STORMWATER MANUAL FOR SITE, DEVELOPMENT, SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS REVIEW SUBMITTALS

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1.0 INTRODUCTION AND SUMMARY OF SUBMITTAL REQUIREMENTS

This manual describes the review process and standards for the stormwater element of Sarasota County Capital Improvement Projects (CIP) and land development projects. The manual is designed to assist the applicant with the submittal process and is consistent with the latest revision (2001) of the County's Land Development Regulations (LDR). For those unfamiliar with the County's submittal requirements and review process for stormwater elements of a project, the following aspects should be noted:

- For projects greater than or equal to 35 acres, greater than or equal to 8 acres of impervious area, or that significantly alter watershed conveyance, a demonstrative criterion of "no adverse offsite impacts" (typically applied as no measurable increase in peak stages) is used in place of the more conventional pre-post peak flow presumptive criterion. The applicant is required to demonstrate no adverse offsite impacts by incorporating the project into the appropriate County Interconnected Pond and Channel Routing (ICPR) watershed model (Section B.4.a.4 in the Subdivision Technical Manual and Section C.4.a in the Development Improvements Technical Manual).

- The 100-year 24-hour storm event is the primary storm used to evaluate the proposed design. The County reserves the right to request other storm events for certain circumstances.

- Submittals include revised existing and proposed conditions.

- Submittal requirements include a number of hard copy and electronic items that must meet the standards specified in this manual.

Hard copy and electronic information is required for each stormwater submittal. A checklist for electronic and hard copy submittals is provided in Exhibit A of this document and should be included with every submittal as an attachment to the transmittal letter along with Appendices C24-C26 from the LDR, as appropriate. An electronic version of this checklist can be obtained via download at the following ftp site: ftp://ftp.co.sarasota.fl.us/Pub/Stormwater/

Electronic submittals should be provided on CD or DVD or other acceptable media and should use the file structure provided in Exhibit B of this document. The file structure can also be downloaded at the same location as the checklist.

1.1 DEFINITIONS

Depending on the context, certain terms describing the same items may differ between model, design, and GIS applications. This section defines the terms in a manner that is consistent with their use in this manual and also provides synonymous terms. To provide consistent nomenclature for stormwater reviews, commonly used stormwater modeling terminology is used

to refer to the model and to the Computer Automated Design (CAD) and Geographic Information System (GIS) database features.

Basin—An area or polygon feature that drains to a single localized drainage feature (e.g., pond, inlet, or swale). Basins are the finest subdivisions of area. In the GIS databases, basins are called ***catchments*** and watersheds are called ***basins***. In this manual basins will be the finest subdivisions of area unless otherwise noted.

Bayshed—The area that drains to one of the major bays, Braden River, or Myakka River. The six baysheds in the County are Braden River, Dona/Roberts Bay, Lemon Bay, Little Sarasota Bay, Myakka River, and Sarasota Bay. In the GIS databases, baysheds are called ***watersheds***.

Catchment—An alternate term for basin that is used in the context of the GIS databases.

Group—An aggregation of basins that are usually discharging to the same tributary channel within a watershed. In the GIS databases, groups are called ***subbasins***.

Link—Any drainage feature in the stormwater models that conveys flow (e.g., pipe, weir, and drop structure).

Node—A location where the water surface elevation is computed. Nodes may represent point locations (e.g., a manhole) or areas (e.g., a stormwater pond). Nodes are used to connect links in the stormwater models and GIS databases.

Subbasin—An alternate term for group that is used in the context of the GIS databases.

Watershed—An alternate term for bayshed that is used in the context of the GIS databases.

A summary of the differences between stormwater modeling terms and corresponding GIS terms used to describe areas shown in Table 1-1 (from smallest unit to largest unit):

Table 1-1 Summary of Area Terms for Modeling and GIS

Size of Area Unit	Modeling Term	GIS Term
Smallest	Basin	Catchment
Next to Smallest	Group	Subbasin
Next to Largest	Watershed	Basin
Largest	Bayshed	Watershed

1.2 LEVELS OF SERVICE AND DESIGN CRITERIA

1.2.1 Quantity

County stormwater quantity levels of service are given in Appendix C14 of the LDR. Please note that acceptable flooding criteria for roadways in Appendix C14 references edge-of-pavement flood depths.

In addition to providing the required levels of service, stormwater quantity design criteria include the applicable criteria in Appendices C5-C6, C11, and C-13 in the LDR plus demonstration of no adverse offsite impacts. Please note that a minimum of a 6-inch buffer is required between the 100-year flood stage and the top-of-berm elevation for detention/retention facilities.

The project size and location will determine which criteria are applied to demonstrate to offsite adverse impacts. For projects greater than or equal to 35 acres, greater than or equal to 8 acres of impervious area (including accumulative projects), or that alter watershed conveyance, a demonstrative criterion of no adverse offsite impacts (typically applied as no measurable increase in peak stages) is applied, provided that the project is within an area where there is a County-adopted ICPR model. The applicant is required to demonstrate no adverse offsite impacts by incorporating the project into the appropriate County ICPR watershed model using the 100-year 24-hour storm event, which is discussed in more detail later in this document. Other projects will normally use the more conventional pre-post peak flow and no net floodplain loss presumptive criteria or a model that is not County-adopted if it represents the best available data for the project area. Special conditions may sometimes warrant a blending of these criteria and/or other criteria. Staff will discuss the evaluation criteria to be applied to the project at the pre-application meeting.

1.2.2 Quality

Water quality design criteria are generally the same as those required by Southwest Florida Water Management District (SWFWMD). According to the Land Development Regulations, 1.5 times the volume required for selected treatment systems is required for stormwater systems directly discharging into saltwater tidal systems, bays, or the gulf. This additional requirement also applies to all systems discharging to Outstanding Florida Waters. Additionally, wet detention systems must be designed to treat 1 inch of runoff, and all other systems must be designed to meet runoff from the first 1 inch of rainfall.

If an alternative from SWFWMD's TP/SWP-022 is used to size a wet detention pond, the applicant shall include a reference to the sizing methodology used. Also, in addition to the requirements in Appendix C26 of the LDR, the applicant shall provide littoral zone calculations and a tabular comparison of littoral zone requirements versus littoral zones provided in the design.

1.2.3 Erosion and Sedimentation Control

The requirements and techniques provided in *The Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual* (Florida Department of Environmental Protection Nonpoint Source Management Section in cooperation with the Florida Department of

Transportation, and hereby incorporated by reference), or approved equivalent, shall serve as the design criteria for erosion and sedimentation control best management practices (BMPs). BMPs shall be clearly shown on the construction plans, and shall be incorporated into the Erosion and Sedimentation Control Plan (ECP), or the Stormwater Pollution Prevention Plan (SPPP).
More detail is provided in Section 3.6.

1.2.3.1. Prior to the commencement of site activity perimeter controls and ingress/egress soil tracking prevention devices shall be installed.

1.2.3.2. During site work:

- Erosion and sedimentation control BMPs in addition to those presented on the plans and outlined in the ECP or SWPPP shall be implemented as necessary to prevent turbid discharges from flowing onto adjacent properties or roadways, off site stormwater conveyances, or off site receiving waters. BMPs shall be designed, installed, and maintained by the Operator to ensure that off site surface water quality remains consistent with State and local regulations (ref. Ch. 54, Article VII, Sarasota County Code).

Off site surface water discharges with turbidity in excess of 29 Nephelometric Turbidity Units (NTUs) above background level shall be immediately corrected. Such incidents shall be reported to Water Resources within 24 hours of the occurrence (ph: 941.861.5000; fax: 941.861.0986). The report shall include the cause of the discharge and corrective actions taken.

1.3 SUBMITTAL REVIEW PROCESS

The submittal review processes for site and development, subdivision, and capital improvement projects are similar but are presented separately because of minor differences. A general summary of the submittal review process is provided as Exhibit C.

With each submittal, Watershed Management will provide a completeness review and will provide comments to the Engineer-of-Record if necessary within 5 working days of the submittal to Public Works Stormwater Division, with the elapsed time on submittals received after 12:00 PM not beginning until the following working day. Watershed Management will provide final review comments within 20 working days from the time Public Works Stormwater Division receives a complete submittal.

1.3.1 Subdivision Projects

Most commercial and residential projects are covered within the subdivision review process. Subdivision projects consist of three review processes—the Preliminary Subdivision Plan, the Final Construction Plan, and the Final Plat. Alternatively, the Preliminary Subdivision and Final Construction Plans may be submitted together in a "Concurrent Review." The primary focus of the Preliminary Subdivision Plan is on revised existing conditions, with general input on the

proposed conditions provided. The focus of the Final Construction Plan will be on meeting the applicable criteria under proposed conditions. For concurrent review submittals, proposed conditions will not be reviewed until the revised existing conditions are approved.

The first step in the review process should include a pre-submittal meeting with staff to introduce the project, discuss which watershed model should be used, and discuss which criteria will be applied for judging whether there are adverse offsite impacts. Once the appropriate watershed model has been obtained from Watershed Management, the Engineer-of-Record should run the 100-year 24-hour simulation or other simulations requested by staff, compare the results to the published flood stages, and provide Watershed Management with a table of the comparison.

Changes from existing conditions to revised existing conditions must be based on "more accurate" information such as a new signed and sealed site-specific survey, unless it is clear to both the Engineer-of-Record and the Watershed Management reviewer that an existing model detail is in error based on previously available data. Once the revised existing conditions are approved, the proposed conditions analyses can be submitted (or can proceed from a concurrent submittal) and should include all of the background calculations for the proposed stormwater management system(s) that are shown in the construction drawings. Submittal of proposed conditions prior to acceptance of the revised existing conditions submittal will not expedite review of proposed conditions. Plat submittals should be consistent with the approved Final Construction Plan submittal.

1.3.2 Site and Development Projects

Development projects not involving the subdivision of land are reviewed under the Site and Development review process. The primary differences between Subdivision reviews and Site and Development reviews are the following:

- Site and Development projects do not require a Final Plat.
- The Site and Development Plan for Site and Development projects is similar to the Preliminary Subdivision Plan for Subdivision projects.
- The Construction Engineering Plan for Site and Development projects is similar to the Final Construction Plan for Subdivision projects.

1.3.3 Capital Improvement Projects

Capital improvement projects—which include but are not limited to roads, stormwater, road and bridge, and operation projects—typically involve more review and coordination with staff than other types of projects, so submittals and reviews are required at 30, 60, and 90 percent completion. With respect to regulatory stormwater permitting, the 30-percent submittal should include an overall concept of the project, a signed and sealed survey of the project area, an initial layout of the proposed stormwater management system, and the revised existing conditions

information. The 60-percent submittal should not be submitted before the 30-percent submittal is approved and should include a draft of the proposed conditions. The 90-percent submittal should include the final proposed conditions with the applicable documentation demonstrating no adverse offsite impacts and adequate water quality treatment and erosion control. Close coordination with the County is encouraged at all stages of design. There are typically no changes affecting stormwater after the 90-percent submittal, so the 100-percent submittal is typically used to verify that no stormwater changes occurred since the 90-percent submittal.

2.0 OVERVIEW OF EXISTING DATA

The County generally maintains all pertinent GIS and model data on the following ftp site: ftp://ftp.co.sarasota.fl.us/Pub/Stormwater/

However, there may be occasions (e.g., where a development is going in near a development that was recently approved) where the most applicable information is not yet contained on the County's ftp site. These issues should be covered in the pre-submittal meeting. The organization of information is shown in Figure 2-1

2.1 ICPR WATERSHED MODELS AND GIS DATA

A map showing all of the Sarasota County models is provided as Figure 2-2. Data are first organized by Bayshed, as shown in Figure 2-1. For the Dona/Roberts Bay, Charlotte Harbor, and Sarasota Bay baysheds, watershed model and GIS data are then organized by watershed. For Little Sarasota Bay and Lemon Bay, watershed model and GIS data are at the bayshed level only due to the interconnected nature of the watersheds.

Model data are organized by the .ICP file and subfolders containing input dbf files and output hydrology, routing, and peak stages dbf files, as shown in Figure 2-1. GIS databases are provided in geodatabase and shapefile formats, and mxds of the watershed data are also provided.

2.2 OTHER DATA

As with the model and GIS data, graphics in pdf file format are also first organized by bayshed and then watershed, as shown in Figure 2-1 Figure 2-3 is an example of the graphics available.

The ToolsResources subfolder contains tools, methodology documents, maintenance procedures, and templates (Exhibit D).

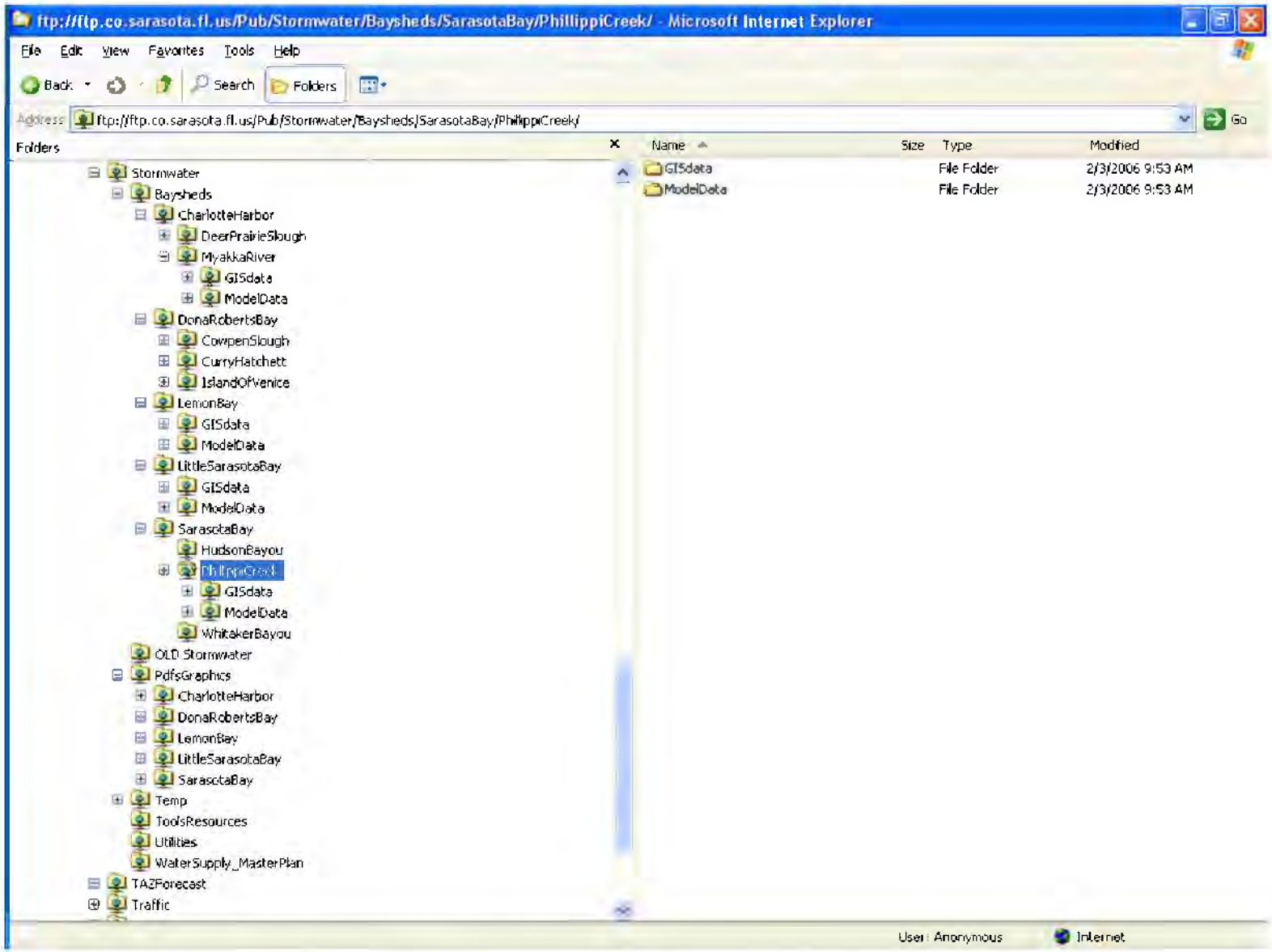

Figure 2-1 Organization of Model and GIS Data on ftp Site

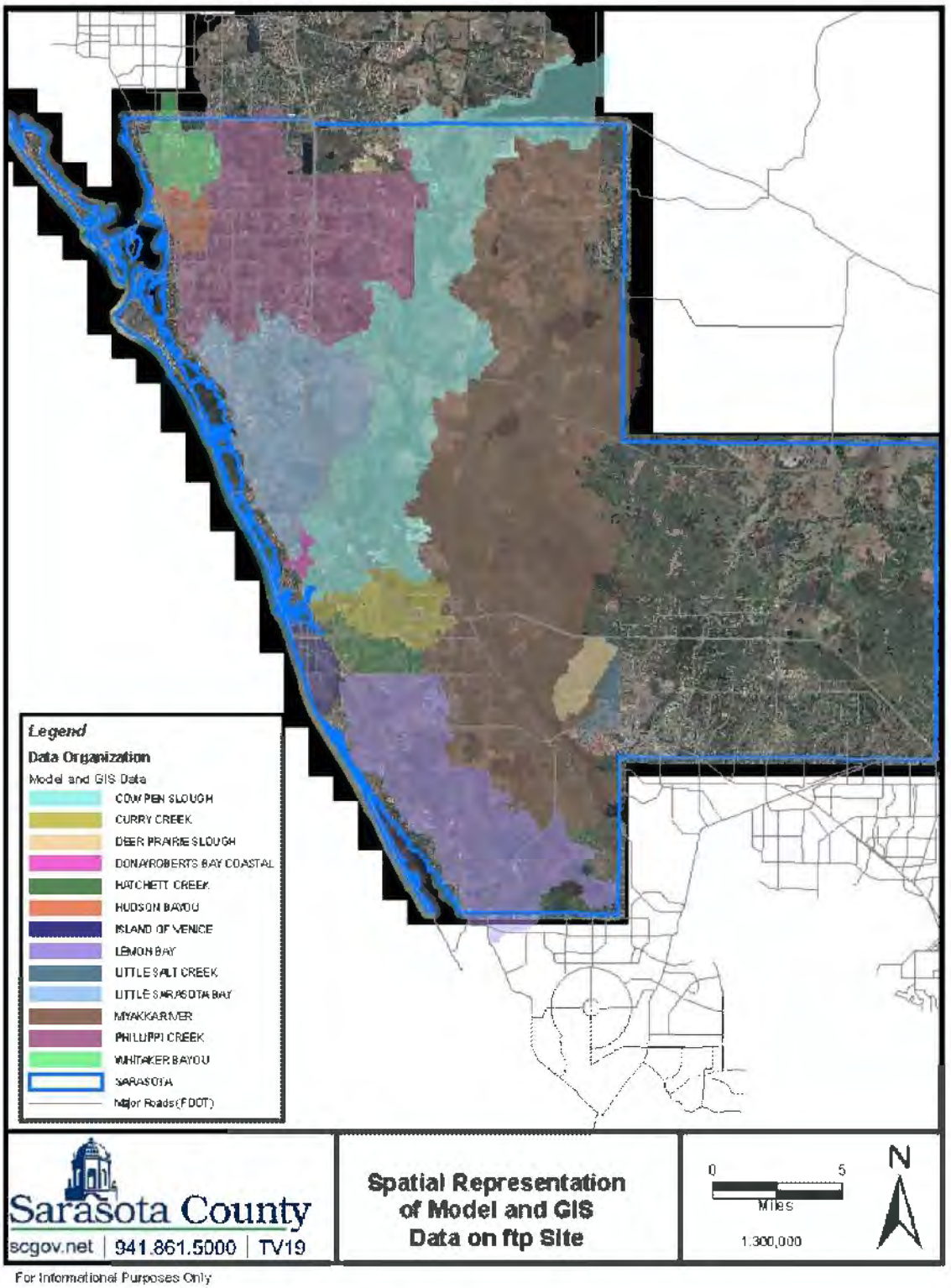

Figure 2-2 Spatial Representation of Model and GIS Data on ftp Site

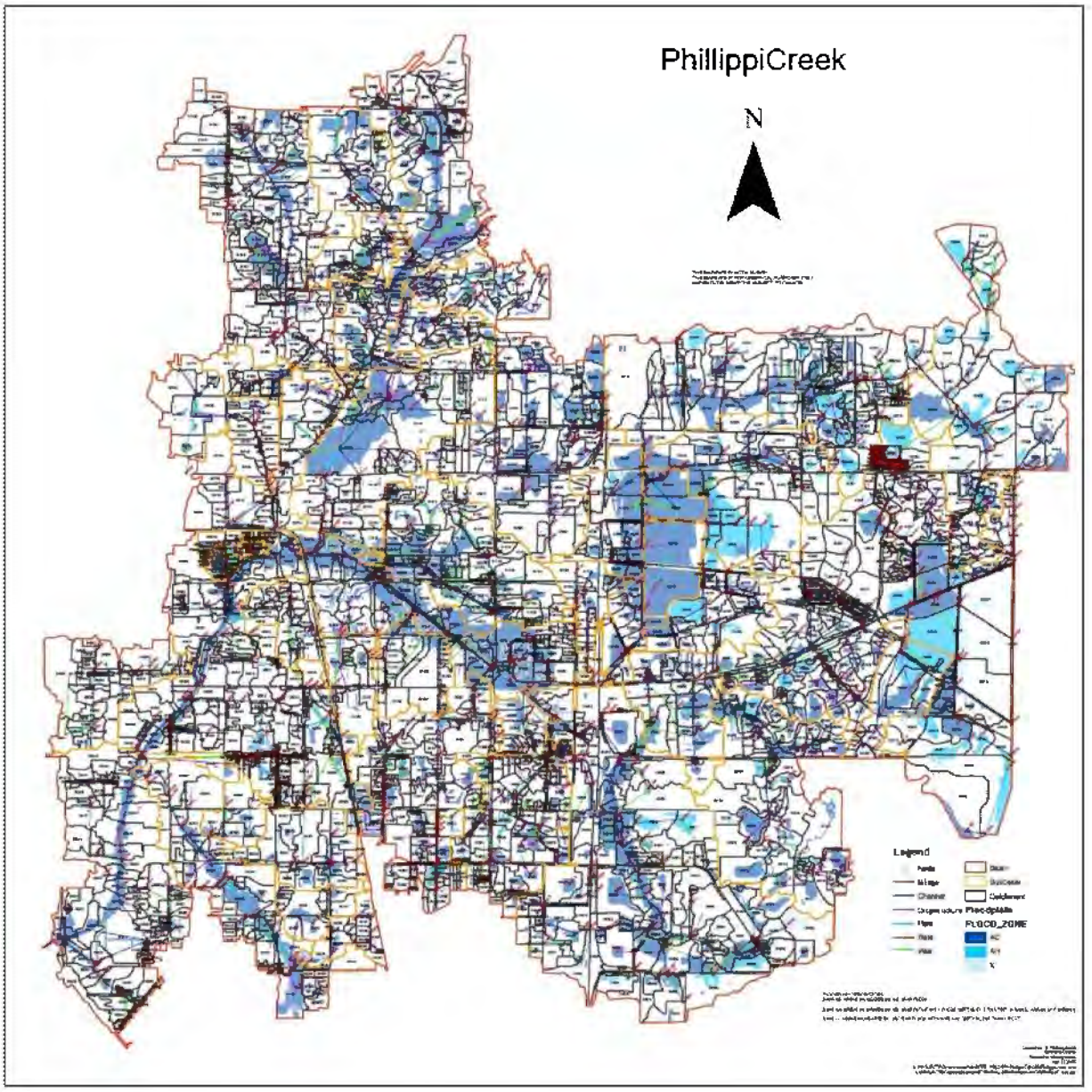

Figure 2-3 Example of Watershed Graphics Available via ftp

3.0 SUBMITTAL STANDARDS

Staff use and track hard copy and electronic information throughout the review process. This section details how both types of information should be prepared.

3.1 MAPS AND DRAWINGS

In this section the term 'maps' refers to the presentation of items such as model schematics, topography, and floodplains. 'Drawings' refers to the presentation of construction-related items. Submittals must contain hard copy and electronic versions of all maps. Hard copies of construction drawings are required and electronic versions in GIS, CAD, or MicroStation format are encouraged. Requirements for hard copy and electronic information are provided in the following section. The required electronic file structure is presented in Exhibit B of this Manual. A zip file containing a blank directory structure that may be used by the applicant to organize the submitted data in the requested manner may be downloaded from the County's ftp site referenced previously in this document.

3.1.1 Hard Copies

Model schematics, time-of-concentration flowpath maps, and floodplain maps that are submitted as hard copies must include the following information as applicable:

- Title
- Owner information and contact information
- Date or date of revision
- Legend
    - Cite data source in legend entry:
        - Soils National Resources Conservation Service (NRCS)
        - Elevation (surveyor, date)
        - Site Boundary (consultant)
        - Floodplain (consultant, date)
    - ICPR model nodes and cross-sections should be labeled with the respective model ID. Example hard copy figures are shown in Exhibit E, with Figure E-1 showing an example model schematic. In the rare instance when a HEC-RAS model is also needed, cross-sections should be labeled with river station.
    - Model links should be labeled according to link type (pipe/culvert, channel, weir, bridge, or rating curve) and flow direction. See Figure E-1 for an example. Links should also include display or labels denoting existing, addition, modification, or deletion as appropriate.
    - Flowpaths should be labeled according to flow regime (sheet flow, shallow concentrated flow, and/or channelized flow). See Figure E-2 for an example.

    - Floodplains for the100-year 24-hour storm event and other events requested by staff should be shown with subbasins, links, and nodes. See Figure E-4 for an example.
    - Polygons representing surface conveyance areas of channels. See Figure E-3 and section 3.2.3.3
- North Arrow
- Scale Bar
- Creator's name (logo is optional)

A pdf of each hard copy map must be included in the final submittal. It is not necessary to provide a figure that shows the entire watershed model, but each figure should show the project area of interest and all points of connection to the watershed model. Signed and sealed hard copies of site survey and construction drawings should also be submitted according to the LDR and standard surveying and engineering procedures, but pdfs are not required for these items.

3.1 2 Electronic Copies

Electronic submittals should include spatial information related to stormwater modeling and infrastructure data and other infrastructure data relevant to the County's asset management databases in GIS and/or CAD formats (dwg, dxf, dgn, or dwf). All spatial information should be submitted as follows:

- State Plane Coordinate System
- Florida West Zone (Zone 3626 – FIPS 0902)
- NAD83 Datum (1990 Adjustment)
- National Geodetic Vertical Datum of 1929 (NGVD29) vertical units should be U.S. Survey Feet

NOTE: At a date to be announced by the County, the North American Vertical Datum of 1988 (NAVD88) will be required in place of NGVD29.

A text file should be included with every submittal detailing the origin, creator's name, date of creation, projection, and datums for each spatial dataset. ESRI metadata will also be accepted in lieu of the text file.

Site survey and construction drawings should be provided in CAD-compatible formats (dwg, dxf, dgn, or dwf). Maps can also be provided in CAD formats, but the CAD information must be provided in a format that can be readily imported into GIS, since the County maintains spatial data on the watershed models in a GIS format. Attributes of CAD files should be developed so that named attributes of model elements are not lost when imported to GIS.

NOTE: At a date to be announced by the County, the use of County-supplied CAD templates will be required to ensure the proper import of CAD data to the County's GIS database.

3.1 2.1 Model Schematics

Model Schematics can he provided in a GIS or CAD format. If CAD files are used, they should be set up so that nodes, links, and basins are on separate layers or levels. Each condition (existing, revised existing, and proposed) should be in a separate layer or file. Nodes should adhere to the following:

- Nodes should be located at link ends when representing point locations and in the center or low spot of storage areas when representing polygon features.
- The attribute table for nodes should include Group and node names that correspond exactly to those used in the ICPR model and an existing/addition/modification/deletion attribute. (Case sensitive)
- There should generally be only one node per basin.

Basins should adhere to the following:

- There should be no sliver polygons (there should be an exact correspondence between the number of basins in the layer or file and the corresponding model).
- There should be no overlapping polygons.
- The attribute table should contain Group and model name, the area in acres to the nearest 0.001 acre, and an existing/addition/modification/deletion attribute. (Case sensitive)
- There should be an exact correspondence between the basin areas (acres) and the model areas.
- The net change in area within a project and watershed should be zero, unless there ıs a demonstrable error ın the existing configuration.

Links should adhere to the following:

- The attribute table should contain Group and link names, upstream and downstream node, link type, and an existing/addition/modification/deletion attribute. (Case sensitive)
- Link lines should be snapped to each associated upstream and downstream node.
- Links should also be digitized to reflect the upstream-to-downstream flow direction implied by the upstream and downstream node assignments.

- Link features should be digitized to closely follow contours and drainage features (i.e., straight lines only where applicable).

The requirements provided in Section 3.2 of this document should be carefully followed to develop model schematics.

3.1.2.2 Floodplains

Revised existing and proposed floodplains in the project area corresponding to the 100-year peak stages from the watershed model should be provided in GIS or CAD format and should be polygons features. The revised existing and proposed floodplains should be on separate, clearly defined layers.

3.1 2.3 Flowpaths

A map showing the hydraulically most remote flow paths used to determine the time of concentration for each basin for revised existing and proposed conditions in the project area should be provided in GIS or CAD format. Each flow path should be segmented to show sheet, shallow concentrated and channelized flow and should cross contours at a perpendicular angle. The map should include basin boundaries with labels, model nodes, and the appropriate topography along with pertinent drainage features.

3.1.3 Digital Terrain Models

If modifications from existing to revised existing conditions are made based on project-specific terrain information, a revised existing digital terrain model (DTM) should be provided. A post-development DTM should be included in each proposed conditions submittal. TIN Generate is an acceptable format for the DTM.

Additional specifications for DTMs will be included in a future release of this document.

3.2 ICPR WATERSHED MODELS

Streamline Technologies' Interconnected Channel and Pond Routing Model (ICPR) is the standard hydrologic and hydraulic model used for site and development, subdivision, and capital improvement projects in Sarasota County. As such, existing ICPR models are available for use and should be developed according to this document, the Sarasota County Watersheds Floodplain Model Methodology Report (Kimley-Horn and Associates, Inc., 2005) in Exhibit F, the ICPR help files, and standard modeling practices.

ICPR model files should be named using the root of the model filename provided by the County followed by _RECM (for revised existing conditions model) or PROP (for proposed conditions) and the date of creation in _DD-MM-YYYY format, and all model elements relevant to each

project should be stored in separate groups. Further information on specific model parameters is provided below. For example, a Revised Existing Conditions model created on May 30, 2006 that was based on a County model named LBM.ICP for the Lemon Bay mode should be named LBM_RECM_30-05-2006.ICP.

3.2.1 Model Templates

Model templates are used to document model and spatial representation (i.e., GIS and/or CAD) changes between existing and revised existing conditions as well as between revised existing and proposed conditions. The County maintains a template spreadsheet on the ftp site presented in Section 2 that may be used to document these changes. Populated templates are required for each submittal involving a model change.

The County has a beta version of a tool that can be used to populate the templates in an automated fashion using input dbfs exported by ICPR. A copy of this tool—along with installation and user instructions—is available on the County's ftp site presented in Section 2. The Engineer-of-Record is still responsible for verifying that additions, modifications, and deletions populated by the tool are accurate and complete.

3.2.2 Hydrology

Hydrologic parameterization within ICPR is an important part of the stormwater design process for revised existing and proposed conditions. As part of the design process, it will probably be necessary to recalculate and/or modify several parameters to accurately simulate runoff within the County's ICPR model(s). The Natural Resource Conservation Service's Technical Release 55 (TR-55, NRCS, 1986 or latest publication) and the Sarasota County Watersheds Floodplain Model Methodology Report are the basis of the standard methods used to develop hydrologic parameters for ICPR. A summary of these methods is provided below.

3.2.2.1 Directly Connected Impervious Area (DCIA)

DCIA should not be incorporated into the curve number (CN) of the basin; rather, it should be specified for each basin as a direct input parameter. Construction plans must contain sufficient documentation of DCIA to be checked versus the model input data for a project. Impervious quantities on the construction plans should be broken down into each type (roofs and driveways, streets, sidewalks, etc.) and water bodies (ponds, wetlands, etc.). Total impervious area and percentage of impervious area must be clearly stated on the cover page of each plan set.

3.2.2.2 Pervious Curve Number

Pervious curve numbers in ICPR actually represent pervious and unconnected impervious areas. A curve number of 78 should be used for all pervious areas unless a different value is approved by staff. Unconnected impervious areas should be area-weighted into the pervious area curve number using the methodology described in TR-55 (i.e., use a CN for the unconnected

impervious area equal to the average of the pervious area CN and 98). Calculations for CN and DCIA must be provided to the County electronically (in a format where calculations are reviewable, i.e., not in pdf format) and in hard copy format.

3.2.2.3 Time of Concentration

Time of concentration (Tc) should be calculated according to TR-55. Maps providing flowpath documentation are covered under Sections 3.1.1 and 3.1.2.3. If a calculated Tc is less than 10 minutes, a Tc of 10 minutes should be used. Flowpaths and Tc calculations will be reviewed for reasonableness as part of all model reviews. A template for calculating Tc is provided in Exhibit G and should be provided electronically (in a format where calculations are reviewable, i.e., not in pdf format) and via hard copy. A sample figure used in support of Tc calculations is provided as Figure E-2.

3.2.2.4 Unit Hydrographs and Peak Rate Factors

Hydrologic routing in ICPR should be performed using the SCS (NRCS) Unit Hydrograph. Unless prior approval is granted by staff, a peaking factor of 100 should be used for undeveloped conditions and a peaking factor of 256 should be used for developed conditions. A peaking factor of 175 may be allowable for rural residential developments.

3.2.2.5 Hydrologic Control Information

The 24-hour duration, 100-year return period storm event must be modeled for all projects and additional storm events requested by staff. Rainfall depths should be selected based on depths provided by SWFWMD for Environmental Resource Permitting (ERP). The hydrologic output information for all storm events should be specified in ICPR according to Table 3-1.

Table 3-1 Required Hydrologic Output Control Information

To Time (Hour of simulation)	Increment (minutes)
Equal to or greater than the *To Time* for Routing	5 or value used in County-approved model

The SCS (NRCS) Type Florida-modified distribution and the global rainfall option should be used for all simulations. ICP, R32, and I32 files should be turned in with each submittal according to the file structure provided in Exhibit B. The Engineer-of-Record should ensure that models exhibit no warnings that may adversely affect model results or cause errors at the start-up of the run. The latest ICPR Service Pack should be used to prepare each submittal.

3.2.3 Hydraulics

Similar to hydrology, the Sarasota County Watersheds Floodplain Model Methodology Report, ICPR help files, and other industry-standard references—in addition to project-specific survey

and terrain information and construction drawings—should be used as guidelines for routing parameterization of ICPR. Guidelines for individual hydraulic elements are provided below.

Pipes for secondary conveyance systems (e.g., most storm sewer pipes) where normal flow will likely occur may be modeled in ICPR or in a different model according to Section 3.3

3.2.3.1 Loss Coefficients

In general, loss coefficients should be assigned based on the ICPR help files. It is important to note how different loss coefficients will be used—particularly with regards to the manhole node type. The manhole node type can only be used if the following conditions are met:

- The node is parameterized according to the ICPR help files.
- The manhole node is only attached to pipes and overflows that are not needed (see Section 4.2.3.5).

Also, bend loss coefficients assigned to pipes not meeting the requirements in the ICPR help files will need to be reassigned to the exit loss coefficient.

3.2.3.2 Floodplain Storage

Floodplain storage in the stormwater management system is represented in the ICPR model by storage associated with the links and stage-area (or stage-volume) relationships associated with the nodes. Nodal storage should be developed using the following guidelines.

- Nodal storage should represent all storage that is not represented by the links, with the exception that surface ponding outside of the designated stormwater management system under proposed conditions (e.g., street and yard flooding) may not be included in the nodal storage in order to ensure that level of service requirements are met—storage outside of ponds, lakes, and wetlands should generally not be included in the proposed conditions model.
- Basin boundaries should serve as the control area for extracting stage-area or stage-volume relationships for applicable nodes. The maximum area in each stage-area relationship should not exceed the area within each basin.
- Stage-area relationships are preferred to stage-volume relationships since they are more readily checked and verified by staff.
- Nodal storage must be separated from conveyance or link storage through the use of channel polygons, which are described in the Section below.
- Stage-area or stage-volume relationships should extend up to at least as high as the 100-year peak stage.

3.2.3.3 Channel Polygons

The storage associated with open channel links must be excluded from nodal (or basin) storage by defining the surface area of the links represented in the model. This concept is demonstrated in Figure E-3. Final conveyance areas must be provided electronically as a CAD- or GIS-hased file and must be shown in a figure that is provided as a pdf.

3.2.3.4 Overflow Requirements

Overflows weirs and/or channels should be included in all models to accommodate flows in excess of the 100-year storm event. Overflow weirs or channels are the preferred modeling methodology and should be included in the model according to the guidelines provided in Table 3-2 below, with irregular weirs being the preferred type.

Table 3-2 Suggested Overflow Weir and Channel Geometries

Weir Geometry	Physical Equivalent
Irregular	Subbasin interconnection (overland flow), roadway
Parabolic	Relatively flat roadway with slight horizontal curves
Trapezoidal	Subbasin saddle or interconnection, roadway
Triangular	Roadway with steep horizontal curves

Weir and channel geometries not listed above may be used as overflows only with prior approval of staff. Broad-crested weirs are appropriate and easier to use for most overflow cases. Overflow channels may be necessary if friction losses are significant. In all cases, overflows should mimic actual physical conditions and be based on survey and/or construction drawings. Weir coefficients should generally be within the range of 2.6 to 3.1, with 2.6 being representative of broad-crested weirs with higher friction losses and 3.1 being representative of sharp-crested weirs and/or broad-crested weirs with significant upstream velocity head compared to the weir velocity. Weirs potentially requiring coefficients less than 2.6 should be modeled as channels. Alternatively, lower weir coefficients may be used with prior approval by staff.

3.2.3.5 Initial Conditions and Warning Elevations

Initial water surface elevations at nodes should be based on seasonal high water elevations and normal pool elevations. The use of an initial conditions floodplain to review initial elevations is strongly encouraged. Warning elevations should be assigned based on physical features (crown of road, top of structure, etc.) and are encouraged to help document that adequate water quantity levels of service are being provided

3.2.3.6 Hydraulic Control Information

It is necessary to route the 100-year 24-hour storm event and other events requested by staff for all projects. The hydraulic output information for all storm events should be specified in ICPR according to Table 3-3 below.

Table 3-3 Required Hydraulic Output Control Information	
To Time (Hour of Simulation)	Increment (minutes)
8	No greater than 15
24	No greater than 5
48 or until all nodes and links are past peak conditions	No greater than 15

Please note that models may be reviewed at increments of 1 minute or finer to ensure that short-duration instabilities are captured.

Hydraulic control information should be set to the more restrictive of the existing watershed model or the guidelines below unless documentation is provided to support the use of other values:

- Max delta z should be 1 foot or less.
- Delta z factor should be 0.005 unless otherwise documented.
- Time step optimizer should be 10 unless otherwise documented.
- Minimum calculation time increment of 0.25 second should be used unless otherwise documented or different in the original County-approved model.
- Maximum calculation time of 60 seconds or less should be used.

The Engineer-of-Record should check that the model does not display errors or warnings of concern at the start-up of the run. All simulations within a submittal should be run on the same computer. ICP, R32, and I32 files should be turned in with each submittal according to the file structure provided in Exhibit B. The Engineer-of-Record should use the latest ICPR Service Pack to prepare each submittal.

3.2.4 Model Quality Assurance/Quality Control (QA/QC)

As part of all modeling efforts, a thorough QA/QC process should be completed before submitting information to the County. Many of the suggested checks highlighted below are the same procedures that the County uses to review submittals.

3.2.4.1 Back-Check with Survey/Construction Plans

Information contained in the ICPR model should be back-checked against what was included in the construction plans. These checks generally include—but are not limited to—the following:

- BASIN DELINEATIONS—Basin delineations for proposed conditions should match the grading shown in the survey and/or plans. Delineations should match information shown in the survey for all areas that are not being re-graded.

- WEIR GEOMETRY—Sharp-crested (drop structures, control structures) and broad-created weirs (subbasin interconnections and overflow weirs) should be back-checked. The geometry and invert elevations in the model and plans should match.

- PIPES—All geometric, invert, and material (roughness coefficient) information should match when the plans are compared with the ICPR model.

A table that correlates each structure and pond with its respective model node should be provided with each submittal. Design high water elevations should be shown on the construction plans for each pond.

3.2.4.2 Back-Check GIS and/or CAD Information

A final check ensures that areas reported in the model match GIS and/or CAD information. Basin areas, stage-area relationships, and cross-section widths are good items to check as part of this final verification process. Information can be checked using spreadsheets (i.e., lookup tables)—as well as manually. This check helps to ensure adequate calculation by automated tools.

3.2.4.3 Mass Balance

All mass balance reports should be checked for each model run. Little to no percent difference should generally be reported towards the beginning of a model run and the percent error should steadily decrease throughout the run. If a percent error is reported by ICPR at the beginning of a model run, initial conditions should be checked before the model is submitted to the County. With the possible exception of the beginning of a run where the denominator is close to zero, the continuity error should be negligible.

3.2.4.4 Hydrograph Review

All stage and flow hydrographs should be checked in and around the project area. Since ICPR reports only what is provided in the "print increment" area in the control information, it is important to review hydrographs that meet the output requirements described in Section 3.2.3.6 of this document.

3.2.4.5 Model Start-Up

Problems with initial conditions can be detected in a number of ways in ICPR and should be checked thoroughly. Node stage-time hydrographs should exhibit a steady change in flow over the first few hours of the run. In general, flow at the first time step (time zero) indicates a problem with an initial condition. A written explanation must be provided to the County if it becomes necessary to provide a model with a non-zero flow at the first time step.

3.2.4.6 Model Stability

In general, stages and flows in the model should not oscillate or change quickly—in other words, stages and flows should be mathematically stable. Particular attention should be paid to stability near peak stage and flow conditions. A written explanation must be provided if it is not possible to stabilize hydrographs within certain portions of a model. This explanation should include the node and link names associated with the problem, a brief description of the issue, and the measures taken to try to remedy the instability. However, significantly unstable models are not likely to be accepted.

3.2.4.7 Missing Interconnections

Models and the required floodplain(s) should be carefully checked for missing interconnections. Figure E-4 illustrates this issue. "Glass-walls" (i.e., representations in the model where water is artificially staged up due to the absence of missing conveyance elements) in models will generally not be accepted.

3.2.4.8 Extrapolations

The Engineer-of-Record should check the node extrapolation and link extrapolation reports. Node extrapolations will generally not be accepted. Link extrapolations may be accepted if the extrapolation depths are relatively small, the storage outside of the link is more properly modeled using nodal storage (i.e., it has zero or nearly zero velocity), and the storage outside of the link is part of the nodal storage.

3.2.4.9 Tabular Output

Peak flows should be checked with respect to peak flows in surrounding conduits as an indicator of potentially suspect results. Sudden and unexplainable gains or losses in peak flows will generally not be accepted. Peak stages should be checked for large, unexpected losses across a single conduit and for stages that increase in a downstream direction.

3.3 STORM SEWERS

Storm sewer systems where normal flow conditions may be assumed or where backwater conditions may be adequately incorporated do not need to be included in the ICPR watershed model, but can be. If they are not included in the watershed model, they must be included in one of the following:

- A separate hydrodynamic model with the appropriate timed boundary condition applied at the outfall.
- A spreadsheet model that determines hydraulic grade lines based on using a prorata runoff rate from the ICPR basin discharge at each inlet or the Rational

Method and takes into account local losses and the pond elevation at the time of peak pipe inflow.

3.4 OTHER MODELS

HEC-RAS may be used to obtain FEMA no-rise certifications. Submittals for these certifications will be subject to most of the review process described in this Manual, except for activities related to updating the County-approved ICPR models and meeting levels of service not applicable to no-rise certifications. The data used in the HEC-RAS model must be consistent with the data used in the County's corresponding ICPR model.

3.5 PERMITTING

Staff may require any information that would otherwise be required by Federal and/or State permit applications, permits, and Construction Stormwater Pollution Prevention Plans (SWP3) in order to authorize a project. Projects that will ultimately disturb at least 1 acre of land are required to obtain permit coverage by filing a Notice of Intent to use Generic Permit for Stormwater Discharge from Large and Small Construction Activities from the Department of Environmental Protection. Refer to Exhibit H for the form.

3.6 EROSION AND SEDIMENTATION CONTROL

In order to maintain the integrity of the surface and groundwater resources of Sarasota County the following is required.

3.6.1 National Pollutant Discharge Elimination System (NPDES) Coverage

Development projects meeting the following criteria shall obtain coverage from the Florida Department of Environmental Protection (DEP) to use the Generic Permit for Stormwater Discharge from Large and Small Construction Activities pursuant to Chapter 62-621 Florida Administrative Code, or its successors:

- Large Construction Activity that disturbs five acres or greater of land, or
- Large Construction Activity that disturbs less than five acres of land that is part of a larger common plan of development or sale that will ultimately disturb five acres or greater, or
- Small Construction Activity that disturbs equal to or greater than one acre and is less than five acres of land, or
- Small Construction Activity that disturbs less than one acre of land that is part of a larger common plan of development or sale that will ultimately disturb between one and five acres.

3.6.2. The Operator *(the entity that owns or operates the construction activity and has authority to control those activities at the project necessary to ensure compliance with*

the terms of the permit) shall provide a copy of the Notice of Intent (NOI) and the Stormwater Pollution Prevention Plan (SWPPP) to Sarasota County Water Resources.

3.6.3. Stormwater Pollution Prevention Plan

The SWP3 should be prepared before construction by a registered civil or environmental engineer or registered landscape architect. All plans should follow the Construction Stormwater Pollution Prevention Plan Template in Exhibit H and the guidance provided in *The Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.* Additional guidance can be found in Exhibits I through K. A Notice of Termination (NOT) should be filed when final stabilization criteria are met and all stormwater discharges associated with construction activity have ceased. The Notice of Termination form is presented in Exhibit L.

The development and implementation of an erosion and sedimentation control system should minimize the adverse impacts of soil erosion and sediment transport. The system should be designed according to the following principles:

- The development plan must be compatible with the existing topography, soils, waterways, and natural vegetation of the site.

- The smallest possible area shall be exposed for the shortest possible time during construction.

- On-site control measures such as silt fences shall be applied to reduce erosion. Stockpiling and storage of materials shall not be located so as to impede flow or cause materials to be eroded by stormwater runoff.

- The SWP3 shall identify permanent stormwater conveyance structures, final stabilized conditions of the site, provisions for removing temporary control measures, controls for potential pollutants, stabilization of the site when temporary measures are removed, inspection procedures, and maintenance requirements for any permanent measures. All sedimentation control structures to be used during construction shall be installed before any construction activity and shall be maintained in an effective working condition until such time as the completion of the permanent system or other erosion control measures can ensure adequate erosion and sediment control.

- The erosion and sedimentation control plan is performance based. Failure to install the erosion and sedimentation control system may result in Code Enforcement.

4.0 REFERENCES

Florida Department of Environmental Protection (FDEP). *The Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.* http://www.dep.state.fl.us/water/nonpoint/ero_man.htm. Most recent update.

NRCS. *Technical Release 55: Urban Hydrology for Small Watersheds.* USDA (U.S. Department of Agriculture). June 1986.

NOTE: Other references included in their entirety in this Manual are not included in this Section.

EXHIBIT A

REQUIRED STORMWATER CHECKLISTS

Hard Copy Requirement Checklist

Sarasota County Stormwater Review Checklist
Required Hard Copy Information
(to be included with every submittal)

Project Name: _____
Bayshed: _____
Consultant Name: _____
Stormwater Engineer-of-Record: _____
Florida PE Number: _____
Phone Number: _____
Date of Submittal: _____

Submittal Type: ☐ Revised-Existing Conditions ☐ Proposed Conditions

General Information:

- ☐ Completed Checklist (this document)
- ☐ LDR Checklists
- ☐ Brief Project Narrative
- ☐ Construction Plans (Proposed Conditions Only)
- ☐ SWFWMD ERP Application (Proposed Conditions Only)
- ☐ SWFWMD ERP Permit (Proposed Conditions Only)
- ☐ NOI (Proposed Only)
- ☐ Written Response to Previous Comments
- ☐ Signed and Sealed Survey

ICPR Hydrologic Model:

- ☐ Time of Concentration Calculations
- ☐ DCIA Calculations
- ☐ Curve Number Calculations
- ☐ Flowpath Figure
- ☐ Hydrology Input (ICPR Report)

ICPR Hydraulic Model:

- ☐ Model Schematic
- ☐ Channel Exclusion Figure

Floodplains:

- ☐ 100-Year, 24-Hour Floodplain Map
- ☐ 500-Year Floodplain Map (if overflows are not used)

Sarasota Templates:

- ☐ Subbasin Balance
- ☐ Comparison Summary Sheets
- ☐ Detailed Comparison Sheets
- ☐ Model-Plans Correlation Table (see Section 3.2.4 of the Stormwater Manual)

Notes to Reviewer:
E.g., this is our second proposed conditions submittal.
We included overflows in our models to accommodate flows greater than 100-year.

Electronic Requirement Checklist

Sarasota County Stormwater Review Checklist
Required Electronic Information
(to be included with every submittal)

Project Name: _____
Bayshed: _____
Consultant Name: _____
Stormwater Engineer-of-record: _____
Florida PE Number:
Date of Submittal: _____
Phone Number: _____

Submittal Type: ☐ Revised-Existing Conditions ☐ Proposed Conditions

I have enclosed a CD that is formatted according to Exhibit B of the Stormwater Manual: ☐ Yes ☐ No
I have enclosed a DVD that is formatted according to Exhibit B of the Stormwater Manual: ☐ Yes ☐ No
A text file and/or metadata is provided on this DVD/CD per Section 3.1.2 of the Stormwater Manual. ☐ Yes ☐ No

All CAD information is in the following format(s): E.g., Autocad 2006 dwg

All GIS information is in the following formats: (Check all that apply.)
☐ shapefiles ☐ mxd
☐ geodatabase ☐ TIN
☐ coverages ☐ raster

GIS information was managed using: E.g., ESRI ArcGIS version 9.1

ICPR Hydrologic Model:
☐ Time of Concentration Calculations
☐ DCIA Calculations
☐ Curve Number Calculations
☐ Flowpath Figure
☐ Hydrology Input (ICPR Report)

ICPR Hydraulic Model:
☐ Model Schematic
☐ Channel Exclusion Figure

Floodplains:
☐ 100-Year, 24-Hour Floodplain Map
☐ 500-Year Floodplain Map (if overflows are not used)
☐ Electronic Floodplain(s)

Sarasota Templates:
☐ Subbasin Balance
☐ Comparison Summary Sheets
☐ Detailed Comparison Sheets
☐ Model-Plans Correlation Table (see Section 3.2.5 of the Stormwater Manual)

Notes to Reviewer:
This is our second proposed conditions submittal.

EXHIBIT B

REQUIRED ELECTRONIC FILE STRUCTURE

Required Electronic File Structure on CD/DVD

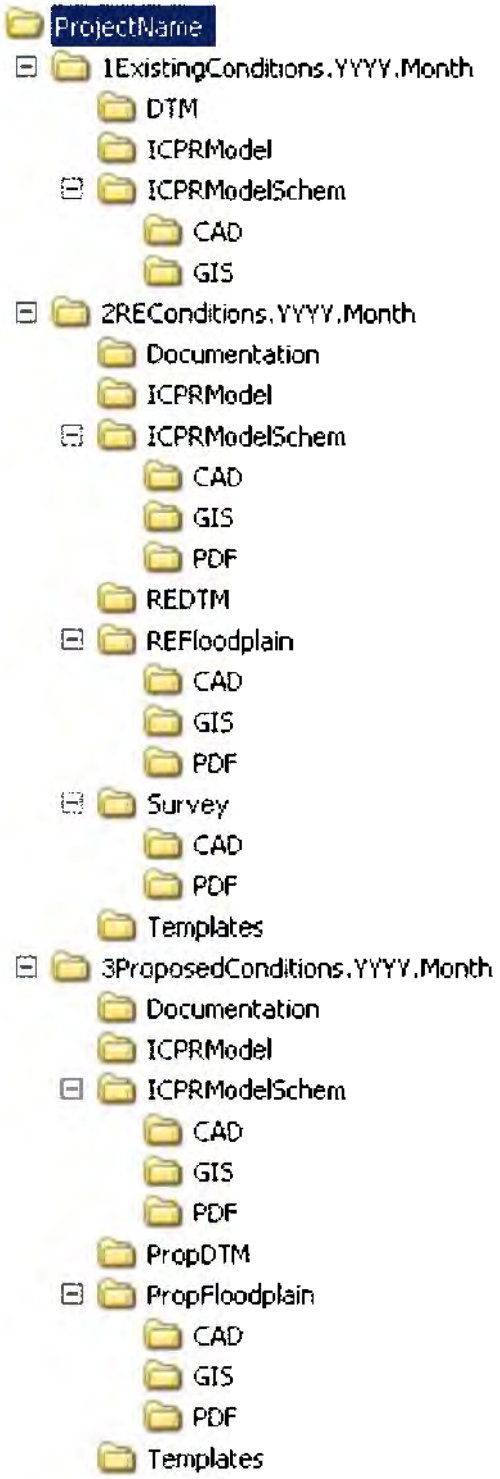

EXHIBIT C

SUBMITTAL WORK FLOW

Sarasota County Stormwater Review Process

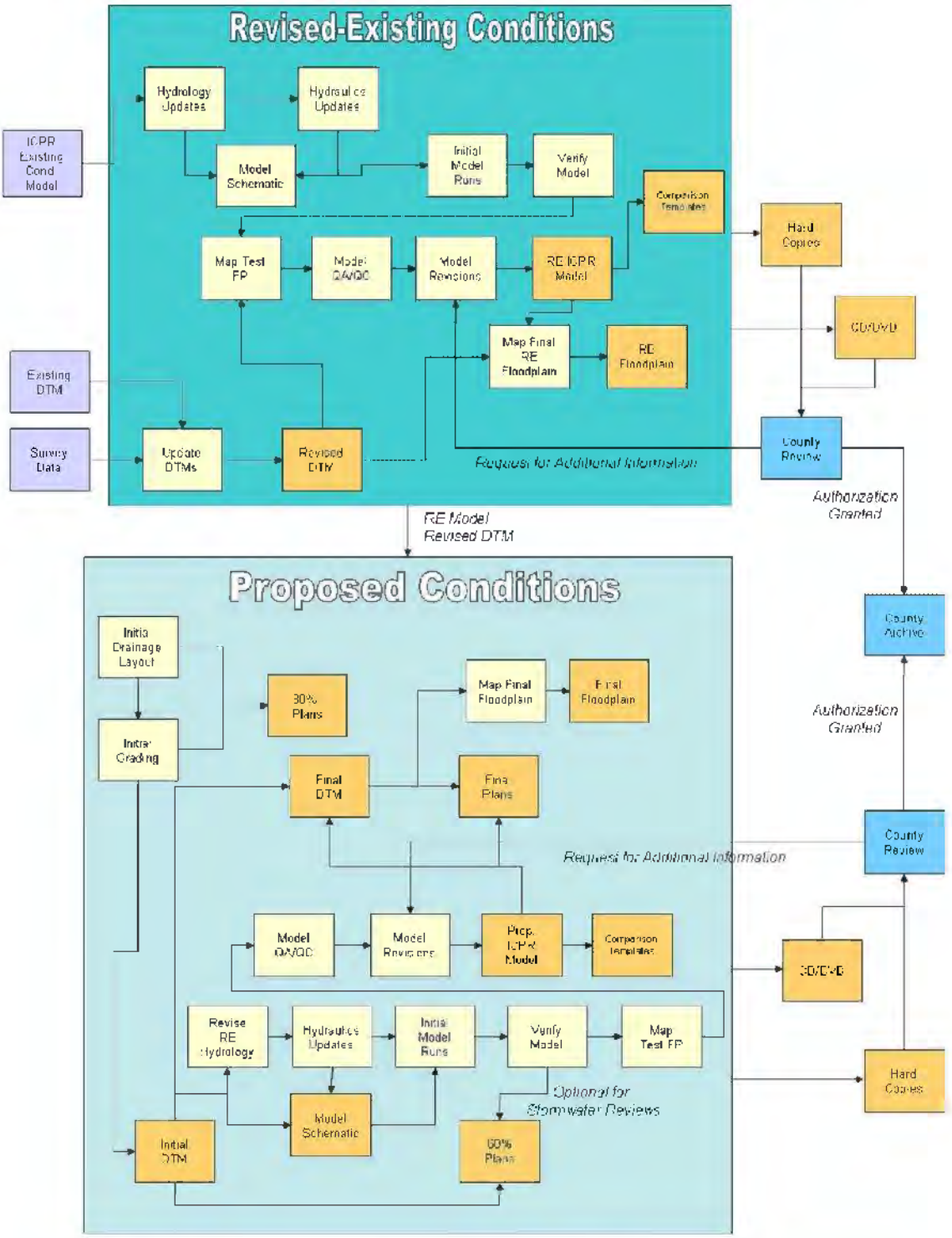

Figure Legend:

Revised-Existing Revisions *(Consultant)*	Proposed Conditions Development *(Consultant)*	Process Input *(Consultant or County)*	Intermediate Step	Required Final Product	County's Process

EXHIBIT D

MODEL MAINTENANCE PROCEDURES AND MODEL MAINTENANCE TEMPLATES

MODEL UPDATE SUMMARY WORKSHEET

Basin: _____ Bayshed: _____

Project Name: _____ Sec/Twn/Ran: _____

Modification Type: _____ New Construction

_____ Modification of Exisiting Conditions

Modification Date: _____ SEU Staff : _____

NAME	BASIN	NODE	PIPE	CHAN	WEIR	X-SECT	DRP STR	BRIDGE
example **	A,M or D							

** Please list whether the basins, nodes, reaches have been added (A), modified (M) or deleted (D)

NOTES: _____

SKETCH

ACREAGE BALANCE SHEET

Existing Conditions	
Basin	Acreage
TOTAL	

- equals -

Revised Existing Conditions	
Basin	Acreage
TOTAL	

- equals -

Proposed Conditions	
Basin	Acreage
TOTAL	

---------- **Nodes** ----------

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

Name:
Group:
Comment:

EXISTING Init Stage (ft): Warn Stage (ft):

Stage (ft)	Area (ac)		

PROPOSED Init Stage (ft): Warn Stage (ft):

Stage (ft)	Area (ac)		

---------- **Nodes** ----------

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

Name:
Group:
Comment:

EXISTING Init Stage (ft): Warn Stage (ft):

Stage (ft)	Area (ac)		

PROPOSED Init Stage (ft): Warn Stage (ft):

Stage (ft)	Area (ac)		

---------- **Nodes** ----------

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

Name:
Group:
Comment:

EXISTING Init Stage (ft): Warn Stage (ft):

Stage (ft)	Area (ac)		

PROPOSED Init Stage (ft): Warn Stage (ft):

Stage (ft)	Area (ac)		

Basins

CHOOSE ONE	EXISTING		PROPOSED	
___ Addition	Basin:	Node:	Basin:	Node:
___ Modification	Group:		Group:	
___ Deletion	Unit Hydrograph:		Unit Hydrograph:	
	Rainfall File:		Rainfall File:	
	Rainfall Amount (in):		Rainfall Amount (in):	
	Area (ac):		Area (ac):	
	Curve #:		Curve #:	
	DCIA (%):		DCIA (%):	
	Peak Factor:		Peak Factor:	
	Storm Duration (hrs):		Storm Duration (hrs):	
	Concentration Time (min):		Concentration Time (min):	
	Time Shift (hrs):		Time Shift (hrs):	

Basins

CHOOSE ONE	EXISTING		PROPOSED	
___ Addition	Basin:	Node:	Basin:	Node:
___ Modification	Group:		Group:	
___ Deletion	Unit Hydrograph:		Unit Hydrograph:	
	Rainfall File:		Rainfall File:	
	Rainfall Amount (in):		Rainfall Amount (in):	
	Area (ac):		Area (ac):	
	Curve #:		Curve #:	
	DCIA (%):		DCIA (%):	
	Peak Factor:		Peak Factor:	
	Storm Duration (hrs):		Storm Duration (hrs):	
	Concentration Time (min):		Concentration Time (min):	
	Time Shift (hrs):		Time Shift (hrs):	

Basins

CHOOSE ONE	EXISTING		PROPOSED	
___ Addition	Basin:	Node:	Basin:	Node:
___ Modification	Group:		Group:	
___ Deletion	Unit Hydrograph:		Unit Hydrograph:	
	Rainfall File:		Rainfall File:	
	Rainfall Amount (in):		Rainfall Amount (in):	
	Area (ac):		Area (ac):	
	Curve #:		Curve #:	
	DCIA (%):		DCIA (%):	
	Peak Factor:		Peak Factor:	
	Storm Duration (hrs):		Storm Duration (hrs):	
	Concentration Time (min):		Concentration Time (min):	
	Time Shift (hrs):		Time Shift (hrs):	

Cross Sections

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

EXISTING

Name: Group:

Comment:

X-sta (ft)	Y-ele. (ft)	Manning's n

PROPOSED

Name: Group:

Comment:

X-sta (ft)	Y-ele. (ft)	Manning's n

Cross Sections

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

EXISTING

Name: Group:

Comment:

X-sta (ft)	Y-ele. (ft)	Manning's n

PROPOSED

Name: Group:

Comment:

X-sta (ft)	Y-ele. (ft)	Manning's n

Cross Sections

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

EXISTING

Name: Group:

Comment:

X-sta (ft)	Y-ele. (ft)	Manning's n

PROPOSED

Name: Group:

Comment:

X-sta (ft)	Y-ele. (ft)	Manning's n

Pipes

CHOOSE ONE	EXISTING			PROPOSED		
___ Addition	Name:			Name:		
	Group:			Group:		
___ Modification	From Node:			From Node:		
	To Node:			To Node:		
___ Deletion	Length (ft):			Length (ft):		
	Count:			Count:		
		Upstream	Downstream		Upstream	Downstream
	Geometry:			Geometry:		
	Span (in):			Span (in):		
	Rise (in):			Rise (in):		
	Invert (ft):			Invert (ft):		
	Manning's n:			Manning's n:		
	Top Clip (in):	0	0	Top Clip (in):	0	0
	Bottom Clip (in):	0	0	Bottom Clip (in):	0	0
	Equation			Equation		
	Flow:			Flow:		
	Entrance Loss Coef:			Entrance Loss Coef:		
	Exit Loss Coef:			Exit Loss Coef:		
	Bend Loss Coef:			Bend Loss Coef:		
	Outlet Chtrl Spec:	Use dc or tw		Outlet Chtrl Spec:	Use dc or tw	
	Inlet Chtrl Spec:	Use dn		Inlet Chtrl Spec:	Use dn	
	Stabilizer Option:	None		Stabilizer Option:	None	

Pipes

CHOOSE ONE	EXISTING			PROPOSED		
___ Addition	Name:			Name:		
	Group:			Group:		
___ Modification	From Node:			From Node:		
	To Node:			To Node:		
___ Deletion	Length (ft):			Length (ft):		
	Count:			Count:		
		Upstream	Downstream		Upstream	Downstream
	Geometry:			Geometry:		
	Span (in):			Span (in):		
	Rise (in):			Rise (in):		
	Invert (ft):			Invert (ft):		
	Manning's n:			Manning's n:		
	Top Clip (in):	0	0	Top Clip (in):	0	0
	Bottom Clip (in)	0	0	Bottom Clip (in):	0	0
	Equation			Equation		
	Flow:			Flow:		
	Entrance Loss Coef:			Entrance Loss Coef:		
	Exit Loss Coef:			Exit Loss Coef:		
	Bend Loss Coef:			Bend Loss Coef:		
	Outlet Chtrl Spec:	Use dc or tw		Outlet Chtrl Spec:	Use dc or tw	
	Inlet Chtrl Spec:	Use dn		Inlet Chtrl Spec:	Use dn	
	Stabilizer Option:	None		Stabilizer Option:	None	

Channels

CHOOSE ONE

___ Addition

___ Modification

___ Deletion

	EXISTING		**PROPOSED**	
Name:				
Group:				
From Node:				
To Node:				
Length (ft):				
Count:				
	Upstream	Downstream	Upstream	Downstream
Geometry:				
Invert (ft):				
TclpInitZ (ft):				
Manning's n:				
Tclip (ft):				
Bclip (ft):				
Main Xsec:				
AxEl1 (ft):				
Aux Xsec1:				
AxEl2 (ft):				
Aux Xsec2:				
Twidth (ft):				
Depth (ft):				
Bwidth (ft):				
LSdSlp (h/v):				
RSdSlp (h/v):				
Equation:				
Flow:				
Eddy Contrac Coef:				
Eddy Expans Coef:				
Entrance Loss Coef:				
Exit Loss Coef:				
Outlet Cntrl Spec:	Use dc or tw		Use dc or tw	
Inlet Cntrl Spec:	Use dn		Use dn	
Stabilizer Option:	None		None	

Rectangular Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	From Node:	From Node:
	To Node:	To Node:
	Count:	Count:
	Flow:	Flow:
	Span:	Span:
	Rise (in):	Rise (in):
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	Bottom Clip (in):	Bottom Clip (in):
	Top Clip (in):	Top Clip (in):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:
	Type:	Type:

Rectangular Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	From Node:	From Node:
	To Node:	To Node:
	Count:	Count:
	Flow:	Flow:
	Span:	Span:
	Rise (in):	Rise (in):
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	Bottom Clip (in):	Bottom Clip (in):
	Top Clip (in):	Top Clip (in):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:
	Type:	Type:

Rectangular Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	From Node:	From Node:
	To Node:	To Node:
	Count:	Count:
	Flow:	Flow:
	Span:	Span:
	Rise (in):	Rise (in):
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	Bottom Clip (in):	Bottom Clip (in):
	Top Clip (in):	Top Clip (in):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:
	Type:	Type:

Trapezoidal Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
	Group:	Group:
___ Modification	Count:	Count:
	From Node:	From Node:
___ Deletion	To Node:	To Node:
	Flow:	Flow:
	Type:	Type:
	Bottom Width (ft):	Bottom Width (ft):
	Left Side Slope (h/v):	Left Side Slope (h/v):
	Right Side Slope (h/v):	Right Side Slope (h/v):
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	StructOpeningDim (ft):	StructOpeningDim (ft):
	Boftom Clip (ft):	Bottom Clip (ft):
	Top Clip (ft):	Top Clip (ft):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:

Trapezoidal Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
	Group:	Group:
___ Modification	Count:	Count:
	From Node:	From Node:
___ Deletion	To Node:	To Node:
	Flow:	Flow:
	Type:	Type:
	Bottom Width (ft):	Bottom Width (ft):
	Left Side Slope (h/v):	Left Side Slope (h/v):
	Right Side Slope (h/v):	Right Side Slope (h/v):
	Invert (ft).	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	StructOpeningDim (ft):	StructOpeningDim (ft):
	Bottom Clip (ft):	Bottom Clip (ft):
	Top Clip (ft):	Top Clip (ft):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:

Irregular Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	Count:	Count:
	From Node:	From Node:
	To Node:	To Node:
	Type:	Type:
	Xsec Name:	Xsec Name:
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	StructOpeningDim (ft):	StructOpeningDim (ft):
	Bottom Clip (ft):	Bottom Clip (ft):
	Top Clip (ft):	Top Clip (ft):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:

Irregular Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	Count:	Count:
	From Node:	From Node:
	To Node:	To Node:
	Type:	Type:
	Xsec Name:	Xsec Name:
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	StructOpeningDim (ft):	StructOpeningDim (ft):
	Bottom Clip (ft):	Bottom Clip (ft):
	Top Clip (ft):	Top Clip (ft):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:

Irregular Weirs

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	Count:	Count:
	From Node:	From Node:
	To Node:	To Node:
	Type:	Type:
	Xsec Name:	Xsec Name:
	Invert (ft):	Invert (ft):
	Control Elev (ft):	Control Elev (ft):
	StructOpeningDim (ft):	StructOpeningDim (ft):
	Bottom Clip (ft):	Bottom Clip (ft):
	Top Clip (ft):	Top Clip (ft):
	Weir Discharge Coef:	Weir Discharge Coef:
	Orifice Discharge Coef:	Orifice Discharge Coef:

Drop Structures

CHOOSE ONE	EXISTING	PROPOSED
___ Addition	Name:	Name:
___ Modification	Group:	Group:
___ Deletion	From Node:	From Node:
	To Node:	To Node:
	Length (ft):	Length (ft):
	Count:	Count:
	Upstream / Downstream	Upstream / Downstream
	Geometry:	Geometry:
	Span (in):	Span (in):
	Rise (in):	Rise (in):
	Invert (ft):	Invert (ft):
	Manning's n:	Manning's n:
	Top Clip (in):	Top Clip (in):
	Bottom Clip (in):	Bottom Clip (in):
	Entrance Loss Coef:	Entrance Loss Coef:
	Exit Loss Coef:	Exit Loss Coef:
	Flow: Both	Flow: Both
	Equation: Aver Conveyance	Equation: Aver Conveyance
	Upstream Inlet:	Upstream Inlet:
	Downstream Inlet:	Downstream Inlet:

Weir 1 of 2 for Drop Structure

EXISTING		PROPOSED	
Count:	Bottom Clip (in):	Count:	Bottom Clip (in)
Type:	Top Clip (in):	Type:	Top Clip (in)
Flow:	Weir Dis. Coef:	Flow:	Weir Dis. Coef:
Geometry:	Orifice Dis. Coef:	Geometry:	Orifice Dis. Coef:
Span (in):		Span (in):	
Rise (in):		Rise (in):	
Invert (ft):		Invert (ft):	
Control Elev (ft):		Control Elev (ft):	

Weir 2 of 2 for Drop Structure

EXISTING		PROPOSED	
Count:	Bottom Clip (in):	Count:	Bottom Clip (in)
Type:	Top Clip (in):	Type:	Top Clip (in)
Flow:	Weir Dis. Coef:	Flow:	Weir Dis. Coef:
Geometry:	Orifice Dis. Coef:	Geometry:	Orifice Dis. Coef:
Span (in):		Span (in):	
Rise (in):		Rise (in):	
Invert (ft):		Invert (ft):	
Control Elev (ft):		Control Elev (ft):	

EXHIBIT E

SAMPLE MAPS

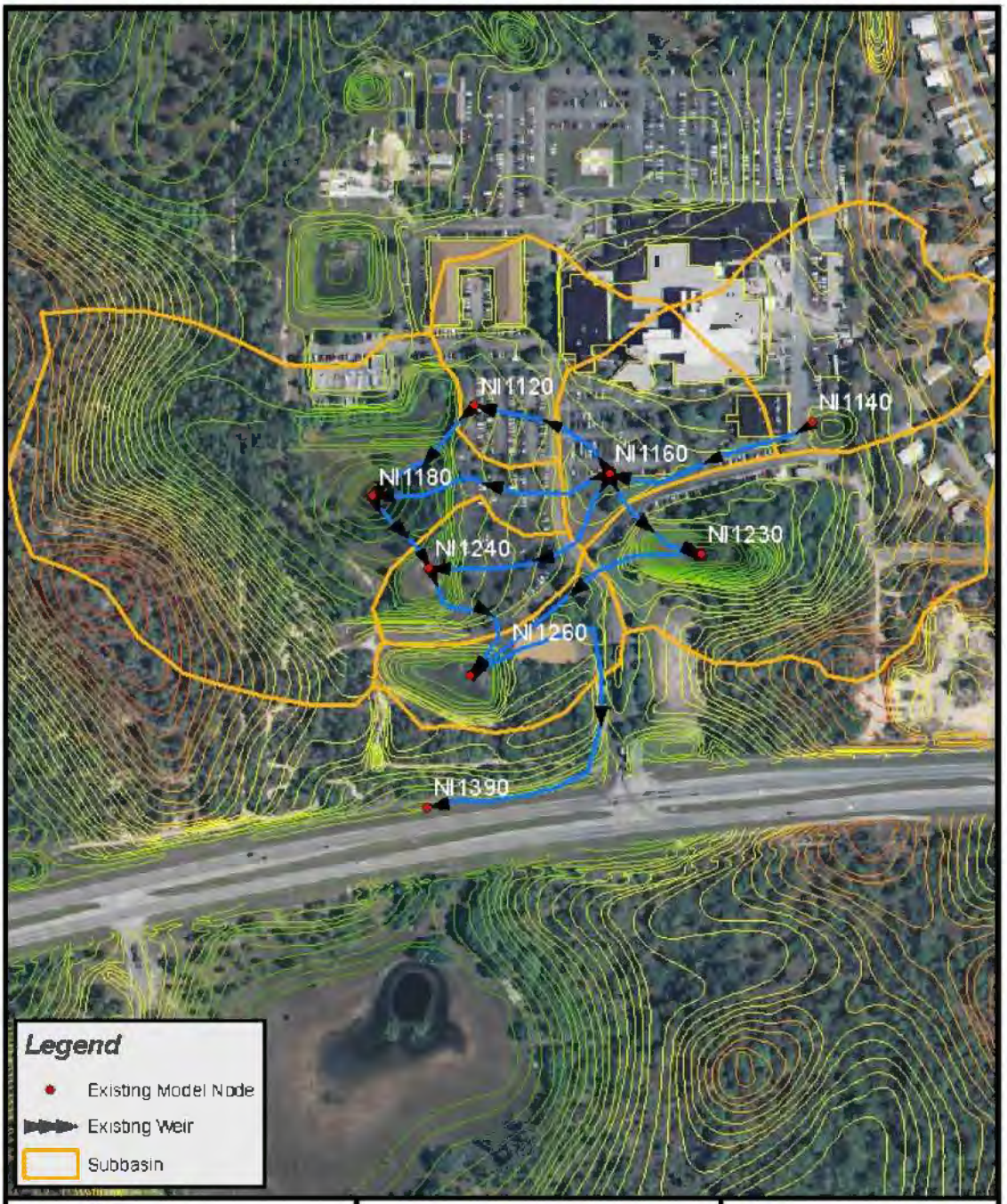

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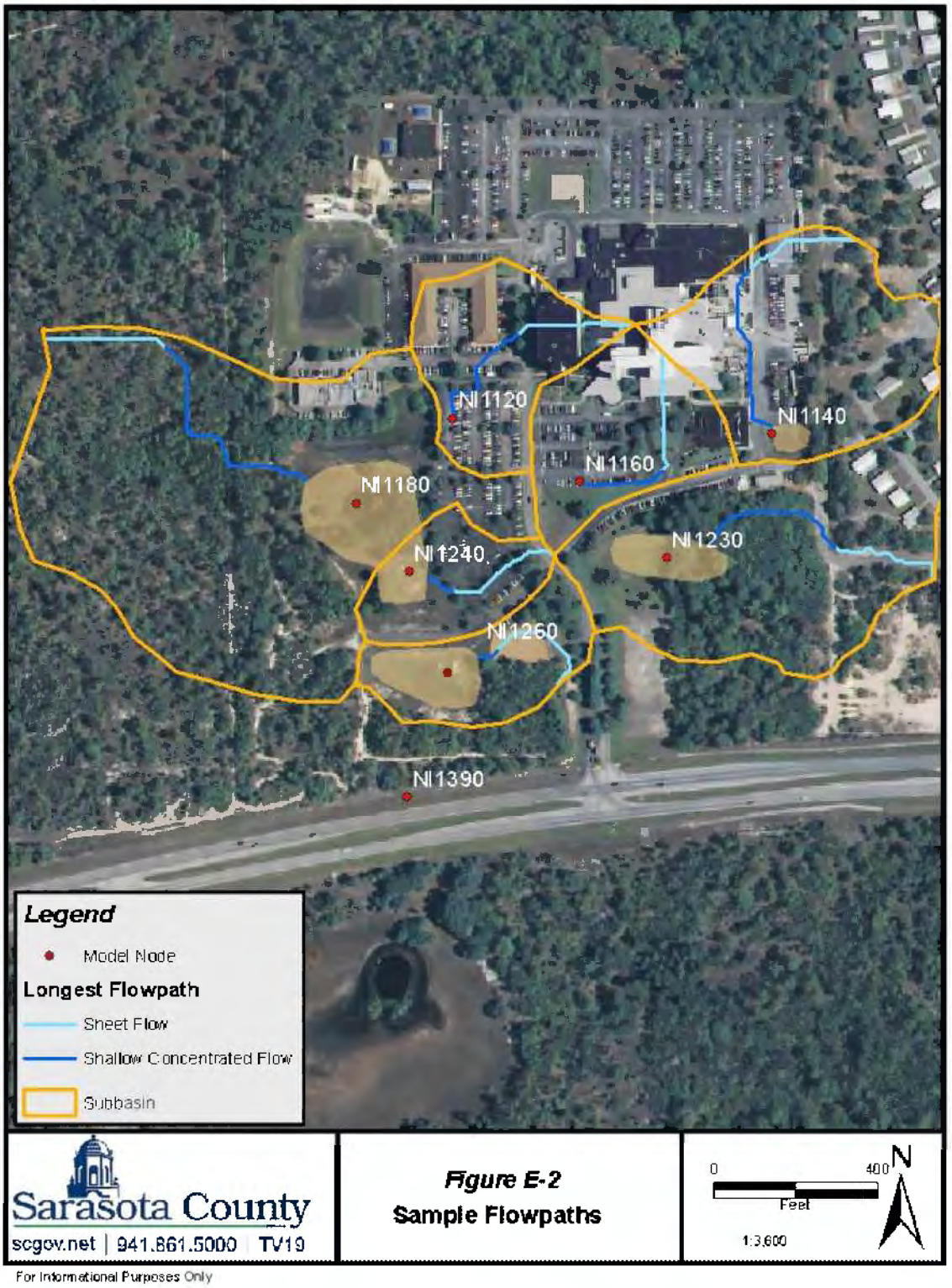
Figure E-1
Sample Model Schematic

0 400 Feet
1:3,600
N

For Informational Purposes Only



For Informational Purposes Only

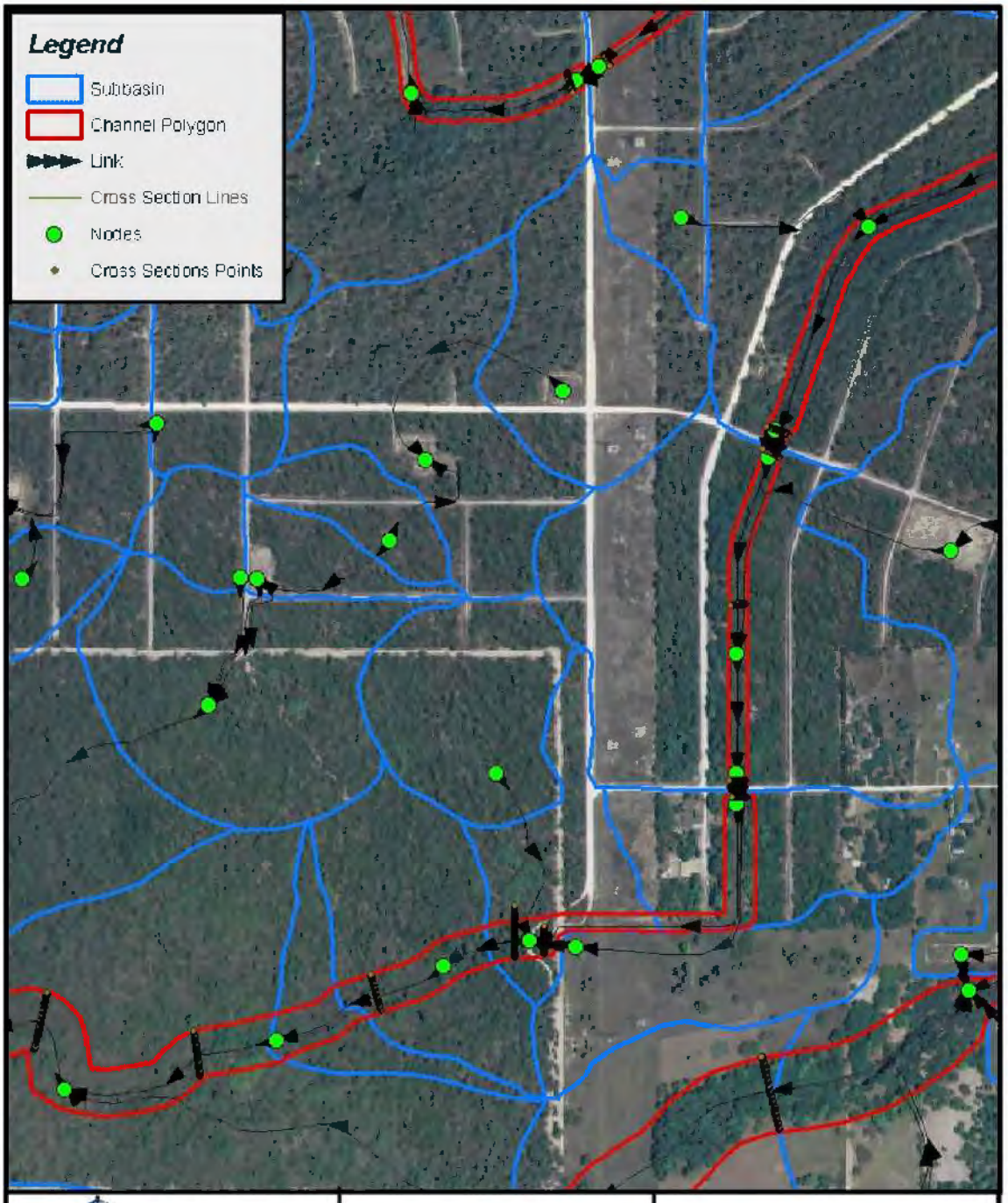


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Figure E-3

Sample of Channel Polygons

0 1,000 2,000
Feet

N

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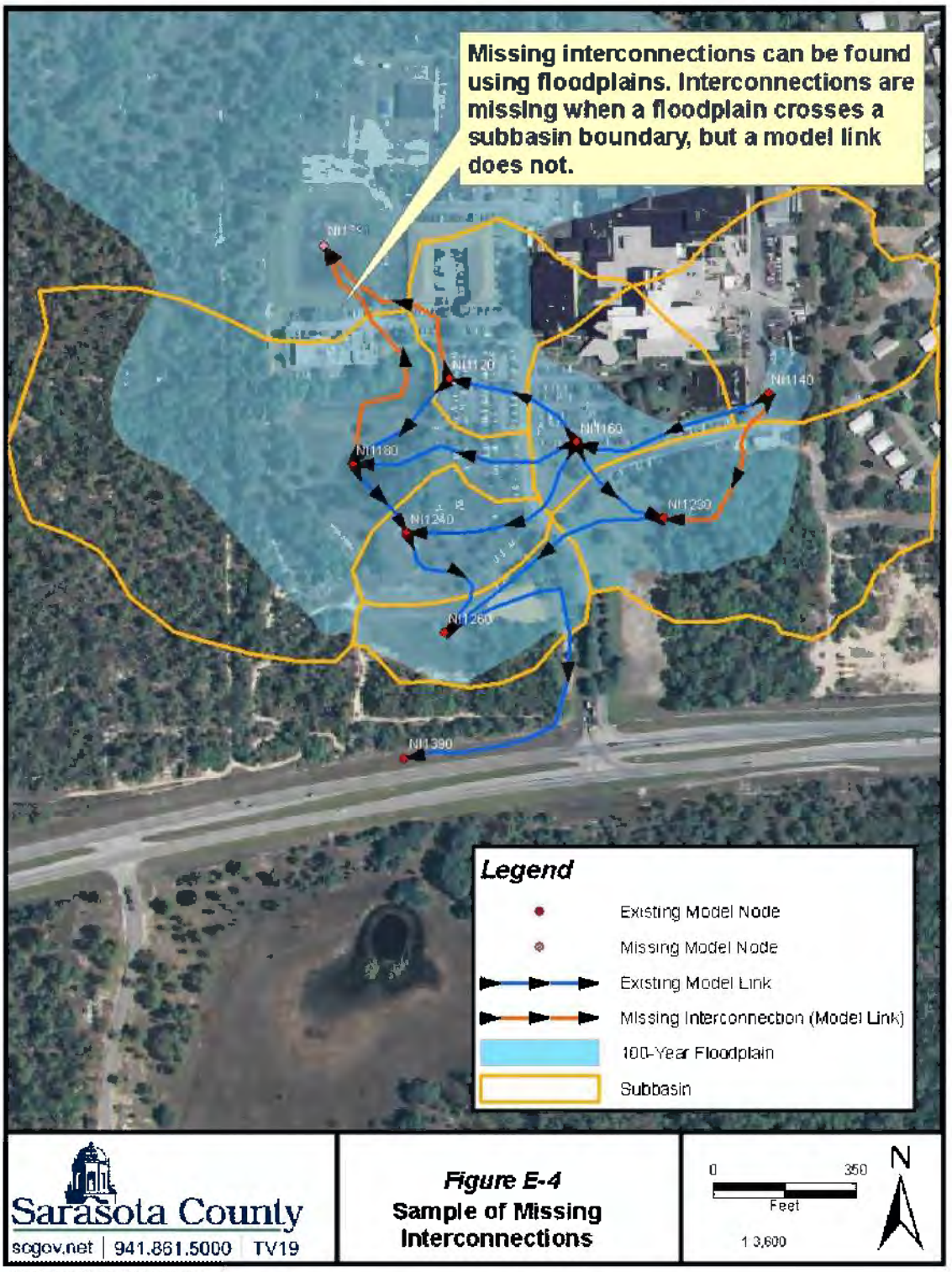

Figure E-4
Sample of Missing Interconnections

For Informational Purposes Only

EXHIBIT F

SARASOTA COUNTY WATERSHEDS FLOODPLAIN MODEL METHODOLOGY REPORT

EXHIBIT G

TIME OF CONCENTRATION TEMPLATE

Suggested Format for Time Of Concentration Calculations

Project Name: ______________________________

Bayshed: ______________________________

Consultant Name: ______________________________

Model Type (Revised Existing or Proposed): ______________________________

Date: ______________________________

Flowpaths for these calculations are provided as Figure ___2___ in this submittal.

Time of concentration for hydraulically most remote point for each subbasin is calculated below according to the NRCS TR-55 methodology.

	Sheet Flow					Shallow Concentrated Flow					Channelized Flow										
Subbasin Name	Manning N	Flow Length	2-Year, 24-Hour Rainfall	Longitudinal Slope	Travel Time	Paved (P) Or Unpaved (U)	Flow Length	Longitudinal Slope	Ave. Velocity	Travel Time	Cross-Sectional Area	Wetted Perimeter	Hydraulic Radius	Longitudinal Slope	Manning N	Ave. Velocity	Flow Length	Travel Time	Time of Concentration	Time of Concentration
		(feet)	(inches)	(foot/foot)	(minutes)		(feet)	(foot/foot)	(fps)	(minutes)	(feet2)	(feet)	(feet)	(foot/foot)		(fps)	(feet)	(minutes)	(minutes)	(hours)
1000	0.15	84	4.25	0.01	9.8	P	358	0.0055	1.51	4.2	5	6.28	0.80	0.0060	0.07	1.42	63	44.5	58.4	0.974
1100	0.15	80	4.25	0.01	9.4														9.4	0.156
1200	0.24	15	4.25	0.33	0.9						6.5	6.28	1.04	0.0055	0.065	1.74	250	143.7	144.6	2.410

EXHIBIT H

NOTICE OF INTENT TO USE GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES

NOTICE OF INTENT TO USE GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES (RULE 62-621.300(4), F.A.C.)

This Notice of Intent (NOI) form is to be completed and submitted to the Department before use of the Generic Permit for Stormwater Discharge From Large and Small Construction Activities provided in Rule 62-621.300(4), F.A.C. The type of project or activity that qualifies for use of the generic permit, the conditions of the permit, and additional requirements to request coverage are specified in the generic permit document [DEP Document 62-621.300(4)(a)]. **The appropriate generic permit fee, as specified in Rule 62-4.050(4)(d), F.A.C., shall be submitted with this NOI in order to obtain permit coverage. Permit coverage will not be granted without submittal of the appropriate generic permit fee.** You should familiarize yourself with the generic permit document and the attached instructions before completing this NOI form **Please print or type information in the appropriate areas below.**

I. IDENTIFICATION NUMBER: Project ID

_____

II. APPLICANT INFORMATION:

A. Operator Name:			
B. Address:			
C. City:		D. State:	E. Zip Code:
F. Operator Status:	G. Responsible Authority:		
	H. Phone No..		

III. PROJECT/SITE LOCATION INFORMATION:

A. Project Name:			
B. Project Address/Location:			
C. City:		D. State:	E. Zip Code:
F. County:	G. Latitude: ° ′ ″	Longitude: ° ′ ″	
H. Is the site located on Indian lands? ☐ Yes ☐ No		I. Water Management District:	
J. Project Contact:			K. Phone No.:

DEP Form 62-621.300(4)(b)
Effective May 1, 2003

IV. PROJECT/SITE ACTIVITY INFORMATION:

A. Indicate whether Large or Small Construction (check only one):	☐ Large Construction (Project will disturb five or more acres of land.) ☐ Small Construction (Project will disturb one or more acres but less than five acres of land.)		
B. Approximate total area of land disturbance from commencement through completion of construction: _____ Acres			
C. SWPPP Location	☐ Address in Part II above ☐ Address in Part III above ☐ Other address (specify below)		
D. SWPPP Address:			
E. City:		F. State:	G. Zip Code:
H. Construction Period	Start Date:	Completion Date:	

V. DISCHARGE INFORMATION

A. MS4 Operator Name (if applicable):
B. Receiving Water Name:

VI. CERTIFICATION[1]:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and Official Title (Type or Print):

Signature: _____ Date Signed: _____

[1] Signatory requirements are contained in Rule 62-620.305, F.A.C.

INSTRUCTIONS – DEP FORM 62-621.300(4)(b)
NOTICE OF INTENT (NOI) TO USE GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES

Who Must File an NOI:

Federal law at 40 CFR Part 122 prohibits the point source discharge of pollutants, including the discharge of stormwater associated with large construction activities as defined at 40 CFR 122.26(b)(14)(x) or small construction activities as defined at 40 CFR 122.26(b)(15), to waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit. Under the State of Florida's authority to administer the NPDES stormwater program at 403.0885, F.S., operators that have stormwater discharge associated with large or small construction activities to surface waters of the State, including through a Municipal Separate Storm Sewer System (MS4), must obtain coverage either under a generic permit issued pursuant to Chapter 62-621, F.A.C., or an individual permit issued pursuant to Chapter 62-620, F.A.C.

Where to File NOI:

NOIs for coverage under this generic permit must be sent to the following address:

NPDES Stormwater Notices Center, MS #2510
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Permit Fee:

Permit fees for large and small construction activities to be covered under the generic permit are specified in Rule 62-4.050(4)(d), F.A.C. The appropriate generic permit fee (either for large or small construction activities) must be submitted along with the completed NOI in order to obtain coverage under the generic permit. **Generic permit coverage will not be granted without payment of the appropriate permit fee.**

The permit fee shall be paid by either check or money order made payable to: "Florida Department of Environmental Protection"

Part I – Identification Number

Enter the project's DEP identification number (generic permit coverage number) if known. If an ID number has not yet been assigned to this project (i.e., if this is a new project), leave this item blank.

Part II – Applicant Information

Item A.: Provide the legal name of the person, firm, contractor, public organization, or other legal entity that owns or operates the construction activity described in this NOI. The operator is the legal entity that has authority to control those activities at the project necessary to ensure compliance with the terms and conditions of the generic permit.

Items B. – E.: Provide the complete mailing address of the operator, including city, state, and zip code.

Item F.. Enter the appropriate one letter code from the list below to indicate the legal status of the operator:

F = Federal; S = State; P = Private; M = Public (other than federal or state); O = Other

Items G. – H.: Provide the name and telephone number (including area code) of the person authorized to submit this NOI on behalf of the operator (e.g., Jane Smith, President of Smith Construction Company on behalf of the operator, Smith Construction Company; John Doe, Public Works Director on behalf of the operator, City of Townsville; etc.). This should be the same person as indicated in the certification in Part VI.

Part III – Project/Site Location Information

Items A. – E.: Enter the official or legal name and complete street address, including city, state, and zip code of the project. Do not provide a P.O. Box number as the street address. If it lacks a street address, describe the project site location (e.g., intersection of State Road 1 and Smith Street).

Item F.. Enter the county in which the project is located.

Item G.: Enter the latitude and longitude, **in degrees-minutes-seconds format,** of the approximate center of the project.

Item H.. Indicate whether the project is located on Indian lands.

Item I.: Enter the appropriate five or six letter code from the list below to indicate the Water Management District the project is located within:

NWFWMD = Northwest Florida Water Management District
SRWMD = Suwannee River Water Management District
SFWMD = South Florida Water Management District
SWFWMD = Southwest Florida Water Management District
SJRWMD = St. John's River Water Management District

Items J. – K.: Give the name, title, and telephone number (including area code) of the project contact person. The project contact is the person who is thoroughly familiar with the project, with the facts reported in this NOI, and who can be contacted by the Department if necessary.

Part IV – Project/Site Activity Information:

Item A.. Check the appropriate box to indicate whether the project involves large construction activity or small construction activity. **Check one box only.**

"Large Construction Activity" means construction activity that results in the disturbance of five (5) or more acres of total land area. Large construction activity also includes the disturbance of less than five acres of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more.

"Small Construction Activity" means construction activity that results in the disturbance of equal to or greater than one (1) acre and less than five (5) acres of total land area. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than one acre and less than five acres.

Item B.: Provide the approximate total area of land disturbance in acres that the project will involve from commencement of construction through completion.

Items C. - G.. Indicate the location where the Stormwater Pollution Prevention Plan (SWPPP) can be viewed. Provide the address where the SWPPP can be viewed if other than as provided in Parts II or III of the NOI. **Note that to be eligible for coverage under the generic permit, the SWPPP must have been prepared prior to filing this NOI.**

Item H.. Enter the estimated construction start and completion dates in the MM/DD/YY format.

Part V – Discharge Information

Item A.: If stormwater from the project discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., City of Tallahassee MS4, Orange County MS4, FDOT MS4, etc.). If stormwater from the project does not discharge to an MS4 but rather discharges to surface waters of the State, leave this item blank or indicate "N/A" and skip to Item B of this part. **Please note that if the project discharges stormwater to an MS4, you must provide the MS4 operator with a copy of the completed NOI.**

Item B.: If the project discharges stormwater to surface waters of the State, and not to an MS4, enter the name of the receiving water body to which the stormwater is discharged. Please provide the first named water body to which the stormwater from the project is discharged (e.g., Cypress Creek, Tampa Bay, unnamed ditch to St. Johns River, Tate's Hell Swamp, etc.).

Part VI – Certification

Type or print the name and official title of the person signing the certification. Please note that this should be the same person as indicated in Item II.G. as the Responsible Authority. Sign and date the certification.

Section 403.161, F.S., provides severe penalties for submitting false information on this application (NOI) or any reports or records required by a permit. There are both civil and criminal penalties, in addition to the revocation of permit coverage for submitting false information.

Rule 62-620.305, F.A.C., requires that the NOI and any reports required by the permit to be signed as follows:

A. For a corporation, by a responsible corporate officer as described in Rule 62-620.305, F.A.C.;
B. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or,
C. For a municipality, state, federal or other public facility, by a principal executive officer or elected official.

EXHIBIT I

GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES

EXHIBIT J

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN TEMPLATE

EXHIBIT K

SAMPLE COPY STORMWATER POLLUTION PREVENTION PLAN

EXHIBIT L

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER NOTICE OF TERMINATION