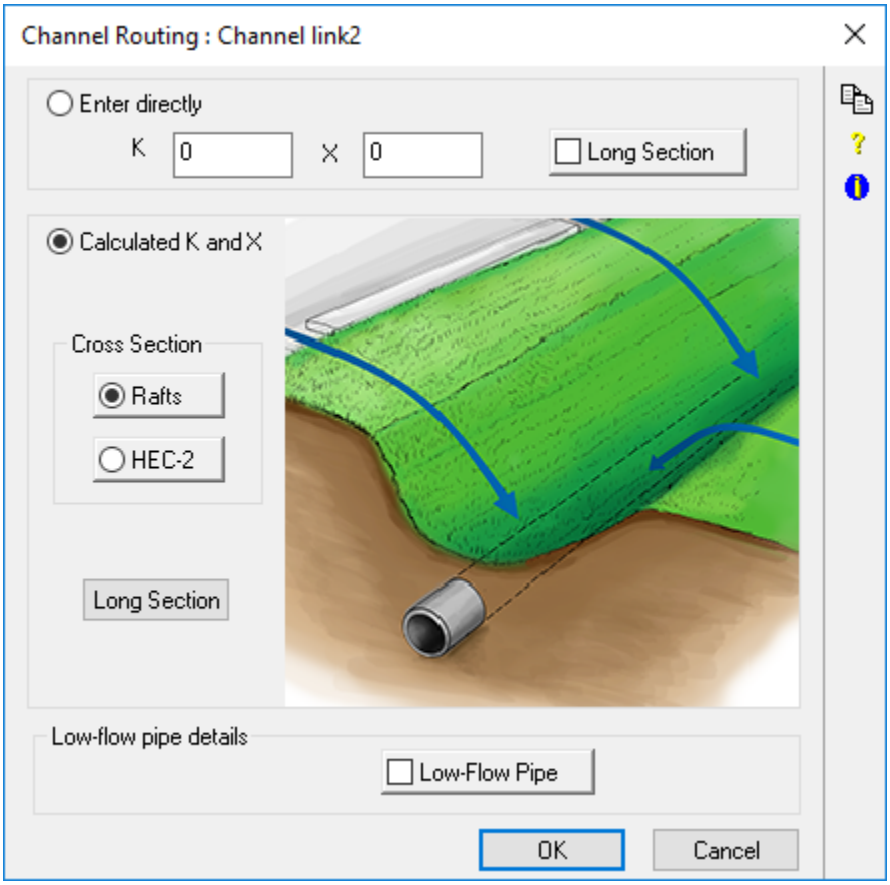
Hydraulics

The hydrographs that have been developed at the individual nodes may be transported through the drainage system in the following ways:

- **Translation (Lagging Link Data)**. The user specifies the length of travel time from one node to the next and the hydrograph is translated on the time base by this length of time with no attenuation of peak flow. Appropriate values may be arrived at by estimating the velocity of flow and consequently the wave celerity, and knowing the length of travel.
- **Low Flow Pipe**. A pipe may be specified (or sized) to carry some or part of the flow with any flow in excess of pipe capacity travelling via the surface to either of two destination nodes. The travel time in this pipe may be computed or set to a fixed number of minutes.
- **Channel Routing**. A Channel/Stream may be defined using either compound trapezoidal channel or HEC-2 style arbitrary sections. (HEC-2 is the widely-used water surface profile computational program developed by the Hydrologic Engineering Center of the US Army Corps of Engineers.) The cross-section shape may be imported directly from an existing HEC-2 file. The Muskingum-Cunge method is used to route the flow through the channel with the consequent attenuation of the peak flow and delay of the hydrograph peak.
- **Diversion Link Data**. Any node may have a diversion link defined in addition to the normal link, which will divert some or all of the flow to an alternate destination node elsewhere in the drainage system.
- **Pipe Design**. Manning's equation is used to size the pipes to carry the peak discharge in the reach.

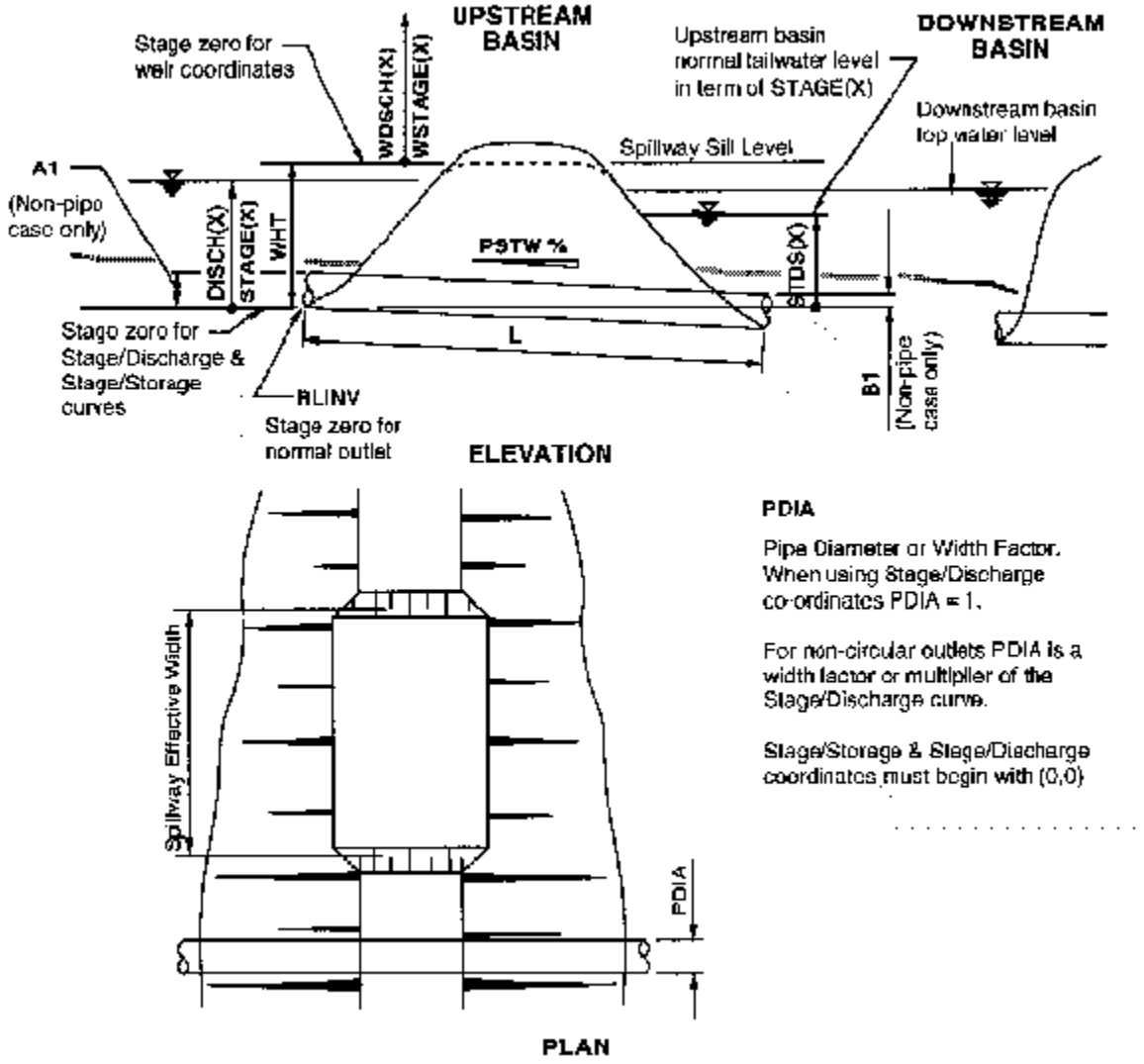


Hydrodynamic Modelling

The hydrographs generated in XPRafts may be directly transferred to the XP-EXTRAN hydrodynamic simulation model, as well as to the MIKE-11 unsteady flow open channel hydraulics model. Hydrographs may also be read back into another XPRafts model.

Storage Basins

Any node in XPRafts may be defined as a storage node. This storage may be quite small (a few cubic metres) or quite large (gigalitres), or any size in-between. On-line and off-line storages may be simulated and the storages may be hydraulically interconnected.



PDIA

Pipe Diameter or Width Factor. When using Stage/Discharge co-ordinates PDIA = 1.

For non-circular outlets PDIA is a width factor or multiplier of the Stage/Discharge curve.

Stage/Storage & Stage/Discharge coordinates must begin with (0,0)

Puls' level pool routing technique is used to route the inflow hydrograph through the nominated storages. A stage storage relationship is defined for each of the storages. The outlet structures that may be handled include:

- circular pipe culverts
- rectangular box culverts
- broad crested weirs
- sharp crested weirs
- ogee weirs
- erodible weirs
- multi-level weirs
- high level outlets
- rating curve outlets
- evaporation
- infiltration

Optimisation methods are available to help design the basin. You may optimise the basin for a maximum discharge or for a maximum allowable storage.