COMPREHENSIVE WATERSHED MANAGEMENT
WATER USE TRACKING PROJECT

Implementation Plan

Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604-6899

Date	Revision	Description	Author
5/19/2004	1.0	Initial Release	SED/PLATO
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EXECUTIVE SUMMARY

Southwest Florida Water Management District
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INTRODUCTION

In December 2003 the Governing Board approved a study to identify the scope, cost and schedule for developing a system to support the Southern Water Use Caution Area (SWUCA) Recovery Strategy and associated rules. In January 2004 the District solicited proposals from information technology consultants with active Florida State Term Contracts and selected Plato Consulting, Incorporated to conduct this study. This document presents the results of this study and provides recommendations for implementing the system hereinafter referred to as the Water Use Tracking System (WUT).

PROBLEM STATEMENT

Rules and procedures are in the process of being implemented to support the SWUCA Recovery Strategy that have no current, automated way of being validated or assessed in their fulfillment of the needs of the plan. There currently is no formal or automated system that exists at the District to comprehensively track and analyze geographic and temporal trends in permitted and actual water uses within the SWUCA. The intent of the WUTS project is to develop this system. The project can be succinctly described as follows:

"Develop A GIS-based system that allows District employees and external customers to spatially and temporally track and analyze key Regulatory and Resource Management data."

Though initially intended to support the SWUCA Recovery Strategy, this WUT system will provide valuable analysis and reporting capabilities to support Water Use Permitting throughout the District.

STUDY METHODOLOGY

In accordance with the Rational Unified Process (RUP) for software development, Plato Consulting gathered system requirements through a series of workshops and interviews with over 25 District staff. Based on the requirements gathered through this process the primary system functions and architecture were defined, risks and opportunities were identified, and an implementation schedule and estimated resource requirements for creating the system were developed.

RECOMMENDATIONS AND IMPLEMENTATION PLAN

Plato Consulting, working closely with District staff, developed a system architecture that relies largely on existing hardware and software systems (the Comprehensive Watershed Management Oracle/ArcGIS Dissemination Server), utilizes web browser interfaces, and is based on industry standard Microsoft .NET software development technologies. The following recommended deliverables will be developed during the implementation phase of this project:

Deliverable 1 – WUTS Software, Documentation and Training. This deliverable includes all source code, compiled computer code, databases, installation, testing, documentation, and training required to

implement the system. In accordance with the RUP the system will be incrementally released in five iterations with a final completion date of June 30, 2005.

Deliverable 2 – Regulatory Database Metadata Documentation. This deliverable includes the development of documentation on the tables and business rules that comprise the current regulatory database (RDB). The resulting document supports the WUT Software, Documentation and Training and RDB Review deliverables as well as data scrubbing/collections efforts external to this project. This deliverable will be completed no later than December 30, 2004.

Deliverable 3 – Regulatory Database Review. The current District RDB was developed in the late 1980s and early 1990s using the best database technologies available at that time. It was designed primarily as a data entry and permit processing system and provides limited analytical capabilities. The use of older technologies and its limited purpose design, when coupled with the numerous modifications made to the system since its original release, has resulted in a system that is difficult to quickly modify in response to new business requirements, or to easily integrate with other District systems. In its current structure, the RDB will also increase the long-term costs associated with maintaining the WUT system. These issues, coupled with other projects that will result in the migration of scientific and business systems off of the IBM Z/OS mainframe server housing the RDB, point to the need to migrate the RDB to a structure that is more compatible with other District systems and is easier to maintain. The Regulatory Database Review deliverable includes a technical review of the current RDB and recommendations for migrating its functionality to a new system that provides transactional data entry and analytical capabilities, is easier to maintain and modify, and integrates more tightly with other District systems. This report will be delivered no later then December 30, 2004 so that funding for implementation can be placed in the FY 2006 budget.

PROJECT BUDGET

The total estimated cost for this project is $1,373,000**.** Plato Consulting will provide consulting services for one full time Project Manager/Database Analyst, three full time Analysts/Developers, one part time Documentation and Training Specialist, and one part time Analyst and Technical Writer Specialist on a time and materials basis from June 14, 2004 through June 30, 2005. Additional anticipated resources for supporting hardware and software for workstations, servers and network facilities are also included in the budget. The District will provide office space, access to District computing equipment and allocation of appropriate staff to provide requirements, data, technical expertise and business logic information.

Summary Project Budget.

Item	**Cost**
Consulting Services	$1,310,000
Software	23,000
Hardware	40,000
Total	$1,373,000

Implementation Plan

1 Introduction

In May 2003 the Southwest Florida Water Management District (District) identified the need to develop a series of computerized databases and software applications to support activities defined in the Southern Water Use Caution Area (SWUCA) Recovery Strategy and to validate and assess the results of the SWUCA II Rules. District staff conducted a review of the proposed system requirements and determined that existing computer systems did not provide the tools necessary to adequately track and analyze the data required for the SWUCA Recovery Strategy. It was also determined that because of the workload associated with existing projects that there are insufficient District staff resources to support the development of the systems required to support the SWUCA Recovery Strategy.

In December 2003 the Governing Board approved a study to identify the scope, cost and schedule for developing a system to support the SWUCA Recovery Strategy and associated rules. In January 2004 the District solicited proposals from information technology consultants on Florida State Term Contracts and selected Plato Consulting, Inc. to conduct this study. This document presents the results of this study and provides recommendations for implementing the system hereinafter referred to as the Water Use Tracking (WUT) system. This document is supplemented by the artifacts listed in Appendix A – Project Activities and Artifacts.

2 Problem Statement

Rules and procedures are in the process of being implemented to support the SWUCA Recovery Strategy that have no current, automated way of being validated or assessed in their fulfillment of the needs of the plan. A significant problem is that no formal or automated system exists at the District (manual or automated) to comprehensively track and analyze geographic and temporal trends in permitted and actual water uses within the SWUCA. Currently, tracking of spatial and temporal trends in permitted and actual water uses is done using manual and semi-automated methodologies conducted by a number of groups in the District. Examples of current work products include monthly summary reports of permitted pumpage developed by the Technical Services Department, annual water use estimates developed by the Conservation Projects Department, and ad hoc maps of permitted pumpage developed by the Mapping and GIS Section (MGIS). This approach is staff time intensive, and since data sources and methodologies vary between different groups conducting these analyses, it can lead to inconsistent or apparently conflicting results. These problems are further complicated by the fact that current database management systems and data collection activities were not specifically designed to support these types of activities. The result is that the current system does not adequately support the types of analyses required for successful implementation of the SWUCA Management Plan.

3 Project Statement

The project can be succinctly stated as follows:

"Develop a GIS-based system that allows District employees and external customers to spatially and temporally track and analyze key Regulatory and Resource Management data."

This system will support District activities defined in the SWUCA Management Plan and will validate and assess the results of the SWUCA II Rules. Although this system is being built to support the efforts within the SWUCA, it will support the same functionality for anywhere within the District.

4 Project Approach

The successful design and development of a software system is both an art and a science. It requires that the developers not only have expertise in software engineering, but to also have the communication skills necessary to elicit requirements from the stakeholders. These two factors are complicated by this project for the following reasons.

- *Software Engineering.* The WUT project will result in a relatively complex set of databases and software applications that will be developed primarily by Plato Consulting staff, but at the end of the project will be maintained by District staff. The successful transitioning of the system from Plato Consulting to the District requires a structured approach to designing, coding and documenting the system.

- *Identifying Requirements.* It is unusual in any software development project for user requirements to remain fixed throughout its entire duration. Users often are unsure of exactly how a system should function until they see it in operation. This problem is exacerbated for the WUT system project since the fundamental reason for developing the system is to support the SWUCA Recovery Strategy and associated rules. The recovery strategy and rules are still in the process of being fully defined, and therefore many system requirements are in flux. Also, many users of the system have not been involved in the SWUCA Recovery Strategy and are unfamiliar with its requirements. Since the WUT system is scheduled to be operational by June 2005 it is not possible to postpone development until all system requirements are fully defined or understood by all users. Instead, there needs to be a well-organized and managed approach to identifying and managing evolving user requirements.

4.1 Software Development Process

Several software development methodologies exist that can be utilized to address the issues describe above. The process best suited for this project is the Rational Unified Process (RUP). The RUP is an approach to software development that seeks to employ modern software development best practices:

- *Iterative Development.* The focus of the RUP is on developing and releasing a system in small useable pieces. Users see functioning software products early in the life cycle and are more involved in the development process, resulting in a system that meets their requirements. Developers can concentrate on delivering several small, high quality components, as opposed to a single large and unwieldy software system.

- *Requirements Management.* There is an emphasis on an organized approach to eliciting, organizing, communicating and managing project requirements. The RUP utilizes graphical requirements documentation/modeling tools as much as is possible since they are easily understood by users. It also recognizes that *a)* requirements change during the life of a project, *b)* requirements can be prioritized for implementation, and *c)* all requirements are typically not met in the initial release of the system.

- *Architecture Driven and Component Use.* The RUP emphasizes the use of a modular, object-oriented software architecture that relies as much as possible on pre-existing and reusable software components. This allows the developers to share code within the project, as well as to utilize code written for this application in other unrelated systems.

- *Configurable Process.* The RUP can be tailored to meet the demands of a wide range of software projects that range from a small system requiring two developers for two months to one that has one hundred developers for three years.

There are four phases to the RUP - Inception, Elaboration, Construction and Transition:

- *Inception Phase:* The goal of this phase is to achieve concurrence among the users regarding the system's scope, determine the primary interactions that will occur between the users and the systems (referred to as use cases), to identify major risks, develop an estimated project cost and schedule, and define an overall architecture (hardware, software and data) that will meet the projects goals.

- *Elaboration Phase:* This phase builds on previous work by thoroughly identifying the use cases (typically 80%), refining the project and schedule estimates, elaborating on the system architecture, developing an initial prototype that demonstrates the architecture and constructing software for high priority use cases.

- *Construction Phase:* During this phase the individual software components are developed, integrated, thoroughly tested and released to the users.

- *Transition Phase:* During this phase all aspects of the system are transferred to the customer, including software documentation, user documentation, training and the technical knowledge required to maintain the system.

4.2 Project Team and Key Activities to Date

In January 2004 the District assembled a team that provides Executive and Senior staff input and sponsorship, project management support and input from a broad spectrum of system stakeholders (Table 1). On February 23, 2004 a Senior Systems Analyst/Designer and Systems Analyst/ Designer from Plato Consulting began working onsite at the District's Brooksville offices on the Inception and Elaboration Phases. The intent was to meet the following goals by mid-May 2004:

- Identification of System Requirements and Use Cases
- Identification of Risks and Opportunities
- System Implementation Recommendations
    - Resources Necessary to Implement the WUT system
    - Project Implementation Plan and Schedule

These goals were to serve as the basis for continuing through the Construction and Transition Phases.

Table 1. Water Use Tracking Project Team.

Executive Sponsors
Gene Heath, Assistant Executive Director
John Heuer, Deputy Executive Director
Bruce Wirth, Deputy Executive Director
Project Sponsors
B. J. Jarvis, Records and Data Director
Mark Barcelo, Hydrologic Evaluation Manager
Project Manager
Steven Dicks, Mapping and GIS Manager
Plato Consulting
Trevor Campbell, Consultant Team Project Management
Timothy Milliken, Lead System Analyst/Designer
Tobin Crain, System Analyst
System Users/Stakeholders
Regulatory Business Experts (10 District Staff)
Scientific Business Experts (5 District Staff)
Technical Support Experts (6 District Staff)
Other Impacted Parties (2 District Staff)

The meeting of these goals has been successfully accomplished through a combination of facilitated workshops and one-on-one meetings with the stakeholders. The workshops were structured to promote interaction amongst stakeholders, and between the stakeholders and Plato Consulting staff, with the intent of identifying and prioritizing system requirements and potential risks. Follow-up interviews with staff were conducted to review and clarify requirements

captured during the workshops. The information gathered during the workshops and meetings was used to develop a series of standard RUP artifacts (see Appendix A – Project Activities and Artifacts).

5 Study Results

The following represents a summary of the findings resulting from this study.

5.1 Requirements and Use Cases

The WUT system is defined by the requirements gathered during the stakeholder workshops. The requirements are grouped into two categories, *Functional* and *Nonfunctional*. Functional requirements specify an action that a system must be able to perform. Examples include tracking permitted pumpage in the SWUCA or find all permits that impact a water body with an established Minimum Flow and Level. Functional requirements are documented in the **Requirements Traceability Matrix**. Nonfunctional requirements specify properties that are constraints upon the system. Examples include how fast the system must run, what computer it will run on or how reliable it must be. These are documented in the **Supplementary Specification**. Together these two types of requirements serve as the basis for developing the WUT system.

The functional requirements are used to determine how users will interact with the WUT system, and how the WUT system will interact with other District systems such as the Regulatory DB. In the RUP the users and other systems are referred to as *Actors*. The interactions between the actors and the WUT system are described in *Use Cases.* Actors and their interaction with the system are documented in the **Use Case Model and Use Cases** artifact. Use cases provide a means of communicating to the stakeholders how the WUT system will function, as well as providing the basis for developing and testing the software that the system is comprised of. The key use cases for the WUT system are listed below:

Process WUT System Startup. This use case will be used when an actor needs to access the system. It provides security and access control to the various functions of the WUT system. The WUT system is accessed through the standard Internet Explorer web browser used at the District.

Generate Well Package. This use case will be used when an actor needs to generate a well package file for import into Groundwater Vistas to model the impact of well/withdrawal changes.

Maintain Business Rule Parameters. This use case will be used when an actor needs to update business rule parameters within the WUT system. These parameters define how data are displayed (summed, average, etc.) to the user but do not impact the original data.

Maintain Water Use Estimates. This use case will be used when an actor needs to maintain water use estimation values for WUPs. The permitted quantity is known for all WUPs. However, the

actual pumpage is only known for those permittees that submit their data. For those permits that do not submit pumpage data, their water use is estimated, based on the data that is submitted from other wells. Currently, the water use estimates are stored in Excel spreadsheets and SAS datasets. Currently, this data can only be viewed in summarized form in the Water Use Estimates document published annually. This use case will allow the actor to import water use estimate data for each WUP into a database table that can be used by the WUT system. This will allow users of the system to view pumpage data, as an estimated value, even for permittees that do not submit their pumpage information.

Process Database Replication. This use case will be used when an actor needs to replicate and normalize (restructure) data that has been copied directly from a DB2 database on the IBM mainframe to a read-only Oracle database.

Maintain Quick Links. This use case will be used when an actor needs to manage the quick links located on the WUT Home Page. These are links to other websites that could be helpful to a WUT user. For example, a link to other water district's websites to possibly view WUP information could helpful. If a permit is requested near the boundary of the District, the ability to view data from the adjacent District would be helpful in determining the impacts of the new permit.

Maintain WUT News. This use case is used when the actor needs to maintain WUT news items for communication to users when they access the WUT Home Page. For example, the system administrator may need to inform WUT users that the system will be down for maintenance over the weekend. Using this feature, the system administrator can create a system maintenance news item that will be displayed between specified starting and ending dates. Displaying news on the WUT Home Page ensures that all users will have access to this important information when they first access the application.

View Change in Use Type or Owner. This use case will be used when an actor needs to view information about the relocation of permitted quantities associated with a specific WUP. The following information will be displayed pertaining to the relocation of a WUP:

- Historical used quantity
- Historical unused quantity
- Reasonable beneficial quantity
- The WUP that the relocated amount came from
- The WUP that the relocated amount went to
- The dates that any of these values took affect or changed

View Compliance Information. This use case will be used when an actor needs to view compliance data associated with a specific WUP. Depending on the data submitted by the permittee, compliance data could include pumpage quantities, meter readings, crop reports, well construction specifications, and any other condition data associated with a WUP.

View Crop Report Information. This use case will be used when an actor needs to view crop report data associated with a specific permit.

View Land Use Information. This use case will be used when an actor needs to view land use data associated with a specific WUP. Possible scenarios include viewing trends for specified areas or determining how water use changed as land use changes.

View Map. This use case will be used when an actor needs to view WUP information spatially using a map created with the functionality provided by GIS.

View Mitigation of MFL Impacts. This use case will be used when an actor needs to view information of how a specific WUP has mitigated its impact on a MFL waterbody. The following information will be displayed to show the mitigation of MFL impacts:

- The permits and their quantities that were bought out to mitigate the MFL impact
- The District's projects and their quantities used to mitigate the MFL impact
- The self-funded projects and their quantities used to mitigate the MFL impact

View Net Benefit Summary. This use case will be used when an actor needs to analyze Net Benefit data associated with a specific WUP. With the implementation of the new SWUCA rules, this process will allow the actor to track the Net Benefits.

View Report. This use case will be used when an actor needs to produce a report from within the WUT Report Library. It is anticipated that the WUT system will have a large number of reports available in its report library.

View Resource Information. This use case will be used when an actor needs to view water resource data associated with a specific WUP. The water resource data is collected by the permittee, and varies depending on the requirements of the permit including water quality data, water flows and levels, total dissolved mineral levels, and rainfall amounts.

View Use of Lapsed Quantities. This use case will be used when an actor needs to view the use of lapsed quantities associated with a specific WUP. The following information will be displayed pertaining to lapsed quantities associated with reduced, abandoned, and retired permits:

- The quantities a retired WUP has contributed to another WUP
- The quantities a WUP has received from a retired WUP
- The retired WUP that a lapsed quantity came from
- The quantities from the retired WUP available as lapsed quantities
- The WUP that a lapsed quantity went to
- Whether a WUP's quantity has been excluded from the lapsed quantity pool as a result of a land acquisition program
- The dates that any of these values took affect or changed

View Use of Quantities Associated With District Projects. This use case will be used when an actor needs to view the quantities used from District Source Augmentation Projects associated with a specific WUP.

View Water Use Permit. This use case will be used when an actor needs to view information about a specific WUP. This WUP information is collected at the time the permit is submitted and approved by the District.

View Water Use Permit Search. This use case will be used when an actor needs to search for and identify a WUP for analysis. The system returns basic information about the permit with the ability to get more detailed information regarding the permit (i.e., wells, Net Benefits, compliance data).

View Water Withdrawal Credit. This use case will be used when an actor needs to view water withdrawal credit information associated with a specific WUP. The following information will be displayed pertaining to the water withdrawal credits for a WUP:

- The offset quantity coming from an alternative source
- Where the alternative source coming from
- The Supplier of the alternative source
- The Receiver of the alternative source
- The distribution of the credit (50% of the offset) between the Supplier and Receiver
- The discontinued quantities to be stored in a standby permit
- The dates that any of these values took affect or changed

View Well Construction Information. This use case will be used when an actor needs to view well construction information that is associated with a specific WUP. Well construction data is information gathered during the construction and permitting of the wells. This information includes well depth, casing depth, well diameter, status code, drilling method, and completion date.

View Withdrawal Pumpage Information. This use case will be used when an actor needs to view actual pumpage data associated with a specific WUP.

5.2 Risks and Opportunities

Any complex project has an associated set of risks and opportunities. *Risks* are project variables that endanger or eliminate the success of the project. *Opportunities* are project variables that provide benefits to processes and activities outside of the project.

5.2.1 Risk Management

The purpose of risk assessment and management is to identify, address, and eliminate sources of risks before they become a threat to the successful completion of a software development project. Risk were documented during the stakeholder workshops and consolidated into the following groups:

- District Staffing Issues
- Data Quality Issues
- Database Integration Issues
- Single point of failure on the Unix side
- Data Availability Issues
- Changing Requirements
- Legacy System Issues
- External User's Use of Data
- Ease of Use
- Lack of User Involvement
- Consultant Staffing Issues

The **Risk Assessment and Management Plan** artifact provides the following information for each risk group:

- *Description*. A brief explanation of the identified risk group.
- *Related Risks and Symptoms.* A listing of the individual risks identified at the workshops that fall into the group including similar risks and/or things that could happen that indicate the risk is materializing.
- *Probability*. The likelihood that this risk will occur on the WUT project. For this assessment, risks are identified as High (very likely to occur), Medium (likely to occur) and Low (very unlikely to occur).
- *Consequence*. The outcome this risk could potentially have on the WUT project.
- *Mitigation Strategy.* General alleviation strategies that will be used to lessen the probability and/or impact of this risk on the WUT project.

The risks that were identified typify software development projects of this magnitude within large enterprises. Though no risk groups were identified that would make the project infeasible, four Risk Groups; District Staffing Issues, Data Quality Issues, Database Integration Issues and Data Availability Issues, were identified as needing to be closely monitored during the Construction and Transition Phases of the project.

5.2.2 Opportunities

Though the RUP does not specifically identify opportunities, they inevitably arise in projects of this magnitude. The following opportunities result from the risk mitigation strategies identified in the **Risk Management and Assessment Plan**.

Improved Software Development Methodology for the District. The District does not have a formally adopted methodology that employs modern software development best practices. The use of the RUP for this project provides the District with the opportunity to obtain mentoring in one of the leading software development processes. The WUT project, in combination with other consultant-led projects planned or underway, provide the District with a unique opportunity to review and evaluate various software development methodologies with the intent of formalizing a set of best practices for use on all District information technology projects.

Identification of Initial Requirements for a Redesigned Regulatory Database (RDB) System. The current series of databases that support the District's regulatory activities were designed using technologies that were current in the late 1980s and early 1990s. The RDB was primarily designed to support the transactional data entry processes associated with issuing permits. These two factors increasingly cause the following problems:

- It is currently difficult and/or time consuming to modify the existing system in response to new requirements such as those generated by SWUCA II. It is also difficult to integrate the RDB with systems such as the District's GIS that employ more modern technologies and design. This is primarily caused by a number of database design and hardware platform decisions were made because of hardware and software limitations in place in the late 1980s and early 1990s. While these hardware and software limitations no longer exist, the RDB design persists.

- There is an increasing divergence in the skill sets required to maintain the RDB and those required to maintain the increasing number of District systems that are based on newer technologies. Examples of these systems include GIS, Laboratory Information Management System (LIMS), Budget Research Analysis Software System (BRASS) and the Acorde Electronic Document Management System. This divergence limits the ability of the District to move software development staff between projects on different systems and increases overall operating costs.

The long-term solution to these problems is to redesign the RDB and migrate it to a hardware and software platform that is more cost effective to maintain and easier to physically and logically integrate with other District systems. While this is not a requirement of successfully implementing the WUT system, the project provides an opportunity to begin this process.

Update of the Documentation of System and Business Rules Associated with Regulatory Activities. The RDB has been modified extensively since its original implementation in the early 1990s. These modifications include both changes to the computer code and the business rules that are applied during the data entry process. In many instances the documentation of these changes is not available, difficult to understand, or lies within the personal knowledge base of a few key District staff members. The WUT project requires access to this business knowledge, and therefore a component of the Construction Phase includes the formal capturing of detailed information on the RDB. This documentation will support ongoing RDB maintenance activities as well as any redesign of the system. The documentation will also assist in identifying any key data gaps or inconsistencies in the database.

6 System Implementation Recommendations

The following recommendations for implementing the WUT system are based upon the work conducted by Plato Consulting staff. They have been reviewed by District staff and represent what is considered to be the best approach to successfully implementing the WUT system within the required time frame.

6.1 Resource Requirements

Software development projects can be viewed in terms of a triangle that depicts resources, time and features (Figure 1). Assuming that no one side of the triangle is fixed, increasing resources (funding or staffing) can increase the number of features. If one side of the triangle is fixed, then it becomes a limiting factor to the project. For example, if funding is limited, typically so will the number of features that can be implemented.

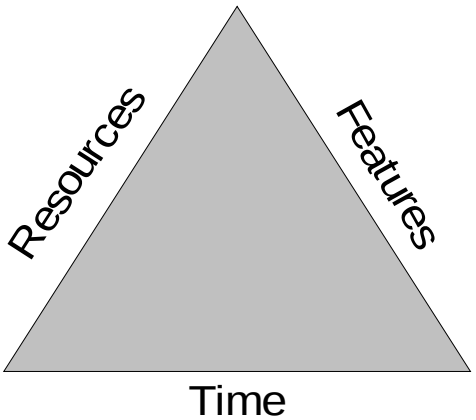

Figure 1. Project Triangle.

In the case of the WUT project, there are two limiting sides to the project triangle, resources and time. For this project resources are defined primarily in terms of District staff time and consultant staff time. Of these, the limiting factor is the availability of key Resource Regulation Division, Information Resources Department and Mapping and GIS Section staff to devote to the project until June 30, 2005. Adding additional consultant support will not positively contribute to the project since there will be bottlenecks associated with limited availability of District staff to actively participate in the project.

The project team recognized early in the process that meeting all of the proposed system requirements would be not possible given the limited availability of District staff resources. The focus therefore turned to identifying the resources (primarily consulting services) that can be effectively applied to the project to insure that the most critical system features (defined in terms

of requirements met and use cases realized) supporting the SWUCA Recovery Strategy will be met within the required time frame.

6.1.1 Consulting Resources

Based on a review and prioritization of the requirements it was determined that the following consultant resources would be required for the project:

Table 2. Consultant Resources.

RESOURCE	HOURS	DURATION	PURPOSE
Project Manager	2200	6/13/2004 – 6/30/2005	Project management, database design review, documentation development and review.
Analyst/Developers (3)	2200	6/13/2004 – 6/30/2005	Business requirements analysis, database development, coding, testing, installation.
Documentation/Training/ Test Specialist	1920	8/2/2004 – 6/30/2005	Develop system documentation, user training, system testing.
Analyst/Technical Writer	1200	6/13/2004 – 1/07/2005	Develop metadata for RDB.
MapDotNet Developer	308	6/13/2004 – 1/07/2005	As needed customization of MapDotNet software.

6.1.2 District Resources

The following are estimated District resources needed to directly support the project (this does not include staff required to implement SWUCA related data entry processes on the RDB or to correct any errors identified in the data in the RDB):

Table 3. District Staff Resources.

RESOURCE	HOURS	PURPOSE
Project Manager	220	Project management, financial oversight, document review
GIS Analyst	2200	Business requirements analysis, testing, data collection
GIS Supervisor	440	Code review, design review
Oracle Database Administrator	220	Review database design
DB2 Database Administrator	110	Assist in RDB review
Lead Programmer Analyst	220	Code review, design review
Senior GIS Analyst	110	ArcSDE geodatabase design support
GIS Analyst 3	110	ArcSDE geodatabase design support
Oracle Database Analyst	220	Oracle/Transformation Server support
Senior Systems Analyst	110	RDB metadata collection support
DB2 Database Analyst	110	RDB metadata collection support
Comp. Systems Supervisor	110	RDB metadata collection support
Regulation Program Director	110	Review system and provide final approval that the system meets the requirements of the SWUCA Recovery Strategy
Hydrologic Evaluation Manager	80	Review system and approval that the system meets the requirements of the SWUCA Recovery Strategy
Senior Attorney	40	Review and approve that system functionalities comply with

		District rule
Resource Regulation Stakeholder Team (2-3 staff)	110	Review analysis testing, approve screens and reports, user testing
Executive Sponsors	20	Final acceptance of the system.
Scientific Stakeholders	80	Review analysis methodologies, user testing
Remaining Stakeholders (each)	40	Participate in meetings, review documents, provide technical expertise
Total	4660	

Additional resource requirements are considered to be minimal and include:

- Four workstations,
- Two servers,
- Off the shelf software components, and
- Facilities (consultant, offices, phones, furniture, supplies, etc.).

6.2 Project Deliverables and Schedule

This project has three distinct sets of deliverables that are described below.

6.2.1 WUT System Software, Documentation and Training

The core deliverables of the WUT system include the following artifacts:

Table 4. WUT System Construction and Transition Artifacts.

ARTIFACT	FORMAT	FORMAL DELIVERABLE
Software Architecture Document	Microsoft Word	Yes
Architectural Proof of Concept	Visual Studio .NET	No
Deployment Model	Enterprise Architect	Yes
Design Model	Enterprise Architect	Yes
Navigation Map	Microsoft Word	No
Test Plan	Microsoft Word	Yes
Test Cases	Microsoft Word	Yes
Test Evaluation Summary	Microsoft Word	Yes
Software Builds	Visual Studio .NET	Yes
Release Notes	Microsoft Word	Yes
Training Materials	RoboHelp / Microsoft Word	Yes

During the Construction and Transition Phases these deliverables will be developed and delivered during a series of five RUP Iterations. The use cases defined in the **Use Case Model and Use Cases** artifact are incrementally developed and released (in whole or part) within each iteration. The following is a summarized schedule (refer to the baseline **Iteration/Project Plan** for detailed mapping of use cases to particular iterations. This schedule was developed by Plato Consultants and is based on their expertise developing similar software products. In any large project there are a number of factors that can require that adjustments be made to the schedule. Examples of these factors include over/underestimation of effort required to develop a particular

component, changes to requirements, data availability or quality issues, equipment failures, changes in the project team or lack of availability/participation of stakeholders.

These factors, particularly over/underestimation of required development efforts tend to be higher in the early stages of the project when requirements and system architecture tend to be less well defined and potentially "non-participatory" stakeholders have not yet been identified. The recommended strategy for mitigating these factors includes the following:

Communications. The goal of these efforts is twofold. 1) Keep stakeholders involved, and therefore interested in the project. 2) Identify and resolve potential issues before they become project threatening. The following activities are intended to facilitate communications:

- Weekly Project Status Meetings that include the District and Plato Consulting Project Managers and the GIS Supervisor.
- Weekly Coordination Meetings between Plato Consulting developers and IRD staff.
- Monthly System Stake Holder Project Status Meetings.
- Monthly Written Project Status Reports submitted by District's Project Manager to Executive and Senior Staff Stakeholders.
- Use of Lotus Notes Team Room for routing of artifacts to stakeholders.

Earned Value Management. Earned Value Management is a methodology for determining cost and schedule performance of a project by comparing estimated work against completed work in terms of the cost value assigned to the work. While the use of Earned Value Management in software projects suffers from the weakness of the objectivity associated with accurately identifying percent of work complete for a software component, it does provide a good metric for monitoring project performance, particularly as the requirements and architecture become better defined in the later stages of the project. Plato Consulting's Project Manager will be responsible for overseeing Earned Value Management tasks.

Table 5. Project Milestones.

MILESTONE	COMPLETION DATE
Iteration 1	August 28, 2004
Iteration 2	October 4, 2004
Iteration 3	December 27, 2004
Iteration 4	February 28, 2005
Iteration 5	May 19, 2005
Transition Phase Begin	May 20, 2005
Transition Phase Complete	June 30, 2005

6.2.2 Regulatory Database Metadata Documentation

This deliverable will consist of developing documentation on the tables and business rules that comprise the current RDB. Data table structure information will be collected through a direct analysis of the RDB tables using SAS, SQL, Visio, Enterprise Architect and other tools as appropriate. Business rules and table relationships information will be collected through

interviews with key District staff in the Information Resources Department and Resource Regulation Division. The resulting document will support the WUT system deliverable, the Regulatory Database Review deliverable and data scrubbing/collections efforts external to this project. Final deliverables will be jointly defined during the initial stages of this effort by the District and Plato Consulting, but it is anticipated that it will include the following minimum information:

- Table Descriptions
- Table Relationships
- Column Descriptions
- Column Domains
- Entity-Relationship Diagrams
- Textual Description of Data Entry/Update/Delete Business Logic
- Known Data Issues

This deliverable will be developed by Plato Consulting's Analyst/Technical Writer. This task starts June 14, 2004 and ends December 15, 2004.

6.2.3 Regulatory Database Review

As discussed above in the Opportunities section, the current RDB is difficult to quickly modify in response to new business requirements or to easily integrate with other District systems based on more modern technologies. In its current structure, the RDB will also increase the long-term costs associated with maintaining the WUT system. This issues, coupled with existing or planned projects that will result in the migration of scientific and business systems off of the IBM Z/OS server that houses the DB2 RDB system, point to the need to migrate the RDB from its current database structure and hardware/software architecture to an Oracle-based database that is more compatible with other District systems. The purpose of the Regulatory Database Review deliverable is to review the current RDB and provide recommendations for migrating its functionality to a new system architecture that has the following minimum characteristics:

- Is amenable to modern object-oriented software development methodologies such as RUP or Extreme Programming.
- Can be spatially enabled through the appropriate use of Oracle Spatial and/or Environmental Systems Research Institute's ArcSDE technologies.
- Incorporates modern relational database capabilities to enforce referential integrity.
- Is amenable to modern three tier (database, business logic, presentation) software architectures.
- Has improved metadata support.

The RDB Database Review deliverable will be based upon information gathered as part of the other two deliverables, review of information collected as part of the Resource Regulation Division's Electronic Document Management System project, interviews with key District staff

and a review of similar systems at other water management districts. District and Plato Consulting staff will jointly define the final format of this report, but at a minimum it should provide the following information:

- Identification of database design weaknesses in the current RDB design.
- Identification of architecture design weaknesses in the current RDB.
- Recommendation for a new system architecture.
- Development of multi-year (2-4) migration strategy, including estimated funding requirements.

The Plato Consulting Project Manager and Analyst/Technical Writer will be responsible for delivering this report no later then December 30, 2004 so that funding for implementation can be placed in the FY 2006 budget. Refinement of this plan will continue for the duration of the WUT system project.

6.3 Project Budget

The total estimated cost for this project is $1,373,000 as defined in Table 6. A detailed budget is defined in Appendix B – Project Budget.

Table 6. Summary Project Budget.

Item	Cost
Consulting Services	$1,310,000
Software	23,000
Hardware	40,000
Total	$1,373,000

The primary contractor on the project is Plato Consulting. It is anticipated that specialized programming services will be required from I. S. Consulting. The District selected Plato Consulting in January 2004 through a competitive process under the terms of the Florida State Term Contract for Information Technology Consulting Services and in compliance with District Policy 150-1.

7 Appendix A – Project Activities and Artifacts

SIGNIFICANT PROJECT ACTIVITIES

Activity	Date
Request for Quotes Issued to Vendors on State Term Contracts	January 16, 2004
Vendor Selected	February 5, 2004
Purchase Order Issued to Plato Consulting	February 6, 2004
Plato Consulting Begins Work	February 23, 2004
Review District Information Technology Infrastructure	February 23-26, 2004
Executive Sponsor Stakeholder Workshop	March 2, 2004
Technical Support Stakeholder Workshop	March 3, 2004
Scientific Business Experts Stakeholder Workshop	March 4, 2004
Regulatory Business Experts Stakeholder	March 8, 2004
Requirements Refinement Meetings with Individual Stakeholders	March 9 –23, 3004
Requirements Review Workshop - All Stakeholders	March 24, 2004
Develop RUP Artifacts	March 25 - May 14, 2004
Final Project Report – Statement of Work	May 15, 2004

PROJECT ARTIFACTS

Artifact	Tools Used	Formal Deliverable
Vision Document	Microsoft Word	Yes
Project Glossary	Microsoft Word	Yes
Supplementary Specification	Microsoft Word	Yes
Use Case Model and Use Cases	Enterprise Architect / Microsoft Word	Yes
Requirements Traceability Matrix	Microsoft Word	Yes
Development Case	Microsoft Word	Yes
Storyboards	Visual Studio .NET	No
Software Requirements Specification	Microsoft Word	Yes
User Interface Prototypes	Visual Studio .NET	No
Change Management Plan	Microsoft Word	Yes
Risk Assessment and Management Plan	Microsoft Word	Yes
Iteration/Project Plan	Microsoft Project	Yes
Issues List	Microsoft Word	No
Programming Guidelines	Microsoft Word	Yes

8 Appendix B – Proposed Project Budget

CWM WATER USE TRACKING PROJECT – IMPLEMENTATION COST ESTIMATES

CONSULTING SERVICES - PLATO Consulting

TITLE	HOURLY RATE	HOURS	COST	NOTES
Project Manager	$ 130	2220	$ 288,600	June 14, 2004 - July 1, 2005
Developer 1				June 14, 2004 - July 1, 2005
Onsite Rate	$ 115	840	$ 96,600	
Offsite Rate	$ 95	1360	$ 129,200	
		2200		
Developer 2				June 14, 2004 - July 1, 2005
Onsite Rate	$ 115	840	$ 96,600	
Offsite Rate	$ 95	1360	$ 129,200	
		2200		
Developer 3				June 14, 2004 - July 1, 2005

Onsite Rate	$ 115	840	$	96,600	
Offsite Rate	$ 95	1360	$	129,200	
		2200			
Documentation and Training Specialist	$ 100	1920	$	192,000	August 2, 2004 - July 1, 2005
Analyst/Technical Writer	$ 100	1200	$	120,000	June 13, 2004 - January 7, 2005
Plato Consulting Subtotal			**$**	**1,278,000**	

CONSULTING SERVICES - I. S. Consulting				
TITLE	**HOURLY RATE**	**HOURS**	**COST**	**NOTES**
Developer	$ 100	308	$ 30,800	As needed MapDotNet development.
			$ 1,200	Travel (10 days)
ISC Consulting Subtotal			**$ 32,000**	

ITEM	**UNIT COST**	**QUAN.**	**COST**	
Laptop Computers	$ 2,500	3	$ 7,500	Consultant development environment.
Build Workstation	$ 2,500	1	$ 2,500	
Testing and Integration Servers	$ 15,000	2	$ 30,000	Support testing environment.
Hardware Subtotal			**$ 40,000**	

SOFTWARE				
MSDN Enterprise	$ 2,150	4	$ 8,600	3 for developers, one for build machine.
Visio Professional w/Maintenance	$ 550	3	$ 1,650	
Dev Partner with Maintenance	$ 1,800	3	$ 5,400	
COTS .NET Components	$ 5,000	1	$ 5,000	
Verisign Cert. For VPN Appliance	$ 950	2	$ 1,900	
Enterprise Arch. Prof.	$ 150	3	$ 450	
Software Subtotal			**$ 23,000**	
TOTAL ESTIMATE PROJECT COST			**$ 1,373,000**	