Table	attribute	type	mandatory	default	unit	comment
v2_1d_boundary_conditions						Boundary condition for 1D connection nodes. Boundaries can only be placed on nodes connected to a single channel or pipe.
	id	serial	*			Unique identifier
	boundary_type	integer	*		1: m above datum 2: m/s 3: m3/s	Boundary type. 1: waterlevel boundary 2: velocity boundary 3: discharge boundary 5: Sommerfeld boundary (waterlevel slope). For types 2, 3 and 5 the channel direction determines sign of the input value. If the boundary is placed on the channel endpoint, positive values mean for example water is being extracted from the model.
	connection_node_id	integer	*			Unique connection node id.
	timeseries	text	*		min,value min,value	Format: min,value min,value Between time succesive lines values are interpolated. (note that during 1 timestep the values is still constant) - Leave no trailing spaces or empty rows at the end of your file. - Make sure there is no space between min,value - In case of multiple boundaries in 1 model: make sure they all have the same number of timeseries rows with exactly the same temporal interval. - In case of multiple boundaries in 1 model: also start- and end time of all timeseries must be the same. - In QGIS it is not posible to directly type enter/newline characters into a table. To enter this format into spatialite you must either use a text editor to compose your timeseries through the field calculator using '\n' to add a new line.
v2_1d_lateral						Lateral for 1D connection nodes
	id	serial	*			Unique identifier
	connection_node_id	integer	*			Unique connection node id.
	timeseries	text	*		min,m3/s	Format: min,value min,value Between time succesive lines values are interpolated. (note that during 1 timestep the values is still constant) - Leave no trailing spaces or empty rows at the end of your file. - Make sure there is no space between min,value - In case of multiple laterals in 1 model: make sure they all have the same number of timeseries rows with exactly the same temporal interval. - In case of multiple laterals in 1 model: also start- and end time of all timeseries must be the same. - In QGIS it is not posible to directly type enter/newline characters into a table. To enter this format into spatialite you must either use a text editor to compose your timeseries through the field calculator using '\n' to add a new line.
v2_2d_boundary_conditions						Boundary condition for 2D model edge (must be on edge of DEM file)
	id	serial	*		-	Unique identifier

Table	attribute	type	mandatory	default	unit	comment
	boundary_type	integer	*		1: m above datum 2: m/s 3: m3/s 5: -	1: waterlevel boundary 2: velocity boundary 3: discharge boundary 5: Sommerfeld boundary (waterlevel slope) schematisation requirements: - the boundary linestring must be placed on the edge of the DEM (outer calculation cells) - the boundary linestring must intersect at least two calculation cells - the complete boundary Linestring must be on on active edge (read: on data pixels). If (a part of) the boundary is on nodata pixels then the boundary is ignored - the boundary linestring may be slightly skewed (maximum 6 pixels skewed) - the boundary also looks at the cross section area at the outside of the model (so the outer pixels at the dem) whether flow is possible
	display_name	text	*			Name field, no constraints
	timeseries	text	*		min,value min,value	Format: min,value min,value Between time succesive lines values are interpolated. (note that during 1 timestep the values is still constant) - Leave no trailing spaces or empty rows at the end of your file. - Make sure there is no space between min,value - In case of multiple boundaries in 1 model: make sure they all have the same number of timeseries rows with exactly the same temporal interval. - In case of multiple boundaries in 1 model: also start- and end time of all timeseries must be the same. - In QGIS it is not posible to directly type enter/newline characters into a table. To enter this format into spatialite you must either use a text editor to compose your timeseries through the field calculator using '\n' to add a new line.
v2_2d_lateral						Lateral discharge for location on 2D
	id	serial	*			Unique identifier
	discharge	double	*		min, m3/s	"Format: min,value min,value Between time succesive lines values are interpolated. (note that during 1 timestep the values is still constant) - Leave no trailing spaces or empty rows at the end of your file. - Make sure there is no space between min,value - In case of multiple laterals in 1 model: make sure they all have the same number of timeseries rows with exactly the same temporal interval. - In case of multiple laterals in 1 model: also start- and end time of all timeseries must be the same. - In QGIS it is not posible to directly type enter/newline characters into a table. To enter this format into spatialite you must either use a text editor to compose your timeseries through the field calculator using '\n' to add a new line. - The horizontal lines should be defined from west to east - The vertical lines should be defined from south to north
	type	integer	*			1: surface
v2_aggregation_settings						Settings for aggretation that are found in the flow_aggregate.nc
	id					Unique identifier
	aggregation_in_space	boolean (in sq	*	FALSE	-	not yet implemented.
	aggregation_method	char(100)	*		-	Method of aggretation, choose from: avg, min, max, cum, med, cum_negative, cum_positive, current (use 'current' only for volume and interception)

Table	attribute	type	mandatory	default	unit	comment
	flow_variable	char(100)			-	The name of output variable that is aggregated. Possible flow variables: discharge flow_velocity pump_discharge rain waterlevel wet_cross-section wet_surface lateral_discharge volume simple_infiltration leakage interception
	global_settings	integer				v2_global_settings scenario id. If not set, the aggregation rule is applied to all models in global_settings. if set, the aggregation rule is only applied to that specific model.
	timestep	integer	*		s	Timestep size for aggregation.
	var_name	char(100)	*		-	Mandatory Name field for flow variable name.
v2_channel						Channel lines between connection nodes. All channels must have at least one cross_section_location.
	id	serial	*			Unique identifier
	calculation_type	integer	*			100 = embedded channel 101 = stand-alone channel 102 = connected channel 105 = double connected channel Embedded or connected can only be used where a DEM is present. Any start-, end- or calculation node along a channel with these types may not lay outside the DEM.
	code	text	*			Name field, no constraints
	connection_node_end_id	integer	*			End node for channel line. Must be present in v2_connection_nodes and the channel geometry endpoint must be snapped on the given connection node.
	connection_node_start_id	integer	*			Start node for channel line. Must be present in v2_connection_nodes and the channel geometry startpoint must be snapped on the given connection node.
	display_name	text	*			Name field, no constraints
	dist_calc_points	double	*		m	Distance between calculation points on linesegments.
	zoom_category	integer				Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_connection_nodes						Location and ID of nodes between channels, pipes and structures. Make sure that: i) When removing a node or changing its ID, make sure the node is not referred to in any of the other tables, ii) When moving a node, make sure to also move any channels and culverts that are snapped to the node, iii) make sure no node is left without any connection, and iv) make sure that every node is connected to either a channel or is used as a manhole (otherwise the calculation type is unknown).
	id	serial	*			Unique identifier
	initial_waterlevel	double			m above datum (NL: NAP)	Initial water level at connection node. Initial waterlevel is interpolated across channel calculation nodes.

Table	attribute	type	mandatory	default	unit	comment
	storage_area				m2	Storage area, e.g. for manholes in sewerage calculations. If a manhole is present on a connection node the storage area must be larger than zero. Note that the manhole's shape, width, and length are for administration only and do not influence the storage area used during simulation. Storage area can also be added to a connection node without the use of a manhole. Nodes that are not connected to channels (for instance when between 2 culverts) require a storage area larger than zero, for others storage area is derived from the channel cross section, reference level and calculation distance.
v2_cross_section_definition						Table of cross-section definitions
	id	serial	*		-	Unique identifier
	code	text	*			Name field, no constraints
	height	text	**		m	For tabulated fill in space-separated heights of profile. All height values must be larger than zero, except for the first value **Mandatory for types 3, 5 & 6.
	shape	integer	*			1 = rectangle; specify width and height (profile/upper side is not automatically closed) 2 = circle; specify width (profile/upper side is automatically closed) 3 = egg; specify only 1 width. From this 3Di creates an egg-shaped profile with heigth = 1.5*width 5 = tabulated rectangle; specify space-seperated width and height intervals. Between intervals the profile is defined straight. Can be closed by stating width 0 at heighest heigth 6 = tabulated trapezium; specify space-sperated width and height intervals. Between intervals the profile is interpolated. Can be closed by stating width 0 at heighest heigth
	width	text	*		m	For tabulated fill in space-separated widths of profile. Fill in diameter for circle.
v2_cross_section_location						Location of cross-section for channels. All cross-section locations must be snapped to a channel vertex. May not be placed on or within 1 cm within start- or endnode.
	id	serial	*			Unique identifier
	bank_level	double	**		m above datum (NL: NAP)	For connected channels only. Reference level for exchange between 1D and 2D. ** Mandatory when channel type is 102.
	channel_id	integer	*			Reference to v2_channel id. Channel id must match the channel on which the location lies.
	code	text	*			Name field, no constraints
	definition_id	integer	*			Reference to v2_cross_section_definition id. Must be present in v2_cross-section_definition table.
	friction_type	integer	*			1 = Chezy !not yet implemented 2 = Manning
	friction_value	double	*		1: m1/2/s 2: s/m1/3	Friction or roughness value for profile
	reference_level	double	*		m above datum (NL: NAP)	Reference level or bottom level for profile.
v2_culvert						Table of culverts, connection between connection nodes
	id	serial	*			Unique identifier
	calculation_type	integer	*	101		100 = embedded channel 101 = stand-alone channel 102 = connected channel 105 = double connected channel Embedded or connected can only be used where a DEM is present. Any start-, end- or calculation node along a channel with these types may not lay outside the DEM.
	code	text	*			Name field, no constraints

Table	attribute	type	mandatory	default	unit	comment
	connection_node_end_id	integer	*			End node for culvert line. Must be present in v2_connection_nodes and the culvert geometry endpoint must be snappen on the given connection node.
	connection_node_start_id	integer	*			Start node for culvert line. Must be present in v2_connection_nodes and the culvert geometry startpoint must be snappen on the given connection node.
	cross_section_definition_id	integer	*			Reference to v2_cross_section_definition id. Must be present in v2_cross-section_definition table.
	discharge_coefficient_negative	double				Discharge coefficient for negative flow (from end to start node). Can be set to 0 when closed. This feature is enabled since the release of 26th of November 2018.
	discharge_coefficient_positive	double				Discharge coefficient for positive flow (from start to end node). Can be set to 0 when closed. This feature is enabled since the release of 26th of November 2018.
	display_name	text	*			Name field, no constraints
	dist_calc_points	double	*		m	Distance between calculation points on linesegments.
	friction_type	integer	*			Friction type 1 = Chezy (not yet implemented) 2 = Manning
	friction_value	double	*		1: m1/2/s 2: s/m1/3	Friction or roughness value for profile
	invert_level_end_point	double	*		m above datum (NL: NAP)	Invert level at culvert endpoint. Must be equal or above ajoining manhole or channel bottom/reference level.
	invert_level_start_point	double	*		m above datum (NL: NAP)	Invert level at culvert startpoint. Must be equal or above ajoining manhole or channel bottom/reference level.
	zoom_category	integer				Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_dem_average_area						
	id	integer				id for the area in which DEM averaging will be applied
v2_global_settings						Global settings
	id	serial	*			Unique identifier
	advection_1d	integer	*	0/1		Use advection in 1D, other schemes 2-6 are in experimental phase
	advection_2d	integer	*	0/1		Use advection in 2D.
	control_group_id	integer				Reference to id that contains control settings for this scenario.
	dem_file	text	*	raster/yourfile.tif	m above datum (NL: NAP)	Relative path to dem file (.tif)
	dem_obstacle_detection	boolean	*		-	Automatically detect obstacles based on DEM-file. Works only in combination with dem_obstacle_height (has no relation with v2_obstacle)
	dem_obstacle_height	double	**		m	Relative height (above lowest pixel of calc cell) for obstacle detection. ** Mandatory when using dem obstacle detection.
	dist_calc_points	double	*		m	Global distance between calculation points for line elements.
	embedded_cutoff_threshold	double		0.05	factor [0 - 1]	Relative length of cell size. When embedded channel intersects 2D grid size over length shorter than the cellsize * cutoff threshold, the embedded channel skips this 2D cell. Usefull for preventing very short embedded channel segments (which slow down your model).
	epsg_code	integer	*		m	Define map projection for study area. Must match raster projection.
	flooding_threshold	double	*	>=0.0	m	Water depth threshold for flow between 2D cells. Depth relative to lowest bathymetry pixel at the edge between two 2D cell.
	frict_avg	integer	*	0	-	The roughness coefficient will be averaged within one cell.

Table	attribute	type	mandatory	default	unit	comment
	frict_coef	double	*		1:[m1/2/s], 2:[s/m1/3]	Constant friction coefficient for 2D.
	frict_coef_file	text		raster/yourfile.tif	1:[m1/2/s], 2:[s/m1/3]	Relative path to friction file (.tif)
	frict_type	integer				1: Chezy for 2D 2: Manning for 2D
	grid_space	double	*		m	Size of smallest grid cell in quadtree, k=1. Must be an even multitude of the raster pixel size.
	groundwater_settings_id	integer				Reference to id that contains groundwater settings for this scenario.
	initial_groundwater_level	double			m above datum (NL: NAP)	Initial groundwater level
	initial_groundwater_level_file	text		raster/yourfile.tif	m above datum (NL: NAP)	Relative path to initial groundwater level file (.tif)
	initial_groundwater_level_type	integer	**			0=max, 1=min, 2=avg **Mandatory when using initial water level file.
	initial_waterlevel	double	*		m above datum (NL: NAP)	Global initial water level.
	initial_waterlevel_file	text		raster/yourfile.tif	m above datum (NL: NAP)	Relative path to initial water level file (.tif)
	interflow_settings_id	integer				Reference to id that contains interflow settings for this scenario.
	interception_global (*or max_interception*)	double			m	Global value for interception.
	interception_file (*or max_interception_file*)	text		raster/yourfile.tif	m	Relative path to interception file (.tif)
	kmax	integer	*			Maximum multitude of smallest grid size in quadtree starting from grid_space at k=1. Grid size increases according to 2^(k-1) * grid_space.
	manhole_storage_area	double	**		m2	Default manhole storage area. This is the surface area that each manhole is given when water reaches above the surface level. **Mandatory when using only 1d flow (no dem) manhole area must be larger than 0 (and an INTEGER) Must be NULL when using only 2d.
	max_angle_1d_advection	double			degrees [0-90]	Maximum angle at which advection is considered.
	max_infiltration_capacity_file					Is depricated in the global settings table, should be defined in the v2_simple_infiltration table. Is/Will be removed with the release of October 2018
	maximum_sim_time_step	double	**		s	Maximum timestep during simulation. ** Mandatory when using timestep plus.
	minimum_sim_time_step	double			s	Minimum timestep during smulation.
	name	text	*			Names must be unique globally. Do not use spaces, capitals, dahses (underscore is allowed) Keep names shorter than 10 characters. Don't use same name as sqlite name.
	nr_timesteps	integer	*			Maximum nr of timesteps. This value is not used in the web portal.
	numerical_settings_id	integer				Reference to id that contains numerical settings for this scenario.

Table	attribute	type	mandatory	default	unit	comment
	output_time_step	double	*		s	Timestep written in output file must be a factor of sim_time_step
	sim_time_step	double	*		s	Simulation time step
	simple_infiltration_settings_id	integer				Reference to id that contains settings for simple infiltration for this scenario.
	start_date	date	*			Format: 2017-01-01
	start_time	timestamp with time zon	*			Starttime of simulation. Format: 00:00:00 (LM: volgens mij mag dit format niet en moet het zoiets zijn: 2014-01-01 00:00:00)
	table_step_size	double	*		m	User-defined table stepsize/increment (m). Use 0.01 for detailed simulation or larger stepsize to speed up exploring model schematisation.
	table_step_size_1d	double		table_step_size	m	User-defined table stepsize/increment (m) for 1d cross-sections and volumes. default value = table_step_size
	table_step_size_volume_2d	double		table_step_size	m	User-defined table stepsize/increment (m) for defining 2D volumes. Can increase speed when this is set larger than table_step_size. default value = table_step_size
	timestep_plus	boolean	*		-	Allow switching to larger timestep when simulation is steady.
	use_0d_inflow	integer	*			Include 0D inflow (NWRW/impervious surfaces) in simulation. 0 do not use 0d inflow 1 use v2_impervious_surface 2 use v2_surface
	use_1d_flow	boolean	*			Include 1D flow in simulation. When using only 1D flow, manhole_storage_area must be larger than zero.
	use_2d_flow	boolean	*			Include 2D flow in simulation. When using only 2D flow, set manhole_storage_area to NULL.
	use_2d_rain	boolean	*			Use rainfall via 2D surface for this scenario
	water_level_ini_type	integer	**			0=max, 1=min, 2=avg **Mandatory when using initial water level file.
	wind_shielding_file	text				IS NOT IMPLEMENTED
v2_groundwater						***do not use in combination with simple_infiltration***
	id	serial	*			Unique identifier
	display_name	text	*			Name field, no constraints
	equilibrium_infiltration_rate	double	*		mm/day	Setting for Horton-based infiltration; This is the equilibrium infiltration rate
	equilibrium_infiltration_rate_file	text		raster/yourfile.tif	mm/day	Relative path to your file (.tif)
	equilibrium_infiltration_rate_type	integer	**			0=max, 1=min, 2=avg **Mandatory when using equilibrium infiltration file.
	groundwater_hydro_connectivity	double	*		m/day	Darcy coefficient
	groundwater_hydro_connectivity_file	text		raster/yourfile.tif	m/day	Relative path to your file (.tif)
	groundwater_hydro_connectivity_type	integer	**		-	0=max, 1=min, 2=avg **Mandatory when using groundwater_hydro_connectivity_file
	groundwater_impervious_layer_level	double	*		m tov NAP	level of impervious layer, bottom of groundwater layer
	groundwater_impervious_layer_level_file	text		raster/yourfile.tif	m tov NAP	Relative path to your file (.tif)
	groundwater_impervious_layer_level_type	integer	**			0=max, 1=min, 2=avg **Mandatory when using groundwater_impervious_layer_level_file.
	infiltration_decay_period	double	*		days	Setting for Horton-based infiltration; determines the period for which the infiltration decays to an equilibrium
	infiltration_decay_period_file	text		raster/yourfile.tif	days	Relative path to your file (.tif)
	infiltration_decay_period_type	integer	**			0=max, 1=min, 2=avg **Mandatory when using infiltration_decay_period _file.
	initial_infiltration_rate	double	*		mm/day	Setting for Horton-based infiltration; It is the initial infiltration rate
	initial_infiltration_rate_file	text		raster/yourfile.tif	mm/day	Relative path to your file (.tif)

Table	attribute	type	mandatory	default	unit	comment
	initial_infiltration_rate_type	integer	**			0=max, 1=min, 2=avg **Mandatory when using initial infiltration file.
	leakage	double	*		mm/d	positive is adding water to the domain, negative is extracting water from the domain.
	leakage_file	text		raster/yourfile.tif	mm/d	positive is adding water to the domain, negative is extracting water from the domain.
	phreatic_storage_capacity	double	*	>0 and <1	-	This is the effective porosity in the groundwater layer, as a fraction between 0 and 1
	phreatic_storage_capacity_file	text		raster/yourfile.tif	-	Relative path to your file (.tif)
	phreatic_storage_capacity_type	integer	**		-	0=max, 1=min, 2=avg **Mandatory when using phreatic_storage_capacity_file.
v2_grid_refinement						Lines that determine local 2D calculation grid refinement.
	id	serial	*			Unique identifier
	display_name	text	*			Name field, no constraints
	refinement_level	integer	*			Local refinement level. Starting from 1. Values above kmax (v2_global_settings) are ignored.
v2_grid_refinement_area						Lines that determine local 2D calculation grid refinement.
	id	serial	*			Unique identifier
	display_name	text	*			Name field, no constraints
	refinement_level	integer	*			Local refinement level. Starting from 1. Values above kmax (v2_global_settings) are ignored.
v2_impervious_surface						Definition of 0D-surfaces.
	id	serial	*		-	Unique identifier
	area	double precisi	*			Cannot be left blank. A value of 0 is allowed.
	code	text	*		-	Code field, no constraints
	display_name	text	*		-	Name field, no constraints
	dry_weather_flow	double			L/day per inhabitant	Dry weather flow per inhabitant.
	nr_of_inhabitants	double			-	Number of inhabitant used for dry wheather flow.
	surface_class	text	*		-	gesloten verharding , open verharding , half verhard , onverhard , pand
	surface_inclination	text	*		-	vlak, hellend, uitgestrekt
	zoom_category	integer			-	Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_impervious_surface_map						Table that linkes v2_impervious_surfaces to connection node ID's.
	id	serial	*		-	Unique identifier
	connection_node_id	integer	*		-	ID of connection node
	impervious_surface_id	integer	*		-	ID of impervious surfce feature
	percentage	integer	*		%	Percentage of impervious surface area places on connection node
v2_interflow						
	id	serial	*		-	Unique identifier
	display_name	text	*		-	Name field, no constraints
	hydraulic_conductivity	double	**		m/day	Global hydraulic conductivity (Darcy) **When interflow_type > 0 then hydraulic_conductivity OR hydraulic_conductivity_file is mandatory
	hydraulic_conductivity_file	text		raster/yourfile.tif	m/day	Relative path to hydraulic conductivity path (.tif) **When interflow_type > 0 then hydraulic_conductivity OR hydraulic_conductivity_file is mandatory
	impervious_layer_elevation	double	**	> 0	m	When using interflow: Depth of interflow layer defined below lowest pixel (so always positive). Imaginary bottom of interflow layer. For interflow types 1 and 2 it is ignored for the volume in the interflow layer (but still it must be filled in when using interflow). The volume in these types is determined by the porosity and the porosity layer thickness. For interflow types 3 and 4 it is used to determine the volume in the interflow layer. In all types the waterlevel in the interflow layer starts at this level. It does not influence flow. ** Mandatory when using interflow

Table	attribute	type	mandatory	default	unit	comment
	interflow_type	integer	* **	0		Include interflow in simulation. 0: No Interflow 1: define 1 porosity value for model. This porsity will be rescaled per pixel (to lowest pixel per cell), so (interflow) volume is the same for each pixel within 1 cell --> define porosity, hydraulic_conductivity, porosity_layer_thickness and impervious_layer_elevation (can be used in combination with groundwater) 2: define 1 porosity value for model. This porsity will be rescaled per pixel (to lowest pixel whole model), so (interflow) volume is the same for each pixel in whole model --> define porosity, hydraulic_conductivity, porosity_layer_thickness and impervious_layer_elevation (cannot be used in combination with groundwater) 3: define 1 porosity value for model. This porsity will not be rescaled, but each pixel in the model has the same porosity. The (interflow) volume for each pixel depends on the impervious_layer_elevation, which is below lowest pixel of cell --> define porosity, hydraulic_conductivity and impervious_layer_elevation (can be used in combination with groundwater) 4: define 1 porosity value for model. This porsity will not be rescaled, but each pixel in the model has the same porosity. The (interflow) volume for each pixel depends on the impervious_layer_elevation, which is below lowest pixel of whole model --> define porosity, hydraulic_conductivity and impervious_layer_elevation (cannot be used in combination with groundwater) * NOT NULL ** do not use interflow in combination with limiter_slope_crossectional_area_2d >0 AND/OR limiter_slope_friction_2d>0
	porosity	double	**			Porosity (between 0 and 1) of interflow layer. ** Mandatory when using interflow
	porosity_file	text		raster/yourfile.tif	-	Relative path to porosity file (.tif)
	porosity_layer_thickness	double	**	> 0	m	Thickness of porosity layer relative to DEM. **Mandatory for interflow_type 1 and 2.
v2_levee						Line with fixed crest level that overides DEM- values at calculation cell borders.
	id	serial	*		-	Unique identifier
	crest_level	double	*		m above datum (NL: NAP)	Crest level of levee segment.
	material	integer	**		-	** Mandatory when you want to use a levee breach during your calculation Material used for breach growth. 1: sand 2: clay
	max_breach_depth	double	**		m below levee crest_level	** Mandatory when you want to use a levee breach during your calculation Maximum breach depth relative to crest level (thus a positive value must be filled in).
v2_manhole						Sewerage manhole
	id	serial	*		-	Unique identifier
	bottom_level	double	*		m above datum (NL: NAP)	Manhole bottom level.
	calculation_type	integer	*		-	Manhole calculation type for 1D-2D connection. 0: embedded 1: isolated 2: connected
	code	text	*		-	Name field, no constraints
	connection_node_id	integer	*		-	ID of connection node on which manhole is placed.
	display_name	text	*		-	Name field, no constraints
	drain_level	double	**		m above datum (NL: NAP)	Manhole drain level (**for connected manholes). If there is a connected manhole without drain level, 3Di will take the top of the pipe from the connection pipes as drain level.

Table	attribute	type	mandatory	default	unit	comment
	length	double	**		m	Manhole length. This value is for administrative purposes only and has no effect on the storage area of the connection node. **Mandatory when shape = 02
	manhole_indicator	integer	*		-	0: inspection (inspectieput) 1: outlet 2: pump
	shape	text	*		-	Manhole shape. This value is for administrative purposes only and has no effect on the storage area of the connection node. To add storage to a connection node, adjust the 'storage_area' in the v2_connection_nodes table. 00: square 01: round 02: rectangle
	surface_level	double	*		m above datum (NL: NAP)	Manhole surface level.
	width	double	*		m	Manhole width or diameter. This value is for administrative purposes only and has no effect on the storage area of the connection node.
	zoom_category	integer	*		-	Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_numerical_settings						Advanced numerical settings
	id	serial	*		-	Unique identifier
	cfl_strictness_factor_1d	double		1	-	Strictness of CFL condition for 1D.
	cfl_strictness_factor_2d	double		1	-	Strictness of CFL condition for 2D.
	convergence_cg	double		0.000000001		For numerical computation several tresholds are needed in the code, to avoid deficiencies due to a limited numerical accuracy. Generally this is to keep the behaviour consistent.
	convergence_eps	double	*	0.00001		Minimal residual for convergence of newton iteration.
	flow_direction_threshold	double		0.000001	m/s	For numerical computation several tresholds are needed in the code, to avoid deficiencies due to a limited numerical accuracy. Generally this is to keep the behaviour consistent.
	frict_shallow_water_correction	integer		0	-	In case the friction assumptions based on the dominant friction balance gives a structurally underestimation of the friction, one can switch this setting on. 0 is off, 1 is maximum between averaged friction and divided channel based friction, 2 is always linearized, 3 linearizes the depth based on a weighed averaged. In this case the maximum depth of a thin layer needs to be defined. Do not use in combination with interflow
	general_numerical_threshold	double		0.00000001		For numerical computation several tresholds are needed in the code, to avoid deficiencies due to a limited numerical accuracy. Generally this is to keep the behaviour consistent.
	integration_method	integer	*	0		Time integration method: 0=Euler implicit
	limiter_grad_1d	integer		1		The limiter on the water level gradient allows the model to deal with unrealistically steep gradients.
	limiter_grad_2d	integer		0	-	The limiter on the water level gradient allows the model to deal with unrealistically steep gradients. When field is left empty, it is switched on!!!
	limiter_slope_crossectional_area_2d	integer		0	-	This limiter starts working in case the depth based on the downstream water level is zero and may be useful in sloping areas. 0 is off, and 1 is a limiter which ends in a a higher order scheme, but is sensitive too instabilities, 2, treats the cross-sections as an upwind method volume/surface area under the assumption that the flow acts like a thin layer, 3 makes a combination of the traditional method in combination with the thin layer apporach. In this case the maximum depth of a thin layer needs to be defined. Do not use in combination with interflow
	limiter_slope_friction_2d	integer		0	-	This limiter starts working in case the depth based on the downstream water level is zero and may be useful in sloping areas. 0 is off, and 1 is on. This limiter is obliged in combination with limiter_slope_crossectional_area_2d>0.. l Do not use in combination with interflow

Table	attribute	type	mandatory	default	unit	comment
	max_degree	integer	*	see comment		Setting for matrix solver. Values below are adviced for different model types 700 for 1D flow 7 for 1D and 2D flow 5 for surface 2D flow only 7 for surface and groundwater flow 70 for 1D, 2D surface and groundwater flow or higher. Play around with this value in case of groundwater, can speed up your model significantly
	max_nonlin_iterations	integer	*	20		Maximum number of nonlinear iterations in single time step.
	minimum_friction_velocity	double		0.05	m/s	For numerical computation several tresholds are needed in the code, to avoid deficiencies due to a limited numerical accuracy. Generally this is to keep the behaviour consistent.
	minimum_surface_area	double		0.00000001	m2	For numerical computation several tresholds are needed in the code, to avoid deficiencies due to a limited numerical accuracy. Generally this is to keep the behaviour consistent.
	precon_cg	integer		1	-	Use preconditioner for matrix solver. Increases simulation speed in most cases, Set to 0 or 1 (default).
	preissmann_slot	double		0	m2	A conceptual vertical and narrow slot providing a conceptual free surface condition for the flow when the water level is above the top of a closed conduit. Often used to guarentee stability, in 3Di unnessary unless used for presurized pipe flow. Works only for circular profiles.
	pump_implicit_ratio	double		1		Determines whether pump discharge is always maximum capacity (0) or discharge is limited to available inflow (1). The latter ensures a smooth discharge. Value between 0 and 1.
	thin_water_layer_definition	double	**	0.05	m	** mandatory when using friction shallow water correction option 3 or limiter_slope_crossectional_area_2d on option 3
	use_of_cg	integer	*	20		Number of iteration of conjugate gradient method, before swtiching to another method
	use_of_nested_newton	integer	*	0/1		1 for 1D calculation with closed profiles to handle non-linearity in volume-waterlevel relation. When using 0 nested newton is switch off by default but will be used when calculations become non-linear. For sewerage systems 1 is advised.
v2_obstacle						Line with fixed crest level that overides DEM- values at calculation cell borders.
	id	serial	*		-	Unique identifier
	crest_level	double	*		m above datum (NL: NAP)	Crest level of obstacle segment
v2_orifice						Structure that can be used for spillways or bridges
	id	serial	*		-	Unique identifier
	code	text	*		-	Name field, no constraints
	connection_node_start_id	integer	*		-	Start node for orifice. Must be present in v2_connection_nodes
	connection_node_end_id	integer	*		-	End node for orifice. Must be present in v2_connection_nodes
	crest_level	double	*		m above datum (NL: NAP)	Crest or bottom level. Must be equal or above ajoining manhole or channel bottom/reference level.
	crest_type	integer	*		-	Type of weir formulation. 3: broad crested 4: short crested
	cross_section_definition_id	integer	*		-	ID of cross section definition in v2_cross_section_definition
	discharge_coefficient_negative	double	*	1	-	Discharge coefficient for negative flow (from end to start node). Can be set to 0 when closed.
	discharge_coefficient_positive	double	*	1	-	Discharge coefficient for positive flow (from start to end node). Can be set to 0 when closed.
	display_name	text	*		-	Name field, no constraints
	friction_type	integer	*			Friction Type. 1: Chezy (not yet implemented) 2: Manning

Table	attribute	type	mandatory	default	unit	comment
	friction_value	double	*		1:[m1/2/s], 2:[s/m1/3]	Friction or roughness value for profile
	sewerage	boolean			-	For internal book keeping. Can be used for statistics in QGIS plugin.
	zoom_category	integer	*			Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_pipe						Table of pipes
	id	serial			-	Unique identifier
	calculation_type	integer	*	1	-	Calculation type for pipe. When start en end connection nodes are manholes only used for calculation points half-way pipe. 0 = embedded 1 = isolated 2 = connected 3 = broad crest 4 = short crest
	code	text			-	Name field, no constraints
	connection_node_end_id	integer				End node for pipe. Must be present in v2_connection_nodes
	connection_node_start_id	integer				Start node for pipe. Must be present in v2_connection_nodes
	cross_section_definition_id	integer	*		-	ID of cross section definition in v2_cross_section_definition
	display_name	text			-	Name field, no constraints
	dist_calc_points	double			m	Distance between calculation points on pipe.
	friction_type	integer	*			Friction type. 1: Chezy 2: Manning
	friction_value	double	*		1:[m1/2/s], 2:[s/m1/3]	Friction or roughness value for profile; friction only accounted for in case of broad crested weir
	invert_level_end_point	double	*		m above datum (NL: NAP)	Invert level at culvert endpoint. Must be equal or above ajoining manhole or channel bottom/reference level.
	invert_level_start_point	double	*		m above datum (NL: NAP)	Invert level at culvert startpoint. Must be equal or above ajoining manhole or channel bottom/reference level.
	material	integer				Material of pipe, used for internal bookkeeping only. 0: concrete 1: pvc 2: gres 3: cast iron 4: brickwork 5: HPE 6: HDPE 7: plate iron 8: steel
	original_length	double			m	For internal use only.
	profile_num	integer				For internal use only.

Table	attribute	type	mandatory	default	unit	comment
	sewerage_type	integer			-	Pipe type. 3Di requires the sewerage_type to be one of the following: 0: gemengd - mixed 1: rwa - rain water 2: dwa - dry wheather flow 3: transport 4: overstort - spillway 5: zinker 6: berging - storage 7: bergbezinkbak - storage tank Some organisations use additional codes. This is not allowed in 3Di.
	zoom_category	integer				Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_pumpstation						List of pumpstations
	id	serial	*			Unique identifier
	capacity	double	*		L/s	Pump capacity.
	zoom_category	integer				For internal book keeping.
	code	text	*			Name field, no constraints
	connection_node_end_id	integer				End node for pumpstation. Must be present in v2_connection_nodes. Can be left blank in which case pump functions as boundary.
	connection_node_start_id	integer				Start node for pumpstation. Must be present in v2_connection_nodes. Can be left blank in which case pump functions as boundary.
	display_name	text	*			Name field, no constraints
	lower_stop_level	double	*		m above datum (NL: NAP)	Level at pump start or end node at which pump stops pumping. Must be below start level.
	sewerage	boolean	*			For internal book keeping.
	start_level	double	*		m above datum (NL: NAP)	Level at pump start or end node from from which it starts pumping. Must be equal or above ajoining manhole or channel bottom/reference level.
	type	integer	*			Type that determines pump function. 1: pump reacts only on suction side 2: pump reacts only on delivery side
	upper_stop_level	double			m above datum (NL: NAP)	Level at pump start or end node at which pump stops pumping. Must be above start level.
	zoom_category	integer	*			Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_simple_infiltration						***do not use in combination with v2_groundwater***
	id	serial	*			Unique identifier
	display_name	text	*			Name field, no constraints
	infiltration_rate	double	*	0	mm/day	Global infiltration rate.
	infiltration_rate_file	text		raster/yourfile.tif	mm/day	Relative path to infiltration file (.tif). Infiltration uses the sum of pixel values per calculation cell in case of rain and sum of wet pixels in case of standing water. Must be NULL (and not "") when not using infiltration otherwise 3di expects infiltration.

Table	attribute	type	mandatory	default	unit	comment
	infiltration_surface_option	integer		0		Option that sets how the infiltration works in calculation cells. 0: rain (whole surface when raining, only wet pixels when dry) 1: whole surface (always whole surface) 2: only wet surface (always only wet pixels) in case not defined then option 0 is used
	max_infiltration_capacity_file	text		raster/yourfile.tif	m	Relative path to max infiltration file (.tif). Maximum infiltration uses the sum of pixel values per calculation cell.
v2_surface						
	id	serial	*			Unique identifier
	area	double	*		m2	Cannot be left blank. A value of 0 is allowed.
	code	text	*			Name field, no constraints
	display_name	text	*			Name field, no constraints
	dry_weather_flow	double			L/day per inhabitant	Dry weather flow per inhabitant.
	function	text				For your own administration.
	nr_of_inhabitants	double			-	Number of inhabitant used for dry wheather flow.
	surface_parameters_id	integer	*			Reference to v2_surface_parameters. The id filled in here must be present in this (v2_surface_parameters) table
	zoom_category	integer	*			Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2_surface_map						
	id	serial	*		-	Unique identifier
	connection_node_id	integer	*		-	ID of connection_node. Connecting the surface area from v2_surface to an connection_node
	percentage	double	*		%	percentage of area to the connection_node
	surface_id	integer	*		-	ID of surface feature
	surface_type	text	*		-	choice to use the 'v2_surface' or 'v2_impervious_surface'
v2_surface_param	For more information on these parameters see: Leidraad riolering C2100 page: 51					
	id	serial	*		-	Unique identifier
	infiltration	boolean	*			0 or 1
	infiltration_decay_constant	double	*		/h	time factor decay infiltration capacity of the surface
	infiltration_recovery_constant	double	*		/h	time factor recovery infiltration capacity of the surface
	max_infiltration_capacity	double	*		mm/h	Maximum infiltration capacity of the surface
	min_infiltration_capacity	double	*		mm/h	Minimum infiltration capacity of the surface
	outflow_delay	double	*		/min	delay of outflow
	surface_layer_thickness	double	*		mm	mm storage on the surface
v2_weir						List of weirs
	id	serial	*		-	Unique identifier
	code	text	*		-	Name field, no constraints
	connection_node_end_id	integer				End node for weir. Must be present in v2_connection_nodes and on channel end node
	connection_node_start_id	integer				Start node for weir. Must be present in v2_connection_nodes and on channel start node
	crest_level	double	*		m above datum (NL: NAP)	Crest level. Must be equal or above ajoining manhole or channel bottom/reference level.

Table	attribute	type	mandatory	default	unit	comment
	crest_type	integer	*		-	Type of weir formulation. 3: broad crested 4: short crested
	cross_section_definition_id	integer	*		-	ID of cross section definition in v2_cross_section_definition
	discharge_coefficient_negative	double	*		-	Discharge coefficient for negative flow (from end to start node). Can be set to 0 when closed.
	discharge_coefficient_positive	double	*		-	Discharge coefficient for positive flow (from start to end node). Can be set to 0 when closed.
	display_name	text	*		-	Name field, no constraints
	external	boolean				For internal book keeping
	friction_type	integer	*			Friction type. 1: Chezy 2: Manning
	friction_value	double	*		1:[m1/2/s], 2:[s/m1/3]	Friction or roughness value for profile; friction only accounted for in case of broad crested weir
	sewerage	boolean				For internal book keeping, 0 (false) or 1 (true)
	zoom category	integer				Visibility in live site. 0 is lowest for smallest level (i.e. ditch) and 5 for highest (rivers)
v2 control tables are filled automatically using the control structures tool in the QGIS Plugin toolbox						
v2_control						
	id	integer	*			Unique identifier
	control_type	text	*			Type of control, options are amongst others: table memory
	control_id	integer	*			id in the v2_control_table (in case of table control) or v2_control_memory (in case of memory control)
	control_group_id	integer	*			id of the v2_control_group this control is part of
	measure_group_id	integer	*			id of the v2_measure_group
	start				s	Start time of the control in seconds since beginning of the simulation. Can be used to link multiple control tables to one control structure.
	end				s	End time of the control in seconds since beginning of the simulation
	measure_frequency					NOT YET IMPLEMENTED
v2_control_group						control_group referred to in v2_global settings
	id	integer	*			Unique identifier
	name	text	*			Name
	description	text	*			Description
v2_control_measure_group						Table defining the different control measure groups
	id	integer	*			Unique identifier
v2_control_measure_map						Table defining the measure stations within a measure group
	id	integer	*			Unique identifier
	measure_group_id	integer	*			ID of the v2_measure_group this measure station is part of.
	object_type	text	*			Type of object to measure at, for example: 'v2_connection_nodes'
	object_id	integer	*			id of the object (of type defined in object_type)
	weight	double	*			weight of measuring station in group, use 1.0 for groups with single measuring station. Combined weight should be 1.0.
v2_control_table						Table defining the table control
	id	integer	*			Unique identifier
	action_table	text	*			Semicolumn seperated table with action values, use # for newline. For Example: -1.7;-1.4#-1.6;-1.3#-1.5;-1.2 When controlling set_discharge_coefficients you need to supply 2 values. One for the positive discharge coefficient and one for the negative discharge coefficient. Example: -1.7;0 0#-1.6;0.5 0.8#-1.5;1 1

Table	attribute	type	mandatory	default	unit	comment
	action_type	text	*			Type of action; examples: 'set_crest_level', 'set_discharge_coefficients', 'set_pump_capacity' (Attention: set_pump_capacity is in unit m3/s instead of l/s of the v2_pumpstation capacity)
	measure_variable	text	*			Measure variable in action table. For instance: 'waterlevel'
	measure_operator	text	*			Operator for direction the action table is read. '<' or '>'
	target_type	text	*			Structure type the control is applied to. For instance: 'v2_weir', 'v2_culvert', 'v2_orifice' or 'v2_pumpstation'
	target_id	integer	*			Id of structure the control is applied to.
v2_control_memory						Table defining the memory control
	id	integer	*			Unique identifier
	action_value	double	*			Value that the measure_variable is set to when memory control becomes active
	action_type	text	*			Type of action; examples: 'set_crest_level', 'set_discharge_coefficients', 'set_pump_capacity' (Attention: set_pump_capacity is in unit m3/s instead of l/s of the v2_pumpstation capacity)
	is_active	integer	*			0: control is inactive when initializing the model 1: control is active when initializing the model
	is_inverse	integer	*			0: normal functioning of the control 1: inverting the lower and upper threshold
	lower_threshold	double	*			Lower threshold of measure_variable. Control becomes inactive when value drops below this value (unless is_inverse = 1)
	measure_variable	text	*			Measure variable in action table. For instance: waterlevel
	target_id	integer	*			id of structure the control is applied to
	target_type	text	*			Structure type the control is applied to. For instance: 'v2_weir', 'v2_culvert', 'v2_orifice' or 'v2_pumpstation'
	upper_threshold	double	*			Upper threshold of measure_variable. Control becomes active when value rises above this value (unless is_inverse = 1)
v2_control_timed						Table defining the timed control (Not yet tested)
	id	integer				Unique identifier
	action_type	text				Type of action; examples: 'set_crest_level', 'set_discharge_coefficients', 'set_pump_capacity' (Attention: set_pump_capacity is in unit m3/s instead of l/s of the v2_pumpstation capacity)
	action_table	text				
	target_type	text				Structure type the control is applied to. For instance: 'v2_weir', 'v2_culvert', 'v2_orifice' or 'v2_pumpstation'
	target_id	integer				id of structure the control is applied to