

Tutorial 2: Reservoirs, Gates, Transfers

The purpose of this tutorial is to learn how to add reservoirs, gates, and transfers to the simple channel-only grid created in Tutorial 1. The grid we are going to create has the following configuration and specifications: The channel portion is identical to the simple channel model from Tutorial 1.

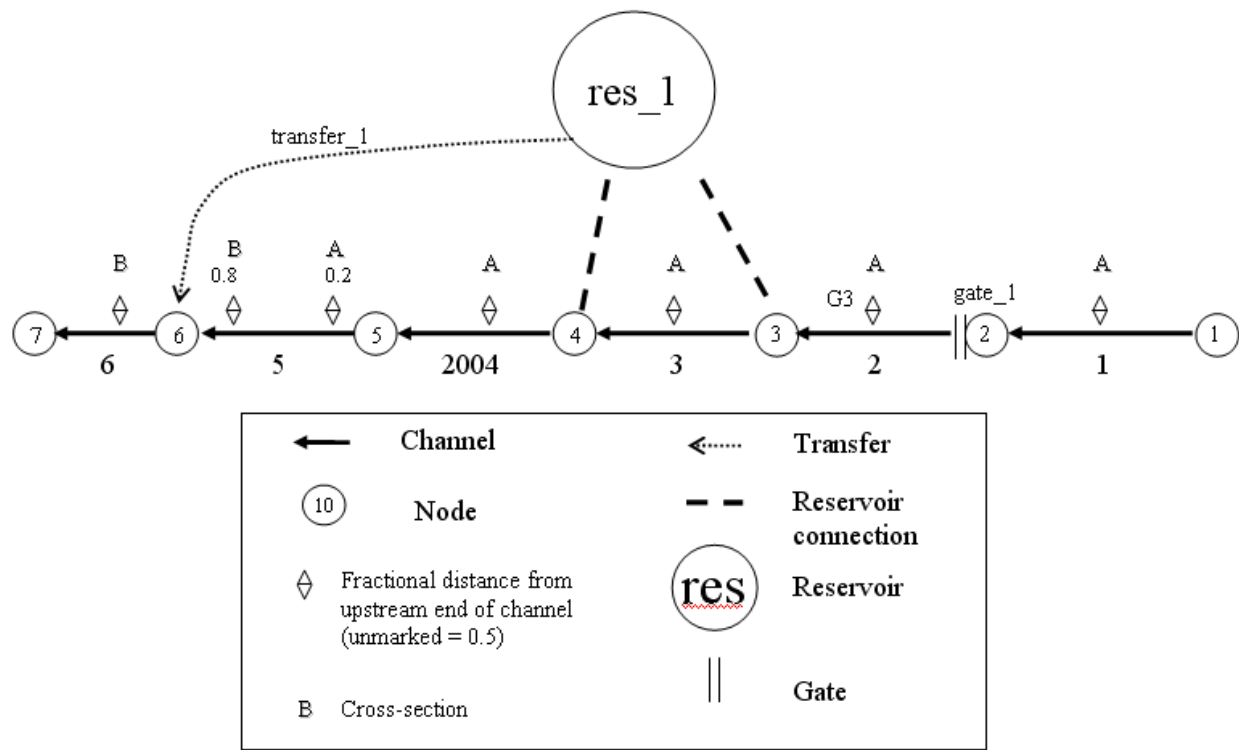


Figure 2 - Simple channel with a new reservoir, gate, and transfer.

The following steps will instruct you on how to create these new features and add them to the simple channel system.

1. Create the reservoir:

- In Windows Explorer, navigate to the directory:
`{DSM2_home}\tutorial\simple\t2_reservoir_gate_transfer.`
- Open *hydro.inp*. At the bottom of the file, Add the skeleton for the reservoir block:

RESERVOIR		
NAME	AREA	BOT_ELEV
END		

- a. Enter the following values into the appropriate fields:
 - i) Name: *res_1*
 - ii) Area (million sq ft): *40*
 - iii) Bottom elev (ft): *-24*
- e. Note from Figure 2 that the reservoir has two connections; one at Node 3, and one at Node 4. These will go in a child table called **RESERVOIR_CONNECTIONS**. The header has the following form:.

RESERVOIR_CONNECTION			
RES_NAME	NODE	COEF_IN	COEF_OUT
END			

- f. Enter the following values into the appropriate fields for the first connection:
 - i) Res Name: *res_1*
 - ii) Node: *3*
 - iii) Res Coef (in): *200*
 - iv) Res Coef (out): *200*
- g. Enter the following values into the appropriate fields for the second connection:
 - i) Res Name: *res_1*
 - ii) Node: *4*
 - iii) Res Coef (in): *200*
 - iv) Res Coef (out): *200*
- h. Save the current settings.

2. Create the Gate.

- a. Now we are going to create the **GATE** table and its child table **GATE_DEVICE**. Note from Figure 2 that the gate is located at Node 2 of Channel 2. This gate consists of both a weir and a pipe. Therefore, two rows of information will be needed for the *GATE_DEVICE* table.
- b. At the bottom of hydro.inp, add the skeleton for the **GATE** table:

GATE			
NAME	FROM_OBJ	FROM_IDENTIFIER	TO_NODE
END			

c. In the *Gates table*:

1) Add a row and enter the following values into the appropriate fields:

- i) Name: *gate_1*
- ii) Connected object: *Channel*
- iii) Name/No: 2
- iv) to Node: 2

2) Create a GATE_DEVICE table with the following fields:

GATE_NAME, DEVICE, STRUCTURE, NDUPLICATE, WIDTH, ELEV, HEIGHT, CF_TO_NODE, CF_FROM_NODE, DEFAULT_OP, POSITION_CONTROL

3) Enter the following values into the appropriate fields:

- i) Gate Name: *gate_1*
- ii) Device: *weir*
- iii) Structure: *weir*
- iv) NDuplicate: 2
- v) Width: 20
- vi) Elev: 2
- vii) Height: *none* (the weir is open and the gate is high)
- viii) CF from Node: 0.8
- ix) CF to Node: 0.8
- x) Default Op: *gate_open*
- xi) Position Control: *gated_top*

d. Again, in the *Gate Devices table*:

1) Right-click and select *Insert row*.

2) Enter the following values into the appropriate fields:

- i) Gate Name: *gate_1*
- ii) DeviceName: *pipe*
- iii) Structure: *pipe*

- iv) # Dupl: 2
- v) Width: 20
- vi) Elev: 2
- vii) Height: *none* (height does not apply to pipes)
- viii) CF from Node: 0.8
- ix) CF to Node: 0.8
- x) Default Op: *gate_open*
- xi) Gate Control: *no_gate*
- e. Save the current settings.

2. Create the Transfer:

A transfer is a momentum-free transfer of water from one node or reservoir to another node or reservoir. We are going to transfer water from the reservoir *res_1* to node 6.

- a. Below the gate input, create the *TRANSFERS table*
 - 1) The headers are:

```
TRANSFER
NAME      FROM_OBJ    FROM_IDENTIFIER  TO_OBJ  TO_IDENTIFIER
END
```

- 2) Enter the following values into the appropriate fields:
 - i) Name: *transfer_1*
 - ii) From Object: *reservoir*
 - iii) To identifier: *res_1*
 - iv) To Object: *Node*
 - v) To identifier: 6
 - b. Save the current settings.

3. Add Initial Conditions for the Reservoir:

- a. Create the *Reservoir Initial Conditions table*:
 - 1) The header and data are

RESERVOIR_IC	
RES_NAME	STAGE
res_1	0.0
END	

4. Add the Transfer Flow Time Series:

We have created the transfer physically, but we have not assigned it a flow. This is done on a separate table, so that the specifications of the transfer can be used with different operations or hydrologies.

a. In hydro.inp, create the *Transfer Time Series* table:

1) The headers are:

INPUT_TRANSFER_FLOW			
TRANSFER_NAME	FILLIN	FILE	PATH
transfer_1	last	constant	40
END			

2) Enter the following values into the appropriate fields:

i) Input Name: *transfer_1*

ii) Fillin: *last*

iii) Input File: *constant*

iv) Path/Value: *40*

b. Save the current settings.

5. Running HYDRO and QUAL

a. In Windows Explorer, navigate to the directory: $\backslash\{DSM2_home\}\tutorial\simple\$.

b. Right-click on the directory, *t2_reservoir_gate_transfer*, and select *Open Command Window Here*.

c. In the command window, type: *hydro hydro.inp*.

d. In the command window, type: *qual qual.inp*.

e. Open the *output.dss* file in the *t2_reservoir_gate_transfer* directory, and examine the results.