9.40	9.30	9.30	9.80		10.60	1060.00	
13 10/01/2013														-				
14 11/01/2013																		
15 12/01/2013																		
16 13/01/2013																		

Figure 3: Template for gauge height

**Note**: Gauge height can be imported in meters centimeters or inches by replacing the text 'Feet' or 'Ft' to 'meter' or m', centimeters or 'CM' and 'cusecs' to 'cumecs'. Following scripts for import of data is available at E:\hydstra\prod\HYD\dat\ini

- wap.import.ini
- wap.import.heightdischarge.xls.hsc

#### 3.2. Import gauge height and discharge data

• Run the *import gauge height & discharge data from Excel file* in HYEXPLORER at the following path:

#### **Company Favourites/ By Function/ Importing**

- Enter the following details in the window that opens as shown in figure 4.
  - Site ID,
  - Data source and
  - Path of file name (Excel file of Gauge height and discharge of the required station) to be import into hydstra

Cit Time-Series Data     WAP.IMPORT.HEIGHTDISCHARGE.XLS.HSC run at 2018/08/27 11:52:29       Cit Stee, Gaugings and Ratings Metadata     WAP.IMPORT.HEIGHTDISCHARGE.XLS.HSC run at 2018/08/27 11:52:29       Cit Water Quality Data     Parameters       Di Modeling     Datasource B	<b>1</b>	HYXPLORE - Hydstra Explorer
By Data Type     By Data Type     By Data Type     By Data Type     Digmeters     Discharge Import Report     By Data Type     Digmeters     Discharge Import     Discharge     Discharge	File Edit Menus Options Help	
Company Favourites     Company     Co	🕥 🔍 📼 🔎 🦿 🔤 🛛 Profile	
Comport Gauge Height & Discharge data from an Import Sediment Data from Excel Import Daly Rainfall Data from Excel Import Climate Stel Mediatation from SCV Import Stell St	Company Favourtes     Company Favourtes     Company Favourtes     Company Favourtes     Mapping Interface     Company Favourtes     Potential     Potential	Excel Gauge Height and Discharge Import Report         WAP.IMPORT.HEIGHTDISCHARGE.XLS.HSC run at 2018/08/27 11:52:29         Parameters         Datasource [B         Filename       D:\GMRC\HYDSTRA[FROM WORKSTATION GMRC\SWHP DATA 2016/PALOTE-2016- GAUGE         Import Gauge Height & Discharge Data from Excel         Program       Options         Help       (for Gauge Height values)         Work Area       [ARCHIVE] V         Node       SEARCH V         Data File Name       C:\VPOSTRA\FROD\HYD\DAT\PTMP\ENTEREDDATA\GAUGE HEIGHT - DISCHARGE\FILE,XLS V         Output Listing       S

Figure 4: Window for import of Gauge height and Discharge data in excel format

• Data will be imported in work file e.g., A, B or C etc. if the data source for file is already existed then the new file will be given the next alphabet.

#### 3.3. Correction of gauge height data

After importing the data, Open the newly created work file using workbench.

- Click the *time series* option in Hydstra.
- Select *File/ Open* or click on icon Open a file 🖻 and enter the code of the site

?			Hydstra
<u>F</u> ile	<u>E</u> dit <u>S</u> election <u>R</u> ep	orts <u>W</u> indow <u>O</u> ptions <u>H</u> elp	
<b>B</b>			-
	Ø	HYDMWB - Open list of sites -	
	Site List	04	?
		VOK X Cancel	

Figure 5: Open site in Work Bench

- Open the required work file. Double click on Gauge Height...
- A gauge height window will open. *Select all blocks the blocks* and *click on Graphics tab* where representation of data can be seen.

it <u>S</u> election <u>R</u> eports <u>W</u> indow <u>O</u> ptions <u>H</u> elp					
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5754401 3575g401 3575g401	35754401				
Pile Edit Variable Window Help			-	- • ×	
Edt Export Collecte Analyse	<b>a</b>				
Variable 100.01 Gauge Height (metres) - Hourly			Start 01:00:00_01/01/2017	End 01:00:00_01/01/2018	
Variable 357	54401.E / 100.01 💻 👘		/ Gauge Height (metres) - Hourly		
File Edit View Mode Blocks Points Selection	Filter Window Options Help				
Read Only Current Blocks : 1 - 3 / 3					
Site ID 35754401 Datasource E	Variable				
Blocks	Jummary	1	Text	Graphic	:s

 A graphical view of the data will open where errors can be identified easily. *Zoom in* the portion of data and see the date and hour of incorrect data entry.

#### HYDSTRA User Manual

## Implementation of HYDSTRA at SWHP-WAPDA using latest data management software (SDIP-Indus Basin project)



• Correct all the data in excel and import it again.

#### 4. Rating Curve in Hydstra

Hyrated function is executed to develop rating curve in hydstra. Following are the steps to develop rating curve:

#### 4.1. Developing Rating curve

a) *Run hyrated* and add the required details i.e., Site ID and the required data base in the rating details, other details should be as follows:

	Open ×	
Rating details:		
Site	36741228	
VarFrom	100.00 ¥	
VarTo	140 ¥	
Load ratings:		
Copy from	n <u>A</u> rchive	
	Vork Area Data	
Work area		
[priv	.hyrated]	
3674122	8, 100.00->140	
Time series:		
Load	See the	
Datasource	C Note Below	
Stage	100.01 V	
Cross Section:		
Site	36741228	
Section	✓ (Blank for none)	
<ul> <li>Image: A set of the set of the</li></ul>	OK 🗙 Cancel	

Figure 6: selection of site and data base

#### Note:

100.01 in time series allows to see the daily gauge data in time series window as indicated by arrow in figure 8. Rating curve line should be straight in log-log graph, cumulative error vs time should be near to zero as shown above.

**b)** Window for developing rating curve will be open then **Add table** by right click on the HYRATED window

c) Add the required data in the window i.e., Rating table stage bottom, Cease to Flow (CTF) and Rating Table stage top and check the option 'equations' and then click *OK* button.

Rating	Profile	×
Before HYRATED creates and confirm the contre		
Stage range of gaugings	3.819 to 14.877	
Stage range of existing tables	3.212 to 40.247	
Max CTF of existing tables	0.000	
Rating table Stage bottom	2.0000	
Rating Table CTF	0.0000	
Rating table Stage top	42.0000	
Table Type O Points O Equations		
🗸 ОК	X Cancel	

Figure 7: Rating Profile

**Note**: CTF is the gauge height where flow ceases and gauges below this height will compute zero discharges. Therefore, for hill torrents (Non-perennial streams) this helps to compute the discharges accurately.

d) Add the required information in the window 'table details' as shown in figure 8.



Figure 8: Window for Table details

- e) Right click on the HYRATED window and add the period using Add button
- f) Entered the date and time in the *period Start tab* and then select the table from *Table list* tab. (*Period should not be started from the date of measurement otherwise shift will not be computed*).

			HYRATED					
Help								
📶 🌇 🐼 Configure error vie	- QQ	<b>ر ا</b>	े 🖩 🚔 ८	' 🔥 [ 🔬 🖧	• π <sup>2</sup>			
Table: Log(h-CTF):Log(Q) (	CTF = 0.000)				] 🗖	Er	ror: Err. v Time	e
	Period List							
Start RefSite Tab	le Phased		Effective Rating		500			
00:00_01/01/2016 34729803 1	N		Axis type Log(h-CTF):Lo	g(Q) 🗸				
			Show lower 50  %	×	1 1			
	Г		Period Details		1 1			
	Period Start		0_01/01/2016 ∨	🗸 ок			* *	*
	Table Site	34729		🗙 Cancel	0	*****	*** <u>*</u> *{*/1/*	* * * * ***
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Figure 9: Adding new period list

**g)** See the table and Time Series Stage vs Time windows for any errors in the imported data



Figure 10: Window for Rating of station

**h)** To develop a good rating curve, divide it into different periods then in multiple rating curves.

**Note:** Error in discharge data can be corrected using **Hydstra Database Manage** - **Site Manage** by double clicking on **Site, Gaugings and Ratings Metadata in HYEXPLORER.** Then **search site** and **click GAUGINGS**- **Gaugings** as shown in figure 11. Similarly, if a discharge value is to be delete then select the particular date

and click the delete button 🗶 .Filter can be applied to delete the gauging's of particular year (s). Please see the *section 2.4.1.* 

2			Hyd	dstra Databas	e Manage - S	ITE Manage		
File Manage Edit View Tools Filter O	Options Help							
🕈 🥖 🗙 🛍 🛤 🛭 🖏 🚰 🂙	🗶 🚿 🗊	8						
[ARCHIVE]		22977 rows	SIT	E (34729803)				
SITE - Sites		68 rows	GA	UGINGS (3472980	3,100,140,18/08/	2016,1200)		
STATION - Stations	Site	VarFrom	VarTo	Meas Date	Start Time	End Time	Gauge No	Start GH
STNINI - Site Specific Data	34729803	100	140	18/07/2016	12:00:00	12:00:00	20160718.0	13.78
BENCH - Benchmark Location	34729803	100	140	21/07/2016	12:00:00	12:00:00	20160721.0	10.98
HISTORY - Site History	34729803	100	140	26/07/2016	12:00:00	12:00:00	20160726.0	11.95
PERIOD - Period of Record	34729803	100	140	28/07/2016	12:00:00	12:00:00	20160728.0	13.19
PEAKTIME - Time of Peak Series	34729803	100	140	01/08/2016	12:00:00	12:00:00	20160801.0	12.38
SERIES - Peak Series	34729803	100	140	04/08/2016	12:00:00	12:00:00	20160804.0	12.26
~	34729803	100	140	08/08/2016	12:00:00	12:00:00	20160808.0	14.69
ATEPER - Rating Tables Period	34729803	100	140	11/08/2016	12:00:00	12:00:00	20160811.0	13.74
RATEHED - Rating Table	34729803	100	140	15/08/2016	12:00:00	12:00:00	20160815.0	11.40
RATEPTS - Rating	34729803		140	18/08/2016			20160818.0	
RATEEQN - Rating	34729803	100	140	22/08/2016	12:00:00	12:00:00	20160822.0	9.71
SSHIFT - Rating Tables St	34729803	100	140	25/08/2016	12:00:00	12:00:00	20160825.0	9.41
O TSHIFT - Rating Tables Ti	34729803	100	140	29/08/2016	12:00:00	12:00:00	20160829.0	9,90
TTABHED - Time-based Table H	34729803	100	140	01/09/2016	12:00:00	12:00:00	20160901.0	9,29
TTABPTS - Time-based Table	24729802	100	140	05/09/2016	12:00:00	12:00:00	20160905.0	7.95
	34729803	100	140	09/09/2016	12:00:00	12:00:00	20160909.0	7.60
	34729803	100	140	15/09/2016	12:00:00	12:00:00	20160915.0	7.69
GAUGMEAS - Gauging fie	34/23005	100	140	19/09/2016	12:00:00	12:00:00	20160919.0	6.76
SECTHED - Cross Section Head	34729803	100	140	22/09/2016	12:00:00	12:00:00	20160922.0	6.800
SECTIONS - Cross Section	34729803	100	140	26/09/2016	12:00:00	12:00:00	20160926.0	6.770

Figure 11: Selection of gauge for editing

• If error view vs time shows zero error then shift has been computed. Therefore, first delete the calculated shifts and then adjust the curve. **See the section** *shift calculation.* 

Accurate discharge calculations from available gauges depends upon the best fit rating curve for the certain period.

i) Save the rating curves using **File/ Save to archive**. Rating will be saved in archive file.

#### 5. Computation of stage Shifts

Run the **Compute Stage shifts** under **System Administration** folder. Enter the required information i.e., *Site ID and Data source file (imported in last step)*, the year(s) for which the shifts are to be compute.

**Note**: if shifts are to be computed for the year 2016 then a first discharge measurement value should be entered for the year 2017. If the measurement of last day of 2016 is available then it is not required to enter the measurement of 2017.

If the shift is not computed for a particular day(s), it means the period is starting from the day of measurement then change the date of start of the period.



Figure 12: computation of gauge shifts

**Note**: If it is required to draw rating curve again then first delete the calculated shifts for particular year (*see section 10.1.2*):

#### 6. Computation of Mean Daily Height and Flow

- a) Archive the work file which was imported at first step but keep a copy of it so that if rating curve is to be modified then it should be available.
- b) Run the Compute Mean Daily Height and Flow under System Administration folder. Select the site and Data Source 'A' i.e., Archive file.
- c) Run the Time-Series Data option under Company Favourites. Open the files using the Work Bench.

<b>?</b> ?		H	Hydstra
<u>F</u> ile <u>E</u> dit	t <u>S</u> election <u>R</u> ep	oorts <u>W</u> indow <u>O</u> ptions <u>H</u> elp	
<b>2</b> 2			
e	P	HYDMWB - Open list of sites – 🗖	×
	Site List	01	••• ?
		V OK X Cancel	

Figure 13: Open site in Work Bench

### 7. Correction and comparison of discharges

a) Copy the archive file into work file so that any changes in the calculated discharges can be made, if required.



Figure 14: copying archive file

b) Correction and comparison of discharges of gauging locations on a single stream: Open the work file to see the graphical representation of computed discharges. In the graphics, added the discharges of downstream gauging station using a reference trace option.

**Note**: open the work file (a copy of archive file) first that needs correction and then follow these steps

- a) **Uncheck** the read only box
- b) Zoom the required area and Click on the select mode or region select. 28 29 29
- c) Click on **move button 1** and drag the hydrograph.
- c) Adjusted the discharges of upstream station where it was higher than the downstream stations (Figure 14).
- d) Correction and comparison of discharges of gauging locations on a different stream:

For example the discharges at Chattar Kallas should be higher from the sum of the discharges of \_\_\_\_\_\_. Following steps should be done in this case:

## Implementation of HYDSTRA at SWHP-WAPDA using latest data management software (SDIP-Indus Basin project)



Figure 15: correction of discharges (gauging station on upstream side) calculated from best fit rating curves

**Note**: If data is to be delete from hydrograph then give the quality code 151-Data missing. The values of deleted data will be replaced with -1.

#### 8. Save and print options for the reports

Once the user is satisfied with the computed discharges then report of the particular station can be generated using the following methodology:

#### 8.1. Using the option 'Report Daily discharge for year'

Report of a selected station(s) can be generated in '.html' format using the following procedure.

- Double click on 'Report daily discharge for a year'
- Select the site and data source, year and other parameters
- Write the name of file at a selected path with extension .html. File will be saved in html format at the given path that can be inserted in Microsoft word, if required.

**Note**: Discharge report of each station can be saved in a particular folder e.g., E:\Final Reports\2018\Besham Qila.html



Figure 16: Creating report in html format

#### **Important**

VarFrom 100.01: discharge is calculated from rating curve

VarFrom 140.0: discharge is taken from the calculated/finalized discharges from file

**Note:** Above method is recommended to generate reports. However, some other options described in *section 13* may also be used to generate the reports.

#### 9. Creating Binder for all discharge sites (Volume 1 of SWHP Report)

When discharges for all the stations are calculated and saved in .html format in the selected folder then add all the files should be inserted in the word file.

- For this, Open a new word file. (Select the A4 Page size)
- Adjust margins as given below



• Go to Insert tab of word file and click on Object and select Text from File.

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ati	Tables	-	Illustrations	2 1	Apps	Media	Links	Comments	Header & Footer	10 · · · 11 · · · 1	Te: 2 · · · 13 · ·		

• Select all the .html files in the selected folder and click *Insert* button. All the files will be added in the new word file.

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Pictures	💽 Massan.html	25	5/10/2018 15:02	Avast HT	ML Doc
Videos	💽 Muzaffarabad.html	26	5/11/2018 18:25	Avast HT	ML Doc
Local Disk (C:)	💿 Nosheri.html	22	2/10/2018 15:11	Avast HT	ML Doc
D (D:)	Palote.html	22	2/10/2018 15:07	Avast HT	ML Doc
Local Disk (E:)	💽 Talhatta.htm	22	2/10/2018 14:44	Avast H1	ML Doc
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- Click on line spacing option under the Home tab

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• Select the zero spacing and single line spacing as given in figure below.

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<u>T</u> abs	Set As <u>D</u> efault	OK	Cancel

• Delete a spacing before each station then all the stations data will be adjusted to single page.

#### **10. Some Additional Options in HYDSTRA**

#### 10.1. Application of filter tool to delete the gaugings and computed shifts

#### 10.1.1. Deleting Gaugings

- Select the Site, Gaugings and Ratings Metadata in HYEXPLORER
- Select the Gaugings-Gaugings
- Select *filter* and write equation as shown in figure to select the shifts of particular year

2			Hydstra Database Manage - SITE Manage	
File Manage Edit View Tools Filter C				
[ARCHIVE]	22992	2 rows	SITE (36741228)	
SITE - Sites	81 r	rows	GAUGINGS (36741228,100,140,26/12/2016,1200)	
STATION - Stations	Site	2	Filter Expression Builder - GAUGINGS	- 🗆 🗙
BENCH - Benchmark Location	36741228	File Tools Help		
HISTORY - Site History	36741228 36741228	🖻 🖬 🗅 🔅	< 2 % * #	
PEAKTIME - Time of Peak Series     SERIES - Peak Series     Monomediate Series     Annomediate Series     Annomediate Series	36741228 36741228 36741228	Combine Field nar AND V Date Me	ne Operator Value asured (MEAS_DATE) ] V Less Than or E V //	✓ 🕂 Add // Replace
KATEPER - Rating Tables Pende     Arteren - Rateren - Rating Tables	36741228 36741228 36741228	AND	MEAS_DATE Greater Than or Equal to '26/12/2016' MEAS DATE Less Than or Equal to '31/12/2017'	Add to query
RATEEQN - Rating	36741228			
SSHIFT - Rating Tables St	36741228 36741228			
TTABHED - Time-based Table H	36741228			
TTABPTS - Time-based Ta	36741228 36741228			
GAUGINGS - Gaugings	36741228			
SECTHED - Cross Section Head	36741228			
SECTIONS - Cross Section	36741228			
SECTSURV - Sections Surveys	36741228			
STNVISIT - Station Visits	36741228 36741228		V OK X Cancel	
INSTREG - Instrument Registratic     INSTHIST - Instrument History (re	26741228		VIK 👗 Lancel	
NRSTN - Network Review Statio				.ii

Figure 17: Application of filter tool to select the gaugings of 2016.

- Select the *delete button* or Go to *Edit/ delete*, a window will open.
- Select the all record in filtered view of Gaugings and click OK.

#### 10.1.2. Deleting Shifts

- Open hymanage i.e., HYDSTRA Database Manage SITE Manage
- Select the station using find key value tool
- Select the SSHIFT-Rating table shift.
- Select filter **n** and write equation as shown in figure to select the shifts of particular year.

File Manage Edit View Tools Filter Help		Hydstra Database Manage - SITE Manage	
[ARCHIVE]	22977 rows	SITE (04)	
- SITE - Sites	5 rows	RATEPER (04, 100, 140, 01/01/2014, 0)	
STATION - Stations	118 rows	SSHIFT (04,100,140,01/01/1900,0)	
BENCH - Benchmark Location		Filter Expression Builder - SSHIFT	_ 🗆 🗙
HISTORY - Site History	File Tools Help		
PERIOD - Period of Record		<b>≩</b> ≝ <b>#</b>	
SERIES - Peak Series 04			
RATEPER - Rating Tables Perior     04	Combine Field name	Operator Value	
RATEHED - Rating Table     O4     RATEPTS - Rating     O4     O4	AND V Start Date (S	DATE) V Less Than or E V / /	✓ ♣ Add // Replace
BATEFON - Bating 04		SDATE Greater Than or Equal to '01/01/2015'	
SSHIFT - Rating Tables SI	AND	SDATE Less Than or Equal to '31/12/2015'	
O- TSHIFT - Rating Tables Ti 04			
TTABHED - Time-based Table H			
TTABPTS - Time-based T; 04			
GAUGINGS - Gaugings			
O SECTIONS - Cross Section 04			
O SECTSURV Sections Surveys			
Of Stevision Visits			
INSTREG - Instrument Registratic 04			
INSTHIST - Instrument History [re 04		🖌 OK 🛛 🗶 Cancel	
NRSTN - Network Review Statio     STNINIKW - Ste Specific Data Keywor			
STNINIKW - Site Specific Data Keywor     04     04			.ii

Figure 18: Selection of Gaugings of selected dates/year using filter tool

• Select the *delete button* or Go to *Edit/ delete*, a window will open.

Delete records x
Delete scope
SITE     SITE
SSHIFT - (Filter Active)  TTABHED  GAUGINGS  GAUGINGS  GAUGMEAS  SECTHED  SECTHED  SECTURV  SECTSURV  SIT  SIT  SIT  SIT  SIT  SIT  SIT  SI
NRSTN
STNINIKW     The current record in SSHIFT     All records in filtered view of SSHIFT for the current RATEPER record     There may be documents associated with these records
OK Cancel Details

Figure 19: Selection of Shifts of selected dates/year using filter tool

• Select the all record in filtered view of SSHIFT... and click OK. Now the hydrated will show the unshifted error view.

#### 10.2. Plotting Rating Curve with equation

- Run HYGPLOT
- Select the site, start date, end date and other required parameters as shown in the Figure

	🚇 HYGPL	.OT - Plot Gauging Inf	ormation – 🗆 🗙
	<u>P</u> rogram <u>O</u> ptions <u>H</u> elp		
	Site	36741228	
2	VarFrom	100 ¥	G.H. (m)
	VarTo	140 V	Discharge (m3/s)
	Start Date	25/12/2016 ¥	(For Gaugings)
	End Date	31/12/2017 ∨	(Leave alone for all)
	Rating Table Number(s)	1 🗸	(-1 = None, -2 = Latest)
	Axis Scale Type	LIN V	(LIN/LOG/P25)
	Plot Output	wap.v	
	Follow 1,2,5 Rule		(LIN/P25)
	Offset Log Scale by CTF/PZF?		
	Spread Over Pages, % Overlap	1 ‡ 25 ‡	(If Pages > 1)
	Confidence interval		
	Label Gauging Numbers, Dates		(If Rating Table <> -1)
	Colour Gaugings by	DATE V	(Must be a section in HYGPLOT.INI)
	Stage Min, Max	-1.000 V -1.000 V	(Leave alone =Autoscale)
	Colour Dates 01/01/2100 v 01/01/2	2100 ¥ 01/01/2100 ¥ 0	01/01/2100 ¥ 01/01/2100 ¥
		🖌 Run 🛛 🗶 Cle	DSe
	HYGPLOT complete		

Figure 20: HYGPLOT for plotting rating curve

• Enter the following path in advanced options of plot output

	Plot Device		×
Device code	WIJ 🗸 WIP file, JSON format		
Override style mask	~		
Override file mask	~		
Size override	0 🗢 0 🜩 (PNG/BMP/JPG)		
Perl filter	wap.postpro.ratingplots.pl	¥	?
Perl extra params	SCR		
Expression	wap.postpro.ratingplots.pl(WIJ,SCR)		-
	VOK X Cancel		

Figure 21: Plotting rating curve for selecting period using hygplot

- 11. Combining the flow of upstream sites and its comparison with downstream site
  - 1. Run *hycrsumx.hsc*
  - 2. Enter data

<b>6</b> .		HY	CRSUMX - Add	l Mult	iple Sites			×
Program O	ptions Help							
OUT	TEST		z			140 V		
Data	Site		Data Source		VarFrom	VarTo	Travel (Mins)	Mult
IN	01		A		100.01 ∨	140 V	0 ‡	1.000
IN	02		A		100.01 ∨	140 V	0 ‡	1.000
IN	03		A		100.01 ∨	140 V	0 ‡	1.000
IN	0		A		100.00 ∨	140 V	0 ‡	1.000
IN	0		A		100.00 🗸	140 V	0 ‡	1.000
IN	0		A		100.00 L	ookup VA	RIABLE table	1.000
IN	0				100.00 🗸	140 V	0 \$	1.000
IN	0		A		100.00 ∨	140 V	0 ‡	1.000
IN	0		A	•••	100.00 ∨	140 V	0 ‡	1.000
TIME								
Start Tim	-	00:00_	01/01/2014 ∨					
End Tim	e	00:00_	31/12/2014 ∨					
Interva	al	01 🔅	DAY V					
Plot Outpu	ıt	SCR ∨						
Output Fil	e	S		¥				
			🗸 Run	×	Close			
HYSCRIPT cor	mplete							
	mpor seamers uses nom							

Figure 22: combining the flows of sites using hycrsumx

- 3. Click the run button.
- 4. Run *Hyplot* and enter the site created above i.e., TEST with data source Z and the site which is to be compared i.e., 04.
- 5. Select same in bottom for downstream site for same vertical axis.

2					HYX	PLORE -	Hydstra	Expl	orer							
File Edit Menus Options Help																
🕥 🔍 🔤 🔎 🦿 🔽 🛛 Pro	file															
P - D My Favourites     Company Favourites     Documentation     Documentation     Documentation     Documentation     D Mapping Interface     D Mapping Interface     D Mapping State     D Mater Quality Data	P1 2 W		me4 Page5 Page6 1 07:06 HYCRSUMX : Model:		ed					Page 13	Page	14   Paqe	e 15   Page 16	Paq	e 17   Paq	ie 18   Pa
Modelling	<b>e</b>				HYPLC	T - Plot	t Hydstra	Data	a Files							~
By Data Type     By Function     A - D Importing	Progr Code		p Data Source	v	arFrom \	/arTo	Туре		Axis	Bottom		Тор	Filled		Options	
▷ - Call Excel Templates	DATA	TEST	Z		140.00 V	140 V	MAXMIN	¥	LIN V	AUTO	~	0.0	NO	¥	NONE	~
Import Gauge Height & Disc	DATA	04	A		100.01 v	140 V	MAXMIN	¥	LIN V	SAME	~	0.0	NO	~	NONE	~
Import Hourly Rainfall Data	DATA	0	A		100.00 v	140 V	MAXMIN	¥	LIN V	AUTO	~	0.0	NO	~	NONE	~
🔐 Import Daily Rainfall Data fr	DATA	0	A		100.00 v	140 V	MAXMIN	¥	LIN V	AUTO	~	0.0	NO	~	NONE	~
Import Tipping Bucket Rain	DATA	0	A	•••	100.00 v	140 v	MAXMIN	¥	LIN V	AUTO	~	0.0	NO	~	NONE	~
Minport Climate Data from CS     Minport Climate Data from CS     Minport Climate Data from Ex     Minport Climate Ste Metadat     Metadat     Minport Climate Ste Metadat     Metadat     Metadat     Metadat     Minport Climate Ste Metadat     Metada	PLOT	Each Page Spans Divided Into Start Time Number of Pages Plot Options Plot Output	1 © PERIOD 1 © DEFAULT 00:00_01/01/20 1 © DEFAULT SCR V	ΓV	Period of rec Best possible (Ignored for I (Ignored for I	resolution eriod of re	cord)	Clos	e							
Error evaluating rating equation TDpCodeArithmetic execute attempted to raise		program\=hupl	ot.													

Figure 23: Plotting of uspstream sites and its comparison with downstream site

6. Click *Run* button. Hydrograph will be appeared.



Figure 24: comparison of discharges of two sites

#### 12. Comparison of Shifted vs non-shifted discharges

• Under system administration run compute gauge height with gaps joined for the selected sites, if not run earlier. Calculated gauge height with gaps can be seen in a work bench.

rogram Options	Help														
ode Site	Dat	a Source	v	arFrom \	/arTo	Туре		Axis	Bottom		Тор	Filled		Options	
ATA 04	A			100.02 V	140 V	MAXMIN	¥	LIN V	AUTO	¥	0.0	NO	¥	NONE	
ATA 04	NO	SHIFT(A)		140.00 V	140 V	MAXMIN	¥	LIN V	SAME	¥	0.0	NO	~	NONE	•
ATA 04	GF			140.00 V	140 V	POINT	¥	LIN V	SAME	~	0.0	NO	~	NONE	
OATA O	A			100.00 V	140 V	MAXMIN	¥	LIN V	AUTO	~	0.0	NO	~	NONE	•
ATA O	A			100.00 ∨	140 V	MAXMIN	$\mathbf{v}$	LIN V	AUTO	~	0.0	NO	¥	NONE	

Figure 25: Window for entering the details for comparison of shifted vs non-shifted discharges.



Figure 26: Comparison of shifted vs non-shifted discharges

**Note**: If it is required to change the computed daily discharges then all above hydrographs can be viewed in a workbench by opening time series data and further procedure is as follows:

#### Procedure:

Open the site first, which need corrections and then the other hydrograph using open trace option. Before changing the daily discharge, first copy the archive file into work file. After changes archive the work file.

#### 13. Save and print options for the reports

Following methods can be used to save and print the reports

#### 13.1. Method1: Using the option 'Report Daily discharge for year'

Report of a selected station(s) can be generated in '.html' format using the following procedure.

- Double click on '*Report daily discharge for a year*'
- Select the site and data source, year and other parameters
- Write the name of file at a selected path with extension .html. File will be saved in html format at the given path that can be inserted in Microsoft word, if required.



Figure 27: Creating report in html format

**Note:** *Above method is recommended to generate the reports*. However, following other options may also be used to generate the reports:

#### 13.2. Method2: Directly printing of files open in HYDSTRA explorer

Reports open in *HYDSTRA explorer* can directly be taken print individually as well as all files by using the *file/ print* all.

#### 13.3. Method 3: Viewing the data in MAPHYD window

- 1. Select the *site and view* the data, a mapView window will open
- 2. Select the required report to open and print

Note: if reports are not available for any new site then run the HYBATCH

HYBATCH - Create a Register	red Batch File	
Program Options Help		
Selection Code	ALLDATA +	(Must be a section in HYBATCH.INI)
		(May include .Job ie PRECOMP.DPR)
Site List	01,02,04	
Data Source	Α	Archive File
Start Date	01/01/2014 -	(Start = End for
End Date	31/12/2015 -	Period of record)
Only Sites Modified Since	01/01/1900 -	(Only checks TS file)
Batch File Name	BATCH. BAT	-
Run Immediately?	<b>v</b>	(Will wait until complete)
	🖌 Run 🛛 🗶 Cl	ose
HYBATCH complete		

#### Figure 28: Window to run hybatch

Before running HYBATCH, run the following so that data may available in reports otherwise reports will be empty.

- a) Compute gauge height with gaps joined
- b) Compute daily mean gauge height (takes lot of time)
- c) Compute daily mean discharge

#### 13.4. Method 4: Generate report for all sites using HYBATCH and HYBATCHW

This method completes in two steps

#### Step 1: Run HYBATCH

нуватся	H - Create a Registe	red Batch File 🛛 🗕 🗖 🗙					
Program Options Help							
Selection Code	ALLDATA V	(Must be a section in HYBATCH.INI)					
(May include .Job ie PRECOMP.DPR)							
Site List	FILE(TEST_SITES.TX	(T) ?					
Data Source	Α …	Archive File					
Start Date	01/01/2015 ¥	(Start = End for					
End Date	31/12/2015 ¥	Period of record)					
Only Sites Modified Since	01/01/1900 ¥	(Only checks TS file)					
Batch File Name	BATCH.BAT	~					
Run Immediately?	✓	(Will wait until complete)					
	🖌 Run 🛛 🗙	Close					
HYBATCH previous run parameter	s loaded						

Figure 29: window to run HYBATCH to create the reports for each site

This option creates the report for each/ selected sites and save it at the following location.

#### C:\hydstra\prod\HYD\dat\ptmp\hybatch

#### Step 2: Run HYBATCHW

This option creates a word document/ daily discharge report in a SWHP report format i.e., Volume I.

👪 HYBATCHW - Prepare HYBATCH C	utputs for WORD Import 🛛 🗕 🗙						
Program Options Help							
HYBATCH Code ALLDAT	A V						
Site List FILE(	rest_sites.txt)						
Separate Site Documents? 🗸	Separate Site Documents? 🗸						
Root for Holding Subdirectories C:\TEM	IP\HYBATCHW\						
Script File for WORD Import HYBATC	HW.LST (Output File in TEMPPATH)						
✓ Run ¥ Close							
HYBATCHW previous run parameters loaded							

Figure 30: Run HYBATCHW to create the files in word format

- A file 'hybatch.dot' creates at the location C:\hydstra\prod\HYD\sys\misc
- Open the file and enable the Content to enable macros, a window will open.
- Add the path of the hybatchw.list file i.e., C:\hydstra\TEMP\TEMP

Select HYBATCHW Script 📍 🗙						
Which HYBATCHW script file would you like to process?						
c:\\hydstra\temp\temp\hybatchw.lst						
OK Cancel						

Figure 31: path for hybatchw.lst file

- Word files of each station will be created at C:\HYDSTRA\TEMP\TEMP\
- Open new word file and select INSERT/Object Text from File

G	$e^x$ .	÷				Note	s on HYD	STRA for WAPDA.docx	- Word (Prod	duct Activation Fa	ailed)						? 📧	i —
ME	INS	SERT DESIG	N PAGE LAY	о тис	REFERENCES	MAILIN	IGS F	EVIEW VIEW										ę
	able	Pictures Onli Pictu	ne Shapes Smart		Screenshot	Apps for Office *	Online Video	Hyperlink Bookmark	Comment	Header Footer	# Page Number •		Quick Parts •	<b>A</b> WordArt		🗠 Date & Time	π Equati	
Ta	bles		Illustration	IS		Apps	Media	Links	Comments	Header & I	Footer				Text	Object	Symbo	als
•	×	17				2 · · · 1 · · ·		2 3 4 5	- 6 - 1 - 7 - 1 -	8 ·   · 9 ·   · 10 ·	11 + 12 + +	13 14 -	1 15 1	<u>∧</u> · · · 17·	+ · 18 ·	Text <u>f</u> rom File	<b>_</b>	

• A window will open, **add the all word files** from the above location. Finally a report of that year (i.e., Vol. 1) will be created.

#### 14. Same run for multiple sites

To run different options e.g., compute stage shift, open time series of sites etc. in a single click, enter site ID with comma separate or add all sites in a text file in a single column, write: File(name\_of\_text\_ file.txt) in sites list.

rogram Options	Help
Site List	FILE(TEST SITES.TXT)
Start Year	2013 🌲
End Year	2016 🜲
Output Listing	5 -

Figure 32: Window for same run of different computations in Hydstra

**Note:** This text file should be placed in C:\HYDSTRA\TEMP\TEMP folder.

#### 15. Calculation of travel time

- 1. Run HYCORREL
- 2. Add the sites separated with comma, select the correlation interval and time step (If sites are close then select the interval of 60 min).

🚇 HY	CORREL - Correlate	Hydstra Data	- 🗆 🗙					
Program Options Help								
Site List	01,04		• ?					
Data Source	A	Archive File						
Raw Variable	100.01 ¥	G.H. (m)						
Correlation Variable	140 V	Discharge (m3/s)						
Start Date	00:00_01/01/2001 v	(Start = End for						
End Date	00:00_01/01/2001 ∨	Period of record)						
Correlation Interval	60 \$	(All times in minutes)						
Minimum Time Shift	-1440 ‡							
Maximum Time Shift	1440 ‡							
Time Step	60 \$							
Output File	5 V							
	✓ Run 🗶 Close							
HYCORREL previous run par	HYCORREL previous run parameters loaded							
1 0111	96.6 1 1 1.							

21	Water and Power Deve	lopment Authority (WAPDA)	HYCORREL V2	3 Output	24/10/2017
	Multiple site correla	tion			
	Suffix	A			
	Variable	100.01 Gauge Height in Metres (Hourly)			
	Correlation interval				
	Time shift range	-1440 to -1440 minutes in 60 minute steps			
	S: time shift				
	C: correlation				
	Site 01	I			
	04 S=24				
	C=0.1	38			

#### 16. To add new site in a map window

- 1. Run *MapHYD*
- 2. File/ open for edit and select the map
- 3. File/ build layer from site list
- 4. Site:STNTYPE(SW)
- 5. Layer Name: SW1 (check box to activate)



- 6. Click on Layer control
- 7. Double click on required layer to edit the properties of layer

File Map View Mode Selection Find Contours Gauges	Options Help			- 0 ×
₽₽ <mark>₽</mark> <mark>8</mark> <b>=</b> ₽°\<@ <b>@</b> }				
	Pakistan (Writable)		View	]
	Layer Settings - SW1           Into         General         Objects         Labels         Points           Active         Image: Compare the set of the set o	×		
1 A A A A A A A A A A A A A A A A A A A		4	Key	10 1.0
- of by I am			SW1	View Active
1) Junior 1			SURFACEWATERSITES	XX
The has a second			CLIMATESITES	XX
the second second		-	GWLITHOLOGY	X X
And the but	0K Cancel	C	o GWLEVELS	x x
on san 5 3		}	V- STREAMS	x x
for the start		Sond	WATERSHED	XI XI
Zoom=337km 73.5207 36.7354 Zoom	Timer I Hints I Drawing Selection Only Grid		r 	

8. Save as new map.

### 17. To create time series in HYDSTRA from data logger data file

- 1. Open Program functions/ Hydstra/TS-Time series/ Loggers/ Generalized Loggers/ TSADMIN-Hydstra/ TS Administration Tables
- 2. Select LOGMAST- Generalised logger registration

Hydstra Database Manage - TSADMIN Manag	ige	
File Manage Edit View Tools Filter Hel	an and a second s	
OZXEA SE V	8	
[ARCHIVE]	50 rows LOGMAST (CAM,WL)	OK Cancel
VARIABLE · Variables     WQVAR · WQ Variables     VARCON · Variable Conversion	Type 🚾 - Campbell Logger Variant (w.	<u>^</u>
VARSUB - Sub variables VARTACE - Variable Traces UNITCODE - Variable Unc Descriptions (r QUALUTY - Quality Codes QUALCODE - Quality Flag Codes GRPVALS - Groups GRPVALS - Groups OGRPVALS - Groups	Description water Leve1 Active?   Sample Data 0 25.05.2017 01:00:00 0.820   ■  Raw data location/mask	
SITE - Sites     SITE - Sites     LOGMAST - Generalised Logger Registri     LOGMAST - Generalised Logger Stations     LOGSTN - Generalised Logger Stations     CHARTS - HYTRACE Chart Geometry     GRAPHTAB - Graphics Tablet Informator     ARCHSIZE - Archive Size	Delete pre-raw data?	
DAYSAV - Daylight Saving     MODEMS - Modem Setup Strings     DATANAP - Time Series Data Mapping     TSCALC - Time Series Calculation Engine     TRANSLAT - Translate Variables and Qu		E
	Perl Proprocessor	
Linked Edit USER3 GW=3.MA=3.MO=	Round start time? ((only if implicit times)) If backwards times: ABORT - Abort job Auto comments  Proceed anothed (36 (18 / 3693) - 66 + 33 - but listen 3  If the start of th	

Hydstra Database Manage - TSADMIN Manag	e	
File Manage Edit View Tools Filter Help		
◎ / 2 4 H 2 5 5 9 9 5		
[ARCHIVE]	50 rows LOGMAST (CAM.WL)	
C VARIABLE - Variables	1 rows LOGCHAN (CAM,WL,1)	OK Cancel
WQVAR - WQ Variables     VARCON - Variable Conversion	Logger Type CAM Variant WL	<u>^</u>
VARSUB - Sub variables     VARTRACE - Variable Traces	Channel	
UNITCODE - Variable Unit Descriptions [r	Variable 100.00 • G.H. (m) Data Type 1	•
QUALITY - Quality Codes     QUALCODE - Quality Flag Codes	Multiply 1.000000 Add 0.200000 PutM	ode PUT ·
GRPKEYS - Group Types	Fixed fields 🗹 Start 25 Length 5 Delimiter	Decum?
GRPVALS - Groups	Non numeric IGNORE • Ignore record	
SITE - Sites     LOGMAST - Generalised Logger Registra	First interval 0 (only for total-type data)	
LOGCHAN · Generalised Logger Ch	Validation 0 99.99.9999 99:99:99 N. NNN A	
LOGSTN - Generalised Loggers Stations     CHARTS - HYTRACE Chart Geometry	Time Shift 0	
GRAPHTAB - Graphics Tablet Information     ARCHSIZE - Archive Size	Maximum Value 2.5000	
DAYSAV - Daylight Saving	Quality for > max 1 • Good continuous records	E. E
MODEMS - Modern Setup Strings     DATAMAP - Time Series Data Mapping	Minimum Value -0. 5000	
- O TSCALC - Time Series Calculation Engine	Quality for < min 1 • Good continuous records	
TRANSLAT - Translate Variables and Qu	Maximum Gap 60 (minutes)	
	Gap Action QUALITY + Insert point of gap quality	
	Gap Quality 151 -	
	Quality start 0 Length 0	
	Comment validation 0	
	Comment start 0 Length 0	
	Time on template	Only space 'H'. 'I and 'E'
	Time On valid	Rule to identify time on data
	Date On template	Only space 'Y','M','D' & 'T
	Date On valid	Rule to identify date on data
	Time Off template	Only space 't+', 'I and 'E'
	Time Off valid	Rule to identify time off data
Linked Edit USER3 GW=3,MA=3,MO=3.		III F

- 3. Run hymkhelp to add the cam logger type in the list of logger type.
- 4. Run HYPROLOG and add the required information.

> - By Function	PR	ar Data to Hydstra
Data Migration	HYPROLOG - Process Generalised Logge	er Data to Hydstra
System Administration	Braggam Ontions Hale	
System Administration     Programs by Function	Program Options Help	
A D Hydstra/TS - Time Series	Logger Type	Campbell Logger
Hydstra/13* Time Series	Variant	WL Vater Level
Hydstra Analysis Plots		
Hydstra Data Management	LoggerID	
Hydstra Manipulation and Import/Export	Data File Name	C:\hydstra\Workshop 23-27 Oct. 2017\passu 19-06-17_mo( -
Image: Hydstra Data Reporting		
US Programs	Data Source	B Work Files
Sites		
Variables	File Once Made	ABORT
Instruments	File Open Mode	
P 🗀 Gaugings	Max. Gap to Join Archive/File	0
Pating Tables		
Cross-sections	Output Listing	S *
A Coggers	Listfirst	0 🚔 input data lines not passing validation
Generalised Loggers	Listingt	input data most net passing randation
TSADMIN - Hydstra/TS Administration Tables		
HYGENLOG - Generalised Loggers Processing	HYGENLOG Field Data File	
HYPROLOG - Process Logger Data File to Hyd	(For use when HYPROLO	G is run automatically from HYGENLOG or HYDMWB)
SVRIMP - Import TS data in Hydstra/TS		Run X Close
River operations		
Hydstra/WQ - Water Quality	HYPROLOG previous run parameters loade	d
⊳ 🛅 Hydstra/GW - Ground Water	SecVarFrom = [140] Stream	m Discharge (cumecs)

Now we can see the data imported from data logger in workbench window.

#### 18. Extrapolation of Rating for estimation of discharge

Method 1: Because rating curve is straight in a log-log graph then selecting the range to maximum gauge height to see the discharge.

Method 2: Option 1: run the HYCHANNL option and add the data in required fields.



•

**Method 2: Option 2:** Run *HYXSDAT*, is an advanced than previous that uses multiple roughness values.

Program       Options       Help         Site       Image: Site       Image: Site       Image: Site         VariFrom       100.0 +       G.H. (m)         VariFrom       140 +       Discharge (m3/s)         Table, Release Number       -2 (m) +       (1 = no rating table, -2 = latest table; -1 = latest release)         Section ID       Image: Very Heat (1 = no rating table, -2 = latest table; -1 = latest release)         Output Type       PLOT *         Plot Output Using       S *         Include Plot Traces       Image: Very Heat (1 = no)         Stage Low       0.000         Stage Low       0.000         Stage Low       0.000         Stage Increment       0.000         PAuto: Veried Perimeter         Manning's Formula       Stage         Rating Table       -1.000         -1.000       0.000         Extensions       -1.000         -1.000       0.000         Stage Increment       0.000         Stage Increment       0.000         Stage Increment       0.000         Verteed Perimeter         Manning's Formula       Stage         Itam = 1.000       0.000         Stage Increment	HYXSDAT - Cross Section Parameter	s Analysis		
VarFrom         100.00 +         G.H. (m)           VarFrom         140 +         Discharge (m3/s)           Table, Release Number         -2 = 1 atest table; -1 = latest release)           Section ID         0         +           Output Listing         5           Vare         0.000           Stage Low         0.000           (Clqual=Auto)         A: Area           Stage Increment         0.000           Stage Increment         0.000           V: Width         P: Wetted Perimeter           P: Wetted Perimeter         P: Wetted Perimeter           Rating Table         -1.000         0.000           Extensions         -1.000         0.000           -1.000         0.000         C: CD           -1.000         0.000         S: Sum AD^1/2	Program Options Help			
Stage Low         0.000         V: Velocity           Stage High         0.000         (Equal=Auto)         A: Area           Stage Increment         0.000         (D=Auto)         W: Width           P: Wetled Perimeter         Roughness         Slope         R: Hydraulic Radius           Rating Table         -1.000         0.000         C: CD         -1.000           Extensions         -1.000         0.000         S: Sum AD^1/2           -1.000         0.000         -1.000         S: Sum AD^1/2	Sit VarFron VarT Table, Release Numbe Section II Output Typ Plot Output Output Listin Output Listin	100.00 - 140 - r -21 0 PLOT - t SCR - S	G.H. (m) Discharg (-1 = no ra (0 = latest	- e (m3/s) ting table, -2 = latest table; -1 = latest release) section)
Manning's Formula         Stage         Roughness         Slope         R: Hydraulic Radius           Rating Table         -1.000         0.000         0.00000         X: Cross Section           Extensions         -1.000         0.000         C: CD           -1.000         0.000         S: Sum AD^1/2           -1.000         0.000         S: Sum AD^1/2	Stage Hig	0.000	(Equal=Auto)	V: Velocity A: Area W: Width
	Rating Table         -1.00           Extensions         -1.00           -1.00         -1.00	0         0.000           0         0.000           0         0.000           0         0.000           0         0.000           0         0.000	0.000000	R: Hydraulic Radius X: Cross Section C: CD

#### 19. Activation of unit of any parameter in the list

IN TSADMIN/ VARIABLES/ SELECT THE VARIABLE IN LIST/ EDIT AND CHECK THE ACTIVATE BOX.

HYXPLORE - Hydstra Explorer				_ 🗆 🗙
File Edit Menus Options Help				
🕥 🔍 🛅 😕 🦿 🚾 🛛 Profile	Hydstra Database Manage - TSADMIN Mana	qe	- • ×	
Arr Proventes     Company Provements     Company Provements	Generacys-Grad Organ     Generacys-Grad Organ     Generacys-Grad Organ     Generaciae Corgan Generaciae     Good Star Generalise Corgan Registr     Good Star Generalise Corgan Statos     Good Star Generalise     Good Star Genera	292 rows     VARIABLE (471)       Variable     471       Variable     471       Variable     471       Variable     471       Variable     471       Unito Degrees     Fahrenheit       Domain     int       Domain     int       Storage Precision     0.100000       Report formal LVX     Level       Unit Code     00500       Record careaded     30/32/2899       Lastmodified     21/04/2009       Variable     15:51       by Trak	61 0K 0excet 34 0K 0excet 35 35 35 35 35 35 36 44 46 44 46 44 57 73 73 73 73 75 75 25 38 30 90 81 94 44 73 74 75 77 75 77 77 77 77 77 77 77	************************************
DB: Apollo: C:\HYDSTRA\PROD\hyd\dat\dbf\ TS:	Files Version: 11.0 OrgCode: WAP User: USE	(3 Profile H GW=3,MA=3,MO=3,TS=3,WQ=3		Read on the
hymanade.exe tsadmin				EN 🔺 😂 🗋 🍡 🛋 🌓 💁 314 PM 27/10/2017

# 20. Editing in the Site information e.g., adding province name or adding new field in the Site window

- 1. Run SYSADMIN
- 2. Select MASTDOC Database Documentation
- 3. Open Find option and write Site in Table Name and click OK button

2			Hydstra Database Manage - S	YSADMIN Manag
File Manage Edit View Tools Filter D	ata Help			
+/×∎ <b>A</b> \$£ 99	8 %			
[ARCHIVE]		207 rows	MASTDOC (SITE)	
CODEGRPS - Code Groups [readonly]	Database Name		ase contains details, such as locati	on information
CODES - Codes	SITELIST		able consists of a single column - S	
STNINIKW - Site Specific Data Keywor     HYDMENU - Hydstra Menus [readonly]     USRMENUS - User Menu Overrides     USRMENUS - Local Hydstra Menus     MINGMENU - HYMANAGE Menu Group     MINMENU - HYMANAGE Menu Group     MASTDOC - Database Documentation     USERMAST - User Database Ov     MASTDICT - Data Dictionary [rea	SNUML SSHIF STATI STNIN STNIN STNIN SUMMA SVISI SVPER SVRAC SVRLI SVRLI SVRLI	Name STITE	Enter key values to find:	× oc me at TN \ \ H io h ci m, ys
USERMESS - User Defined Messages     PASSWD - Hydstra Users     USERLOG - User Last Logins	SVRTA SVRTA SVRTR SWBAN	OK 🗙 Car	ncel CPrevious	ys S wi
DBFLOG - Log file for table accesses [re	SWBFIELD	Stores details	of field audits	
PLOTDEVS - Plotter device codes	SWBIICAT		of IICATS field audits	
	SYSCODES	SYSCODES is ma	intained by Kisters Pty Ltd it conta	ins entries used
	TESTNUMS			

 Select the MASTDICT – Data Dictionary then select the Category2 that contains province information (if someone want to add new information in Site window then select a category with no data i.e. Category 3 or 4 etc.)

	SITE	19 QQUARTER	С	2	0 False	False	#MESS(DD.SITE.QQUARTER.LONG)
MNGMENU - HYMANAGE Menu Group	SITE	20 QUARTER	с	2	0 False	False	#MESS(DD.SITE.QUARTER.LONG)
MAINMENU - HYMANAGE Menu	SITE	21 SECTION	N	2	0 True	False	#MESS(DD.SITE.SECTION.LONG)
	SITE	22 TOWNSHIP	с	3	0 False	False	#MESS(DD.SITE.TOWNSHIP.LONG)
MASTDOC - Database Documentation	SITE	23 RANGE	с	3	0 False	False	#MESS(DD.SITE.RANGE.LONG)
USERMAST - User Database Ov	SITE	24 MERIDIAN	С	3	0 False	False	#MESS(DD.SITE.MERIDIAN)
MASTDICT - Data Dictionary [rea	SITE	25 ACTIVE	L	1	0 False	False	#MESS(SYS.COMMON.ACTIVE)
USERDICT - User Data Di	SITE	26 OWNER	с	8	0 False	False	#MESS(SYS.COMMON.OWNER)
MESSAGES - Master Messages (reador	SITE	27 COMMENCE	D	8	0 False	False	#MESS(DD.SITE.COMMENCE)
USERMESS - User Defined Messages	SITE	28 CEASE	D	8	0 False	False	#MESS(DD.SITE.CEASE)
PASSWD - Hydstra Users	SITE	29 STNTYPE	C	3	0 False	False	#MESS(DD.COMMON.SITETYPE)
USERLOG - User Last Logins	SITE	30 REGION	C	8	0 False	False	#MESS(DD.COMMON.REGION)
	SITE	31 ORGCODE	с	3	0 False	False	#MESS(DD.COMMON.ORGCODE.LONG)
DBFLOG - Log file for table accesses [re	SITE	32 BARCODE	с	15	0 False	False	#MESS(DD.COMMON.BARCODE)
PLOTDEVS - Plotter device codes	SITE	33 CATEGORY1	с	8	0 False	False	#MESS(DD.COMMON.CATEGORY.LONG) 1
	▶ SITE	34 CATEGORY2	c	8	0 False	False	#MESS(DD.COMMON.CATEGORY.LONG) 2
	SITE	35 CATEGORY3	с	8	0 False	False	#MESS(DD.COMMON.CATEGORY.LONG) :
1	<b></b>		-	-			

5. Select **USERDICT** to see the information available in category2. (otherwise add new record using plus button).

CODEGRPS - Code Groups [readonly]		64 rows		MASTDICT (SITE, 34, CATEGORY2)	
CODES - Codes		1 rows		USERDICT (SITE, CATEGORY2)	
STNINIKW - Site Specific Data Keywor	Database Name	Field Name	Long Head		Short Head
HYDMENU - Hydstra Menus [readonly]	▶ SITE	CATEGORY2	Province		Province
USRMENUS - User Menu Overrides					
MNGMENU - HYMANAGE Menu Group					
MAINMENU - HYMANAGE Menu					
MASTDOC - Database Documentation					
USERMAST - User Database Ov					
MASTDICT - Data Dictionary [rea					
USERDICT - User Data Di					
MESSAGES - Master Messages [reador					
USERMESS - User Defined Messages					

- 6. Select CODEGRPS Code Groups
- 7. Open Find and enter cat2 (or required category)

			Hy	dstra Database	Manage -	SYSADMIN I	Manag	е
File Manage Edit View Tools Filter Sp	ecial Help							
	R							
[ARCHIVE]		615 rows		CODEGRPS (CAT	2)			
CODEGRPS - Code Groups [readonly]	Code Group	Desc			Code Len	Desc Len	System	Date Created
CODES - Codes	CAT2	User defined	SITE category	2	-	8 39	т	30/12/1899
STNINIKW - Site Specific Data Keywor	CAT20	User defined	SITE category	20		8 39	т	21/05/2014
HYDMENU - Hydstra Menus [readonly]	CAT3	User defined	SITE category	3	-	B 39	т	30/12/1899
USBMENUS - User Menu Overrides	CAT4	User defined	SITE category	4	-	8 39	т	30/12/1899
0	CAT5	User defined	CTTE category	c		· 70	т	20/12/1200
LOCMENUS - Local Hydstra Menus	CAT6	User defined		Enter	r key values	to find:		×
MNGMENU - HYMANAGE Menu Group	CAT7	User defined						
MAINMENU - HYMANAGE Menu	CAT8	User defined	Group Name CAT	2				
MASTDOC - Database Documentation	CAT9	User defined						
USERMAST - User Database Ov	CHARGE	Electric Cha						
MASTDICT - Data Dictionary [rea	CHARTGEO	Chart Geomet						
USERDICT - User Data Di	CHOSENBY	GW Site Chos						
MESSAGES - Master Messages [reador	CME	Measuring Ir						
	COL	Collection A						
USERMESS - User Defined Messages	COMPTYPE	Company Type						
PASSWD - Hydstra Users	CONTROL	Control type						
USERLOG - User Last Logins	COUNTRY	Country code				1		
DBFLOG - Log file for table accesses [re	COUNTY	County	🖌 ок	🗶 Cancel	Previous			
PLOTDEVS - Plotter device codes	DATATRAN	Data transfo	<u> </u>	••	-	1		
-	DATATYPE	Data type in	Period databas	e		8 20	5	30/12/1899

8. Select **CODES** – Codes and add/ edit the provinces information as many required using the add or edit button.

<mark>្នា</mark> File Manage Edit View Tools Filter Sp	ecial Help		Hy	dstra Databas	se Manage - SYSADMIN Manage
[ARCHIVE]		615 rows		CODEGRPS (CA	AT2)
CODEGRPS - Code Groups [readonly]		6 rows		CODES (CAT2,	)
CODES - Codes	Code Group	Order	Code	Desc	
STNINIKW - Site Specific Data Keywor	CAT2	0		Unkn	iown
HYDMENU - Hydstra Menus [readonly]	CAT2	0	BAL_STAN	Balo	chistan Province
USRMENUS - User Menu Overrides	CAT2	0	FATA	Fede	rally Administered Tribal Areas
	CAT2	0	КРК	Khyb	er Pakhtunkhwa Province
MNGMENU - HYMANAGE Menu Group	CAT2	0	PUNJAB	PUnj	ab province
MAINMENU - HYMANAGE Menu	CAT2	0	SINDH	Sind	lh province
MASTDOC - Database Documentation     USERMAST - User Database Ov					
🖻 ······ 🍋 ·· MASTDICT - Data Dictionary [rea					

- After required editing close the window the new window will appear for information that CODEGRPS/ CODES tables have been updated click Yes to accept the changes.
- 10. Run *HYMKHELP* to update the changes in Hydstra.

#### 21. Copying time series data from one system to other system

Time series data i.e., gauge heights and discharge can be copied and paste from one system to other by using the following procedure.

• Open the folder

#### E:\hydstra\prod\HYD\dat\hyd

- Search the site by giving the site code with '.a, .ax and .BAK' extensions
- Copy all the files and paste it in the same folder in other system

**Note**: only the archive file is copied. Measured Discharges data, Ratings and other parameters are not copied.

### 22. Changing the site ID

Copy the HYSITNUM.INI from misc path i.e.\prod\hyd\sys\misc and paste at INI folder i.e.\prod\hyd\dat\ini

```
      hysitnum.ini - Notepad
      -

      File Edit Format View Help

      [version]

      version=1

      [config]

      ;set testmode=1 to report what would happen but do nothing, set testmode=0 to actually do the update

      testmode=1

      [sitemap]

      ;Put in this section a list of all the sites you want mapped

      ;format is oldstn=newstn

      rydsys05=hydsyr05

      Replace the above text as

      old Site ID=New Site ID
```

Number of sites can be added in the same format.

**Note**: replace 1 with 0 at testmode=1 in the hysitnum.ini file to actually do the update otherwise do nothing to run as test mode.

- Save the hysitnum.ini file
- Run HYSITNUM in hydstra
- Run hymkhelp
- Read the HYSITNUM in Hydstra Help for more details

#### USER SOFTWARE INSTALLATION GUIDE

The step by step procedure for installation of HYDSTRA is given as follows:

- 1. Keep the copy of 'hydstra' folder into the *E drive* of Hard disk. The entire Hydstra system resides in the \hydstra\prod folder including all data and programs.
- 2. Install the VFPODBC.msi placed at E:\hydstra\prod\HYD\sys\setup\ADO Folder



This will start an installation Wizard, follow the prompts accepted all defaults until it has been installed successfully

3. Install the msxml.mxi placed at E:\hydstra\prod\HYD\sys\setup\MSXML Folder



This will start an installation Wizard, follow the prompts accepted all defaults until it has been installed successfully

4. If the hydstra software folder is to place in different drive (not E:\hydstra\prod) then you will need to edit the [Path Prefixes] section of the \hydstra\prod\hyd\hyconfig.ini file:



5. Right Click on desktop and click on New\Shortcut and enter the following path then click on next.

e:\hydstra\prod\hyd\sys\run\hyxplore.exe /u=user3 /p=pass3

		×
📀 🖻 Create Shortcut		
What item would you like to create a shortcut for?		]
This wizard helps you to create shortcuts to local or network programs, files, fol Internet addresses.	ders, computers, or	
Type the location of the item:		
e:\hydstra\prod\hyd\sys\run\hyxplore.exe /u=user3 /p=pass3	Browse	
Click Next to continue.		
	Next Cancel	

**Note**: the procedure for installation of hydstra is also given in the **'.html'** file available in hydstra folder.