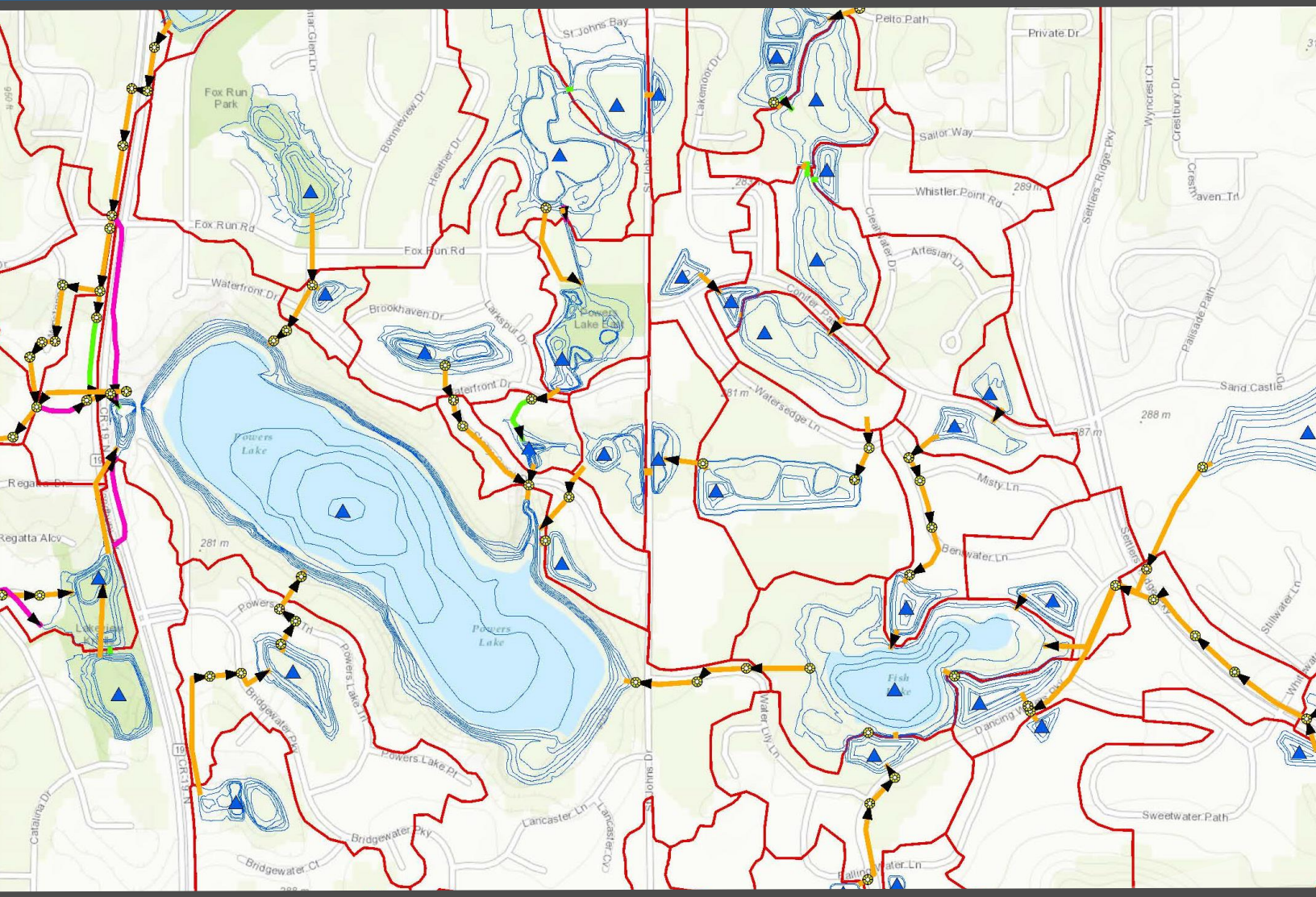
USER GUIDE



Surface Water Model User Guide

South Washington WATERSHED District

Prepared by Houston Engineering, Inc.
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Version 0.1

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Acronyms and Abbreviations List

DEM	Digital Elevation Model
GIS	Geographic Information System
SWMM	Storm Water Management Model
SWWD	South Washington Watershed SWWD

1 INTRODUCTION

This document is intended to serve as a user guide for the South Washington Watershed District (SWWD) surface water models. It describes the general structure of the SWWD modeling data and how it is intended to interact with the XP-SWMM (SWMM) modeling software it was created for. An ArcGIS personal geodatabase template was developed along with this documentation. This template serves as the basis for SWWD modeling data structure and was created to house all of the data required for each of the SWWD models. The sections of this report reference this template and the feature classes, tables, and other data within it.

This structure and documentation was developed for multiple reasons:

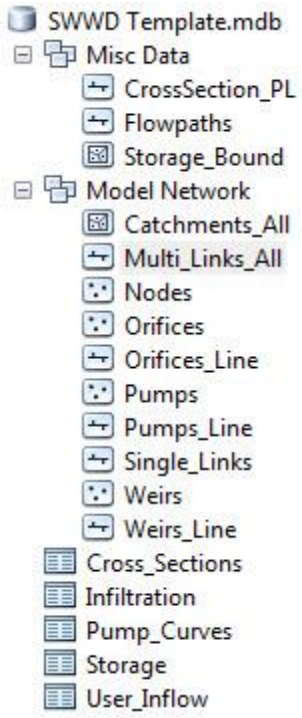
1. The structure and documentation will help the SWWD maintain and protect the monetary investment they have made in developing watershed models.
2. The data structure will allow modeling data to be utilized outside of the modeling software.
3. The modeling data and this documentation can be easily shared with others who may be performing work for or within the SWWD.

The following sections detail the overall data structure utilized by the SWWD.

2 GEODATABASE

The basis for the SWWD data structure is the ArcGIS personal geodatabase (geodatabase). A geodatabase stores spatial and tabular data in a central location where it can be easily accessed and managed. The geodatabase can be utilized both by ArcGIS mapping software as well as by SWMM modeling software. The data for each individual model is housed within its own geodatabase. The basic structure for the SWWD geodatabases is shown in **Figure 1**.

Figure 1. SWWD model geodatabase structure.



The following sections explain the different parts of the template geodatabase.

2.1 Geodatabase Domains

Surface water models operate by performing numerous iterations of many different hydrologic and hydraulic calculations. What the modeler enters into the front end of the modeling program is often vary different than what the model engine actually uses to perform the calculations. For example, a modeler might designate a pipe as "circular" in the modeling software. The software indicates "circular" on the front end but actually saves a number (*1* for example) in its database. This value (*1*), when sent to the model engine, indicates that equations for a circular pipe should be used in performing calculations pertaining to that pipe. In short, the model engine needs the number "1" and not the word "circular" in order to perform a calculation. In other cases, such as elevations, the elevation that the modeler enters may be saved "as is" in the modeling database and used directly by the modeling engine for calculation purposes.

In order to generate geographic information system (GIS) data that can be directly imported into SWMM, a systematic approach is needed to translate front end language (i.e. "circular") into model engine language (i.e. "1"). This is done in GIS through the development of attribute domains. Attribute domains are rules that can be applied to attribute fields and define possible values that can be entered into that field. Domains come in two types, range and coded. A range domain dictates a range of values for the field. For example, impervious percentages of a watersheds can only range from 0% to 100%; a range domain would prevent any values outside

that range from being entered into that attribute field. A coded domain is used to limit responses (e.g. pipe shapes) and also to code them for model entry (i.e. circular=1). Not every attribute field requires a domain. For example, a pipe invert attribute is an elevation, and can just be entered as a number. The model engine uses these types of numbers directly.

Attribute domains were developed for the SWWD models and are included in each model geodatabase. The individual attribute domain tables are given in **Appendix A**. The attribute fields that utilize domain mapping, and the domain they utilize are included in the tables in **Appendix B**.

The utilization of domain mapping within the model geodatabase structure allows for a more user-friendly front end when building and viewing model data in GIS. For example, the user will be able to see the actual pipe shape descriptions (i.e. circular, rectangular, arch, etc.) within the data tables, rather than the number codes that the modeling software uses.

2.2 Model Network

The model network feature dataset includes all of the spatial data that is required for constructing the geometric network of the model. The shapefiles within the model network feature dataset have attribute fields that contain various hydrology and hydraulic data that is required by the model.

2.2.1 Catchments

Catchment data is used by the model to determine hydrology calculations. The catchment shapefile indicates the spatial location and geometry of each of the catchments in the model; the shapefile attributes contain all of the catchment-specific hydrology data needed for entry into SWMM. Attribute fields exist for multiple hydrology methods available in SWMM and not all attributes may be needed. Additional data and information used to determine catchment hydrology parameters can be found in the catchment flow path data. This is described in more detail in **Section 2.4.2**.

Catchment database linkage is unique in SWMM. A general overview of how to link geodatabase files to SWMM is included in **Section 3**. To successfully establish a catchment GIS database link in SWMM, the database link must be set up as a node link. This is because all of the catchment hydrology data within the model is stored and accessed from the node data structure of the model.

One runoff node in SWMM may receive runoff from up to five different catchments; these catchments are labeled 1-5 within the runoff node data structure. Limitations in the GIS database linkage require that the modeler separate a shapefile containing all of the catchments into up to five separate catchment files, depending on the number of catchment draining to the same runoff node. A separate GIS database linkage is required for each of

these shapefiles. Therefore, in any particular SWWD model geodatabase, up to six catchment files may exist. These are described in **Table 1**.

Table 1. Catchment shapefile descriptions.

Shapefile Name	Description
Catchments_All	This shapefile contains all of the catchments within the model. It is the parent shapefile to each of the five separate catchment shapefiles. The field attribute that determines catchment number is CATCH_NUM.
Catchments_1	Catchments that will be mapped to the #1 catchment location in SWMM runoff nodes. This file should only contain one catchment for each runoff node listed.
Catchments_2	Catchments that will be mapped to the #2 catchment location in SWMM runoff nodes. This file should only contain one catchment for each runoff node listed.
Catchments_3	Catchments that will be mapped to the #3 catchment location in SWMM runoff nodes. This file should only contain one catchment for each runoff node listed.
Catchments_4	Catchments that will be mapped to the #4 catchment location in SWMM runoff nodes. This file should only contain one catchment for each runoff node listed.
Catchments_5	Catchments that will be mapped to the #5 catchment location in SWMM runoff nodes. This file should only contain one catchment for each runoff node listed.

All of the catchment shapefiles listed in **Table 1** have identical attributes and domain mapping. It is recommended that any changes to the catchments be completed on the *Catchments_All* shapefile. The separate catchment shapefiles can then be recreated and updated using this file.

The data schema for this shapefile can be found in **Appendix B**, **Table 1**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.2.2 Nodes

Node data includes both model junction and storage nodes. The former are non-storage water transfer points while the latter allow for ponding and pooling of water within the storage volume. The data at these locations are used as boundary conditions for hydraulic calculations that transfer water through the links.

The *Node* shapefile indicates the spatial location and geometry of each of the nodes in the model; the shapefile attributes contain all of the hydraulic data needed for entry into SWMM. Attribute fields exist for various aspects of the hydraulics available in SWMM and not all attributes may be needed for each model.

The data schema for this shapefile can be found in **Appendix B**, **Table 2**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.2.3 Single Links

The SWMM modeling software allows for two different types of links: single and multi. The former only allows for one conduit and is limited in the conveyance type. The latter allows for multiple conduits. The conduit data within a single and multi links is utilized by the model to determine how water is transferred from node to node. Various hydraulic equations are associated with each conduit, and the data parameters are used in these equations.

The *Single_Links* shapefile indicates the spatial location and geometry of each of the single links in the model; the shapefile attributes contain all of the hydraulic data needed for entry into SWMM. It is important to note that when single link data is imported into a SWMM model, it is drawn as a straight line between the upstream and downstream nodes. This may or may not follow the actual path of the conveyance but this simplified geometry does not have any effect on the modeling, as the model is utilizing the information attributed to the single link and not the actual geometry. Attribute fields exist for various aspects of the single link hydraulics available in SWMM and not all attributes may be needed for each model.

The data schema for this shapefile can be found in **Appendix B**, **Table 3**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.2.4 Multi Links

As discussed in **Section 2.2.3**, the SWMM modeling software also uses multi-links to simulate multiple conduits. The multi-link functionality is identical to the single link functionality, with the exception of the addition of multiple conduit naming and options. The *Multi_Links* shapefile indicates the spatial location and geometry of each of the multi links in the model; the shapefile attributes contain all of the hydraulic data needed for entry into SWMM. As with single links, when multi links are imported into the model, they are drawn as straight lines between the upstream and downstream nodes. Attribute fields exist for various aspects of the hydraulics available in SWMM and not all attributes may be needed for each model.

One multi link in SWMM may include up to seven different conduits; a conduit is identified by its conduit ID number (and subsequent conduit flag number). Similar to catchments, limitations in the GIS database linkage require that the modeler separate a shapefile containing all of the multi links into up to seven separate multi link files, depending on the maximum number of conduits within a multi link. A separate GIS database linkage is required for each of these shapefiles. Therefore, in any particular SWWD model geodatabase, up to eight multi link files may exist. These are described in **Table 2**.

Table 2. Multi link shapefile descriptions.

Shapefile Name	Description
Multi_Links_All	This shapefile contain all of the multi links within the model. It is the parent shapefile to each of the seven separate multi link shapefiles. The field attributes that are specific to each of the seven possible conduits are COND_ID1 through COND_ID7 and C_FLAG_1 through C_FLAG_7
Multi_Links_1	Multi links that will be mapped to the #1 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID1 and C_FLAG_1 should be used for features in this shapefile.
Multi_Links_2	Multi links that will be mapped to the #2 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID2 and C_FLAG_2 should be used for features in this shapefile.
Multi_Links_3	Multi links that will be mapped to the #3 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID3 and C_FLAG_3 should be used for features in this shapefile.
Multi_Links_4	Multi links that will be mapped to the #4 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID4 and C_FLAG_4 should be used for features in this shapefile.
Multi_Links_5	Multi links that will be mapped to the #5 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID5 and C_FLAG_5 should be used for features in this shapefile.

Shapefile Name	Description
Multi_Links_6	Multi links that will be mapped to the #6 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID6 and C_FLAG_6 should be used for features in this shapefile.
Multi_Links_7	Multi links that will be mapped to the #7 conduit location in a multi link. This file should only contain one conduit for each link listed. COND_ID7 and C_FLAG_7 should be used for features in this shapefile.

All of the multi link shapefiles listed in **Table 2** have identical attributes and domain mapping. It is recommended that any changes to the multi links be completed on the *Multi_Links_All* shapefile. The separate catchment shapefiles can then be recreated and updated using this file.

The data schema for this shapefile can be found in **Appendix B**, **Table 4**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.2.5 Weirs

Various types of hydraulic conveyance are often modeled as weirs including physical weir structures, pond outlet drop structures, and approximate storage overflows. Weir data for the SWWD models is stored as a point shapefile and also has an accompanying line shapefile.

The *Weir* shapefile is a point feature and indicates the spatial location of the weir within the model; the shapefile attributes contain all of the weir hydraulic data needed for entry into SWMM and not all attributes may be needed for each model. An additional line shapefile, *Weirs_Line*, is included in the data. This shapefile contains the same identifying attributes as the weir point file (Link ID and Weir ID), but contains none of the hydraulic weir attribute data; it is included for geometry purposes only to complete the geometric network when viewing the model network in GIS. All database connections to the SWMM model are made using the point shapefile.

The data schema for these shapefile can be found in **Appendix B**, **Table 5**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.2.6 Orifices

The purpose of an orifice generally is to divert excess stormwater from the stormwater system to another location. Orifice data for the SWWD models is stored as a point shapefile and also has an accompanying line shapefile.

The *Orifices* shapefile is a point feature and indicates the spatial location of the orifice within the model; the shapefile attributes contain all of the orifice hydraulic data needed for entry into SWMM and not all attributes may be needed for each model. Similar to weirs, an additional line shapefile *Orifices_Line* is included in the data. This shapefile contains the same identifying attributes as the orifice point file (Link ID and Orifice ID), but contains none of the hydraulic orifice attribute data; it is included for geometry purposes only to complete the geometric network when viewing the model network in GIS. All database connections to the SWMM model are made using the point shapefile.

The data schema for this shapefile can be found in **Appendix B**, **Table 6**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.2.7 Pumps

Pumps are used to transfer water from one location to another based on a defined pumping rule curve, where flow rate is dependent upon the upstream and downstream pumping conditions. Pump data for the SWWD is stored similarly to weir and orifice data, as a point shapefile and also has an accompanying line shapefile.

The *Pumps* shapefile is a point feature and indicates the spatial location of the pump within the model; the shapefile attributes contain all of the pump hydraulic data needed for entry into SWMM and not all attributes may be needed for each model. Pumps in SWMM must reference a pump curve; this reference is included in the pump attributes. Each pump can have its own pump curve or multiple pumps may reference the same curve. Pump curve data is stored in a separate table and is discussed in more detail in **Section 2.3.4**. Similar to weirs and orifices, an additional line shapefile *Pumps_Line* is included in the data. This shapefile contains the same identifying attributes as the pump point file (Link ID and Pump ID), but contains none of the hydraulic pump attribute data; it is included for geometry purposes only to complete the geometric network when viewing the model network in GIS. All database connections to the SWMM model are made using the point shapefile.

The data schema for this shapefile can be found in **Appendix B**, **Table 7**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.3 Tables

Tables within the geodatabase are used to store non-spatial data. Often this non-spatial data pairs up with some of the spatial data through a common attribute such as an ID. For example, as described in **Section 2.2.7**, pumps are part of the geometric network of the model, but the pump curves that dictate how they operate are stored in a table. The data from the pump curve data is referenced by the pump link within the model when pumping calculations are performed.

2.3.1 Node Storage

Storage tables are used by the model to determine available storage volume at storage nodes and as a result, accurately map high water elevations based on the inundation of this volume. Node storage is typically developed in the form of stage-area curves; these are incremental surface areas at various elevations (stages). The incremental stage-area data are integrated to determine the available storage volume at each elevation and the model allows water to fill these volumes when necessary. Often, stage-area data tables are developed through contour mapping or digital elevation model (DEM) geoprocessing. This is further discussed in **Section 2.4.3**.

Stage-area data for the SWWD models is located in the geodatabase table *Storage*.

The data schema for this table can be found in **Appendix B**, **Table 8**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.3.2 Infiltration

Infiltration is the loss within a model through transport into the ground. Infiltration datasets are utilized in the SWWD models in catchment hydrology to simulate various infiltration conditions. Infiltration data can be applied at a high resolution (i.e. at a catchment scale) or more broadly across the model such as simulating a seasonal soil condition.

In SWMM, infiltration data is stored as a Global Data Type. The data that is needed for the infiltration model entries is located in the geodatabase table *Infiltration*.

The data schema for this table can be found in **Appendix B**, **Table 9**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.3.3 Cross Sections

Cross section datasets are utilized in the SWWD models by natural channel conduits. The data dictates the cross sectional profile of the natural channel, including station, elevation, length, and roughness.

In SWMM, cross section data is stored as a Global Data Type. The data that is needed for the cross section model entries is located in the geodatabase table *Cross_Sections*. Additional information regarding the spatial cross section data can be found in **Section 2.4.1**.

The data schema for this table can be found in **Appendix B**, **Table 10**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.3.4 Pump Curves

As discussed in **Section 2.2.7**, pump curve datasets are utilized in the SWWD models by pump links. The data determines what flow rate us used to transfer water through the pump, based on the hydraulic conditions at the upstream and downstream ends of the pump.

In SWMM, pump curve data is stored as a Global Data Type. The data that is needed for the pump curve model entries is located in the geodatabase table *Pump_Curves*.

The data schema for this table can be found in **Appendix B**, **Table 11**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.3.5 User Inflows

External node inflow are user time series inflow data that simulates water entering the model at a particular node. These typically include boundary conditions where water may be flowing in from another source outside of the model.

In SWMM, node inflow data is stored within the node data structure. The data for these node inflows is located in the geodatabase table *User_Inflow*.

The data schema for this table can be found in **Appendix B**, **Table 12**, and includes data field definitions, descriptions, applicable domains, and SWMM variable mapping.

2.4 Miscellaneous Data

There are various data that are not directly entered into the model, but are instead indirectly used to develop the model inputs. These data are stored in the Miscellaneous Data feature dataset of the model geodatabase. This feature dataset can also be used to store any other data related to the model development. This may include land use cover/types, additional infrastructure data, etc. However, it is important that the modeler document the data that is included within this feature dataset, so as to avoid confusion by others attempting to utilize the model and data structure.

2.4.1 Cross Section Profile Lines

In order to determine the natural cross section profile data discussed in **Section 2.3.3**, profile cut alignments are required. These profile lines are often used with DEM raster data to extract elevations at interval stations along the profile alignment.

Cross section profile line data for the SWWD models is located in the geodatabase polygon shapefile *CrossSection_PL*.

The data schema for this shapefile can be found in **Appendix B**, **Table 13**, and includes data field definitions, descriptions, and applicable domains.

2.4.2 Catchment Flow Paths

Catchment flow paths define the path that water travels in the catchment between the most hydraulically distant point in the catchment and the catchment discharge point. Flow paths can be used for various hydrologic analysis and are typically used for calculating the catchment time of concentration (Tc) value and the catchment slope.

Catchment flow path data for the SWWD models is located in the geodatabase line shapefile *Flowpaths*.

The data schema for this table can be found in **Appendix B**, **Table 14**, and includes data field definitions, descriptions, and applicable domains.

2.4.3 Node Storage Boundaries

In order to define the storage area data discussed in **Section 2.3.1** and utilized by storage nodes within the models, definitive storage boundaries are required. These boundaries are often the highest elevation contour surrounding the storage depression plus some additional elevation to allow for an overflow or outlet.

The storage area curves are typically determined using the maximum elevation boundary and some geoprocessing technique. This process determines the stepwise area at incremental elevations. This data is used by modeling software to determine how much volume is available at the storage node.

Node storage boundary data for the SWWD models is located in the geodatabase polygon shapefile *Storage_Bound*.

The data schema for this shapefile can be found in **Appendix B**, **Table 15**, and includes data field definitions, descriptions, and applicable domains.

3 SWMM IMPORT

As described throughout this guide, it is possible to directly link components from the SWWD model geodatabase directly to the SWMM software database. This allows a model to be generated directly from the geodatabase with very little effort. Beyond the importing of data, the effort required to have a fully functioning model is minimal on the part of the modeler. This is of benefit for several reasons:

- GIS is generally a much more user-friendly environment for developing and maintaining watershed hydrologic and hydraulic data;
- Entities such as watershed districts, technical professionals, and government or regulatory agencies are much more likely to have a GIS software package license than an SWMM modeling software license;
- Geodatabases provided an open single centralized location for housing data. Generating models from a database reduces the likelihood that model updates could be made elsewhere (i.e. within a model itself rather than in the geodatabase);
- A geodatabase-based model structure allows for annual model updates and maintenance to be performed effectively and efficiently;
- Maintaining model data within a GIS database ensures that model input and results are readily available and easily transferrable to others for use in design, evaluation, and permitting; and

- Maintaining model data within a GIS database ensures that model input and results are readily available for use in external applications such as online data viewers.

For these reasons, SWWD has chosen to maintain their models in that structure. This section describes how the modeling data within the geodatabase can be directly linked to the SWMM software.

3.1 Mapping Schema Information

Included in **Appendix B** are tables for each of the data files within the SWWD model geodatabases. Each table outlines metadata for the field attributes as well as information needed to establish a database connection with the SWMM modeling software. The various parts of these tables are explained in the following sections.

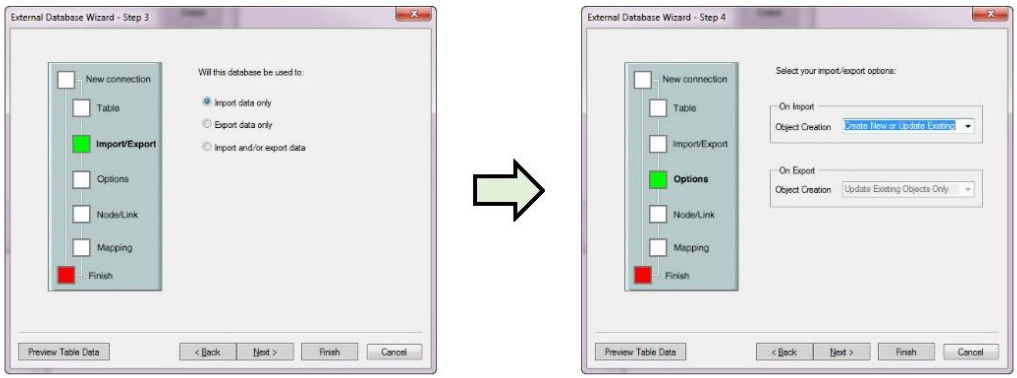
3.1.1 GIS Link Data

The GIS link data defines several key aspects of the database link: the data type (i.e. node, single link, global database, etc.); whether the link should allow import, export, or both; and how to create or update model data based on the link. An example GIS Link Data section (for nodes) is shown in **Figure 4** along with the corresponding SWMM entry dialog boxes. The information in the table indicates data entry into the dialog boxes.

Each table within **Appendix B** includes a GIS Link Data section similar to the one shown in **Figure 4**.

Figure 2. GIS Data Link example setup.

GIS Link Data	
Object Type	Node
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A

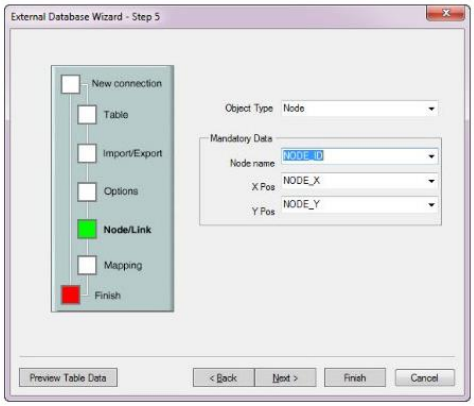


3.1.2 Mandatory Data

The Mandatory data defines field attribute mapping that is required in order to create features in the model using the database connection. This includes critical information such as ID naming and geographical location of the point (nodes) or endpoint (links). An example Mandatory Data section (for nodes) is shown in **Figure 4** along with the corresponding SWMM entry dialog boxes. The information in the table indicates data entry into the dialog boxes.

Figure 3. Mandatory Data example setup.

Mandatory Data	
Node Name	NODE_ID
X Pos	NODE_X
Y Pos	NODE_Y



Each table within **Appendix B** includes a Mandatory Data section similar to the one shown in **Figure 4**.

3.1.3 Attribute Fields

The tables in **Appendix B** include information about all of the feature class and table attribute fields within the model geodatabase. Descriptions of the different information within these tables is included in **Table 3**.

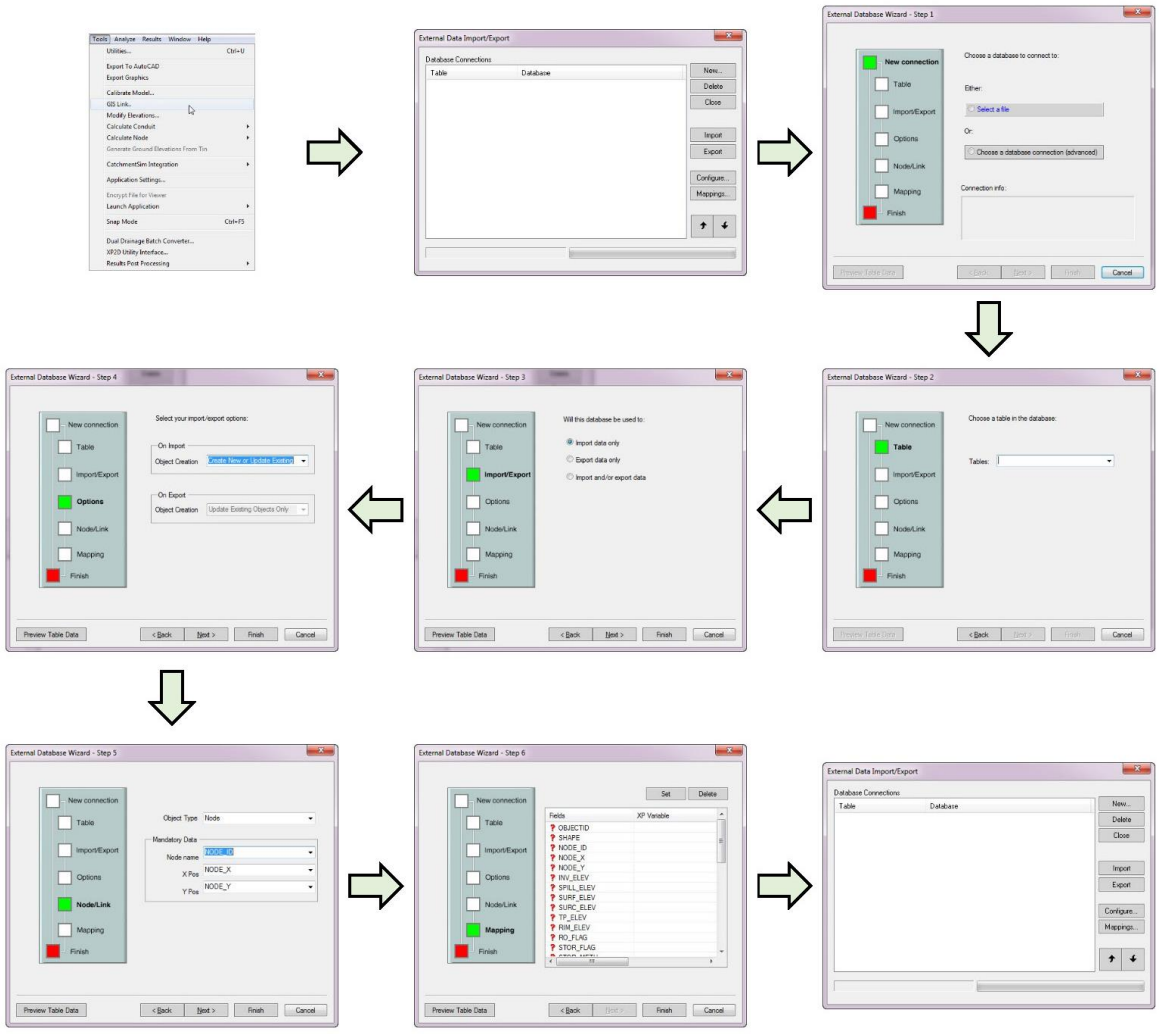
Table 3. Feature class and table field data descriptions (Appendix B).

Data	Description
Field Name	Feature class or table field name
Data Type	Feature class or table data type that input data is defined within
Field Alias	Feature class or table field alias name
Description	Detailed description of the field attribute
Domain Name	Name of domain associated with attribute field
Domain Type	Type of domain associated with attribute field
Mapped XP-SWMM Variable	Name of map-to variable within the XP-SWMM variable data tree

3.2 SWMM Database Connection

The overall SWMM model GIS link process is shown in **Figure 4**. First, select *GIS Link* from the Tools menu. This will open up the dialog box where database connections are shown. Select *New* and another dialog box will appear. Choose *Select a file* and navigate to the appropriate SWWD model geodatabase and select *Next*. Now select the table (shapefile or table) within the geodatabase to establish a connection with (e.g. Nodes). Select *Next* and in the next two dialog boxes, utilize the GIS Link Data for the appropriate file in **Appendix B** to determine the various setup parameters (i.e. Import/Export and Object Creation). Select *Next* and utilize the Mandatory Data for the appropriate file in **Appendix B** to select required attribute data (e.g. Node ID, Node X, Node Y, etc). Select *Next* and utilize the attribute field mapping in the appropriate table in **Appendix B** to setup all of the SWMM mapping variables necessary. When completed, select *Finish* and return to the database connections dialog window. Continue to setup any additional connections and when completed, highlight each connection and select *Import* to import them into the SWMM model.

Figure 4. GIS Link process.



4 ADDITIONAL SWMM INFORMATION

SWMM is a constantly evolving software. New version of the software are released on an approximately bi-annual basis with service packs being released throughout the in between periods. The information within this guide is accurate as of the release of the 2016 Version of XP-SWMM. The versioning of this guide allows for updates to the guide as software improvements and updates become available. The most accurate source of information regarding SWMM is from the XP website, www.xpsolutions.com, particularly the XP-SWMM 2016 Resource Center website, http://help.xpsolutions.com/display/xps2016.

Appendix A
Model Geodatabase Domain Mapping

Domain Name	Fields	Codes	Max Value	Min Value
Activation_Flag	Not Active	0		
	Active	1		
Advanced_Routing_Options	Standard-Dynamic Wave	0		
	Always Use Non-Linear Accel. Term	1		
	Never Use Non-Linear Accel. Term	2		
	Kinematic Wave	3		
Calc_Floodway_Enc_Using	Left Bank Only	0		
	Right Bank Only	1		
	Equal Right and Left Bank Reduc.	2		
	Symmetrical About Centerline	3		
	Equal Right and Left Bank Convey Reduc.	4		
Catchment_Number	No Subcatchments	0		
	Subcatchment 1	1		
	Subcatchment 2	2		
	Subcatchment 3	3		
	Subcatchment 4	4		
	Subcatchment 5	5		
Conduit_Factor_Flag	Off	0		
	On	1		
Conduit_Shape	Circular	1		
	Rectangular	2		
	Special	3		
	Trapezoidal	6		
	Natural	8		
	User-Defined	13		
	Power Function	7		
Curve_Number			98	0
Depth_Criteria_Option	Min Yc or Yn	0		
	Critical Depth, Yc	1		
	Normal Depth, Yn	2		
Dry_Weather_Flow_Flag	No	0		
	Yes	1		
Dry_Weather_Flow_Generation_Method_(HDR)	Direct Flow	0		
	Unit Flow Rate	1		
	Census-Based	2		
EntranceExit_Loss_Type	Energy Loss Coef.	0		
	Pressure Change Coef.	1		
Floodway_Encroachment_Flag	Off	0		
	On	1		
Floodway_Encroachment_Stations	Use Existing Encroachment Stations	0		
	Calculated Encroachment Stations	1		
Flow_Direction_Option	Free Flow	0		
	Downhill Only	1		
	Uphill Only	2		
Gauged_Inflow_Flag	No	0		
	Yes	1		
Global_Data_Type	Natural Section Shape	Natural Section Shape		
	Infiltration	Infiltration		
	Pump Ratings	Pump Ratings		
Groundwater_Drains_To	Drain out of System	1		
	Drain to Node or Conduit	0		
Infiltration_Method	Horton's	0		
	Green Ampt	1		
	Uniform Loss	2		
	SCS Method	3		
Inlet_Capacity_Flag	Full Inlet Capaity	0		
	Restricted Inlet Capaity	1		
Inlet_Type	N/A	0		
	Concrete Circular Square Edge with Headwall	1		

Domain Name	Fields	Codes	Max Value	Min Value
	Concrete Circular Groove End with Headwall	2		
	Concrete Circular Groove End Projecting	3		
	Corrugated Metal Circular Headwall	4		
	Corrugated Metal Circular Mitered to Slope	5		
	Corrugated Metal Circular Projecting	6		
	Concrete Circular 45 deg Beveled Ring	7		
	Concrete Circular 33.7 deg Beveled Ring	8		
	Concrete Rectangular 30 to 75 deg Wingwall Flares	9		
	Concrete Rectangular 90 and 15 deg Wingwall Flares	10		
	Concrete Rectangular 0 deg Wingwall Flares	11		
	Concrete Rectangular 45 deg Wingwall Flares	12		
	Concrete Rectangular 18 to 33.7 deg Wingwall Flares	13		
	Concrete Rectangular 90 deg Headwall with .75inch Chamfer	14		
	Concrete Rectangular 90 deg Headwall with 45 deg Bevels	15		
	Concrete Rectangular 90 deg Headwall with 33.7 deg Bevels	16		
	Concrete Rectangular .75inch Chamfers with 45 deg Skewed Headwalls	17		
	Concrete Rectangular .75inch Chamfers with 30 deg Skewed Headwalls	18		
	Concrete Rectangular .75inch Chamfers with 15 deg Skewed Headwalls	19		
	Concrete Rectangular 45 deg Bevels with 10 to 45 deg Skewed Headwalls	20		
	Concrete Rectangular .75 in Chmfr, 45 deg non-offset Wingwalls	21		
	Concrete Rectangular .75 in Chmfr, 18.4 deg non-offset Wingwalls	22		
	Concrete Rectangular .75 in Chmfr, 18.4 deg non-offset w/w, 30 deg Skewed Barrel	23		
	Concrete Rectangular Top Bevel with 45 deg offset Wingwall Flares	24		
	Concrete Rectangular Top Bevel with 33.7 deg offset Wingwall Flares	25		
	Concrete Rectangular Top Bevel with 18.4 deg offset Wingwall Flares	26		
	Corrugated Metal Rectangular 90 deg Headwall	27		
	Corrugated Metal Rectangular Thick Wall Projecting	28		
	Corrugated Metal Rectangular Thin Wall Projecting	29		
	Concrete Horiz. Ellips e Square Edge with Headwall	30		
	Concrete Horiz. Ellips e Groove End with Headwall	31		
	Concrete Horiz. Ellips e Groove End Projecting	32		
	Concrete Vert. Ellipse Square Edge with Headwall	33		
	Concrete Vert. Ellipse Groove End with Headwall	34		
	Concrete Vert. Ellipse Groove End Projecting	35		
	Corrugated Metal Arch 18 inch Corner, 90 deg Headwall	36		
	Corrugated Metal Arch 18 inch Corner, Mitered to Embankment	37		
	Corrugated Metal Arch 18 inch Corner, Projecting	38		
	Corrugated Metal Arch 18 inch Corner, No Bevels	39		
	Corrugated Metal Arch 31 inch Corner, Projecting	40		
	Corrugated Metal Arch 31 inch Corner, No Bevels	41		
	Corrugated Metal Arch 31 inch Corner, 33.7 Bevels	42		
	Corrugated Metal Arch 90 deg Headwall	43		
	Corrugated Metal Arch Mitered to Embankment	44		
	Corrugated Metal Arch Thin Wall Projecting	45		
	Concrete Throat Circular Smooth Tapered Inlet	46		

Domain Name	Fields	Codes	Max Value	Min Value
	Corrugated Metal Throat Circular Rough Tapered Inlet	47		
	Concrete Throat Elliptical Tapered Inlet, Beveled Edges	48		
	Concrete Throat Elliptical Tapered Inlet, Square Edges	49		
	Concrete Throat Elliptical Tapered Inlet, Thin Edge Projecting	50		
	Concrete Throat Rectangular Tapered Inlet	51		
	Concrete Throat Rect. Side-tapered, Less Favorable Edges	52		
	Concrete Throat Rect. Side-tapered, More Favorable Edges	53		
	Concrete Throat Rect. Slope-tapered, Less Favorable Edges	54		
	Concrete Throat Rect. Slope-tapered, More Favorable Edges	55		
Laurensons_Method_Options	Calculate B	0		
	Direct B	1		
Materials	RCP (~0.013)	RCP		
	CMP (~0.024)	CMP		
	PVC (~0.011)	PVC		
	DIP (~0.013)	DIP		
	Asphalt (~0.015)	Asphalt		
	Concrete (~0.014)	Concrete		
	Smooth Steel (~0.012)	Smooth Steel		
	High Grass (~0.035)	High Grass		
	Mowed Grass (~0.030)	Mowed Grass		
	Mowed Grass w/Obstructions (~0.035)	Mowed Grass w/Obstructions		
	Mowed Grass/Asphalt (~0.02)	Mowed Grass/Asphalt		
	Dense Trees (~0.10)	Dense Trees		
	Mature Row Crops (~0.035)	Mature Row Crops		
	Mature Field Crops (~0.040)	Mature Field Crops		
	Scattered Brush/Heavy Weeds (~0.05)	Scattered Brush/Heavy Weeds		
	Rip Rap (~0.035)	Rip Rap		
	Trees/Shrubs (~0.08)	Trees/Shrubs		
	Sparse Trees/Grass (~0.040)	Sparse Trees/Grass		
	Earth Channel, winding, weedy banks (~0.04)	Earth Channel, winding, weedy banks		
	Earth Channel w/Gravel (~0.04)	Earth Channel w/Gravel		
Measure_Depth_From	Node Invert	0		
	Spill Crest	1		
Node_Type	Manhole	Manhole		
	Culvet Inlet	Culvert Inlet		
	Curb - Catch Basin	Curb - Catch Basin		
	Wet Pond	Wet Pond		
	Dry Pond	Dry Pond		
	Wetland	Wetland		
	FES	FES		
	FES with Trash Guard	FES with Trash Guard		
	Outlet Structure	Outlet Structure		
	Circular Pipe Projected From Fill	Circular Pipe Projected From Fill		
	Bee-Hive Catchbasin	Bee-Hive Catchbasin		
	Drop Inlet	Drop Inlet		
	Weir	Weir		
	Pump Station	Pump Station		
	N/A	N/A		
	Other	Other		

Domain Name	Fields	Codes	Max Value	Min Value
	Lake	Lake		
	Infiltration Basin	Infiltration Basin		
	Natural Depression	Natural Depression		
Orifice_Flag_Gate	No	0		
	Yes	1		
Orifice_Shape	Circular	0		
	Rectangular	1		
Orifice_Type	Side Outlet	1		
	Bottom Outlet	2		
Outfall_Flag	Non-Outfall	0		
	Outfall	1		
Percentage			100	0
Ponding_Type	No Ponding	0		
	Ponding Allowed	1		
	Sealed	2		
	Link to 2D	3		
Pump_Rated_By	Well Volume	1		
	Depth in Node	2		
	Dynamic Head	3		
	Static Head	4		
Routing_Method	Runoff	0		
	SCS Hydrology	1		
	Kinematic Wave	2		
	Unit Hydrograph	4		
	Rational Formula	5		
	Laurenson	3		
Runoff_Flag	Non-Runoff	0		
	Runoff	1		
Runoff_Flow_Redirection_Flag	Off: No Flow Redirection	0		
	On: Flow Redirection	1		
Runoff_Redirection_Drain_To_Subcatchment_Number	Subcatchment 1	1		
	Subcatchment 2	2		
	Subcatchment 3	3		
	Subcatchment 4	4		
	Subcatchment 5	5		
SCS_Hydrograph_Shape	Curvilinear	0		
	Triangular	1		
SCS_Initial_Abstraction_Fraction			1	0
SCS_Initial_Abstraction_Method	Depth	0		
	Fraction	1		
SCSI_Initial_Abstraction_Method	Depth	0		
	Fraction	1		
Special_Conduit_Shape	Horseshoe	3		
	Egg-Shaped	4		
	Basket-Handle	5		
	Gothic	14		
	Cantenary	15		
	Semi-Ellicptic	16		
	Semi-Circular	17		
	Modified Basket-Handle	18		
	Rect, Triangular Bottom	19		
	Rect, Roung Bottom	20		
	Horizontal Ellipse	28		
	Vertical Ellipse	29		
	Arch	30		
Storage_Flag	Non-Storage	0		
	Storage	1		
Storage_Method	Constant	1		
	Power Function	2		

Domain Name	Fields	Codes	Max Value	Min Value
	Stepwise Linear	3		
Structure_Present	No	0		
	Yes	1		
Surcharge_Elevation_Option	Use Node Surcharge Elevation	0		
	Use Spill Crest Elevation	1		
Type_of_Outlet_Control	Free Outfall	1		
	Fixed Backwater	2		
	User Tide Coefficients	3		
	Computed Tide Coefficients	4		
	User Stage History	5		
	Flow History	6		
	User Rating Curve	7		
Uniform_Loss_Cont_Loss	Absolute	1		
	Proportional	2		
Unit_Hydrograph_Method	Nash	0		
	Synder (Alameda)	1		
	Synder	2		
	Rational Formula	3		
	Santa Barbara Urban Hydrograph	4		
	Time Area	5		
Unit_Type_(HDR)	cfs	0		
	mgd	1		
	gpm	2		
	gpd	3		
User_Inflow_Flag	No User Inflow	0		
	User Inflow into this Node	1		
Weir_Flap_Gate	No	0		
	Yes	1		
Weir_Type	Transverse	1		
	Side	3		

Appendix B
Model Feature Class and Table Attribute Field Schema

Table 1. Catchment metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Node
Import/Export	Import Only
Object Creation On Import	Update Existing
Object Creation On Export	N/A
Mandatory Data	
Node Name	NODE_ID
X Pos	NODE_X
Y Pos	NODE_Y

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
CATCH_ID	Text	Unique Catchment ID	Unique Identification ID, combination of the runoff node ID and the catchment number			
RO_NODE	Text	Runoff Node	Node that catchment runoff drains to			Node Name
CATCH_NUM	Short Integer	Catchment Number	Catchment number (1-5) corresponding to XP-SWMM subwatershed number	Catchment_Number	Coded	
NODE_X	Double	Node X Coordinate	Runoff node x-position coordinate			X Pos
NODE_Y	Double	Node Y Coordinate	Runoff node y-position coordinate			Y Pos
CATCH_FLAG	Short Integer	Catchment Flag	Catchment active flag	Activation_Flag	Coded	Sub-Catchment Flag [Subcatch #]
AREA	Long Integer	Catchment Area (ac)	Catchmen area in acres			Area [Subcatch #]
SLOPE	Long Integer	Catchment Slope	Non-dimensional catchment slope (i.e. 1%=0.01)			Slope [Subcatch #]
IMP_PCT	Long Integer	Impervious Percentage	Impervious percentage as a number (i.e. 70%=70)	Percentage	Range	Impervious Percentage [Subcatch #]
WIDTH	Long Integer	Catchment Width	Catchment width			Width [Subcatch #]
ROUTE_METH	Short Integer	Routing Method	Hydrologic routing method	Routing_Method	Coded	Routing Method [Subcatch #]
PERV_CN	Long Integer	Pervious Area Curve Number	Pervious curve number	Curve_Number	Range	Pervious Area Curve Number [Subcatch #]
TC	Long Integer	Time of Concentration	Time of concentration			Time of Concentration (or Parameter 2) [Subcatch #]
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute			
SHAPE_Area	Double	SHAPE_Area	Standard ArcGIS attribute			
SHAPE_FACT	Long Integer	Catchment Shape Factor	Catchment shape factor			SCS Shape Factor
HYD_SHAPE	Short Integer	Hydrograph Shape	SCS Method: Hydrograph shape	SCS_Hydrograph_Shape	Coded	Hydrograph Shape [Subcatch #]
IA_METH	Short Integer	Initial Abstraction Method	Initial Abstraction Method	SCS_Initial_Abstraction_Method	Coded	Initial Abstraction Method [Subcatch #]
IA_DEPTH	Long Integer	Initial Abstraction Depth	Initial Abstraction Depth	SCS_Initial_Abstraction_Depth		Initial Abstraction Depth [Subcatch #]
IA_FRAC	Long Integer	Initial Abstraction Fraction	Initial Abstraction Fraction	SCS_Initial_Abstraction_Fraction	Range	Initial Abstraction Fraction [Subcatch #]
LAU_METH	Short Integer	Laurensons Method Options	Laurenson's Method Options	Laurensons_Method_Options	Coded	Laurenson's Method Options [Subcatch #]
UH_METH	Short Integer	Unit Hydrograph Method	Unit Hydrograph Method	Unit_Hydrograph_Method	Coded	Unit Hydrograph Method [Subcatch #]
GW_FLAG	Short Integer	Groundwater Flag	Groundwater Flag	Groundwater_Flag	Coded	Groundwater Flag [Subcatch #]
GW_DRAINTO	Short Integer	Groundwater Drains To	Groundwater Drains To	Groundwater_Drains_To	Coded	Groundwater Drains To: [Subcatch #]
GW_DT_NAME	Text	Groundwater Drain to Node Conduit	Groundwater Drain to Node Conduit			Groundwater Drains To Node or Conduit [Subcatch #]
RO_RD_FLAG	Short Integer	Runoff Redirection Flag	Runoff Redirection Flag	Runoff_Flow_Redirection_Flag	Coded	Runoff Flow Redirection Flag [Subcatch #]
RO_RD_DT	Text	Runoff Redirection Drain to Node	Runoff Redirection Drain to Node			Runoff Redirection Drain To Node [Subcatch #]
RO_RD_CT	Short Integer	Runoff Redirection Drain To Catchment	Runoff Redirection Drain To Catchment	Runoff_Redirection_Drain_To_Subcatchment_Number	Coded	Runoff Redirection Drain To Subcatchment Number [Subcatch #]
INFILTRATION	Text	Infiltration Reference	Infiltration Reference			Infiltration Reference [Subcatch #]

Table 2. Node metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Node
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
Node Name	NODE_ID
X Pos	NODE_X
Y Pos	NODE_Y

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
NODE_ID	Text	Node ID	Unique identification ID			Node Name
NODE_X	Double	Node X Coord	Node x-position coordinate			X Pos
NODE_Y	Double	Node Y Coord	Node y-position coordinate			Y Pos
INV_ELEV	Double	Invert Elevation	Node invert elevation			Invert Elevation
SPILL_ELEV	Double	Spill Crest Elevation	Node spill crest elevation			Ground Elevation (Spill Crest)
SURF_ELEV	Double	Surface Elevation	Node surface (ground) elevation			
SURC_ELEV	Double	Surcharge Elevation	Node surcharge elevation			Node Surcharge Elevation
TP_ELEV	Double	Top of Pond Elevation	Top of pond elevation			
RIM_ELEV	Double	Manhole Rim Elevation	Rim or casting elevation			
RO_FLAG	Short Integer	Runoff Node Flag	Runoff node flag	Runoff_Flag	Coded	
STOR_FLAG	Short Integer	Storage Node Flag	Storage node flag	Storage_Flag	Coded	Storage Node Data Flag
STOR_METH	Short Integer	Storage Method	Storage method option	Storage_Method	Coded	Storage Method
STOR_MEA_FRM	Short Integer	Measure Depth From	Measure storage depth from	Measure_Depth_From	Coded	Measure Depth From:
SURC_ELEV_OP	Short Integer	Surcharge Elevation Option	Surcharge elevation option	Surcharge_Elevation_Option	Coded	Surcharge Elevation Option
PONDING	Short Integer	Ponding Type	Ponding type	Ponding_Type	Coded	Ponding Type
INI_DEPTH	Double	Initial Depth	Initial water depth			Initial Depth
CONST_INF	Double	Constant Inflow	Constant inflow flag			Constant Inflow
ICAP_FLAG	Short Integer	Inlet Capacity Flag	Inlet capacity flag	Inlet_Capacity_Flag	Coded	Inlet Capacity Flag
MAX_ICAP	Double	Maximum Inlet Capacity	Maximum inlet capacity			Maximum Inlet Capacity
OC_BW	Double	Backwater Outfall Elevation	Static outfall backwater elevation			Oulet Control Backwater
USER_IF_FLAG	Long Integer	User Inflow Flag	User inflow flag	User_Inflow_Flag	Coded	User Inflow Flag
GA_IF_FLAG	Short Integer	Gauged Inflow Flag	Gauged inflow flag	Gauged_Inflow_Flag	Coded	Gauged Inflow Flag
OF_FLAG	Short Integer	Outfall Flag	Outfall flag	Outfall_Flag	Coded	Outfall Flag
OC_TYPE	Short Integer	Outfall Control Type	Outfall control type	Type_of_Outlet_Control	Coded	Type of Outlet Control
DC_OP	Short Integer	Outfall Depth Criterion	Outfall depth criterion type	Depth_Criteria_Option	Coded	Depth Criteria Option [Depth Criteria Type]
DW_F_FLAG	Short Integer	Dry Weather Flow Flag	Dry weather flow flag	Dry_Weather_Flow_Flag	Coded	Dry Weather Flow Flag
DW_F_TYPE	Short Integer	Dry Weather Flow Type	Dry weather flow generation method	Dry_Weather_Flow_Generation_Method_(HDR)	Coded	Dry Weather Flow Generation Method (HDR)
DW_F_U	Short Integer	Dry Weather Flow Units	Dry weather flow units	Unit_Type_(HDR)	Coded	Unit Type (HDR)
DW_F_R	Double	Dry Weather Flow Rate	Dry weather flow rate			Flow Rate (HDR)
DW_F_A	Double	Dry Weather Flow Area	Dry weather flow area			Area (HDR)
DW_F_D	Double	Dry Weather Flow Density	Dry weather flow density			Density (HDR)
DW_PF	Double	Dry Weather Peaking Factor	Dry weather peaking factor			Peaking Factor (HDR)
NODE_TYPE	Text	Node Type	Node type	Node_Type	Coded	
ACT_RO	Short Integer	Active in Runoff Layer	Active in the runoff layer	Activation_Flag	Coded	
ACT_HD	Short Integer	Active in Hydraulics Layer	Active in the hydraulics layer	Activation_Flag	Coded	

Table 3. Single links metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Link
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
Link	LINK_ID
US Node	US_NODE
DS Node	DS_NODE

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
LINK_ID	Text	Link ID	Unique identification ID			Link
US_NODE	Text	Upstream Node ID	Upstream node ID			US Node
DS_NODE	Text	Downstream Node ID	Downstream node ID			DS Node
COND_SHP	Short Integer	Conduit Shape	Conduit shape	Conduit_Shape	Coded	Shape
US_INV	Double	Upstream Invert	Upstream node invert			Upstream Invert Elevation
DS_INV	Double	Downstream Invert	Downstream node invert			Downstream Invert Elevation
LENGTH	Double	Length	Length of conduit (ft)			Length
DIAMETER	Double	Diameter or Height	Diameter or height of conduit (ft)			Diameter (Height)
SLOPE	Double	Conduit Slope	Slope of conduit in % (i.e. 1%=1.0)			Conduit Slope
MATERIAL	Text	Material	Conduit material	Materials	Coded	
ROUGH	Double	Mannings n	Manning's roughness factor (n)			Roughness
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute			
COND_SSHP	Short Integer	Conduit Special Shape	Special conduit shape	Special_Conduit_Shape	Coded	Special Conduit Shape
INI_FLOW	Double	Initial Flow	Initial conduit flow (cfs)			Initial Flow
FLOW_DIR	Short Integer	Flow Direction Option	Initial conduit flow direction	Flow_Direction_Option	Coded	Flow Direction Option
BOT_WIDTH	Double	Bottom Width	Bottom width (trapezoid) or width (rectangle) of conduit			Bottom Width
LH__SS	Double	Left Hand Side Slope	Trapezoid left hand side slope, (x:1) (i.e. x=50, 50:1)			Left-hand Side Slope
RH_SS	Double	Right Hand Side Slope	Trapezoid right hand side slope, (x:1) (i.e. x=50, 50:1)			Right-hand Side Slope
LH_CL	Double	Left Hand Channel Length	Natural section left hand channel length			Left Channel Length
RH_CL	Double	Right Hand Channel Length	Natural section right hand channel length			Right Channel Length
CF_FLAG	Short Integer	Conduit Factor Flag	Conduit factor activation flag	Conduit_Factor_Flag	Coded	Conduit Factor Flag
LOSS_TYPE	Short Integer	EntranceExit Loss Type	Entrance/Exit loss type			Entrance/Exit Loss Type
ENT_LOSS	Double	Entrance Loss	Conduit entrance loss			Entrance Loss
EXT_LOSS	Double	Exit Loss	Conduit exit loss			Exit Loss
PCC_KU	Double	Pressure Change Coeff Ku	Pressure change loss coefficient Ku			Pressure Change Coefficient Ku
PCC_B	Double	Pressure Change Coeff B	Pressure change loss coefficient B			Pressure Coefficient B
LF_RF	Double	Low Flow Roughness Factor	Low flow roughness factor			Low Flow Roughness Factor
DEPTH_ROUGH	Double	Depth at which Roughness Changes	Depth at which roughness changes			Depth at which Roughness Changes
CE_LOSS_C	Double	ContractionExpansion Loss Coeff	Contraction-Expansion losss coefficient			Contraction Expansion Loss Coeff.
TWF	Double	Time Weighting Factor	Time weighting factor			Time Weighting Factor
BARREL	Double	Number of Barrels	Number of barrels			Number of Barrels
S_DEPTH	Double	Sediment Depth	Sediment depth			Sediment Depth
P_EX_FACT	Double	Pipe Extension Factor	Pipe extension factor			Pipe Extension Factor
INLET_TYPE	Long Integer	Inlet Type	Pipe inlet type (inlet control)	Inlet_Type	Coded	Inlet Type
ADV_RO	Short Integer	Advanced Routing Options	Advanced routing options	Advanced_Routing_Options	Coded	Advanced Routing Options
F_ENC_FLAG	Short Integer	Floodway Encroachment Flag	Floodway encroachment flag	Floodway_Encroachment_Flag	Coded	Floodway Encroachment Flag
F_ENC_STA	Short Integer	Floodway Enc. Station	Method for floodway encroachment	Floodway_Encroachment_Stations	Coded	Floodway Encroachment Calculation Method
F_ENC_L	Double	Left Flood Enc Station	Left encroachment station			Left Encroachment Station
F_ENC_R	Double	Right Flood Enc Station	Right encroachment station			Right Encroachment Station
F_ENC_MDI	Double	Flood Enc Max Depth Inc	Maximum depth increase for floodway encroachment			Floodway Max Depth Increase
F_ENC_CM	Short Integer	Floodway Enc Calc Meth	Calculation method for floodway encroachment	Calc_Floodway_Enc_Using	Coded	Encroachment Station Option
X_SEC_REF	Text	Cross Section Reference	Cross section reference (Natural Section Shape) for natural channels			Natural Section Shape GLDB Reference
LINK_FLAG	Short Integer	Link Active Flag	Link active in the hydraulics layer	Activation_Flag	Coded	

Table 4. Multi links metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Multi Link
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
Channel/Conduit	COND_ID[#]
US Node	US_NODE
DS Node	DS_NODE
Link	LINK_ID

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
LINK_ID	Text	Link ID	Unique identification ID			Link
US_NODE	Text	Upstream Node ID	Upstream node ID			US Node
DS_NODE	Text	Downstream Node ID	Downstream node ID			DS Node
COND_SHP	Short Integer	Conduit Shape	Conduit shape	Conduit_Shape	Coded	Shape
US_INV	Double	Upstream Invert	Upstream node invert			Upstream Invert Elevation
DS_INV	Double	Downstream Invert	Downstream node invert			Downstream Invert Elevation
LENGTH	Double	Length	Length of conduit (ft)			Length
DIAMETER	Double	Diameter or Height	Diameter or height of conduit (ft)			Diameter (Height)
SLOPE	Double	Conduit Slope	Slope of conduit in % (i.e. 1%=1.0)			Conduit Slope
MATERIAL	Text	Material	Conduit material	Materials	Coded	
ROUGH	Double	Mannings n	Manning's roughness factor (n)			Roughness
COND_SSHP	Short Integer	Conduit Special Shape	Special conduit shape	Special_Conduit_Shape	Coded	Special Conduit Shape
INI_FLOW	Double	Initial Flow	Initial conduit flow (cfs)			Initial Flow
FLOW_DIR	Short Integer	Flow Direction Option	Initial conduit flow direction	Flow_Direction_Option	Coded	Flow Direction Option
BOT_WIDTH	Double	Bottom Width	Bottom width (trapezoid) or width (rectangle) of conduit			Bottom Width
LH__SS	Double	Left Hand Side Slope	Trapezoid left hand side slope, (x:1) (i.e. x=50, 50:1)			Left-hand Side Slope
RH_SS	Double	Right Hand Side Slope	Trapezoid right hand side slope, (x:1) (i.e. x=50, 50:1)			Right-hand Side Slope
LH_CL	Double	Left Hand Channel Length	Natural section left hand channel length			Left Channel Length
RH_CL	Double	Right Hand Channel Length	Natural section right hand channel length			Right Channel Length
CF_FLAG	Short Integer	Conduit Factor Flag	Conduit factor activation flag	Conduit_Factor_Flag	Coded	Conduit Factor Flag
LOSS_TYPE	Short Integer	EntranceExit Loss Type	Entrance/Exit loss type			Entrance/Exit Loss Type
ENT_LOSS	Double	Entrance Loss	Conduit entrance loss			Entrance Loss
EXT_LOSS	Double	Exit Loss	Conduit exit loss			Exit Loss
PCC_KU	Double	Pressure Change Coeff Ku	Pressure change loss coefficient Ku			Pressure Change Coefficient Ku
PCC_B	Double	Pressure Change Coeff B	Pressure change loss coefficient B			Pressure Coefficient B
LF_RF	Double	Low Flow Roughness Factor	Low flow roughness factor			Low Flow Roughness Factor
DEPTH_ROUGH	Double	Depth at which Roughness Changes	Depth at which roughness changes			Depth at which Roughness Changes
CE_LOSS_C	Double	ContractionExpansion Loss Coeff	Contraction-Expansion losss coefficient			Contraction Expansion Loss Coeff.
TWF	Double	Time Weighting Factor	Time weighting factor			Time Weighting Factor
BARREL	Double	Number of Barrels	Number of barrels			Number of Barrels
S_DEPTH	Double	Sediment Depth	Sediment depth			Sediment Depth
P_EX_FACT	Double	Pipe Extension Factor	Pipe extension factor			Pipe Extension Factor
INLET_TYPE	Long Integer	Inlet Type	Pipe inlet type (inlet control)	Inlet_Type	Coded	Inlet Type
ADV_RO	Short Integer	Advanced Routing Options	Advanced routing options	Advanced_Routing_Options	Coded	Advanced Routing Options
F_ENC_FLAG	Short Integer	Floodway Encroachment Flag	Floodway encroachment flag	Floodway_Encroachment_Flag	Coded	Floodway Encroachment Flag
F_ENC_STA	Short Integer	Floodway Enc. Station	Method for floodway encroachment	Floodway_Encroachment_Stations	Coded	Floodway Encroachment Calculation Method
F_ENC_L	Double	Left Flood Enc Station	Left encroachment station			Left Encroachment Station
F_ENC_R	Double	Right Flood Enc Station	Right encroachment station			Right Encroachment Station
F_ENC_MDI	Double	Flood Enc Max Depth Inc	Maximum depth increase for floodway encroachment			Floodway Max Depth Increase
F_ENC_CM	Short Integer	Floodway Enc Calc Meth	Calculation method for floodway encroachment	Calc_Floodway_Enc_Using	Coded	Encroachment Station Option
X_SEC_REF	Text	Cross Section Reference	Cross section reference (Natural Section Shape) for natural channels			Natural Section Shape GLDB Reference
LINK_FLAG	Short Integer	Link Active Flag	Link active in the hydraulics layer	Activation_Flag	Coded	
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute			
COND_ID1	Text	Conduit ID 1	Conduit Name 1			Conduit Name 1

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
COND_ID2	Text	Conduit ID 2	Conduit Name 2			Conduit Name 2
COND_ID3	Text	Conduit ID 3	Conduit Name 3			Conduit Name 3
COND_ID4	Text	Conduit ID 4	Conduit Name 4			Conduit Name 4
COND_ID5	Text	Conduit ID 5	Conduit Name 5			Conduit Name 5
COND_ID6	Text	Conduit ID 6	Conduit Name 6			Conduit Name 6
COND_ID7	Text	Conduit ID 7	Conduit Name 7			Conduit Name 7
C_FLAG_1	Short Integer	Conduit Flag 1	Conduit Flag 1			Conduit Flag 1
C_FLAG_2	Short Integer	Conduit Flag 2	Conduit Flag 2			Conduit Flag 2
C_FLAG_3	Short Integer	Conduit Flag 3	Conduit Flag 3			Conduit Flag 3
C_FLAG_4	Short Integer	Conduit Flag 4	Conduit Flag 4			Conduit Flag 4
C_FLAG_5	Short Integer	Conduit Flag 5	Conduit Flag 5			Conduit Flag 5
C_FLAG_6	Short Integer	Conduit Flag 6	Conduit Flag 6			Conduit Flag 6
C_FLAG_7	Short Integer	Conduit Flag 7	Conduit Flag 7			Conduit Flag 7

Table 5. Weir metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Weir
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
Weir Name	WEIR_ID
US Node	US_NODE
DS Node	DS_NODE
Link	LINK_ID

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
LINK_ID	Text	Link ID	Unique identification ID			
WEIR_ID	Text	Weir ID	Weir ID			Weir Name
US_NODE	Text	Upstream Node	Upstream node ID			US Node
DS_NODE	Text	Downstream Node	Downstream node ID			DS Node
WEIR_FLAG	Short Integer	Weir Active Flag	Weir activation flag	Activation_Flag	Coded	
WEIR_TYPE	Short Integer	Weir Type	Weir type indicator	Weir_Type	Coded	Weir Type
WEIR_L	Double	Weir Length	Weir length			Weir Length
WEIR_CWN	Double	Crown or Top of Weir	Crown or top of weir elevation			Crown or Top of Weir
WEIR_CST	Double	Weir Crest	Weir crest elevation			Weir Crest Elevation
WEIR_DC	Double	Weir Discharge Coeff	Weir discharge coefficient			Weir Discharge Coefficient
WEIR_FG	Short Integer	Weir Flag Gate	Weir flap gate activation flag	Weir_Flap_Gate	Coded	Reverse Flow Eliminated Using Flag Gates Flag

Table 6. Orifice metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Orifice
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
Orifice Name	ORF_ID
US Node	US_NODE
DS Node	DS_NODE
Link	LINK_ID

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
LINK_ID	Text	Link ID	Unique identification ID			Link
ORF_ID	Text	Orifice ID	Orifice ID			Orifice Name
US_NODE	Text	Upstream Node	Upstream node ID			US Node
DS_NODE	Text	Downstream Node	Downstream node ID			DS Node
ORF_FLAG	Short Integer	Orifice Active Flag	Orifice activation flag	Activation_Flag	Coded	
ORF_INV	Double	Orifice Invert Elev	Orifice invert elevation			Orifice Invert Elevation
ORF_TYPE	Short Integer	Orifice Type	Orifice type	Orifice_Type	Coded	Orifice Type
ORF_AREA	Double	Orifice Area	Orifice outlet area			Orifice Area
ORF_SHP	Short Integer	Orifice Shape	Orifice shape	Orifice_Shape	Coded	Orifice Shape
ORF_H	Double	Orifice Height	Orifice height			Orifice Height
ORF_DC	Double	Orifice Discharge Coeff	Orifice discharge coeffeicient			Discharge Coefficient
ORF_FG	Short Integer	Orifice Flag Gate	Orifice flag gates active	Orifice_Flag_Gate	Coded	Reverse Flow Eliminated Using Flag Gates Flag

Table 7. Pump metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Pump
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
Pump Name	P_ID
US Node	US_NODE
DS Node	DS_NODE
Link	LINK_ID

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute			
LINK_ID	Text	Link ID	Unique identification ID			
P_ID	Text	Pump ID	Pump ID			
US_NODE	Text	Upstream Node	Upstream node ID			US Node
DS_NODE	Text	Downstream Node	Downstream node ID			DS Node
P_FLAG	Short Integer	Pump Active Flag	Pump activation flag	Activation_Flag	Coded	
P_DESC	Text	Pump Description	Pump description			Pump Description
P_RB	Short Integer	Pump Rated By	Pump rated by option	Pump_Rated_By	Coded	Pump Rated By:
P_IND	Double	Initial Depth	Initial water depth			Initial Depth
P_START	Double	Pump Starts	Pump start elevation			Pump Starts
P_STOP	Double	Pump Stops	Pump stop elevation			Pump Stops
P_TV	Double	Total Volume	Well total volume			Total Well Volume
P_IV	Double	Initial Volume	Well initial volume			Initial Well Volume
P_SF	Double	Speed Factor	Pump speed factor			Pump Speed Factor
P_REF	Text	Pump Curve Ref	Pump rating curve reference			Pump Rating Curve Reference

Table 8. Storage curve metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Node
Import/Export	Import Only
Object Creation On Import	Update Existing
Object Creation On Export	N/A
Mandatory Data	
Node Name	NODE_ID
X Pos	NODE_X
Y Pos	NODE_Y

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
NODE_ID	Text	Node ID	Unique identification ID			Node Name
NODE_X	Double	Node X Coordinate	Node x-position coordinate			X Pos
NODE_Y	Double	Node Y Coordinate	Node y-position coordinate			Y Pos
ELEV	Double	Elevation	Stepwise elevation in feet			
DEPTH	Double	Stepwise Depth	Stepwise depth in feet			Stepwise - Depth
AREA	Double	Stepwise Area	Stepwise area in acres			Stepwise - Surface Area
INV_ELEV	Double	Invert Elevation	Storage node invert elevation			
SURF_ELEV	Double	Surface Elevation	Storage node ground surface elevation			
STRUC	Short Integer	Structure Present	Is a structure present at the low point	Structure_Present	Coded	
SORT_NODE	Text	Table Node	Used for sorting by node			

Table 9. Infiltration metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Global Database
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
GLDB Name	INF_REF
GLDB Type	GD_TYPE

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
CATCH_ID	Text	Catchment ID	Catchment reference if infiltration by catchment			
INF_REF	Text	Infiltration Reference	Unique ID of infiltration data to reference in catchment			GLDB Name
INF_METH	Short Integer	Infiltration Method	Infiltration method type	Infiltration_Method	Coded	Equation Options
IMP_DEP_STR	Double	Impervious Depression Storage	Impervious depression storage			Inch (Impervious Area) Input
PER_DEP_STR	Double	Pervious Depression Storage	Pervious depression storage			Inch (Pervious Area) Input
IMP_MAN_N	Double	Impervious Mannings n	Impervious Manning's n value			Manning's "n" (Impervious Area) Input
PER_MAN_N	Double	Pervious Mannings n	Pervious Manning's n value			Manning's "n" (Pervious Area) Input
ZDP	Double	Zero Detention Percentage	Zero detention percentage			Zero Detention (%) Input
H_MAX_IR	Double	Horton Max Infiltration Rate	Horton maximum infiltration rate			Max Infiltration Rate Input
H_MIN_IR	Double	Horton Min Infiltration Rate	Horton minimum infiltration rate			Min (Asymptotic) Infiltration
H_DECAY	Double	Horton Decay Rate	Horton decay rate			Decay Rate of Infiltration
H_MAX_IV	Double	Horton Max Infiltration Vol	Horton maximum infiltration volume			Maximum Infiltration Volume
GA_ACS	Double	Green Ampt Avg Cap Suct	Green Ampt average capilary suction			Average Capilary Suction Input
GA_IMD	Double	Green Ampt Init. Moist Deficit	Green Ampt initial moisture deficit			Initial Moisture Deficit Input
GA_SHC	Double	Green Ampt Sat Hyd Cond	Green Ampt saturated hydraulic conductivity			Saturated Hydraulic Conductivity Input
UL_IL	Double	Uniform Loss Initial Loss	Uniform loss intial loss			Initial Loss
UL_CL	Short Integer	Uniform Loss Cont Loss Meth	Uniform loss continuing loss method	Uniform_Loss_Cont_Loss		Continuing Loss Type
UL_CLA	Double	Uniform Loss Cont. Loss Abs	Uniform loss continuing loss absolute value			Continuing Loss Absolute
UL_CLP	Double	Uniform Loss Cont. Loss Prop	Uniform loss continuing loss proportional value			Continuing Loss Proportional
SCS_CN	Double	SCS Pervious CN	SCS initial abstraction pervious area curve number			Pervious Area Curve Number
SCS_IA_TYPE	Short Integer	SCS Init Abs Type	SCS initial abstraction loss type	SCSI_Initial_Abstraction_Method		SCS CN Loss Type
SCS_IA_D	Double	SCS Init Abs Depth	SCS initial abstraction depth			SCS Depth
SCS_IA_F	Double	SCS Init Abs Fraction	SCS initial abstraction fraction			SCS Fraction
GD_TYPE	Text	Global Data Type	Global data type, "Infiltration" for infiltration data sets	Global_Data_Type		GLDB Type

Table 10. Cross section metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Global Database
Import/Export	Import Only
Object Creation On Import	Create New or Update Existing
Object Creation On Export	N/A
Mandatory Data	
GLDB Name	CS_ID
GLDB Type	GD_TYPE

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
CS_ID	Text	Cross Section ID	Unique ID of cross section data to reference in link			GLDB Name
GD_TYPE	Text	Global Data Type	Global data type, "Natural Section Shape" for cross section data sets	Global_Data_Type	Coded	GLDB Type
STA	Double	Station	Cross section station			Station
ELEV	Double	Elevation	Cross section elevation			Elevation
LINK	Text	Link Using XSect	Like ID utilizing cross section			
L_OB_STA	Double	Left Overbank Station	Left overbank station			Left Overbank Station
R_OB_STA	Double	Right Overbank Station	Right overbank station			Right Overbank Station
L_OB_MAT	Text	Left Overbank Material	Left overbank material	Materials	Coded	
MC_MAT	Text	Main Channel Material	Main channel material	Materials	Coded	
R_OB_MAT	Text	Right Overbank Material	Right overbank material	Materials	Coded	
L_OB_N	Double	Left Overbank Mannings n	Left overbank Mannings n			Left Overbank Manning's n
MC_N	Double	Main Channl Mannings n	Main channl Mannings n			Main Channel Manning's n
R_OB_N	Double	Right Overbank Mannings n	Right overbank Mannings n			Right Overbank Manning's n

Table 11. Pump curve metadata and XP-SWMM mapping schema.

GIS Link Data						
Object Type	Global Database					
Import/Export	Import Only					
Object Creation On Import	Create New or Update Existing					
Object Creation On Export	N/A					
Mandatory Data						
GLDB Name	PUMP_ID					
GLDB Type	GD_TYPE					
Field Name	**Data Type**	**Field Alias**	**Description**	**Domain Name**	**Domain Type**	**Mapped XP-SWMM Variable**
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
PUMP_ID	Text	Pump ID	Pump unique ID			GLDB Name
RATE	Double	Pump Flow Rate	Pumping rate (cfs)			Pump Flow Rate
D_DH_V	Double	Depth Dyn Head Volume	Depth, dynamic head, or volume			Node Depth, Dynamic Head, Well Volume
GD_TYPE	Text	Global Data Type	Global data type, "Pump Ratings" for pump rating curves	Global_Data_Type	Coded	GLDB Type

Table 12. Node user inflow metadata and XP-SWMM mapping schema.

GIS Link Data	
Object Type	Node
Import/Export	Import Only
Object Creation On Import	Update Existing
Object Creation On Export	N/A
Mandatory Data	
Node name	NODE_ID
X Pos	NODE_X
Y Pos	NODE_Y

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type	Mapped XP-SWMM Variable
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute			
NODE_ID	Text	Inflow Node	Unique identification ID			Node name
NODE_X	Double	Node X Coordinate	Node x-position coordinate			X Pos
NODE_Y	Double	Node Y Coordinate	Node y-position coordinate			Y Pos
TIME_HR	Double	Time (hrs)	Time data in hours			Time
FLOW_CFS	Double	Flow (cfs)	Flow data in cubic feet per second			Flow

Table 13. Weir line metadata.

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute	N/A	N/A
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute	N/A	N/A
LINK_ID	Text	Link ID	Link ID	N/A	N/A
WEIR_ID	Text	Weir ID	Weir ID	N/A	N/A
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute	N/A	N/A

Table 14. Orifice line metadata.

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute	N/A	N/A
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute	N/A	N/A
LINK_ID	Text	Link ID	Link ID	N/A	N/A
ORF_ID	Text	Orifice ID	Orifice ID	N/A	N/A
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute	N/A	N/A

Table 15. Pump line metadata.

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute	N/A	N/A
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute	N/A	N/A
LINK_ID	Text	Link ID	Link ID	N/A	N/A
P_ID	Text	Pump ID	Pump ID	N/A	N/A
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute	N/A	N/A

Table 16. Cross section profile line metadata (miscellaneous data).

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute	N/A	N/A
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute	N/A	N/A
LINK_ID	Text	Link ID	Link ID with associated cross section	N/A	N/A
CS_ID	Text	Cross Section ID	Cross section ID	N/A	N/A
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute	N/A	N/A

Table 17. Catchment flow path metadata (miscellaneous data).

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute	N/A	N/A
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute	N/A	N/A
CATCH_ID	Text	Catchment ID	Catchment ID	N/A	N/A
RO_NODE	Text	Catchment Runoff Node	Node that catchment runoff goes to	N/A	N/A
SHAPE_Length	Double	SHAPE_Length	Standard ArcGIS attribute	N/A	N/A
US_ELEV	Double	Flow path US Elev	Upstream elevation of flow path line	N/A	N/A
DS_ELEV	Double	Flow path DS Elev	Downstream elevation of flow path line	N/A	N/A
FP_LEN	Double	Flow path Length	Length of flow path line	N/A	N/A
FP_SLOPE	Double	Flow path Slope	Slope of flow path line	N/A	N/A
FP_WIDTH	Double	Flow path Width	Catchment width	N/A	N/A

Table 18. Storage node storage boundary metadata (miscellaneous data).

Field Name	Data Type	Field Alias	Description	Domain Name	Domain Type
OBJECTID	Object ID	OBJECTID	Standard ArcGIS attribute	N/A	N/A
SHAPE	Geometry	SHAPE	Standard ArcGIS attribute	N/A	N/A
NODE_ID	Text	Node ID	Storage node ID relating to boundary	N/A	N/A
SHAPE_Length	Double	Catchment Runoff Node	Standard ArcGIS attribute	N/A	N/A
SHAPE_Area	Double	SHAPE_Length	Standard ArcGIS attribute	N/A	N/A