Table 10.1 New Features and Changes for Build 2007-07-AA

Links	Description
New Features and Changes	
Defaults (.tcf file) Defaults (.ecf file – 1D only models)	Build 2007-07-AA uses new defaults as listed further below. **If upgrading a model from the previous release (Builds 2006-06-Bx), use Defaults == PRE 2007-07-AA, if backward compatibility is required.** The new defaults are listed below and briefly described further down in the table: **2D Domains (.tcf file)** • The default material value is now zero (was previously one). For backward compatibility use Change Zero Material Values to One == ON in the .tcf file. • The routines that process polygons is now much faster. To use the old routines set Inside Region == Method A in the.tcf file. • The calculation of 1D water level weighting factors for 2D HX cells has been reworked. To use the previous approach set Line Cell Selection == Method C in the .tcf file. • New default approach for adjusting ZU and ZV values on VG cells that enhances stability. Use VG Z Adjustment == ZC in the tcf file for the previous approach. • Materials are now, by default, directly sampled at the cell mid-sides, in addition to the cell centres, thereby giving a higher resolution and better definition of Manning's n values. For backward compatibility use Bed Resistance Cell Sides == AVERAGE M. • The GIS projection is now checked on all input GIS layers. If the projection is not the same as specified by MI Projection, an ERROR occurs. For backward compatibility, use MI Projection Check == WARNING so as to not stop the simulation. **1D Domains (.ecf file)** • Further improvements/changes to some culvert flow regimes and the transitioning between regimes. To use the previous approach specify Culvert Flow == Method C and Culvert Critical H/D == 1.5 in the .ecf file.
Section 4.10.7	1D H (water level) boundaries can now be connected directly to a 2D HX boundary. This is particularly useful for setting a 2D water level boundary that varies spatially and temporally along its length (eg. a tidal boundary that varies in amplitude and phase along the length of the boundary).

Links	Description
Table 5.1 Section 7.1.2	Windows message boxes are now used to advise when the simulation has finished, has an error in the input data, etc. (Note, this feature was incorporated into the 2006-06-Bx builds but was not documented.) The message boxes can be switched off using the –nmb run-time option (See Table 5.1).
Section 5.10	Re-compiled to allow for models that use more than around 1.4Gb RAM.
Section 7.2.2	Continued improvements to ERROR/WARNING/CHECK message reporting. New messages added, and numbers assigned to each message that links to a database of messages and further explanation of likely causes for the message to occur. Some of the new messages are: • WARNING if SA object does not select any 2D cells (active or inactive). • More warnings and checks for when pits lie within active 2D cells of more than one 2D domain. • ERROR message if a Read MID Zpts command is not reading a .mid file with the correct number of attributes (this usually occurs if a .mif file is accidentally specified). • ERROR message for checking that the cell side wet/dry depth is not greater than the cell wet/dry depth. If running with Defaults == Pre 2007-07-AA, then this message is issued as a WARNING.
Section 7.1.1 Section 7.5 Section 8.1	Mass balance reporting is now much more comprehensive and has been extended from just the 2D domains to now include: • Overall model (ie. combination of all 1D and 2D domains). • 1D domains • 1D/2D links Familiaristion and monitoring of the mass balance reporting is strongly recommended so that “unhealthy” models are detected and corrected.
Section 5.11	Added –b, -nmb, -mb, -t, -x run-time options to ESTRY.exe.
Section 7.4.6	_TS.mif files now automatically vary the number of output times so that they do not exceed the 250 attribute limit in MapInfo (ie. the whole hydrograph will now appear when graphing time-series output in MapInfo – this was previously not the case if more than 245 time-series output times occurred).
Section 7.1.1.1	Ctrl-C on the Console (DOS) window now pops up a message box asking whether the simulation is to be stopped. If Yes is selected the simulation is finished off neatly, and any network licence is released. Note that for some, yet unknown, reason Ctrl-C can only be pressed once (a second occurrence will terminate the process without finishing off the simulation neatly).

Links	Description
Table 4.21	If a negative rainfall (ie. infiltration) occurs at a 2D cell, it is only applied to wet cells (previously it was applied irrespective of whether the cell was wet or dry). This is useful for modelling infiltration from the surfacewater into the ground.
Read MI Cyclone	Added background wind attributes to the Read MI Cyclone GIS layer (these attributes will need to be added to existing layers).
Section 4.7.4.1 Structure Losses Table 4.6	New A and F flags for 1d_nwk B, C and R channels to individually override the global Structure Losses setting. Use A to adjust structure losses and F to fix. For example to fix the inlet and outlet losses on a rectangular culvert specify a Channel_Type of "RF".
Section 4.11.2.2	Z values along WLLs for bridge channels are now always based on the processed data (ie. will overwrite any WLLp Z values). This ensures the bridge deck underside is correctly represented.
WLLP Interpolate Bed	New command WLLP Interpolate Bed that sets the centre WLL point to the channel bed based on the processed data (rather than use any value from a WLLp layer).
VG Z Adjustment	New option for VG Z Adjustment. Can now specify MAX before or after ZC option to force the adjusted ZU/ZV and ZH points to be set to the max ZC value rather than an interpolated value based on the surrounding ZC values. This option provides significant enhancements in some situations to the stability of the flow over the breach.
Section 4.11.2.1	If a WLL is snapped to a node, the processed data used for setting any bed elevations is now that from the higher channel unless it is a bridge in which case it uses the bridge processed data.
Line Cell Selection	Enhancement to selection of cells along 1D/2D HX Interface lines that uses a perpendicular interpolation from the 2D cell centres onto the line providing a "smoother" water surface profile along HX lines, and better stability along 1D/2D HX interfaces.
Table 5.1	New TUFLOW.exe run-time option to make a copy of a model. This is particularly useful for transferring a model from one site to another, or for making an archive or backup of the model. (It is invaluable for large models with many inputs!)
Section 4.10.5.2 Read MI ISIS Network Read MI ISIS Nodes	For ISIS linked models, the Node and Channel IDs in the 1d_isis.mif layers are now case sensitive to conform with ISIS. Therefore, the ISIS IDs must be identical in terms of case and characters to the IDs in the layers connecting ISIS and TUFLOW.

Links	Description
Culvert Flow Section 4.7.4.3	Further enhancements to culvert flow and stability. These include: • Retention of previous timestep entrance/exit velocities for both upstream and downstream controlled flow conditions (previously the prevailing regime was only stored), which provides smoother transitioning between upstream and downstream controlled flow regimes. • Much improved convergence for Regime C and tests for non-convergence (if does not converge, inlet control is assumed). • Allows unsubmerged downstream controlled flow Regime D to be included for zero length channels (usually pits), providing improved results in pit channels as surcharging starts. Previously only critical and fully submerged conditions applied. • Fix to Regime E (see Bug Fixes section of this table). These enhancements are set using Culvert Flow == Method D (the new default). For backward compatibility use Method C.
Culvert Critical H/D	New .ecf command Culvert Critical H/D that sets when downstream controlled flow regimes (Regime B to E or F) take preference over upstream controlled regimes based on the ratio of the upstream head above the culvert sill over the culvert height. The default is OFF (ie. infinitely large H/D). In previous builds a value of 1.5 was used. For backward compatibility use 1.5.
Table 4.7	New option for the Length_or_ANA attribute in a 1d_nwk layer: If the ANA value for a 1d_nwk point is < 0 then it is used as a multiplier on the NA for that node. For example, setting a value of -1.5 will increase the storage of that node by 50% (ie. multiply the NA table by 1.5). This may be useful in stabilising problematic 1D nodes, noting that excessively increasing the storage of a model may unacceptably distort the results.
Minimum NA Pit	New .ecf Minimum NA Pit command. This only applies to the upstream node of a pit channel, not the pit itself. If the Length_or_ANA 1d_nwk attribute value of a pit is less than or equal to zero, the upstream pit channel node will be assigned the Minimum NA Pit value. The default is a value of $1m^2$.
Minimum NA Defaults	The Minimum NA value is now NOT applied to automatically created NA tables (this occurs for the upstream pit channel nodes and any node with an ANA value that is greater than 0.001 and there is no NA table that has been manually specified or created from channel storages). Backward compatibility only through using the Defaults == PRE 2007-07-AA command.

Links	Description
Minimum Channel Storage Length	New.ecf Minimum Channel Storage Length command. If a channel's length is less than the value specified, then the Minimum Channel Storage Length is used for calculating any storage contributions from the channel. This may be useful in stabilising short channels, noting that artificially increasing the storage of a model may unacceptably distort the results and should be sensitivity tested. The default is a value of zero metres.
	Objects in .mif file are now not case sensitive to be compatible with other software that export .mif files. Previously they were case sensitive based on that used by MapInfo.
Section 4.3	If a polygon or region's "Center" is not specified in the .mif file (this occurs for some software when exporting .mif files), it is now automatically calculated (previously TUFLOW would give a WARNING and ignore the region). The centre is estimated by averaging the x and y values (note that for Multiple Region objects, the result maybe unpredictable). TUFLOW uses the region's centre for some objects such as 2d_fc and 2d_po polygon objects.
Inside Region	New and much faster routine for assigning values to the TUFLOW 2D grid within a polygon from a .mif file. The new .tcf command Inside Region provides backward compatibility by using the old, slower approach (Method A). Method B is the new approach and is the default. Testing thus far has shown the two methods yield identical results although it is possible that if a point lies exactly on a polygon boundary different results may occur. To appreciate the increase in startup time this feature offers, testing on two large models reduced the startup time from 20 minutes to 3 minutes for one model, and from 40 minutes to 5 minutes for the other. The faster startup time occurs for any polygon layers being accessed from the .tgc and .tbc files, particularly those containing large number of vertices.
Bed Resistance Cell Sides Read MI Mat	New .tcf command Bed Resistance Cell Sides that is used to define how the bed resistance value at a 2D cell's mid-side (ie. that used in the momentum equation) is calculated. The approach prior to this release was AVERAGE M which takes the average Manning's M (1/Manning's n) value of the two adjoining cell centre values. The AVERAGE n option takes the average Manning's n values of the cell centres, and INTERROGATE (the default) applies the exact value from the material polygons using Read MI Mat. The INTERROGATE option provides a higher resolution sampling of material values compared with just sampling at the cell centres. This higher resolution sampling is particularly useful in modelling urban areas where frequent and large changes in Manning's n occurs.

Links	Description
Change Zero Material Values to One	New .tcf command Change Zero Material Values to One. The default material value is now zero (previously one), which means that every cell must be assigned a material value (ie. use Set Mat). A zero material value now produces an ERROR. For backward compatibility use Change Zero Material Values to One == ON.
	The maximum Material ID is now 32,767 (was previously 99,999). If material values greater than 32,767 were used, these will need to be reworked.
	Added new attribute, dH, to 1d_mmH.mif output layer that contains the largest head drop across any channels that end at that node (ie. only channels that are digitised so that their downstream end is at that node are used to determine dH). Provided channels are digitised from upstream to downstream this is very useful for identifying any increases in water level (thematically map the dH attribute) caused by any instabilities.
Section 5.3 Section 7.1.3 (for -tsl switch)	New "_ TUFLOW Dongle <serial_no> Simulations.log" file for logging all simulations using that dongle to one location. For network dongles, the URL for where this is to be located needs to be coded into the dongle using the -tsl run-time option. For standalone dongles this will also work. The default (if no URL has been specified) is to write the file to C:\.
Section 7.1.3	The _ TUFLOW Simulations.log files now contain the computer name and active licence site.
	Network dongle monitoring changed so that if the network is disconnected or crashes, or the TUFLOW Server goes down, during a simulation TUFLOW then checks every 3 minutes until a new network licence is available. Of note is that "ghost licences" may occur on some networks when a simulation is running and the network is disconnected (either by pulling out a cable or the network being down). A notebook computer that started a simulation and is then removed from the network may also create a ghost licence. At present the only way to remove these ghost licences is to restart the TUFLOW Security Server (which can be done even if there are simulations running as TUFLOW will now keep checking for a network licence until it finds one). Ghost licences don't seem to occur if a simulation is terminated by closing the window or killing the TUFLOW process. Different networksmay yield different outcomes in terms of the generation of ghost licences.
BC Zero Flow	New .tcf command BC Zero Flow == [{OFF} | START | END | START and END]" that zeros the start and/or end of 1D and 2D flow hydrographs (QT, ST, SA). This is particularly useful if the simulation extends outside the duration of the hydrograph and the start/end flow values need to be set to zero.

Links	Description
MI Projection Check	New .tcf command MI Projection Check == [{ERROR} | WARNING] that checks that the GIS Projection for all input layers is the same as that specified by MI Projection. If Defaults == Pre 2007-07-AA is set, the default setting for this new command is WARNING.

Links	Description
Bug Fixes	
	The 2d_uvpt_check.mif layer did not correctly write out for multiple 2D domain models when one or more 2D domains did not contain flow constriction cells, while others did.
	Bug fixes relating to pits: previous builds did not always correctly allocate pit SX connections for 2nd, 3rd, etc, 2D domains; occassionally a pit near the perimeter of a 2D domain was not included (TUFLOW would stop with an obsure message).
	Bug fix that did not correctly write out the number of vertical walls attribute in the 2f_fc_check.mif file.
	Bug fix that tried to assign automatic WLLs to culverts with a duplicate point along the 1d_nwk channel line.
	Bug fix that did not correctly write the us_invert level to the 1d_nwk_check.mif layer for the upstream pit channel node. (It was correctly written to the .eof file.) Does not affect the hydraulic calculations.
Check MI Save Date	Bug fix that if Check MI Save Date == WARNING is set and a warning is issued, TUFLOW goes into an infinite loop and crashes. Workaround was to set Check MI Save Date to OFF.
	Corrected problem with culvert Regime E flow when Structure Losses == ADJUST, that occurred due to the exit loss coefficient being adjusted when the full exit loss should apply. This would result in an abnormal jump in culvert flow while in Regime E. This fix is incorporated into Culvert Flow == Method D (the new default). For backward compatibility use Method C, however, occurrence and influence of Regime E flow should be reviewed.
Table 4.8	Changed the setting of the default width (if eN1 < 0.001) of automatic weirs over R and C channels (ie. RW and CW) to be the diameter/width multiplied by the number of culverts (previously, the width was not multiplied by the number of culverts). For backward compatibility, original weir width can be set by manually setting the eN1 attribute to the Diameter_or_Width attribute value of the culvert.
	Bug fix that when using a restart file TUFLOW occassionally set the 2D FC bridge deck additional loss value incorrectly. Not backward compatible.
	Bug fix that caused a MATH Error when writing the uvpt_check.mif file.
	Bug fix that accidentally connected a CN line to a hidden node created by a 2d_bc 2D or QT line. TUFLOW was previously stopping with a message that the CN line was unused or not snapped.

Links	Description
	Fixed up 1d_bc_check.mif file so that QT region inputs are now correctly shown (previously inflows at nodes with H boundaries, for example at a SX connection, were being shown when they weren't really there). 1d_bc_tables_check.csv file correctly showed the inputs.
	Bug fix that sometimes caused TUFLOW to crash if reading more than one 2D SA RF polygon. This fix also incorporated into 2006-06-BG.
	Bug fix that incorrectly set the water levels on dried VG cells (only applies to simulations with source inflows, eg. SA, RF). May cause slight changes in results, but and is likely to provide greater stability if there are dried VG cells. Backward compatibility provided if Defaults == Pre 2007-07-AA is set (noting that setting this command reinstates the bug). This bug also causes the mass error calculations to falsely give a mass error that is not occurring.