

DATABASE CONTRACT SUMMARY REPORT

PREPARED FOR:

**WATERSHED PROTECTION DEPARTMENT
CITY OF AUSTIN
AUSTIN, TX**

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TABLE OF CONTENTS

INTRODUCTION.....3

NEEDS ASSESSMENT UPDATE.....3

 Watershed Protection Department (WPD) Data Model.....3

 Figure 1 – Proposed WPD Data Management Model.....4

 Waterways Module.....4

 Storm Sewer Module.....5

 Watershed Module.....5

 Site Definition Module.....6

 Flood Control and Analyses.....7

 Maintenance.....8

 Streambank Erosion Control and Analyses.....8

 Water Quality Control and Analyses.....9

 Monitoring.....9

 Permitting and Environmental Reviews.....10

 Public Input and Information.....10

 Complaints and Spill Response.....10

 Data Management and GIS Support.....11

DATABASE CONTRACT.....11

 Summary of Meetings.....14

 Business Functional Model.....18

 Application Definitions.....19

 Figure 2 - Watershed Protection Department – Database/GIS Applications.....20

 Technical Support.....22

SUMMARY AND CONCLUSIONS.....23

APPENDICES

 A. MEETING NOTES

 B. BUSINESS FUNCTIONAL MODEL

 B.1 Business Functional Model – Organizational Chart

 B.2 Business Functional Model – Functional Model Outline

 C. PROPOSED APPLICATIONS LIST

 C.1 Application Definition Forms

 C.2 Application Definition Process

 C.3 Applications Status Report

 D. GENERATED WORK PLANS

 D.1 Floodplain GIS

 D.2 Drainage Infrastructure GIS

 D.3 Site Management Application

INTRODUCTION

This summary report document describes the activities undertaken as part of the database development contract between Camp Dresser & McKee Inc. (CDM) and the Watershed Protection Department (formerly the Drainage Utility Department) of the City of Austin. The following sections of this report will present a status update of the *Data Management Needs Assessment* report (CDM, September 1996) and a description of the activities that were completed under the database contract from November 1996 through November 1998.

NEEDS ASSESSMENT UPDATE

This section will appraise and update the status of the action items defined in the Watershed Protection Department's (WPD's) September 1996 *Needs Assessment* report. There are several stages in which an action item may exist and their status are categorized as follows:

Not Completed - little was been done to complete the action item.

Partially Completed - a significant portion of the action item was completed.

Work Plan Developed - a work plan was developed to complete the action item.

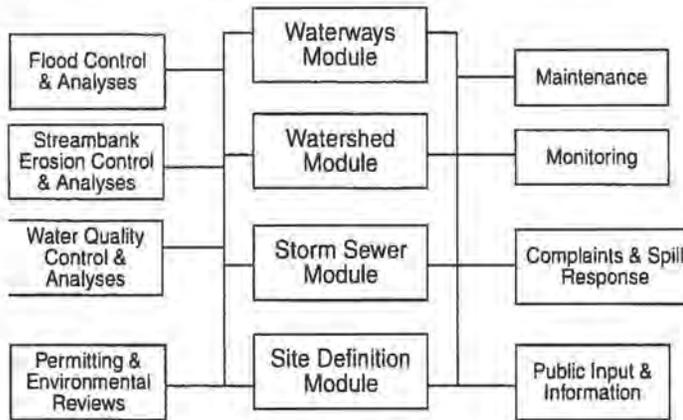
Completed - the action was completed and a task description is provided.

The following section presents a description of the WPD's 1996 proposed data model and assesses the relative status of each proposed action item, in bold type, according to the above defined categories for reference.

Watershed Protection Department Data Model

An overview of the proposed Watershed Protection Department (WPD) data model is shown in Figure 1 (see next page). Each of the data modules shown in the figure would be linked to one or more other modules, especially the spatial context modules, which would be very heavily integrated into the Department's Geographic Information System (GIS). The details of each module are described below including an overview (purpose) and the data tables, the potential data sources, data users, and future GIS links. The key to the data structure are four primary modules containing information about the defined networks in the City's watersheds. These core modules would be accessible to all WPD - authorized users and would be maintained by the City's Data Management/GIS group.

**FIGURE 1
PROPOSED WPD DATA MANAGEMENT MODEL**



The four central core modules include: 1) Waterways, 2) Watershed, 3) Storm Sewer, and 4) Site Definition. These four core modules are introduced and discussed, individually, followed by discussions of the eight defined sub-modules (shown in Figure 1) in the subsequent sections.

Waterways Module - describes the waterways network including rivers, creeks, springs, ponds, culverts, bridges, etc. The information stored in this module would be supported by the GIS to represent a topologically-connected waterways network. The waterways network would be subdivided into river and creek sections (miles, feet, kilometers, etc.) and each river or creek segment would have a unique identifier, probably watershed - code based.

Action Items:

Using GIS, create a series of routes for the rivers and creeks throughout the watersheds and subdivide the river and creek network into segments and build the database table. **This effort was partially completed (for 17 watersheds) through development of the GIS applications built for the WPD's Master Plan activities.**

Move summary information for the ponds, bridges and culverts into the data tables from the WPD Maintenance group's FoxPro tables. **Not completed.**

Using GIS, provide spatial locations for the ponds, bridges, and culverts loaded in the previous action item. **Partially completed. The Regional Stormwater Management Program (RSMP) application was completed which links the RSMP database to ArcView GIS. Residential and water quality pond databases were recently geocoded by WPD staff. Bridge and culvert geocoding remains to be defined. A comprehensive maintenance mapping application for ponds, bridges, and culverts is still needed.**

Using GIS, develop an application that would map the drainage infrastructure based upon a system condition rating. **Not completed. Unable to complete task until drainage infrastructure system has been digitally mapped and geocoded.**

Storm Sewer Module - describes the infrastructure for the storm sewer network such as pipes, inlets, catch basins, ditches, etc. A key data field would be the feature ID for all the features in this module. The information in this module is dependent upon the GIS and would be developed through a formal inventory and data conversion plan.

Action Items:

Develop a plan for converting the existing storm sewer information to a digital format using the database and the GIS tools. The plan should also include the necessary update procedures. **A work plan was developed for implementing the Drainage Infrastructure GIS.**

Convert the existing storm sewer infrastructure data to digital format for use in the Department-wide database/GIS. **Work plan completed (see Appendix D.2).**

Design a detailed database structure to contain all the storm sewer infrastructure information as needed by the Department. **Not completed.**

Watershed Module - describes the area based information needed for the Department, such as watersheds, sub-watersheds, soils, land use, impervious areas, groundwater recharge zones, and environmentally-sensitive areas. Some of this information is available from other City departments and will be integrated using GIS and database retrieval tools.

Action Items:

Establish data transfer procedures with the City departments that own or maintain the land use and soils data. **Completed. Land use data and soils information is available from the City's Infrastructure Support Services (ISS) group.**

Establish sub-watershed boundary delineation procedures for use by Department staff. **Sub-watershed delineations were mapped and completed (for 17 watersheds) as part of the Master Plan project. Documented procedures defining how boundaries will be established in the future were partially completed and are planned for development as part of the Master Plan Toolbox project.**

Use the GIS tools to populate the relevant field values of the Watershed Protection Department (WPD) databases (acreage, population, etc.) and establish the update procedures for future changes. **Partially completed, as site management system database structure was defined for a standardized reach numbering system. Documentation procedures for input of future changes were not completed.**

Site Definition Module - describes the generic sites where information is being managed for use throughout the waterways, storm sewer, watershed, and associated networks. Each site would have a unique identifier, a specific description, an owner (who maintains the site database), river or creek section ID (Waterways), or FEATURE_ID (Storm Sewer), or Site Management ID (Watershed). Each WPD site identification data structure would address the different types of sites — flow monitoring sites, rain gauge sites, sampling sites, survey sites, project improvement sites, complaints sites, maintenance sites, etc. This unique, site-specific information, that is key to the Department's data structure, would be maintained by the Data Management/GIS group in support of all the other WPD function groups.

Action Items:

Establish the Department site definition procedures for all technical groups to use in identifying existing sites and for establishing future sites. **Partially completed. An example of a Site Management GIS application was created (see Appendix D.3). A final application with supporting documentation was not completed.**

Use the GIS to populate the X and Y values in the site definition table. **Partially completed. The ERM Site Table project is planned for future development.**

The focus of the above paragraphs was to assess the status of the interconnected core modules of the WPD's proposed database network. The scope of the following sections will examine the status of the sub-module data systems that interrelate with the four core modules. Each sub-module is assigned to an owner designated from one of the four divisions within the department.

The WPD is comprised of four operational division that are organized below the Office of the Director administration. The divisions are designated as follows:

- Environmental Code Review and Inspection;
- Environmental Resource Management;

- Stormwater Management; and
- Watershed Engineering.

The sub-module database systems that are owned and maintained by each WPD division will provide the data source that will serve the primary core module information systems. The status of each sub-module is discussed below.

Flood Control and Analyses (Watershed Engineering Division)

Action Items:

Work with Data Management/GIS (ISS) group to develop the "baseline" coverage for the watersheds and utilize the GIS to populate the required data tables.

Completed as part of the Master Planning process for 17 prioritized watersheds.

Complete research into the new Flood Early Warning System (FEWS) software and develop a data transition plan to migrate the summary FEWS data into the Department's monitoring data structure. **Completed by City staff.**

Develop a suite of database and GIS tools to automatically write out portions of the HEC-1, HEC-2, HEC-RAS, and other model data sets (i.e. cross-sections). **Partially completed. Work plan to accomplish this work was developed (as part of Floodplain GIS work plan – see Appendix D.1).**

Review the suite of hydrologic/hydraulic modeling tools available from several leading vendors. These newer tools would increase productivity and could be easily integrated into the Department's data structure to create modeling data sets. **A work plan to complete this work was developed (see Appendix D.1).**

Develop RSMP participation coverage map in the GIS and the necessary update procedures. **Completed as part of the RSMP GIS application.**

Maintenance (Stormwater Management Division)

Action Items:

Develop a plan to update the existing storm sewer records (maps and data) before the conversion to digital format is started. **Work plan to accomplish this work was**

completed (see Drainage Infrastructure GIS Work Plan – Appendix D.2).

Develop a plan for converting the existing storm sewer information to a digital format using the database and the GIS tools. The plan should also include the necessary update procedures. This data would complete the storm sewer module. **Completed (see Drainage Infrastructure GIS Work Plan – Appendix D.2).**

Develop (in conjunction with the Data Management/GIS group) a mapping application to display the good/fair/poor ratings developed for the drainage infrastructure. **Not Completed.**

Research the off-the-shelf software packages that might assist the group in maintenance management. The procedures and criteria for this research must be approved by Maintenance team and GIS/database administrator. There are several excellent packages available and a vendor summary notebook was compiled (that includes ARC/INFO-based systems, such as BaySys Technologies, Inc., Green Bay, WI) which could serve to enhance current operations. **Partially Completed.**

Streambank Erosion Control and Analyses (Watershed Engineering Division)

Action Items:

Using GIS, develop an application that will color-code the waterways based upon the assessment values developed for the individual sites. **Partially Completed, as part of the Master Plan problem identification process for 17 watersheds. GIS documentation procedures and graphic user interface tools are still needed.**

Water Quality Control and Analyses (Environmental Resources Management Div.)

Action Items:

Using GIS, develop an application to map the waterways based upon their Environmental Integrity Index (EII) value. **Not Completed.**

Develop a standard data report, in conjunction with the Monitoring and Data Management/GIS groups. The reports will present a summary of the data collected during the previous reporting period(s). **Not Completed.**

Define the update procedures to maintain the pollutant loading (existing and future) calculations in the watershed module (by land use). **Not Completed.**

Define the update procedures to maintain the predicted water quality (from the models) in the waterways modules (by river or creek station). **Not Completed.**

Monitoring (Environmental Resources Management Division)

Action Items:

Establish a Department Monitoring/Data Management Manager to maintain procedures for data collection, handling and reporting including QA/QC protocols. **Not Completed.**

Develop a set of protocols to load summarized data into the Department sampling data tables from other systems such as FEWS, the Joint Water Quality database, the stormwater ASCII files. **Partially Completed, as the ERM Site Management System project is planned for future implementation (see Appendix D.3). Documentation procedures to link GIS and database still needs developed.**

Develop a standard set of data collection protocols and data quality objectives (i.e. why are we collecting this data and what will it be used for?). **Not Completed.**

Using GIS, develop an application to map all the monitoring sites by color code or unique symbology. **A draft of the Site Management System application prototype was developed. A work plan for the final application was recently discussed for future implementation (see Appendix D.3).**

Permitting and Environmental Reviews (Environmental Review and Inspection Div.)

Action Items:

Develop data transfer procedures to move summary information about permits under review from the Division's EXCEL spreadsheets to the Department database. **Not Completed.**

Public Input and Information (Office of the Director)

Action Items:

Develop a list of summary information from the master plan effort for distribution to all interested parties. **Partially Completed, as part of the Master Plan process. Summary information was presented at a series of Public Outreach meetings held during the summer 1998. Comprehensive summary list is still needed.**

Develop distribution procedures for products, such as reports, maps, and data sets. Some items (maps and data sets) can be distributed in DRAFT format. **Partially Completed, as part of the Master Plan process. Summary information was presented at a series of Public Outreach meetings held during the summer 1998. Documented procedures for public distribution protocols are still needed.**

Develop data set production and distribution procedures (in conjunction with the Data Management/GIS group) to ensure that data can be distributed easily, for example, in CD-ROM format. **Not Completed.**

Complaints and Spill Response (Environmental Resources Management Division)

Action Items:

Research the PC-based applications available for complaint management (including spills) to integrate all activities into a single dispatch system. **Not Completed.**

Develop a data transfer process to move summary data from the Macintosh database to the Department database. **Partially Completed. Researched by the WPD's Data Management Coordinator and potential solutions were identified.**

Using GIS, develop an application to display complaints and spills on the map. **Not Completed.**

Data Management and GIS Support

Action Items:

Organize the Department's Data Management/GIS group into one building and one area to maximize the synergy amongst the technical staff. **Partially Completed. GIS and data management technical services are provided by Infrastructure Support Services (ISS), a City department that maintains both GIS and database management applications.**

Establish a Data Management/GIS manager to prioritize workload for the Department and to interface with other City departments (this position can be integrated with the monitoring manager). **Completed with the transfer of Ann McCracken into the Watershed Protection Department.**

Convert the existing storm sewer infrastructure data to digital format for use in the Department-wide Database/GIS system. **Partially Completed as part of the Master Plan. Drainage Infrastructure GIS Work Plan was developed (see Appendix D.2).**

Create a series of routes for the rivers/creeks throughout the watersheds and subdivide the river and creek networks into segments using stations as designated starting and ending points. **Partially Completed. Drainage Infrastructure GIS Work Plan was developed (see Appendix D.2).**

DATABASE CONTRACT

In response to the findings of the *Needs Assessment* report (CDM, 1996), the WPD began development of a central database system to support the Department's activities in November 1996. The first step in the database design process was to better understand the various business functions that the department performs. This process led to the development of the Business Functional Model (BFM) documents (see **Appendix B**) which characterize the nature of the work performed by the WPD's four divisions and indicate where information is collected and transmitted. The BFM documents should be revised and updated every year to assure that the business functions of the department are annually reviewed and documented.

The findings of Business Functional Model analysis revealed that the original intent of the database contract, which focused on building a central database system to support the many, widely-varied business functions was not feasible, without requiring major hardware and software changes throughout the WPD. For example, many Apple-based operating systems exist within the WPD and perform vital data management functions, but they would be required to modify their hardware /software configurations to be compatible with the proposed IBM-based central database system. Also, the functional dissimilarity and broad diversity of the department's existing databases were not favorable for systematic conversion to a centralized database framework. As these examples indicate, the original approach to create a central database system, at this time, posed several potential constraints which would disallow for a smooth conversion from the existing departmental database system. Specific

constraints such as expensive hardware/software upgrades and supplemental training requirements would be necessary to allow for transition to a central database system.

Therefore, the database contract's approach was modified to focus on prioritized development of specific database applications designed to serve the four different divisions. This transition from a central database system approach to an integrated, operational database system approach allowed the project team to meet the primary needs of each division's staff, while also improving the WPD's data management functions.

Instead of building a centralized WPD database system, the department management and the project team decided to start with development of more functional database applications that meet specific operational needs (e.g., RSMP, Complaints Management, Code Inspections, etc.). Each database application is designed to meet the following criteria: 1) the ability to be shared with other groups and divisions; 2) the ability to be combined, where appropriate, so they can serve the needs of more groups than the database owner; and 3) the ability to serve as modules to other databases, where appropriate.

The City of Austin does not yet have a centralized database system, but this is changing as larger databases are being developed and are being shared across multiple departments. As the City of Austin moves to centralize many of its databases across its many departments, the structure of the WPD databases will possess the flexibility to convert their database structure into these centralized databases. The project team's approach incorporated this understanding that the department's database applications are intended to eventually move into the City's centralized database system (as it is developed) and were designed for this transition. Thus, the goal of this contract refocused on the development of prioritized database applications that meet specific departmental needs and work as a linked, operational database. In support of this goal, a master list of database applications that serve the department's business functions, was created by the project team to act as a guidance document for future database development activities (see **Appendix C**).

In addition to defining the department's business functional model and the master list of database applications, there were also ongoing technical support efforts which included senior technical management support, support to the WPD's master planning process, and the development of technical work plans for future use by the department. The WPD's database contract concentrated on the integrated design and implementation of the department's information management system. The contract began with three (3) major work components. Each of these major components: 1) a business functional model; 2) application definitions; and 3) technical support – are summarized as to their status in the following sections. Besides

these three primary contract components, several key milestones were accomplished through the progression of this project:

- A Database/GIS Team was created with representatives from the four divisions within the Department and chaired by the department's Database Coordinator. The mission of this team was to: 1) Identify existing and needed data; 2) Determine how best to use the data; 3) Improve data distribution and accessibility; and 4) Educate department staff;
- A master project schedule was developed which integrated the technical support tasks required for completion of the Master Planning process;
- The development of specific application teams for each database project whose purpose it is to define the application objectives required by the Department to assure that a sufficient data standard is available to support the development of a work plan; and
- The development of three work plans – 1) Floodplain GIS, 2) Drainage Infrastructure GIS, and 3) Site Management Application system – which are intended for use by the Department to solicit services from outside contractors (see **Appendix D**).

Besides the direct benefits that were accomplished specifically towards pure database design, development, and implementation, another primary indirect benefit under the WPD's database contract was the technical coordination and application development of the problem area identification system that supports the department's prioritization Master Plan process. Further discussion of the Master Plan products developed is presented in the Technical Support Section near the end of this document.

Summary of Meetings

The table below lists all the meetings held during the execution of the database contract. As can be seen, during the technical support visits by senior CDM staff, several meetings were conducted to maximize the technical work sessions. These meetings resulted in action items that were generated, assigned, and completed, as appropriate, by the parties involved. These meetings were held during the time frame of November 1996 to April 1998.

1996 Database Contract Meetings

DATE	MEETING	ATTENDEES
11/15/96	Database Contract Administration Issues Meeting	McCracken, Hamilton, <i>Bristol</i> , <i>Pantalion</i>
11/15/96	Database Contract Task ID Meeting	McCracken, <i>Pantalion</i> , <i>Bristol</i> ,

1997 Database Contract Meetings

DATE	MEETING	ATTENDEES
1/9/97	Database Contract Scheduling Meeting	McCracken, <i>Bristol</i> , <i>Lovett</i>
2/26/97	Central Database Design Meeting	McCracken, Li, Fields, <i>Bristol</i> , <i>Pantalion</i>
2/26/97	Functional Model Meeting	Hamilton, McCracken, McClintock, Houston, Fields, Gowing, Tull, Li, Painter, <i>Bristol</i> , <i>Pantalion</i> ,
2/27/97	Central Database Design Meeting	McCracken, Fields, Li, <i>Bristol</i> , <i>Pantalion</i> ,
2/27/97	Flood Control Issues Meeting (Master Plan)	McCracken, Gowing, Powell, Li, Thomas, <i>Bristol</i> , <i>Pantalion</i>
4/16/97	Master Plan Database Project Schedule Meeting	McCracken, Li, Sampson, Painter, <i>Bristol</i> , <i>Pantalion</i>
4/16/97	Flood Control Meeting	Thomas, McCracken, Duncan, Gonzales, <i>Pantalion</i> , <i>Bristol</i>
4/17/97	Master Plan GIS Meeting	McCracken, Thomas, Powell, Winer, Sampson, Hiel, <i>Bristol</i> , <i>Pantalion</i>
6/12/97	Project Review / Action Planning Meeting	McCracken, <i>Bristol</i>
6/12/97	Prioritization Identification Planning Meeting	Hamilton, Clayton, Kelly, Shay, Hartigan, Gosselink, Tull, McCracken, <i>Pantalion</i> , McClintock, Houston, Windsor, Thomas, Gonzales, Walker, <i>Bristol</i> , <i>Schenk</i>
6/12/97	Central Database Planning Meeting	McCracken, <i>Pantalion</i> , <i>Bristol</i> , <i>Schenk</i>
6/13/97	Central Database Design Meeting	McCracken, <i>Pantalion</i> , <i>Bristol</i> , <i>Schenk</i>
6/13/97	Flood Control Database Planning Meeting	Gonzales, Duncan, Guerrero, Sampson, Li, McCracken, <i>Bristol</i> , <i>Schenk</i>
6/20/97	Central Database Action / Review Meeting	McCracken, <i>Pantalion</i> , <i>Bristol</i> , <i>Schenk</i>
7/10/97	Central Database Coordination Meeting	McCracken, <i>Pantalion</i> , <i>Schenk</i>
7/22/97	Flood Survey Complaint Database Meeting	Houston, Guerrero, Gonzales, Painter, McCracken, <i>Schenk</i>

1997 Database Contract Meetings

DATE	MEETING	ATTENDEES
8/5/97	Reach Numbering Planning Meeting	Walker, Gonzales, Thomas, Duncan, Schenk
8/5/97	Project Status Update Meeting	McCracken, Pantalion, Bristol, Schenk
8/6/97	Flood Control Prioritization Application Meeting	Houston, Hartigan, Thomas, McCracken, Pantalion, Bristol, Hughes, Schenk
8/6/97	Reach Numbering System Meeting	Thomas, Gonzales, Winer, Dominguez, McCracken, Pantalion, Bristol, Hughes, Schenk
8/7/97	Flood Control GIS Application Meeting	Griffey, Sampson, McCracken, Li, Pantalion, Painter, Thomas, Gonzales, Bristol, Hughes, Schenk
8/7/97	Operational Database Planning Meeting	McCracken, Bristol, Schenk
8/7/97	Project Review / Action Meeting	McCracken, Pantalion, Bristol, Hughes, Schenk
8/18/97	Storm Sewer Mapping / Complaint Database Mtg.	Houston, McCracken, Romero, Rappaport, Schenk
9/9/97	Project Status Meeting	McCracken, Bristol, Schenk
9/16/97	Master Plan – Problem Area ID – Status Mtg.	Pantalion, McCracken, Bristol, Schenk
9/17/97	Operational Database – Application Grouping	Pantalion, McCracken, Bristol, Schenk
9/18/97	Operational Database – Presentation Meeting	Hamilton, McCracken, Bristol, Schenk
9/18/97	Project Review / Action Meeting	McCracken, Pantalion, Bristol, Schenk
10/20/97	Management Team Meeting - Operational Database Presentation	Heitz, Hamilton, Houston, Oswald, McClintock, McCracken, Schenk
11/4/97	GIS / Database Team Meeting	McCracken, Pantalion, Walker, Guerrero, Scroggins, Bristol, Schenk
11/4/97	Hardware / Network Issues	LaBonte, Buechler, Winer, Walker, McCracken, Bristol, Schenk
11/4/97	Database Contract Planning Meeting	Hamilton, McCracken, Bristol, Schenk

1997 Database Contract Meetings

DATE	MEETING	ATTENDEES
11/5/97	Complaint Management Application Planning Mtg.	Cooper, Lesniak, Clayton, Winer, Bostick, Williams, Grube, Guerrero, Romero, McCracken, Shay, <i>Bristol, Schenk</i>
11/5/97	Maintenance Management Application Planning Mtg.	Houston, Grube, Guerrero, Romero, <i>Bristol, Schenk</i>
11/6/97	Project Review / Action Meeting	McCracken, <i>Bristol, Schenk</i>

1998 Database Contract Meetings

1/13/98	Floodplain GIS / Database Planning Meeting	Oswald, Walker, Painter, Pantalion, Scharlach, Roberts, Windsor, Winer, McCracken, <i>Bristol, Brashear, Schenk</i>
1/13/98	Programming Issues – Operational Database	Trocino, Tobias, McCracken, <i>Bristol, Schenk</i>
1/13/98	Requests / Complaint Management Planning Mtg.	Trocino, Tobias, Mayo-Clark, Grube, Romero, Scroggins, Winer, Guerrero, McCracken, <i>Bristol, Schenk</i>
1/14/98	GIS / Database Team Meeting	McCracken, Pantalion, Scroggins, Guerrero, Walker, <i>Bristol, Schenk</i>
1/14/98	ERM GIS / Database Planning Meeting	McClintock, Pantalion, Glick, Peacock, Kaufmann, Bliss, Cooper, Chang, Turner, <i>Bristol, Schenk</i>
1/14/98	Drainage Infrastructure GIS (DIG) Planning Mtg.	Houston, <i>Bristol, Schenk</i>
1/15/98	GIS / Database Project Planning Meeting	Pantalion, Bliss, McCracken, <i>Bristol, Schenk</i>
1/15/98	Project Review / Action Meeting	McCracken, <i>Bristol, Schenk</i>
3/24/98	DIG Work Plan Development - ISS Coordination Meeting	LaBonte, Houston, Ritter, Sampson, Painter, Pacatte, A. Martinez, C. Martinez, Hazelwood, McCracken, <i>Plante, Schenk</i>
3/24/98	DPWT File Room Source Data DIG Meeting	A. Martinez, Glover, <i>Plante, Schenk</i>
3/24/98	DIG (Drainage Infrastructure GIS) Planning Mtg.	Houston, McCracken, <i>Plante, Schenk</i>

1998 Database Contract Meetings

DATE	MEETING	ATTENDEES
3/25/98	Watershed Engineering – DIG Planning Meeting	Oswald, Walker, McCracken, <i>Plante, Schenk</i>
3/25/98	ERM – DIG Planning Meeting	Cooper, Turner, McCracken, <i>Plante, Schenk</i>
3/25/98	Stormwater Management - DIG Planning Meeting	Nichols, Guerrero, Grube, McCracken, <i>Plante, Schenk</i>
4/15/98	Drainage Infrastructure GIS Development Meeting	Houston, Guerrero, Grube, Winer, Newman, Pantalion, McCracken, <i>Bristol, Schenk</i>
4/15/98	ERM Site Management System Development Meeting	Pantalion, Herrington, Turner, McCracken, <i>Bristol, Schenk</i>
4/16/98	Floodplain GIS Development Meeting	Oswald, Walker, Winer, Pantalion, Roberts, Ernest, Scharlach, Li, Windsor, McCracken, <i>Bristol, Schenk</i>
4/16/98	GIS / Database Team Meeting	Houston, Pantalion, Scroggins, Walker, Guerrero, McCracken, <i>Bristol, Schenk</i>
4/17/98	Contract Review Meeting	Hamilton, Pantalion, McCracken, <i>Bristol, Schenk</i>

Key: Meeting Attendees — WPD/City Personnel: Normal Font
 CDM Personnel: *Italic Font*

Appendix A provides a place to store meeting notes from the meetings listed in the tables above. These notes are for historical reference to the actions created during the meetings.

Business Functional Model

The first major activity in the Database contract was to define the business functions of the Department. The purpose of the business functional model was to identify and describe the primary responsibilities of the Department. A working committee was created which developed a master list of business functions by the major functions of the WPD:

- Problem Identification
- Solutions Management
- Regulatory – Compliance Management

- Infrastructure Management
- Information Management

A document was prepared (see **Appendix B**) which will be revisited every year by the working committee to ensure that the changes in the Department are reflected in the functional model document. Quarterly reviews of the business functional model are also planned, as appropriate, by the Data Management Coordinator.

Application Definitions

To adequately define the types of data required for the department database, the applications required to support the department's business functions needed to be defined. Following definitions of the department's business functions, the database applications needed by department staff to carry out those business functions were identified. With the required applications identified, the data structure needed to drive these applications was then properly defined. Once the department has a clearer vision of all its data requirements, then the size and structure of the departmental database can be determined.

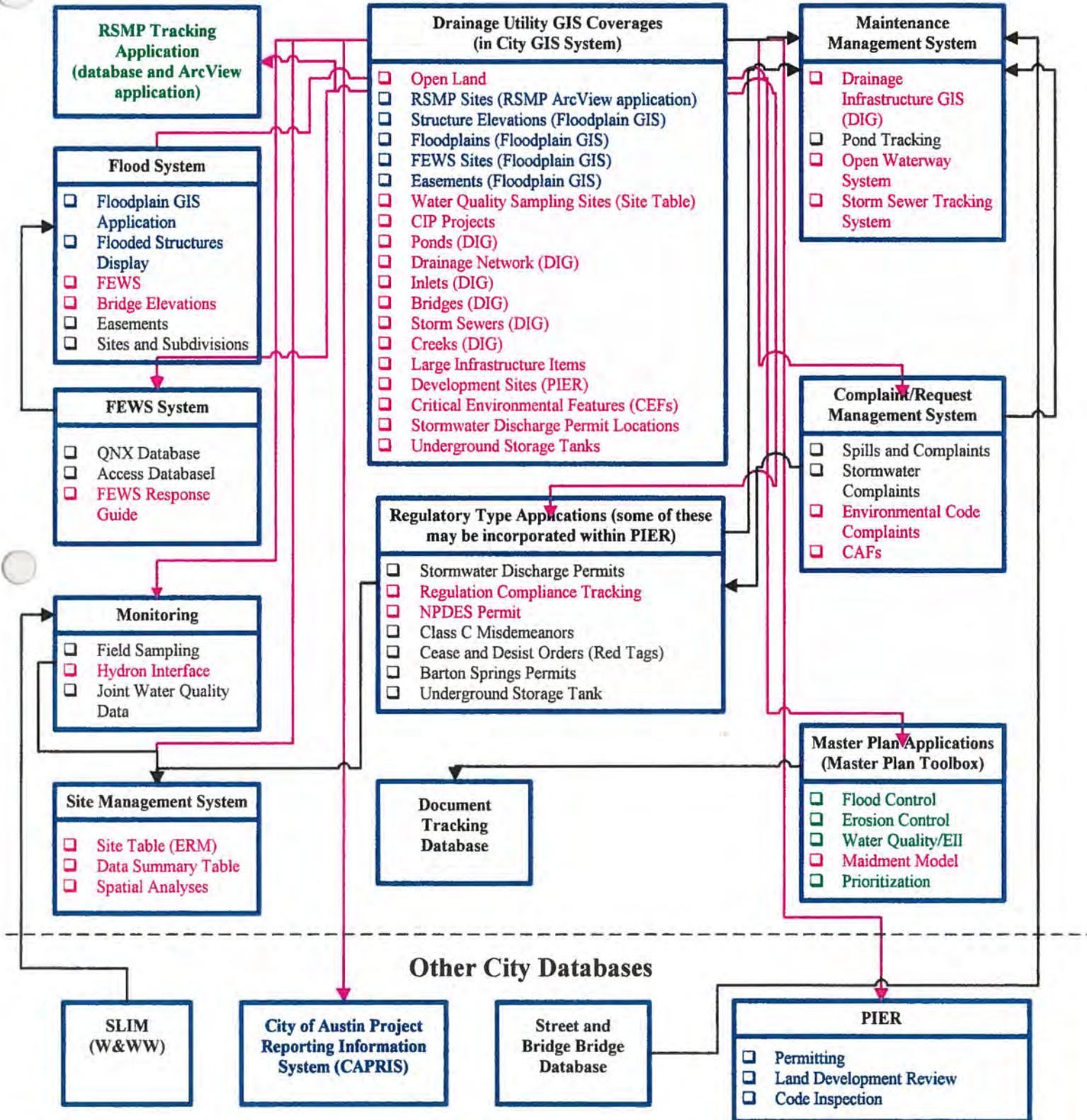
The proposed WPD applications, as defined by the needs assessment process, is presented in Figure 2 (as shown on the following page). A table of all the potential applications that support the department's business functions is presented in Appendix C in the Applications Status Report. The Application Status Report provides the following information for each identified application:

- Database/application name
- Type of application
- Purpose and Description
- Current Status
- Resources being used or considered
- Divisions/Groups Needing Access to Application
- Contact Person(s)
- Other Application/Database Links
- Business Functional Model Links
- Priority

As the Applications Status Report was being created, each application was also being better defined using an application definition assignment form. The Application Definition Form

Figure 2

Watershed Protection Department Database/GIS Applications



Color Code:

* Applications that do not yet exist in automated form - red

* Current applications (may need significant revisions) - black

* Database/GIS links - pink

* In progress new applications or coverages - blue

* Newly written or rewritten applications - green

* Links between databases - black.

(shown in **Appendix C**) provides the following attribute information for most of the identified applications:

- Title
- Division/Group
- Key Contact(s)
- Current Status
- Desired Status
- Possible Links
- Possible Databases to Combine With
- GIS Component
- Questions/Notes

Each application is assigned a priority-based status for current and future utility. Once an application has reached a high priority and has been reviewed by the Database/GIS Team for implementation, the details of the application can then be developed. These details are developed through the use of application teams consisting of members from throughout the Department and also other departments in the City, as necessary. A description of the application development team process is also provided in **Appendix C**.

The current application development teams that are in place are defined as follows:

- Complaints Management
- Drainage Infrastructure GIS
- Floodplain GIS
- Code Inspection Database
- ERM Site Table Project

Three of these application development teams have already developed draft work plans, that are discussed in the following section.

Additionally, several of the prioritized applications have been started by City staff such as the RSMP database application and the design of the code inspection database. This contract assisted in the identification of the potentially departmental applications but some of these applications can be built and implemented by City staff.

Technical Support

During the work session meetings summarized earlier in this report, there were many areas of technical support which were addressed during those meetings. The areas of technical service and support included:

- Facilitation of team meetings
- Technical assistance in the master planning process
- Research into available software applications
- Discussions of computer hardware and software requirements with City information services personnel
- Development of work plans for specific applications

Three work plans, developed through the database contract, can now be used by the Department to solicit services from outside contractors (**See Appendix D**). The developed work plans include:

- 1) Floodplain GIS;
- 2) Drainage Infrastructure GIS; and
- 3) Site Management Application system.

Support to the department's master planning process was focused on the development of several ArcView based applications which allowed the city staff to better organize, analyze and present their information. Two applications — 1) Flood Control and 2) Prioritization — were developed in concert with the city GIS staff. These applications have been used during the master planning process to complete the problem area identification work effort.

Finally, there are two additional applications being designed and developed under the data base contract. These include the Site Management application (**See Appendix D**) and the Master Plan Toolbox (a graphic user interface with a menu-based suite of tools and utilities) developed during the master planning process that will be implemented for future WPD use.

SUMMARY AND CONCLUSIONS

The Watershed Protection Department now has a "conceptual road map" with which to continue to improve and build upon to meet its future data management needs by performing the following tasks:

- Keeping the business functional model current,
- Updating the applications list as defined by the staff needs,
- Continuing the Database/GIS Team group meetings, and
- Implementing an application development team for each project to be undertaken that involves multiple Divisions.

The Department will systematically build a very sophisticated and integrated information management system if it periodically reviews and plans for its future data retrieval needs and adapts to computer industry technological advances.

The data management tools are defined and in place along with implementation procedures. All that is needed in the future is a continued effort of systematic approach both by Department staff and by external technical services, as may be required.

APPENDIX A
MEETING NOTES
(RESERVED TO STORE MEETING NOTES)

APPENDIX B

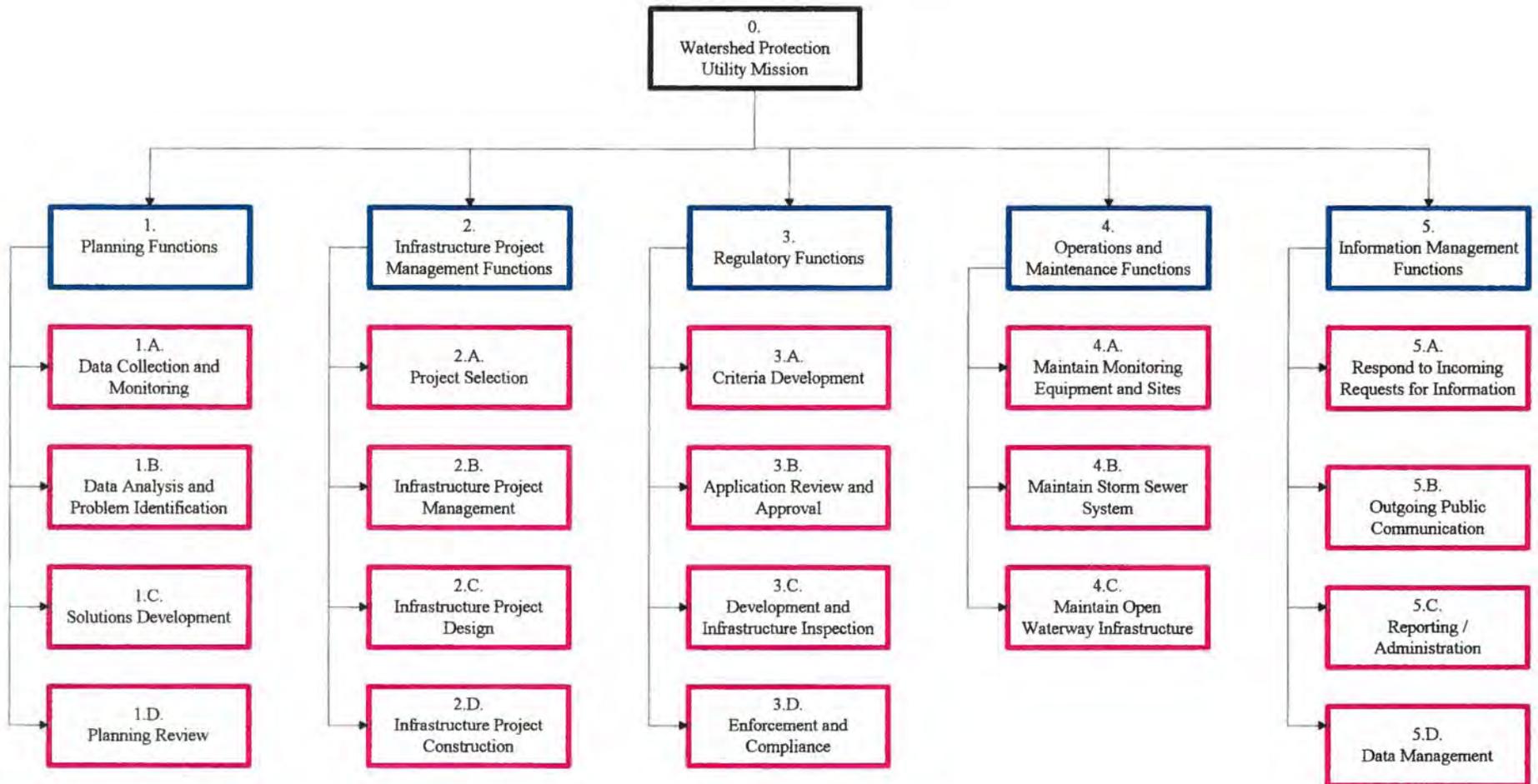
BUSINESS FUNCTIONAL MODEL (BFM)

B.1 BFM ORGANIZATIONAL CHART

B.2 BUSINESS FUNCTIONAL MODEL OUTLINE

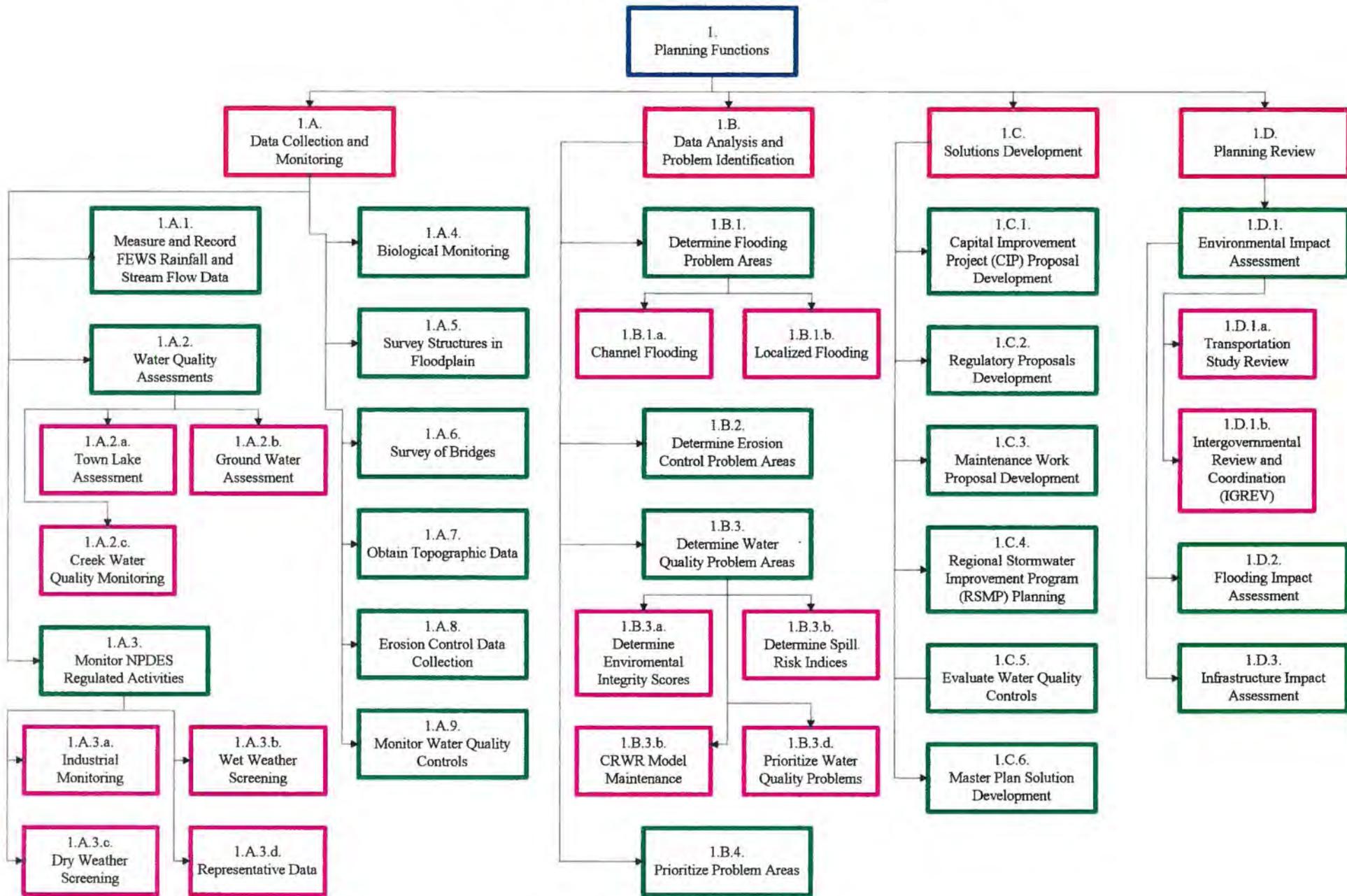
APPENDIX B.1
BUSINESS FUNCTIONAL MODEL
ORGANIZATIONAL CHART

Watershed Protection Department Business Functional Model



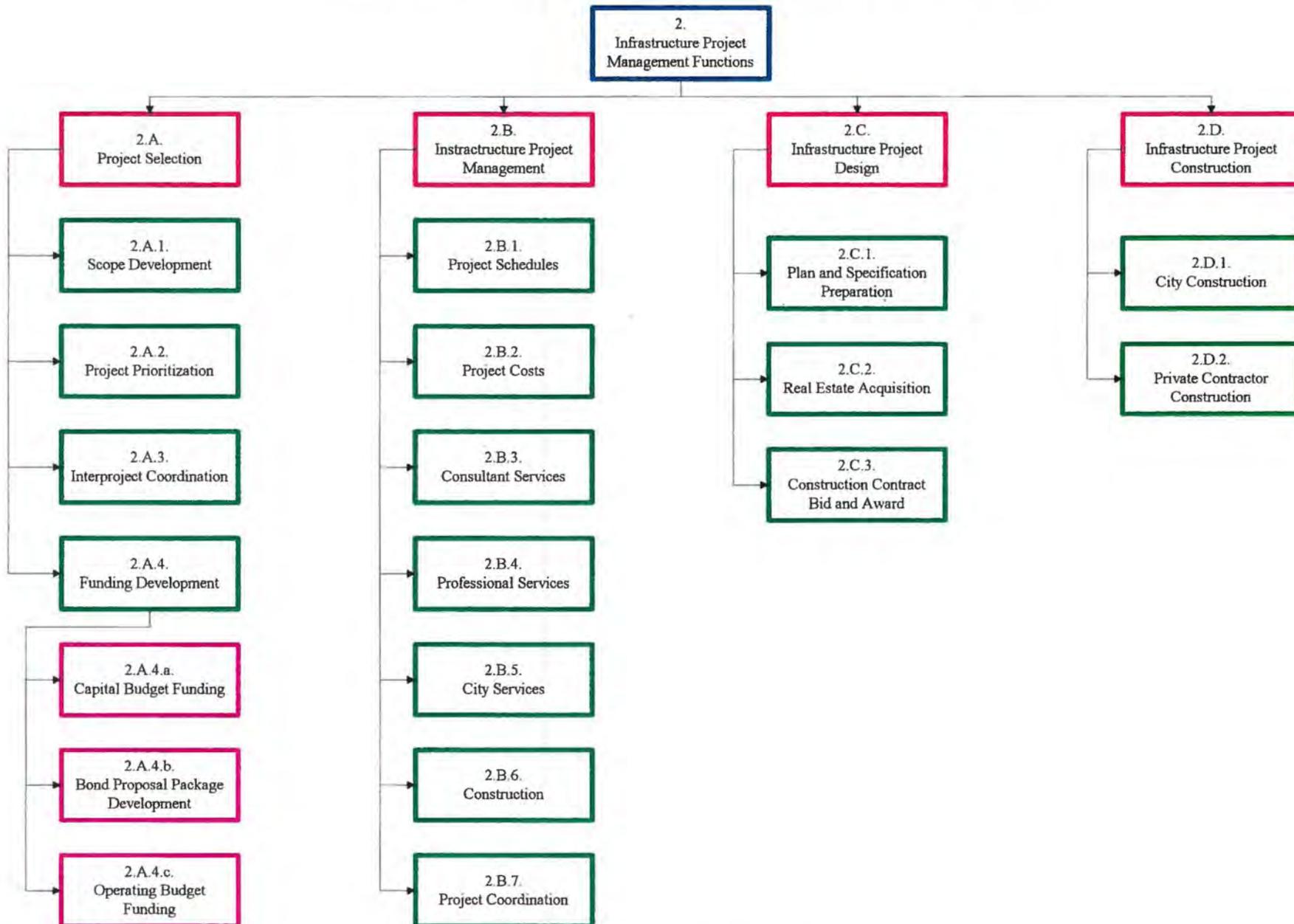
Watershed Protection Department

Business Functional Model - Planning Functions



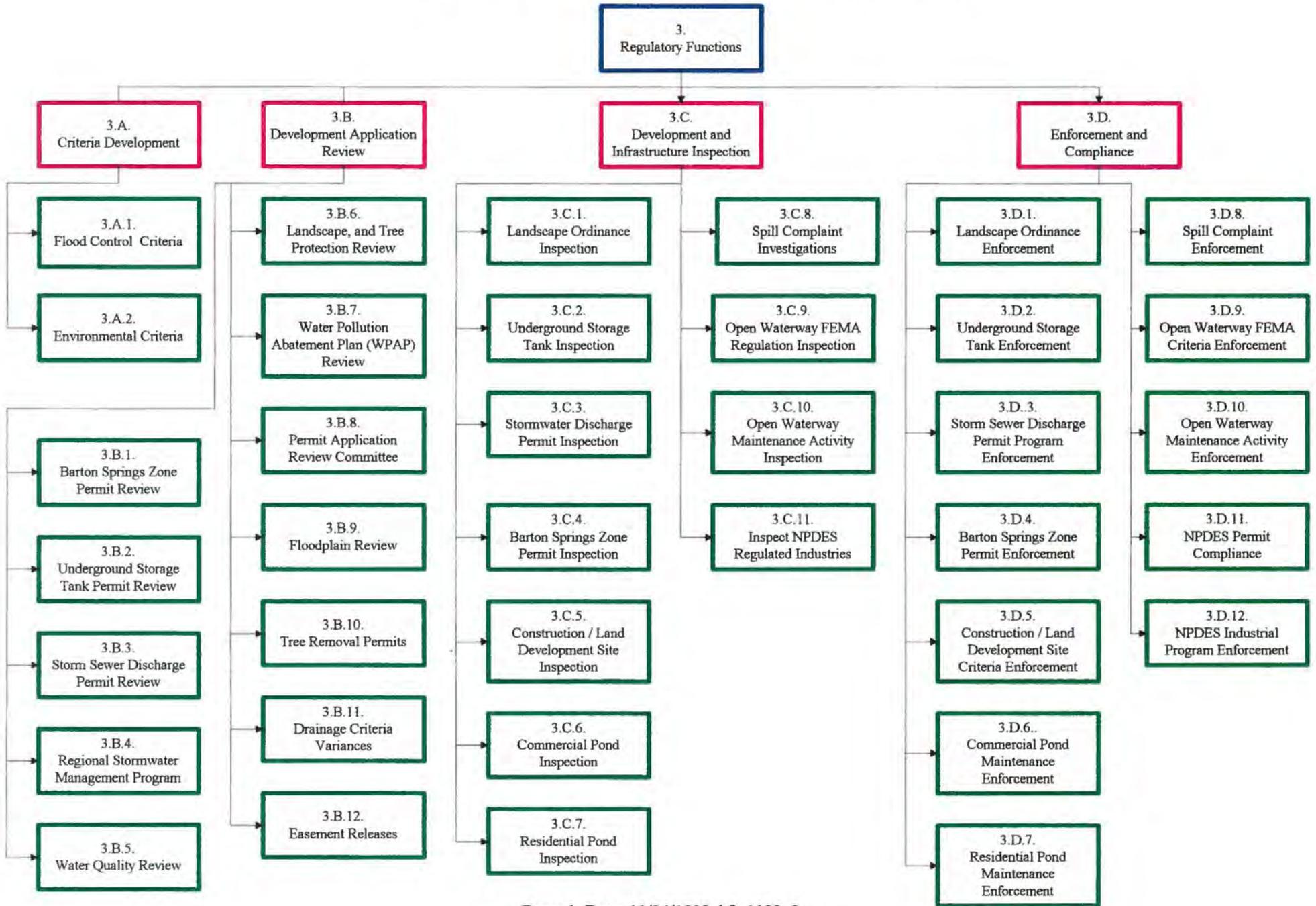
Watershed Protection Department

Business Functional Model -Capital Improvement Program Functions



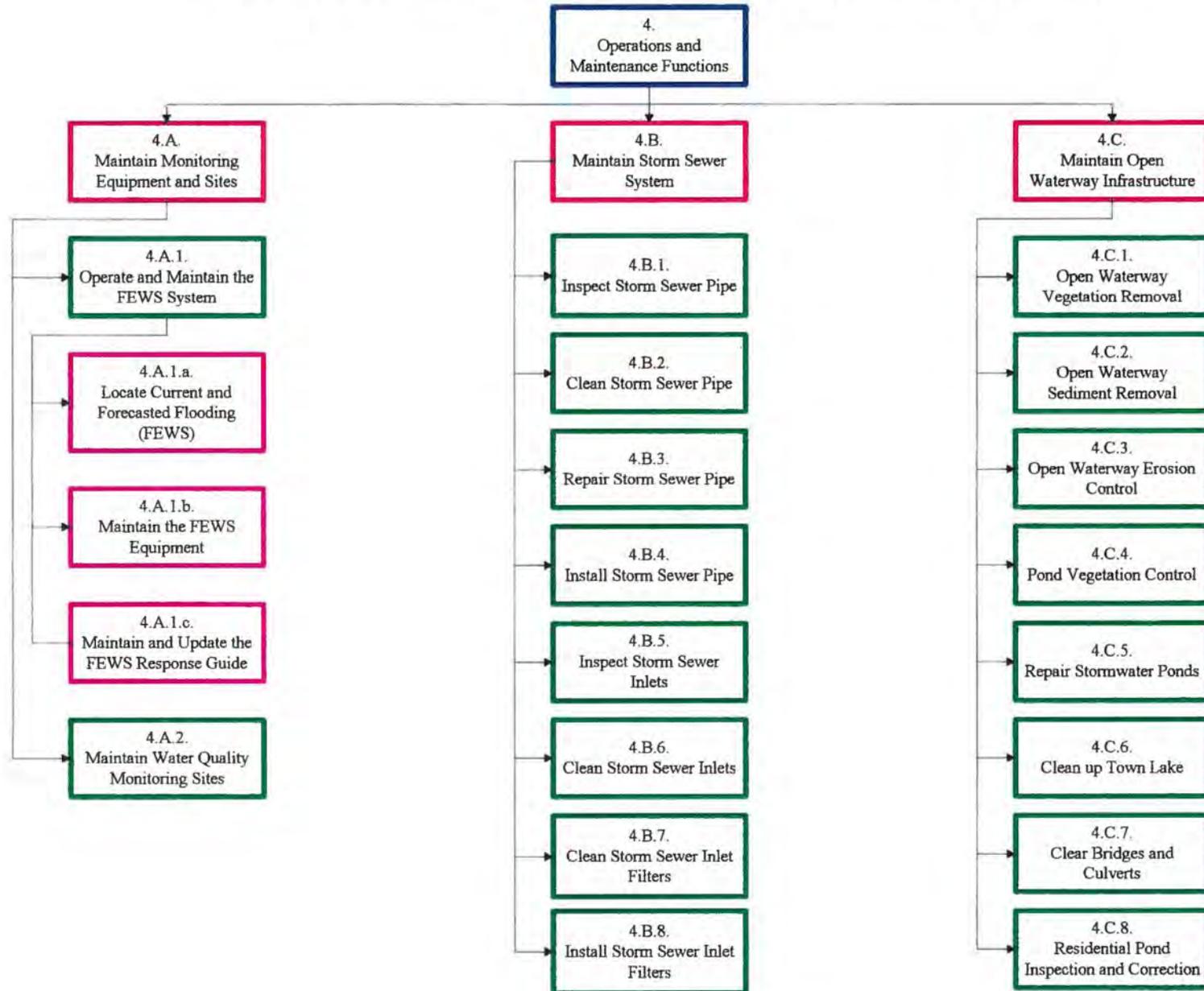
Watershed Protection Department

Business Functional Model - Regulatory Functions



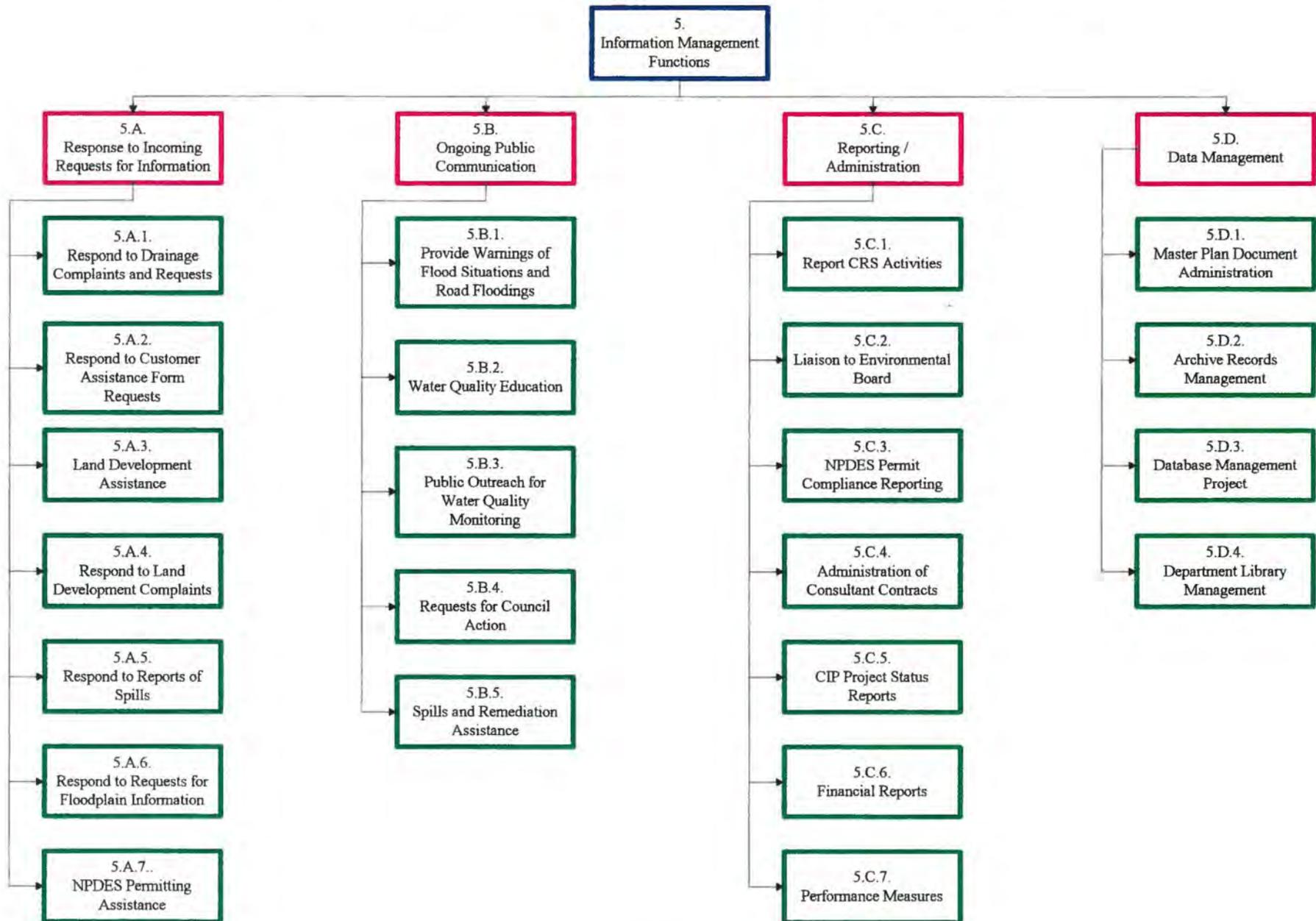
Watershed Protection Department

Business Functional Model - Operations and Maintenance Functions



Watershed Protection Department

Business Functional Model - Information Management Functions



APPENDIX B.2
BUSINESS FUNCTIONAL MODEL
BUSINESS FUNCTIONAL MODEL OUTLINE

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
0	Watershed Protection Utility Mission	Serve the citizens of Austin by using environmentally responsible and cost effective water resource management to protect lives, property and the quality of life.		
1	Planning	Through data collection, research and other methods, identify water quality, flooding and erosion problem areas throughout the City of Austin. Evaluate and prioritize potential solutions for the correction of these problems.	G Oswald, D Walker, E Peacock, J Guerrero, G Clayton	Master Plan Applications
1.A.	Data Collection and Monitoring	Measurement and storage of stormwater data to evaluate the nature of precipitation and runoff and/or the performance of drainage infrastructure during storm events.	D Walker, E Peacock, G Chang	FEWS, Monitoring Database: Hydron Interface, DIG, ERM Site Table
1.A.1.	Measure and Record FEWS Rainfall and Stream Flow Data	Measure, receive, and store rainfall data and stream flow depth data continuously in real time.	D Walker, G Chang	FEWS, Monitoring Database: Hydron Interface, DIG
1.A.2.	Water Quality Assessments	Collect water samples from Austin's creeks and lakes.	E Peacock	Monitoring: Field Sampling
1.A.2.a.	Town Lake Water Quality Monitoring	Sampling of Town Lake to characterize the current health of the lake and suitability as a source of drinking water.	M Lyday, M Turner	Monitoring: Field Sampling
1.A.2.b.	Ground Water Water Quality Monitoring	Sampling of Barton Springs and other springs to identify and quantify the impact of urbanization on ground water quality.	D Johns, S Pope	Monitoring: Field Sampling
1.A.2.c.	Contributing Creek / Watershed Monitoring	Sampling of Austin's creeks, Town Lake, and the Edwards Aquifer to monitor the status of these water resources.	M Lyday, G Chang	Monitoring: Field Sampling, ERM Site Table

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
1.A.3.	Monitor NPDES Regulated Activities	Measure performance of regulated drainage systems and activities in order to comply with the EPA's Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) permit program.	J Pantalion, R Jackson	Regulatory Database: Ordinance Information, NPDES Permit, DIG
1.A.3.a.	Industrial Monitoring	Monitor NPDES regulated industries as required.	S Cooper, R Jackson	Regulatory: Stormwater Discharge Permit Database
1.A.3.b.	Wet Weather Screening	Conduct wet weather screening throughout storm sewer system.	G Chang, R Glick, R Jackson	
1.A.3.c.	Dry Weather Screening	Conduct dry weather screening of major storm sewer outfalls.	G Chang, S Cooper, R Jackson	
1.A.3.d.	Representative Data	Monitor stormwater runoff as required by NPDES permit.	G Chang, R Jackson	
1.A.4.	Biological Monitoring	Conduct biological monitoring including data in support of USFWS efforts to protect endangered species.	M Scoggins, B Davis, E Peacock	Monitoring: Field Sampling
1.A.5.	Survey Structures in Floodplain	Survey structures in identified floodplains to determine location, address, type, and FFE of at-risk structures.	Flood Control Manager, D Walker	Flood System: Floodplain GIS
1.A.6.	Survey of Bridges	Obtain physical data on bridges and culverts for use in predicting performance during storm events	D Walker, J Guerrero	Flood System: Bridge Elevations and Flooded Structures, DIG, Street and Bridge Database
1.A.7.	Obtain Topographic Data	Develop GIS coverages and/or detailed survey information for drainage infrastructure, land use and channel topography.	D Walker, J Guerrero	DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
1.A.8.	Erosion Control Data Collection	Collect erosion data from each watershed for the purpose of determining the severity of erosion problems.	G Clayton, M Kelly	Master Plan Applications: Erosion Control
1.A.9.	Monitor Water Quality Controls	Monitor the performance of implemented water quality solutions.	G Chang, L Tull	
1.B.	Data Analysis and Problem Identification	Through data analysis, identify water quality, flooding and erosion problem areas throughout the City of Austin.	G Oswald, E Peacock, G Clayton, Flood Control Manager, J Pantalion, J Guerrero	Flood System, Monitoring, Master Plan Toolbox, DIG, ERM Site Table
1.B.1.	Determine Flooding Problem Areas	Through data analysis, identify flooding problem areas.	Flood Control Manager, R Windsor, D Walker	Flood System, Master Plan Applications: Flood Control, DIG
1.B.1.a.	Channel Flooding	Maintain H& H models, rating curves development, and compare forecast CWSEL vs. FFEs, and determine floodplain problem areas.	Flood Control Manager, D Walker, R Windsor	Flood System: Floodplain GIS
1.B.1.b.	Localized Flooding	Analyze storm sewers and small open waterways from drainage complaints and local studies.	Flood Control Manager, D Walker, R Windsor, G Guerrero	Flood System: Floodplain GIS
1.B.2.	Determine Erosion Control Problem Areas	Identify erosion problem areas from drainage complaints and local studies.	G Clayton, M Kelly	Master Plan Applications: Erosion Control
1.B.3.	Determine Water Quality Problem Areas	Through data analysis identify water quality problem areas.	E Peacock, P Hartigan, J Drew	Master Plan Applications: Maidment Model
1.B.3.a.	Determine Environmental Integrity Indices	Calculate and update EII scores using field assessment results.	E Peacock, M Turner, P Hartigan, J Drew	Monitoring: Field Sampling

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
1.B.3.b.	CRWR Model Maintenance	Maintain and apply Pollutant Loading Model developed by CRWR.	E Peacock, M Turner, P Hartigan, J Drew	Master Plan Applications: Maidment Model
1.B.3.c.	Determine Spill Risk Indices	Calculate and update Spill index response program data.	E Peacock, E Wadsworth, P Hartigan, J Drew	Complaint / Request Management System: Spills and Complaints
1.B.3.d.	Prioritize Water Quality Problems	Calculate water quality problem score using available indices.	S Cooper, P Hartigan, J Drew	Master Plan Applications: Maidment Model
1.B.4.	Prioritize Problem Areas	Overlay mission areas for purpose of determining comprehensive integrated problems in each watershed. Prioritize the problem areas Citywide and by watershed across missions.	M Heitz, J Hamilton, G Oswald, N McClintock, F Houston, P Murphy, J Pantalion, J Drew	Master Plan Applications: Prioritization Application
1.C.	Solutions Development	Planning, evaluation and selection of potential solutions.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	Master Plan Applications, Floodplain GIS, DIG
1.C.1.	Capital Improvement Project (CIP) Proposal Development	Identify the scope, schedule, budget, and funding methods of potential CIP projects	G Kosut, G Clayton, L Tull, M Newman	CIP Tracking, Complaint/Request System, Maintenance System
1.C.2.	Regulatory Proposals Development	Develop new or revised regulations under City regulations for the purposes of preventing erosion water quality and flooding problems.	L Tull, G Oswald, P Murphy, S Cooper	
1.C.3.	Maintenance Work Proposal Development	Evaluate and compile drainage requests and develop maintenance schedules.	J Guerrero, J Grube	Complaint/Requests System, Maintenance System, DIG
1.C.4.	Regional Stormwater Improvement Program (RSMP) Planning	Evaluate planned and current project development and develop regional stormwater projects to mitigate those impacts.	M Vigil	RSMP Tracking Application, PIER

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
1.C.5.	Evaluate Water Quality Controls	Develop appropriate, effective, and cost-efficient pollutant control strategies.	L Tull, J Rohlick, C Lesniak, P Hartigan	
1.C.6.	Master Plan Solution Development	Develop and recommend prioritized integrated solutions for implementation.	J Pantalion, J Drew	Master Plan Applications
1.D.	Planning Review	Review for proposed, unfunded projects prior to their being placed on bond proposal or otherwise approved.	N McClintock, G Oswald, F Houston	DIG
1.D.1.	Environmental Impact Assessment	For proposed projects, review the effect of public and private infrastructure, development projects, and State, City, and local regulations, policies, or actions on water quality.	E Peacock, L Tull	Master Plan Applications, PIER
1.D.1.a.	Transportation Study Review	Review the transportation recommendation of the ATS and rate their potential impact to the City of Austin's water resources.	P Hartigan	
1.D.1.b.	Intergovernmental Review and Coordination (IGREV)	Identifies impacts from new regulations and helps the City plan for the impacts from future regulations.	E Peacock	
1.D.2.	Flooding Impact Assessment	Review CIP projects for potential drainage / flooding impacts.	M Newman, D Walker, Flood Control Manager	Complaint/Request Management System, Floodplain GIS
1.D.3.	Infrastructure Impact Assessment	Identify and resolve conflicts of proposed projects with existing or proposed drainage infrastructure.	M Newman, J Guerrero, A Romero, C Brading	Master Plan Applications: Prioritization, Maintenance Management System, DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
2	Infrastructure Project Management Functions	The final selection, design, and management of infrastructure improvement projects (funded projects).	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	Master Plan Application: Prioritization, Maintenance Management System, Flood System
2.A.	Project Selection	Selection and funding of infrastructure projects that best support the department's mission.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	
2.A.1.	Scope Development	Identify detailed scope and impact of project.	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	
2.A.2.	Project Prioritization	Prioritization of selected infrastructure projects that best support the Department's mission.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	Master Plan Applications
2.A.3.	Interproject Coordination	Effective integration and coordination of potential infrastructure projects.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	
2.A.4.	Funding Development	Development of funding programs for selected infrastructure projects.	J Hamilton, F Houston, N McClintock, G Oswald	ISS Financial Databases
2.A.4.a.	Capital Budget Funding	Development of a Capital Budget to finance infrastructure project design and construction.	J Hamilton, F Houston, N McClintock, G Oswald	ISS Financial Databases
2.A.4.b.	Bond Proposal Package Development	Development of a bond proposal package for the purpose of obtaining funding for CIP projects.	G Kosut, G Oswald, M Newman, L Tull, E Peacock	

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
2.A.4.c.	Operating Budget Funding	Development of an Operating Budget to finance infrastructure project design and construction.	M Newman, J Guerrero, A Romero, C Brading	ISS databases used for projections of fees/expenditures (includes long-term revenue projections).
2.B.	Infrastructure Project Management	Monitoring of infrastructure project progress and quality.	F Houston, G Oswald, N McClintock, P Murphy	CAPRIS, Maintenance Management System, DIG
2.B.1.	Project Schedules	Monitoring of project timelines and deadlines.	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	CAPRIS
2.B.2.	Project Costs	Monitoring of project costs.	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	CAPRIS
2.B.3.	Consultant Services	Selection and management of professional service for project design.	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	CAPRIS
2.B.4.	Professional Services	Go through RFQ (Request for Qualifications) process to obtain professional engineering services (where applicable).	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	
2.B.5.	City Services	Management of in-house services for project design.	M Newman, G Clayton, M Vigil, L Tull, J Guerrero	CAPRIS
2.B.6.	Construction	Monitoring of project construction by private contractor or by City forces.	M Newman, M Vigil, L Tull, G Clayton, J Grube, J Guerrero, G Bostick	CAPRIS

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
2.B.7.	Project Coordination	Provide scheduling and coordination of project phases (e.g., study, design, construction, and warranty).	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	CAPRIS
2.C.	Infrastructure Project Design	Design of infrastructure projects.	J Hamilton, F Houston, N McCLintock, G Oswald	
2.C.1.	Plan and Specification Preparation	Preparation of design plans and specifications for projects.	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	
2.C.2.	Real Estate Acquisition	Acquisition of lands, easements and rights-of-way for projects.	J Guerrero, C Brading	
2.C.3.	Construction Contract Bid and Award	Advertisement, bid and award of construction contract for projects.	C Clayton, M Newman, G Kosut, E Peacock, L Tull, G Guerrero, C Brading, M Vigil	CAPRIS
2.D.	Infrastructure Project Construction	Construction of infrastructure projects.	F Houston, J Grube	
2.D.1.	City Construction	Construction of infrastructure projects by City forces.	J Grube, D Lopez, L Nichols	
2.D.2.	Private Contractor Construction	Construction of infrastructure projects by private contractors.	M Newman, G Clayton, M Vigil, L Tull, J Guerrero	

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
3	Regulatory Functions	Ensure compliance with City ordinances / regulations.	P Murphy, N McClintock, F Houston, G Oswald	TCAD GIS Coverages, FEMA GIS Coverages, PIER
3.A.	Criteria Development	Develop, review and update criteria to ensure proper design and protection of watershed infrastructure.	M Vigil, J Guerrero, J Grube, D Walker, G Clayton	Maintenance Management System
3.A.1.	Flood Control Criteria	Develop, review and update criteria to ensure proper design of drainage infrastructure related to flood control.	M Vigil, J Guerrero, J Grube, D Walker	Flood System: Easements and Sites and Subdivisions, Maintenance Management System, RSMP Tracking
3.A.2.	Environmental Criteria	Develop, review and update criteria to ensure proper design of infrastructure related to erosion control and water quality.	P Murphy, L Tull, G Clayton, J Guerrero	PIER
3.B.	Application Review and Approval	Review development permit applications to ensure compliance with City ordinances / regulations.	F Nikorak, S Cooper, A Scharlach, M Vigil, J Guerrero, S Rainosek	PIER, DIG
3.B.1.	Barton Springs Zone Permit Review	Issue annual operating permits for water quality controls in the Barton Springs zone for treatment of stormwater runoff.	F Nikorak	Regulatory: Barton Springs Permits
3.B.2.	Underground Storage Tank Permit Review	Review plans for the installation, removal, or upgrading of underground storage tanks. Issue and renew permits (every 3 years) to facilities with underground storage tanks.	S Schwarting	Regulatory: UST
3.B.3.	Storm Sewer Discharge Permit Review	Review plans and issue permits to regulated commercial and industrial businesses to prevent illegal discharge of pollutants from their properties.	S Cooper, S Tyler	Regulatory: Stormwater Discharge Permit, DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
3.B.4.	Regional Stormwater Management Program	Review proposed development applications and evaluate drainage impact to determine if developer can pay a fee in lieu of providing on-site detention.	M Vigil	RSMP Tracking Application, DIG
3.B.5.	Water Quality Review	Review proposed development for compliance with water quality regulations.	F Nikorak	PIER: Land Development Review
3.B.6.	Landscape and Tree Protection Review	Review proposed development for compliance with landscape and tree protection requirements.	S Rainosek	PIER: Land Development Review, Flood System: Easements, Sites and Subdivisions
3.B.7.	Water Pollution Abatement Plan (WPAP) Review	Review WPAP plans and applications and issue permits for Sewerage Collection Systems (SCS) in the Austin area as required by the Edwards Aquifer rules.	S Pope	Monitoring: Field Sampling, ERM Site Table
3.B.8.	Permit Application Review Committee	Review TNRCC permitting actions to reduce water quality impacts to the City's drinking water supply resulting from TNRCC permitted disposal of wastewater effluent via direct discharge to streams/rivers, irrigation, or subsurface disposal.	J Balogh, L Tull	Monitoring: Field Sampling, ERM Site Table
3.B.9.	Floodplain Review	Ensure compliance of proposed development applications with FEMA regulations.	Flood Control Manager, R Windsor, D Roberts, R Gilbert	Flood System: Floodplain GIS
3.B.10.	Tree Removal Permits	Review requests and then issue or deny permits for removal of protected trees.	R Gilbert, L Chaumont	
3.B.11.	Drainage Criteria Variances	Review proposed variances from the Drainage Criteria Manual and evaluate impact on watershed infrastructure and on maintenance operations.	M Vigil, J Guerrero, A Romero	

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
3.B.12.	Easement Releases	Review drainage easement requests and evaluate impact on watershed infrastructure and maintenance operations.	R Windsor, J Guerrero, C Brading	Flood System: Easements
3.C.	Development and Infrastructure Inspection	Inspect development activity and existing infrastructure for compliance with applicable ordinances and regulations.	P Murphy, F Houston, N McClintock	PIER: Code Inspection, Complaint/Request Management System, Maintenance Management: Pond Tracking
3.C.1.	Landscape Ordinance Inspection	Inspects development activity for compliance with landscape ordinances.	Lynn Chaumont	PIER: Code Inspection
3.C.2.	Underground Storage Tank Inspection	Inspect and test underground storage tanks for leakage.	S Schwarting	Regulatory: Underground Storage Tank
3.C.3.	Storm Sewer Discharge Permit Inspection	Inspect commercial and industrial businesses within the City for illegal discharges of pollutants.	S Cooper, S Tyler	Regulatory: Stormwater Discharge Permit, DIG
3.C.4.	Barton Springs Zone Permit Inspection	Inspect permitted controls in the Barton Springs Zone	F Nikorak	Regulatory: Barton Springs Permits
3.C.5.	Construction / Land Development Site Inspections	Inspect site development activity to ensure compliance with approved plans and applicable ordinances / regulations.	G Bostick	PIER: Code Inspection
3.C.6.	Commercial Pond Inspection	Inspect commercial and other privately-operated ponds for compliance with applicable ordinances / regulations.	J Guerrero, A Romero	Maintenance Management: Pond Tracking, DIG
3.C.7.	Residential Pond Inspection	Inspect residential and other City-operated ponds for compliance with applicable ordinance / regulations.	J Guerrero	Maintenance Management: Pond Tracking, DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
3.C.8.	Spill Complaint Investigations	Investigate environmental pollution calls from Environmental Hotline and from Police and Fire Departments.	S Cooper, C Lesniak	Complaint/Request Management System: Spills and Complaints, DIG
3.C.9.	Open Waterway FEMA Regulation Inspection	Inspect open waterways as required by FEMA's CRS regulations.	J Guerrero	Maintenance Management System: Open Waterways
3.C.10.	Open Waterway Maintenance Activity Inspection	Inspect open waterway maintenance activity for compliance with applicable ordinances / regulations, especially FEMA/CRS, USCOE 404 and TNRCC Edward's Aquifer regulations.	G Bostick, J Guerrero, M Lyday	Maintenance Management: Open Waterways, Regulatory: Regulation Compliance Tracking
3.C.11.	Inspect NPDES Regulated Industries	Conduct inspections of regulated industries as required by permit.	S Cooper, R Jackson	Regulatory: NPDES Permit
3.D.	Enforcement and Compliance	Enforce applicable City, state and federal ordinances / regulations.	P Murphy, G Oswald, N McClintock, F Houston	PIER: Code Inspection, Regulatory: Class C Misdemeanors, Cease and Desist Orders, Regulation Compliance Tracking
3.D.1.	Landscape Ordinance Enforcement	Enforce ordinance compliance by issuing notices of violation.	L Chaumont	PIER: Code Inspection
3.D.2.	Underground Stormage Tank Compliance	Enforce ordinance compliance by issuing notices of violation.	S Schwarting	Regulatory: Underground Storage Tank
3.D.3.	Stormwater Discharge Permit Program Enforcement	Enforce compliance with the Stormwater Discharge Permit Program and with City ordinances and regulations relating to pollution.	S Cooper, S Tyler	Regulatory: Stormwater Discharge Permit
3.D.4.	Barton Springs Zone Permit Enforcement	Enforce permit compliance through permit suspension, legal injunction, or billing the owner for City repairs.	F Nikorak	Regulatory: Barton Springs Permits

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
3.D.5.	Construction / Land Development Site Criteria Enforcement	Enforce compliance with approved land development site plans and applicable ordinances regulations.	G Bostick	PIER: Code Inspection
3.D.6.	Commercial Pond Maintenance Enforcement	Enforce proper pond maintenance by notifying pond owners by phone or by issuing notices of deficiencies.	J Guerrero, A Romero	Maintenance Management: Pond Tracking, DIG
3.D.7.	Residential Pond Maintenance Enforcement	Enforce proper pond maintenance by notifying City contractor of deficient work or performance.	J Guerrero, C Martinez	Maintenance Management: Pond Tracking, DIG
3.D.8.	Spill Complaint Enforcement	Enforce mitigation of environmental pollution by sending out notices of violation.	S Cooper, C Lesniak	Complaint/Request Tracking: Spills and Complaints, DIG
3.D.9.	Open Waterway FEMA Criteria Enforcement	Enforce FEMA's CRS regulations by scheduling appropriate maintenance work.	J Guerrero, A Romero, J Grube	Maintenance Management: Open Waterways
3.D.10.	Open Waterway Maintenance Activity Enforcement	Enforce compliance with applicable ordinances / regulations, especially FEMA/CRS, USCOE 404 and TNRCC Edward's Aquifer regulations, by notifying City forces of correct procedures.	G Bostick, J Guerrero, M Lyday	Maintenance Management: Open Waterways, Regulatory: Regulation Compliance Tracking
3.D.11.	NPDES Permit Compliance	Ensure compliance with the City's MS4 permit under the National Pollutant Discharge Elimination System (NPDES) program by tracking municipal program's status.	J Pantalion, R Jackson	Regulatory: NPDES Permit, DIG
3.D.12.	NPDES Industrial Program Enforcement	Enforce industrial control measures as required by federal permit.	S Cooper, R Jackson	Regulatory: NPDES Permit, DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
4	Operations and Maintenance Functions	Operate and maintain Watershed Protection Utility Infrastructure	F Houston, D Walker, J Guerrero, J Grube	Maintenance Management System, DIG
4.A.	Maintain Monitoring Equipment and Sites	Install, operate and maintain equipment and databases to measure and record rainfall surface, subsurface water levels and water quality data.	D Walker, G Chang, R Glick	FEWS, Monitoring: Field Sampling, Hydron
4.A.1.	Operate and Maintain the FEWS	Install, inspect and repair the warning devices (including all hardware and software) of the FEWS.	D Walker	FEWS: QNX Database, Access Database
4.A.1.a.	Locate Current and Forecasted Flooding (FEWS)	Identify flood areas and calculate the magnitude and timing of flooding during severe weather events.	D Walker	FEWS, Flood System: Floodplain GIS
4.A.1.b.	Maintain the FEWS Equipment	Maintain the FEWS equipment to capture real-time rainfall and stream flow data.	A Martinez, R Todd	FEWS: FEWS Response Guide
4.A.1.c.	Maintain and Update the FEWS Reponse Guide	Maintain and update records of historical maximums, past flooding, and forecast flood elevations with guidelines for responding to actual events.	D Walker	FEWS: FEWS Response Guide
4.A.2.	Maintain Water Quality Monitoring Sites	Maintain automatic water quality samplers and flow meters. Electronically download data from flow meters.	G Chang, R Glick	Monitoring: Field Sampling, Hydron, W&WW Slim
4.B.	Maintain Storm Sewer System	Inspect and clean storm sewer pipe, inlets and inlet filters.	J Grube	Maintenance Management System: Stormsewer Tracking System and DIG
4.B.1.	Inspect Storm Sewer Pipe	Inspect storm sewer pipe manually and with video camera to determine condition and assess need for maintenance.	C Martinez, J Guerrero, P Reyes, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
4.B.2.	Clean Storm Sewer Pipe	Clean storm sewer pipe to provide more effective flood flow conveyance.	C Martinez, J Guerrero, P Reyes, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG
4.B.3.	Repair Storm Sewer Pipe	Repair existing storm sewer pipe to provide more effective flood flow conveyance, prevent erosion of surrounding soil, and prevent storm sewer collapse.	L Gattis, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG
4.B.4.	Install Storm Sewer Pipe	Install replacement or new storm sewer pipe to provide more effective flood flow conveyance.	L Gattis, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG
4.B.5.	Inspect Storm Sewer Inlets	Inspect storm sewer inlets to determine condition and assess need for maintenance.	P Reyes, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG
4.B.6.	Clean Storm Sewer Inlets	Clean storm sewer inlets to provide more effective flood flow conveyance.	P Reyes, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG
4.B.7.	Clean Storm Sewer Inlet Filters	Clean storm sewer inlet filters to provide more effective capture of litter and debris and to avoid clogging of storm sewer inlets.	P Reyes, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG
4.B.8.	Install Storm Sewer Inlet Filters	Install storm sewer inlet filters to capture litter and debris before it reaches Town Lake and its tributaries.	P Reyes, L Nichols, J Grube	Maintenance Management System: Stormsewer Tracking and DIG

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
4.C.	Maintain Open Waterway Infrastructure	Provide effective flow of stormwater in open waterways.	J Grube, L Nichols	Maintenance Management System: Open Waterway and DIG
4.C.1.	Open Waterway Vegetation Removal	Remove debris and excess vegetation from open waterways to provide effective flood flow conveyance.	C Martinez, J Guerrero	Maintenance Management System: Open Waterway and DIG
4.C.2.	Open Waterway Sediment Removal	Remove accumulated sediment from open waterways to provide effective flood flow conveyance.	J Grube, D Lopez, F Perez, O Trevino	Maintenance Management System: Open Waterway and DIG
4.C.3.	Open Waterway Erosion Control	Perform small erosion control projects in open waterways to reduce or prevent loss of property, erosion / sedimentation of Town Lake and its tributaries, and loss of flood flow conveyance.	J Grube, L Wagner, G Clayton	Maintenance Management System: Open Waterway and DIG
4.C.4.	Pond Vegetation Control	Remove excess vegetation from stormwater ponds to provide effective flood control and water quality protection.	C Martinez, J Guerrero	Maintenance Management System: Pond Tracking and DIG
4.C.5.	Repair Stormwater Ponds	Restore and repair stormwater ponds to provide effective flood control, erosion control, and/or water quality protection.	B Booth, D Lopez, J Grube	Maintenance Management System: Pond Tracking and DIG
4.C.6.	Clean up Town Lake	Remove safety hazards and debris from Town Lake and the confluences with its tributaries to improve water quality.	P Reyes, L Nichols, J Grube	Maintenance Management System: Pond Tracking and DIG

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
4.C.7.	Clear Bridges and Culverts	Remove debris and obstructions from bridges and culverts to provide effective flood flow conveyance.	J Grube, D Lopez, F Perez, O Trevino	Maintenance Management System: Pond Tracking and DIG, Street and Bridge Bridge Database
4.C.8.	Residential Pond Inspection and Correction	Inspect stormwater ponds to determine condition and assess maintenance need. Correct any problems.	J Guerrero, A Romero	Maintenance Management System: Pond Tracking and DIG
5	Information Management	Management the collection, storage and dissemination of information regarding drainage and environmental issues.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	
5.A.	Respond to Incoming Requests for Information	Provide response to complaints and requests for information from citizens, media, and other agencies regarding drainage situations.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	Complaint / Request Management System
5.A.1.	Respond to Drainage Complaints and Requests	Provide response to citizens about their drainage concerns through investigations, inspections, data compilations, and recommendations.	J Guerrero, C Martinez, A Romero, C Coy, G Clayton, Flood Control Manager, M Newman	Complaint / Request Management System
5.A.2.	Respond to Customer Assistance Form Requests	Respond to Customer Assistance Form (CAF) requests for information related to Department issues by talking (as appropriate) to requestor, researching the issue, identifying solutions (if possible), and providing an appropriate response.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy, P Mayo Clark	Complaint / Request Management System
5.A.3.	Land Development Assistance	Provide information to prospective developers on what the regulations are for obtaining a development permit from the City.	R Gilbert, G Bostick, L Chaumont, S Scroggins	PIER: Land Development Review
5.A.4.	Respond to Land Development Complaints	Respond to citizen complaints regarding possible illegal land development activities.	R Gilbert, G Bostick, L Chaumont, S Scroggins	Complaint / Request Management System, PIER

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
5.A.5.	Respond to Reports of Spills	Respond to hazardous and non-hazardous material spills as well as citizen pollution complaints within the City of Austin limits, the five-mile extra-territorial jurisdiction, and within the City's water supply.	S Cooper, C Lesniak	Complaint / Request Management System: Spills and Complaints, Monitoring: Field Sampling, ERM Site Table
5.A.6.	Respond to Requests for Floodplain Information	Provide information on floodplain areas and flood elevations to the public.	D Walker, R Windsor, D Roberts	Flood System: Floodplain GIS
5.A.7.	NPDES Permitting Assistance	Provide information and referrals for complying with NPDES municipal, construction and industrial permit requirements.	R Jackson	
5.B.	Outgoing Public Communication	Provide information to citizens, media, and other agencies regarding drainage situations and issues.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	New system being developed for use on Exchange/Outlook (outside of Dept.).
5.B.1.	Provide Warnings of Flood Situations and Road Floodings	Provide real-time flood warnings for flood-prone areas of the City to citizens, City management, and the media through the EOC. Direct City personnel to barricade flooded roadways to protect the traveling public.	D Walker	FEWS System
5.B.2.	Water Quality Education	Provide information to the public and private sector on issues related to water quality and non-point source pollution in order to encourage source control of pollutants.	K Shay	Regulatory: NPDES Permit, Monitoring: Field Sampling
5.B.3.	Public Outreach for Water Quality Monitoring	Expand public knowledge of water quality issues by encouraging citizen participation in the Water Watchdog Monitoring Program.	E Peacock, M Scoggins	Monitoring: Field Sampling

Watershed Protection Department

Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
5.B.4.	Requests for Council Action	Submit for Council action (e.g., budget amendment, ordinance changes, contract approval).	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy, P Mayo Clark	New system being developed for use on Exchange/Outlook (outside of Dept.).
5.B.5.	Spills and Remediation Assistance	Provide technical assistance and guidance to other City Departments during spills and subsequent remediations that occur on other City Department properties.	S Cooper	Complaint / Request Management System: Spills and Complaints
5.C.	Reporting / Administration	A resource for research, evaluation, and preparation of information necessary for reporting to higher management, Council and other regulatory agencies.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	All Department Databases.
5.C.1.	Report CRS Activities	Compile information on City's efforts to comply with Community Rating System (CRS) and report results to the Federal Emergency Management Agency (FEMA).	D Walker, R Windsor, D Roberts	Flood System
5.C.2.	Liaison to Environmental Board	Provide administrative support to Environmental Board.	R Burns	
5.C.3.	NPDES Permit Administration	Administer permit, develop and submit annual reports and data to EPA regarding the City's compliance with EPA's Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) permit program.	J Pantalion	Regulatory: NPDES Permits
5.C.4.	Administration of Consultant Contracts	Management and administration of all non-CIP consultant/vendor contracts.	J Hamilton, C Martinez, J Guerrero, J Grube	
5.C.5.	CIP Project Status Reports	Communicate information on CIP project status. Includes funding information, status, schedule, etc.	G Kosut, L Tull, C Brading, M Newman, J Grube	CAPRIS

Watershed Protection Department Business Functional Model - Outline

Function Label	Definition	Description	Key Contacts	Related Databases
5.C.6.	Financial Reports	Communicate financial information on expenditures, encumbrances, authorizations, and appropriations for operating and capital budgets. This information goes to Council, City Budget Office and the Environmental Board.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	ISS Financial Databases
5.C.7.	Performance Measures	Communicate information on Department performance to higher management.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	All Department Databases.
5.D.	Data Management	Management of documents and information with the Department.	J Hamilton, F Houston, N McClintock, G Oswald, P Murphy	Document Tracking Database
5.D.1.	Master Plan Document Administration	The administration of Master Plan documents.	J Hamilton, K Shay	Document Tracking Database
5.D.2.	Archive Records Management	Compile, document, and store all documents (e.g., paper files, maps, departmental electronic files) that are sent to City records storage.	J Hamilton, K Shay, R Burns, E Peterson, S Heumann	Document Tracking Database
5.D.3.	Database Management Project	Create, manage, and implement database structures for the Watershed Protection Department.	A McCracken	
5.D.4.	Department Library Management	Compile, document, and store all documents (e.g., paper files, maps, departmental electronic files).	K Shay, E Peterson, R Windsor, J Drew	Document Tracking Database

APPENDIX C

PROPOSED APPLICATIONS LIST

- C.1 APPLICATION DEFINITION FORMS**
- C.2 APPLICATION DEFINITION PROCESS**
- C.3 APPLICATIONS STATUS REPORT**

APPENDIX C.1
APPLICATION DEFINITION FORMS

Application Definition Form

- Title:** Provide an appropriate title for this application.
- Division or Task Group:** Indicate the Division or Task Group who would be the primary users of this application.
- Key Contact:** List the person or persons who would be the key contact for this application.
- Current Status:** Briefly describe the current status of this application (i.e., how is this data managed now). Include the platform and software currently used (if any).
- Application Needs:** Briefly describe what the application needs to do.
- Possible Links:** Refer to the list of applications and list other applications this program may need to link to.
- Combine With:** Are there other applications or tables this application should be combined with?
- GIS Component:** Indicate if this application needs a GIS component.
- Options:** List the major options likely to be available for moving this application from its current status to where it needs to be. If costs for expected hardware, software and programming can be approximated, list these with each option.
- Prioritization Factors:** Briefly describe the ramifications of not developing or improving this application; include both current and future problems.
- Prioritization Rating:** Assign a prioritization rating between 1 and 5 (1 highest) to this application.

Operational Database Applications Approach

Key Issues to Resolve

- Computer hardware and software constraints
- Determine if application resides within only one division or spans multiple divisions
- Decide whether to purchase vendor application, hire consultant, or use internal resources to build application.
- Determine if client server application or stand alone PC application
- Look at common data needs to determine if applications should be combined
- Look at the number of business functions served
- Determine if high profile need (ie, legal, political, regulatory).

Category A - Small, Critical Applications

Criteria

- Small consensus groups
- Easy and quick fix
- High demand/need
- No organizational impacts (business as usual)
- Minimal additional hardware/software needs
- Build only

Applications

RSMP Tracking Application
Drainage Utility GIS Coverages
Floodplain GIS Application
FEWS GIS Application
Storm water Complaints (interim step)

Category B - Large, Critical Applications

Criteria

- High cost of implementation
- Organizational changes possible
- Hardware/software needs
- Larger consensus group
- Buy versus build

Applications

Complaint Management

- Spills and Complaints
- Storm water Complaints (could be part of Maintenance Application)
- Code Review Complaints
- CAFs Council Complaints

Maintenance Management (Maintenance and Complaints could be combined)

- Stormwater Complaints
- TV Inspection
- Acceptance Letter
- O&M Waiver
- Creeks and Bridges
- Vegetation Control
- Inlets and Inlet Filters
- Ponds
- Storm water Maintenance Schedule

Storm Sewer Mapping

Monitoring

- Hydron Interface
- Field Sampling
- Joint Water Quality Database
- **Code Division Application**
- Underground Storage Tank
- Storm Sewer Discharge Permits
- Filed (Class C Misdemeanors)
- Red Tag (Cease and Desist Orders)
- Barton Spring Permits
- Ordinance Information Application

C - Pending and Need More Information

Master Plan Applications

- Flood Control
- Erosion Control
- Water Quality/EII
- Maidment Model
- Prioritization

Storm water NPDES Permit Applications

- To be determined

Flood Control Bridge Elevation

- Data Retrieval Module

CIP Planning

Code Inspection (may be part of PIER)

Land Development Review (will be part of PIER)

Oracle Query Tool

Flood Control

- Easements
- Sites and Subdivisions

Example Application Definition/Assignment Form

APPLICATION DEFINITION

Title: Drainage Utility GIS Coverages (GIS)

Division or Task Group: ERM, Engineering, ALL

Key Contact: Joe Pantalion

Current Status: Does not exist

Desired Status: This application would do to basic functions – 1) provide procedures for maintaining land based information in Arc/Info for use my numerous Department sections; and 2) provide an ArcView tool for retrieving, displaying and plotting the land based information. Expand this to include all the GIS coverages needed by the Drainage Dept.

Possible Links: Definitely would be linked to the City GIS since it would be dependent upon the existing and future land use / land cover.

Combine With:

GIS Component: YES

ASSIGNMENT INFORMATION

Options: The only option is to provide the land based information to the Department in a simple ArcView tool.

Application Description: Pre processing portion of the application would define the land based activities important to the Drainage Dept. (RSMP sites, BMP sites, pervious / impervious land, development sites, etc.). These coverages would be maintained in the City GIS with content updates by the Drainage Dept.

Develop an ArcView application which would retrieve the Arc/Info coverages and provide several analyses functions and output functions. This application would be made available to all Department sections for use in their work.

Prioritization Factors: If this work is NOT conducted, the Drainage Dept. would continue to obtain this information from the GIS group upon request.

Prioritization Rating: 1

Activities to Complete: Review the coverages which have been built in the GIS and the applicability to the Drainage Dept.

Define the additional coverages needed by the Drainage Dept (RSMP, UST, BMPs, etc.)

Develop update procedures (owner, frequency, format, etc.) for the GIS Group to maintain the coverages.

Design and build the ArcView application to bring the Arc/Info coverages down to the desktop for use by the Drainage Dept staff.

Hardware Needed & Costs: NA

Software Needed & Costs: ArcView in several PCs

Development Costs: Est. – One person month to define procedures for GIS Group
One person month to build the ArcView tools

Date Needed: TBD

Start Date:

Completion Date:

Assigned to:

Comments: This is a low priority since the GIS Group can continue to support this function. However, a standard procedure needs to be established to get information into the GIS from the Drainage Dept.

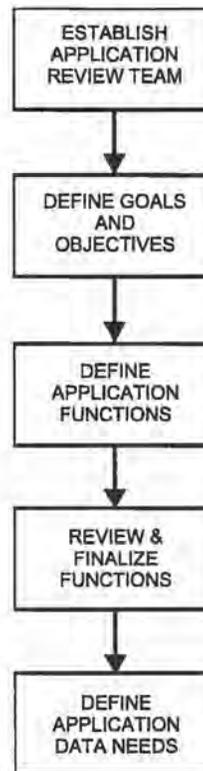
APPENDIX C.2
APPLICATION DEFINITION PROCESS

Application Definition Process

This document describes the application implementation process which we have implemented within the Drainage Utility Department, City of Austin, TX. This memorandum will walk through the process and describe the major steps and milestones.

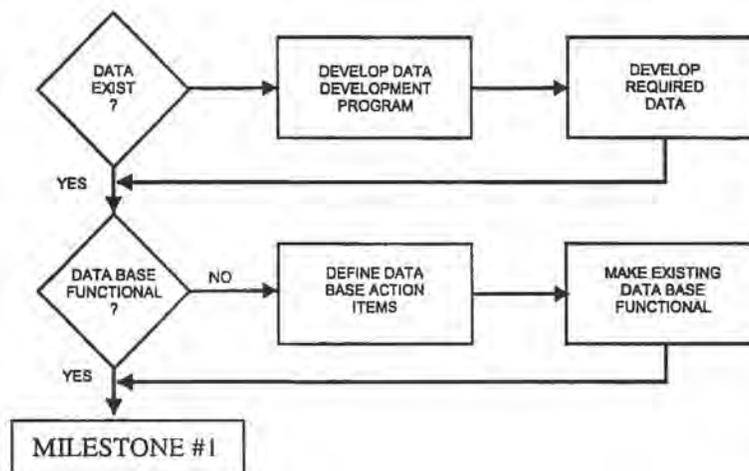
Step 1 – Application Definition

The first step in the Application Implementation process is the application definition. The functions completed in this step address the preliminary definition of the application functions and data needs. These functions and data needs help in defining the final goals and objectives of the application, the first milestone in the process (Milestone #1). The results of this step will feed the next step which addresses the data needs of the application.



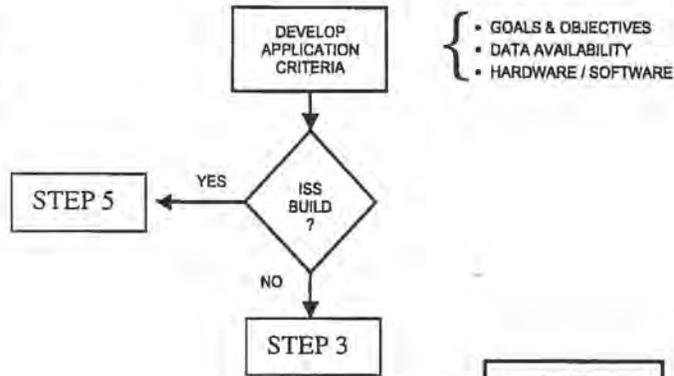
Step 2 – Data Needs

The second step in the application implementation process addresses the data needs of the application. For any application, there is a defined set of data required for the application. This step in the process will answer two basic questions – 1) Does the data currently exist? and 2) Is the current data base functional ?



If the data for the application does not currently exist then a data development program will be required. The data development program must be defined and implemented to begin the process of building the required data sets for the application. If the data exists but the

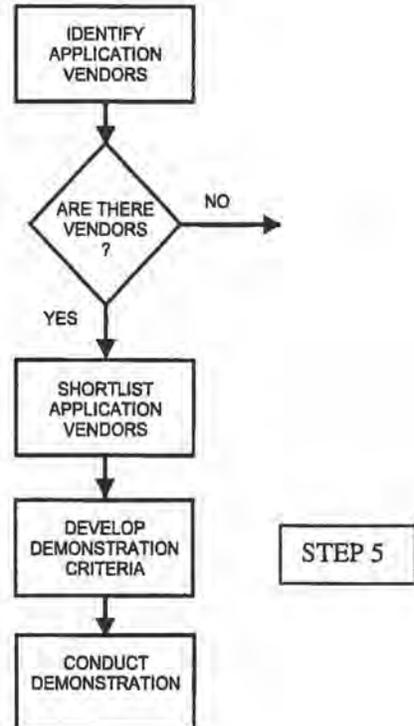
current database is not functional, then a list of database action items needs to be developed and the existing database must be made functional. This process can occur in conjunction with developing the application criteria.



Milestone #1 – Application Criteria

Once steps one and two have been completed, the process should have naturally produced the application criteria which consists of:

- the goals & objectives of the application addressing functions and needs,
- the data needs and availability, and
- the hardware and software requirements.



With the application criteria now available in a written document, the process can continue.

Before beginning step 3 of the application implementation process, a major question must first be answered –

Will the ISS Group build this application? If the answer is yes, then both steps 3 and 4 can be skipped and the process can move on to step 5. If no, then step 3 must be completed.

Step 3 – Vendor Identification

This step in the process will identify any third party vendors who may provide a software product that will meet the application criteria established at milestone #1. These criteria can be used to screen application software vendors and the remaining functions in step 3 will short list the applicable vendors and conduct appropriate demonstrations.

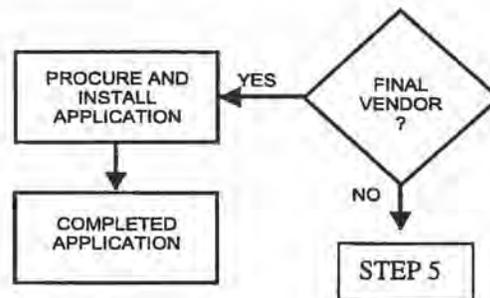
A key function in step 3 is to develop, ahead of time, a set of vendor demonstration criteria. These criteria will be used during the vendor software demonstrations and will make the selection process much easier.

The key question asked during step 3 is –

Are there any vendors who provide this type of application software ? . If the answer is no, then the process can skip to step 5 and begin the application construction process using internal ISS resources or outside contractor resources.

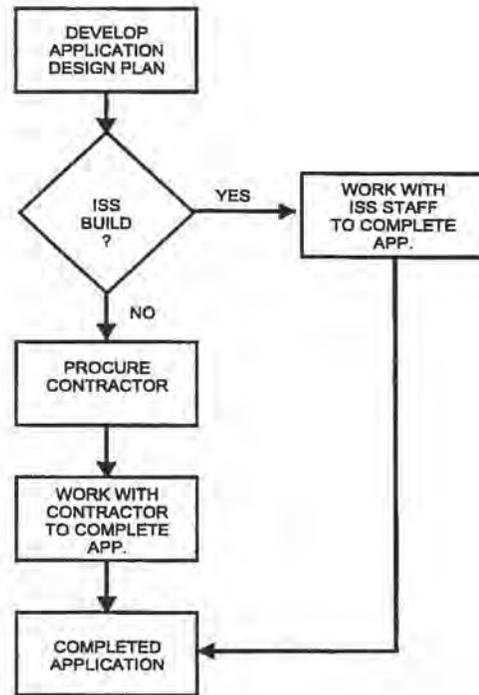
Step 4 – Application Procurement

Once the vendors have been identified and the demonstrations have been completed under step 3 of the process, the next step will procure the selected vendor. Step 4 will take the results of the vendor reviews and develop the paperwork required to procure and install the vendor's software. This process may take several weeks, depending upon the cost of the selected application software.



Step 5 – Application Construction

This step is only executed when a vendor based application software is not procured. If there are no software vendors which can provide the application required, then the application must be designed and built through the Department. The Department has two basic ways to get an application built – 1) through ISS support, and 2) through contractor support. In either case, the first function in this step is to develop an application design plan. This application design can be used by either ISS or a contractor to build the application to meet the needs of the Department.



If the ISS group can provide the necessary services to build the application then the Department's application project team will work with ISS staff, using the application design as a guide. If the ISS group can not provide the necessary services, then the Department will procure those services from a contractor experienced in developing drainage oriented application software. The contractor will also work with the application project team and will use the application design document.

Milestone #2 – Completed Application

The last milestone in the process is the completed application. The process will get to this milestone from three different functions – 1) through a procured application from a selected third party vendor; 2) through the application development work by the ISS staff; or 3) through the application development by a contractor.

APPENDIX C.3
APPLICATION STATUS REPORT

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
High Priority Projects (listed in order)										
RSMP ArcView Application	RSMP	GIS capabilities are being added by digitizing the RSMP sites and having an ArcView application written to link the polygons with the database.	Application being tested by two users. Expect to fully implement during October 1998.	Wayne Painter of ISS GIS will complete application and install.	WE - RSMP	A Winer, M Vigil, J Tondre, G Taffinder, S Heumann	RSMP Database Application, PIER (eventually)	Will be Year 2000 Compliant	H1	Expected to be implemented 10/98
Drainage Infrastructure GIS (DIG)	Drainage Infrastructure Management System	Replace outdated paper storm sewer maps with digitized maps of City of Austin drainage infrastructure.	The DIG RFQ went out September 23. The Pre-Response Meeting will be held October 6 with responses due back October 21. The DIG Implementation Team will make a decision on which to hire and will make a recommendation to Council during December or January.	Consultant will be hired for this project. Greg Sampson and Wayne Painter of ISS GIS assisting with project.	SWM (High), WE (High), ERM (High), ERI (Med)	D Walker, C Martinez, J Grube, J Pantalion, E Kaufman, M Claudio-Ehalt, A Winer, M Newman	Complaint/Request Management System, Maintenance Management System, Floodplain GIS	Will be Year 2000 Compliant	H2	High profile need. Customer service need.
Floodplain GIS System	Flood Management System	GIS Application to visually show whether or not structures in the City of Austin and ETJ are in the 5, 10, 25 or 100 year floodplains. Expected completion date of 1/1/2000.	A contract was signed with CDM for the initial work on this project. The first phase of the project is underway and involves the identification of the various data sources and the work that is needed to make this data available.	Combination of staff, CDM, and ISS.	WE (High), ERI	A Winer, G Oswald, A Scharlach, R Windsor, D Roberts, R Clark, D Walker, J Pantalion, G Sampson	PIER, FEWS, FEWS Sites, Structure Elevations (GIS Coverage)	Will be Year 2000 Compliant	H3	High profile need. Customer service need.
Flooded Structures Display	Master Plan Applications	Combine Carter-Burgess data with FEWS sites to show at what storm events, structures and bridges are likely to be underwater. This is a display of the Flood Control Master Plan GIS project done by ISS GIS.	This project is in final test phase. When completed this will be an interactive GIS application that can be used to generate maps for analysis purposes.	ISS GIS	WE - FEWS	David Walker	Monitoring: Hydron Interface, FEWS Sites (GIS Coverage)	Will be Year 2000 Compliant	H4	Part of Flood Control Master Plan Application.
Master Plan Tool Box	Master Plan Applications	Front end and documentation for Flood Control and Prioritization Applications	Colleen Hughes has submitted a Scope of Work for this project the beginning of October, 1998. The project schedule has not yet been set.	Colleen Hughes of CDM is working on this.	All Divisions	J Hamilton, J Pantalion, D Walker	Other Master Plan Applications, Floodplain GIS, FEWS Sites, Structure Elevations (GIS Coverage)	Will be Year 2000 Compliant	H5	Critical for next phase of Master Plan.

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
Stormwater Discharge Permits	Stormwater Discharge Permits	Character based Oracle system needs corrections, better reports and redesign to Windows version. Need to replace MACs with PCs to be able to use new system. Will need GIS link.	ISS Programming has completed most of the high priority changes and has created new reports. At this point, primarily bug fixes are being made until after 3/1/99 (Sharon back), when the design work will begin on converting this application to a Windows version.	Bob Fields of ISS Programming is currently working on this project.	ERM (High), ERI (Med)	S Cooper, S Schwarting, S Doyle replacement	UST, NPDES Permit, DIG, SDP Locations, Underground Storage Tank Sites	Not sure if current version is Y2K compliant. Windows version will be.	H6	ISS has this project. High priority need for ERM.
Stormwater Complaints	Complaint / Request Management System	The design of the entire Complaint / Request Tracking Management System will be done, but this is the first module that will be written. Will add Erosion information as separate table and screen.	Stormwater Maintenance Management Group actively working on cleaning up existing FoxPro version. Design work for Complaint / Request Management System in the early stages. Will design entire system, but the Stormwater module will be developed first.	ISS will be approached first, but packages and consultants will also be considered.	SWM (High)	J Guerrero, A Romero, C Coy, M Kelly, C Lesniak, S Scroggins	DIG, Maintenance Management System	FoxPro 2.6 version not Y2K compliant. New application will be.	H7	Customer service need.
Pond Tracking	Drainage Infrastructure Management System	Replace FoxPro tables with application both Stormwater and ERM can use. Include Acceptance Letters, Commercial and Residential Pond Inventory, Pond Inspections, Pond Maintenance, and a Pond Locator (ArcView Application).	Need to do the following: 1) Identify staff from ERM and SW to serve on Pond System Review Team. 2) Meet with ISS to discuss platform and programming language to use. Project will commence until after Stormwater Complaint Database Module is completed.	Will start with ISS Programming to determine if they can write application in FoxPro or Oracle. Will meet with ISS GIS to discuss ArcView Application.	SW - Maintenance Planning (High), ERM (High), ERI (Medium)	J Guerrero, A Romero, G Peters, L Tull, J Pantalion, M Claudio-Ehalt, J Grube	PIER (for completed pond information), Stormwater Discharge Permits, Pond Sites, DIG	FoxPro 2.6 version not Y2K compliant, but there is a workaround. New application will be.	H8	Needed for more than one Division. High profile need. Current system inadequate.
Code Inspection	Code Inspection	Replacement of Datatrieve application to tracks inspection of development projects. Transfer existing data into new application.	ISS is actively working on this application (as of 10/1/98), which is part of the PIER Database.	ISS Programming	ERI (High), SWM (Med)	N Galati, S Scroggins, J Guerrero (re Pond completion)	LDRS, PIER, Drainage Infrastructure Management System, Development Sites, DIG	Current Datatrieve version not Y2K compliant. New application will be.	H9	Current system not Year 2000 compliant. High priority for Inspection Division of ERI.
ERM Site Management Application	Site Management Database	GIS application to tie ERM sampling and other sites to summary data and provide for spatial analyses.	CDM developed a work plan for this project and Colleen Hughes has provided consulting services. Jean Drew is lead for this project. In process of scoping out this project with database owners.	CDM will do both the work and the work plan on this project.	ERM	J Drew, J Pantalion, S Cooper, M Turner, G Chang	Field Sampling, Hydron, Stormwater Discharge Permit, Water Quality Sampling Sites, Open Land	Will be Year 2000 Compliant	H10	High priority for Division.

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
Underground Storage Tank	Underground Storage Tank	Application to track location and status of Underground Storage Tank permits and inspections. Current Datatrive application needs to be redone. Needs GIS link. Needs link to SDP.	In process of correcting addresses so sites can be mapped. Plan to incorporate under PIER. Hope to begin design work by the end of the first quarter 1998/1999.	ISS Programming	ERI (Medium), ERM	Schuyler Schwarting, Sharon Cooper, Susan Scroggins	Storm Sewer Discharge Permits, Underground Storage Tank Database	Current Datatrive version not Y2K compliant. New application will be.	H11	Current database in Datatrive - not Year 2000 compliant.
Field Sampling	Monitoring	Add two new modules - QAQC routine and upload of W&WW data. After that, design and implement Windows version of application.	QAQC routine completed early 1998. The W&WW upload routine completed and implemented September 1998. Chris Herrington continues to work on the design of the Windows version of this application.	Bob Fields of ISS (time permitting when not working on SDP) and Chris Herrington of ERM working on upload and conversion of application to Forms 5.0.	ERM (High)	Martha Turner, Chris Herrington, George Chang, Roger Glick	W&WW Slim Database, EII Application (MP), NPS Rain, Hydron Interface, Site Management System	Not sure if current version is Y2K compliant. Windows version will be.	H12	Ranked higher than Complaints because already being worked on and can be an ongoing project.
Land Development Review	PIER	Application which provides for the tracking of development projects. This data is not currently captured in any database. It will be part of the PIER database rather than a Drainage Utility managed database.	This is a Planning Dept. project, but WPD needs to be part of it. This will be a part of PIER. It will include a GIS link. A conversation with S Wilkenson during 1998 indicated that a prototype will come out soon, but it will not include the migration of the LDRS data. Additional funding will be needed for this project. Need more information.	ISS will probably need to do this application. Steve Wilkenson of Planning is the Project Lead.	ERI	Pat Murphy, Steve Wilkenson, Frank Houston	Pond Tracking, RSMP Tracking, CAPRIS, Critical Environmental Features (CEFs)	Will be Year 2000 Compliant	H13	Ranked higher than Complaints because Planning is spearheading this effort.
Spills and Complaints	Complaint / Request Management System	Upgrade existing Double Helix MAC system to provide better access throughout department and enhance capabilities as needed. Need to coordinate conversion of this system with replacement of MACs with PCs.	ERM's consultant, Chuck Hinkle is making changes to the Helix version that will provide additional functionality and bring the structure closer to what will be used for the Dept. Complaint / Request Database. This will be the second module developed, so the Spills group can switch from MACs to PCs.	ISS will be approached first, but packages and consultants will also be considered.	ERM (Medium)	S Cooper, C Lesniak, E Kaufman	Storm Sewer Discharge Permits, Underground Storage Tank Database, DIG	The current database is Y2K compliant.	H14	Need to replace MACS with PCs and current database only runs on MACS.

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
Environmental Code Complaints	Complaint / Request Management System	Automate current manual system of tracking citizen complaints regarding environmental code issues.	A tentative determination has been made that this module does belong in the Complaint / Request Tracking system rather than with PIER. It will be designed along with the Stormwater module.	ISS will be approached first, but packages and consultants will also be considered.	ERI (Medium)	S Scroggins, G Bostick	Cease and Desist Orders, Code Inspection, DIG, PIER, Complaint / Request Tracking System	Only tracked by paper now. New system will be Y2K compliant.	H15	Small number of complaints generated, but it would be useful to have access to other complaints.
CAFs	Complaint / Request Management System	Module to provide better link between CAF System and Complaint Management System. Module will allow for the tracking of CAFs.	Some portions of this module may be written and included with the Stormwater Complaint / Request module to allow for CAF tracking.	Look at combination of ISO (enhancement of ACAP) plus ISS (addressing and GIS link) programming. Also consider packages.	SWM (High), WE, ERI (Low), ERM (Low)	P Mayo Clark, J Hamilton, J Guerrero, S Cooper, G Clayton, K Shay	DIG	Only tracked by paper now. New system will be Y2K compliant.	H16	High profile need, but not as critical as other projects.
Missment Model	Master Plan Applications	A method to update the coverages over time is needed as well as conversion to NAD 83. Needed for Phase II of the MP.	Cleanup work needed. ERM is getting a cost estimate from CRWR for this work (status as of 7/98).	CRWR	ERM (High)	E Peacock	Monitoring: Field Sampling, Water Quality Sampling Sites	Not sure if this is an issue with this system.	H17	Not as high a priority because Phase II of the Master Plan has been postponed for now.

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
Medium Priority Projects (listed in order)										
Bridge Elevations	Drainage Infrastructure Management System	Link bridge inventory with HEC RAS output. Produce report and maps.	Spreadsheet created by Watershed Engineering has a lot of this information, but it does not link to Bridge Inventory. Project on hold for now.	Nothing is being considered at present.	WE - Flood Control, FEWS	A Scharlach, D Walker, E Poppitt	Floodplain GIS, DIG, Flood Control Master Plan Application	Only tracked by spreadsheet now. New system will be Y2K compliant.	M1	
Open Waterway System	Drainage Infrastructure Management System	Set up a system similar to that of Pond Tracking. The modules would include Open Waterway Inventory (would require ID of reaches), Inspections, Maintenance, and O&M Waivers).	No work on this project currently being done. When Pond Tracking System is being specified, this system and the Storm Sewer System will be discussed.	This system should be similar to Pond Tracking. If ISS does that system, they should be able to do this one as well.	SWM (Medium)	F Houston, J Guerrero, A Romero, J Grube, G Oswald	Complaint/Request Management System, Floodplain GIS, Pond Tracking, DIG	Will be Year 2000 Compliant	M2	
Storm Sewer Tracking System	Drainage Infrastructure Management System	Set up a system similar to that of Pond Tracking. The modules would include Storm Sewer Inventory (would include Large Infrastructure Items), Storm Sewer Inspections, Work Orders, Maintenance History, Inlet Filter System, and a link to the DIG.	No work on this project currently being done. Need to DIG done first or at same time this system is being developed.	This system should be similar to Pond Tracking. If ISS does that system, they should be able to do this one as well.	SWM (Medium)	F Houston, J Guerrero, A Romero, J Grube	Complaint / Request Management System, Floodplain GIS, DIG, Large Infrastructure Items (coverage)	Will be Year 2000 Compliant	M3	
Erosion Control	Master Plan Applications	Automation of Chan contract data into query and data entry application.	Work is being done to meet the Master Plan, but application has not been developed, nor are their plans to do so soon.	More information needed to determine this.	WE - Erosion Control	G Clayton, A Winer	Complaint / Request Management System, Erosion Control Master Plan Application	Will be Year 2000 Compliant	M4	
Hydron Interface	Monitoring	An application used to interface with Hydron database and take summary data from Hydron and make it available to other applications.	Hydron has been implemented and is currently in use. The Hydron Interface will be a later project.	Nothing is being considered at present.	ERM - Water Quality (Medium)	G Chang, J Hubka, R Robinson, M Turner, C Herrington	Field Sampling, SLIM, FEWS, ERM Site Table	Will be Year 2000 Compliant	M5	

Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
CAPRIS	CAPRIS	Access to W&WW and Public Works CCIP Tracking System module called CAPRIS.	WPD Project Managers are being kept informed of the status of this project. Work is underway to incorporate TCIPR into it. Plans are to implement during the 1998/1999 Fiscal Year. The GIS coverage issue hasn't yet been addressed.	W&WW has hired a consultant who is working with ISS programmers on this project.	ERM - Water Resource Evaluation (Low), WE - Erosion Control	S Heumann, G Kosut, M Newman, E Peacock, L Tull, J Guerrero, C Brading	CIP Projects (GIS Coverage)	Will be Year 2000 Compliant	M6	Moved up to medium status because it has become an active project.
Barton Springs Permits	Barton Springs Permits	Incorporate this small, Excel database into the Maintenance Management System.	Currently being tracked in FileMaker Pro Database maintained by Neil Galati. Plan to incorporate into PIER.	Nothing is being considered at present.	ERI (Low)	N Galati, S Scroggins	Pond Tracking, PIER	FileMaker Pro is Y2K compliant.	M7	Moved up to medium status because will be incorporated into PIER this year.
Cease and Desist Orders (Red Tags)	Cease and Desist Orders	FileMaker Pro database is working fine. This should ultimately be included in other systems (ie, Code Inspections, Complaints, PIER).	Currently being tracked in FileMaker Pro Database maintained by S Scroggins. Plan to incorporate into PIER.	Nothing is being considered at present.	ERI (Low)	S Scroggins	Complaint / Request Management System, Class C Misdemeanors, PIER	FileMaker Pro is Y2K compliant.	M8	Moved up to medium status because will be incorporated into PIER this year.
Class C Misdemeanors	Class C Misdemeanors	FileMaker Pro database is working fine now, but will eventually be a module to link to Complaint and Pond databases	Currently being tracked in FileMaker Pro Database maintained by S Scroggins. Plan to incorporate into PIER.	Nothing is being considered at present.	ERI (Low), ERM (Low), Stormwater (Low)	S Scroggins, S Cooper, J Guerrero	Complaint / Request Management System, Class C Misdemeanors, PIER	FileMaker Pro is Y2K compliant.	M9	Moved up to medium status because will be incorporated into PIER this year.
Low Priority Projects (listed in order)										
NPDES Permit	Regulatory Database	An application related to the NPDES Permit has yet to be determined.	Nothing is being considered at present. Waiting for more information.	Nothing is being considered at present.	ERM (Low)	J Pantalion	TBD	Will be Year 2000 Compliant	L1	
Easements	Floodplain Management System	Expand small database used by Floodplain Office and add interface. Make available to Maintenance Planning.	Excel spreadsheet being maintained by Flood Control. No work on this project currently being done.	Could make this part of Floodplain GIS System or Maintenance Management System.	WE - Flood Control, SW - Maintenance Planning (Med)	A Scharlach, R Windsor, D Roberts, J Guerrero	Floodplain GIS, DIG, Maintenance Management System	Only tracked by spreadsheet now. New system will be Y2K compliant.	L2	

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
Sites and Subdivisions	Floodplain Management System	Expand small database used by Floodplain Office and add interface.	FoxPro table being maintained by Flood Control. No work on this project currently being done.	Could make this part of Floodplain GIS System.	WE - Flood Control, ERI	A Scharlach, R Windsor, D Roberts, R Gilbert	Floodplain GIS, PIER	FoxPro 2.6 version not Y2K compliant, but there is a workaround. New application will be.	L.3	
Document Tracking Database	Document Tracking Database	Database that will be used to determine the location of Master Plan and other Department documents.	ERM Library Database already in existence (MS Access), but needs updating. MP document tracking not yet designed.	Nothing is being considered at present.	All Divisions	K Shay, Ellee Peterson	May link to other department databases.	Current application in Access is Y2K compliant.	L.4	
Water Quality/EII	Master Plan Applications	Program the EII process, including the parameters used in the WQ EII calculation. Include module to prioritize problem areas. Need to have this for Phase II of the MP in 1.5 yrs.	Not sure of current status or exact needs here.	More information needed to determine this.	ERM - Water Resource Evaluation (Low)	E Peacock, P Hartigan, M Turner	Field Sampling, Site Management System	Will be Year 2000 Compliant	L.5	
Joint Water Quality Database	Monitoring	Evaluate need for and/or upgrade of existing Joint Water Quality Database. The data from other agencies may no longer be needed or will be merged into Field Sampling. The rest of the data will probably go into Hydron.	No work on this project has been scheduled	Any work that needs to be done will either be by George Chang's staff or ISS.	ERM - Water Quality (Low)	G Chang, J Hubka, M Turner, B Bai	Field Sampling, Hydron Interface, Site Management System	Was assured by B Bai that there are no Y2K problems with this database, but it has not been certified.	L.6	
Regulatory Compliance Tracking	Regulatory Database	This would be a combination ordinance lookup system and regulatory compliance tracking application.	Some of the ordinance information is on-line and available via the Intranet. Steve Willkenson is the contact. What the regulatory compliance tracking application will contain has not been discussed.	This is probably an ISS project if we need to request to have something done.	ERM - NPDES (Low)	J Pantalion, P Murphy, L Tull, S Cooper, F Houston	NPDES Permit, PIER, Development Sites and Open Land (GIS Coverages)	Will be Year 2000 Compliant	L.7	

**Watershed Protection Department
Proposed and in Process Database/GIS Projects
Status Update - Fourth Quarter, 1997/1998**

Application Name	Database Name	Purpose/Description	Current Status and Next Steps	Resources being used or Considered	Divisions Needing Access and Division Priority	Project Teams and/or Contacts	Database/GIS Links	Year 2000 Compliance	Rank	Justification for Rank
Completed Projects										
RSMP Database Application	RSMP	Automation of raw FoxPro table into Visual FoxPro application to track RSMP projects.	Visual FoxPro application complete and installed 4/98 with dual data entry into old database. Report and query interfaces completed and fully installed 6/98. Enhancements will be made over time and plan is to eventually convert to Oracle.	John Tibbetts of ISS Programming wrote application. Ron Cook completed and installed the application.	WE - RSMP, SWM	M Vigil, J Tondre, G Taffinder, S Heumann, A Winer	Land Development Review, DIG, RSMP Sites			Completed and installed 4/98-6/98
Prioritization Application	Master Plan Applications	Automate process of taking scores from the various missions and producing map and report output which indicates where the priority problem areas are for all missions.	Completed. Master Plan Tool Box project will be front end and documentation for this application.	Colleen Hughes of CDM worked on this Application.	All Divisions	J Hamilton, J Pantalion	Other Master Plan Applications, Floodplain GIS, FEWS Sites, Structure Elevations			Completed 2/98
Flood Control Application	Master Plan Applications	Automate process of taking scores from the various missions and producing map and report output which indicates where the priority problem areas are for all missions. Also includes calculation of flood threat.	Completed. Master Plan Tool Box project will be front end and documentation for this application.	Colleen Hughes of CDM and Ying Li of ISS worked on application.	All Divisions	J Hamilton, J Pantalion, A Scharlach, D Walker, A Winer	Other Master Plan Applications, Floodplain GIS			Completed 2/98

APPENDIX D
GENERATED WORK PLANS

- D.1 FLOODPLAIN GIS**
- D.2 DRAINAGE INFRASTRUCTURE GIS**
- D.3 SITE MANAGEMENT APPLICATION**

APPENDIX D.1
FLOODPLAIN GIS WORK PLAN

**WORK PLAN
FOR THE
DEVELOPMENT
OF A
FLOODPLAIN GIS**

PREPARED FOR:

**WATERSHED PROTECTION DEPARTMENT
CITY OF AUSTIN, TX**

PREPARED BY:

**CAMP DRESSER & McKEE INC.
AUSTIN, TX**

JUNE 1998

**WORK PLAN
FOR THE
DEVELOPMENT OF A
FLOODPLAIN GIS APPLICATION**

The purpose of this work plan is to design, develop / select , and implement a suite of GIS based tools to support the Watershed Engineering Division, Watershed Protection Department in creating an ArcView based geographic information system (GIS) to be used by Division staff and, eventually, the general public over the Internet. The application will be built, tested and implemented for the Watershed Engineering Division with access over the Intranet to other City departments and with public access over the Internet. The GIS will be developed by building upon the ArcView "Viewer" system developed by the City's ISS Department plus the use of other Internet technology tools. Under this work plan, the GIS application will, at a minimum, incorporate the following capabilities:

- Display Three Flood Plain Delineations - 1) Future Conditions 25 year; 2) Future Conditions 100 year; and 3) FEMA Current Conditions 100 year.
- Graphically identify flood prone building structures.
- Provide queries to identify flood prone structures by watershed, depth of flooding, frequency of flooding, specific reach, change in floodplain elevation, and link customer mail-out address list to queries.
- Maintain attribute data for flood prone structures and land parcels, such as
 - watershed
 - geographic location
 - lowest floor elevation
 - water surface elevation (WSEL)
 - easements
 - street address
 - Division
 - subdivision, phase, lot/block
 - land parcel tax ID number
 - FIRM panel number
 - Flood hazard zone
 - FEMA elevation certificate (record notation and raster image)
 - Building Permit number
 - Resource Type
- Provide INTERNET Access via MapObjects (MO-IMS).
- FAX and / or mail a customer response form letter

- Provide watershed hydrologic and hydraulic model support and maintenance for the following
 1. HEC-1 and HEC-RAS models resident within GIS
 2. hydraulic cross-sections and baseline graphic and attribute data management
 3. watershed/subwatershed delineation and hydraulic x-section determination from TIN / DTM
 4. floodplain delineations from TIN / DTN and X-Section WSEL
 5. landuse/impervious cover graphic data management including integration of hydrologic subunit characterization parameters

The initial GIS application will be for the Waller Creek watershed with capability for expansion for up to 60 watersheds. The following tasks will be undertaken in this work plan.

PHASE 1 - FEMA INFORMATION MODULE

This phase of the project is designed to build the GIS application required to support the Division's current operations related to FEMA floodplain management. Phase 1 will be completed by the end of 1998.

Task 1.1 – Evaluate Data Resources

This tasks will assist Division staff in organizing and reviewing the data required for the application using the pilot watershed – Waller Creek. City staff have already begun to develop the three primary data sets – 1) FEMA 100 year floodplain boundaries via the Q3 program; 2) parcel polygons using GIS; and 3) the TCAD parcel data linked to the parcel graphics. Other supplementary data sets will be researched for potential use in the application. These data sets may include but not be limited to:

- Existing floodplain database (FoxPro), Some cleanup will be required.
- Certificates of Elevation (CE) and Letter of Map Revision (LOMR), etc.
- River network (from GIS)
- Topography (from new city base map)
- Roads, buildings, other references (defined base map)
- Address file from ISS
- Watershed boundaries from ISS
- FEMA information (FIRM panel number, etc.)
- Easements
- Parcel attributes (address, Division, subdivision, etc.)

City staff will provide the Waller Creek data sets and all known available

information on existing data sets within the City of Austin and the State of Texas for use in this task.

Division staff will also provide written review comments on the task memorandum within 30 days of receipt.

Task Product – a memorandum describing data sources, accuracy, content, applicability, needs for additional data and recommended update frequency plus the procedures required to maintain the different data sets.

Task 1.2 – Develop Floodplain Boundary Coverage

This task will review the work completed by the City on the FEMA Q3 Flood Data and will confirm that the FEMA 100-year flood boundary is functional in ArcView for the Waller Creek watershed. Any additional efforts required to improve the data set to make it compatible for use at the land parcel scale and for estimation of water surface elevations will be completed and documented for subsequent use in other watersheds. This task will utilize the ArcView applications developed for the Department's master planning process as a basis for this task.

It should be noted that base flood elevations are **not** provided with the vector Q3 data sets from FEMA and that FEMA does **not** recommend estimating elevations using this data. FEMA recommends all base elevations be taken directly from the manual paper flood insurance rate maps (FIRM).

This task will also develop an algorithm to establish the water surface elevation of the selected parcel in reference to the FEMA floodplain boundaries. This algorithm will be reviewed and approved by Division staff before implemented in subsequent tasks.

Division staff will provide the FEMA Q3 flood data in ArcView format for use in this task. Division staff will also provide the appropriate FEMA water surface elevations in digital format for use in the application.

Task Product – an enhanced ArcView file of the FEMA 100-year boundary with capability for estimating water surface elevation at the land parcel level along with documentation on its use.

Task 1.3 – Define Internet Application Requirements

This task will define the Map Objects utilities and the hardware specifications of the WPD Internet server including enhancements to existing servers and network infrastructure. The City will provide technical staff to attend the required

meetings to define the Intranet hardware and software environment and will also provide written review comments on the task memorandum within 30 days of receipt.

Task Product – a memorandum describing the hardware specifications to be used in the Internet application and a recommended schedule for procurement, as necessary.

Task 1.4 – Import Data to ArcView and Populate Attribute Files

Based on the results from Task 1.1, this task will import all of the data sets referenced in Task 1.1 into ArcView for use by Division staff. The City's ArcView based *VIEWER* application will be utilized as a base set of tools with which to view and display the GIS coverages being built for this application. The activities to be completed in this task include:

- Import Existing Floodplain database and review the existing FoxPro database to determine which fields are needed in ArcView. Also, determine which fields will be updated by GIS application and design the database requirements.
- Import features from the City's new planimetrics.
- Import the FEMA 100-year flood boundary (already in ArcView shape file format).
- Import all Letters of Map Revisions (LOMR's) and develop a floodplain boundary coverage for Waller Creek by adjusting the FEMA 100 year floodplain boundary with the LOMR's.
- Import base map features for the Waller Creek watershed from the City's land parcel polygon GIS data developed in Task 1.1 and provide a working base map in ArcView for the Floodplain GIS.
- Import the TCAD parcel attributes based upon the link developed by the Division staff as described in Task 1.1
- Plot test map of FEMA floodplain boundary, parcel polygons and City of Austin base map for the Waller Creek pilot watershed.
- Conduct a review session with Division staff.
- Produce a test plot of a parcel map for a watershed using the available data
- Demonstrate land parcel attribute file features through screen displays and report style output.

Division staff will provide all data sets developed by the City and will attend a working review session. The City will provide a copy of the *VIEWER* application for use in this task and will also provide written review comments on the task memorandum within 30 days of receipt.

Task Product – a memorandum describing the data integration issues and

GIS coverages which are integrated with the City's *VIEWER* application.

Task 1.5 – Develop and Review BETA Application

This task will utilize the MapObjects IMS software and the utilities developed by the City GIS and will build the BETA application with an easy-to-use graphic user interface (GUI). This will include the following activities:

- **Define the Required Utilities** – City GIS staff will provide Map Objects utilities from other applications for use
- **Build a Start screen** – City of Austin with watershed boundaries
- **Build an Input Box** – User enters street address, tax parcel ID number, or subdivision lot/block of Parcel under question plus other required data (name, organization, etc.) into the supporting data base
- **Retrieve Parcel** - Application will take input address or tax parcel ID number or subdivision lot/block and display parcel (using the address matching utility from City GIS or parcel attribute file data)
- **Build a Select Box** – which floodplain boundary (2 Austin; 1 FEMA); only FEMA active in Phase 1
- **Display Parcel** - Display selected parcel, selected floodplain boundary and estimated floodplain water surface elevation on the screen.
- **Display OK?** – Select output product (plot output, printer output) and send to printer / plotter in standard letter format.

Using this prototype application, six user reviews will be conducted.

Task Product – a functional BETA application that meets the specifications and has been reviewed by the end users.

Task 1.6 – Develop and Test Final Application

This task will take the BETA application along with the end user review comments and build the final application on the Department Intranet. There will be additional programming efforts required to integrate the application as the end users request into the Intranet environment. Activities under this task include:

- Coordinate with Division staff to ensure the same look and feel as other Department sites.
- Implement the user review issues into the final Intranet application.
- Conduct up to six user reviews with final Intranet application to finalize the application design.

The City will provide access to the WEB master and will attend user review sessions (up to six). Division staff will also provide technical guidance in City

computer systems operations, as needed.

Task Product – a final application running on the Department's Intranet along with a draft user's guide.

Task 1.7 – Documentation and Training

This task will provide formal training to the Division's user community in a classroom style environment. Application users from throughout the City will be selected and a one-day training session will be conducted. Training and documentation will include procedures for expanding the system to other watersheds. In addition, the final documentation will be completed which will consist of a users manual and system management document plus on line help files for key functions as recommended by the user community. System management documentation will address hardware and software related constraints, WEB site issues, data base storage requirements, and application backup procedures.

Task Product – one training session; a user guide; system documentation; and on-line help files.

Task 1.8 – QA/QC Oversight

Division staff will define up to two visits by an independent contractor with experience in developing floodplain GIS applications. This task will provide an independent contractor for the QA/QC reviews.

Task Product – written comments related to the independent QA/QC review sessions (up to two).

PHASE 2 - GIS-MODELING INTERFACE MODULE

This phase of the project will address the GIS interface to the Division's current suite of hydrologic and hydraulic models used in establishing flood levels. Phase 2 will be completed by the end of 1998.

Task 2.1 – Research Available Vendor Packages

This task will research and develop information on up to four hydrologic and hydraulic modeling-GIS linkage software packages specified by Division staff and produce a listing of the features within each package. The research process will document each software package with respect to the performance criteria developed by the Division staff. If possible, copies of the software packages will be obtained for the review process.

Division staff will develop software performance criteria and will provide written review comments on the task memorandum within 30 days of receipt.

Task Product: a task memorandum describing the pros and cons of each software package reviewed and recommendations for the final application.

Task 2.2 – Conduct Vendor Demonstration

This task will coordinate and facilitate up to four software demonstrations of the pre-selected commercial packages.

Task Product: documentation of the vendor demonstrations and system recommendations for incorporation into the City's GIS.

Task 2.3 – Implement Selected Software Package

This task will assist Division staff in procuring and implementing the selected software from Task 2.2 on Division hardware. The selected software vendor will be provided with system implementation specifications or requirements that will define the final sign off on system implementation by Division staff. The sign off specifications will be developed by Division staff and will be used to certify that all functions required have been delivered.

Task Product: a functional GIS to model interface that meets the written specifications.

PHASE 3 - STRUCTURE DISPLAY MODULE

This phase of the project will enhance the master planning applications to display flood prone structures within a specific floodplain boundary. Phase 3 will be completed within a 6 month time frame.

Task 3.1 – Develop Required Data

This task will combine the required data sets as supplied by Division staff. These data sets include:

Water surface elevations (from HEC-RAS model),
Flood plain boundaries - FEMA 100, COA25 and COA100 (from Phase 1 and Phase 2) as developed using the software implemented in Phase 2 of this project,
Structure footprints from the City's new planimetrics (from the GIS – Phase 1),

Structure floor elevations and geocoding (from Master Plan application),
Parcel attributes (from Phase 1), and
Easements (from the city GIS).

Working data sets for the Waller Creek watershed will be developed using the data provided. Division staff will provide all the available data sets listed above in ArcView compatible format and will also provide floodplain boundaries as defined by the software product implemented under Phase 2 of this project.

Task Product: Waller Creek ArcView ready data sets for mapping the flood prone structures and drainage easements.

Task 3.2 – Customize Master Plan Application

This task will customize the Department's existing master plan ArcView application for use in identifying and mapping the flood prone structures. The same approach used in the master planning application will be utilized here; that is, the flood prone structure will be identified by comparing structure elevations with water surface elevations.

Task Product: an ArcView application for use with the Waller Creek data sets to identify flood prone structures and associated parcel data.

Task 3.3 – Import Pilot Watershed Data

This task will import the data required (Task 3.1) for identifying and mapping the flood prone structures. The Waller Creek working data set will include all three flood plain boundaries and associated water surface elevations as provided by Division staff. Given the flood water surface elevation, the flood prone structures will be identified based upon their first floor elevation (or lowest floor elevation). A map of these flood prone structures, for each flood level, will be created.

Task Product: an operational Structural Display Module and a map and associated attribute data of the flood prone structures in Waller Creek for each flood level.

Task 3.4 – Documentation and Training on Application and Procedures

This task will document the procedures of preparing the data sets and running the ArcView application. The documentation will be prepared and submitted for review to Division staff. Training on the use of the application will be provided in a single training session to Division staff.

Task Product: documentation of application and data sets and training on

the data sets and the use of the ArcView application, including the use of data queries, etc.

PHASE 4 - PUBLIC INTERNET MODULE

This phase of the project will migrate the Intranet application developed in Phase 1 of the project to the Internet for public use. Phase 4 will be completed 4 months after notice to proceed.

Task 4.1 – Determine Goals of Public Internet Application

Division staff will define the functions to be made available to the general public over the Internet. These functions may range from simple map display and print only capabilities to database updates from end user. Additional, on-line help files will be designed under this task to support the general public user.

Task Product – a memorandum documenting the functions to be made available to the general public.

Task 4.2 – Migrate Local Intranet Application to Internet

This task will migrate the local Intranet application to the City's WEB server for general public access. As the migration is conducted, certain functions of the application will be disabled. These functions will be defined in Task 4.1. Once the Internet version of the application is operational, it will be open to the general public and maintained by the City's WEB master in conjunction with the Watershed Engineering Division.

Task Product – an operating Internet application available to the general public with sufficient on-line help.

LEVEL OF EFFORT

Phase 1 - FEMA Information Module	Estimated Hours
Task 1.1 – Evaluate Data Resources	132
Task 1.2 – Develop Floodplain Boundary Coverage	80
Task 1.3 – Select Intranet Map Application	40
Task 1.4 – Import Data to ArcView and Populate Attribute Files	152
Task 1.5 – Develop and Review Application Prototype	192
Task 1.6 – Develop and Test BETA Application	228
Task 1.7 – Documentation and Training	128
Task 1.8 – QA/QC Oversight	80
Phase 2 – GIS-Modeling Interface Module	
Task 2.1 – Research Available Vendor Packages	64
Task 2.2 – Conduct Vendor Demonstration	48
Task 2.3 – Implement Selected Software Package	184
Phase 3 - Structure Display Module	
Task 3.1 – Develop Required Data	24
Task 3.2 – Customize Master Plan Application	88
Task 3.3 – Import Pilot Watershed Data	56
Task 3.4 – Documentation and Training on Application and Procedures	104
Phase 4 - Public Internet Module	
Task 4.1 – Determine Goals of Public Internet Application	56
Task 4.2 – Migrate Local Intranet Application to Internet	216
Estimated Total Project Hours	1,792

APPENDIX D.2
DRAINAGE INFRASTRUCTURE GIS
WORK PLAN

**WORK PLAN
FOR THE
DEVELOPMENT
OF A
DRAINAGE INFRASTRUCTURE GIS**

SECTION 1 - INTRODUCTION, BACKGROUND AND GOAL

The purpose of this document is to establish a work plan designed to guide the City of Austin Watershed Protection Department toward development of a drainage infrastructure mapping system based on Geographic Information System (GIS) technology. The ultimate goal is to establish a system which can both streamline and improve the many business processes of the Department through automation, thereby allowing limited resources to be more efficiently utilized. Such a system can result in many measurable benefits such as reduced time required to respond to and clean up spills, or to log and generate work orders to address customer complaints.

Detailed mapping of all City drainage projects was performed manually until the year 1974. At that time, a combination of factors led to the end of efforts to regularly update the maps. Since that time, several efforts to manually update the paper maps and/or to convert mapping operations to a digital system have been started, but none of these have been maintained on an ongoing basis.

Therefore, a major goal of this work plan is to set forth direction for a mapping program in such a manner that digital mapping and GIS will become a basic and integrated function across the Watershed Protection Department. To that end, this work plan seeks to lay out tasks designed to:

- ◆ Establish the necessary in-house resources to oversee the development of drainage infrastructure maps, and to maintain them on a continual basis. For example, a new full-time equivalent (FTE) employee is needed to maintain the GIS data on a daily basis.
- ◆ Establish a project team across divisions to review and modify/approve the intermediate work products building toward a complete system.
- ◆ Use existing data sources to the maximum extent practicable to leverage previous investments.

- ◆ Concentrate on pilot data products and maximize the development of "quick hit" applications which can demonstrate the immediate benefits of GIS development, and thereby secure funding for full system deployment.

The remaining sections of this work plan are organized as follows:

- ◆ Section 2 describes the steps taken to develop the work plan. Section 2 also briefly reviews a few of the discussions held and highlights the major drainage infrastructure mapping-related needs of Watershed Protection Department staff.
- ◆ Section 3 describes paper and electronic data sources identified during plan development, and how these sources may fit into the drainage infrastructure mapping picture.
- ◆ Section 4 lists the recommended work plan tasks and a generalized schedule for implementation.
- ◆ Section 5 presents three options to develop a working drainage infrastructure GIS for a test or pilot area. The three options vary principally in the scope of the area to be included and the level of detail in the data to be collected. General budget considerations, i.e. how existing funds might be allocated to the various work plan tasks under each option, are included in this section.

SECTION 2 - WORK PLAN DEVELOPMENT

This work plan was developed based on information gathered during a series of informal discussions with representatives of different Watershed Protection divisions. Discussions were conducted during the week of March 23-27, 1998. These discussions served to provide CDM with an overview of a few of the major business processes carried out by Watershed Protection, but by no means constitutes a detailed review of all processes and needs. Nevertheless, CDM is confident that the recommended elements of this work plan can place Watershed Protection on the road toward meeting some of the most basic and shared drainage infrastructure mapping and automation needs across the divisions.

Stormwater Management Division

The Stormwater Management Division is responsible for the overall operation and maintenance of the City's drainage infrastructure, including the storm sewer system (inlets, inlet filters, pipes and outfalls), open waterways (Town Lake, creeks and ditches), roadway drainage structures (bridges, culverts) and water quality and flood control ponds. Planned and complaint-driven maintenance (both routine and

emergency) is handled by this Division. The Division has oversight responsibility for most construction-related tasks that address localized flooding and/or erosion, including drainage facilities that have become inadequate over time and problems arising from private development activities.

The Stormwater Management Division has the most urgent need to know both the horizontal and vertical locations of drainage features. Locational data is important from both an absolute (relation to ground surface) and relative (relation to other mapped features such as easements and other utilities) standpoint.

The most critical need of the Division is the ability to locate all drainage infrastructure with a reasonable level of confidence. Currently, staff estimate that perhaps as much as 30 percent of the drainage infrastructure is not shown on existing maps. The depth of drainage structures is not available without time consuming research of record drawings, if they are even available.

Other important needs include applications relating to work order management, for both routine and complaint-driven maintenance, a document imaging system (to allow on-line retrieval of construction related documents from within the basic GIS interface), and coordination of utility and infrastructure activity.

Watershed Engineering Division

The Watershed Engineering Division is principally responsible for the Flood Early Warning System, Flood Plain information, Regional Stormwater Management Program, and Erosion Control and Flood Control Capital Improvement Projects. The long-range goal of the Division is direct GIS linkages from the drainage infrastructure data to hydrologic and hydraulic models. A separate effort to create a floodplain GIS is underway to meet some of the short-term goals of the Watershed Engineering Division. Watershed simulation models will be incorporated into the floodplain GIS.

Environmental Resource Management Division

Among the principal business processes of the Environmental Resources Management Division are the tracking and containment of hazardous spills within the City of Austin, and the identification of sources of contaminants identified in City waterways. Both of these processes rely heavily on the existing paper maps. Unlike the Stormwater Management Division, however, spatial accuracy is of less concern to the Environmental Resources Management Division. The primary need is for the accurate representation of system connectivity, so that, for example, a spill that entered the drainage system at a known location can be quickly traced to the outfall point and mitigation measures put in place. The ability to identify potential contamination sources upstream of a known outfall requires the same data, along

with information on the locations and types of businesses operated within the watershed.

Since a topologically connected network such as the drainage infrastructure system is rather easily traced by automated means, the two basic needs identified above are ideal candidates for "proof-of-concept" type applications which can show demonstrable results to gain support for system-wide GIS deployment.

Environmental Code Review and Inspection Division

CDM and representatives of the Division were unable to meet as part of the work plan development effort. However, this Division has expressed a need for comprehensive drainage infrastructure mapping as well as for drainage infrastructure-related applications which could be developed.

SECTION 3 - EXISTING DATA SOURCES

Base Map Data. CDM met with representatives of the Information Support Services (ISS) Department to review the base mapping effort. The City (as well as several surrounding counties) was recently re-flown and the end products from this effort, expected to be complete shortly after the beginning of 1999, will include detailed orthophotography, planimetrics data (transportation layers, hydrography, buildings, etc.) and topography.

ISS is currently reviewing the products for a 4 square mile pilot area in downtown Austin. After certain quality control issues are resolved for this area, the photogrammetrist will begin delivering data in eight planned shipments covering all of Travis County, from east to west. As stated above, all data for the County is expected in early 1999. Therefore, it appears that the need for base mapping will be met through this existing City project. All data products will be available in ARC/INFO formats. All data are based on the Texas State Plane Central Zone (Zone 5376), NAD 1983 coordinate system. CDM had previously acquired the draft pilot area data for a related project.

Cadastral Data. Travis County is the source for cadastral (real property) data. The extent, format and quality of the data were not evaluated during development of this work plan. The cadastral data will be required as a layer for most drainage infrastructure mapping system users, as well as for users of the flood plain mapping application being developed for the Watershed Engineering Division.

Utility Data. Data on the water and wastewater facilities within the City of Austin are available from the Water and Wastewater Utility. Existing vector data (ARC/INFO) is about two years out-of-date. Updates to the water and sewer layers,

as well as expansion of the tabular data contained in these coverages, is ongoing and is expected to be completed by the end of 1999. Meanwhile, geo-referenced raster images of the water and sewer maps, with hand-drawn updates, can be acquired from the Water and Wastewater Utility, if needed. These data are based on the same coordinate projection as the base map products.

Data availability from other utilities, such as gas, electric and phone, are unknown. In many areas of the country, these data are not shared due to competitiveness concerns.

Stormwater Data. CDM visited the File Room at One Texas Center to review the paper map storage and retrieval methods. The purpose of this visit was to establish a very basic understanding for how the existing paper maps might be used in developing a digital drainage infrastructure mapping system. A set of counter maps, updated through 1974 as discussed earlier, appear to be the only map set available (incomplete) in the file room. These maps are referenced to a City grid map located in the file room counter area. Notes on the maps can lead to the original plan and profile locations. These maps appeared to be in fair condition. Most of the older City projects covering the downtown areas are recorded in great detail on linen maps in notebooks kept in the counter area. These maps appeared to be in excellent condition.

There is a computerized system on-site for retrieving lists of plans using keywords such as street name. This system is undergoing revision to a new PC-based system. It is not clear when the new system will be in place. Many of the more recent sets of plans are placed in boxes in the file room area and are not indexed. Much of the knowledge required to identify the plans for a given area appears to be almost solely institutional (personal knowledge of the File Room staff).

The most promising source of drainage infrastructure data for use in the mapping project is the digital copies of the 1974 paper maps, possibly supplemented with additional information. Based on discussions with several City personnel, these maps were apparently digitized by Water and Wastewater Utility staff in the 1980's using Synercom, and were converted to ARC/INFO more recently. These digital maps appear to be the source of the paper maps used by the Stormwater Management and Environmental Resources Management Divisions.

CDM obtained copies of the original ARC/INFO coverages from a back-up tape stored at the City. There appear to be four coverages which include:

Inlets: Approximately 17,000 inlets located throughout the City. Detailed data is incomplete, but includes inlet type (curb or open), inlet size and the watershed in which the inlet is located.

Miscellaneous Points: Several thousand points (located throughout the City) which appear to include storm sewer manholes, outfalls, head walls, rip rap locations, and possibly other features.

Channels: About 7,500 channel records which appear to represent ditches and other open conveyances within the City. There appears to be spotty dimensional data on channel size, but no elevations.

Storm Sewers: Approximately 47,000 line segments which appear to consist primarily of closed conduit storm sewers. There is reasonably good dimensional information but it does not appear that vertical data collection was part of the effort.

CDM reviewed these data sets and determined them to be in the Texas State Plane Central NAD 1927 coordinate system. CDM projected the Inlets, Miscellaneous Points and Channels data sets into the NAD 1983 coordinate system to make them compatible with the pilot area data sets. CDM will also project the Storm Sewer data set, but due to its larger size it had not been projected as of this writing.

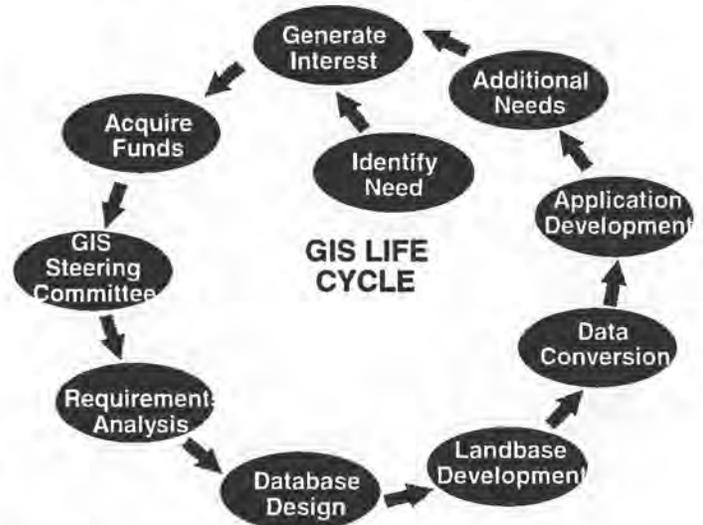
The data sets appear to overlay very well on the digital orthophotography within the pilot area, at least from a graphics standpoint. For example, many of the mapped inlets were located on, or very close to, the edge of pavement as visible from the orthophotography. Of course, field investigations will be required to verify that the types of features represented in the digital maps are in the correct locations and are coded properly with regard to feature type and dimensions, where noted. Nevertheless, the preliminary indications are encouraging that this data could be used as the basis for starting the drainage infrastructure mapping project. Since the storm sewers were reasonably well aligned with the inlets and miscellaneous points in the original data sets, this layer will also coincide reasonably well with the new data.

There are also several dBASE/FoxPro data sets which store data related to various aspects of the Watershed Protection Department's work processes, such as a complaint database, a spills database, and a storm sewer database which may provide some additional information which can be related back to the storm sewer digital maps. For most of the point databases (complaints, spills), only the site address can be used to potentially link records to a digital base map, through the process of geo-coding to the street centerline file.

SECTION 4 - WORK PLAN TASKS

This section provides detailed work plan tasks for a Phase I pilot area GIS implementation project. A Phase II Citywide roll-out would generally follow the same overall task structure, with a little more time required to complete each task, and a lot more time for data conversion. Phase I is generally intended to cover a 1-year period, with Phase II covering years 2 and beyond.

The work tasks are structured to follow the GIS life cycle. The Phase I Work Plan begins at the "Steering Committee" stage, and follows through the "Applications Development" stage. The "Requirements Analysis" stage is omitted from Phase I to concentrate available funding on visual products that can stimulate interest for the beginning of Phase II. The "Landbase Development" stage is also omitted since base map development is included in the Citywide effort under ISS.



It is important to note that Phase I covers a pilot system, with detailed GIS data development for a specified area, along with up to four key applications. The pilot system, and the associated tasks laid out in this Work Plan, is designed to lead back to the start of the life cycle in the context of a Citywide drainage infrastructure GIS. The recommended Phase I work tasks follow.

Phase 1

Task 1: Project Initiation (Month 1-3)

The Project Initiation task is intended to establish a clear understanding among all project team members as to the scope and objectives of Phase I. Completion of this series of sub-tasks will result in an updated version of this work plan which:

- ◆ Defines all tasks
- ◆ Documents Department and Consultant responsibilities
- ◆ Describes all pilot products
- ◆ Establishes a firm schedule for completion of Phase I Tasks

The Department has established a Database/GIS Team and plans to hire a GIS Coordinator as a compliment to the existing Database Manager position. To carry this Work Plan forward, we recommend that the Database/GIS Team assist the GIS Coordinator in the following areas:

- ◆ Review of all deliverables
- ◆ Review of Consultant technical memoranda

We propose the following sub-tasks for Task 1:

- 1.1 Create GIS Coordinator Position and Fill It
- 1.2 Conduct Phase I Work Plan Review Meeting
- 1.3 Finalize Phase I Work Plan and Schedule

Task Product – Phase I Work Plan and Schedule for Months 4-12

Task 2: Project Management (Month 3-12)

The project management task is intended to enable the GIS Coordinator and Consultant project manager to direct and coordinate the resources of the project team to complete all tasks on schedule and within budget, and to keep Department management informed on project status. The main tasks under project management, in addition to day-to-day oversight of the project, is periodic reporting.

The following sub-tasks are suggested for Task 2:

- 2.1 Conduct Monthly Project Coordination Team Meetings (10)
- 2.2 Prepare Bimonthly Project Status Reports (5)
- 2.3 Conduct Executive Briefing (1)
- 2.4 Conduct GIS Applications Workshop (see Task 6.1)

Task Product - Bimonthly Status Reports

Task 3: Develop Database Design for Pilot GIS (Month 3-4)

The purpose of this task is to identify the key databases and attributes to be developed for pilot implementation. It is envisioned that this task will be limited to identifying the key features required to implement the pilot system. The purpose of limiting the database design effort at this stage is to conserve the limited available funds so that they may be applied for use in pilot data conversion. As such, this task will be repeated (or expanded upon) prior to full system implementation. The database design will identify:

- ◆ Databases to be developed and tabular attributes to be collected
- ◆ Valid list and range criteria for tabular attributes
- ◆ Feature identification/naming conventions
- ◆ Linkages between database tables

The recommended sub-tasks for the database design task include:

- 3.1 Review Existing Department Databases
- 3.2 Identify Databases to be Included in Conversion
- 3.3 Develop Draft Database Design Report
- 3.4 Conduct Database Design Review Meeting
- 3.5 Finalize Database Design Report

Task Product - Database Design Report

Task 4: Develop Pilot Data Conversion/Upgrade Plan (Month 5-6)

The purpose of this task is to develop a detailed plan to upgrade the existing GIS data contained within the ARC/INFO coverages, and to convert the paper-based data required to supplement the electronic data and complete the data set for the pilot area. This plan will identify the data sources and record maps that will be used to complete the GIS within the selected pilot area. The plan will identify:

- ◆ assignment of primary responsibility for data conversion
- ◆ positional accuracy requirements that meet user needs within available resources
- ◆ data accuracy standards that can be optimized through effective data preparation and validation procedures
- ◆ use of quality control techniques and software during conversion
- ◆ development of a final Quality Assurance Plan
- ◆ maintenance of converted data until the full system is in place

The following sub-tasks are suggested:

- 4.1 Inventory and Review Pilot Area Source Materials
- 4.2 Conduct Data Conversion Interviews
- 4.3 Define Positional and Data Accuracy Options
- 4.4 Define Data Scrub/Rake Alternatives
- 4.5 Define Field Data Collection Alternatives
- 4.6 Develop Data Conversion Techniques
- 4.7 Define Quality Control and Quality Assurance Procedures
- 4.8 Define Maintenance Procedures
- 4.9 Define Role of City Personnel in Conversion
- 4.10 Develop Draft Conversion Plan
- 4.11 Conduct Conversion Plan Review Meeting
- 4.12 Finalize Data Conversion Plan

Task Product - Data Conversion/Upgrade Plan

Task 5: Pilot Data Conversion (Month 7-9)

The data conversion effort will concentrate on the upgrade of existing data and the collection of new data, to assemble the attributes identified in the database design document using the procedures identified in the Data Conversion/Upgrade Plan. At the close of Task 5, it is envisioned that the data will be contained and managed within a GIS environment, with native GIS query/view/edit/plot capabilities. However, the applications developed to allow user interaction with the data in the context of Watershed Protection Department business processes will not yet be complete. Although the specific sub-tasks for Data Conversion will be identified in the Data Conversion/Upgrade Plan, typical (since much of the spatial data within

the pilot area may be available from existing electronic sources, this may not be a "typical" data conversion effort) data conversion sub-tasks would include:

- 5.1 Assemble Data Sources for Pilot Area
- 5.2 Perform Data Scrub (Source Material Markups)
- 5.3 Perform Data Rake (Key-in of Attributes for each Record)
- 5.4 Assemble Completed Data Sets
- 5.5 Perform Quality Control Checks
- 5.6 Review Quality Control Reports and Make Corrections
- 5.7 Repeat Quality Control Checks
- 5.8 Perform Quality Assurance/Data Acceptance Tests
- 5.9 Accept and Maintain Converted Data

Task Product - Pilot Area Drainage Infrastructure System Maps/Data

Task 6: Scope and Develop Pilot Applications (Month 3 and 7-11)

This task is intended to identify up to four key applications which can be easily developed and demonstrated using converted data from the pilot area, and which meet some of the basic needs of the Watershed Protection Department. Most of the work under this task will be performed in conjunction with and after completion of the Task 5 Pilot Data Conversion effort. However, to better focus the Pilot Database Design effort, a GIS Applications Workshop is envisioned for early in month 3 of the project. In this Workshop, the Database/GIS Team will be expected to discuss and agree upon the key applications that will be implemented within the Pilot GIS. A critical aspect of this workshop will be a focus on and discussion of the relative complexity of different applications, and which can be implemented within the constraints of time and budget. Sub-tasks included in this effort are:

- 6.1 Conduct GIS Applications Workshop (same as 2.5)
- 6.2 Develop Application Templates (how application will work)
- 6.3 Develop Screen Layouts and Basic Interface
- 6.4 Develop "Alpha" Applications
- 6.5 Review/Test Alpha Applications (Users)
- 6.6 Refine Applications to Produce "Beta"
- 6.7 Develop Draft Documentation
- 6.8 Review/Test Beta Applications and Documentation (Users)
- 6.9 Finalize Applications and Documentation
- 6.10 Demonstrate Applications

Task Product - Application Documentation, Presentation

Task 7: Pilot Phase Review and Phase II Planning (Month 12)

The purpose of this task is to perform an in-house review of the pilot phase, concentrating on the problems encountered and the lessons learned. This task may also represent the opportunity to demonstrate Phase I products to senior management or elected officials, to secure additional funding for full-system roll-out. Suggested sub-tasks include:

- 7.1 Conduct Pilot Review Meeting
- 7.2 Develop Pilot Completion Report
- 7.3 Develop Draft Work Plan for Phase II
- 7.4 Conduct User Training for Pilot Data and Applications
- 7.5 Conduct Pilot Demonstrations as Appropriate

Task Product - Phase I Completion Report and Phase II Work Plan

SECTION 5 - PILOT AREA OPTIONS AND BUDGET CONSIDERATIONS

There are three potential options that we see for implementation of a pilot GIS within the City of Austin. These options vary in the location and extent of data collection suggested. The three options are:

1. Traditional Pilot Area. A pilot area is usually selected which provides an adequate cross-section of the features expected to be encountered on a Citywide basis. A pilot area should be big enough to allow estimates of jurisdiction-wide conversion costs to be made, but at the same time not so big as to require an extended period of time (and funds) to complete. For the City of Austin, it would make sense to have a "traditional" pilot area coincide with the Citywide GIS pilot area, which consists of four square miles in downtown Austin. Base map layers will be available for this area sooner than anywhere else within the City.
2. Citywide, Reduced Data Option. This option was discussed as a possibility during discussions with Department staff. Under this option, the Phase I project would concentrate on collecting data to identify the horizontal locations and connectivity of all storm collection system features within the City. The more detailed and time consuming efforts required to collect the vertical data would not be conducted as part of Phase I under this option.
3. Watershed Pilot Area. Under this option, an irregular-shaped pilot area corresponding to an existing drainage area would be selected. This option would be similar to option 1 except that resources would be concentrated on a single watershed rather than portions of several watersheds which would likely be involved with a traditional, rectangular pilot area. By selecting a

watershed which is politically "hot", the Watershed Protection Department may be able to more effectively leverage the Phase I investment to help secure funds for Citywide roll-out. After discussion with Department staff, it was suggested that the Waller watershed (5.8 square miles) should be used for analysis of this option.

Table 1 centers around estimated levels of City effort and Consultant effort to conduct each of the seven tasks, for the three pilot area options. Estimates are given in man-hours. While we have attempted to provide our best estimate of what it will take to complete each task, the limited time available to review existing data sources means that these estimates can be considered planning level (+/- 50%) at best, and could easily be off by an order of magnitude, especially for data conversion (Task 5).

In addition, the time to develop Pilot GIS applications under Task 6 is completely dependent on the applications selected for implementation. Our time estimate is based on complete development of four applications of moderate complexity. A very simple application could conceivably be developed in a week or less, while very complex applications could easily take 1000 hours or more to develop.



Table 1
Estimated Level of Effort (City and Consultant)
for Three Pilot Area Options

Pilot Area Option*	Task	Level of Effort (hours)	
		City	Consultant
All Options	1	200	40
All Options	2	440	120
Traditional	3	160	200
Citywide	3	120	160
Watershed	3	160	200
Traditional	4	800	400
Citywide	4	600	320
Watershed	4	800	400
Traditional	5	600	240
Citywide	5	4000	1200
Watershed	5	900	360
All Options	6	440	800
All Options	7	320	160
Traditional Total		2960	1960
Citywide Total		5120	2800
Watershed Total		3260	2080

* The "traditional" option assumes that drainage infrastructure data collection will include invert/depth data for a 4-square mile pilot area.

The "Citywide" option assumes that drainage infrastructure data collection will not include invert/depth data.

The "watershed" option assumes that drainage infrastructure data will include invert/depth data for a 5.8 square mile pilot area.

APPENDIX D.3
SITE MANAGEMENT APPLICATION
WORK PLAN

Site Management System City of Austin Drainage Utility Department

The implementation of a Site Management System developed to support the Drainage Utility Department's watershed management activities would greatly facilitate data sharing by establishing standardized site management procedures and creating an ArcView application which would provide department staff with a user friendly tool for identifying available data. The system would be developed first as a prototype to support ERM watershed monitoring and then be expanded for other divisions. The required tasks and proposed products are outlined below.

Task 1: Establish Standardized Site Management Procedures

Efficient data sharing is dependant on the ability to easily associate data collected from different monitoring programs. Monitoring teams must coordinate on establishing consistent naming conventions for sampling locations and parameters as well as developing standardized procedures for implementing new monitoring locations and/or programs.

1. Establish standard naming convention for sites.
 Evaluate using Master Plan reach naming convention.
2. Establish standard naming conventions for parameters.
3. Establish standard operating procedures for adding new sites.
4. Establish standardized data summaries for each data source for inclusion in the Site Management Application.

Task Product: Site Management SOP

Task 2: Develop ArcView Site Management Application

An ArcView application would serve as the primary tool for tracking site management activities for the Drainage Utility Department. It would first be developed for ERM monitoring programs. The application would include site coverages of all monitoring being conducted by ERM including detailed information describing each monitoring location, such as site name, description, and parameters monitored. Suggested attributes that might be tracked for each site are listed below.

Site Attributes

Site name	Parameters monitored
Description	Sampling intervals
Site ID	Site photo/video
Established date	Site visit log
Watershed	Field sketch
Site type (Water Quality, Rainfall, Flow...)	Contact person – department, phone
Years monitored	Master Plan site designation / FEMA station

Figure 1 shows an example of what the user interface might look like. Using reference coverages such as watershed boundaries, major roads, or planimetrics the user could zoom in on areas of interest and select

one or multiple sites to obtain information. A site information table highlighting selected sites would contain all the attributes available. Data summaries would also be available for each site. Data summaries may include summary statistics for each parameter monitored or daily totals for time series data. The format of data summaries would be defined for each data type / monitoring program individually in order to provide the most useful condensed version of the data available. The data summaries could be printed or downloaded to a spreadsheet or text file for future use. The application could also store multimedia information such as site photos, videos, or field sketches.

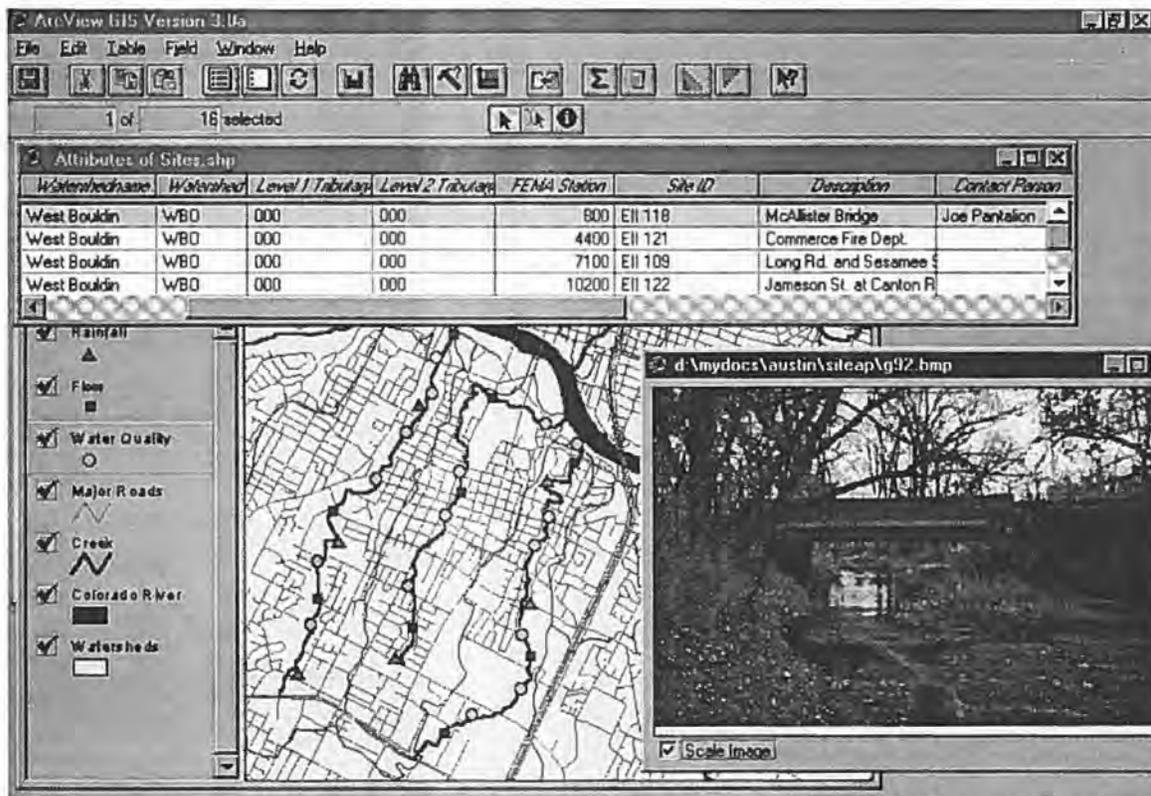


Figure 1: User interface showing selected site, site information table, and site photo.

The application would also allow the user to search for a known site based on attributes such as Site ID or select all sites where a selected parameter was monitored. The application would also provide routines for adding new sites, which would include populating required attribute data as defined by the Site Management Procedures established under Task 1.

Task Product: Site Management ArcView Application