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.

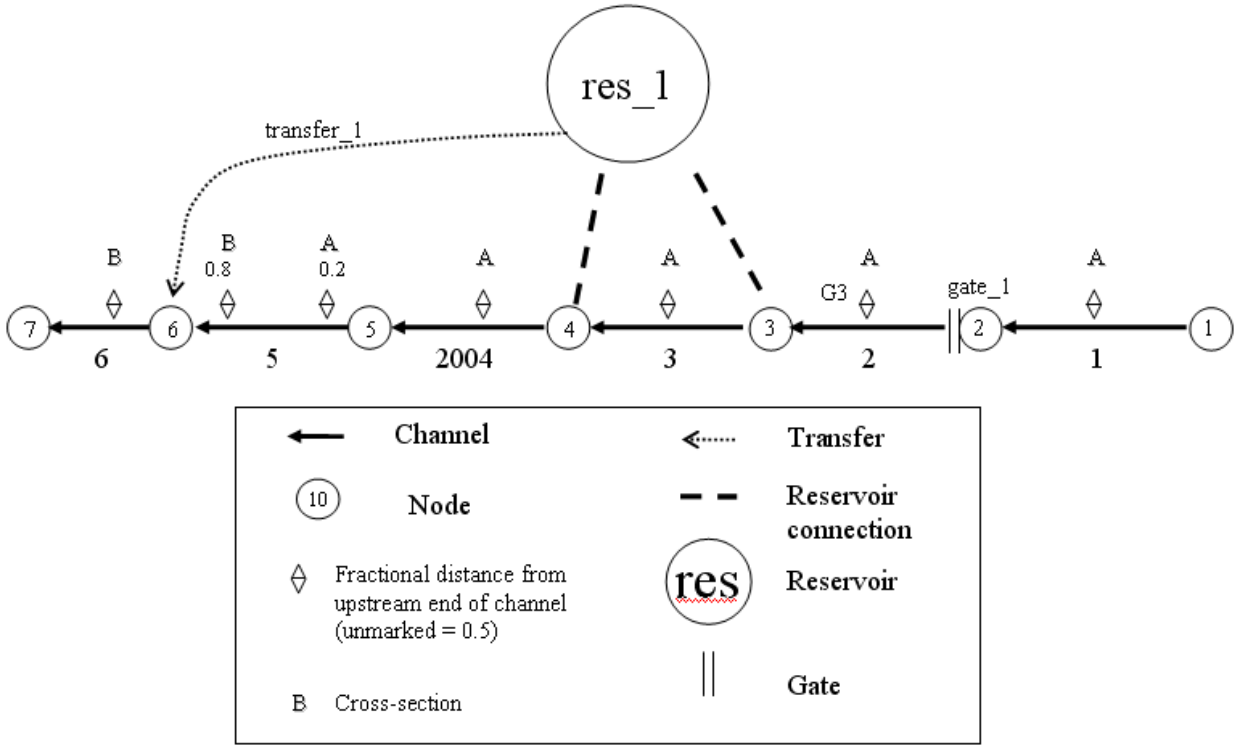

Figure 2 - Simple channel with a new reservoir, gate, and transfer.

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:**
   a. In Windows Explorer, navigate to the directory: *\{DSM2_home}\tutorial\simple\t2_reservoir_gate_transfer*.
   b. 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: *{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.