King County

GIS Production Operations and Maintenance Plan

Document History

Date	Who	Description
3/19/2002	GIS Technical Committee	Document completed and discussed at the GIS Technical Committee meeting.
4/1/2002	George Horning	GIS Technical Committee consensus vote for submitting document to the GIS Oversight Committee.
4/5/2002	Michael Berman	Submittal of document to the GIS Oversight Committee.
5/28/2002	GIS Technical Committee	Document amended with new content for Section 4.6 Department of Public Safety.

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1 Introduction

This document describes the state of Geographic Information Systems (GIS) in King County. It represents the culmination of a collaborative effort by staff throughout the County to document *all* GIS efforts from participating agencies and their role in accomplishing specific King County business functions. GIS is critical to the business of King County as demonstrated in its use for property valuations, development and environmental regulations, emergency services, election services, natural resource management, wastewater facilities planning, public health, transportation, policymaking, and growth management. Now, with this document, one can see how integral this technology is.

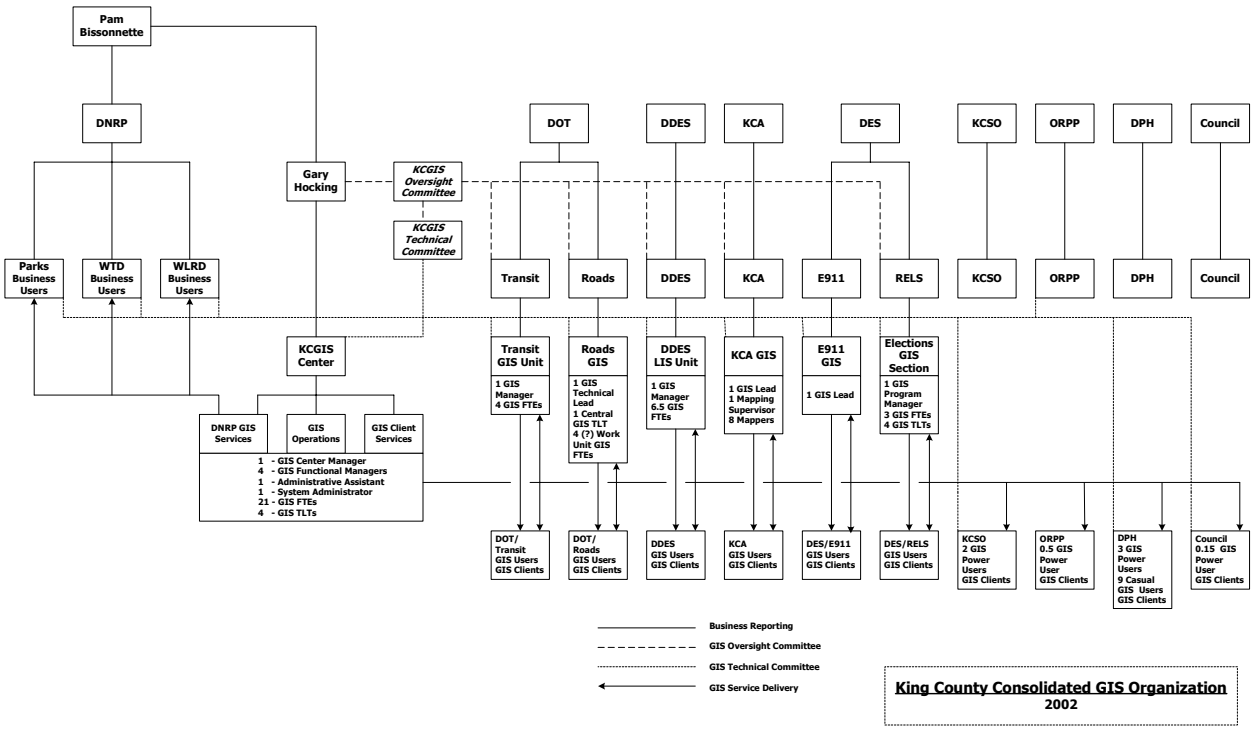
In spring of 2001, the King County Executive communicated his vision for the future of GIS. Implementation of this vision necessitated reorganization and consolidation of enterprise GIS functions under a single point of accountability – the Department of Natural Resources and Parks (DNRP) Director. It also established a management structure at both a technical and oversight level. The result is a streamlined, cost-effective organization for the coordination of King County GIS activities. A necessary starting point for this organization was to inventory existing and planned GIS work tasks. This document is that inventory and is the first of its kind in King County. It is a comprehensive list of current work tasks, department program details, budget information, successes, challenges, and future initiatives.

Specifically, Chapter 2 is a high-level overview of the organization of King County GIS. Chapter 3 describes the enterprise activities of the King County GIS Center work program and Chapter 4 describes the individual work programs for each participating department. This document includes information on the five major components of any GIS hardware, software, data, application and staff. Each of these is addressed in the context of current structures and planned changes for fiscal year 2002. The result is a comprehensive picture that details the King County GIS work program. Specific 2002 tasks and efforts have been extracted from the text of this document and are included in a separate document.

The information in this document will be used to refine King County's GIS through continued cooperation, coordination and communication. Development of this document has also served as a mechanism for identifying and capturing inter-department coordination issues, potential areas of duplication, and instances where improved communication would enhance the County's GIS investment. These issues will be resolved through the established organizational structure, incorporated into specific department work plans, and documented in future versions of this plan. Some of the most challenging issues include providing GIS support services in the face of budget reductions, coordination of software upgrades to ensure continued inter-department information exchange, the assignment of ownership for ongoing maintenance of core GIS layers, and ensuring data are maintained to meet the business needs of the County. Facing these challenges directly will only serve to strengthen the County's investment in GIS.

King County GIS is a rich source of data, a unique set of innovative applications, and a group of highly skilled professionals targeted at serving the public's geographic needs. This resource is fundamental to the diverse business functions of the County, and this document describes it fully. The support from the Executive, management and staff have provided a solid foundation for us to nurture and grow GIS to world-class status so that we might continue to serve to the best of our ability the residents of King County.

2 King County GIS Organization



2.1 DNRP Director

In April 2001, the Department of Natural Resources and Parks (DNRP) Director was tasked by the King County Executive to manage consolidation of the County GIS program and the transfer of the KCGIS Center function to DNRP. The Executive's decision was based upon his vision that King County become a regional provider of GIS services, the need to meet the business needs of departments who depend on GIS and the need to have a stable source of funding. The consolidation of the County GIS program has manifested itself as:

- Work programs not related to department business, along with the associated GIS support staff, will be transferred to the KCGIS Center group located in DNRP.
- Coordination and collaboration between the department GIS units and the KCGIS Center staff will be much more extensive than in the past. This will include all aspects of the GIS program (data development, data maintenance, data management, application development, etc.).
- GIS user departments will maintain copies of department GIS data on the KCGIS Center data warehouse.
- The GIS governance structure has been reactivated. This structure includes:
  - The GIS Oversight Committee, which will oversee the County GIS program. Reporting to the DNRP Director and providing information to the Technology Management Board.
  - The GIS Technical Committee, which will address programmatic issues and make recommendations to the GIS Oversight Committee.

The DNRP Director is accountable to the County Executive for the success of the overall King County GIS program. The responsibilities of the DNRP Director include:

- Deciding issues that cannot be resolved by the Oversight Committee.
- Negotiating for or developing revenues to support the program.
- Reporting program progress to the County Executive.

2.2 Oversight Committee

The GIS Oversight Committee membership shall consist of a representative from the following County Departments: DNRP, DOT, DDES, and Assessments. Members must have authority for: Budget approval; GIS programs within their department; representation of customers and end users; and policy decisions. The GIS Oversight Committee will appoint a maximum of two rotating members for a one-year term from agencies and programmatic areas that have significant involvement in GIS. Currently, the one appointed member represents DES. Members will not serve on both the GIS Technical Committee and the GIS Oversight simultaneously. The DNRP Technology Unit Manager, who is accountable to the DNRP Director, chairs the GIS Oversight Committee. The GIS Oversight Committee is responsible for guiding the direction of the County GIS program. Issues that cannot be resolved at the GIS Oversight Committee will be escalated to the DNRP Director. The GIS Oversight Committee charter can be found in Appendix C. Examples of GIS Oversight Committee responsibilities are:

- Review KCGIS Center and Department GIS budgets and work plans.
- Review the annual GIS business plan.
- Review and approve the Countywide GIS Operations & Maintenance Plan.
- Review and approve standards for both policy and technical direction as recommended by the GIS Technical Committee (cartographic, change management, etc.).
- Address any issues regarding use of standards escalated from the Technical Committee.
- Provide an annual report on work program status to the Technology Management Board.
- Review and approve the annual budget for KCGIS Center services.
- Recommend an annual cost allocation model for KCGIS Center services.
- Make recommendations to the Technology Management Board as needed.
- Resolve issues escalated from the Technical Subcommittee.

2.3 Technical Committee

GIS Technical Committee membership will consist of one GIS technical manager or GIS professional from the following King County GIS user agencies:

KCGIS Center	DOT-Transit	DNRP-Wastewater Treatment
Assessments	DOT-Roads	DNRP-Water & Land Resources
Public Health	Public Safety	DNRP-Parks
DDES	DES-Records & Elections	ORPP
County Council	DES-E911	

The list of participating GIS user agencies will be reviewed and updated yearly. Members will not serve on both the GIS Technical Committee and the GIS Oversight Committee simultaneously. The Committee will elect a Chair and Vice-Chair yearly. The GIS Technical Committee is accountable to the GIS Oversight Committee and is responsible for developing standards, coordinating work programs, addressing programmatic issues and making recommendations to the Oversight Committee. Issues that cannot be resolved by the Technical Committee will be escalated to the Oversight Committee. The GIS Technical Committee charter can be found in Appendix 5.2.1. Examples of Technical Committee responsibilities are:

- Report to the GIS Oversight Committee.
- Recommend policy for Countywide GIS technology to GIS Oversight Committee.
- Develop and recommend GIS templates and standards for the Countywide GIS program to the Oversight Committee (cartography, O&M, etc.).

- Monitor the use of standards approved by the Oversight Committee; escalate issues to the Oversight Committee.
- Coordinate KCGIS Center and department GIS unit work program development and develop an annual GIS Business Plan for review and approval by the GIS Oversight Committee.
- Review existing data and develop a prioritized approach for migration and integration in to the GIS data warehouse.
- Develop mechanism for inventorying current application development projects.
- Provides a forum for discussion of GIS technical issues.
- Educate departments about the value GIS will add to business practices.
- Maintain an inventory of Countywide GIS data and applications.
- Prepare quarterly reports on the status of the Countywide GIS program.

The full Technical Committee meets twice per month and there may be additional workgroup meetings.

2.4 Departments

The coordination and collaboration between department GIS units and the KCGIS Center staff must be more extensive than it has been in the past. All aspects of the County GIS program should be addressed (i.e., data development, data maintenance, data management, application development, etc.). Department GIS units will also need to work together with the Technical Committee and KCGIS Center staff to prioritize and integrate copies of department GIS data in to the KCGIS Center data warehouse. Examples of department GIS unit responsibilities are:

- Maintain the data and applications necessary to support department and County business needs.
- Comply with the County GIS standards approved by the Oversight Committee.
- Originate the development of new data and coordinate with KCGIS Center to ensure that all new data can be integrated in to the GIS data warehouse.
- Work cooperatively with the KCGIS Center data managers to integrate appropriate versions of department production data in to the GIS data warehouse.
- Work cooperatively with the KCGIS Center to ensure that newly integrated data is quality controlled and no data corruption has resulted.
- Work cooperatively with the KCGIS Center to ensure data maintenance is completed on schedule.
- Participate in the evaluation of architectural options.
- Provide abstract information on application development initiatives via the Technical Committee.
- Articulate GIS business needs.
- Ensure GIS staff maintains levels of expertise.
- Work cooperatively with the KCGIS Center in support of the regional GIS services vision.
- Actively participate on GIS committees (Technical, Oversight, etc.).

2.5 KCGIS Center

The KCGIS Center staff have two primary goals for the work they do, those are:

- Provide the GIS services that King County department customers require to support their business needs.
- Develop the coordinated, integrated County GIS environment needed to attain the Executive's vision for King County to be a regional provider of GIS services.

The KCGIS Center staff report directly to DNRP management. The KCGIS Center work program will be developed under the guidance of the Technical and Oversight Committees, via the agency GIS Business Plan developed and approved by these two committees. The KCGIS Center must work in collaboration with these committees and the department GIS units to coordinate the program and systems development necessary to meet the needs of County departments while moving to build the GIS environment needed to attain the County Executive's vision. Examples of KCGIS Center responsibilities are:

- Comply with the County GIS standards approved by the Oversight Committee.
- Actively participate on GIS committees (Technical, Oversight, etc.).

Support Services

- Market regional GIS services in coordination with King County departments, set up and manage data sharing agreements.
- Provide GIS contract administration.
- Coordinate response to external data requests.

Client Services

- Provide a single point of contact for access to King County GIS Services.
- Provide GIS training services.
- Provide database design expertise, as requested, to departments originating data to assure new data can be integrated in to the GIS data warehouse.

Architecture and Operations

- Manage the central data warehouse.
- Provide application development expertise to departments as requested.
- Provide metadata tools.
- Provide public access to data.
- Facilitate integration of department data in to the GIS data warehouse.
- Coordinate with department GIS units to ensure that maintenance occurs on schedule.
- Coordinate quality control with department GIS units to ensure that integration of updated data has not resulted in data corruption.
- Report data maintenance problems to the Technical Committee.
- Coordinate the evaluation of architectural options with department GIS units and provide an alternative analysis to the Technical Committee.
- Implement and maintain the architectural standards approved by the Oversight Committee.
- Maintain a common application development environment.
- Provide abstract information on application development initiatives via the Technical Committee.

2.6 KCGIS Budget and Funding

GIS Center Budget and Revenue Allocations

	KC GIS Center - Cost Center 3181M			DNRP GIS Unit - Cost Center 3182M	
	GIS O&M Funding Model Share Allocation	**GIS Hourly Rate Client Services Work**	**Total GIS Center**	**DNRP GIS Unit Funding Allocation**	**TOTAL 2002 Proposed GIS**
Dpt_COUNTY COUNCIL(0010)	22,454	12,500	34,954		34,954
Budget Office(0140)		7,500	7,500		7,500
Dpt_REGIONAL POLICY & PLNG(0180)	22,454	25,000	47,454		47,454
Dpt_SHERIFF(PUBLIC SAFETY)(0200)	22,454	50,000	72,454		72,454
Dpt_PARKS & RECREATION(0340)	44,907	50,000	94,907	176,817	271,724
Dpt_EMERGENCY MGMT(0401)		9,571	9,571		9,571
Dpt_PROPERTY SERVICES(0440)	22,454	15,000	37,454		37,454
Dpt_RECORDS & ELECTIONS(0470)	44,907	5,000	49,907		49,907
Dpt_PROSECUTING ATTORNEY(0500)		15,000	15,000		15,000
Boundary Review Board(0630)		7,500	7,500		7,500
Dpt_ASSESSMENTS(0670)	179,630	10,000	189,630		189,630
Dpt_COMMUNITY SVCS DIV(0934)		15,000	15,000		15,000
Total CX	359,260	222,071	581,331	176,817	758,148
Superior Court/CJ(0512)		5,000	5,000		5,000
District Court/CJ(0532)		5,000	5,000		5,000
COUNTY ROAD FUND(000001030)	97,620	129,130	226,750		226,750
EMERGENCY TELEPHONE E911(000001110)	125,099	10,000	135,099		135,099
EMERGENCY MEDICAL SERVICE(000001190)			0		0
SURFACE WATER MGT FUND(000001210)	145,094	0	145,094	352,904	497,998
DEVLPMNT & ENVRNMNT SVCS(000001340)	179,630	5,000	184,630		184,630
PUBLIC HEALTH POOLING(000001800)	44,907	12,500	57,407		57,407
Solid Waste Operating(000004040)	55,244		55,244		55,244
AIRPORT - BOEING FIELD(000004290)	22,454	10,000	32,454		32,454
I-Net(000004531)		2,500	2,500		2,500
WATER QUALITY(000004610)	143,811	30,000	173,811	366,020	539,831
PUBLIC TRANSPORTATION(000004640)	209,247	69,763	279,010		279,010
Total Non-CX	1,023,104	278,893	1,301,997	718,924	2,020,921

Contingent Billing to KC Agencies		250,516	250,516		250,516
Billings to Agencies Outside KC	0	228,750	228,750	0	228,750
Total CX, Non-CX, and Outside Agencies	1,382,364	980,230	2,362,594	895,741	3,258,335

2002 - King County GIS Funding Mechanism Summary

GIS SERVICE RECIPIENTS:	GIS SERVICE PROVIDERS:				
	KCGIS Center (Located in DNRP)			Department GIS Units Costs (4)	Outside GIS Consultants & Vendors (5)
	Data Warehouse O&M Costs (1)	GIS Client Services Costs (2)	DNRP GIS Services Costs (3)		
KC Council:	Fixed quarterly I/F transfer	Service specific I/F transfer			
Budget Office:		Service specific I/F transfer			
ORPP:	Fixed quarterly I/F transfer	Service specific I/F transfer			
Sheriff's Dept:	Fixed quarterly I/F transfer	Service specific I/F transfer		Budgeted & paid internal to fund	Billed to fund
Prosecuting Attorney:		Service specific I/F transfer			
Boundary Review Board:		Service specific I/F transfer			
Superior Court:		Service specific I/F transfer			
District Court:		Service specific I/F transfer			
DES – Emergency Management Div:		Service specific I/F transfer			Billed to fund
DES – Property Services Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer			
DES – Records & Elections Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer		Budgeted & paid internal to fund	Billed to fund
DES – E911 Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer		Budgeted & paid internal to fund	Billed to fund
DES – ITS Div.– I-Net:		Service specific I/F transfer			
DNRP – Parks Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer	Fixed quarterly I/F transfer		
DNRP – Water & Land Resources Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer	Fixed quarterly I/F transfer		Billed to fund
DNRP – Wastewater Treatment Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer	Fixed quarterly I/F transfer		Billed to fund
DNRP – Solid Waste Div.:	Fixed quarterly I/F transfer				Billed to fund
Dept of	Fixed quarterly	Service specific		Budgeted & paid	

Assessments:	I/F transfer	I/F transfer		internal to fund	
Community & Human Services Dept.:		Service specific I/F transfer			
DOT – Roads Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer		Budgeted & paid internal to fund	Billed to fund
DOT – Transit	Fixed quarterly I/F transfer	Service specific I/F transfer		Budgeted & paid internal to fund	Billed to fund
DOT – Airport Div.:	Fixed quarterly I/F transfer	Service specific I/F transfer			Billed to fund
DDES:	Fixed quarterly I/F transfer	Service specific I/F transfer		Budgeted & paid internal to fund	Billed to fund
Public Health Dept.:	Fixed quarterly I/F transfer	Service specific I/F transfer			Billed to fund
Outside Agencies:	Future – mechanism TBD	Service specific invoice			

Notes:

1. KC GIS Data Warehouse O&M Costs are 'fixed costs' funded by agencies on a share model basis determined annually. They are billed to agencies by the GIS Center at the beginning of the year for fixed quarterly interfund transfer via AIRS form.
2. KCGIS Center Client Services Costs are provided on a 'full cost reimbursement basis', billed to agencies as work is completed. They are generally billed to KC Agencies via individual interfund transfers. Outside agencies are billed via invoice and pay by check or PO.
3. KCGIS Center DNRP GIS Unit Costs are 'negotiated annual level of service costs' allocated to three specific DNRP divisions. They are billed to the divisions by the GIS Center at the beginning of the year for fixed quarterly interfund transfer via AIRS form.
4. Department GIS Unit Costs are budgeted internal for those departments that maintain their own separate GIS organizations. All costs are internal to the individual department fund.
5. Costs for outside GIS consultants and vendors are billed directly to the appropriate fund. Such costs may include:
    - GIS SW purchase & maintenance
    - GIS required HW
    - Specialized GIS based applications (E-911, Sheriff, etc.)
    - GIS data (digital orthophotography, imagery analysis and classification, etc.)
    - Consulting
    - Application development

Individual department GIS units have their own budgets and related work programs. Please see department specific information in Section 4.

3 KCGIS Center Work Program

The KCGIS Center mission is to deliver efficient, quality GIS technology solutions to the public, King County staff and our regional customers that meet the unique business needs of King County agencies and the communities we serve. We work in partnership with King County departments and their GIS units on enterprise GIS coordination, infrastructure, data, applications and services, to provide information

systems that are accurate, consistent, accessible, affordable and comprehensive for both internal and external partners.

3.1 Business Function

The work program of the KCGIS Center supports Enterprise Geographic Information Systems functions for King County Government including:

Client Services	Support for business end users where departments or regional agencies need specialized project or workgroup specific GIS services.
Enterprise Services	Consolidated, cost efficient, standardized provision of purchase agreements, data acquisition, data sales, training, Internet presence and data development.
Marketing	Manage the marketing of KC GIS products, resources, and services to potential users in County departments and to outside regional agencies.
Operations	Services provided by Operations staff include administration of the Data Warehouse, geodatabase design, data development, data storage administration, RDBMS administration, application development and system integration. Operations staff areso responsible for coordinating the assessment of proposed architectural changes with the GIS Technical Committee and implementing changes, standards, etc. as approved by the GIS Oversight Committee.
Program Administration	Provide budget, financial and staff management for the KCGIS Center. An integral part of the KCGIS Center work program is management of the consolidated DNRP GIS Unit. This unit provides GIS support and services for business end users in all DNRP divisions (for full detail see Section 4.4).

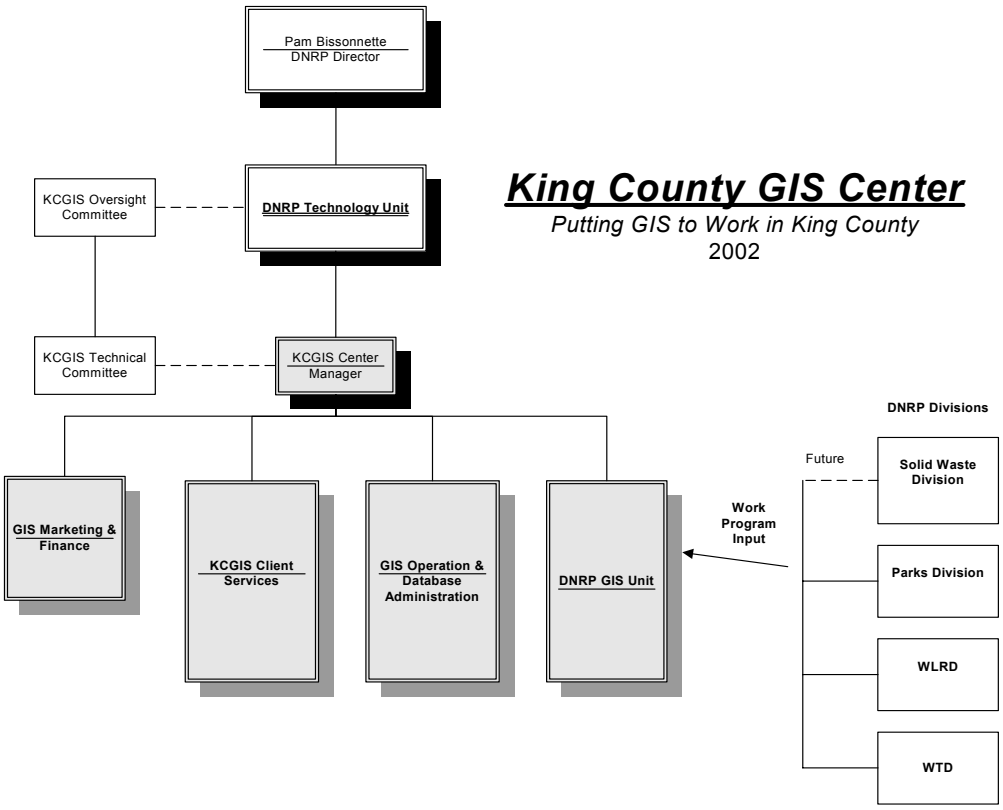
3.2 GIS Program Overview

In 2001, County Executive Sims assigned responsibility to DNRP as single point of accountability for all King County GIS activity. To support this new responsibility, the KCGIS Center was moved from ITS (Information and Telecommunications Services) to DNRP and combined with a limited number of staff from other departments who had been involved in Countywide enterprise GIS activities. The work program of the KCGIS Center is focused on performing enterprise GIS functions to support the Executive's goal for Countywide GIS. In November and December 2001, the County Council confirmed creation of a new King County GIS Internal Service Fund, located within DNRP, tasked with operating, maintaining and enhancing GIS services for County agencies and external customers.

Also in 2001, DNRP decided to consolidate all current GIS staff in the Water and Land Resources Division (WLRD), Wastewater Treatment Division (WTD) and Parks into a single operational unit managed by the KCGIS Center. The result is a GIS program scope of responsibility for the KCGIS Center that includes not only enterprise wide resources and services, but also agency specific GIS service delivery, similar to that provided by GIS units in the Department of Transportation (DOT), Department of Development and Environmental Services (DDES), Department of Executive Services (DES), and Department of Assessments. The work program of the DNRP GIS Unit is described in Section 4.4.

The KCGIS Center is located administratively within the DNRP Technology Unit, which also provides Systems Administration and Office Administrative Support. The DNRP Technology Unit Manager provides administrative oversight of the KC GIS program as discussed in Section 2 above.

The KCGIS Center includes 32 authorized staff positions organized into four program units (see organization chart below). A key component of the effective operation of the KCGIS Center is the ability to assign staff to specific tasks across organizational lines, to support operational efficiency, the development of redundant expertise, and individual professional development.



Client Services	The Client Services Unit offers a full spectrum of customized consulting and project services on a cost-reimbursable fee basis to King County business units, staff and to external customers - regional agencies, cities and public service providers within King County. The services can provide, augment or supplement the GIS capability of an agency. The client services group is comprised of ten staff (six FTEs and four TLTs). Currently (1/02) five FTE and two TLT positions are filled. The vacant positions will only be filled in response to work load. The FTE positions include a unit manager and lead staff designated for map production and training coordination functions. For additional details see below Section 3.6.2 Client Services. Requests for enterprise data or application development will be routed to the KC GIS Operations Manager who will work with the Client Services Manager and the requesting department to determine the best way to deliver the requested services. The Client Services Manager will coordinate requests for enterprise services (see Section 3.6.1 Enterprise GIS Services) initiated by other King County departments and external clients with the appropriate KCGIS Center Managers.
DNRP GIS	The consolidation of DNRP departmental staff within the KCGIS Center in a matrixed management structure is a new effort that is addressed in Section 4.4. The DNRP GIS

	Unit is comprised of ten FTE GIS analysts, plus the Technology Unit Manager.
Operations	KCGIS Center provides a broad spectrum of implementation services including data warehousing, RDBMS administration, enterprise data and application development, geodatabase design, and systems development for GIS professionals and end-users throughout the County. The GIS Operations Unit maintains a high level of expertise in current technology across multiple development, database and information delivery environments. The GIS Operations Unit is comprised of six FTEs plus the Operations Manager. The KCGIS Center Operations Unit works on enterprise GIS operations, applications and data development projects. Request for assistance and other services from the KCGIS Center will be routed through the appropriate unit manager dependent on the type and source of the request. For additional details see Section 3.6.1 Enterprise GIS Services. Existing Architecture In King County, data and metadata is posted to directories with group permissions correlated by agency from a distributed network of GIS units. Nightly batch routines scan the posting directories for files to be checked into a common spatial data warehouse organized by subject areas. Each site has data stewardship responsibilities to assure that information is comprehensive and trusted across organizational units as an enterprise information base. For implementation details see Section 3.4.1.3 Control. The King County GIS cadastral base framework coverage is a superset of cadastral features designed to provide a single composite source of spatial features from which business coverages are derived. The cadastral base framework coverage was developed as a digital conversion of the King County Department of Assessments parcel maps and includes, in addition to tax lots, sub-parcel features for easements and other restricted categories. Edits to the cadastral base can be made by any KC GIS site in order to provide linework representing boundaries or linear features in the associated coverages they maintain. Data Stewardship Data responsibility is dependent on a concept of organizational stewardship where data is managed for the mutual benefit of the enterprise, rather than by organizational ownership where data is in the possession and control of the originating agency. Data stewardship includes the responsibility for providing metadata adequate for the development of enterprise applications and use of the data throughout the enterprise. Each site is responsible for maintaining descriptive metadata for the spatial data for which it is responsible. The KCGIS Center is responsible for administering and publishing the metadata. Metadata is currently stored in a relational database format and published on the Internet site (see Section 3.3.4 Metadata). Data stewards are wholly responsible for the content, quality, accuracy and timeliness of the data layers that they maintain. The KCGIS Center verifies that posted data complies with database format and standards. For details see Section 3.4.1.3 Control. Information Access Data and enterprise applications are available to any agency in King County with a LAN or WAN connection to KCGIS Center servers. For connection details see Section 3.2.4 Hardware and Software below. Access to information across the channels of individual lines of business requires more than the ability to establish a physical database connection or map a shared drive resource. The combination of enterprise data, applications and metadata enables access to a wide variety of possible views of

	information for analytical, mapping, discrete query and decision support activity. For information on enterprise applications see Section 3.4. Transparency of Control Each organization with stewardship responsibilities can define and update the content, metadata, and control data of the assets for which they are responsible. Control functions are handled by reference to metadata and by operations within a defined structural framework. Anyone in an organization can update information about the staff or data managed by the organizational unit. Problems with inappropriate behavior in the use of this open access system are handled administratively.
Program Administration	KCGIS Center administration is comprised of four staff (KCGIS Center Manager, Marketing & Finance Manager, Office Manager, and System Administrator). This function performs budgeting, staff management, financial control, and administration for the entire KCGIS Center, including the DNRP GIS Unit. The Office Manager also provides general and financial administrative support for KCGIS Center staff and functions. The system administrator position is funded by the KCGIS Center budget, but system administration management is provided by the DNRP Technology Unit Manager. Finance includes management of the KC GIS Internal Service Fund, budgeting, funding development, billing, financial expenditure controls, and reporting. Marketing promotes the use of KC GIS resources by appropriate County business sectors that are not current GIS users. Marketing also promotes the Executives vision of KC GIS as a regional service provider to local municipalities, utilities, districts and other jurisdictions. Additional program administration functions are performed by the KCGIS Center Operations, Client Services and DNRP GIS Unit managers.

3.2.1 KCGIS Center Finance and Funding

On December 10, 2001 the County Council passed Ordinance 2001-0555 establishing the KCGIS Center in DNRP as "…the geographic information systems…internal service fund, for the purpose of accounting for financial resources for the full cost of operating, maintaining and enhancing automated geographic information systems that serve both County agencies and external customers."

KCGIS Center funding is provided from three sources (note that costs for program management, administration, and overhead are allocated to each of the three funding sources):

- Enterprise GIS activity (described as GIS O&M Share Model Funding below) is funded by 16 County agencies through a shared funding model negotiated by the GIS Oversight Committee, as detailed in Section 2.
- KCGIS Center Client Services are funded by fees based on full cost recovery.
- The DNRP GIS Unit is funded by DNRP divisions based on annual work program level of effort and staffing requirements. Note that any DNRP GIS work beyond the annual work program is provided as client services on a cost reimbursable basis. See also Section 4.4.

2002 KCGIS Center Financial Plan:

Beginning Fund Balance	250,000
Revenues	
GIS O&M Share Model Funding	1,382,364

Client Services Cost Reimbursable Work	980,230
DNRP GIS Unit	895,741
Total Revenues	3,258,335
Expenditures	
GIS Core Operations & Maintenance	(1,382,364)
Client Services	(980,230)
DNRP GIS Unit Operations	(895,741)
Total Expenditures	(3,258,335)
Estimated Underexpenditures	32,583
Other Fund Transactions	
Total Other Fund Transactions	0
Ending Fund Balance	282,583
Target Fund Balance	271,527

3.2.2 Training

For information on the KC GIS Training Program administered by the KCGIS Center see Section 3.6.1 Enterprise GIS Services. The following information is specific to KCGIS Center staff.

On-going staff development is managed via an individual training plan agreed with the KCGIS Center Manager. Required training is generally made available during the regular work hours within King County offices when available or at remote training sites when there are no other practical alternatives. Components of the plan are:

- Progressive County-provided GIS/IS professional training through ESRI, ORACLE, ERDAS, and Microsoft certified training programs. Coursework may be instructor led or on-line interactive.
- Self-directed training - generally of a 'continuing education' nature obtained via night or weekend classes. KCGIS Center will reimburse 50 percent of the cost of successfully completed 'continuing education' when it fits in with a logical staff development plan that meets the projected business needs of the KCGIS Center. There is a dollar limit determined annually for the amount of training reimbursement, based on budget considerations and overall GIS training plan.
- Conferences and individual professional research - staff development includes these tools as well, when budget and workload permit their use.
- County-provided development training throughout the Office of Human Resource Management (OHRM) and/or DNRP.

We also emphasize the integration of learning on the job through the use of on-line information sources listed in the KC GIS knowledge base http://www.metrokc.gov/gis/services/KnowledgeBase.htm, small group presentations made by staff who have researched advanced topics, and the use of team programming techniques.

Funding for KCGIS Center staff training is included in the annual budget. Funding sources in 2001 included grant funds and/or merit awards from FEMA, NASA, and ESRI. We will continue to seek grant funding and recognition for project execution in the upcoming years.

3.2.3 Staffing Requirements

Refer to the organization chart in Section 3.2 above. The KCGIS Center Manager reports to the DNRP Technology Unit Manager. The KCGIS Center Manager position is vacant and it is anticipated that it will

be filled during first quarter, 2002. Enterprise GIS services are provided by staff arranged in two primary workgroups - Client Services and Operations.

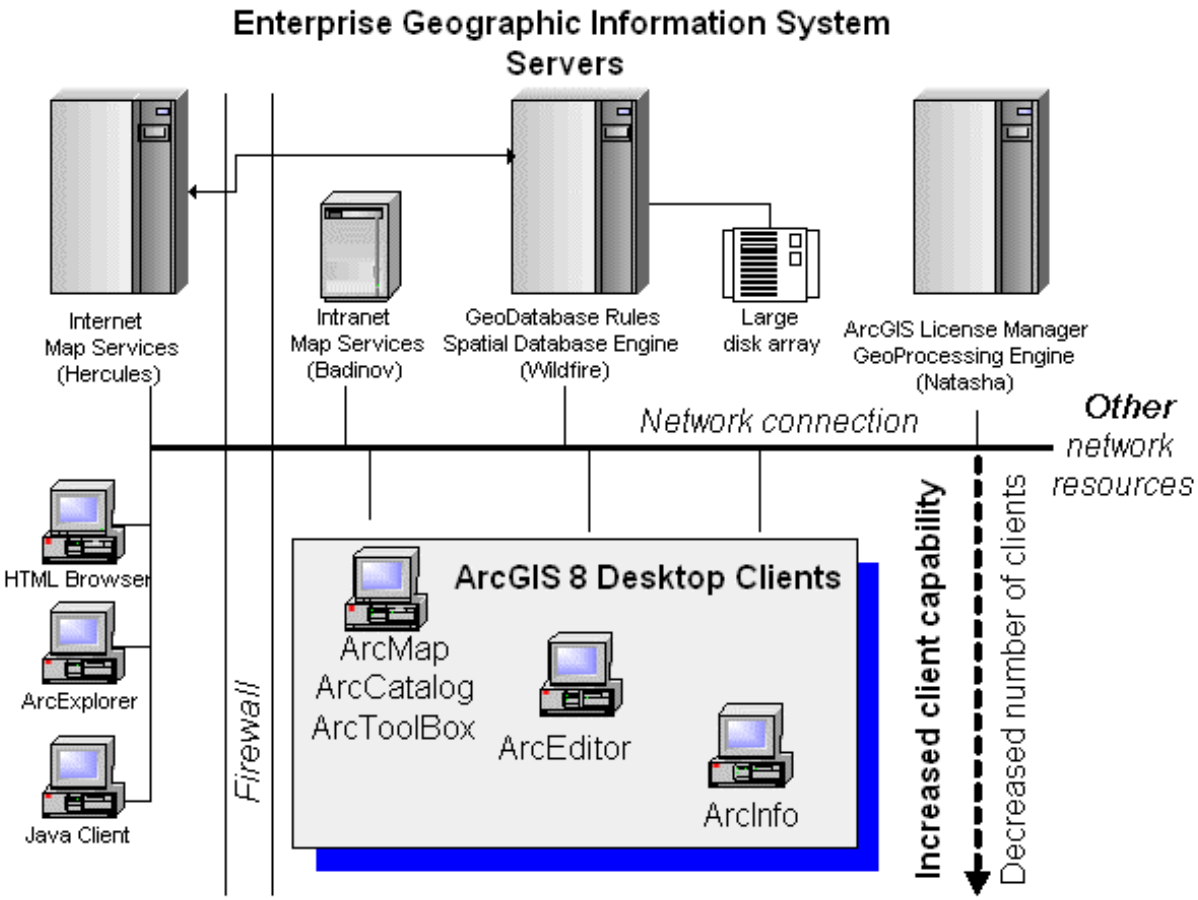
The Client Services Supervisor manages six staff, four that support cartographic and analytic requests, one who coordinates the training program and one who is the production coordinator. Three additional positions are currently vacant.

The Operations Manager supervises a staff of six programmers and database administrators. The Operations Manager also works as a Senior Programmer and Senior GIS Database Administrator with overall responsibility for RDBMS and SDE administration. Lead roles are assigned for Legacy GIS Database Administration (generally referred to as the Cadastral Database Coordinator), Oracle Database Administration, and Spatial Database Engine Administration. At any given time other staff will have primary responsibility for application development environments including Java, ArcObjects/VB, Avenue, JavaScript and AML.

Work Unit	Working Title	Current Classification
KCGIS Center Administration & Marketing		
	KC GIS Manager	TBD (Vacant)
	Finance and Marketing Manager	ISA3
	DNRP Unit Manager	ISA3
	System Administrator	TBD (Vacant)
	Office Manager	TBD (Vacant)
KC GIS Client Services		
	Client Services Manager	ISA3
	Production Coordinator	ISA2
	Training Coordinator	ISA1
	GIS Analyst	ISA1
	GIS Analyst	ISA2
	GIS Analyst	ISA1 (Vacant)
	GIS Analyst TLT	ISA1
	GIS Analyst TLT	ISA1
	GIS Analyst TLT	ISA1 (Vacant)
	GIS Analyst TLT	ISA1 (Vacant)
KC GIS Operations		
	Operations Manager	ISA3
	DBA/Analyst	ISA3
	DBA/Application Developer	ISA2
	Senior Application Developer	ISA2
	Senior Application Developer	ISA2
	Application Developer	ISA2
	Programmer/Analyst	ISA1

3.2.4 Hardware and Software

The KCGIS Center provides UNIX and MS Windows access to 750GB of enterprise storage space on a primary server, an enterprise license manager on a second server, and delivery of Internet services on a third server.



Data Server: wildfire.metrokc.gov (146.129.27.231) Unix AlphaServer ES40			
Unix mount point	**Windows share**	**Use of storage location**	**Permissions**
/plibrary	/plibrary	Coverages	Read-only
/maint	/maint	Data development	Read/write GIS site
/projects	/projects	Active projects;	Read/write defined by owner
/scratch	/scratch	Temporary work	Read/write defined by owner, cleared weekly
/plibrary2	/plibrary2	Shapefiles and remotely sensed images	Read-only

Enterprise license manager, Orca.metrokc.gov (146.129.27.230)
NT 4 Compaq 8000

Internet server, *Hercules* ww5.metrokc.gov (146.129.240.123)
NT 4 Compaq 7000

Staff file systems currently on ITS servers will be moved to a DNRP server.

Natasha (Currently not online)
AlphaServer 2100
Unix Test Platform

Badinov (Scheduled for replacement)

NT 4 Micron Powerserver
NT Test Platform

All devices are accessible via the County LAN/WAN.

Print/Plotter	Description
Bigfoot	HP DesignJet 8500 Large-format color ink jet plotter capable of plotting maps of virtually any length using 36-inch wide paper rolls. Resolutions up to 600dpi.
Yeti	HP Design Jet 3800CP Large-format color ink jet plotter capable of plotting maps of virtually any length using 54-inch paper rolls. Resolutions up to 600dpi. The 3800CP is equipped with a Fiery X2-W, PostScript Level 3 Raster Image Processor
Alma	HP CLJ 8500 Color Laser Printer High-capacity color printer capable of printing letter, legal, and tabloid (11 x 17-inch) pages. Can also print duplex (both sides of page). Resolutions up to 600dpi.
Rocky	HP LaserJet 4si, black and white printer for daily office use. Letter and Legal sized prints only.

3.2.4.1 Server Software

Name	Description
ArcIMS	ArcIMS is an ESRI software product used for putting interactive mapping functionality on a web site. The KCGIS Center administers the Internet ArcIMS site and an Internet development and testing site. See also; for more information on how ArcIMS enables Enterprise GIS Services in Section 3.6.1.
Arc Spatial Data Engine (ArcSDE)	KC GIS stores and serves enterprise data through ArcSDE (current version 8.1.1, service pack 1, build 854). ArcSDE provides for the storage, maintenance and serving of spatial and business data on and RDBMS. The KCGIS Center administers ArcSDE on Oracle . See also; for more information on how ArcSDE enables Enterprise GIS Services in Section 3.6.1.
Arc8 License Manager	Support transition to Arc8 environment. For more information on enhancement and development of an enterprise environment see Section 3.6.1 Enterprise GIS Services.
MS IIS	Internet server software
Oracle	Two database instances are licensed, a standard edition for the data warehouse and an enterprise edition to support data editing. The standard edition is licensed for an unlimited number of client connections. The enterprise edition is currently licensed for 15 named users and includes the Oracle Spatial data types option. See also Section 3.5.2 RDBMS.
Unity Servlet Exec	Java Servlet Engine support ArcIMS deployment

3.2.4.2 Client Licenses Managed for the Enterprise

# of	Name	Type	Description
	ArcGIS	Floating	COM based heavy client software for more information see ESRI Web site:

			http://www.esri.com/software/ArcGIS/index.html
4	ArcInfo 8		
10	ArcView 8		
64	ArcSDE Connects	Server managed	
Legacy GIS Software: ArcInfo 7			
	Exceed		Requires Xterminal emulation or telnet connection from Unix OS
3	ARCINFO	Floating	
18	ARCINFO	Node Locked	
1	Network	Floating	
1	TIN	Floating	
4	COGO	Floating	
6	COGO	Node Locked	
1	Grid	Floating	
2	ArcPress	Floating	
4	ArcView 1.x/2.x	Floating	Unused
2	ArcView 3.x Unix	Floating/Reserved	
?	ArcView 3.x NT	ArcView is the desktop GIS software by ESRI that is most commonly used in King County. The KCGIS Center maintains a purchasing agreement with ESRI. There are approximately 180 ArcView licenses deployed throughout the County. ArcView provides all of the GIS functionality that most users require, including display and analysis of geographic data and high quality map production. ArcView is not an adequate software package for the development and maintenance of data, however, and therefore is considered an end-user product.	

3.2.4.3 Other GIS-Related Software

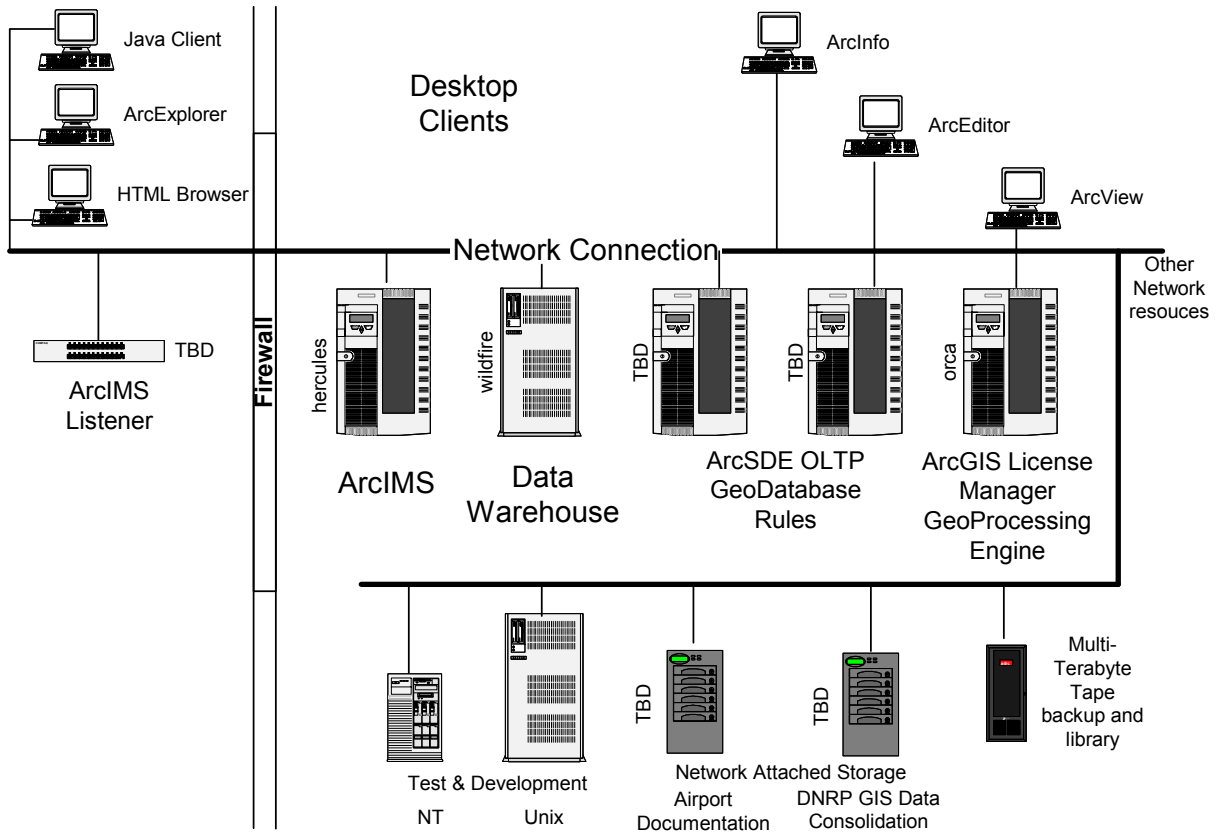
Name	Description
AutoCad	License available for upgrade, not currently used
ERDAS Imanage	RS Image processing software
FrontPage	Web page editing
Oracle Jdeveloper EE	Oracle Java development environment
Visio 2000 EE	Data modeling, includes ESRI Geodatabase CASE extensions
Visual Studio EE	MS COM development environment
XML Spy	XML editing
Professional Illustration Software	Professional graphic design and illustration software is used primarily to create publication-quality finished maps, and secondarily to support the production of map-based publications and web graphics. Illustrator, FreeHand and Photoshop are all used to create graphics for web pages. Adobe ImageReady, a companion to Photoshop, is used to optimize web graphics and to create animated GIF images and Javascript image rollovers. Macromedia Flash has been used in a limited extent so far to create animated map-related presentations. Flash has potential applications
Adobe Illustrator	A vector-based drawing program, is the primary map-making tool. A set of plug-in filters, Avenza MAPublisher, provides the means to faithfully import GIS

	data to Illustrator drawings. The Illustrator/MAPublisher combination can also export shapefiles, providing two-way data migration between ArcView and Illustrator.
Adobe Photoshop	An image editing program, is used to illustrate certain map layers that are best represented, or can only be represented in a raster-based format, such as images created from digital elevation models.
Macromedia FreeHand	A vector-based drawing program that is comparable to Adobe Illustrator, is used in some instances to carry out map-making tasks that cannot be done well or at all with Illustrator. The main example of this is line simplification, i.e., weeding of vertices.
Adobe PageMaker and Adobe InDesign	Page layout programs that are used to layout and produce some map-based or map-related publications, such as map brochures that include maps and extensive text and photo layouts.

3.2.4.4 Enhancements

ArcIMS	Appraise the need for alternate or supplemental web application servers to handle an increasing load.
Disk space management	Reestablish quotas for organization project areas; establish best practices for management of disk space allocated to GIS units.
Backup and tape archiving	DNRP funded the acquisition of an enterprise class backup system in 2001 and will implement this system in early 2002. The tape library has an online storage capacity of xxx GB. Veritas xxxx
Enhance Enterprise Services	See Enterprise GIS Services: Enhancement in Section 3.6.1.1 for more information on consolidation of: • ArcSDE geodatabase editing; • ArcGIS transition capability; • Software distribution and licensing; • Data storage; and • Information delivery.

3.2.4.5 Development



ArcIMS	The ArcIMS architecture will be reconfigured to bring the application server inside the firewall to improve the connection to the Data Warehouse and reduce network traffic through the firewall.
Data management	Acquire primary and failover server capacity to support an Arc Geodatabase editing environment as an enterprise service. ArcSDE layers would be published from this environment to the Data Warehouse. This service will support editing of enterprise, departmental and project data with privileges established by the GIS Unit. The RDBMS for the ArcSDE implementation will be Oracle 9i Enterprise Edition.
Data storage	• Data storage will be provided for the Department of Assessments to keep an independent replicated data store of cadastral base information sufficient to meet their legal requirements; so as to avoid having to acquire new standalone servers for this purpose. • A network attached storage device to be acquired by the DOT Airport Division will be administered by the DNRP Technology Unit to support the Airport Documentation Management System. • A network attached storage device will be added to consolidate DNRP GIS data sources from various existing DNR servers.
Enterprise application development environment	• Migration to MS Visual Studio 7 for object oriented capability, XML data services and remote computing support. • Upgrade to Oracle jDeveloper 9i for object oriented capability, XML data services

	and remote computing support.
GeoProcessing Engine	Establish a GeoProcessing Engine for support of Arc8 Workstation desktops where access is through an enterprise license server.

3.3 Spatial Data

The KCGIS Center administers the enterprise spatial data warehouse. For a listing of all spatial data available in the data warehouse see the spatial data catalog: http://www.metrokc.gov/gis/sdc/index.htm. See also, the individual department sections in Section 4 for listings in departmental work programs.

The King County GIS program recognizes the value and benefits which may be gained by sharing GIS data with other organizations, and encourages data sharing whenever possible. For King County, this enables access to highly detailed, up-to-date information maintained by local jurisdictions, such as cities and utility districts. For those jurisdictions, data sharing makes available information for adjacent areas which is essential for planning and management purposes, but which they lack the resources to develop and maintain themselves. In addition, King County is able to obtain data for adjacent counties and other areas of the state when they are needed for County projects.

The King County GIS program currently shares data on an informal basis with a variety of state, county, city and utility organizations. In addition, the KCGIS Center has established formal data sharing agreements with several governments and businesses. These have been established through a formal agreement, a memorandum of understanding or a letter describing the terms and conditions of the arrangement. For a list of existing agreements see: http://www.metrokc.gov/gis/sdw/data_acquisition.htm.

3.3.1 Maintenance

The KCGIS Center maintains four types of data:

- Data acquired from external sources;
- Data under permanent stewardship;
- Data under temporary stewardship; and
- Project specific data.

These categories are described in the following sections.

3.3.1.1 External Data Sources

The KCGIS Center is the single point of contact for GIS data acquired and/or exchanged with external agencies, including that acquired from commercial GIS data providers. The following is a list of data acquired from external data sources that is currently available in the Data Warehouse. External source data is posted without alteration of the data content, file or item names to the greatest degree possible. If included, metadata are incorporated into KC GIS metadata, also to the greatest degree possible.

Library	Layer Name	Layer Description
Admin	GDTZIPCD	GDT 5-digit zip code boundaries, based on tiger line files
census	BLK53033	Census Blocks for King County
	C9053033	King County Boundary
	CD453033	Portions of Congressional Districts in King County
	CST53033	Puget Sound, Lake Washington, Duwamish, Ship Canal

Library	Layer Name	Layer Description
	CTP53033	Transportation Planning Area: Single poly for whole County
	CTY53033	KingCo Boundary
	FAZ	Population Forecast Analysis Zones for greater Puget Sound
	GRP53033	Census Block Groups
	IND53033	Muckelshoot and Puyallup Tribal Lands
	KGL53033	Key Geographic Locations: Airports, Malls, etc.
	LAN53033	Hospitals, Camps, Jails, Colleges, Golf, Boeing Field, Parks
	LNB53033	Railroad lines: BN, Soo, UP, Monorail, Northern Pac, Unnamed
	LNC53033	Utility Line Networks (owners unknown)
	LND53033	Bandera Airstrip, Unnamed
	LNH53033	Creeks, Streams, Lakes, Canals, Rivers, Sloughs
	LTP53033	Landmark Points: 5 Named - 4 Camps, 1 Hospital
	M9053033	Minor Civil Divisions: County divided into 10 Regions
	MCD53033	Minor Civil Divisions: County divided into 10 Regions
	P9053033	Cities and Selected Unincorporated Areas
	PLA53033	City areas defined by Census; not necessarily corp. limits
	SAZ	Small Analysis Zones (Transportation Planning)
	SDU53033	School Districts as defined by Census
	SHR53033	Coastal Shorelines: KingCo Land Area
	STR53033	Street Network
	T53033AIR00	00 Muckelshoot, Puyallup
	T53033BLK00	00 Census Blocks for KingCo
	T53033CTY00	00 KingCo Boundary
	T53033GRP00	00 Census Block Groups
	T53033PLC00	00 City areas defined by Census; not necessarily corp. limits
	T53033TRT00	00 Census Tracts for King County
	T53033VOT00	00 Voter Districts for King County
	TAZ53033	Traffic Analysis Zones: Entire County
	TRT53033	Census Tracts: Entire County
	UAR53033	Census version of Urban Growth Area
	URB53033	Urban/Rural Areas: Entire County
	VTD53033	Voter Districts: Entire County
	WAT53033	Entire County: Lakes, Puget Sound, and Land
	WBD53033	Lakes, Reservoirs, Rivers, Puget Sound, Sloughs with names
mtbaker	MERGLAND	Mt. Baker-Snoqualmie National Forest Land Management
	MTBTRAIL	
	OWNER	Administrative boundary for the Mt. Baker-Snoqualmie NF
	RECREATN	General location of many of the developed recreation sites

Library	Layer Name	Layer Description
	ROADS	Mt. Baker-Snoqualmie National Forest Roads
	SHED_WTR	Basins Watersheds Subwatersheds
	STREAM	Mt. Baker-Snoqualmie National Forest Streams
	WATERPLY	Water features that are mapped as polygons including rivers.
	WLDERNES	Mt. Baker-Snoqualmie National Forest Wilderness Areas
pierceco	ARTERIAL	Arterial Street Network
	PCCITIES	City boundaries in Pierce County
	PCCITY	Pierce County City Boundary
	PCCON100	100 foot contours for Pierce County, from USGS 1:24,000 maps
	PCCON20	20' contours for Western Pierce County, from 1:24,000 maps
	PCPARCEL	Tax parcels for all non-Federal lands in Pierce County
	PCUGSERV	Pierce County urban growth and urban service areas
	PCWRIA10	Basin boundaries for WRIA 10 in & adjacent to Pierce County
	PC_STRCL	Pierce County street centerline network
	PC_UGB	Pierce County urban growth boundary
seattle	BRKLINES	Changes in the surface behavior that define topography
	CONTOUR	Two foot elevation contours for Seattle
	CONTROL	High accuracy survey monuments - NGS Common Land DataBase
	CSOBASIN	Seattle DWU combined sewer overflow basin areas
	CTYLIMIT	North and south boundaries of the City of Seattle
	DITCHES	Ditches within the City of Seattle and its utility service area
	DWU	Drainage Wastewater Utility - Seattle mainline
	DWUABA	Seattle DWU - Abandoned sewer & drainage mainlines
	DWULAT	drainage & wastewater utility - side sewers and lateral lines
	DWULATPT	drainage & wastewater utility - lateral line connection points
	DWUMH	Seattle drainage & wastewater utility – manholes
	DWUMNL	drainage & wastewater utility – main lines
	DWUMNLPT	drainage & wastewater utility – main line connection points
	DWUPOLY	drainage & wastewater utility - structures & facilities
	ELEV	Elevation coverage
	FLOOD	100 year flood hazard areas in the City of Seattle
	HYDRANT	Water hydrants in the City of Seattle & its utility service area
	LANDFILL	Former sanitary landfill areas in the City of Seattle
	LIQZONE	Potential liquifaction zones in the City of Seattle
	MLEGAL	LEGAL arcs changed by SED after LEGAL cover delivered
	MUNI	Seattle incorporated municipal area defined by charter.
	NEIGHDIS	Seattle neighborhood districts

Library	Layer Name	Layer Description
	OBSCURED	An outline of obscured areas on an orthophoto.
	OUTFALL	
	POTSLIDE	Potential slide areas in the City of Seattle
	SEAHYDRO	
	SEBLDG	Seattle building outlines, derived from 1993 digital orthophotos
	SEZONING	Zoning classifications for the City of Seattle
	SHORELIN	City of Seattle shorelines, water bodies, and city limits
	SND	Seattle Street Network Database arc coverage.
	WATERLIN	Physical shorelines along all major Seattle water bodies.
	WETLAND	Known wetland areas in the City of Seattle
	WILDLIFE	Known wildlife areas and corridors in the City of Seattle
	WTRLN	Seattle Water Department main water lines
	WTRPLY	Seattle Water Department structures and facilities
	WTRPT	Seattle Water Dept. point features, including valves & fittings
	WTRPZA	
	WTRPZP	Seattle Water Department water pressure zones
	WTRSVC	Seattle Water Department local water service lines
snoco	PADS	
	RESER_PL	Military and Native American reservations
	SCBASINS	Snohomish County drainage basins and subbasins
	SCCITIES	City boundaries in Snohomish County
	SCLNDREC	Snohomish County integrated land records, including parcels
	SCPOLADM	Snohomish County political & administrative districts
	SC_STRCL	Snohomish County street centerline network
	SC_SWRDS	Snohomish County sewer districts
	SC_UGB	Snohomish County urban growth boundary
	STCEN_LN	

3.3.1.2 Data Temporarily Maintained by KCGIS Center

The KCGIS Center maintains stewardship on a temporary basis for GIS data that are either legacy/obsolete, or are under development in coordination with another agency. Data categorized as legacy/obsolete will be archived and deleted. Data stewardship will be reassigned to the maintenance agency upon completion of development.

Library	Layer Name	Description
admin	BLKTILE	Block Tile
	POCA	Public ownership and administrative boundaries
	RTABNDRY	Regional Transit Authority Boundary (approximate)
	ZIPCODE	King County Zip Code boundaries

Library	Layer Name	Description
census	~~CENSUSID~~	
	~~BLOCKGRP~~	~~1990 Census Tract/Blocks with the same hundred level~~
	~~BLOCKNET~~	~~1990 Census Blocks developed for KC TRC from Tigerline files.~~
	~~PLACE~~	~~1990 Census Places edited by KCTRC~~
	~~TAZ~~	~~1990 Traffic Analysis Zones for Greater Puget Sound~~
	~~TRACT~~	~~1990 Census Tracts developed for KCTRC from Tigerline files.~~
district	CEMDST	
enviro	CANOPY	Forest Canopy
	FAULTS	Faults of the Seattle Fault Zone
	SOIL	
	SOILUSGS	Soils coverage from USGS
hydro	BIGWATER	Largest water bodies in King County
	MUN_WSHD	
	PRECIP	
	RAINSNOW	
	STORM10	10 year storm events
natres	FPD_USFS	US Forest Service Production Districts
other	~~ARTCLUST~~	~~Poly coverage of clusters of Public Art Sites in King County.~~
	~~ARTSITES~~	~~Point coverage of Public Art Sites in King County.~~
	BIKEMET	Bicycle/non-motorized vehicle paved and unpaved routes
	E911_ESN	Emergency Service Area
politicl	WASHCO	County boundaries for all of Washington State
property	LD_NAMES	Annotation from RECDNET for lot dimensions in Map Portal parcels
	LOT_DIMN	Lot dimension annotation from RECDNET layer
	PARCEL	King County tax parcels and related property features
	PLAT	
	ROW	Street right of way with PIN

3.3.1.3 Data Maintained by KCGIS Center

The KCGIS Center maintains data used to control and access the data warehouse.

Library	Layer Name	Description
admin	~~RECDSTAT~~	~~Status of Recdnet conflation coverage~~
other	AIRINDEX	Center Points of DNR Aerial Photos
	AIRPHOTO	Flight Lines for WA State DNR Aerial Photos of King County
	INDEX_QT	Copy of the tiled index with twp, range and 1/4 tile lines only.
	INDEX_TR	Copy of the tiled index with township and range lines only.
	NAVAID	
	ORTHOIDX	Index for NIES orthophotos

Library	Layer Name	Description
	POINOPUB	Points of Interest owned or operated by non-public agencies
	POIPUB	Points of Interest owned or operated by public agency
	THOM_BROS	The Thomas Guide page index
Recdlib	BASEADJ	Control points for adjustments of the cadastral base
	INDEX	Index of RECDNET tiles
	MAPNUM	Map number index
	~~MAPNUMOK~~	
	PLSSTIC	
	RECDNET	Sub-Parcel Cadastral Framework Coverage

3.3.1.4 Client Services Project Data Not in the Spatial Data Warehouse

Layer Name	Layer Description
BASECASE2006-030900	Boeing Field DNL Noise Contours from CAD
DNL_COMPLETE	Boeing Field parcels within DNL Noise Contours
PARCEL_CLIP_2640	Boeing Field parcels cliped within one half mile buffer
2640_MILE	Boeing Field one half mile buffer around property bound
AIRPORT_BOUND	Boeing Field Property boundary from CAD
PAVEMENT	Boeing Field paved and grass surfaces from CAD
AIRPORT_LINES	Boeing Field linework layer from CAD
AIRPORT_BOUND_FILL	Boeing Field polygon version of airport_bound
RUNWAYS	Boeing Field runways
SEATAC	Seatac linework layer from CAD
RPZATZ_L	Seatac RPZ and ATZ for proposed 3rd Runway - arc
RPZATZ_P	Seatac RPZ and ATZ for proposed 3rd Runway - polygon
ST_DNL	Seatac DNL Noise Contours from CAD - polygon
DNL_PARCEL_BASE	Seatac parcels within DNL Noise Contours
POS_PARCELNUM	Seatac parcels with Owners Name for Noise Program
NORTH_NAMES	Seatac parcels within north RPZ/ATZ of proposed 3rd Runway
SOUTH_NAMES	Seatac parcels within south RPZ/ATZ of proposed 3rd Runway
COUNCIL_DISSLOVE	Council Districts dissloved to region poly
PUB_LAND	DCFM publicly owned land in King County
PUBKINGC	DCFM KingCo owned land in King County
ALL_PHASES	DCFM Grand Ridge Project - All trails around and thru park
ALLCUT	DCFM Grand Ridge Project - All potential res developable land
CLEVELAND	DCFM Grand Ridge Project - Cleveland Park
CNTRLPRK	DCFM Grand Ridge Project - Parking Area
CONNECTOR	DCFM Grand Ridge Project - Connection between park properties
GPSTRAIL	DCFM Grand Ridge Project - GPS captured trail
GRANDBND	DCFM Grand Ridge Project - Park property
GRANDWETLD	DCFM Grand Ridge Project - Wetlands within park
ISS_NEWDEV	DCFM Grand Ridge Project - Residential development
ISSAQUAH_DEV	DCFM Grand Ridge Project - Residential development
ISSAQUAH_DEV2	DCFM Grand Ridge Project - Residential development

PROP_TRAIL	DCFM Grand Ridge Project - First propose route
PROP_TRAILS	DCFM Grand Ridge Project - Second proposed route
PRUZAN	DCFM Grand Ridge Project - All potential res developable land
TRAIL_EDITED	DCFM Grand Ridge Project - Finished proposed trail
ADD2TAXPAYER	DCFM Grand Ridge Project - Selected park parcel
MHILL_PUBOWNER	DCFM Grand Ridge Project - Selected publicly owned parcels
PARK_EDITED	DCFM Grand Ridge Project - Selected park lands
TAXPAYER	DCFM Grand Ridge Project - Selected publicly owned parcels
RENTON_PARCELS	KCDOT Renton Project - Selected site parcels
DUVALL	Duvall - City with neighborhoods
2'NE	Duvall - 2 foot contours
2'NW	Duvall - 2 foot contours
2'SE	Duvall - 2 foot contours
2'SW	Duvall - 2 foot contours
DAMAGED_ROADS_MAJOR	EOC Training - Roads
DAMAGED_ROADS_NOMERCER	EOC Training - Selected roads
DAMAGED_SCHOOLS	EOC Training - Selected schools
DAMAGED_STRUCTURES	EOC Training - Selected structures
RESIDENTS_ONLY	EOC Training - Zone of residential impact
HOSPITALS_FINAL	EOC Development - Relocated Hospitals
PSGASLINES	EOC Development - PSE Gas Lines
RNR1LAH_V2	EOC Development - Potential Lahar Zones
RNR1NORTH	EOC Development - Potential Lahar Zones
RNR2LAH_V2	EOC Development - Potential Lahar Zones
RNR3LAH_V2	EOC Development - Potential Lahar Zones
RNRPYRO	EOC Development - Potential Lahar Zones
SCHSITE_DEV	EOC Development - Relocated schools
STUDY	EOC Development - Clipping bound of study area
TRANSFER_STATIONS	EOC Development - Relocated Transfer Stations
WPPIPELINE	EOC Development - Pipeline
NH_GEOCD1	HWMP - Geocoded business locations in North Highline
INET2001PIERCESITES	INET - Sites in Pierce County 2001
INET2001SITES	INET - Sites 2001
LANDMARKS	Mercer Island - City landmarks
LIDPARK	Mercer Island - I-90 Lid Park
PARKSFROMAERIAL	Mercer Island - City park bounds
PIONEERPARK	Mercer Island - pioneer park bound
PNTSOFINTRST	Mercer Island - City points of interest
SHORELINE	Mercer Island - City shoreline
SPORTCOURT	Mercer Island - City sportcourts
STREET_HIGHLIGHT	Mercer Island - City Arterials
STREETNAMESIGNS	Mercer Island - City intersection signage
SEC11CLIPBOX	Novadyne - Clipping box
SEC11PARCEL	Novadyne - Parcels, Sec 11, T25R7
SEC11PARCEL_FIN	Novadyne - Amended parcels for Sec 11
STREETS	Novadyne - Streets, Sec 11, T25R7
S00GEO2_FINAL	Public Health - Geocode project

S00GEO2_GEOCD1	Public Health - Geocode project
S00GEO2_MATCHED	Public Health - Geocode project
S00GEO2_SPATIALJOIN	Public Health - Geocode project
PLINE_WRTDST	Shoreline WD - District bound with perimeter
SHWD_WRTDST	Shoreline WD - District bound
VASHON_CLIP	IERE - Vashon Island study - Clipping box
VASHON_PARCELS	IERE - Vashon Island study - Parcels
CTOUR1	BCRA - Contours of study area
PARCEL_FIX	BCRA - Parcels of study area
PLSS_CLIP	BCRA - PLSS of study area
STUDY_AREA	BCRA - Study area
KC_PARCEL_ERROR	Des Moines - Parcels
AU_ANNEX_AREAS	Fire Dist 44 - Auburn annexation areas
DUPERAC_ZONING_FD44	Fire Dist 44 - Duellings per acre
FD44	Fire Dist 44 - Fire District Bound
FPP_IN_FD44	Fire Dist 44 - Farmland Protection Properties
NODATA	Fire Dist 44 - Parcels without Assessor data
NODATA_NW9	Fire Dist 44 - Parcels without Assessor data in NW9 zone
NODATA_SE4	Fire Dist 44 - Parcels without Assessor data in SE4 zone
NODATA_SEC15	Fire Dist 44 - Parcels without Assessor data in sec15
UGA_FD44	Fire Dist 44 - Urban Growth Line in FD44
18PARCELS	Intracorp - Woodinville Parcel Project
SITE_GEO	ITS - Coordinates for Radio Tower
ADDED_LIBRARIES	KCLS - New Sammamish library locations
ADDED_SCHOOLS	KCLS - New Sammamish school locations
2000TRACTS	KCLS - White Center Tracts
SCHOOLS	KCLS - White Center school locations
T53033TRT00	KCLS - White Center Tract data
SEBLDG_MERGE	KC Jail - Building footprints
ARTSFLORAL	Kirkland - Public art
CITYLLIMIT_PL	Kirkland - City limit
FREEWAY	Kirkland - Freeways
ONSTRBIKELANE	Kirkland - On street bike lane
OVERPASS	Kirkland - Freeways overpass
PARKS99	Kirkland - Parks
PEDESTRIAN	Kirkland - Pedestrian lanes
RAIL_LN	Kirkland - Rail road line
SCHOOLS	Kirkland - Schools
SELFACILITY	Kirkland - Selected Facilities
STEEPGRDOVERPATH	Kirkland - Steep grade
STREETNET	Kirkland - Streets
TRAFFICVOLUMN	Kirkland - Traffic volume
TRANSITCTR	Kirkland - Transit center
NP_COMP	Normandy Park - Comprehensive Plan Zoning
NP_PARCEL_CLIP	Normandy Park - Parcels in city
NP_ZONING	Normandy Park - Current zoning from Assessors table
NP_ZONING_FIXED	Normandy Park - KC GIS edits from manuscript review

NP_ZONING_FIXED_JE	Normandy Park - Edits by John Everett of NP Planning
NW2204	Normandy Park - Parcel fix for those on edge of SEA tile
PARCEL_FIX1	Normandy Park - Parcel fix for those on shoreline
SEA586	Normandy Park - Parcel fix for those on edge of SEA tile
NEWZIPINC	Ombudsman - Edited Zip2000_color
ZIP_2001	Ombudsman - First edits
ZIP2000	Ombudsman - Original
ZIP2000_COLOR	Ombudsman - Coded by Council district
ZIPINC	Ombudsman - Interim copy
360NETWORKS	ORPP - 360 Networks fiber optic network
BUR_CPLU	ORPP - Burien Comp Plan
BUR_ZONE	ORPP - Burien Zoning
COMPPLAN	ORPP - Des Moines Comp Plan
CP_VALUES	ORPP - Des Moines Comp Plan values
DM_PARCEL_CLIP	ORPP - Des Moines parcels
DM_PARCEL_FIXED	ORPP - Des Moines parcels fixed
DM_PARCEL_Y_ZONING	ORPP - Des Moines parcels fixed with zoning
SEATC_CPLU	ORPP - Seatac Comprehensive Plan
SEATC_ZONING	ORPP - Seatac zoning
TUK_PARCEL	ORPP - Tukwila parcels
TUK_ZONING	ORPP - Tukwila zoning
COMPLU001	Redmond - Comprehensive Plan
4NEWSTA	Solid Waste - 4 stations placed from table
4NEWSTA_DD	Solid Waste - 4 stations projected to decimal degrees
5NEWSTATION_DD	Solid Waste - 5 stations projected to decimal degrees
TRANSFER_FINAL	Solid Waste - Compilation of all stations
TRANSFER_NEW	Solid Waste - Additional stations
TRANSFER_STATIONS_GEO	Solid Waste - Geocoded stations
TRANSFER_TEST	Solid Waste - Test geocode
TRANSFER_TEST2	Solid Waste - Test geocode
CITY_SHAPES	Transportation Planning - Cities
CITYANNEX	Transportation Planning - City Annexations
CITYANNEX_CLIP	Transportation Planning - Selected City Annexations
DOTLOGO	Transportation Planning - Logo
ETP CORRIDORS	Transportation Planning - Eastside Trans Plan, corridores
ETP FRWY CORR	Transportation Planning - Eastside Trans Plan, freeway corridors
ETP LAKES	Transportation Planning - Eastside Trans Plan, lakes
ETP OTHER PROJS	Transportation Planning - Eastside Trans Plan, other projects
ETP OTHER PT PROJ	Transportation Planning - Eastside Trans Plan, pub trans projects
ETP ROADS	Transportation Planning - Eastside Trans Plan, roads
ETP STRTS WITH NAMES	Transportation Planning - Eastside Trans Plan, streets
ETP_FRWYS	Transportation Planning - Eastside Trans Plan, freeways
CLIP1	Woodinville - Easements NW quarter
CLIP2	Woodinville - Easements NE quarter
CLIP3	Woodinville - Easements SE quarter
MERGE1	Woodinville - Merged easements
CLIP_BOX	Woodinville - clipping box

WO_ST_ADDRESS	Woodinville - ST_ADDESS clipped for city

3.3.2 Enhancements

In the ArcGIS model data sets are a collection of feature classes that share the same spatial reference and are grouped for editing of shared topology and object relationships; you can only edit feature classes within one collection at a time. Data sets are functionally equivalent to the framework coverages such as RECDNET.

Topological relationships between feature classes and objects in different data sets are not currently supported by ArcGIS. This concept has been implemented, in the existing ArcInfo 7 environment, through the use of keyfiles for vector data and has proven to be problematic and difficult to maintain. The reality of the situation is that keyfiles can only be used to support data rectification and are not suitable for maintaining topological relationships across data sets over the long term.

Decision support cannot occur across channels with disparate data sets (see also Information Access in Section 3.2 GIS Program Overview). Most of the efforts listed below are focused on establishing topological relationships and data integration to support the implementation of a consistent data model when support is available from the ArcGIS environment.

3.3.2.1 Data Warehouse Administration

Cadastral Framework Coverage	• Work with Assessments to resolve type 12 deletes. • Support Assessments' efforts to redraft areas where survey control was inadequate in the original data conversion. • Work with Assessments to define procedures for review and incorporation of cadastral data from other jurisdictions.
Conversion of Seattle Parcel Data	The effort to translate the Seattle parcel data sets into the RECDNET format, where it can be maintained by Assessments, and to provide a means for returning parcel updates to the City of Seattle will be implemented this year. This marks the third major attempt to address this problem in six years. It is notable that the current KCGIS Center Operations Unit staff was able to support the Assessor's Office to resolve all outstanding issues. This is an outstanding example of how success is achieved when the mutual benefit of all parties is acknowledged.
Street Centerline Coverages	• Continue development of procedures to add and edit roads and attributes to the street address coverage (ST_ADDRESS). One large hurdle will be access speeds over the WAN. Final deployment will almost certainly be dependant on the successful installation of INET at DDES. • Correlate the unincorporated County road inventory system data maintained by Road Services to the conflated ST_CRIS data layer. • Develop and implement procedures to fix jogs in the ST_ADDRESS; correlate with the cadastral framework development. • Continue manual maintenance of road classifications for cartographic display. • Develop geodatabase relationships between the CRIS layer to the street address layer.
Data Sets	Develop structural enhancements that draw a clear distinction between King County data sets and feature classes that are rectified to the cadastral base and data that are not.

	Currently rectified data include: • Any data layer derived from RECDNET • Elections- all feature classes • Census – 2000 block, blockgroups and tracts • ST_ADDRESS • ST_CRIS Work closely with other GIS units to support data rectification efforts; of particular note the commitment by DDES to complete rectification of a number of planning layers. Develop naming conventions for data sets.
Survey Layer	The ability of all agencies to meet their specific business needs, within the context of a comprehensive, coordinated, consolidated enterprise data model, is dependent on enhancements to the cadastral base. Regrettably funding for this effort has not been forthcoming, but is scheduled for consideration in future years. In the interim we need to: • Develop with the Roads Services Survey Unit a methodology for updating unincorporated King County survey data. • Develop with municipalities and other agencies' agreements for acquisition of survey data and methodology for updating survey data. (See also: Data acquired from external agencies in this section.)
Transition to ArcSDE	Additional update routines for SDE layers from data warehouse coverages. Administrative schemas that correspond to subject categories of the directory structure of the legacy /plibrary coverage and /plibrary2 shapefile structure will be used.

3.3.2.2 Data Enhancements

For data sources listed in the Spatial Data Maintenance section:

- Identify and transfer stewardship for data temporarily maintained by KCGIS Center, as appropriate.
- Identify spatial aggregations or subsets needed to support enterprise applications and develop a standard methodology for implementation.
- Identify data of unknown or undocumented sources and remove from warehouse as appropriate.
- Work with client sites to improve migration of data from departmental and project data into the data warehouse.

For data acquired from external agencies:

- Distinguish between external data source material and primary King County data sources, identifying all external data subject grouping by agency. This would include commercial data sources. For example: move unconflated census data to a USCB folder and have only conflated census data in a census folder.
- The data acquisition function has been incorporated into the Operations Unit as part of the development of enterprise data resources. The metadata recorded for these data need to include information about the need for the data by KC agencies, use patterns, refresh cycle time requirements and required data transformations. This effort will also look to expand the acquisition of external data to support regional GIS.

- Identify external data that requires conflation to the cadastral base data.

3.3.3 Development

The KCGIS Center has extensive experience and expertise in major data conversion, development and rectification projects. Projects that have been identified and funded are listed below. The development and implementation of geodatabase models for transitioning to the ArcGIS environment is also discussed.

3.3.3.1 Data Warehouse Administration

Data Modelling	Implementation of ArcGIS version 8 necessitates replacing the common geography model with a new database design, including relationship rules, to ensure geometric coincidence of interdependent feature classes. The KCGIS Center staff will work with Assessments staff to develop the Arc8 database design for the cadastral framework, and subsequently with data stewards to develop relationship rules for other layers.
Non-spatial data	See Section 3.5.3 Other Data Management Activity.

3.3.3.2 Data Development

Census	Census geometry has been rectified to street centerline, parcel lines and waterfeatures to derive census block groups and tracts that are coincident to the cadastral base. Specific adjustment to block boundary alignments based on review comments received will occur as data at this level is required.
EOC	Develop comprehensive County map layers for use by the Emergency Operations Center. This project will improve a number of map layers by including incorporated districts formerly out of the scope of interest of County departments. Map layers will be acquired from adjoining counties to build out a more complete data set for the Puget Sound region.
Airport	The King County Airport needs a documentation management system for leaseholds and ownership from 1929 forward to the current time. When the conversion of historic documents and maps is complete the system will provide access to an estimated 200 to 400 scanned map images and 425,000 pages of documentation. Spatial query to these resources will be provided by the development of lease boundary and property boundary reference layers. The work of scanning conserved, historic maps will be conducted by the Roads Services Division Mapping Center. The KCGIS Center Operations Unit will provide system design and database development services; see also, supporting application development in Section 3.4.3 Development.

3.3.4 Metadata

Metadata helps to assure that the data retains value over time regardless of changes in personnel, organizational structure, use context or data collection methods. Data conversion and collection is the most expensive element of an information system; tracking change as data is transformed when applied to or derived from new business purposes is essential to drive down the total cost of the information system over time. Metadata also helps to eliminate the duplication of effort that results from a lack of knowledge about other data sources within the enterprise.

FGDC-compliant metadata for a spatial data layer is maintained by the agency that created the layer. The KC GIS format has five sections: Description, Contacts, Data Overview, Spatial Features and Constraints. Metadata information is stored in Oracle relational tables and is available in two formats: FGDC-compliant and the more readable KC GIS format. A subset specific to the standard CD distribution is also generated. Metadata is maintained with the Doctool and Update applications, for details see Section 3.4 Spatial Applications.

3.3.4.1 Metadata Enhancement

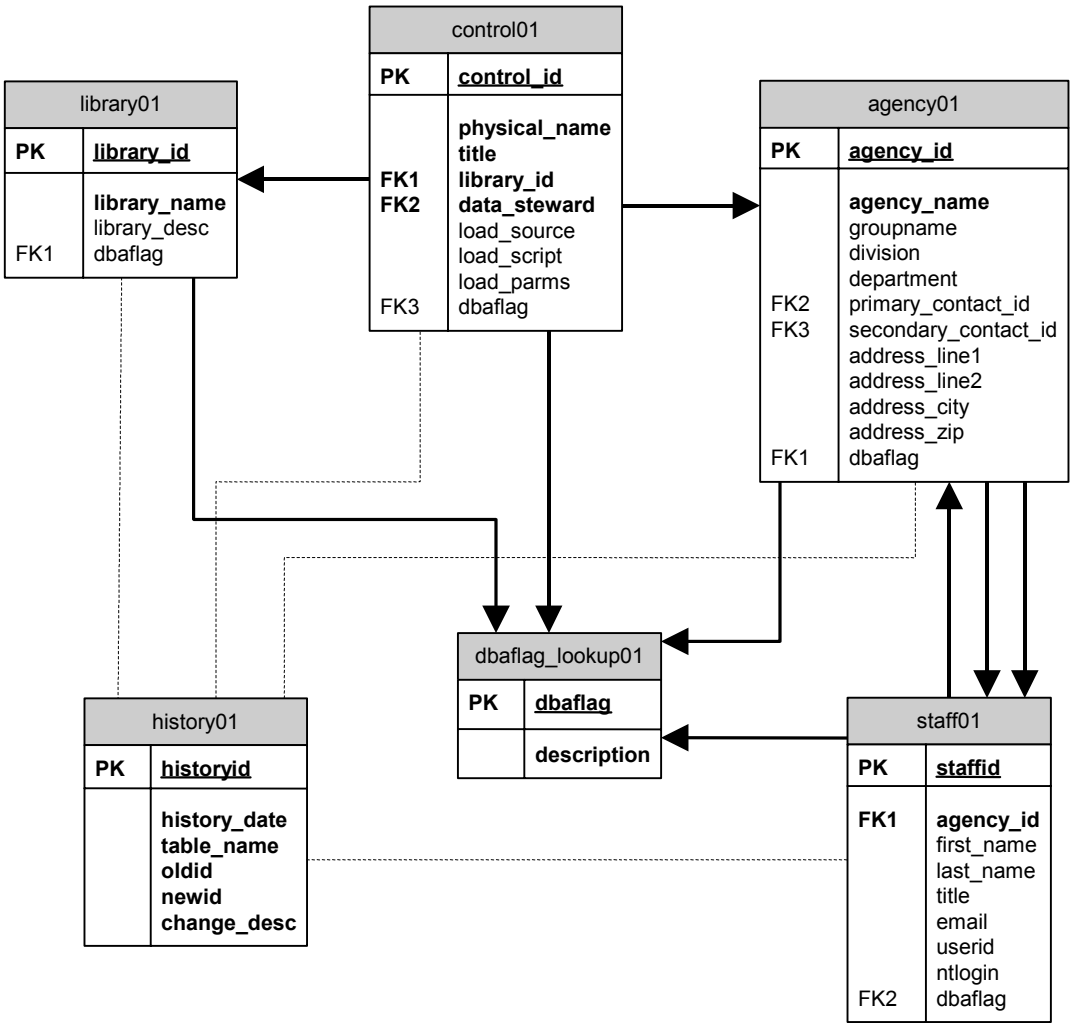
For data layers listed in the Spatial Data section above, the KCGIS Center needs to:

- Identify and transfer stewardship, as appropriate, or delete. No effort will be made to locate or update metadata for legacy or obsolete data.
- Identify external data that requires conflation to the cadastral base data.
- Identify project data that are to be moved into the Data Warehouse and complete the associated metadata.

3.3.4.2 Metadata Development

In 2002, the KC GIS enterprise metadata storage and maintenance environment will be updated to accommodate the Arc8 environment. Metadata for spatial data will be maintained using the Arc8 metadata editor and stored in an XML format in Oracle. The Operations Unit will also be investigating methodologies for generating metadata for non-spatial relational and object data stored in the data warehouse using the Oracle Metadata API.

The migration of metadata to mixed relational and XML storage necessitates changes in control applications, front-end routines that use metadata, and new methodologies for generating the spatial data catalog. The pared down control structure that will remain in a relation format is illustrated below.



3.4 Spatial Applications

KCGIS Center applications are documented to commonly accepted industry standards. KCGIS Center application development staff uses MS Outlook Team Folders for tracking tasks in current iteration plans. Directories on the *Orca* server are established for code and documentation as well as to ensure proper backup and efficient retrieval, if needed.

3.4.1 Maintenance

Existing applications used for information access, data warehouse utilities and data stewardship utilities are listed below.

3.4.1.1 Front End

This suite of applications provides end-users with a variety of easy to use information access options to the KC GIS Data Warehouse. See also: Information Access in Section 3.2 GIS Program Overview.

AvLib	This ArcView extension (ArcView Library) enables the user to: • Browse spatial data layers by subject and feature type, with data layers identifiable by alias, filename and/or description. • Add themes to a View and automatically set various theme properties, such as symbology, which normally are randomly generated by ArcView. • Links data to metadata via an html browser. • Access image data, which is difficult to organize and retrieve. This application provides the user with menu choices for one click access to any image data we have on the system. • Load a standard view from a library of user defined views. The application also provides a means for the user to store his or her own Views locally or to submit a view to the KC GIS Data Warehouse so that other users may access it. • Generate maps using standard layouts.
Districts and Development Conditions Report	The King County Districts and Development Conditions report provides information on a property's place in King County, such as: Parcel Number, School District, Zoning designation, Jurisdiction, Water District, Comprehensive Plan designation, Zipcode, Sewer District, Agricultural Production District, County Council District, Council Member, and Watershed. Written in ASP and utilizing ArcIMS, it allows anyone with a web browser to access the page (http://www5.metrokc.gov/webmaps/dd_report.asp) and enter either an address (within King County only) or a Parcel Number. If a matching record is found, the user is then given a full report of associated data for that property. This page will also take a Parcel Number as an argument in the URL, so other sites or applications can link into the report. iMAPs' Property Search function links into this report.
KC Parcel Tools	This ArcView extension provides users in any King County department with an easy to use interface to selected Assessor's data in the Data Warehouse. There are five main functions of this application: • Queries based on a known PIN or Taxpayer name. • Looking up information on previously selected parcels. These selections would typically be made on spatial criteria such as an address or its proximity to another feature. • Easy access to the RECDNET framework layer LIBRARIAN tiles, including tools for loading and managing the Arc and Annotation features. • Map a quarter section of RECDNET data with minimal user input. • Formatted mailing labels for selected parcels.
KC Property Report	KC Property Report is an on-line query tool into the tabular data from the King County Assessor's office stored in the KC GIS Oracle RDBMS. Written in ASP, it allows anyone with a web browser to access the page (http://www5.metrokc.gov/webmaps/property_report.asp) and enter either an address (within King County only) or a Parcel Number. If a matching record is found, the user is then given a full report of associated data for that property. This page will also take a Parcel Number as an argument in the URL, so other sites or applications can link into the report. iMAPs' Property Search function links into this report.
iMAP	iMAP is a lightweight HTML map viewer that provides online access to map layers in the King County Spatial Data Warehouse and other related information. The map viewer can be customized to display different data sets and to have different interfaces. The several

	versions share a common interface for ease of use, and also group and present data from different subject areas. Each custom iMAP version is referred to as a Map Set. iMAP includes a property search tool that is fully integrated with the basic application and thus accessible in all Map Sets. A variety of other data query tools are also part of the standard iMAP user toolbox. iMAP provides 'drill across' and 'drill down' capabilities, which gives all users with a suitable web browser open, online access to enterprise information that otherwise would be available only to the GIS users within King County government agencies, or as static data on the KC GIS data CDs.

3.4.1.2 Back End

This suite of applications enables GIS professionals to manage and fulfill their data stewardship responsibilities. See also: Data Stewardship in Section 3.2 GIS Program Overview.

Doctool	Doctool is an AML application designed to create and maintain documentation of spatial objects and their associated features. By stepping through a series of GUIs, users may specify properties and documentation for multiple aspects of the chosen object, including (but not limited to) abstract information, spatial descriptions, usage limitations, relates, and descriptions of specific spatial, tabular, and attribute features. The documentation is stored in the Metadata Database, a series of Oracle tables, which are accessed during the periodic update of the HTML pages used for the Spatial Data Catalog.
Eventlog Reader	Eventlog reader is a web-based application written in ASP. It is located on the intranet web server so only King County Employees can have access: http://badinov.metrokc.gov/eventlogform.asp. This application is used for building queries and viewing records from the "EVENTLOG" table in the Oracle database. Other applications, such as the nightly coverage positing routines, integrations routines, and shapefile conversion routines write information about their actions to the EVENTLOG table. Users can use the Eventlog Reader to easily see these records using their web browser.
Inview	Inview (INtegration VIEWer) is an ArcInfo application that is designed to allow users to view edits applied to the cadastral base (RECDNET) and cadastral base annotation coverages. Use of Inview increases the overall efficiency of the submittal/integration procedure by decreasing the time necessary to perform QA checks. Time is decreased in two ways: Inview replaces the need for QA plots, which can back up the plotter and cause wait time for users; and by having a consistent, onscreen, visual checking device to quickly identify and document problems with submittals, communication between users and the integration application maintenance staff is facilitated.
Keytool	Keytool is designed to create and maintain polygon keyfiles that describe GIS datasets conflated to the King County GIS cadastral superset coverage, RECDNET. A keyfile is an INFO table that describes the relationship between KEY, the unique polygon identifier for RECDNET, and a user-defined item that describes the user's feature that is derived from RECDNET. A separate keyfile is stored for each tile of RECDNET. Using a choice of processing techniques, the necessary spatial data is extracted from RECDNET to form the desired polygon information. The application uses a GUI to allow users to compare RECDNET with the original coverage linework and choose the correct polygons from RECDNET required to build a new coverage. This GUI is constructed from standard ARCINFO AML menus.
MaintRec	The maint_rec tool provides King County agencies with a set of tools to populate tiled edit coverages with new or updated features. The edit coverages provide the KC GIS DBA and KC Assessor with updates for maintaining their respective layers. The KC GIS DBA is responsible for maintaining the Recdnet layer and the KC Assessor is responsible for maintaining the Recdanno layer. The maint_rec tool includes the following interactive tools: Extract Recdnet and Recdanno features by user specified extents; Import ARCINFO

	coverages, and translate DXF files and ARCINFO export files into coverages; Display, select, add and edit arc and polygon labels and their associated attributes; Display, select, add and edit subclass annotation and their associated symbol markers and leaders; Execute quality assurance checks on edits, facilitate error detection and resolution, generate quality assurance check plots and error reports and generate finish plots; and Submit finalized edits to the proper submittal directory.
Sitetool	Sitetool allows KC GIS members to maintain and update their spatial and organizational information. It consists of a set of applications that allow users to: • Add coverages and tables to the data warehouse; • Change the name, library or data steward for existing data; and • Enter organization and staff contact information.

3.4.1.3 Control

This suite of utility applications and scripts is used to operate the KC GIS Data Warehouse. These utilities are frequently run as scheduled batch jobs and are only run by administrative accounts. See also: Transparency of Control in Section 3.2 GIS Program Overview.

ArcSDE scripts	Tablespace definition Command line load scripts
Docgen	The Docgen routine creates content for the Spatial Data Catalog. There are two output formats: a simple format and FGDC. Docgen currently does not write directly to the web site – instead, it creates the necessary files on Wildfire that must be processed through Microsoft Front Page in order to have the appropriate borders attached (either web site or CD).
Integrate	The integration routines provide multiuser editing capabilities in an Arc LIBRARIAN environment. These routines test and incorporate the updates generated by King County agencies for their layers derived from the framework RECDNET and RECDANNO layers. The routines are called from the cron_update script as a part of the nightly database update processing. Two types of updates can be submitted from KC agencies: manual updates and those generated from the MaintRec tool. The manual updates are submitted in the form of three coverages called: RECARC, RECPNT and RECANNO. Updates generated from the MaintRec tool uses a different naming convention for the same three coverages so many edits can be submitted for a single tile. The name format is as follows: arc_<submit-id>; pnt_<submit-id>; ann_<submit-id>. They are in the identical data format as the RECARC, RECPNT and RECANNO coverages respectively. The submit-id is acquired from an Oracle sequence number generator called SUBMITSEQ. The RECARC coverage contains: • New arcs to be added to Recdnet • Replacement Arcs. The RECPNT coverage contains: • Labels for new Recdnet polygons • Labels containing attribute changes for Recdnet polygons (pin, lot, type)

	• Points identifying Recdnet arcs flagged for deletion • Points identifying Recdnet arcs flagged for new arc type values • Points identifying Recdnet arcs flagged for splitting • Points identifying Recdnet arcs flagged for replacement The RECANNO coverage contains: • Recdanno Deletions • Recdanno Replacements • Recdanno Additions RECDNET Integrations: During every integration all recarc and recpnt submittal coverages (includes MaintRec generated covers) for each tile are combined into one corresponding recarc and recpnt coverage. The combined coverage name format is arc<integrateid> and pnt<integrateid>. The integrateid is acquired from an Oracle sequence number generator called INTEGRATESEQ. Using the combined coverages, all changes are made to a copy of Recdnet. Data integrity checks are made to the new RECDNET coverage and if it passes, it is positioned for the update cycle to post into the library. Upon failure of tests the tile will be "hung" (no updates integrated) until the Cadastral Base Coordinator rectifies the errors and allows for re-integration. RECDNET QC Checks: • Arc intersect errors • Duplicate arcs • Invalid dangle arcs (1/2 foot distance to nearest Recdnet arc) • New or edited arcs outside tile area • Missing or invalid attribute values for arcs (see Appendix B) • Label errors • Missing or invalid types for polygon labels (see Appendix B) • Duplicate polygon key values • Zero mapnums RECDANNO Integrations: RECDANNO submittal coverages are not combined for each tile and many recanno submittals may be integrated into a copy of RECDANNO. Upon integration into the tiled recdanno coverage it is placed in the post directory structure for the update cycle to upload it into plibrary. Note: Complicated updates to recdnet topology and all edits to recdanno are best handled using the MaintRec tool. Manual submittals should be limited to adds and deletes of arcs. RECDANNO QC Checks: • Validate new or modified annotation characteristics (see Appendix B) General Public Library Coverage Checks: • Check coverage is clean • Check for a valid projection file

	• Check for invalid data file item format
LibTool	The library tool routines are varied and include routines for: • Restoration of data structures after a system crash • Eventlog calls for tracking
RDBMS scripts	Recover Manager (RMAN) scripts are used to backup and restore the Oracle database instances. Backup scripts are executed on schedule. A catalog of backup sets is maintained in a standalone Oracle backup database. SQL Loader scripts are used in conjunction with a scheduled job process to perform periodic loads of large amounts of data from Offices of Assessments and the Recorder. These loads are scheduled to run overnight to minimize both unavailability of involved tables and writeable status of the involved tablespace. SQL/PLSQL scripts are used to streamline the task of adding database user accounts and to maintain duplicate data in different structures during migration of database structure or applications.
Update	The Update routines are varied and perform many functions to update the Data Warehouse files for KC GIS sites. The routines are called from the cron_update script as a part of the nightly database update processing. The functions of the update cycle are as follows: • Finds submitted keyfiles in the post directory structure. ▪ Tests to determine it exists in the control tables. ▪ Tests for valid agency and format. ▪ Posts the keyfiles. • Finds submitted tile keyfiles in the post directory structure. ▪ Tests to determine it exists in the control tables. ▪ Tests for valid agency and format. ▪ Posts the tiled keyfiles. • Find submitted ArcInfo Export file in the post directory structure. ▪ Import the file. • Finds submitted final coverages in the post directory structure. ▪ Tests to determine it exists in the public library. ▪ Tests for valid agency and format. ▪ Posts the final coverages. • Finds submitted tiled coverages in the post directory structure. ▪ Tests to determine it exists in the public library. ▪ Tests for valid agency and format. ▪ Posts the tiled coverages. • Generates coverages for updated tiles • tar files of updated parcel data to ftped to KC Assessors.

	• Finds updated coverages and generates corresponding shapefiles on plibrary2 • Truncates then repopulate the oracle table SHAPESIZE for the view AVLIBMENU. Loads view AVLIBMENU and exports as a DBF file.

3.4.2 Enhancements

DNRP	Inventory all DNRP GIS applications and evaluate enhancement and maintenance requests.
Desktop mapping Front-end	Work with department GIS units to consolidate the various desktop mapping front-end applications that are currently in use throughout the County by incorporating functionality into the existing AvLib application.
iMAP	• Work with GIS sites to develop and add map sets as needed. • Develop a set of guidelines and a tutorial for creating map sets. • Migrate existing legacy MOIMS applications to iMAP.
Legacy applications	In general, all of the above legacy applications are in maintenance mode and any enhancement request will be evaluated conservatively. Minimal enhancements to the MaintRec editor – this tool will become obsolete once the new cadastral framework model is in place. However, because of the time involved for this, interim enhancements to MaintRec will still take place.

3.4.3 Development

As GIS across the King County enterprise migrates to Arc8 during 2002 – 2003, applications and data that were developed and are used in the ArcInfo 7.x environment will become obsolete. ArcView 3.x will also be phased out in favor of ArcView8. A major development push will be to replace and enhance many of the applications listed above to offer users the advantage of Arc8's much-improved interface, editing tools and data structuring tools.

Address matching and geocoding	There is a widespread need for standardized batch and simple geocoding interfaces for desktop mapping and web environments. With the completion of the ST_ADDRESS coverage these applications can be developed.
Airport Document Retrieval	An application for accessing scanned map and documentation images will be developed following the completion of the initial phase of the Airport documentation scanning and database development.
Cadastral base editor	A comprehensive review and replacement of existing applications. See also data modeling.
DNRP	Develop a strategy for migration of existing DNRP GIS applications into an integrated framework as the applications are migrated to an Arc8 environment. Inventory new DNRP application requests.
Internet	• Develop a lightweight and embedded mapping application that references the same map sets as iMAP. • Work with departments to develop new map sets, including, but not limited to, elections,

	census and CIP map sets. • Develop methods for regional access and HTTP download of spatial data subsets to remote locations. • Investigate alternate access platforms. • Add additional access to existing departmental data stores.
KClib	This Arc8 interface will replace AVLib, offering all of its functionality with the added ability to browse SDE layers. Functionality will vary with the type of Arc8 desktop license.
iMAP	Develop a lightweight version for embedded mapping.
LibTool8	Utilities to manage the Data Warehouse and GeoDatabase editing environments – ArcSDE and Oracle routines that replace the existing LibTool utilities.
SiteTool8	Develop an entry interface for the control metadata described in Section 3.3.4.2 Metadata Development above. This interface would essentially replace the existing SiteTool application and would provide methods for data stewards to trigger standard Oracle/ArcCatalog routines.
StreetTool	StreetTool is an Arc8 template that is currently in beta. It was developed to allow users to easily access and edit street centerlines and associated data layers, including addressing and other attributes. StreetTool is currently being used by Roads services to edit the CRIS linework.
XP practices	Work with the best practices subcommittee to implement XP application development environment. See also Section 3.4.4 Application Development Methodology.

3.4.4 Application Development Methodology

As GIS data and development move to open, object-oriented environment corresponding change in development methodology becomes necessary and desirable. The transition from maintaining operability of legacy applications to implementing new technologies demands a rigorous yet flexible software development methodology. The purpose of enterprise applications is to continuously meet the needs of the enterprise customers. The KCGIS Center applications group is in the process of adopting a well-defined, customer-oriented, rules-driven programming methodology known as extreme programming or XP. For details of Extreme Programming see http://www.extremeprogramming.org.

To implement this methodology, GIS programmers are co-located in KCGIS Center offices and report to the Operations Manager. Any GIS application development work by Client Services or DNRP GIS Unit utilizes this same methodology, with staff temporarily relocated adjacent to other programmers, as warranted.

XP concepts that are particularly pertinent to enterprise application development in our context are:

Involve the customer.	The customer is the expert on the business functionality the software is to deliver. The customer stipulates what the application does, the developer determines how it will do it. The customer-developer team determines tests to serve the dual purpose of demonstrating to customers that their needs are being met as well as demonstrating to developers precisely what those needs are. All phases of an XP project require communication with the customer, preferably on a regular basis, face to face, and on site. It is particularly important in our context to distinguish between the roles of "customer" and "developers," as this had been unclear and problematic in the past. Customers

	(business people) are responsible for making the business decisions – determining what business needs are to be met by the application, determining criteria for acceptance testing, and helping to determine functionality. Developers (technologist) are responsible for making the technical decisions – determining timelines for functionalities, deciding upon design, implementing functionality (writing and testing the code), and integrating the iterations. A person who is defining business needs cannot take on the role of developer, and likewise, developers cannot dictate business needs. Applications are developed on an iterative basis, where each iteration requires minimal time (one to three weeks); introduces a limited, agreed-upon amount of functionality; is thoroughly tested before the next iteration; is fully documented; and has immediate feedback when released to the customer. Functionality is not added until it is needed. All code is written as part of an iteration cycle. Communication between the customer and the developer at every iteration ensures that application requirements are met.
Common code ownership	Common code ownership provides for continuity of progress and support in the event that the development team for a given project changes. Since responsibility for the code is shared by multiple programmers and is developed according to agreed standards across the development team, support is not compromised by incremental turnover in the group. Practices that promote common code ownership include: • Moving people around to ensure that every member of the team is familiar with, and shares responsibility for, the code. As a general rule, in every iteration, the person who has been on the team longer is moved to a new area. We have practiced this by mandating the handoff of major AML applications between iterations. In an object oriented development environment the frequency of the moves should increase when staff are at the same level in the language. • Production coding involves two people in one session side by side at a single computer. Code is reviewed in real time as it is built, significantly cutting down code defects and on time spent debugging. Everyone on the team is capable of editing any code at any time; thus both the programmers and the team as a whole become more flexible and the loss of a team member does not impact timelines or application quality. Standards evolve as a result of development teams working with all of the code. These standards should be reviewed and documented as frequently as is indicated by updates.
Outcomes	Simplicity. Following Extreme Programming methodology by definition results in applications that are simple and elegant, which are more valuable than those that are complex and hard to maintain. Simplicity also applies to the clarification of communication channels across the enterprise. Code Quality. Pair programming coupled with moving people around on programming projects results in higher quality code from the outset, decreasing project time. Continuity of Support. XP methodology also ensures multiple points of contact and reduced risk of loss of expertise associated with staff turnover.

3.5 System Integration

In the next fiscal cycle we anticipate being able to avoid acquisition and maintenance costs associated with servers, server software and support costs at multiple locations throughout King County by providing access to KC GIS domain infrastructure. Consolidation at a single location also has implications for administration of RDBMS and ArcSDE in that the scale of operations permits configurations optimized for OLTP and Data Warehousing and staff expertise, with depth of coverage, in specialized fields.

A consolidated geographic information infrastructure also has implications for true enterprise integration and information delivery across channels.

3.5.1 Network Bandwidth

Network bandwidth from KC GIS domain servers to desktops is a critical success factor, particularly where spatial data editing is occurring.

3.5.2 RDBMS

Oracle8*i* version 8.1.7 is used to store, maintain and serve GIS and Business data as well as any metadata tables and other data control structures. Oracle also is the RDBMS supporting the enterprise ArcSDE installation. The KCGIS Center has standard and enterprise licensed instances deployed.

Microsoft Access	Access is used to convert, manipulate and compile tabular data as needed on Client Services projects. The list of clients who have required this service includes the Port of Seattle, Mountain View Fire District, Shoreline Water district and numerous King County government agencies. Conversion of the ASCII text files (as formatted by the US Census Bureau) of Year 2000 census data was accomplished using Access conversion templates provided by the US Census Bureau. Often KCGIS Center staff uses ArcView shapefile data as a starting point for queries or additional application activity, but then turns to Access for a greater variety of tools and data-processing capabilities than is available from the built-in ArcView 3.2 database engine. A general example of broader database functionality is the analysis of County Assessor's tables and records to quantify land value and other statistics. As a specific example, the Port of Seattle requested that a compilation of certain Assessor's fields from numerous tables be attached to a shapefile of properties within the flight paths of SeaTac Airport. A similar study was done for Boeing Field at the request of the King County Department of Construction and Facilities Management.
MS SQLserver/MSDE	

3.5.2.1 Development

Source Configuration Management	Consider implementation of Oracle 9i SCM as a centralized repository of KCGIS Center team resources storing both structured and unstructured data.
Internet File System	Consider implementation of Oracle Internet File System for storage of files in an organized inventory including: spreadsheets, text documents, html documents and other semi-structured or unstructured data files.

3.5.3 Other Data Management Activity

Implement Lightweight Directory Access Protocol (LDAP), Version 3 in Oracle to support simplified directory management and improve access to data resources. This effort may be dependent on the prior implementation of LDAP in a Windows 2000 Server environment

Unstructured data: spreadsheets, mdb, text
Structured data: xml
Tabular/relational: Census STF1 data for King County
Object data: Oracle Spatial

Metadata: Extraction and development of a lexicon of the common words used in formal data names and abbreviation

3.6 Client Services and User-Base Support

The target for KCGIS Center client services and user base support includes both direct support to business end-users throughout the County, as well as GIS staff in other departments and offices (see Section 2, King County GIS Organization Chart). KCGIS Center client services and user base support broadly includes those activities that help other GIS professionals and/or GIS end users productively put to use the data, applications, and metadata included in the KC GIS Data Warehouse. In addition, as an integral part of the KC GIS Regional GIS approach, many of these services are made available to GIS professionals and business end-users in local public agencies.

KCGIS Center client services and user-base support can be divided into two categories:

- Enterprise GIS Services are those which can generally be provided at a fixed cost to a very large number of users by optimal use of information technology, or for which single point of contact or dissemination are desirable. Cost for Enterprise GIS services are included in the KCGIS Center O&M Budget.
- GIS Client Services are those for which end user needs and demand tend to vary and which have a variable cost to provide. Single point of contact for the provision of these types of services is desirable. KCGIS Center, as single point of contact for cross department provision of these services, has been mandated by KC GIS Consolidation. KC GIS Client Services are provided for hourly or set fees on a cost-reimbursable basis.

3.6.1 Enterprise GIS Services

ArcIMS	A publishing technology and an application and data (information) serving technology. ArcIMS serves a number of Map Sets to the user, who can access the ArcIMS Map Sets either through ArcGIS, ArcExplorer, or through a web browser, using a customized viewer. Map Sets define groupings of selected GIS layers, the symbology used by those layers, and any relationships to database tables they may have. ArcIMS can serve any number of Map Sets, providing unique opportunities for data integration. See also, for information on existing map sets, http://www.metrokc.gov/gis/mapportal/mapsets.htm.
ArcSDE	Enables true multiuser editing of GIS data Improved management of enterprise data Improved system architecture Improved management of enterprise data by: • Better access to RDBMS data in other enterprise and departmental data holdings through and improved system architecture. • Enabling Geodatabase modeling. ▪ The ArcSDE gateway with ArcInfo is used to implement additional integrity constraints within data sets that aren't practical to implement in the RDBMS itself. For example, you can add connectivity rules for utility networks. ▪ The next release will be capable of building relationship rules between data sets to maintain data conflation. For example, census block boundaries which may correspond to street centerlines, property lines, streams or lake shores can have defined relationships to edges in the corresponding ST_ADDRESS, PROPERTY, and HYDRO layers so that when geometry is adjusted in the associated layers the adjustment will flow to the census data.

	Improved architecture • The ArcSDE gateway between the GIS and the RDBMS to share and manage your spatial data as relational tables. In a heterogeneous database environment, where a number of different departmental or personal database systems are used, ArcSDE provides a common model for geographic information based on standards for managing spatial data in a SQL database that have been defined by both international standards bodies, and industry organizations. • The ArcSDE application server provides performance advantages as well as providing a mechanism for supporting server side applications. • ArcSDE allows you to distribute the GIS application processing between the database server, the client and the ArcSDE application server. For more information see the ESRI Web site: http://arconline.esri.com/arcsdeonline/.
Help Desk Support	KCGIS Center staff provides a limited capability to respond 1:1 to resolve problems and answer questions for end-users. The Client Services Unit handles most of the phone calls and e-mail related to providing help with the use of King County GIS data. We are contacted daily by federal, state and municipal agencies, as well as private firms and individuals, all interested in the use or availability of King County owned and managed GIS data.
Internet site	The external Web site (http://www.metrokc.gov/gis) is set up to provide public information on enterprise GIS operations in the County. The KC GIS Internet site informs KC GIS professionals in other departments and offices, as well as business end-users throughout the County. In addition, as an integral part of the KC GIS Regional GIS approach, the KC GIS Internet site is available to GIS professionals and business end-users in local public agencies. The site is organized into five main sections with shortcuts to services within those sections. Home: The home page is structured as a KC GIS news resource, and is updated weekly. Other pages in this section outline KCGIS Center's mission and vision, and provide staff and contact information, useful links and the web site's sitemap. Shortcuts to departmental GIS sites: • Act as a point of contact for regional GIS; • Provide support to users of that enterprise operation; • Disseminate information on the creation and maintenance of enterprise GIS data; • Provide access to metadata for enterprise data sets; and • Provide a mechanism whereby GIS data and information can be easily accessed by the general public. Map Portal: The Map Portal consists of three interrelated content areas: • iMAP http://www.metrokc.gov/gis/mapportal/index.htm, an ArcIMS application which lets both internal users and the public access GIS map layers and do their own analysis; • Virtual Map Counter http://www.metrokc.gov/gis/vmc/index.htm, an online library of published King County digital maps; and • MapLinks, links to GIS resources on the Internet organized by subject matter.

	Client Services: Outlines the types of services available and rates. This section also includes information on GIS training offered through the KCGIS Center, as well as information on purchasing data. See also the shortcuts to: Knowledge Base Data sales Training Spatial Data Catalog: The Spatial Data Warehouse is published metadata organized alphabetically, by agency and by subject. Content for each data layer is determined by that layer's data steward. There are currently two formats: FGDC-compliant, and a more readable format that was developed in-house specifically for KC GIS data. The latter is the default, and has been set up so that the most general and often-used information is at the top, with information becoming more specific and complex as the user scrolls down the page. The FGDC format is available as a link near the top of the default page. See: http://www.metrokc.gov/gis/sdc/ Data Warehouse: This section includes information on data access, development, acquisition and distribution; tools and applications; system and data architecture, metadata definitions and spatial data standards; directory structure, data posting procedures and index coverages.
Intranet	The internal Web site (http://badinov.metrokc.gov) is used as a means to disseminate information that is of interest only to internal King County users, including user documentation, technical documentation and development procedures; and as a development and test server for Internet applications including ArcIMS applications. This site will be moved to http://orca.metrokc.gov early in 2002.
License management	License management of legacy software. See also: Enterprise GIS Services Enhancement in Section 3.6.1.1 below.
Master Purchasing Agreement	The KCGIS Center maintains a Master Purchasing Agreement with ESRI. This allows County agencies and other municipalities to purchase ESRI products at a discount. The MPA is reviewed annually. The existing agreement was established in 1995, revised in 2000, expires in 2003, may be extended for one or two additional years, but must be renegotiated in 2005. The agreement will be amended as necessary to add terms, conditions and pricing for new/updated products and to delete terms, conditions and pricing for discontinued products. The MPA was negotiated between KCGIS Center, KC Procurements, KC Prosecuting Attorney's Office and ESRI; includes license terms & conditions, pricing for the entire ESRI product line and covers purchases of ESRI software, data products and product maintenance by all KC departments and agencies. This agreement also documents King County's allocation of complimentary registrations for the annual ESRI International User Conference. Cities and other local public agencies within KC may purchase ESRI software, data products and product maintenance under this agreement.
Regional GIS	Regional GIS services are provided and coordinated by the Marketing & Finance Manager. The goal of this program is to advance the County Executive's vision for KC

	GIS to be a regional service provider. To implement this vision, three major objectives will be pursued: • Systematic and institutionalized regional GIS data sharing. • The extension of KC GIS to regional agencies as full partners, meaning both with access to all enterprise KC GIS resources and services and participation in the funding of future KC GIS costs. • Marketing of KC GIS client services to support the successful implementation of GIS by local agencies. Providing these services is a benefit to all KC GIS agencies by centralizing cross agency coordination and ensuring that a consistent message about KC GIS is disseminated. Benefits travel all directions in regional GIS cooperative agreements.
Training Program	The training program provides access to an extensive selection of on-site ESRI courses. For the primary client desktop platforms, ArcView 3.2 and Arc8, the KCGIS Center has an ESRI-certified instructor on staff in order to provide a substantial reduction in the course cost and to increase the frequency with which these courses are offered. We also coordinate with the Olympia office of the ESRI Training Program to offer several courses from the ESRI training catalog semi-annually in the KC GIS Training Center. As required, the KCGIS Center contracts with ESRI and other training providers (Oracle, ERDAS) to offer advanced and specialty GIS coursework in the KC GIS Training Center. For GIS end-users, courses developed by the Client Services Unit on how to use enterprise applications on the job are offered at least once each quarter. In general, there are at least one to two classes offered each month. The course schedule for the training program is developed by the KCGIS Center Management Team in consultation with the KC GIS Technical Advisory Committee.
User Group	The KC GIS Users Group is open to all users of the King County Enterprise GIS and to current or potential users from outside local agencies as part of the KC GIS Regional GIS Program. Convening once a month, presentations from technology vendors or recent accomplishments by KC GIS sites are routinely scheduled for the edification of enterprise GIS users. The meetings also offer a showcase where new techniques and information resources are shared with KC GIS sites. The KC GIS Users Group is administered by staff from the KCGIS Center Operations Unit.

3.6.1.1 Enhancement of Enterprise GIS Services

Arc Spatial Data Engine (ArcSDE)	A dual database concept that separates online transactional processing (OLTP) from data warehousing will be implemented in the first quarter of 2002. A new enterprise ArcSDE environment will be established to provide GIS units with enterprise geodatabase editing capabilities. Administrative schemas corresponding to the GIS units Unix group name will be established. Login to the administrative schema will be controlled by the specific GIS unit, from which access privileges for staff to data layers within the schema can be established. The data warehouse ArcSDE environment will be modified to accommodate publication of data from the editing environment into either departmental or enterprise subject areas.

	See also: Section 3.2.3.1 Server software and development.
Internet	To reinforce the identification of the KCGIS Center as the single point of contact for access to King County GIS services, the KC GIS Web site must become the single point of web contact. In 2001, the Internet web address was moved out of DAIS and onto the root King County Web (www.metrokc.gov/gis) to reflect its enterprise-wide function. There are a number of departmental GIS web sites on both the Internet and intranet, and while the audiences that they serve are similar – oftentimes the same – as the KC GIS enterprise Web site, it is not the intent of the KCGIS Center to assimilate them. Departmental web sites serve department-specific needs, while the KC GIS Web site is intended as a source of information for the entire enterprise. However, redundancies and inefficiencies are inevitable when maintaining so many sites devoted to GIS. Departmental content aimed at County GIS professionals should be evaluated for potential relevance and interest outside that department, and if this is the case, moved to the KC GIS Web site. If it is of specific interest to only members of that department (specific editing procedures, projects, or technical issues, for example), it should remain where it is. However, in the light of departmental communication, intranet information should be linked back to the departmental intranet. Content intended for public consumption should be available from a single location – the enterprise web site – to reduce search time and also eliminate redundancy. Virtual Map Counter Create a single managed repository for all published digital maps. Web links from Internet and intranet web sites would reference the same content. All published maps would be available from a single location – the Virtual Map Counter. Data Warehouse Update the content of the Data Warehouse section and archive content regarding procedures, systems and other information that have been rendered obsolete.
Intranet	Enhance the Documentation section with added information on procedures as they are developed; create an easy-to-find links page to other departmental GIS intranet pages; either continue development of the Tracking section and begin using, or remove it.
License management	Why: • Cost efficiency • Understanding use patterns • Integration into enterprise system administration and development The initial effort will begin with planning for the migration of licenses for Assessments, Public Health, DNRP, and ORPP. See also ESRI ArcOnline for deployment models: http://arconline.esri.com/arcobjectsonline/TechnicalDocuments/LicenseIssues.htm
Training	Develop courses focused on the use of enterprise information and applications, such as: • Creating ArcIMS map sets;

	• Using KClib and the Spatial Data Warehouse; • ArcGIS editing with StreetTool; and • Using census data. Funding for desktop GIS coursework.

3.6.2 Client Services

The KCGIS Center provides client services on a cost-reimbursable basis to end-users both within King County and from external agencies. The Client Services Unit is frequently the initial point of contact for business users to the KCGIS Center. In this capacity, client services staff works with the client to determine the scope of work and to facilitate the hand off of work to the appropriate GIS unit. Services executed by the Client Services Unit are detailed below. See also: http://www.metrokc.gov/gis/services/index.htm.

Data Development	Data development by the Client Services Unit is performed as needed to complete specific projects in conjunction with a map or analysis product or where the Client Services Unit is functioning as a defacto GIS unit for a business unit. The resulting datasets are normally intended for client use and not by the King County GIS enterprise data warehouse. Data may be spatial and/or non-spatial. Coordination is maintained at all times with enterprise data development. Enterprise data development and conversion projects are administered by the Operations Unit.
Data Sales	Standard data from the King County GIS spatial data warehouse is available for purchase on CD-ROM media. The standard sets of CDs are updated on a periodic cycle and the data is available as both ArcInfo coverages, updated semi-annually, and as shapefiles, updated quarterly. Only data published by King County is released; requests for data acquired from external sources are referred back to the original source for the data. In those cases where customer data needs are not met by one of the standard KC GIS data CDs, a custom data request can be fulfilled by the Client Services Unit.
Needs Assessments	Needs Assessments are evaluations of a client's current needs for GIS data, applications, projects, analyses, and/or map products. In addition, Needs Assessments look at a client's capability (or lack thereof) to initiate, produce, and maintain these products. Careful attention is paid to existing data and personnel infrastructure within the client's organization, to look for possible integration opportunities and benefits. The end product of a needs assessment is an "Action Plan" document. As the Client Services Unit responds to a client request they may propose that the scope of work is greater than the immediate task or project proposal and suggest that a more comprehensive needs assessment is required. Examples of Needs Assessments that the KCGIS Center has produced are those done for the City of Tukwila, and the City of DesMoines. Major development efforts will require the formation of a development team including members of the KCGIS Center and the business area involved under the direction of the Finance and Marketing Manager.
Publication Cartography	The KCGIS Center is prepared to engage in mapping projects that require the highest level of cartographic design and production, especially those projects for which the client needs publication-quality final products.

	Publication-quality map product development requires skills, experience, and tools that most GIS professionals and business units do not posses or have access to. Similarly, graphic design practitioners, who are often employed to design and create map products, rarely have GIS backgrounds or experience in cartographic design and the mapping sciences. Thus, in the area of publication cartography, the KCGIS Center is equipped to extend the capabilities of the average GIS unit and bridge the gap between GIS and traditional graphic design and production. Publication-quality mapping capability in the KCGIS Center is achieved first and foremost by individuals who have extensive experience in designing and creating map products for a broad range of clients and subject areas, including the physical sciences, resource management, public policy, education and recreation. The experience and skill of the KCGIS Center staff is then augmented by blending GIS tools and data with professional graphic design and illustration software, which results in print and web-based map products that reach beyond the separate limitations of GIS and traditional graphic design. All of this, plus the ability to offer complementary services, such as copy editing, publication design, image editing, and printing coordination, as well as its extensive first-hand experience developing, managing and using King County and regional spatial data, is designed to make the KCGIS Center a one-stop solution for publication-quality mapping needs.
Scope of Work Assessment	The Client Services Unit performs a scope of work assessment when responding to client requests and employs three main project management tools to insure a successful outcome. The first is a spreadsheet for assigning a project identification number and capturing client contact and billing information. The second is the Project Request Form that functions as a scope of work document. Following an initial client contact for services, this form itemizes the products or services to be delivered, map layers or tabular data to be used, either from the Data Warehouse or delivered by the client, project schedule for meetings, milestones and deliveries, and cost of output materials such as plotting. The third project management tool is the Timecard reporting application. This Oracle database reporting tool is used to track actual time spent on specific projects and is used in final billing procedures.
Thematic Mapping and Spatial Analysis	These services are typically performed for clients without a GIS unit or to supplement GIS capabilities. The KCGIS Center Client Services group works with prospective clients to define a scope of work for a project, and then designs and produces a map or geographic analysis according to the client's specifications. Often one of our projects is used as a template by a contracting agency to start building its own GIS in addition to satisfying its immediate business needs. For a project in which an organization plans to develop its own thematic data, Client Services can direct the client in proper field techniques and conversion procedures. Through these service activities, Client Services is able to act as the eyes and ears of the KCGIS Center throughout the County. Often, Client Services projects expose or highlight absences of information in a spatial format, user concerns regarding data integrity or completeness, and data conflicts (e.g., two or more city boundary layers). They can also uncover data developed by non-King County Government (KCG) groups that could benefit KCG goals.
Training Program	The training program provides access to an extensive selection of on site ESRI courses. For the primary client desktop platforms, ArcView 3.2 and Arc8, the KCGIS Center has

	an ESRI-certified instructor on staff in order to provide a substantial reduction in the course cost and to increase the frequency with which these courses are offered. We also coordinate with the Olympia office of the ESRI Training Program to offer several courses from the ESRI training catalog semi-annually in the KC GIS Training Center. As required, the KCGIS Center contracts with ESRI and other training providers (Oracle, ERDAS) to offer advanced and specialty GIS coursework in the KC GIS Training Center. For GIS end-users, courses developed by the Client Services Unit on how to use enterprise applications on the job are offered at least once each quarter. In general, there are at least one to two classes offered each month. The course schedule for the training program is developed by the KCGIS Center Management Team in consultation with the KC GIS Technical Advisory Committee. The Client Services Unit administers the training program and provides one-on-one training about KC GIS data and applications on an ad-hoc basis. The course "Putting GIS to Work in King County" was developed to familiarize County staff with the enterprise map layers and ArcView extensions written for common use.

3.6.2.1 Clients Supported in 2001

ORGANIZATION	CONTACT
Bellevue Schools - Trans. Dept.	Kate Rae
Church Group	Merrill Rid
City of Des Moines	Corbitt Loch
City of Duvall	George Steirer
City of Federal Way	Paul Bucich
City of Kirkland	Xiaoning Jiang
City of Mercer Island	Pete Mayer
City of Normandy Park	Steve Bennet
City of Pacific	Steve Ladd
City of Woodinville	Patrick Lynch
Fire District 44	Mike Barlow
Geaographic Data Technology (GDT)	Nancy Runnals
Intracorp	Lisa Albo
KC Council	David Randall
KC DCFM	Kelly Donahue
KC DCFM	John Llewellyn
KC DCFM	Kelly Donahue
KC DCFM	Leslie McLean
KC DCFM – Airport	John Current
KC DNR	Mike Leathers
KC DNR – Wastewater	Allen Alston
KC DNR – WLRD	Steve Zubalik
KC DOT	Gerrie Jackson
KC DOT - Office of Regional Trans. Planning	Lisa Shafer
KC EOC	Michael Loehr
KC HWMP	Donna Galstad
KC INET	Barbara Larson
KC ITS	Cheryl Boudreau
KC Library System	Linda Fredricks
KC Ombudsman	Amy Calderwood

ORGANIZATION	CONTACT
KC Ombudsman	Duncan Fowler
KC ORPP	Nanette Morales
KC Parks	Harkeerat Kang
KC Public Health	Jim Allen
KC Solid Waste	Stephanie Mano
KC SWES	Don Althauser
Lakehaven Utility District	Rick Lortz
Matthew Williams, Managing Attorney	Cindy Petersen
Port of Seattle	Brad Jenson
Port of Seattle	Lynae Jacobson
Port of Seattle	Jude Barrett
Private Law Firm	Julie Gaisford
Resource Games	John Jaquet
Shoreline Water District	Phillip Lay
Society of Council Respresenting Accused Persons	Matt Renschler
Tele Atlas	Blake Liebermann
TetraTech	Tom Spangenberg

3.6.2.2 Development

While funding is currently provided on a fee basis, the King County Executive's intent is that the KCGIS Center provides services at no cost to internal King County clients who are not able to allocate budget resources for GIS. To this end, the 2003 Executive-proposed budget will include provisions to accomplish the Executive's goal. External clients will still be subject to a fee-for-service arrangement, as will internal King County clients who have the means, but choose not to have GIS staff positions, or have workloads in excess of staff availability. Allocated FTE or TLT positions will be filled in order to accommodate the increased workload that is anticipated from the Executive's directive.

King County agencies with budgeted funding for ad hoc client service requests include:

- Assessor’s Office
- Budget Office
- County Council
- Development and Environmental Services
- District Court
- E-911
- Prosecuting Attorney
- Public Health
- Records and Elections
- Road Fund
- Sheriff
- Superior Court
- Water Quality

Agencies with budgeted funding for ad hoc client service requests and/or with identified specific needs include:

	Identified specific need for:
Airport	Development of a documentation management and query system for ownership, leasehold and facilities maps and records from 1925 to the present.
Boundary Review Board	Quarterly annexation and incorporation activity report for King County and occasional additional map requests.
Department of Community and Human Services (DCHS)	Map and data requests regarding DCHS projects such as housing, airport noise programs, community councils, and census analyses. Potential application work includes a custom version of iMAP relating to census data.
Office of Emergency Management	Coordination of staffing and preparation for activation of the EMC GIS station.
Office of Regional Policy and Planning	A wide variety of maps, data, and analyses regarding existing and proposed planning policies and other King County Council action impacts. Significantly, this includes work in support of the King County Annual Growth Report.
Parks and Recreation	Custom cartographic support for brochure and publication mapping.
Property Services	Migration of web mapping for County-owned property and potential telecommunication sites to iMAP.

4 2002 King County GIS Work Plan

4.1 Department of Assessments

The mission of the Department of Assessments is to serve the citizens of King County by providing fair, equitable and understandable property valuations, forming the basis for funding of public services. The Department of Assessments is responsible for discovering, listing and valuing all taxable real and personal property within King County for preparation of the tax roll. The department has approximately 242 employees and is structured into five divisions. These divisions are Administration, Accounting, Residential Appraisal, Commercial/Business and Information Services.

The coordination of GIS at Assessments is done through the Accounting division. Besides being a mechanism for updating the cadastral data, the purpose of GIS within the Department of Assessments is to assist with valuation and information delivery methods.

4.1.1 Business Functions

GIS within the Department of Assessments is used in valuing property, defending valuation methods and estimates, maintaining public records including maps, legal descriptions and taxing district boundaries, administering exemptions and calculating levy rates. GIS provides easy access to data that is valuable for performing Assessments business functions. GIS is integrated into many aspects of the Department's business functions including but not limited to:

Property Appraisal – Appraisers use GIS maps, applications and data when valuing property. GIS is used for data retrieval and analysis. In addition, GIS is used to update property characteristics.

Map/Property Boundary Maintenance - GIS is used for discovering and listing taxable real property within the County. Assessments is responsible, under RCW 84.40.160, for maintenance of property configurations within King County. GIS is being used to fulfill the responsibility. The old quarter section

Mylar maps are being retired and being replaced by maps generated from GIS data. Numerous agencies and individuals both within and outside the County access GIS property boundaries maintained by Assessments.

Exemptions – Assessments administers a portion of The Open Space Act (Chapter 84.34 RCW), which provides for current use assessment of farm and agricultural land, timber land and other open space land. Once land is classified, taxes are based on the current use value of the land rather than its highest and best use. Assessments must maintain both current use value and market value on these properties. GIS provides analysis and mapping of characteristics unique to Current Use Exemption monitoring.

Annexations/Levy – GIS is used to produce maps and data for internal use specific to the Assessment calendar year. GIS is used to generate the taxing boundaries. From this, maps and lists are generated for State Department of Revenue for apportionment of utility valuations and the state levy.

Appeals – GIS data and analysis are used as evidence and support for defense of valuation decisions.

Misc. Property Related Analysis/Public Info. – GIS is used for validation of proposed annexations, property search and information requests, Assessor maps, public notification of neighboring properties and other public agency requests.

4.1.2 GIS Program Overview

Assessments does not have a separate GIS entity from which business is conducted. The GIS "program" at Assessments is integrated into the whole department. GIS in Assessments consists of a coordinator, data maintainers, analysts and users. The coordinator reports to the Accounting Division Manager.

The department has eight cartographers who are responsible for maintaining the Countywide (corporate) cadastral data as well as other data sets used internal to Assessments. The cartographers are part of the Accounting Division and report to the Mapping Unit Supervisor. The priority of both the coordinator and cartographers is to support the appraisal function of the department. Appraisers in both the Commercial and Residential Appraisal Divisions make use of GIS in their daily business to effectively perform their job functions. Programmers and analysts in the Information Systems Division integrate GIS into applications and use GIS analysis for data updates.

The many factions of GIS within Assessments provide mapping, analysis, training and data development. Appraisers and specialists annually request standard maps products and additionally use ArcView to support their appraisal work. Appraiser use of ArcView has been driven by individual appraisers and deployed to users within Commercial and Residential Appraisal. GIS has become a primary tool used for data analysis by a number of appraisers. Data development occurs at the request of users. It can be requests for new data layers or the accumulation of data sets from various jurisdictions and organizations. Spatial analysis is done by various entities depending on the nature of the request.

Assessments works closely with the KCGIS Center to maintain the Countywide cadastral data. Because Assessments does not have a staff of GIS programmers there is a heavy reliance upon the expertise of the KCGIS Center to build, maintain and support applications for maintenance of the Countywide cadastral data set. In addition, to insure the integrity of the cadastral data, Assessments requires daily attention from the KCGIS Center to insure that data is integrated in a timely manner and fixed when there is a failure in the process. Assessments also relies upon applications developed by the KCGIS Center, namely the *iMAP*, Parcel-Picker and AvLib applications.

Assessments has a ten-year MOU with the City of Seattle for maintenance of the Seattle GIS parcel data. The MOU ends in August 2002. Coordination of this effort and the post MOU transition is an ongoing effort.

4.1.2.1 Training

Assessments staff have attended KCGIS Center training courses and other outside GIS courses such as those taught at the University of Washington. Internal training is conducted on an ad hoc basis as needs become apparent. Most group training is done in small groups on specific aspects of GIS that may be useful to a job function. The Coordinator or other advanced GIS users who have written applications do internal training. As technology moves forward, Assessments will require substantial training to adapt to the new Arc8 application and data model. Training throughout the department is generally done on an as needed basis due to the limited funds available for training. The Administration Division at Assessments administers training funds. In the current environment, the drafting staff is adequately trained and proficient users of both COGO and the maintenance applications. When the shift is made to the Arc8 environment, substantial training will be required for the drafting staff to ensure the same proficiency exists and there is no drop in the level of output with regards to data maintenance. Extensive Arc8 training will not likely occur until a timeline for migration from the Arc7.x environment is established. Informal Arc8 training for individuals will occur through usage of the software.

4.1.2.2 Staffing Requirements

Assessments has one staff position to focus on GIS within the department. This position fulfills the roll of GIS coordinator, analyst, data developer and system administrator. In addition, appraisers, cartographers, analysts and programmers contribute to the integration of GIS into the department business. Most of the data maintenance and update is done within the Accounting Division while programmers, analysts and appraisers in other divisions implement GIS technology as well.

In addition to helping the public and Assessment staff with mapping related questions and research, the cartographers in the mapping section do the majority of the GIS data maintenance for Assessments. The use of GIS for data maintenance of the cadastral data requires more staff time than the old manual methods of updating mylars. At times, there is insufficient staff to keep up with the demand placed on the mapping staff. There are a number of reasons for this. First, Assessments currently maintains two different sets of GIS cadastral data, that for the City of Seattle and that for the rest of the County. The data and methods for updating these sets are not interchangeable and for the Seattle effort there are redundant steps due to the nature of the Seattle data model. Second, with the implementation of digital cadastral data drafting can no longer just “draw” plats or segs on the map to fit surrounding parcels but they must adjust data as necessary based on the survey data they receive. Since every effort is being made to improve the positional accuracy of the cadastral data, drafting is often forced to redraw entire maps to reflect the improved survey control that is received with new plats. Related to this are the positional problems that exist from the original conversion of the data. Both poor control and improper registration of some maps during conversion created warped data. When drafting attempts to add data to these maps, there can be significant effort in completing the most simple property boundary modification. Finally, the addition of data into the RECDNET data model requires significant QA processing and data checking that was never an issue in the manual drafting paradigm.

Improvements to the data maintenance process would include more staff, quicker methods for data entry, simplification of the data entered and modification of the workflow at Assessments. No staffing changes are anticipated during 2002 but adjustments to the flow of information at Assessments should reduce the amount of backlog that occurs at certain times of the year. More discussion on improvements to data maintenance can be found in Section 4.1.3.1.

With the anticipated conversion of the Seattle data in 2002, there will be additional demands placed on the drafting staff, both for the conversion effort and to bring the Seattle data into compliance with the requirements of the appraisers for mapped data.

Staffing allocations are generally carried over from year to year. As the need for GIS within the department expands, existing staff has developed the skills necessary to integrate GIS into the department business functions.

Working Title	Current Classification
GIS Coordinator - 1	PA III
Mapping Unit Supervisor - 1	Mapping Unit Supervisor
Cartographer - 7	Cartographer
Analysts, Programmers, Appraisers	Various

4.1.2.3 Hardware and Software

- Assessments has three SUN workstations networked together to operate as data servers. The two Sparc 20's are named *Sungis1* and *Sungis2* and the Sparc2+ is named *Assessments*. The system holds approximately 15 gigs of data and is running Solaris 2.5. The data includes both the Seattle cadastral library contents, a replication of the King County library cadastral data and various data sets maintained by Assessments. *Sungis1* is the ArcInfo license server and main application server. Data is distributed across the three machines with the Sparc 2+ being used for processing large datasets. Phase out of the SUNs won't occur until the Seattle/King County data translation is completed. Within the next year, Assessments will likely move all GIS data/workload to a KCGIS Center server. In addition, GIS users at Assessments utilize a HP 1055cm plotter, digitizing tablet and color printers. Replacement of the digitizer will need to be addressed before Assessments will let go of all SUN equipment.
- The cities such as Kirkland and Des Moines are developing their own GIS data that may be used in the future as part of the spatial accuracy data enhancement effort. Assessments currently uses the Seattle GIS data which has a very high level of spatial accuracy when updating the Seattle area parcel data. We expect this kind of "data sharing" to continue even after the conversion of the Seattle data to the King County format. There may be opportunities in the future for incorporation of cadastral data sets maintained by other jurisdictions. It should be noted however that GIS data from other entities does not always translate into useable data for the King County GIS database. Differences exist in the format, quality and type of data captured. In some cases, there is more effort required to bring external data sets into compliance with the County data format than to draw the data from scratch.
- Maintenance of the corporate data is done on *Wildfire*. *Wildfire* is accessed from PC's using Hummingbird Exceede software. The PC's for drafting are running Windows 2000. Windows 98 and 2000 are running on other PC's throughout the department.
- Due to the limited capacity of the SUN machines, there is no outside access to data on these machines.
- Due to access limitations, the lack of an I-NET connection to the 900 Oaksdale building where the Residential Appraisal group resides hinders access to the vast amounts of data on the KC GIS servers. Replication of data on Assessments servers is required if residential appraisers want to take full advantage of the available GIS data in the County. This is a limitation for GIS, as it requires constant monitoring to insure that current data exists on internal servers.
- With an increasing dependence on the KCGIS Center servers, *Wildfire* in particular, it is imperative to Assessments that the servers are stable and operational at all times during Assessment's standard work week. Once Assessments has shifted to *Wildfire*, a minimum of eight FTE's will be dependent on its operation for keeping the County cadastral data updated.

4.1.3 Spatial Data

The Department of Assessments maintains a variety of GIS data sets both corporate and for specific department uses. The most widely used data set is the cadastral data for the County, which is a corporate data set primarily, maintained on the KCGIS Center server *Wildfire*. The department data is stored both as tiled library coverages and Countywide coverages. Shapefiles are usually generated from coverage data although the appraisal groups maintain some shapefiles for their needs. While conversion of the Seattle data to the County format is expected to occur in 2002 this will not reduce the amount of

data maintained by Assessments. The maintenance effort will be shifted from one data set to another. Upon completion of the Seattle data translation, the need for maintenance of data on Assessments obsolete SUN servers will go away. At this time, moving Assessments data sets to a KCGIS Center server can occur. This should make documentation and access to the data from Assessments easier because of the SAMBA connection from the PC's to *Wildfire*.

4.1.3.1 Maintenance

While drafting makes every effort to map property changes in a timely fashion, the tax calendar and system limitations at Assessments may impact this effort. Assessments is still working on the King County mainframe when new properties are created or merged. There are two main types of property changes that occur, segregation and merger (seg/merge) and new plats/condos. When seg/merge activities occur, the property is created in the abstract section, sent to mapping for addition to the GIS and then basic information such as value history and taxpayer information are sent for key-punch into the mainframe. It takes at least a week to process a seg/merge request. Mainframe data is downloaded to Assessments SQL database once a week. Once the data has been downloaded, the appraisers can begin adding property characteristics to the data. Plats and condos are treated differently than seg/merges, which results in a lag time between when the property is recorded and when the data is put into the GIS or Assessments server. Plats are not added to the system continually throughout the year due to the need for Assessments to close the tax roll for certification. In order for a plat to make it onto the tax roll for a given year, it must be recorded by May 31 of the prior year. Because a current year tax roll is still active after May 31, complete sets of new account numbers are not generated until later in the year when the tax roll closes or before May 31 of the year for which it will be taxed. There is a small window of opportunity at the end of the year when complete account numbers for plats received after May 31 can be assigned on the mainframe. Because of Annexation deadlines and other assignments for the platting staff, assignment of complete plat parcel numbers does not resume again until April. During the time that the tax roll is closed for certification, drafting still makes the seg/merge changes to the GIS data but the mainframe and server data is not updated until the tax roll is reopened in January.

Due to the data problems generated during the data conversion and extensive processing required with the RECDNET database the amount of time to process a change by drafting has been increased. By evaluating internal processes, the Accounting Division has developed ways to reduce the workload in drafting and spread the maintenance cycle over the whole year. In the past, drafting had been reluctant to add plats to the maps until a complete set of information is available for a plat. This meant that drafting would not receive information until months after a plat was recorded. Assessments has modified the flow of data so drafting will receive the base information it requires for new plats at the time of recording. This will allow the input of plats into the GIS at an earlier point in the year although the data might not be on the server tables distributed by Assessments. In addition, drafting is trying to increase the use of DXF files from developers and reduce the amount of data captured for plats. Assessments is also testing software products that could help streamline the data input process although this is not something that would be implemented in 2002. Other potential areas for streamlining the data entry process might include an arrangement with DDES to forward DXF files to Assessments for AutoCAD drawings that are received in Unincorporated King County. Or, for DDES to convert the DXF files to a separate plat coverage/layer that could be accessed by Assessments. A long-range goal would encourage developers to deliver the DXF files to the County at the time of recording new plats. The cities, unincorporated King County and the developers would ideally be working with the same coordinate information so steps involved with integration of the data could be minimized. Modifications to the RECDNET data for complete removal of type 12 arcs on an ongoing basis would also help streamline the cadastral maintenance process. As more and more changes are administered to the RECDNET database the number of type 12 arcs (arcs marked for delete) and associated polygons increases. This generates many sliver polygons that must be dealt with during the maintenance and checking process. Additional modifications to the Maint_rec application used for maintaining the cadastral data could also help speed up the data entry process. These are addressed in the Application Maintenance section.

Assessments is responsible for maintenance of data on a Countywide corporate basis.

Layer Name	Layer Description	Update

RECDNET	Countywide Cadastral Data. Includes streets and other features necessary for describing property boundaries. Based on the legal description of the property.	Updated daily as segregation/merger activities take place
PARCEL	Countywide Parcel Boundaries derived from RECDNET.	Updated daily as segregation/merger activities take place.
RECDANNO	Countywide Cadastral Annotation. Includes street names and other features necessary for describing property boundaries.	Updated daily as segregation/merger activities take place.

Assessments maintains the following department data sets.

Layer Name	**Layer Description**	**Update**
PARCEL	Seattle Parcel Data. As part of a MOU with the City of Seattle, Assessments maintains the parcel data for the City service area in accordance with standards defined by the City. Because the Seattle data is not integrated with the rest of the County, the current parcel data exists only on Assessments Unix servers.	Updated daily as segregation/merger activities take place.
PLAT	Plats. New plats are added to this layer when the positional accuracy of RECDNET is in question or when a plat is so large that using the Maint_Rec tools is inefficient.	Updated as needed.
COMAREAS	Commercial Area boundaries.	Updated as needed.
RESAREAS	Residential Areas boundaries	Updated as needed.
CITY ZONING – VARIOUS COVERAGES	Zoning for incorporated cities. Incorporated zoning data is generated (but not necessarily maintained) as a means for updating the server tables.	Updated as needed
ASSESSMENTSSURV	Survey data necessary for building new plats or redrawing cadastral data.	Updated as needed.
ASSESSMENTSWET	Wetland boundaries taken from department overlays and updated wetland information.	Updated as drafting has time to convert data from department overlays.

ASSESSMENTSCODE	Levy Code Boundaries Partially complete and in development. Currently, Assessments is working with Elections to adopt boundaries as input in DSTCODE.	Updated as needed to meet statutory requirements for development of the data.
ASSESSMENTSCITY	City boundaries. Assessments is currently working with Elections to adopt the city boundaries as maintained by elections.	Updated as needed to meet the March 31 statutory requirements for deployment of the data.

4.1.3.2 Enhancements

- Spatial accuracy improvements are ongoing but effective enhancements must start with improved survey control data where the original data used in conversion is faulty. A mechanism for updating the ref_grid layer from which the original data was created needs to be addressed in 2002. The ref_grid data was put together from various sources as part of the King County GIS Capital Project. Sources include cities, the King County Survey branch, the KCGIS Center and Washington Department of Natural Resources (DNR). Development of new control and rectification of data to the new corners should be a separate data enhancement project funded by the KCGIS Center with input from Assessments. Rectification of data to new control could require hundreds of labor hours especially if the data must be redrawn. At this time, it is difficult to provide an estimate for the time required to rebuild the cadastral data to improved control. Some work has already been done at Assessments as part of the data maintenance process. Some problems are more severe than others and the data more dense. To date, the known problem areas include, but are not limited to, portions of Kirkland, Auburn, Enumclaw; many areas especially in Ranges 8 through 12 where DNR POCA data was used as section control data; many quarter-sections along major water bodies (except the City of Seattle Service Area) and about 300 quarter-sections that were captured from Assessor 1"=200' mylars.
- The cities, such as Kirkland and Des Moines, are developing their own GIS data that may be used in the future as part of the spatial accuracy data enhancement effort. Assessments currently uses the Seattle GIS data which has a very high level of spatial accuracy when updating the Seattle area parcel data. We expect this kind of "data sharing" to continue even after the conversion of the Seattle data to the King County format. There may be opportunities in the future for incorporation of cadastral data sets maintained by other jurisdictions. It should be noted however that GIS data from other entities does not always translate into useable data for the King County GIS database. Differences exist in the format, quality and type of data captured. In some cases, there is more effort required to bring external data sets into compliance with the County data format than to draw the data from scratch.
- Options for ongoing maintenance of the ref_grid layer may involve the inclusion of the survey branch at a Countywide level to incorporate and update the erroneous corners or for Assessments to maintain the Ref_grid data as updated information becomes available.
- Upon completion of the Seattle conversion, an effort to enhance the annotation will ensue. There are specific annotation features, which are not part of the Seattle data that are required by Assessments when valuing property.

4.1.3.3 Development

- Conversion of the City of Seattle GIS data to the King County GIS format is anticipated to occur during 2002. This was supposed to occur as part of the King County GIS Capital project. There is not a separate funding source for this type of project. Assessments will be asked to take on this effort in addition to other demands for maintenance of the cadastral data and other business functions that they do.

- Sensitive Area data from the mylar overlays may be transferred to a GIS layer. These data were compiled from the King County Wetlands inventory with modifications and calculations performed by Assessments at the time that the data was created. Additional wetland data from cities and short plats are also included in this data set. There is not a separate funding source for this type of project. This data was skipped over as part of the King County GIS Capital project as data that would be captured elsewhere. The data on the overlays is critical to performing accurate appraisal of properties with wetlands. Unless a comparable source for the information can be obtained digitally, this data needs to be converted to satisfy the needs of appraisers. There is no deadline on conversion of the data except for the extinction of our SUN equipment to which Assessments digitizing tablet is tied.
- Continued development of the levy code layer will occur. The levy code corresponds to the amount of money a taxing district can levy on a particular property. This data is maintained by Assessments as required by the State. The levy code boundaries are currently maintained by drafting. Conversion of the Levy Code data was supposed to occur as part of the King County GIS Capital project. The conversion that did occur was not up to the standards required by Assessments for this information, nor were the tools available to enhance and maintain the data. There is not a separate funding source for this type of project. Assessments has taken on this project in addition to other business functions.

4.1.3.4 Metadata

FGDC documentation exists for the GIS Parcel and RECDANNO data on the server *Wildfire*. No documentation exists for RECDNET (which is administered by KC GIS but primarily edited by Assessments). Since RECDNET is the backbone for the configuration of parcels it should be documented. Documentation exists for maintenance decisions that have been set for the cadastral data. Extensive documentation and maintenance practices exist for the maintenance of the City of Seattle data. Little documentation exists for department data sets. During 2002, Assessments will improve the documentation of department data sets.

4.1.4 Spatial Applications

Assessments has two types of spatial applications: internal department applications, which are developed and maintained at Assessments; and external applications, which are not maintained by Assessments but are necessary for completing Assessments work. Access and input to external applications has a direct impact on the ability of Assessments to perform its business functions.

4.1.4.1 Maintenance

The following internal applications are maintained by Assessments:

- KingView is a VB application that uses MapObjects for accessing spatial data. This application was developed by Assessments' Information Services Division for appraisers to use in valuing property and defending appeals.
- The Commercial division has developed an ArcView application for providing access to spatial and server data for the commercial appraisers while allowing appraisers access to the analytical capabilities of ArcView.
- Assessments maintains numerous ArcInfo applications including but not limited to an application for generating the "official" Assessments quarter-section map, processing annotation information for property size to be uploaded to the server tables, a plat library suite of routines for extraction, maintenance and insertion into the library, levy code mapping and parcel listing application, standard plotting applications based on server data for Commercial, Residential and Open space maps, data transfer routines for replication of *Wildfire* data on SUN servers, and applications for appending Seattle data into City service area coverage. The above applications are maintained by the GIS Coordinator and appropriate drafting staff.

The following are external applications that are used by Assessments but maintained by other organizations:

- Mant_Rec and associated data integration applications is used for maintaining the cadastral data. This set of applications impacts Assessments ability to efficiently perform maintenance of the cadastral data. Assessments had direct input into development and testing of these tools. See the KCGIS Center section for an application description.
- Parcel-Picker, AVLib and *iMAP* are used on a daily basis for easy access to the public library data. . See the KCGIS Center section for an application description.
- The City of Seattle created Seattle maintenance and data transfer routines. There is a shared responsibility for maintenance of the applications.

4.1.4.2 Enhancements

The KCGIS Center has been responsive to requests by Assessments for changes to the maintenance-related applications. Additional requests exist but may be difficult to implement due to the RECDNET design and extensive retooling that would be required to the maintenance process. These additional improvements are mentioned as issues that may or may not be addressed in the current maintenance application but which should be addressed in future application design. Improvements to Maint_rec and related applications would help reduce the time and effort required updating the corporate cadastral data. The maintenance process has high overhead for data extraction, integration and checking. Reduction in this overhead would directly impact the amount of time spent on each property change. Improvements to Maint_rec include the ability to import labels with the Import tool, modifications to the annotation tools, the ability to use back coverages, complete removal of type 12 arcs from RECDNET at the time of coding, completion of the transfer arc functionality and real time integration of data into RECDNET so post integration viewing can be eliminated.

Enhancements to KingView by Assessments Information Services group will likely occur in 2002. Enhancements include integration of GIS with the Assessments Comp Sales application, the ability to update server data and the separation of data layers for Commercial and Residential appraisers.

4.1.4.3 Development

No GIS applications are currently planned for development.

4.1.4.4 Documentation

Documentation for ArcInfo applications is minimal and generally done at the code level. Applications that are used routinely by the drafting staff have instruction sheets describing operation of the application. A users guide has been developed for the King View application.

4.1.5 System Integration

Assessments maintains all property characteristics data in SQL Server. Numerous tables are used to store the data. Applications have been written to access and update the server files. There is no real-time connection between the SQL server data and maintenance of the GIS data. Integration of GIS with the business applications is a priority but will be balanced with other application needs/priorities within the department. Real time connectivity is unlikely to occur until the cadastral data is converted to the Arc8 environment where it can be stored in the SQL Server.

4.1.5.1 RDBMS Backend Support

The King View application provides users with access to a snapshot GIS parcel shapefile and real-time access to the Server data. Most ArcView users use snapshots of both the server data and the GIS data when performing analysis of the data.

The KCGIS Center provides one stop shopping for many County GIS users by having Assessment data accessible from the Parcel-Picker Application. The monthly data extract provided to the KCGIS Center in addition to the real-time access to RECDNET generally provides adequate information for County users. Over time this should reduce the amount of internal queries for Assessment information. Access to the data from the *iMAP* application provides external access to a snapshot of data until there can be a direct connection to the Assessment servers. Lack of information on the *iMAP* application regarding currency of data makes reliance on the data difficult.

4.1.5.2 Other Department Data Management Activity

No information provided.

4.1.6 Client Services and User-Base Support

GIS application and data priorities are set by the division managers and processed within the appropriate division. Most department GIS activity is driven by the needs of the appraisers. Priorities are given to the Residential and Commercial appraisal groups for their needs on the annual revaluation of property. Production of maps and the accumulation of data for use in ArcView analysis is the primary activity for the revalue process. The appraisers generally do their own GIS analysis for appraisal related issues. The coordinator supports internal ad-hoc requests for GIS mapping or analysis. Requests from cities and other entities for analysis of property value information are fielded as needed. Some ad-hoc requests are forwarded to the KCGIS Center when the request is beyond the scope of Assessments' responsibility.

The drafting section requires ongoing support from the GIS Coordinator for dealing with data maintenance/development and software/hardware issues.

The relationship with the City of Seattle and its GIS department in Seattle Public Utilities has provided Assessments with weekly and routine updates of the Seattle legal layer as well as zoning in exchange for updates from Assessments for parcels and tabular data. Despite the problems the cumbersome Seattle GIS data model represents for Assessments in terms of a workload, the model for data exchange has benefited both agencies. The quality of the Seattle data is very high so the positional accuracy of the parcel data for the City closely matches that of the Seattle legal layer.

A working relationship with the KCGIS Center for data maintenance and application development is imperative for the existing data maintenance model. Due to the lack of real-time GIS data updates, the need for nightly processing of data and the manual intervention required by the nightly data integration process, a cooperative relationship has developed between the two agencies. The KCGIS Center is extremely responsive to the needs of the drafting section for incorporation of new data and for improvements to the maintenance process. An agreement with the KCGIS Center requires a two-day turnaround on any data integration of data fixes submitted by Assessments. This has worked to support both Assessments work and that of the rest of the County for the ability to access current data.

Relationships have developed with cities and other jurisdictions for feedback on problems and access to the cadastral data.

The parcel data maintained by Assessments has been reproduced on the KCGIS Center Web site but no GIS data is deployed on the Assessors' office Internet/Intranet sites.

4.2 Department of Development and Environmental Services

The mission of the Department of Development and Environmental Services (DDES) is to serve, educate and protect the community through the implementation of King County's development and environmental regulations. To carry out this mission the department is responsible for intake and review of building and land use permits, inspection of building construction and land development, and for administration and enforcement of building, land use, fire, and environmental codes. DDES has jurisdiction in unincorporated King County and has approximately 300 employees organized into three divisions. These divisions are Administrative Services, Building Services and Land Use Services.

The GIS function for DDES is housed in the Administrative Services Division and is managed within a separate section known as Land Information Services (LIS). The LIS section provides a full range of GIS services to the entire department. The primary objectives of the LIS section are to speed delivery of department services, enhance permit review and support decision-making.

4.2.1 Business Functions

The LIS section of DDES provides geographic analysis, geographic data development and maintenance, customized end user applications, and map production services to the staff, customers and stakeholders of DDES. Analysts and technicians in the section support a variety of the department's business needs by manipulating and presenting geographic information in the form of maps, graphics, data files and reports. Analysts also develop, integrate and maintain corporate and department geographic data sets.

The work program of the LIS section supports several of the core business functions of the department including:

Permit Intake – Permit technicians use applications and databases developed by the LIS section during permit screening and intake. These tools and data sets are essential to successfully conduct intake review and complete the permit application process. Site location, zoning, development conditions, sensitive areas and other land related factors are identified and confirmed using GIS tools. Permit viability is assessed, permit requirements determined, and permit routing initiated. Customized applications integrated with the department's permitting system provide these functions at the public front counter and in the permit intake center.

Permit Review – GIS tools are used in several sections of the department to support permit review. GIS is used by the Site Engineering and Planning section to generate a series of maps for each project under review. These maps illuminate a range of factors that influence site planning. GIS tools are also used by the Plan Review Services section to determine snow-load and site slope factors, which guide decisions on roof and foundation requirements. The Current Planning section uses GIS to determine development conditions, historic zoning and planning requirements.

Inspection and Enforcement – GIS tools are used by the various inspection and enforcement sections of the department to determine inspection areas, project assignments and to balance inspection and case workloads.

Regulatory Review – The Land Use Planning and Education section uses GIS tools to develop planning proposals for regulatory control. GIS techniques are also used in programs with regulatory impact including ESA response, comprehensive planning, sub-area planning, sensitive area protection and management, and special use studies.

Public Information – GIS maps, data, and applications are used extensively in the department for public information and education. Development controls such as zoning, land use, and sensitive areas are depicted using GIS techniques on maps and atlases, and in newsletters and bulletins. GIS property-based data are disseminated to the public via customized Internet applications including the Development Conditions Search Engine and Planning Maps map set of *iMAP*.

4.2.2 GIS Program Overview

The LIS section of the Administrative Services Division is responsible for carrying out the GIS program plan for the department. The section supervisor (known as the Program Manager) reports to the Administrative Services Division Manager. Four GIS analysts/programmers (a fifth position is currently vacant) and two addressing technicians report to the Program Manager. The LIS section is organized around four functional categories of work. These are data, mapping and analysis, applications, and addressing. A GIS analyst/programmer serves as lead for each of the first three functional categories. The data lead is responsible for the department's GIS data warehouse, GIS data development and maintenance, and GIS data coordination with other agencies. The mapping and analysis lead is responsible for the coordination of spatial analysis projects and the generation of mapping products. The application lead is responsible for development, enhancement and maintenance of the department's GIS

applications. Finally, the addressing technicians are responsible for designation of street names, and for assignment, verification and correction of building addresses for unincorporated King County.

The LIS section provides services to DDES staff, customers and stakeholders. Requests for assistance typically come directly from DDES staff and management, or customers of DDES, and are routed by the LIS Program Manager to appropriate LIS staff for response. A major change to the LIS section work program in 2002 is that GIS services will no longer be provided to a handful of agencies outside the department. This work program change is in response to the Countywide GIS consolidation. The agencies that have traditionally relied on the LIS section for all, or a substantial portion, of their GIS needs include the Office of Regional Policy and Planning, the Department of Community and Human Services, the Department of Public Health, and the Boundary Review Board. Beginning in 2002, requests to the LIS section for GIS services from these or any other agency external to DDES will be redirected to the KCGIS Center Client Services Manager. If needed, the LIS section will provide subject area expertise or project materials to the KCGIS Center Client Services Manager in order to assist in completing these service requests.

4.2.2.1 Training

GIS end-users in the department receive training from LIS section staff in the operation of GIS applications and the appropriate use of GIS data. This is most often carried out in structured training sessions of 90 to 120 minutes. These training sessions are offered annually, or more often if requested, to each section or work unit. Training content is customized for each session to suit the needs of the attendees.

There is no formal training program nor is there a line item training budget within DDES for the GIS analyst/programmers. However, ad hoc requests for training may be approved by DDES management based on need and availability of funds. When training is authorized, the funding source is the DDES revenue fund.

GIS programmer/analysts are adequately trained to meet the current DDES GIS program goals. However, as the LIS section migrates to the ArcGIS 8 software platform the staff may need to supplement their skills through formal course work. GIS professionals at DDES are encouraged to participate in relevant seminars and conferences, as well as the KC GIS user meetings. Analysts/programmers will be briefed on, and will adhere to, the set of GIS professional responsibilities that are to be developed by the GIS Technical Committee in 2002.

4.2.2.2 Staffing Requirements

The LIS section staffing model for 2002 consists of 1.0 FTE Program Manager (ISA-III), 4.5 FTE GIS Analysts/Programmers (ISA-II), and 1.5 FTE Addressing Technicians. 0.5 Analyst/Programmer position is currently vacant and will remain so pending ongoing review of department needs and revenues. This staffing scheme is unlike previous years in that 2.0 FTE GIS Technician (ISA-I) positions have been eliminated. The elimination of these positions is partially in response to the Countywide GIS consolidation and partially in response to a change in the nature of the scope of work performed by the LIS section. The work of the ISA-I positions was focused on production mapping and ad hoc analysis for internal as well as external (that is non-DDES) clients. The workload related to these tasks is influenced by two factors. First, beginning in 2002 the LIS section will no longer provide mapping and analysis services to external customers. Second, the emphasis of the LIS section work program has substantially shifted to complex data maintenance tasks and the programming of end-user applications. Those two factors have combined to essentially dry up the work normally performed at the ISA-I level. However, it is too early to determine if the 2002 staffing model will be adequate to serve the department's ongoing needs, which may require further changes to the model in 2003.

There are three funding sources for the 7.0 FTE positions within the LIS section. The great majority of funding (6.0 FTE) comes from DDES permit fee revenues. These 6.0 FTE are supported from the overhead portion of the department's base and hourly permit fee calculations. These costs are spread across all DDES non-overhead sections according to budgeted FTE counts. The E-911 Program

supports 0.5 FTE for the purposes of address verification and correction to improve emergency response. The Habitat Conservation Program (HCP) supports 0.5 FTE for the purposes of collecting, improving and analyzing environmental data. The work tasks to support HCP are spread among several of the GIS analysts. Approximately 20% of an addressing technician FTE is reimbursable through hourly fee charges billed to permit customers. The total staffing budget (salaries plus benefits) for the LIS section in 2002 is approximately $590,000.

Working Title	Current Classification
Program Manager	ISA III
Database Administrator	ISA II
Application Developer	ISA II
Mapping and Analysis Administrator	ISA II
Analyst	ISA II
Analyst (vacant)	ISA II
Addressing Technician	Addressing Technician
Addressing Technician	Addressing Technician

4.2.2.3 Hardware and Software

The LIS section operates GIS in both UNIX and PC environments. There is one UNIX server dedicated to GIS. It is a HP 9000 E-Class Server, Model E35, and is known as *Oreo*. *Oreo* runs HP-UX 10.20 B. Networked to *Oreo* are three HP 9000 Series 700 workstations, and four HP Envizex P Series x-terminals. *Oreo* is a production machine and serves as the ARCINFO license manager and the ARCINFO coverage data server. Data are served via a SCSI connection to a mass storage unit.

The department operates several PC servers, one of which is utilized for GIS purposes. This server is an older 200-megahertz Pentium known as *DDES001*, and is used to serve ArcView applications and data. *DDES001* runs Novell Netware 4.11. Data are retrieved via a fiber optic connection to a Storage Area Network (SAN) device. This PC server is scheduled for replacement early in 2002.

The PC desktop environment in the LIS section is mixed with various Pentium based machines running mostly Windows 95 and Windows 98, with a few test machines on Windows 2000 and Windows NT 4.0. The variety of OS platforms in use is a legacy of a series of software compatibility issues. The LIS section is testing the feasibility of moving toward a Windows 2000 standard for all machines. The GIS end-users in the department are standardized on Windows 98. The PC network for the department is an Ethernet LAN with multiple servers and a data transfer rate of 100 megabits per second. The department is served by a T1 external network connection.

The LIS section also has a one-half share in a Windows NT server known as *Hercules. Hercules* currently resides on the 24th floor of Key Tower. *Hercules* is used by DDES in cooperation with the KCGIS Center as an Internet server for publishing interactive mapping applications developed with MapObjects and ArcIMS.

Three ARCINFO 7.2.1 Patch2 floating licenses are run from a license manager on *Oreo*. Also included is one license each for TIN, GRID, and ArcPress. ARCINFO software licensing and maintenance are handled in cooperation with KCGIS. Twenty ArcView GIS 3.1 licenses are run from a LAN installation on *DDES001* and are accessible by nearly all PCs in the department. One ArcIMS 3.1 license is operated from a Windows NT 4.0 environment.
Specialized output devices used by the LIS section include an HP DesignJet 1055CM color plotter and a Canon CLC 900 color copier/printer. Maximum roll size for the plotter is 36". Maximum sheet size for the copier/printer is 11" by 17". Both devices are networked and accessible via the department's LAN.

Ancillary software used by the LIS section include AutoCAD 14.0, Adobe Illustrator 8.0, Adobe Acrobat Distiller 5.0, Adobe PageMaker 6.5, Adobe Photoshop LE, Microsoft Access 97, and Visual Basic.

During 2002, the LIS section will begin and possibly complete migration to the ArcGIS 8.1 environment. This will require a substantial change in the hardware and operating system environment. A major

challenge for the migration will be converting to the Windows 2000 operating system. The LAN administration and PC support staff in DDES have little experience with Windows 2000 set up and administration. There are also unresolved Windows 2000 compatibility issues with other enterprise software systems (e.g. Permits Plus) operated by the department. The learning curve for the PC support staff and the continued reliance of the remainder of the department on Windows 98 and Novell may hinder rapid adoption of ArcGIS 8.1 at DDES.

The move to ArcGIS 8.1 by the LIS section will eventually necessitate the adoption of the Spatial Data Engine (SDE) and a database management system (DBMS). Whether this will occur in 2002 is unclear at this time. Two options for acquiring this technology will be explored. One option is to establish remote access to SDE and Oracle served from the KCGIS Center. The other option is to set up a local instance of SDE at DDES and use a cost effective DBMS solution such as SQL Server.

Another challenge that effects the whole department, and the LIS section in particular, is the lack of an I-NET connection to the 900 Oakesdale Building. Without this high-speed connection the LIS section cannot make practical use of the centralized data libraries on *Wildfire* or other servers remote to DDES. Until an I-NET connection is provided the LIS section must continue to periodically transfer, process and store locally several large data sets including the parcel layer and the Assessor property tables. These efforts consume considerable staff time on an ongoing basis. In addition, enterprise front-end applications such as AvLib and Parcel Tools are rendered useless to the department because of a reliance on fast connections to the data on *Wildfire*. The limitations placed on the department as a result of not having a connection to I-NET are significant. Therefore the department will continue to strongly advocate for an early connection to I-NET.

4.2.3 Spatial Data

The LIS section operates a broad data program including maintenance, enhancement and development of both corporate and department GIS data. Corporate data are those that are distributed to an audience beyond DDES and are available in the KCGIS Center data repository. Department data are those developed solely for use at DDES.

GIS data are held in two main data repositories at DDES. One data repository is a set of ARCINFO map libraries on *Oreo* that are maintained using LIBRARIAN. These map libraries closely mirror the contents of the *Wildfire* plibrary system, although some names for directories and files are different. The other data repository is a series of directories on *DDES001*, which contains ArcView shapefiles and is also set up to mirror the plibrary structure. A description of the GIS data program at DDES is included in the following sections.

4.2.3.1 Maintenance

Two tables are presented in this section. The first table lists corporate GIS data for which the department serves as steward and that reside in the GIS public library on *Wildfire.* The second table lists data that are primarily for internal department use and are not posted to plibrary.

Corporate Data

Layer Name	Layer Description	Update Frequency
ZONING	Polygons representing zoning classifications for unincorporated King County as well as portions of the County annexed or incorporated since 1993 (King County zoning is no longer in effect in annexed areas, information retained for historic purposes only). Attributes include current and potential zoning.	As needed

Layer Name	Layer Description	Update Frequency
COMPLU01	Polygons representing King County Comprehensive Plan land use designations for unincorporated King County as well as portions of the County annexed or incorporated since 1993 (King County planned land use is no longer in effect in annexed areas, information retained for historic purposes only). Archival versions of planned land use are retained on an annual basis (e.g., Complu00, Complu99, etc.)	As needed
GRWTHPAT	Polygons representing King County generalized land use pattern, which is a simplification and grouping of the Comprehensive Plan land use designations.	As needed
UGLINE01	Lines representing the King County Urban Growth Area (UGA) boundary. Archival versions of the UGA boundary are retained on an annual basis (e.g. Ugline00, Ugline99, etc.)	As needed
CLRESTR	Polygons representing clearing and grading restrictions as defined by Title 16 Building and Construction Standards – 16.82.150 of King County Code.	As needed
DPA	Polygons representing demonstration project areas as defined by Title 21A Zoning – 21A.55 of King County Code.	As needed
PSC	Polygons representing areas with property specific development standards (also known as P-suffix conditions) as defined by Title 21A Zoning – 21A.38 of King County Code.	As needed
SDO	Polygons representing areas with special district overlay designations as defined by Title 21A Zoning – 21A.38 of King County Code.	As needed
SDR	Polygons representing areas with special drainage requirements as previously defined by Title 9 Surface Water Management – 9.04 of King County Code. These requirements have been repealed but the layer is retained for historical purposes.	None planned
SHORELINEMMP	Polygons representing Shoreline Management Master Program designations as defined by Title 25 Shoreline Management of King County Code.	Irregular
COALMINE	Polygons representing Sensitive Area Ordinance coal mine hazards as defined in Title 21A Zoning – 21A.24 of King County Code.	Irregular
ERODE	Polygons representing Sensitive Area Ordinance erosion hazards as defined in Title 21A Zoning – 21A.24 of King County Code.	Irregular
SLIDE	Polygons representing Sensitive Area Ordinance landslide hazards as defined in Title 21A Zoning – 21A.24 of King County Code.	Irregular
SEISM	Polygons representing Sensitive Area Ordinance seismic hazards as defined in Title 21A Zoning – 21A.24 of King County Code.	Irregular
WETLD	Polygons representing Sensitive Area Ordinance wetlands as defined in Title 21A Zoning – 21A.24 of King County Code. Attributes include wetland ID and wetland rating (also known as class). An Access database linked by wetland ID provides detailed wetland inventory data.	Irregular
FEMAFLDP OR FLDPLAIN	Polygons representing Sensitive Area Ordinance flood plains Flood Plains (may be owned by DNRP)	Irregular

Layer Name	Layer Description	Update Frequency
AGRPDDST	Polygons representing the Agricultural Production District (APD) as defined by Chapter 3 of the King County Comprehensive Plan.	As needed
FORPDDST	Polygons representing the Forest Production District (FPD) as defined by Chapter 3 of the King County Comprehensive Plan.	As needed
RFFA	Polygons representing the Rural Forest Focus Area (RFFA) as defined by Chapter 3 of the King County Comprehensive Plan.	As needed
HORSE_COMM	Polygons representing Equestrian Communities as defined by Chapter 3 of the King County Comprehensive Plan.	As needed
CITYMAST	Polygons representing city annexation boundaries, including pending annexations. Includes current corporate boundaries and annexation and incorporation activity since mid-1980's. Key attributes include jurisdiction, annexation status and annexation effective date. The layer City is a derivative of Citymast.	As needed
CITY	Polygons representing current city boundaries. Layer City is a simplified derivative of Citymast.	As needed
CPAREA	Polygons representing Community Planning Areas as defined by various planning documents.	None planned
KCADDRGRID	Lines representing King County addressing grid as adopted by Resolution 16622.	None planned
MUCKL_IR	Polygons representing Muckleshoot Indian Reservation boundary.	None planned
SCHSITE	Points representing school sites.	Irregular
DRAINCAR	Polygons representing parcels associated with drainage incident citizen action requests (formerly known as drainage complaints). Derived periodically from drainage incident database maintained by DNRP-WLRD.	Irregular
UAC	Polygons representing Unincorporated Area Councils (UAC).	As needed
ASGWC95	Polygons representing areas susceptible to ground water contamination as defined by Chapter 4 of the King County Comprehensive Plan.	None planned
FARMLAND	Polygons representing properties participating in the Farmland Preservation Program.	Irregular
FIRESTN	Points representing fire station sites.	Irregular
FPD_LINE	Lines representing the Forest Production District (FPD) boundary as defined by Chapter 3 of the King County Comprehensive Plan.	As needed
MPS	Polygons representing road mitigation payment system zones, which are derived from Small Area Zones (SAZ).	As needed

Department Data

Layer Name	Layer Description	Update Frequency
TDR	Polygons representing parcels receiving or sending Transfer of Development Rights (TDR).	As needed
JPA	Polygons representing joint planning areas as defined by the King County Comprehensive Plan.	Irregular
BOG_DA	Polygons representing bogs as regulated by the Surface Water Design Manual	Irregular

Layer Name	Layer Description	Update Frequency
ERS_DA	Polygons representing erosion drainage as regulated by the Surface Water Design Manual.	Irregular
LH_DA	Polygons representing landslide hazard drainage areas as regulated by the Surface Water Design Manual.	Irregular
MDPA	Master Drainage Plans Areas as defined and regulated by the Surface Water Design Manual.	Irregular
MRWATERS	Polygons representing major receiving water bodies as regulated by the Surface Water Design Manual.	Irregular
BSNWIDE	Polygons representing basin wide drainage conditions as defined by Surface Water Design Manual.	Irregular
AREASPFC	Polygons representing area specific drainage conditions as defined by the Surface Water Design Manual.	Irregular
HISTSITE	Parcel specific database of historic sites as defined by the King County Historic Resource Inventory.	Irregular
INTERLOC	Polygons representing DDES interlocal agreements with various cities and agencies.	As needed
CITYIMP	Polygons representing impact areas (areas of interest) as defined by various cities.	Irregular
SCHDIST	Polygons representing school districts. A derivative of Election's schdist with additional attributes.	Irregular
CDIST96	Polygons representing King County Council Districts. A derivative of Election's kccdst with additional attributes.	Irregular
BLDG_IA	Polygons representing building inspection areas.	Irregular
LU_IA	Polygons representing land use inspection areas.	Irregular
CODE_IA	Polygons representing code enforcement areas.	Irregular
GRAD_IA	Polygons representing grading inspection areas.	Irregular
ESA_IA	Polygons representing Environmental Species Act (ESA) inspection areas.	Irregular
CLEAR_IA	Polygons representing clearing inspection areas.	Irregular
ESC_IA	Polygons representing erosion and sediment control inspection areas.	Irregular
Z_XXXXX	A series of polygon layers representing zoning changes per various King County ordinances. Each layer shows the before and after zoning for a given ordinance. Layer name provides ordinance number (e.g. Z_11353).	As needed
LU_XXXXX	A series of polygon layers representing Comprehensive Plan land use changes per various King County ordinances. Each layer shows the before and after planned land use for a given ordinance. Layer name provides ordinance number (e.g. LU_11353).	As needed
SANT.MDB	Parcel specific database for Sensitive Area Notice on Title (SANT) information.	Monthly
UGAREA01	Polygons representing the Urban Growth Area (UGA).	As needed
STREAM	Lines representing the Sensitive Area Ordinance streams as defined in Title 21A Zoning – 21A.24 of King County Code.	Irregular
SNOWLOAD	Polygons representing ground snow load zones.	Irregular
INTRMPAA	Polygons representing interim Potential Annexation Areas (PAA) for cities in King County.	As needed
KINGADDR.MDB	Parcel specific database of situs addresses as recognized by DDES for properties in unincorporated King County.	Continually
PERMPAR	Polygons representing parcels associated with DDES permits. Includes historical parcels that no longer exist.	Monthly

Layer Name	Layer Description	Update Frequency
PARCELS.MDB	Parcel specific database for development conditions information.	As needed
CHINOOK	Polygons representing 500-foot buffer from streams identified by Chinook distribution analysis.	As Needed
MINE97	Polygons representing mineral resource sites as defined by Chapter 3 of the King County Comprehensive Plan.	As needed
FCCTELCO	Points representing locations of existing and planned telecommunication facilities as registered with the Federal Communication Commission (FCC).	Quarterly
ARSONSXX	Points representing the locations of fire investigations for the given year. Layer name provides the year (e.g. ARSONS98).	Irregular

4.2.3.2 Enhancements

Data enhancement work by the LIS section is subject to priorities as established by DDES management. Typically these priorities are established during an annual review, which occurs in the first quarter of the year and includes input solicited from sections and work units. Once management has established the priorities the resulting work plan is often subject to revision as situations warrant. Therefore the list of data enhancement projects included in this subsection is subject to change.

Layer Conflation – Currently most of the efforts to enhance GIS data at DDES are focused on conflation of cadastral-based data layers to match the cadastral features maintained by the Department of Assessments. The conflation work is necessary to accurately depict boundaries for such features as zoning. Layers that will undergo conflation in 2002 include zoning classifications (to be completed early in 2002), comprehensive plan land use designations (to be completed by mid-year), a suite of development condition layers (code restrictions, demonstration project areas, p-suffix conditions, and special district overlays), and city boundaries. Zoning and land use are prioritized for early completion, with conflation of the other layers to follow.

King County Addressing Grid – The King County addressing grid needs further attribution along Public Land Survey section lines. In the initial development of this layer many section lines were left without attribution, which results in labeling problems in various mapping applications. The attribution will be completed in 2002. Also, the feasibility of adding city-based addressing grids will be explored. It is known that approximately 12 cities have addressing grids that vary from the King County system. The amount of work required to accurately depict these independent address grids is unknown.

Historic Sites – The historic sites layer maintained by DNRP and the historic sites database maintained by DDES have never been reconciled. In 2002 these data sets will be compared and the differences examined and corrected. The final product will be a GIS layer with table relates to additional attribute data. The completed layer will be for DDES use and will be updated annually.

Sensitive Area Notice on Title Database – The Sensitive Area Notice on Title (SANT) database will be expanded to include additional feature categories. Categories to be added include native growth protection easement, Already Build Construction (ABC), channel migration, and native growth retention area. The current SANT database has limitations because it does not include all features for which a Sensitive Area Notice on Title may be recorded. Adding these additional feature types will result in a more comprehensive database.

Development Conditions Pre-Conversion Layers – The Parcel.mdb, which contains parcel specific development condition information, is a standalone and separately maintained database. The database is used as the source for the Development Conditions Search Engine on the Internet. Since this is a parcel specific database it needs to be updated every time there is parcel segregation or merger activity and keeping it synchronized with other information sources is problematic. Converting the information contained in this database into a set of GIS layers would drastically reduce the need for updates because the boundaries for the development conditions, on which the parcel specific data are based, rarely change. Creating the conditions layers will also insure that information obtained from the Development

Conditions Search Engine will match other sources such as Base2. Not all development conditions need to be spatially reconstructed from Parcel.mdb. Only the pre-conversion conditions (that is the conditions that were in effect prior to the completion of second phase of the zoning conversion, which was adopted by Ordinances 12822, 12823, and 12824 on July 18, 1997) need to be built.

Situs Addressing and King County Street Network – The LIS section will partner with the Transit Division and the KCGIS Center in the maintenance of situs addressing and street network data. Both agencies are developing data sets and applications and it is the intention of DDES to serve as a data maintainer for each of these efforts. Activity by DDES in 2002 will most likely be limited to helping define specifications and requirements and to testing.

4.2.3.3 Development

Data development work is subject to the same management process for setting priorities as established by DDES for data enhancement work. Typically these priorities are established during an annual review, which occurs in the first quarter of the year and includes input solicited from sections and work units. Once management has established the priorities the resulting work plan is then subject to revision as situations warrant. Therefore the following list of data development projects is subject to change.

Zoning History – A zoning history layer will be developed from the zoning ordinance layers (Z_xxxxx). This layer, which will be a compilation of all ordinance layers, will allow for a chronological "drill down" of zoning history for a given location. This resulting layer will be a resource for DDES planners to quickly and accurately determine zoning requirements for a specific date. This information is needed when researching vesting issues related to permitting and land use. The initial layer will contain zoning history back to 1993. Future enhancement of the layer will be to add zoning history for pre-1993. This information will be compiled and added to the history layer in reverse chronological order.

FCC Telecommunication Sites – A Federal Communication Commission (FCC) telecommunication sites layer is being developed from FCC source material. The first iteration of this data has been completed and the layer will be updated quarterly from online FCC data. This layer will be a critical reference source during review of permits for telecommunication facilities. The location of nearby telecommunication facilities can be determined and issues of co-location of facilities and cumulative impact on neighborhoods can be assessed.

Fish and Wildlife Habitat Conservation Areas – A Fish and Wildlife Habitat Conservation Areas (FWHCA) layer will be developed to support the work of interdepartmental teams (FWHCA Conservation Strategy Team and the FWHCA Comment Team) implementing county regulations to meet the requirements of the Growth Management Act (GMA). This layer will depict those areas defined by the teams as critical areas for protection of fish and wildlife habitat. The layer may be based on combinations of existing development condition and sensitive area layers or it may include new data and analysis.

Land Capacity Tracking Database – A land capacity tracking database will be developed in 2002. This database will provide the capability to quickly compile necessary information to transmit to the State of Washington to meet the annual reporting requirements of the Growth Management Act. The information to be compiled will come from DDES permits for land segregation, commercial and industrial facilities, and multiple family dwellings. The tracking database will allow for the collection of the necessary data as the permit is processed, and eliminate the current procedure, which involves compiling the data at the close of each year by a tedious and time consuming review of permit files.

Consolidated Inspection Areas – Currently there are seven separately maintained inspection area layers for DDES staff. Each work unit in DDES, which assigns inspectors to geographically defined work areas, has independently created a layer to suit its own business processes. DDES senior management has approved an initiative to explore the feasibility of combining these separate layers into a single integrated scheme. The scheme would feature the necessary granularity to suit the various work units so that no single area is too large for any given inspector and areas can be aggregated or reassigned without changing the underlying boundary definitions.

Tri-county Sub-basin Database – As part of the department's support of the ESA/GIS Chinook Data Work Group, ongoing maintenance of the Tri-County sub-basin database will be required. The process of

creating formal reports, to present the database to the public, has partially begun in 2001, and will continue into 2002.

Preliminary Plat Applications – A preliminary plat applications layer will be created to aid in long term tracking of these important land use actions. When a plat is recorded the parcel numbers associated with the preliminary plat application are retired and the parcel layer is reconfigured to depict the new plat. The result is a loss of the spatial linkage to preliminary plat. What is needed is a layer to depict the original parcel with attribution to maintain the relationship to the information in the preliminary plat application. Research will be conducted and a layer will be created of preliminary plat applications still being tracked by the Land Use Services Division, some of which date to the 1970's.

4.2.3.4 Metadata

In 2002, the LIS section will complete and update metadata in the KCGIS spatial data catalog for all layers for which DDES has stewardship responsibility.

The LIS section maintains a data catalog (DataCatalog.mdb) in Microsoft Access. This catalog is an inventory of data the LIS section stores and maintains either for use in GIS applications or on a recurring basis for mapping and analysis. The catalog contains descriptive information about the data with indicators to show which DDES applications use the data. The LIS section data administrator has responsibility for updating the catalog.

4.2.4 Spatial Applications

The LIS section has an extensive GIS application development and support program. The primary tools used in this program include ArcView applications developed with Avenue, ArcIMS applications using XML and Java, and web interfaces using Cold Fusion and Microsoft Access. The spatial application program at DDES is described in the following sections.

4.2.4.1 Maintenance

Planning Maps – Planning Maps is a map set incorporated into *iMAP*, King County's ArcIMS Internet application. It primarily used to obtain information on zoning classifications and land use designations for unincorporated King County. The map set is designed to provide DDES staff and its customers with quick and easy access this basic planning information. Planning Maps was developed in collaboration with the KCGIS Center.

Parcel Locator – The *Parcel Locator* is a MapObjects based parcel finder application, which is scheduled to be taken off-line early in 2002. The Planning Maps map set of *iMAP* was designed as a replacement for the *Parcel Locator*. No further maintenance of the *Parcel Locator* is intended at this time.

Base2 – Base2 is a customized ArcView project used by staff at DDES to locate and determine the characteristics of a parcel and its vicinity. Base2 have been the primary tool available to GIS end-users at DDES for the last several years. It is a popular application and has been adopted by a handful of County agencies for their own use. However, the LIS section has discontinued support for Base2 to external agencies. Lagging performance has always been an issue with Base2 as response times to queries can be frustratingly slow. To reduce end-users reliance on Base2 much of its functionality and information content has been ported to quicker browser-based applications such as the *Parcel Locator* and now *iMAP*. The trend to de-emphasize Base2 will continue in 2002. Nevertheless, the application will continue to be supported at DDES for the foreseeable future.

AutoPlot – AutoPlot is a customized ArcView project that provides a quick and easy method for printing a series of maps that are used during site review. Each map in the series depicts a different set of environmental or regulatory features that may effect site development.

InspectArea – InspectArea is a customized ArcView project used to define and maintain inspection area attributes and boundaries. Several work units within DDES have field inspection staff assigned to specific geographic areas. A data entry and editing interface in InspectArea allows DDES supervisors to

interactively adjust inspection area boundaries and measure the effect of those changes on job assignments and workloads before committing to the boundary edits.

Development Conditions Search Engine – The Development Conditions Search Engine is an Internet application using Cold Fusion and Microsoft Access. It provides parcel specific development condition information for unincorporated King County in tabular format with access to scanned and indexed map images.

SANT Data Entry Module – The Sensitive Area Notice on Title (SANT) Data Entry Module is a user interface for the SANT database (SANT.mdb). The interface is designed to aid data entry personnel in collecting the pertinent information from recorded notice on title documents. The collected information is used in DDES parcel finder applications such as Base2 to inform users about sensitive area features that are associated with a subject parcel.

Varic – Named after the department's recently retired arson investigation dog, Varic is a customized ArcView data entry module. It is used to locate and add fire investigation records into an annual shapefile (e.g. ARSON98). The shapefile can be used for crime analysis and for annual mapping and reporting of arson cases. The application has been defunct for over three years but will be updated for use in 2002.

4.2.4.2 Enhancements

Spatial application enhancement work by the LIS section is subject to priorities as established by DDES management. Typically these priorities are established during an annual review, which occurs in the first quarter of the year and includes input solicited from sections and work units. Once management has established the priorities, the resulting work plan is then subject to revision as situations warrant. Therefore the following list of spatial application enhancement projects is subject to change.

Development Conditions Search Engine – The Development Conditions Search Engine will be redesigned in 2002 to retrieve source information from GIS layers rather than from tables maintained in Parcel.mdb. Maintenance of Parcel.mdb is time consuming and largely redundant work, which can be eliminated once the Development Conditions Search Engine is no longer reliant on Parcel.mdb. This project is tied to the data enhancement effort to use Parcel.mdb to generate the layers that would be required as source information for the redesigned Development Conditions Search Engine. The conversion of the application to use shapefiles rather than tables will insure that information provided by the Development Conditions Search Engine will match information retrieved from Base2.

AutoPlot – The AutoPlot map printing application will be upgraded to meet new mapping requirements, add functionality, and improve reliability. The details of this upgrade have largely been determined from user comments and requests. Follow-up meetings with users were held to finalize the enhancement plan.

DDES Defined Map Sets – Additional map sets for *iMAP* will be identified and developed in 2002 based on priorities established by DDES staff and management. The map sets will typically be developed to serve a specific business need, rather than attempting to create generic map sets that may not serve any given business need particularly well. Tentatively, the map sets to be developed for *iMAP* include SAO hydrologic hazards, SAO geologic hazards, development conditions and snow load analysis. The LIS section will also explore the feasibility of developing intranet map services using ArcIMS. Access to these map services would be limited to the DDES intranet. Intranet maps services would focus on DDES issues related to permit tracking, addressing and site review.

SANT Data Entry Module – The SANT Data Entry Module will be enhanced to allow for entry of additional categories of site features. This project is tied to the data enhancement effort for the SANT.mdb.

Varic – The fire investigation data entry module known as Varic will be enhanced to better control input of new information. At a minimum, additional edit checks need to be added to the application to validate data before it is submitted to the database. The complete enhancement program for this module will be determined in discussions with the Fire Investigation Unit.

4.2.4.3 Development

At this time there are no LIS section proposals for wholly new spatial applications. If any proposals emerge they will be evaluated by DDES management based on recommendations made by the LIS section.

4.2.4.4 Documentation

Documentation of LIS section applications is usually maintained within coding scripts. This documentation typically includes header sections, with purpose statements and modification history, and comment lines embedded in the code. Limited user material has been prepared for AutoPlot and Base2. Basic "getting started" and overview instructions will be prepared for *iMAP* in 2002. There are no other plans to provide further documentation of LIS section applications.

4.2.5 System Integration

The focus of the LIS section is to provide land information to support the primary business of the department, which is to reliably process permits. A separate unit at DDES, known as Information Services, has responsibility for maintaining the permit processing systems. A vendor supplied solution, 'PERMITS' Plus®, provides the user interfaces and back-end databases for the permitting system. The IS unit has built several additional systems to support the department including time keeping, financial, management reporting, and data warehousing. The LIS section receives support from and works with the IS unit to add the land-based information component to the department's systems.

4.2.5.1 RDBMS back-end support

The LIS section currently uses Microsoft Access for back-end support of GIS. This function is limited to a handful of specific use databases such as SANT.mdb and Parcel.mdb, which are discussed in previous sections. In addition the LIS section makes use of an Open Database Connection (ODBC) to an Informix data warehouse of permitting information. This connection is used by the LIS section to extract information from the data warehouse for use in GIS applications, and for mapping and analysis projects.

When the LIS section migrates to ArcGIS 8.1 during 2002 the data housed in LIBRARIAN on the UNIX server *Oreo* will be transitioned to a RDBMS, probably SQL Server running on Windows 2000.

4.2.5.2 Other Department Data Management Activity

The bulk of DDES data management tools and processes are geared to support the department's permitting system and its related functions. These systems are maintained in an Informix DBMS running on a UNIX platform. These systems operate outside the direct control of the LIS section.

4.2.6 Client Services and User-Base Support

The customer base for the LIS section is typically personnel from all divisions within DDES requiring various GIS services. Occasionally the customer base is broadened to include DDES customers and stakeholders. Services provided range from responding to ad hoc requests for information to long-term customized support for GIS end-users. The services generally fall into the categories of mapping, analysis, data development and applications.

Mapping and analysis services at DDES most often relate to parcel and/or permitting issues. Data development services are initiated when a customer's project requires new data. Many of the data sets created in these circumstances are only utilized for the duration of the project, but occasionally they have broad significance and are retained in data libraries at the department or corporate level. Application services are defined by user requirements and are developed to support specific business functions, most often based on the need to retrieve information about a parcel.

Services are typically requested through the LIS section Program Manager as a result of meetings with work units, or through phone or e-mail requests, or other informal meetings with staff. Services are occasionally requested directly from LIS section staff, but these requests are then directed to the Program

Manager for assignment to the appropriate staff member. Service requests are prioritized by review with clients and supervisors, taking into account project complexity, possible duration of the project, and availability of LIS section staff. The LIS section holds twice-weekly meetings, where projects are assigned to staff members according to their areas of expertise. Active projects are also reviewed during these meetings to review project status, scope, and to assure timeliness of delivery.

For work plan development the LIS section Program Manager solicits input from staff and management to determine the highest priority projects and issues for the coming year. The Program Manager compiles the input and presents findings to the DDES senior management team. The management team rates projects, which are then incorporated into the long-term work plan for the LIS section.

DDES is active in the use of the Internet, and the LIS section plays a primary role in the development of content and applications for the web. The LIS section uses a variety of methods to disseminate information on the Internet. These include map images, a database search engine and interactive mapping applications.

Map Images – The LIS section maintains a web page of reference maps in PDF format (URL). The contents of this page include the King County Zoning Map, the King County Comprehensive Plan Land Use Map, the DDES Base Map and the Ground Snowload Map. In addition, two atlases are reproduced on the Internet in PDF format. These are the King County Zoning Atlas and the King County Comprehensive Plan Land Use Atlas. The reference maps and atlases are updated and posted to the Internet as changes to their underlying information occur. The LIS section also maintains a web page to track city annexation and incorporation activity. The page includes maps for each recent or proposed annexation.

Database Search Engine – The LIS section maintains a database search engine, which provides information on development conditions associated with parcels. The application, known as the Development Conditions Search Engine, uses a Cold Fusion license on the Internet server known as *Persephone* to query information in an Access database stored on the same server. Currently the application stands alone, and consideration is being given to modify it to operate with an interactive mapping application.

Interactive Mapping Applications – The department purchased and owns a half share in the Internet server known as *Hercules*. *Hercules* is the server used by King County to house Internet mapping applications run with MapObjects and ArcIMS software. The LIS section maintains a MapObjects mapping application known as the *Parcel Locator*. The *Parcel Locator* was originally developed in 1999 and is scheduled to be discontinued in 2002. The LIS section partners with the KCGIS Center in the development of ArcIMS applications within the *iMAP* environment. Further details on the section's activities in interactive mapping applications are available in 4.2.4.

4.3 Department of Executive Services

The Department of Executive Services (DES) was created from the reorganized Department of Information and Administrative Services (DIAS). In 2002, DES has approximately 1,040 employees. The reorganized department provides services to the citizens of King County through the following agencies:

- Office of Civil Rights
- Emergency Management
- Facilities Management
- Finance and Business Operations
- Human Resource Management
- Information and Technology Services
- Records Elections and Licensing Services
- Risk Management

The Department of Executive Services also houses the Board of Ethics and the Civil Rights Commission.

DES is currently updating the mission statement, guiding principals and goals of the department. The previous mission was to serve the citizens of King County and enable others to serve. The goals of the department are:

> Identify and meet changing customer requirements. Encourage and expand the use of strategic partnerships. Maintain and enhance an empowered, highly skilled workforce reflecting the diverse community we serve. Manage information and technology to improve services and information sharing. Provide leadership to meet the current and future needs of King County. Exercise responsible stewardship of County resources

GIS services within DES are provided by two distinct GIS work units: The E-911 Program Office, located within the Office of Emergency Management (OEM) and King County Elections GIS (KCEGIS) section. Both provide key information services to support the specific business needs of the respective divisions within DES.

The Asset Development and Management Section of the Facilities Management Division, maintains a GIS workstation with one ArcView license. Department level GIS coordination with this division will be addressed in the 2003 Operations and Maintenance document.

4.3.1 Business Functions

The Department of Executive Services provides the following services to the citizens of King County: animal control; licensing/registration for automobiles, boats, taxicabs, marriages and pets; election services including voter registration, candidate filing, and absentee ballots; Geographic Information System (GIS) production services; emergency and disaster planning information; E-911 services; civil rights enforcement; employment; recording of documents; and risk management. Additionally, the department manages County properties, procurement processes, and receives property tax payments.

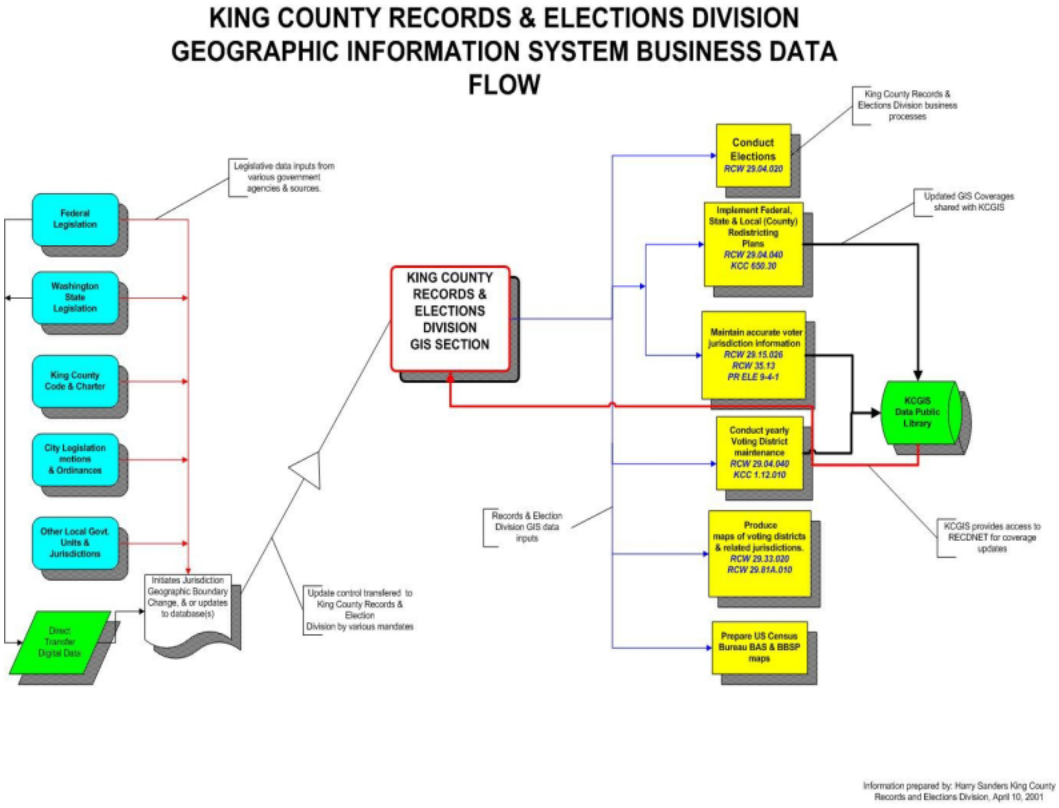
Records, Elections and Licensing Services Division

The KCEGIS work unit has the primary GIS responsibility for the creation, integration and maintenance of geographic boundary data incorporated into the "District" theme of the King County Coordinated GIS (KC GIS) Program. The District data layer is utilized by many agencies within King County and it supports numerous County department business applications. KCEGIS staff supports division and department business functions by providing digital map and CD production services, data creation, integration, maintenance and analysis.
Listed below are department business functions by division that rely on geographic data and GIS applications:

Records, Elections and Licensing Services Division

- ***Political Redistricting/ Voting District Maintenance*** **-** GIS analysts within the division are responsible for the implementation and integration of data resulting from Federal, State and local redistricting plans *(RCW 29.69B-29.70).* To support this program, GIS tools applications and spatial data are used by Elections staff to analyze plans and implement district changes.
- ***Jurisdiction Boundaries*** **-** In King County, the Manager of the REALS performs the business function of the "County Auditor." Under State law, the "Auditor" is mandated to conduct primary, general and special elections for all political jurisdictions (including cities, towns, and minor taxing districts) within the County and to perform all duties required in order to carry out this function. *(RCW 29.04.020).* In order to do this, the "Auditor" must maintain the latest accurate information describing the geographic boundaries of these jurisdictions, as well as the director, council, or commissioner districts within, and ensure that such information is kept current. *(RCW 29.15.026 and Public Rule Doc. No. ELE 9-4-1).*

- ***Election Support -*** Jurisdictions in King County can conduct as many as seven elections per year. GIS staff, data, and tools are used to support the business of conducting elections. Candidate filing, jurisdiction flagging, ballot layout and design, absentee ballots, voting equipment delivery, routes, troubleshooter zones, production of the Local Voters Pamphlet, and polling place location and assignment *(RCW 29.57)*, all rely on spatial data and applications maintained and supported by KCEGIS staff.
- ***Voter Registration -*** the Elections office processes approximately 800,000 voter registration transactions per year. The State law *(RCW 29.07.220)* requires the Auditors office to maintain a computer database containing names, address, minor taxing districts (jurisdictions) and precinct information for every voter. KCEGIS staff maintains spatial data and supports the applications crucial to this business function.
- ***Document Recording -*** The King County Records Office (Records) processes and records documents related to real estate transactions and collects excise tax and recording fees *(RCW 36.22.010).* The recording procedure relies on accurate up to date city jurisdiction information to process these transactions. KCEGIS data and staff provide support to this business application.



Office of Emergency Management

The E-911 Program Office is located within the Office of Emergency Management. The E-911 GIS Mapping Administrator provides GIS support to the Program Office and 17 Public Safety Answering Points (PSAPs) in King County. The Federal Communications Commission (FCC) requires that wireless carriers be capable of implementing Phase II wireless 911 service, including the actual location of 911 callers, by October 1, 2001. GIS maps will be used to support the display of wireline and wireless 911 call locations at the PSAPs. GIS maps, applications and education will also support the functions of PSAPs in King County to enable to quickly and efficiently dispatch fire, police and medical aid in response to wireless and wireline 911 calls.

4.3.2 GIS Program Overview

The two distinct GIS work units, The E-911 Program Office and King County Elections GIS (KCEGIS), provide key information services to the specific business needs of the respective divisions within the Department of Executive Services.

Specifically, the E-911 Program Office provides information and GIS services to the 17 PSAPs in King County as well as GIS information to departments that closely meet the needs and functions of E-911. Whereas the KCEGIS provides data creation, data maintenance, data analysis, systems support, cartographic production and graphic services to the Records Elections and Licensing Services Division (REALS), as well as performing Legislative mandated functions associated to the duties of the County Auditor.

Both the E-911 Program Office and KCEGIS develop yearly independent budgets and work programs, and GIS activities are generally carried out independently. Cross-divisional organizational cooperation and application development between the two units in 2002 will consist of the sharing of street segment and address data. For security purposes, this data will exclude name and personal information of registered voters in King County. The address data will only be allotted to the E-911 GIS Mapping Administrator, processed through the E9GIS application, and addresses will be matched to existing building point locations in the GIS database to help pinpoint 911 calls. In the future, it is anticipated that KCEGIS, the E-911 Program Office, and other agencies within DES, will cooperate further on joint GIS project development.

Records, Elections and Licensing Services Division

The KCEGIS work unit is physically housed in the King County Records Elections and Licensing Services Division (REALS). The GIS Program Manager reports to the Election Superintendent for operations and maintenance of Election related work programs. The Program Manager also interfaces with the Division Management Team, and or appropriate department staff for coordination of cross-departmental projects.

In 2002, three FTE GIS analyst positions, and four TLT GIS staff report to the Program Manager. These analysts perform duty assignments supporting four basic business areas: political redistricting, voter registration, and election support and customer service. Duties and job responsibilities are shared between GIS staff, with the division of labor coordinated and assigned by the Program Manager. Although the workload is distributed evenly between staff members, one analyst is responsible for supporting the ongoing data maintenance needs and requests of the Voter Registration section, one analyst has the primary responsibility for data integration and maintenance to the district themes, and one analyst handles special data requests and all production related issues. The four GIS TLT positions will be working exclusively in the implementation of the 2002 Federal, State, and Council redistricting effort.

Customer service for both internal and external clients is reviewed and approved by the Program Manager. This is accomplished by coordinating special projects and requests with the KCGIS Center, to determine which agency should respond to the request. KCEGIS provides client services to support staff efforts in REALS, DES and numerous other internal County agencies.

The services provided by KCGIS staff include GIS data analysis, census demographics, cartographic production and CD and map sales. These services are also provided to the general public and clients outside the County organizational structure. In 2001, KCEGIS staff produced and sold approximately 75 CDs and 450 paper maps containing spatial data.

Below is a partial list of external clients supported in 2001.

4.3.2.1 KCEGIS Clients Supported in 2001

ORGANIZATION	CONTACT
Seattle Public Schools	Patrick O'Hagan George Sanders

ORGANIZATION	CONTACT
SGSI	John Schlosser
King County Council Staff	Lisa Hofferbur Linda Thielke Lauren Smith Sue Ellen Roach Helen Chatalas Darrell Cook Ken Lundberg Jeanne Keenan
Management of America	Larry Faulk
Highline Water District	Teya Hillerman
Sound Transit	Terry Lapatino Alex Stevens
Shoreline Parks	Charles Sturgis
King County Library System	Linda Fredricks Jed Moffitt
King County Democrats	Paul Berry
King County Republicans	Reid Davis
Washington State Democrats	Betsy Lin
Washington State Republicans	Chris Vance
Perkins Coie	Amy Gaffney
KC ORPP	Nanette Morales
KC DCFM	Bernard Thompson
Shoreline Water District	Phillip Lay
Val Vue Sewer District	Dana Dick
City of Bellevue Utilities	Larry Southworth
Kroll Map Company	Maria Jam
Southwest Suburban Sewer District	Darren Hill
Washington State Redistricting Commission	Ethan Moreano
Data Resources	Michael Andrew
The Seattle Times	Tom Boyer
The Seattle Post Inteligencer	Phoung Le
Washington State C.A.P.A.A.	Miebeth Bustillo-Hutchins
King County DCHS	Bong Santo Domingo
Renton Public Schools	Randy Matheson
Bellevue Planning Department	Nicholas Matz
King County Housing Authority	Claude Iosso
Labels and Lists	Bruce Anderson
Advanced Custom Software	Mary Webb
University of Washington	Earl Bell Dick Morrill Elenore Chase
Political Consultant	Catherine Vaninga
Political Consultant	Mike Snyder
Political Consultant	Sheryl Fontaine
Political Consultant	Ezra Basom
Puget Sound Regional Council	Jay Clarke Greg Cioc
The Civic foundation	Brian Livingston
Marshall GIS	Elizabeth Marshall

ORGANIZATION	CONTACT
The Office of the Secretary of State	Hal Lymus
Save our Schools	Chris Jackins
King County Libertarian Party	John Evans
Grassroots Solutions	Robert Richman
Citizens for Responsible Government	James Brown
Trust for Public Lands	Fred Tollgate
Pam Roach for County Council	Pam Roach
I-733 Campaign	Philip Lloyd

Office of Emergency Management

The GIS section of the E-911 Program Office is set up to support wireless and wireline 911 call location display functionality at the 17 PSAPs in King County. One E-911 GIS Mapping Administrator reports to the E-911 Program Manager. The E-911 GIS Mapping Administrator is responsible for all GIS operations in the E-911 Program Office and at the PSAPs.

Primary duties:

- Creating and maintaining a GIS mapping system for the 911 centers in the King County E-911 system.
- Creation, maintenance and management of the GIS maps.
- Use of specialized 911 mapping software.
- Implement the display of the maps at the 911 call answering positions.
- Coordination with the wireless carriers for the mapping information of their cell sites.
- Wireless data interpretation.
- Manipulation and implementation of wireless data at the PSAPs.
- Coordinating with County GIS agencies, cities, state GIS departments, vendors and the 911 centers.
- Coordination with the E-911 Data Network Coordinator for the maintenance of the maps on the Data Network servers, and the download of map updates to the PSAPs.
- Coordinate with PSAP Computer Aided Dispatch vendors, Mobile Data System vendors, and other vendors for the integration of map display at the PSAPs.
- Maintain current knowledge of technological changes in the 911 field and in the telecommunications industry, determine the impact to the E-911 Program Office and PSAP mapping systems, and address the impact.

Work Program - The work program is determined by the E-911 Program Office. GIS services to the PSAPs are prioritized by the order in which mapping is installed and activated at the PSAPs, which is based on the number of wireless 911 calls answered. Requests for GIS assistance are received via phone, e-mail or at the quarterly PSAP meeting.

The E-911 work plan is technology driven. Wireless carriers are mandated by the FCC to provide wireless call location information to PSAPs. The counties are mandated by state law to provide countywide E-911 service. It is the responsibility of the counties to ensure that the PSAPs are capable of receiving and utilizing the call location data. Wireless 911 calls have gone up to approximately 40 percent of the total 911 calls in King County, and this percentage continues to increase. In order to display the location information associated with each 911 call, 911 call location technologies must be installed at the PSAPs. The work plan is developed through coordinated meetings with PSAPs, wireless carriers and GIS vendors.

4.3.2.2 Training

Records, Elections and Licensing Services Division

The Record Elections and Licensing Services Division does not have a formal GIS training program. GIS courses and workshops are attended when both time and current budget allow. Both the KCEGIS Program Manager and staff participate in specialized GIS training courses that are offered by the KCGIS Center. KCEGIS staff also receive specialized training classes to meet the needs of the business units to which they provide support (i.e., special census training, election data management). The Program Manager receives training in administration and management, and must maintain certification as a Washington State Certified Election Administrator (CEA). This is accomplished by attending various training sessions and workshops held throughout the year, offered by the Office of the Secretary of State.

Non-GIS Division staff receives training in specific applications related to spatial data; to support related Voter Registration & Elections programs (i.e., Polling Place Finder). This end user training is accomplished by the Program Manager or one of the two FTE GIS analysts.

The 2002 training budget for KCEGIS of $2,000.00 is inadequate to meet the training needs of the work group. Due to the lack of funding, during the first half of 2002 most of the training effort will focus on Census data and Redistricting training utilizing online virtual campus courses from Environmental Systems Research Incorporated (ESRI) and other vendors. In the second half of 2002, KCEGIS staff needs to receive training in Arc 8 and courses related to the new software model.

Office of Emergency Management

- Training end user clients at the PSAPs is one of the job responsibilities of the E-911 GIS Mapping Administrator. There is no set budget for training end-user clients, as this training is written into the job description as a required responsibility of the E-911 GIS Mapping Administrator.
- In the coming year, training will be focused on the call takers and dispatchers at the PSAPs. Call takers and dispatchers will be trained on the use of the Microdata GIS ALI Trakker application. ALI Trakker is a GIS-based map display application that displays ArcView GIS shapefiles. ALI Trakker will be installed at the PSAPs in order to display cell tower locations and coverage areas, and the location of wireless and wireline 911 calls.
- There is participation in the KCGIS Center training classes.
- Training on the Microdata GIS E9GIS application occurred in August of 2001. Future training classes will focus on the ALI Trakker map view application installed at the PSAPs. Microdata GIS will send representatives to King County to train the E-911 GIS Mapping Administrator as well as the staff at the PSAPs on the use of the ALI Trakker application.

4.3.2.3 Staffing Requirements

The Department of Executive Services has nine employees dedicated to GIS staff positions for 2002. The staffing allocation for the divisions and agencies within the Department is outlined below.

Records, Elections and Licensing Services Division

- For 2002, the KCEGIS staff consists of 1.0 FTE program manager, 2.0 FTE analyst/programmers, 1.0 FTE analyst/technician, 2.0 TLT analyst/programmers, and 2 TLT analyst/technicians.

Working Title	Current Classification
Program Manager FTE	ISA III
Analyst / Programmer FTE	ISA II
Analyst / Programmer FTE	ISA II
Analyst / Programmer TLT (Vacant)	ISA II
Analyst / Programmer TLT (Vacant)	ISA II
Analyst TLT	ISA I
Analyst TLT	ISA I

Working Title	Current Classification
Analyst FTE (vacant)	ISA I

GIS positions within the Records Elections and Licensing Services Division are CX funded with 80 percent revenue backing. The Source of revenue is obtained from election billing for incorporated cities and towns in King County pursuant to RCW 29.07.101and RCW 29.07.030.

The TLT positions within REALS are funded through 2002 to provide support for the Federal, State and local redistricting project. This project is a mandatory legislated work program that must be performed every ten years following the decennial Census.

The KCEGIS staffing allocation for 2002 is adequate provided that the existing vacancies can be filled. The FTE ISA I analyst position is key to the division for the long term, if KCEGIS continues its current level of customer service and division staff support.

Office of Emergency Management

- Staffing that is funded by the 911 taxes in King County currently consists of 1.0 FTE E-911GIS Mapping Administrator in the E-911 Program Office. At this point, one FTE has been sufficient to provide the needed GIS administrative support.

4.3.2.4 Hardware and Software

Record Elections and Licensing Services Division

KCEGIS operates GIS in both UNIX and PC environments. The PC environment consists of eight Dell Dimension XPS T500 workstations running a combination of Windows NT 4.0 and Windows 2000 Professional. The section operates and maintains a Dell Poweredge 4200 server specifically for GIS data, where assorted shapefiles and projects (i.e., preliminary redistricting plans) and other related data are stored. A Digital Equipment Corporation (DEC) alpha workstation running UNIX provides the primary GIS development platform. A Dell Latitude CP Laptop is used for remote poll scan and Election Day trouble shooting GIS activities. KCEGIS utilizes an HP Design Jet 2500 CP plotter as its primary output device for large format map production. Other printing resources include an HP 2500 CM Professional Series Color Printer, and numerous HP Laser printers available via the Election Domain Local Area Network. KCEGIS currently has one primary ArcInfo floating license on *Wildfire* and five ArcView 3.2 licenses. During the second half of 2002, the section will migrate to the ArcGIS 8.1 environment thus discontinuing the floating ArcInfo license.

Maintenance of KCEGIS' corporate data is performed on *Wildfire* operating UNIX from PCs using Hummingbird Exceed software. Departmental data specific to REALS KCEGIS are stored and backed up on Dell Poweredge servers housed in the King County Elections office. Voter registration data, election data and applications are stored and backed up on servers housed at King County Information and Technology Services (ITS). Additional software used by the section includes: Avenza Map Publisher Adobe Illustrator 9.0, Adobe Acrobat 5.0, Adobe PageMaker 6.5, Adobe Photoshop 6.0, Coldfusion, Visio Professional, Microsoft: Access, Excel, Project, Powerpoint, SQL, Visual Basic, and Visual InterDev.

There are no currently known in-house hardware issues that need to be addressed in 2002 for REALS.

Office of Emergency Management

- Hardware installation in 2002 will consist of servers, PCs and monitors at the PSAPs in order to view the ALI Trakker map application.
- There are two licensed copies of ESRI ArcView 3.2a software. One is located at the E-911 GIS Mapping Administrator workstation and one on the portable laptop in the E-911 Program Office.

- One licensed copy of E9GIS, ALI Auditor, E9Collector, ALI Trakker, and E9Wireless is installed on the E-911GIS Mapping Administrator workstation as well as on a portable laptop that is used for field data collection and processing.
- E9GIS is a software extension to ArcView GIS designed for the development and update of E-911 GIS mapping data. This application simplifies, enhances, and helps control GIS data for 911 use. E9GIS also helps manage, integrate and improve existing GIS databases from various GIS data warehouses.
- ALI Auditor automates the synchronization of GIS data against the Automatic Location Information (ALI) Database, which is the address information associated with the phone placing a 911 call that is displayed on a screen at the PSAP.
- E9Collector is a software extension to ArcView GIS designed to efficiently and accurately capture all necessary coordinate and resident information required to build the E-911 tabular and spatial databases. E9Collector is the primary field data collection system that will be used to collect specific 911 field data in King County.
- ALI Trakker is the map display software that will be installed at the PSAPs in King County, which will allow 911 call takers and dispatchers to view wireless and wireline 911 calls on a King County base map.
- E9Wireless is an ArcView Extension that allows for easy creating, editing and displaying of wireless tower information. Wireless tower information, in the format of a lat/long, is coupled with other necessary data and processed through E9Wireless for display on ALI Trakker at the PSAP.
- The E-911-Program Office has purchased licenses for the Microdata GIS suite of applications. The licensing agreement includes updates to all of these applications as well as product support when updates become available through Microdata GIS.

The E-911 Program Office and the 17 PSAPs in King County are connected via a dedicated 911 Data Network. The Data Network gives the PSAPs the ability to communicate and share data with each other. In addition, maps will also be transported over the Network from the E-911 GIS Mapping Administrator workstation in the E-911Program Office to the central Data Network server, and then download to individual servers at the PSAPs. The individual servers at the PSAPs are connected to a PC at each call answering position. When the 911 call taker logs on, the map automatically updates any changes to the base map from the server at the PSAP.

- Hardware at the E-911 Program Office:
  - Desktop computer.
  - Laptop computer.
  - GPS unit.
- Hardware at the PSAPs:
  - PC and monitor for ALI Trakker map viewer for wireless and wireline 911 call display.

4.3.3 Spatial Data

Many agencies within DES utilize some form of spatial data such as street address files or associated data queries related to address. Some of this data is maintained in-house while other agencies opt for applications and data to be maintained by other offices such as ITS. This is primarily due to the lack of in-house IT resources to create and maintain applications and data.

Records, Elections and Licensing Services Division

KCEGIS develops, maintains and enhances a range of corporate and department GIS data. Once corporate GIS data has been created or updated on the REALS network, the data is stored as ArcInfo coverages and associated shapefiles on the KCGIS Center server *Wildfire*. Many County and external

agencies use spatial data developed by the REALS Division to perform their respective business functions.

Office of Emergency Management

- Spatial Data is maintained, enhanced, created and updated for the E-911 Program Office and individual PSAPs.
- Spatial data for 911 consists of geographical data from the KCGIS Center.
- 911 specific data:
  - Emergency Service Areas
  - Cell towers
  - Cell Sectors
  - PSAP specific spatial data, such as patrol zones and tow zones

4.3.3.1 Maintenance

Records, Elections and Licensing Services Division

In order to meet State and Federal statutes, the Elections GIS staff must create and maintain geographic boundary data for those jurisdictions that elect candidates or conduct special election on propositions. In King County, these corporate data sets consist of the following:

Corporate Data

Layer Description	Layer Name	Maintenance and Update Frequency
Boundaries of incorporated cities and towns	CITYDST	Updated as needed for election purposes
Congressional District boundaries in King County	CONGDST	Every 10 years, following the Decennial Census
Director districts within the Seattle School District	DIRDST	Yearly, coincidental with yearly Precinct alterations
Unique Levy Description Polygons	DSTCODE	Update immediately following annexation activity
King County Fire Protection Districts	FIRDST	Update immediately following annexation activity
King County Hospital Districts	HSPDST	Update immediately following annexation activity
King County Court Electoral Districts	JUDDST	Yearly, coincidental with yearly Precinct alterations
2001 King County Council Districts	KCCDST	Every 10 years, following the Decennial Census
Legislative Districts in King County	LEGDST	Every 10 years, following the Decennial Census
King County Library District	LIBDST	Update immediately following annexation activity
Proposed Electoral Districts	MS1DST	Updated as needed for election purposes
Proposed Electoral Districts	MS2DST	Updated as needed for election purposes
Municipal Incorporation Districts	MUNDST	Updated as needed for election purposes
King County Park Districts	PRKDST	Update immediately following annexation activity
King County School Districts	SCHDST	Update immediately following notification of Transfer of Territory
King County Sewer Districts	SWRDST	Update immediately following annexation activity
Voting Districts	VOTDST	Yearly, coincidental with yearly

		Precinct alterations
Combined Water and Sewer Utility Districts	WSDST	Update immediately following annexation activity
King County Water Districts	WTRDST	Update immediately following annexation activity

KCEGIS staff also maintains corporate spatial data for Cemetery, Airport, and other associated misc. districts.

Department Data

Layer Description	Layer Name	Maintenance and Update Frequency
Street centerline address	STREETSEG	Updated as needed for election purposes
Voting precinct assignment	PRECINCT	Updated as needed for election purposes
Minor taxing district assignment	LEVY	Updated as needed for election purposes
Unique Ballot style	COMBO	Updated as needed for election purposes
Election polling place assignment	POLLPLACE	Updated as needed for election purposes
Election supply delivery routes	ROUTE	Updated as needed for election purposes
Election day trouble shooter assignments	ZONE	Updated as needed for election purposes

Office of Emergency Management

- No stewardship for King County GIS data.
- Maintenance of the following spatial data will be assembled through the E-911 Program Office:

Department Data

Layer Description	Layer Name	Maintenance and Update Frequency
Police, Fire and EMS service zones	ESAZ	As needed
Carrier Cell tower locations	CELL TOWERS	As needed
Sector Coverage areas of towers	CELL SECTORS	As needed

4.3.3.2 Enhancements

Records, Elections and Licensing Services Division

Most of the Division data enhancement efforts in 2002 focus on improving spatial accuracy of minor taxing district coverages. This effort will be completed by coordinating with the Department of Assessments and the related taxing districts, and cities and towns in King County. Other data enhancements that will occur in 2002 include conflation of new legislative, congressional, and King County council districts.

Office of Emergency Management

- The addition and activation of new cell tower information from the seven wireless carriers currently providing service in King County.
- GPS additions and updates to existing King County GIS road data.
- GPS additions and updates to existing King County locations and building data.

4.3.3.3 Development

Records, Elections and Licensing Services Division

The development of new data layers is primarily dependent on GIS funding within the Division' work plan. Currently (2002) no additional data development has been funded. New data development can still occur, but it must coincide with an existing planned work program and must be accomplished as an efficiency effort.

Section 4.3.4.3 of the O & M Plan refers to the enhancement of data and applications effected by the implementation of the GEMS VoterView system. When complete, this new application will mean a major change in the structure of numerous Election databases. This will translate to a change in database maintenance as well. Application updates will move from the IBM host mainframe at ITS, to NT Servers in the King County Elections office.

Office of Emergency Management

In the 2002 project scope, the E-911 Program Office E-911 GIS Mapping Administrator will work on maintaining current cell tower and sector information as updates from the wireless carriers are submitted. Also, in cooperation with King County Roads and King County DOT, the E-911 GIS Mapping Administrator will work increasing the accuracy of the street centerline road layer, which is necessary for the location of wireless 911 callers.

The E-911 Program Office will also coordinate acquisition of site information such as:

- Building points.
- Non-building points, such as street signs, fire hydrants, mile markers, etc.
- PSAP specific spatial data to assist in locating 911 calls.

4.3.3.4 Metadata

Records, Elections and Licensing Services Division

FGDC documentation exists for GIS Coverages on *Wildfire*. This documentation is currently out of date and needs to be improved. In the second half of 2002, the metadata will be brought up to the approved KCGIS and FGDC standards.

Office of Emergency Management

4.3.4 Spatial Applications

Many Divisions in DES maintain spatial applications; I just don't know what or where they all are??

Records, Elections and Licensing Services Division

The REALS Division GIS work group supports numerous spatial applications related to the administration of elections, voter registration and document recording. The majority of the applications reside on the IBM host mainframe computer at ITS.

The two major types of applications that KCEGIS staff support are related to the Vote process and the Simulation processes.

The VoteUpdate applications assign the correct Jurisdiction information to clients who are registering to vote or moving to a new address in King County. Applications and Graphic User Interfaces (GUIs) allow for street, address, name, DOB and other data to be entered by Division staff and stored as part of the VoteMaster file. Other related applications identify and flag Absentee, Inactive, Cancelled and Service voters.

The applications related to the Simulation process allow for multiple “what if” scenarios related to jurisdiction and street segment management.

4.3.4.1 Maintenance

Records, Elections and Licensing Services Division

Voter and Election related GIS applications are reviewed and maintained yearly, or as the need arises. There is no current proposal for a system of scheduled maintenance.

4.3.4.2 Enhancements

Records, Elections and Licensing Services Division

The Election section of the REALS Division has entered into a contract with Global Elections Systems to provide an automated Voter Election Management System (EMS). The EMS is divided into two separate components: Voter Registration (VR) and Ballot Tabulation. The Ballot Tabulation portion of the contract has been fulfilled and has been in operation since September of 1998.

The Voter Registration component, which includes a GIS backbone, is still under development and should be completed by 2002. The new application, called Voter View, will improve the speed and accuracy of spatial data related to Jurisdiction management and analysis.

Office of Emergency Management

N/A

4.3.4.3 Development

Records, Elections and Licensing Services Division

In 2002, the REALS Division will explore the feasibility of developing GPS applications for Poll routes, locations, and Trouble Shooter zones. This development effort will be coordinated with EOM and discussed with the KCGIS Center.

Office of Emergency Management

N/A

4.3.4.4 Documentation

Records, Elections and Licensing Services Division
Documentation of division applications are sparse and incomplete and need to be updated in 2002. A users guide is under development for the VoterView application.

4.3.5 System Integration

N/A

4.3.5.1 DBMS Backend Support

N/A

4.3.5.2 Other Department Data Management Activity

None

4.3.6 Client Services and User-Base Support

Records, Elections and Licensing Services Division

The KCEGIS unit provides user support to all Division staff working with spatial data (i.e., address, street segment files, and candidate information). The primary duties of updating street, voter, jurisdiction, and census data provides service to clients within the Division, as well as members of the public and agencies outside King County.

Office of Emergency Management

The E-911 Program Office and the 17 PSAPs are the primary customer base for the E-911 GIS Mapping Administrator. Customer service to the PSAPs is provided as mapping is activated at each PSAP. Once the mapping has been activated, the PSAP can begin to assess their needs for additional GIS information other than what is shown on the base map, and submit requests for more PSAP specific GIS information. For example, the Washington State Patrol PSAP requested the addition of state highway mile markers.

- As the E-911 Ali Trakker mapping application is installed at each PSAP, the E-911 GIS Mapping Administrator will process requests for GIS updates, maps and new data requests. Requests for services will be sent to the E-911 GIS Mapping Administrator via phone, e-mail or at the quarterly PSAP meetings.
- Internal clients, primarily the E-911 Program Office staff, request maps and other GIS data via e-mail or voice communication. Map services are processed secondary to the on-going work for any prior requests made by the PSAPs.

4.4 Department of Natural Resources and Parks

In 2002 the Department of Natural Resources merged with the Department of Parks and Recreation to become DNRP. This merger expanded DNR's original mandate to provide sound environmental resource management, wastewater and solid waste handling and regulatory services to now include public recreation services and expanded open space resource management. The approximately 1,600 employees of DNRP provide services to the Department as a whole by meeting the specific business needs of its four divisions: Parks, Solid Waste, Wastewater Treatment, and Water and Land Resources.

The department is responsible for:

- Providing a storm water and wastewater transport system, operating treatment plant facilities, and monitoring system conditions.
- Controlling the flow of the County's solid waste stream, managing transfer and landfill operations, and overseeing the waste reduction program.
- Providing storm water drainage and flood management services, supporting watershed and stream monitoring and enhancement, and managing open space acquisition.
- Managing park and recreation programs, services and facilities, and serving as steward of natural resource lands and wildlife habitat through the acquisition, preservation and management of forests, farmland, wetlands and natural areas.

DRNP houses two distinct but functionally related GIS business units: the KCGIS Center and the DNRP GIS Unit. The KCGIS Center provides GIS coordination, infrastructure and professional services to agencies within King County and the regional community. For more information on the KCGIS Center, see Section 3. The DNRP GIS Unit is administered by the KCGIS Center, but provides GIS services only to the Department of Natural Resources and Parks. The DNRP GIS Unit provides specific analytical, cartographic and data creation and maintenance products to customers in each of the four DNRP divisions. The structure and work program management of the DNRP GIS Unit is designed so that this unit can meet the specific GIS needs of the individual DNRP divisions.

4.4.1 Business Functions

GIS supports business needs in all divisions of DNRP, though current activity within the Solid Waste Division is limited. The DNRP GIS Unit directly supports a large number of workgroups within the Wastewater, Parks, and Water and Land Resources Divisions, and to a lesser extent in Solid Waste. GIS activities include development and maintenance responsibility for 32 enterprise data layers, numerous department, divisional, and project-specific data sets, as well as extensive cartographic and analytical support. GIS data management and production work supports a combination of both short- and long-term projects, including interdepartmental projects. Though some new application development is performed, the focus is more on application maintenance.

Parks Division

GIS capabilities are used to integrate services across work section boundaries. GIS services provide for inventory and maintenance of Parks facilities and support the fundamental work of the Parks Division to monitor and maintain recreational facilities and open space. Specific business functions include:

- ***Facilities and site maintenance*** - Maintain a safe and inviting parks environment enriching the public's experience. Manage open spaces and natural areas in a manner that fosters a thriving environment for habitat and safe appropriate visitation of parkland by the public. GIS is used to develop, enhance and maintain information and maps about sites and facilities that Parks maintains, and to develop and maintain applications that ease access to those maps and information. GIS is a central part of its "ParksInfo" system, integrating with data about Park facilities stored in the "Park Site and Facilities Information" (PSAFI) database.
- ***Recreational and event services*** - Provide primary recreation services for residents in unincorporated areas of King County, including pool and open-water programs. Provide a year-round facility for hosting quality entertainment and life-enriching educational events. GIS supports this function through cartographic production, specifically brochure publication. GIS staff also work with recreation staff in using data stored in the non-GIS CLASS database to create facilities maps.
- ***Program development and land management*** - GIS plays a major support role in mid- to long-term project and capital planning through cartographic production and spatial and tabular analysis to produce reports. Specific components of this business function include: long-term plans for parks, open space, natural area, and trail acquisitions and developments; development and coordination of the annual Capital Improvement Program and the 6-year Capital Improvement Program; property management oversight on all special use permits; development of special use agreement park property improvements and park encroachments; and pursuing capital grant funds and management of special grant programs.

Wastewater Treatment Division

GIS supports this division's mandate to be a steward of the region's environment by protecting the water, land and natural habitats and safely disposing of and reusing wastewater and solid wastes. GIS services augment planning of wastewater services, monitor for changed conditions and develop programs to meet customer needs. Specific business functions include:

- ***Conveyance System Improvements*** - The CSI project is a multi-year, multidisciplinary effort to prioritize and coordinate regional conveyance system planning. The County's regional conveyance system consists of over 250 miles of pipes and 42 pump stations in addition to force mains, regulators and tunnels that transport wastewater from local sewer systems to the County's two existing regional secondary treatment plants. The CSI project focuses on County-owned regional conveyance facilities. However, it provides a framework for ongoing discussions between the County and the 35 local sewer agencies regarding local and regional facility upgrades to improve the overall system's level of service. The CSI project is also addressing very short-term critical capacity issues and potential storm-induced overflows in the existing regional system, as well as operational and maintenance needs. GIS data management, cartographic production and analyses are critical to the support of this program in maintaining an inventory of the conveyance system, providing modeling

input and serving as a means to distribute information to the multiple participants in the regional program.

- ***Brightwater Siting and Conveyance*** - GIS provides maps and analysis for siting recommendation and criteria analysis for siting a third wastewater treatment plant. GIS data and tools will also be used extensively to plan conveyance and outfall siting for new plant.
- ***Regional Infiltration/Inflow Control Program*** - GIS supports the program's goals to reduce the amount of excess clean storm water and/or groundwater that enters the local sewer collection systems. New and updated coverages depicting local sewers, King County sewers, meter locations, modeling basin locations and sewerable areas are created. Maps and analysis to support wastewater modelers are created. The GIS support of this program is closely affiliated with a prime contractor, Earth Tech.
- ***Facilities Inspection*** - The Facilities Information Retrieval System (FIRS), a GIS-based database, is used for tracking facilities and sewers data and for developing the Onelines atlas. Related is GIS support for the Facilities and Offsite Inspection teams through development of automated tools, databases and cartographic products.

Water and Land Resources Division

GIS services provide data, tools and analytical support to assist in planning and monitoring of the natural environment. Multiple mandates include sustaining healthy watersheds, protecting public health and water quality, preserving open space and working farms and forests, ensuring adequate water for people and fish, managing public drainage systems and protecting/restoring habitats. Specific business functions include:

- ***Strategic Initiatives*** - GIS is used for analysis of policy and funding.
- ***Science, Monitoring and Data Management*** - Water quality and hydrologic assessment and analysis. Coordination with various data management and field activities to ensure efficient access to all relevant spatial data.
- ***Land and Water Stewardship Services*** - GIS services for programs including watershed support, groundwater management, lakes program stewardship, and hazardous waste.
- ***Office of Rural and Resource Programs*** - Data development, analysis and mapping for programs including agriculture, forestry, resource protection incentives, noxious weeds mitigation and natural lands management.
- ***Stormwater Services*** - GIS supports service delivery analysis and supports and drainage investigation and inspection services. Regulation and compliance and NPDES permit compliance are also supported.
- ***Flood Hazard Reduction Services*** - GIS data and analysis are used to predict and monitor flood hazard zones and provide basin-wide regional analysis.
- ***Capital Projects and Open Space Acquisitions*** - GIS is used to depict and analyze proposed acquisitions, and provide ecological and surface water engineering services.

4.4.2 GIS Program Overview

The County Executive's 2002 budget proposal includes several department-level consolidations, including the merging of the Department of Parks and Recreation with the Department of Natural Resources and the consolidation of the KCGIS Center function into DNRP. The Parks merger resulted in the new DNRP having the following divisions: Water and Land Resources, Parks, Wastewater Treatment and Solid Waste. Except for Solid Waste, each division previously maintained its own GIS staff to provide GIS services and support to meet its business needs. As part of the DNRP GIS Unit consolidation, the GIS staff from each of these divisions has been combined into a single functional group within the KCGIS

Center. This new DNRP GIS Unit continues to support the business needs of all DNRP divisions, working in close coordination with division managers and staff.

Establishment of the DNRP GIS Unit as a component of the KCGIS Center enables closer coordination between the two groups and ensures access to the full range of resources available through the KCGIS Center. At the same time, the detailed knowledge of division business needs, the data which are most needed to address those needs, and the work and process flows specific to each division are maintained and developed by individual DNRP GIS Unit staff members, each of whom focuses on the specific division with which they are affiliated. Coordination among the unit staff is maintained through ongoing informal discussions, project-driven cross-division support, weekly project update meetings, and a monthly DNRP GIS Unit staff meeting. Coordination with other departments and with the rest of the KCGIS Center is maintained primarily through monthly KC GIS user group meetings and monthly KCGIS Center staff meetings, but there is regular, ongoing coordination as well through less formal project-oriented discussions.

The DNRP GIS Unit is operated using a system of matrixed management, coordinated between the KCGIS Center and division program managers. This is illustrated on the KCGIS Center organization chart in Section 2. The work of the KCGIS Center's ten staff members is overseen by the DNRP Technology Unit Manager, who is also the KCGIS Center's Support Services Supervisor. This person is responsible for administrative supervision, workload management, and maintenance of QA/QC standards and procedures for all KCGIS Center projects. Depending on scope, complexity, and resource requirements, project requests and work direction are either routed and assigned directly to unit staff by division program managers or coordinated, prioritized, and assigned by the DNRP Technology Unit Manager. Once a project has been initiated, ongoing coordination, review, and reprioritization occur as needed between the DNRP Technology Unit Manager, the division program manager, and the unit staff assigned to the project.

Parks Division

The DNRP GIS Unit provides Parks GIS services. Two employees are assigned to work on Parks' projects and each has specific core responsibilities. One analyst oversees database design and data management of the parks facilities database while the other's primary focus is the parks and trails map layers, GPS data collection and property data management.

Wastewater Treatment Division

Like Parks, the DNRP GIS Unit provides GIS services to the Wastewater Treatment Division (WTD), with four employees assigned to this group. The GIS analysts associated with the WTD are closely associated with specific long-term project assignments. One analyst is the primary contact for the Infiltration and Inflow study, closely aligned with a consultant working for King County; a second analyst is primarily responsible for the new Brightwater treatment plant siting and outfall design support; a third has emphasis on the conveyance systems improvement project; while the fourth focuses on offsite facilities one-lines, local sewer and monitoring data, and ArcIMS applications. There is cross support between staff and each member shares in handling ad hoc assignments. However client requests are generally closely associated with the staff member representing that project emphasis, and assignments are directed on that basis.

Water and Land Resources Division

Four GIS analysts in the DNRP GIS Unit provide GIS services for the Water and Land Resources Division (WLRD). One of these analysts is affiliated with the Office of Rural and Resource Lands. The other three analysts are affiliated with the GIS and Visual Communications group. The DNRP GIS Unit staff that support WLRD receive project assignments based more on software specialty and geographically-defined environment resource specialty than by major projects, as with WTD. One analyst maintains the GIS intranet site, develops ArcIMS applications and has primary data responsibilities for WRIA 9 and jurisdictional data layers. A second analyst has comparable WRIA 8 responsibilities, including maintenance responsibilities for the hydrography layer, as well as being the remote sensing lead.

Forestry, agriculture, land ownership, noxious weeds and current use assessment data layers are the primary responsibilities of the third analyst, along with acting as data and analytical lead on open space acquisitions. The fourth analyst is responsible for WRIA 7 and provides support as needed for the other analysts. Client requests are routed based on these various staff emphases.

4.4.2.1 Training

Formal training is available to GIS program managers and staff from a variety of sources, both internal and external. The KCGIS Center provides GIS training through a quarterly class schedule - a combination of County-specific and ESRI core classes taught by ESRI-certified instructors.

The DNRP GIS Unit does not provide any formal training classes of its own. The breadth of GIS-related skills and abilities demonstrates the deep reservoirs of both basic and specialized skills available. However with the increasing complexity of the GIS science and practical application it is becoming more difficult for individuals, much less divisions, to maintain a high-level of proficiency across the board in ArcInfo/ArcGIS-specific topics and related topics. There is an increasing trend for staff to develop specialties beyond a core of basic GIS functionality. Developing this specialty while maintaining core competence in light of technology advancements is complicated by the high cost of formal training classes. The availability of ESRI-certified in-house instructors, however, may provide opportunities to obtain official ESRI training at lower costs.

Individual professional development for DNRP GIS Unit staff is focused toward specific division and workload requirements. Though a formal training program does not exist for staff, training is obtained both through internal and external sources. Internal training opportunities include formal meetings of the monthly GIS User Group meetings sponsored by the KCGIS Center as well as informal one-on-one assistance or information sharing. There is a high level of coordination of this type that crosses division boundaries. This type of training is usually no cost. External training is obtained through vendor-specific courses usually held at County facilities from vendor-certified instructors. The cost of these classes is usually borne by the division requesting the training.

Beyond the staff of the DNRP GIS Unit, skill development for GIS users is generally focused on ArcView 3.x training. Introductory ArcView classes are available through the same venue as more advanced GIS classes. Substantial ArcView client support is provided by the KCGIS Center staff in the form of trouble-shooting and functionality help, though this help is provided on an ad hoc basis. The large ArcView client base throughout the department reflects the relatively large workload this informal training places on the KCGIS Center staff.

A view of the current status of self-rated GIS skills can be found in the skills matrix maintained by the DNRP GIS Unit staff solely as an internal management tool. This matrix could be used to develop specific staff training plans. A similar inventory of desktop ArcView users may be useful in determining deficiencies, if any, in Arcview functionality among client users. Greater and more balanced deployment of ArcView skills and abilities would reduce the workload requirements for KCGIS Center staff in day-to-day assistance of client GIS users, allowing them to focus on higher level GIS products and processes. This may be especially significant in improving the number and capability of 'power' desktop users who have a need for a higher level of knowledge than that now provided in the introductory ArcView classes.

Training classes currently available through the County have a strong focus on software functionality, application development skills and, to a lesser extent, database design and modeling skills. Long-term data management efficiencies require that an expanded audience of data collectors and data maintainers who have some role in developing spatially-enabled data sets receive training in a broader array of GIS-related areas including:

- Database design and modeling concepts, to assist in data collection efforts;
- Data and application documentation and metadata; and
- Data maintenance/database integrity protocols, including adherence to in-house protocols.

Training needs may be met by:

- Developing a formal training plan with necessary budgetary components to determine the fiscal limitations on the amount of formal classroom training that may be possible. This plan can be based on the skills matrix mentioned above.
- Encouraging more cross-divisional skills; information and work sharing, in order to leverage skill set emphasis.
- Adjusting workload to provide opportunities for scheduled, uninterrupted Computer-Based Training (CBT) or hands-on self-training.
- Developing a mentor program where GIS specialists spend scheduled uninterrupted time in one-on-one self-designed training on a specific topic.
- Using the skills matrix to serve two additional purposes: a resource for users to determine best source for assistance, and as a mechanism to determine presenters for short 'introductory' classes to solely address functionality levels. These could be delivered as informal 'brown bag' presentations.
- Providing more frequent low or no-cost introduction to in-house tools to encourage use.
- Identifying specific user needs (i.e., types of questions they ask) and providing real-life incremental approaches to GIS-related problem solving. At the same time, match these needs with existing data and applications to maximize the utility of existing resources.

Particular mention should be made of the need for a comprehensive ArcGIS 8.1 training and migration plan. Though some formal training and on-the-job experience exists among staff in DNRP, the inconsistent deployment of ArcGIS 8.1 throughout the enterprise as well as the department has not leveraged the training dollars so far spent. This transition is complicated by the new licensing and cost scheme associated with this version of ESRI's software, as well as by marginally adequate hardware for successful deployment.

Any transition and training plan will have to take into account different functionality requirements for GIS analysts versus 'power' ArcView users and desktop ArcView users. This is especially significant in light of ESRI's software suite, which is deployed as a common interface across the product line. Initial successful deployment of ArcGIS 8.1 software may be achieved with sufficient and appropriate training of the revised desktop interface. Long-term success will only be achieved as analysts and users adapt to the additional migration from the arc-node/directory data model to the OOD geodatabase/SDE model. Additional training and competence must be attained in the shift from the AML-based programming language to COM compliant VB application development in order for full functionality to be reached.

4.4.2.2 Staffing Requirements

The staff of the DNRP GIS Unit consists of two employees who focus on Parks, four employees who focus on Water and Land Resources, and four employees who focus on Wastewater Treatment. All ten of these GIS analysts are funded through the KCGIS Center and are classified as follows:

Work Focus	Working Title	Classification
All DNRP Divisions	DNRP Technology Unit Manager & Support Services Supervisor	ISA III
Parks Division	GIS Analyst	ISA II
Parks Division	GIS Analyst	ISA II
Water and Land Resources Division	GIS Analyst	ISA II
Water and Land Resources Division	GIS Analyst	ISA II
Water and Land Resources Division	GIS Analyst	ISA I
Water and Land Resources Division	GIS Analyst	ISA I

Wastewater Treatment Division	GIS Analyst	ISA II
Wastewater Treatment Division	GIS Analyst	ISA II
Wastewater Treatment Division	GIS Analyst	ISA II
Wastewater Treatment Division	GIS Analyst	ISA II

In the future, as the volume of work handled by the DNRP GIS Unit increases, staff workloads will be monitored regularly by the Technology Unit Manager. An annual review will be conducted, in coordination with DNRP division program managers, to determine whether the number of KCGIS Center staff is adequate to meet anticipated needs for the year ahead. Based on this annual determination, recommendations may be made periodically to request additional staff for the KCGIS Center.

4.4.2.3 Hardware and Software

During 2001, hardware and software support for GIS use within the DNRP was provided by three different sources: servers within respective DNRP divisions, WTD support through Transit's *Cougar* server, and enterprise-level support through KCGIS Center servers. The KCGIS Center consolidation within DNRP will relocate the enterprise data, RDBMS, licensing, software servers and ancillary hardware to the DNRP facilities where they will continue to support enterprise services. The migration of software licensing, data access and applications and any required support from the Transit server to alternate server(s) will be completed by the end of January 2002.

The formation of the DNRP GIS Unit will not be immediately reflected in a consolidated data, application and license server environment. Through 2001, each separate division, as well as the Rural and Resource Lands section within WLRD, maintained its own GIS data server. This was in addition to the data accessed from the enterprise database in Plibrary or, in the case of WTD, the near mirror of Plibrary data housed on Transit's *Cougar* server.

Parks server, a Compaq Proliant 1600 named *Rasta* runs NT 4.0. Its GIS share is titled *Parks-01* and serves as a combined development and production environment. Primarily a data server for both shapefiles and coverages, it also hosts ArcInfo and networked ArcView licenses.

The Office of Rural and Resource Programs (ORRP) within WLRD maintains an Intel system named *Wlrnt5* running NT 4.0. The GIS share, *ORRP*, serves as a combined development and production environment. It is solely a data server and hosts no licenses. Both coverages and shapefiles are stored.

The GIS and Visual Communication section within WLRD maintains a dual-processor Intel system named *Wlrnt6* running NT4.0. IT has three partitions related to GIS data: W*lrgis*, *Vol1* and *Vol2*. *Wlrgis* serves as the production database with the other two shares serving as development and project working space. Both production and development environments store shapefiles and coverages. This server also hosts ArcInfo and network ArcView licenses. Additional development GIS data, largely specific to the Science, Monitoring and Data Management group within WLRD is housed in a data share on the *Wlrnt4* server.

The WTD division's internal server is called *Aqua*, a Compaq 5500 running Novell Netware OS. In 2002 server functions will be migrated to a Dell server running Windows 2000 OS. The GIS share is titled *Iliamna* and serves as a combined production and development environment. It is solely a data server, since networked ArcInfo and ArcView license support has been provided by the Transit server.

The GIS desktop environment among the GIS analysts is primarily NT/Windows 2000. The exception is WTD's current ArcInfo workstation access through *Hummingbird Exceed* emulation from the Transit UNIX server. ArcView users within the department operate solely in a Windows environment though the operating system includes 98, NT and 2000. Network connectivity, software installs and upgrades for GIS implementation are provided by the respective division LAN workgroups. GIS-specific WAN connectivity is also maintained with the Oracle instance within DNRP's Environmental Laboratory. This connectivity supports direct *SQLPlus* access as well as supports the *Wtrsamp* application maintained through the WTD.

Collectively, the divisions of DNRP have 98 documented ArcView licenses and six ArcInfo licenses distributed over the GIS servers and desktop environment described above. The Parks *Rasta* server hosts 1 NT ArcInfo 7.x workstation license and six ArcView v. 3.1 shared network licenses. Parks maintains standalone ArcView licenses. The WLRD *ORRP* server hosts four ArcView v.3.1 shared network licenses but no ArcInfo licenses. The WLRD GIS and Visual Communications server, *Wlrnt6*, hosts 4 NT ArcInfo v.8.1 and 45 ArcView v.3.1 shared network licenses. In addition, three standalone ArcView v.3.2 and three standalone v.3.1 licenses are used within the division.

Each division maintains its own complement of output devices. Due to capacity limitations, access to the plotters is generally restricted to the GIS analyst staff, though they are networked and accessible via division LANs. The Parks merger and the KCGIS Center consolidation will require evaluation and possible relocation of input (digitizing) and output (plotter and printer) devices.

Division	Large Format Plotter	Other Output Devices
WLRD, GIS&VC	HP DesignJet 2500CP, 36" width max	HP 8500 N Color Laser Printer, 11x17 maximum
WLRD, ORRP	HP DesignJet 2500CP, 36" width max (not specifically dedicated to ORRP)	HP 8500 N Color Laser Printer, 11x17 maximum (not specifically dedicated to ORRP)
Parks	Plotter not moved with staff, Parks DNRP will be assigned existing output hardware	
WTD	HP DesignJet 2500CP HP DesignJet 650	

Ancillary software available to GIS analysts within the DNRP GIS Unit varies according to the division they serve. Access to ERDAS image processing software is provided through WLRD. A suite of desktop publishing software is available through the WLRD Visual Communications Unit. Web content development software is used by the GIS staff of all three divisions and ArcIMS programming software is used by both WLRD and WTD.

This complexity in architecture, both in the mix of operating systems and in the number of servers, has resulted in inefficiencies both in data management and GIS software license management. The Parks Department merger and the DNRP GIS Unit configuration resulting from the KCGIS Center consolidation has provided DNRP the opportunity to evaluate the current department and division-level GIS data management situation. The current data management environment has been recognized by the division GIS specialists as having the following limitations:

- ***Multiple Data Locations***: Current data are scattered over six server/server partitions. This has several consequences, including the inability to share data easily across the network due to varying network protocols, and an excessive number of locations for analysts and users to map to and search for required data.
- ***Poor Data Coordination***: Divisions have duplicate GIS data residing on their respective servers, though often these are not exact copies. This has resulted in inefficient space management and also results in the inefficient use of GIS analysts' time in locating needed data and ensuring that they have the correct version of the data for their use.
- ***No Clear Production/Development Environment Separation***: The servers managed within the divisions serve as mixed development and production environments without clear QA/QC and access protocols to make this separation more distinct. Users of the data must often make assumptions about the quality of undocumented data or choices between very similar undocumented data sets.

DNRP staff involved in mapping the course of the GIS consolidation effort have thoroughly documented the issues briefly outlined here as part of developing a DNRP Support Unit Consolidation Issues Paper. Multiple alternative solutions have also been outlined in this document, which is available from the Unit Manager. The alternatives take into account the need for greater data coordination and data migration,

where appropriate, to the enterprise server; however, they focus primarily on the long-term need for a dedicated DNRP production/development environment.

To address this need, a dedicated DNRP snap server will be acquired and installed during the first quarter of 2002. This server will be used to consolidate and manage GIS data currently maintained on the multiple servers described above. DNRP GIS Unit staff will review and evaluate all of these data to determine which should be moved to the new server and which should be deleted or archived, and to determine the best structure within which to organize and manage data on the new server. This will be a substantial effort that will require a significant amount of staff time during the period of this transition. In addition to the sorting, organization, and migration of these data, the DNRP GIS Unit will review access and maintenance issues and will develop and implement policies and procedures to address those issues. This may include designation of one of the Unit staff to serve as DBA for the consolidated data, if this is deemed necessary and appropriate.

Deployment of the new DNRP snap server is expected to resolve many of the GIS data management issues faced by the department. To achieve maximum effectiveness, however, this physical restructuring should be accompanied by further development of:

- Metadata documentation procedures as a method to evaluate data and make decisions as to appropriate enterprise/department/division location for long-term maintenance.
- Established QA/QC procedures to ensure long-term integrity of data stored on the DNRP server.
- Documented and advertised data management procedures for maintaining appropriate use of production and development environments. This includes strict library/database access protocols.
- Coordination with all DNRP GIS users who create and manipulate shapefile and tabular data sets to develop migration paths for appropriate data sets created outside of the DNRP GIS Unit.

Software licensing issues, outlined below, also need to be addressed as part of the Parks integration and DNRP consolidation.

- Inefficient license use, license managing for ArcView for shared networked licenses. Currently there is no metering procedure for managing the use of shared licenses.
- Uncontrolled and inconsistent stand-alone ArcView installations, including different versions and update patches.
- Licensing distribution for ArcInfo: local LAN licensing vs. centralized license server (i.e., *Wildfire*).
- Standard deployment protocols for the ArcGIS 8.1 software suite, related to the deployment plan for ArcGIS 8.1, including investigation of any desktop hardware limitations for supporting ArcGIS 8.1 products (specifically ArcView).
- Network access plan needed to bridge differences in division networking protocols.

Licensing of GIS software is coordinated through the KCGIS Center. This licensing coordination is primarily oriented toward ArcInfo workstation software. Standardization and coordination for ArcView licensing is less evident. The revised ESRI licensing scenario for the ArcGIS 8.1 product line could provide the opportunity to consolidate existing licensing, particularly for ArcEditor and ArcInfo functionality. Though the ArcGIS floating license concept for ArcView 8 may provide similar flexibility for this upgrade, the existing mix of shared and standalone ArcView 3.x licenses will require reevaluation as this legacy application will continue to provide core desktop functionality in the immediate future.

4.4.3 Spatial Data

Each division represented within the DNRP GIS Unit has maintenance and enhancement responsibilities for multiple GIS themes stored in the warehouse. Each division also maintains, enhances and develops data that are stored only on the division servers described above in the Hardware and Software section.

4.4.3.1 Maintenance

The department maintains over thirty master coverages in the corporate library (see list by division below). These data are maintained as ArcInfo 7.x coverages and as shapefile equivalents.

A large number of coverages and shapefiles are maintained on the separate division-level GIS data servers. These data range from project-specific to division-specific to department-level data (see list by division below). These are general categories at present, and have not been defined in detail.

Individual users maintain datasets at the workgroup level, usually in the form of value-modified shapefiles or subsets of master data. Related attribute data are often maintained at this level as well.

Parks - Corporate data sets

Layer Name	Layer Description	Maintenance and Update Frequency
HISTSITE	King County Historic Sites point file	Randomly
PARK	Representation of parks in King County, it may not be complete, especially for non-KC owned properties	Randomly
PARKS_Q	Parks Working Coverage and will be replaced shortly	Randomly
TRAIL	Trails in King County	Randomly

Parks - Division data sets

Layer Name	Layer Description	Maintenance and Update Frequency
PSAFI_FACILITIES	Facilities	As Needed
MAINTDIST	Maintenance Districts	As Needed
RESCOORD	Resource Coordinator Districts	As Needed
PARKS_P	Parks Property	As Needed

In addition to data sets created and owned by King County, coordination with cities, the state and the federal government results in the acquisition of data about non-KC parks. Depending on the circumstances under which these data were acquired, there may be additional maintenance responsibilities for these data.
Parks also maintains several Parks-generated coverages. A list of these coverages is available in an Access database maintained in Parks. The Parks-DNR merger will require all divisions of DNRP to resolve data overlap and redundancy issues.

Wastewater Treatment - Corporate data sets

Layer Name	Layer Description	Maintenance and Update Frequency
FACILITY	Manholes, pump stations, regulator stations, treatment plants. The Facility point coverage is generated from coordinate locations in the Facility Information Retrieval System (FIRS). It represents all facilities in the King County Wastewater Treatment System.	Randomly
IWPERMIT	Industrial Waste Permits	Randomly
PALNT	Regional Wastewater Treatment plants. It contains the location of regional wastewater treatment plants, including King County owned plants and others in King, Pierce, and Snohomish Counties.	Randomly
SERVAREA	Sewer service basins contributing flow to KC WTD facilities. It depicts the King County Wastewater Service Area. Sewer service basins, not political boundaries, define it. It represents the area from which local component	Randomly

	agency sewer utility districts collect flow that is eventually conveyed and treated by King County. Additionally, it is defined by the Urban Growth Boundary to encompass potentially sewerable area for planning flow projections.	
SEWER	Major sewage conveyance system. This coverage depicts King County Wastewater Treatment Division's conveyance system. It is generated from the Facility Information Retrieval System (FIRS), a database maintained by the Wastewater Treatment Division, Facility Inspection Section. Arc segments represent sections of conveyance pipe between manholes or other facilities (see FACILITY point coverage).	Randomly
SITEPLAN	Facility footprints. Building footprints of treatment plants or other facilities	Randomly
SWRBASIN	WPCD defined boundaries for sewer basins including planning basins (PATPLA). SWRBASIN shows sewer infrastructure flow basins in King, Pierce, and Snohomish Counties. This coverage is used for modeling and planning wastewater flows. This coverage does NOT represent the King County Wastewater Treatment Service Area (see coverage SERVAREA).	Randomly
WTRSAMP	Water Sampling sites. Sampling locations from LIMS database. WTRSAMP is a point coverage representing the location of water quality sampling sites. The coverage is generated weekly from the LIMS oracle database maintained by the King County DNR Environmental Lab. Each point has an attribute identifying its LIMS locator ID.	Weekly

Wastewater Treatment - Division data sets

Layer Name	Layer Description	Maintenance and Update Frequency
FLOW_MONITOR	Contains several types of Infiltration/Inflow (I&I) monitors: mini-basin monitors, long-term monitors, modeling monitors	Randomly
SEWER AGENCY INFO	Forty (40) different local sewer agency sewerlines	Randomly
DISCHARGE POINTS	Various discharge points within KC WTD service area. Includes WTD CSO (consolidated sewer outfalls), and discharge points using local agency CSO	Randomly

The division also maintains multiple non-corporate themes and deals with a significant number of acquisitions of data from external sources.

Water and Land Resources - Corporate data sets

Layer Name	Layer Description	Maintenance and Update Frequency
CARTLAKE	Lakes and Double Bank Streams. The scale of this coverage is the best scale possible at each location.	Randomly
CARTSTREAM	Cartographic Streams	Randomly
DRNBASIN	Drnbasin is King County Department of Natural Resources, Water & Land Division's (KC WLRD) version of Water Resource Inventory Areas (WRIA) and watersheds in King County. Please note that KC's version differs from the supposed "official" version that the Washington State Department of Ecology (WA DOE) produces (available on their web site). Most notably, in the KC version, WRIA 9 includes Vashon Island and Elliott Bay basin, and the Rock Creek area is included in WRIA 8, not WRIA 9. For the King County area, drnbasin is generally considered to be more correct than the WA DOE version, and is what KC WLRD uses in all planning efforts.	Randomly

FISH9	Dist. of 7 salmon spp. in WRIA 9 streams, 5 presence classes. FISH9 contains fish distribution information in Water Resource Inventory Area 9 for seven fish species: chinook *(Oncorhynchus tshawytscha)*, coho *(Oncorhynchus kisutch)*, sockeye *(Oncorhynchus nerka)*, chum *(Oncorhynchus keta)*, pink *(Oncorhynchus gorbuscha)*, steelhead *(Oncorhynchus mykiss)*, & cutthroat trout *(Oncorhynchus clarki)*.	Annually
FISH9_PT	Point observations of 7 salmon spp. In WRIA9, 7 observ. Classes. FISH9_PT contains fish observation information in Water Resource Inventory Area 9 for seven fish species: chinook *(Oncorhynchus tshawytscha)*, coho *(Oncorhynchus kisutch)*, sockeye *(Oncorhynchus nerka)*, chum *(Oncorhynchus keta)*, pink *(Oncorhynchus gorbuscha)*, steelhead *(Oncorhynchus mykiss)*, & cutthroat trout *(Oncorhynchus clarki)*.	Annually
FISHV	Dist. of 5 salmon spp. in Vashon streams, 1 presence class. FISHV contains fish distribution information on Vashon Island for five fish species: chinook *(Oncorhynchus tshawytscha)*, coho *(Oncorhynchus kisutch)*, chum *(Oncorhynchus keta)*, steelhead *(Oncorhynchus mykiss)*, & cutthroat trout *(Oncorhynchus clarki)*.	Annually
FISHV_PT	Point observations of 5 salmon spp. On Vashon. FISHV_PT contains fish observation information on Vashon Island for five fish species: chinook *(Oncorhynchus tshawytscha)*, coho *(Oncorhynchus kisutch)*, chum *(Oncorhynchus keta)*, steelhead *(Oncorhynchus mykiss)*, & cutthroat trout *(Oncorhynchus clarki)*.	Annually
FLDPLAIN	A digital representation of the paper FEMA flood maps. This coverage details the locations of 100 & 500-year floodplains, as well as the locations of floodways, as defined by the Federal Emergency Management Agency.	Randomly
GWMA	Groundwater Management Areas. GWMA depicts the boundaries of areas that have undergone groundwater management planning according to a Washington state program	Randomly
HABITAT	King County Wildlife Network. The Wildlife Habitat Network was designed to link high quality streams, wetlands, and open space lands, and to minimize habitat fragmentation. The goal of the network is to make sure that habitats remain connected across the landscape after development occurs.	Randomly
KC_WHPA	Well Head Protection Areas are designed to show where contamination can flow into a well. Delineation of these zones is part of EPA's Source Water Protection Program. The different areas show how long it would take contamination to reach the well: 6 month, 1 year, 5 year, or 10 year "time-of-travel" zones.	Randomly
SURFGEOL	KC Surface Geology	Randomly
WELL_A	Water supply wells, group A. Public Water System wells with 15 or more connections, as recorded by the WA Department of Health. See also related datasets WELL_B and WELL_ALL.	Randomly
WELL_ALL	All well locations from King County groundwater database. This dataset shows the locations of all wells listed in the King County Groundwater database. These are mainly private wells of individual homeowners, but some Public Water Supply group A or group B wells are also included. See also related datasets WELL_A and WELL_B.	Randomly
WELL_B	Water supply wells, group B. Public Water System wells with 2 to 14 connections, as recorded by the WA Department of Health. See also related datasets WELL_A and WELL_ALL	Randomly
WTRBODY	Open Water	Randomly
WTRCRS	Streams - topological network. This coverage contains watercourses for King County drainage basins, including some areas in adjoining counties.	Randomly

	WTRCRS is designed as a topologically complete network of stream centerlines, with extensive related attribute tables. This data set is integrated from numerous sources, primarily at 1:24,000 scale. WTRCRS cross-references other commonly used hydrographic data inventories, and is also suitable for medium to small-scale map displays and generalized analyses.	
WTRCRS12	Additional Tributaries	Randomly
WTR_SERV	Water Service Areas	Randomly
WQ_LOCS	Sampling locations for groundwater quality. These data show the well and spring locations where King County has sampled for groundwater quality. More detailed information about the sampling points is found in the additional related table, wq_locs.smp, which has a many to one relationship with the coverage.	Randomly

Water and Land Resources - Division data sets

Layer Name	Layer Description	Maintenance and Update Frequency
CITY_3CO	Incorporated cities in the tri-county area	As needed
CUT_AG	Current Use Taxation: Agricultural properties	Annually
CUT_FOREST	Current Use Taxation: Forest land properties (> 20 acres)	Annually
CUT_PBRS_TIM	Current Use Taxation: Timberland (5-20 acres) and Public Benefit Rating System Properties	Annually
FLOOD_PROP	Flood buyout parcels	As needed
FPP	Farmland Preservation Program Parcels	As needed
JURIS00	Incorporated areas in KC as of year 2000 merged by Jurisdiction with 2000 census population - Ship Channel added to Seattle	None planned
JURIS90	Incorporated areas in KC in 1990 merged by Jurisdiction with 1990 census population	None planned
LNDCOV95	Landcover derived from 1995 Landsat Satellite image	None planned
LNDCOV95_PY	Same as lndcov95, only a polygon coverage	None planned
RFFA	Rural Forest Focus Areas (as adopted in 2001 Comp. Plan): Areas targeted for sustaining large contiguous blocks of rural forest	As needed
WEED2001	Noxious weed infestation locations for 2001	Annually

As with the Parks Division, data sets are acquired from external agencies, sometimes on a one-time basis, but more frequently on a recurring basis so that the data are periodically updated. Often these data require some type of import or conflation procedures to be applied.

There is increasing need to refine the levels of data associations in light of adherence to public disclosure policy, metadata requirements and data management and organization. A greater level of resolution as to the appropriate 'level' of the respective data sets would assist in developing a master maintenance and enhancement plan and schedule for data sets in each group. Meeting this goal would also require a migration plan to effectively evaluate and migrate appropriate data generated by desktop ArcView users. The proliferation of shapefiles and associated dbf attribute tables produces large amounts of temporary 'throw-away' data. However other spatial data generated through project-driven initiatives would be beneficial when migrated to a central DNRP library or the corporate enterprise library. These data would need to proceed through the necessary QA/QC steps to ensure their validity and utility.

Similarly problematic is the replication of corporate data, or data from other departments, to DNRP servers. Simple replication, though space intensive, does not present significant maintenance issues and may only be an issue in data access and programming consistency. However, editing of any of the

replicated data sets puts significant added maintenance responsibilities on staff, and is likely to result in unsynchronized data sets.

Beyond a theme-specific maintenance/enhancement plan, there is the need to determine the reasons why corporate and department data sets are replicated so frequently, and when changes are made to a replicated set, what real or perceived limitations of the original data set force these changes to be made. Possibly a 'gap' analysis that determines analyst's and user's data requirements could drive a logical process to data redesign or enhancements. This would provide an opportunity to determine what combination of data enhancements, subsetting or improved analyst and user data access and manipulation skills would work the best to minimize data replication and non-transactional edits.

Any hardware architecture improvements, as suggested in Section 4.4.2.3, for a more centralized DNRP GIS production and development environment would require that improved database design, library control and database administration also be implemented. Current DNRP servers closely mimic the library design of the corporate spatial data warehouse, though they also include variations from a standard design. DNRP-specific requirements may result in modifications, usually additions, to the corporate design, but these need to be justified and documented. More thoroughly developed and enforced protocols would also be necessary to ensure that good database 'hygiene' is maintained for both the production and development environments. The DNRP GIS Unit, who has met during 2001, has developed preliminary scoping for designing a common library structure and protocols for migrating the separate division libraries to a central DRNP library.

4.4.3.2 Enhancements

Though enhancements are made to data at all levels discussed in the Maintenance section above, there is not a comprehensive plan or schedule for the department that provides the status of enhancement updates. Most enhancements are performed on an as-need basis, largely driven by project requests. A plan and schedule may be useful in separating those data sets, both corporate and otherwise, into a generally dynamic group and a relatively static group. This may assist in determining which data sets require a detailed data model and implementation plan (dynamic set) and which static data sets can be tracked in less detail and may only require metadata update for documentation. The Maintenance section above discusses issues that are related to enhancements as well as maintenance.

4.4.3.3 Development

New data development is driven by various forces, not all of which are coordinated. Though large data development projects for data sets that may span department as well as division interest, such as imagery acquisition, Countywide hydrographic layer, and landcover themes, other datasets are built or contracted for within divisions with little or no corporate or department-level coordination. The high cost of data development should require a more cohesive approach to evaluating and planning data development projects. The need for the data sets is not usually the issue, but rather the most efficient way to leverage labor and budgetary resources to deliver the product. The proposed DNRP data management protocol beginning with a Project Planning component will assist in tracking the project and coordination between the purely GIS spatial portion and other portions sponsored by resource and laboratory staff.

Parks Division

Parks GIS continues to develop an integrated database, ParksInfo, which integrates all information related to Parks and Recreation facility use and maintenance. This does not specifically include the creation of any new GIS data layers, but does speak to the continued evolution of the Parks GIS layer and its related databases. Parks GIS no longer has responsibility for any one-time central GIS data creation.

Wastewater Treatment Division

Currently underway, but to continue into 2002, is development of a sewerland coverage area. SEWERLAND is an ArcInfo coverage showing parcels in King County's Wastewater service area categorized as:

- Sewered - serviced by sewers;
- Potentially sewerable - currently not sewered but could be; and
- Not sewered - areas that will never by sewered, like parks, waterbodies and freeways.

It is based on several information sources, including 2000 color orthophotos, local sewer agency comprehensive plans and local sewer agency verbal input.

Water and Land Resources Division

Two data development projects, originally under the auspices of the ESA/SAO data acquisition initiative, are in progress and will be in development in 2002. Funding for these projects is multi-departmental but project lead and GIS support contributions will be provided by the department.

- Multispectral Imagery Landcover - Department funding is provided from WTD, though project support is provided by WLRD GIS. The project will complete a portion of the deliverables (classification products for GMA through the end of 2001). Pending availability of funding in 2002 an 11-class landcover model for the entirety of King County will be completed during the first phase. Depending on the results and success of Phase I, remaining funding may be expended to produce additional landcover products in Phase II.
- Hydrography Theme - Groundwork and work plan development has been largely completed for development of a new hydrographic model for King County. Development work for this theme would begin in 2002 and continue, pending sufficient funding, through 2003. The initiation of the GIS work is dependent on the successful completion of the current Digital Elevation Model data project. Fallback alternatives include revamping the existing KC hydrography database, wtrcrs, or using and accepting stewardship responsibilities for the portion of the WA DNR framework hydrography data set covering King County. Any alternative chosen will include development and maintenance of route system to support environmental and facilities event mapping.
- Fish Distribution Data for WRIA's 8 & 9: In 2000, technical workshops were conducted to determine possible fish distribution information for 7 salmon species in Water Resource Inventory Areas 8 & 9 along with Vashon Island. The datasets currently are separated geographically and are in slightly different database formats. The database structures need to be improved and all the data merged together into one dataset.
- Resource Lands Management Database: to be developed in conjunction with the Parks Division. Starting in 2002 King County will be will be directly managing approximately 30% of the King County parks acreage. An initial database has been created which includes categorization of properties. This will be expanded with data from site visits and from resource management decisions.
- Resource Lands Program Participation Database: this multi-layered database will integrate existing and new data from multiple forestry, agriculture, and resource incentive (current use assessment) programs, and will support monitoring efforts.
- Major Landowners: the desired product is a database that provides ownership information on public, non-profit, and large private lands. This will require identification, verification, and integration of information from multiple sources, and involves interest and cooperation across divisions and departments.
- Land Cover Change Database: which will allow tracking of temporal changes in parcel size, development, and conversion from forestland.

- Event Table Development: the WLRD Science, Monitoring and Data Management (SMDM) group has started the process of migrating its existing aquatic habitat, fisheries, and hydrologic data to MS SQL-Server. The databases and data extraction tools are being designed to take advantage of dynamic segmentation capabilities of ArcView and ARCINFO by creating event tables for use with a routed hydrography layer. The effort is using the Washington and Oregon Hydrographic Framework data model, which is not currently implemented in the KC GIS WTRCRS routed hydro layer. Close cooperation with the hydrography theme project above will be necessary to ensure route development and maintenance to support SMDM's dynamic segmentation applications.

- Dynamic Segmentation QC and Analysis Tools: SMDM is contracting with the KCGIS Center group to provide Avenue programming assistance to develop two ArcView applications. The first works in conjunction with a Visual Basic data entry application to visualize stream habitat and riparian field data in order to check the spatial accuracy and attribute coding. This product should be completed by the end of December 2001. The second application is in the preliminary design stage and its purpose is to provide extended query and analytic functions to generate and use event themes for environmental assessment and monitoring purposes. This product will require many weeks of development effort by KC GIS Center and SMDM staff in the first quarter of 2002.

4.4.3.4 Metadata

Metadata for corporate data sets that reside on Plibrary are stored in the Oracle RDBMS managed on the *Wildfire* enterprise server and are published in the King County Spatial Data Catalog. These metadata serve as an information source for the data sets they describe, as well as a portion of the library control on the GIS database. Department metadata exist for all data sets maintained in Plibrary. However, the level of quality of the metadata varies significantly, and a large portion of the metadata does not meet FGDC standards. In addition, it is unknown whether quality control tests indicate the level of compliance with these standards. For data that reside on the department servers, FGDC-compliant metadata generally do not exist. Various levels of documentation may exist in the form of notes or other reference material but these generally have not been organized or reviewed. Data set summaries (i.e., data dictionaries) have been created and are generally maintained in either spreadsheet or Access database format. These inventories have been very useful in tracking important data sets, particularly those that have changed names or migrated locations.

Other department-level efforts are underway to standardize metadata collection for other data sets, many of which are not fully spatially enabled but may otherwise support existing spatial extents. Coordinating this effort with improvements in metadata documentation for GIS data sets is critical.

Efforts should focus on:

- Making an element-level inventory of the FGDC metadata of data sets on Plibrary for which DNRP has stewardship responsibilities, and devise a plan for enhancement, with a goal of passing metadata parser (mp) and other quality assurance tests for compliance.
- Develop a protocol for ensuring that metadata updates are made when data edits require refresh of the metadata.
- Any new data moved to Plibrary would have previously passed mp and other quality control measures as established by the department data management group.
- Providing sufficient metadata training for GIS specialists, users, and other data collectors to ensure consistent metadata for all data sets documented.
- Establish protocols for documenting data at the department level, consistent with maintenance of data dictionary/library control tools, to take advantage of system automation for metadata maintenance and retrieval.
- Establish alternatives for metadata creation, storage, and retrieval for GIS and GIS-related data sets in light of protracted transition to ArcGIS ArcCatalog where eventually available, and to cover situations where this mechanism will not be available.

- Coordinating metadata protocols, tool implementation, and access between 'pure' GIS ArcInfo environment and other department-level efforts.
- Assessing the value of the ESA-related data set inventory spearheaded by the Department of Transportation/Roads Maintenance Division in mid-2000. These data, if deemed current enough, could form the basis for developing minimal, standardized FGDC metadata. Though this would require data reentry, it would help focus documentation efforts on a single widely-used documentation model and hopefully reduce the need to gather this information again at a later date.
- Developing a plan for integrating ArcGIS XML-format metadata with XML-format metadata created outside ArcGIS.
- Developing and maintaining a searchable metadata database derived from the XML metadata files.

The goal of full metadata for all corporate and department data sets should remain in focus. Minimal 'FGDC-compliant' metadata comprising the appropriate elements from the Identification and Metadata Reference Information could be a near-term goal for a larger universe of data sets. Creation of this core level of metadata would assist in resolving the appropriate storage and distribution/availability level assigned to respective data sets.

4.4.4 Spatial Applications

The DNRP GIS Unit is responsible for several spatial applications that have been developed to support departmental business functions. These include ArcView applications developed with Avenue, ArcIMS applications, and database update and query tools. KCGIS Center staff from three DNRP divisions have developed these applications for their respective divisions and maintain them in coordination with the KCGIS Center application development team. The DNRP spatial application program is described in the following sections.

4.4.4.1 Maintenance

It is anticipated that the planned staffing of the DNRP GIS Unit will maintain any applications dedicated to DRNP employee use or which are currently maintained within DRNP. A maintenance plan and schedule would be useful in determining maintenance and enhancement requirements. Potential changes in application development procedures in light of the DRNP-KC GIS consolidation will likely result in revised maintenance and enhancement protocols for any new applications developed in 2002.

No single point of contact or reference exists for a current list of DNRP spatial applications, including those that use spatial data but may be contracted out (i.e., not developed in-house). Individual developers, application maintainers, or GIS managers have the responsibility for reference and detail information about applications. A more standardized, formal method for application documentation may serve the dual purpose of ensuring sufficient, consistent application documentation and providing a high-level inventory and status report.

Parks

Parks GIS maintains several GIS and non-GIS applications:

- *ParkView* (ArcView 3.2a – based park information look-up tool).
- *PSAFI* (MS Access and SQL Server – based park site and facility information application, which tracks all park facilities from drinking fountains to park sites, and their relationships).
- ArcIMS Parks System - KC GIS *Map Portal* map set that provides an overview of the County's park system.

Wastewater Treatment Division

WTD maintains the following GIS applications:

- *Wtrsamp* - merges DNRP Environmental Laboratory LIMS (Oracle) water sampling summary information with GIS representation of sample site locators. Updated weekly for access from the corporate library.
- *Industrial Waste Application* - designed to help identify permit locations within selected sewer/drainage basins. Basins can be selected from a map directly or by tracing the sewer network from a specific node (manhole). This application was written to run in ArcInfo AML.
- *Facilities Information Retrieval System (FIRS)* - stores and queries County sewer system data, which include KC sewerlines, manholes, treatment plants, pump stations and regulator stations. This also supports the Onelines atlas.
- *ArcIMS Map Service* - offers a view of data collected by King County in support of studies to find the best location for a treated wastewater marine outfall. Unlike the other map set hosted through the KC GIS *Map Portal*, this is a project-specific Map Set that is not based on a Countywide map extent, nor does it contain the parcel search function that is common to the Countywide map sets.
- Several ArcView 3.x extensions have been developed that are provided for use by WTD clients.

Water and Land Resources Division

The Division does not directly support any ArcView-based or other custom applications through the GIS staff. Various workgroups have expressed interest in ArcView and/or ArcIMS-based applications to meet their needs. The Drainage Services section contracted for the development of a GIS-based (MapObjects) complaint tracking system. Vendor support for this system has not been completely satisfactory and internal solutions may need to be found.

Currently two ArcIMS map services are running on the KC GIS *Map Portal*, Hydrographic Information and Groundwater Project. This Map Set presents the hydrographic features of King County, including wetlands and drainage basins. The opening view shows drainage basins, drainage sub-basins and wetlands on a Countywide basemap of rivers, streams and lakes.

4.4.4.2 Enhancements

Enhancements to existing applications shall be done under the supervision of the KCGIS Center, with DNRP GIS Unit staff matrixed to a KCGIS Center application development team. As indicated in the Application Maintenance section above, an application-specific plan and schedule for enhancements could improve workload balance, priority ranking and life cycle analysis. If implemented it would assist in indicating where enhancements and upgrades should relent to new application development. This may be especially pertinent in light of the Arc 8 Visual Basic/Object Model architecture compared to existing AML and Avenue-driven applications. Though there will be a protracted period of support required for legacy applications, the high cost of application development and the need to develop applications that span multiple functional goals require that more consideration be given to the enhancement vs. new development balance.

Part of the GIS consolidation will sever the server support for WTD supplied by Transit on their *Cougar* server. Migration of WTD applications currently running on *Cougar* to a DNRP server is planned for completion by the end of January, 2002.

4.4.4.3 Development

All new application development shall be done under the supervision of the KCGIS Center, with DNRP GIS Unit staff matrixed to a KCGIS Center application development team. As discussed above, existing applications, outside ArcIMS, will require redevelopment once the transition to Arc 8 is made. This will be required by the shift in programming language, desktop interface and data model design.

Creation of a protocol for new application development would assist significantly in making proper determination of goals, work resources and appropriate technologies. Existing procedures in place for planning and accessing Internet programming could be meshed with DNRP's data management project planning proposal to create a linear process for concept to deployment of a GIS application.

Informal discussions for several non-ArcIMS applications has occurred, but scoping has not been completed nor has the technical approach for these applications been determined.

Specific WLRD ArcIMS applications in the planning stage (in priority order):

- *Local Drainage Services* - KC GIS portal application to support drainage complaint tracking and response. This application will require additional data sets than currently available and some specialized programming for table access and printing requirements.
- *Hamm Creek Brownfields pilot project* - likely to operate outside KC GIS portal, but would depict soil and groundwater contamination data in a cooperative project between King County, EPA and the Environmental Coalition of Seattle.
- *Salmon data* - KC GIS portal depicting the available salmon data from the 2000 workshops.

4.4.4.4 Documentation

Documentation of DNRP GIS Applications will follow traditional programming etiquette. Existing documentation of current applications is maintained in various formats and in varying levels of detail. As a supplement to an enhanced application inventory, more standard documentation for all DNRP-maintained applications should be developed. Successful implementation of the FGDC Content Standard for digital geospatial data for application documentation exists and could be used as the core for all application documentation. The Standard could prove particularly useful for documenting successive process steps relating to application enhancement and maintenance items.

4.4.5 System Integration

GIS work and emphasis structured along division lines in best support of the business needs of each division has also produced challenges to department-level system integration. Discussion of a more integrated environment for data management is provided in 4.4.2.3 Hardware and Software. The restructuring of the DNRP GIS Unit will provide new opportunities to integrate tabular data management efforts as well, in concert with the KCGIS Center as a whole. On-going data management efforts, initiated at the department level in 2001 and described in 4.4.5.2 below, should continue through the training and implementation phase currently scheduled. Broader issues of data management will benefit from this and other efforts to address common data management issues that are pertinent to both the core GIS unit and other workgroups dealing with data collection and application design.

4.4.5.1 RDBMS Backend Support

As data sets become larger and attribute data become increasingly complex, there is additional impetus to migrate management of spatial-related tabular data sets to more appropriate environment. Currently department (as well as coverage-based enterprise data) attribute data are stored in a mixed environment comprising:

- Info tables for coverage based GIS data - accessed through ArcInfo software through division data sets.
- Dbase format files for shapefile equivalents and standalone shapefiles data sets - accessed through ArcInfo and ArcView software through division data sets.
- Microsoft Access databases - maintained independently by multiple users in isolated desktop environments.
- Microsoft Excel spreadsheets - maintained independently by multiple users in isolated desktop environments.

- Microsoft SQL server tables - maintained in central locations in WLRD, Parks and proposed deployment in DNRP technology unit.
- Oracle database tables - KC GIS instance and DNRP Environmental Laboratory Information Management System (LIMS).
- External data sources, such as MetroScan (for parcel and assessor information), are also relied upon as an attribute data source, though direct connectivity is usually applicable.

Inconsistency in use and availability of database resources has prevented more extensive deployment of these resources for managing GIS attribute data. Though long-term enterprise plans will host coverage data and eventually geodatabase GIS data through the KC GIS Oracle instance, legacy applications and department maintained datasets, including related data tables, would benefit from a well-planned implementation and use of these available resources, both at the KC GIS and department level.

This plan would need to address:

- Protocols for access and use;
- Network access requirements;
- Comfort level and training needs;
- Design protocols; and
- Migration plan for moving or mirroring multiple independent databases to more central repository.

Parks Division

Parks GIS makes extensive use of *SQL Server* running on server *Parks-01*. Several park site databases are stored and maintained using *MS Access* to access *SQL Server*.

Wastewater Treatment Division

Access databases have been extensively used to store attribute data, particularly that collected from field visits. The Environmental Laboratory LIMS Oracle database is accessed to provide updated attribution of the Wtrsamp coverage.

Water and Land Resources Division

The division's primary Microsoft SQL server, primarily used by the Scientific Monitoring and Data Management (SMDM) workgroup, is not currently used or accessed for GIS data. However this will change in early 2002 when query tools to create event tables from stream habitat data for GIS applications are created. This and other opportunities exist to make greater use of this resource, particularly in light of the development of GIS-related and data sets that could be spatially-enabled.

4.4.5.2 Other Department Data Management Activity

The Department of Natural Resources and Parks is a large collector and processor of environmental, habitat and physical facilities data. Beyond the data sets created and maintained specifically by DNRP GIS analysts, numerous other DNRP scientists and laboratory staff build or add to a wide range of natural resource related databases. These databases often have a direct spatial component, could be 'spatially-enabled' or are tabular data closely associated with existing spatial coverages. The long-term plan for the migration of spatial data sets from the coverage data model to the geodatabase model in a SDE environment puts additional impetus on coordination between core spatial data maintainers and those staff creating stand-alone or supplemental data sets.

Data management coordination requires the tight integration of the efforts of broad coalition involved in the Data Management and Data Release Procedures workgroup. This group's mandate is to produce an integrated education and implementation package to address the following:

- Project Planning;
- Sampling Analysis Plans;
- Data Collection Standards (support the SAP);
- Metadata Requirements (document the resulting data sets from the project); and
- Data Release Standards.

Though this group's activities extends beyond the bounds of the work program for the DNRP GIS Unit staff, intersection of the GIS staff and this group's activities needs to occur at the following junctions:

- Correct and logical spatial modeling during the project planning stage for those data collection efforts that will have a direct spatial component.
- Logical and well-designed tabular data collection through SAP and data collection standards so that integration and relation to existing spatial data sets can be done seamlessly.
- Standardized and well-developed metadata for data sets derived from projects that can be cross-walked with geospatial metadata to avoid duplicate documentation and sole search capabilities.

Parks Division

Parks GIS has by default also been the source of labor to create and maintain many Parks Division databases. This has included, or will include, the *ParkPay* database, the *Turn-Around-Document* database, the *PSAFI* database, the AP database (currently being rewritten for MS Access by Parks GIS staff), and labor management database (currently being rewritten for MS Access by Parks GIS staff).

Wastewater Treatment Division

The GIS staff work closely with other work units to cooperatively manage and integrate data from these groups into the GIS program. Some examples include:

- Planned future coordination with DNRP Environmental Laboratory in developing additional non-spatial data into spatial data. An existing example of this integration is the Wtrsamp coverage that derives weekly refreshed data from the LIMS Oracle database at the laboratory.
- Working with the Facilities Inspection Team to develop GIS applications using that workgroup's pipeline survey data stored on video.
- Coordinating with the Capital Improvement Program group to develop non-spatial project data into GIS application data.
- Working with the Modeling workgroup to structure data and design application requirements to view and analyze rain gauge and flow monitor data.

Water and Land Resources Division

WLRD Science Monitoring and Data Management (SMDM) section has started a multi-year program to move it's aquatic habitat, fisheries, benthics, stream flow and meteorological data into a MS SQL-Server environment with other WLRD environmental datasets to follow. The majority of these data will be spatially enabled for use as event themes in ArcView and ArcInfo. A substantial amount of work is going into data modeling, standardizing data item definitions, establishing quality control procedures, documenting datasets and designing data loading and extraction tools. SMDS is coordinating its activities with the GIS O&M Technical Committee and other cross-agency data management groups.

4.4.6 Client Services and User-Base Support

DNRP maintains an intranet presence using a technology section with subsections dedicated to various topics, including GIS topics. The overall mission of the DNRP GIS intranet Web site is to:

- Promote and publicize completed work products of the DNRP GIS Unit staff.
- Provide assistance to DNRP ArcView users in completing their work.
- Provide information for DNRP GIS Unit clients about how to request GIS services.
- Inform staff from other departments about DNRP GIS projects and activities.

Two pages will continue to be updated monthly in 2002:

The main topics page (http://dnr-web.metrokc.gov/dnrtech/gis/index.htm) which serves as a promotional page advertising (to both GIS users and non-GIS users) an example of the current work within each of the divisions of DNRP.

The Data News page (http://dnr-web.metrokc.gov/dnrtech/gis/data/data.htm), which is targeted more at GIS users and serves as an efficient method to inform GIS staff Countywide of new data available from the DNRP GIS Unit staff.

Other pages are updated as time allows.

The KCGIS Center's Web pages and the DNRP GIS intranet are intended to serve similar audiences but with different foci: the former focusing on serving and promoting enterprise Countywide needs and the latter geared more specifically to DNRP information and technical issues. There may be a need to reevaluate the long-term design, content and maintenance issues of separate web sites in light of both the Parks merger and the DNRP-KCGIS Center consolidation. However any integration should be done only where obvious redundancy is found, and any changes must ensure that both GIS specialists and general users find information tailored to their needs. It is especially important that users do not find the search for web-based information confusing or inefficient.

Parks Division

Parks GIS maintains an intranet web site that contains links to dozens of static maps and a few Cold Fusion interfaces to databases maintained by Parks GIS staff. These include the Park System Caller Log, the Concessionaires database, and the Park Inspections database.

Wastewater Treatment Division

The Division maintains no separate GIS web site. Division GIS staff are significant contributors to the DNRP GIS intranet site content.

Water and Land Resources Division

The GIS intranet web design and content are managed by the WLR group within the DNRP GIS Unit, in concert with Departmental intranet staff. WLR GIS staff also provide significant content input.

Beyond delivery of GIS services through the Internet/intranet, GIS analytic support and cartographic production are also delivered to numerous workgroups within the department. This support falls into three general categories:

- Support with ArcView or extension functionality (including in-house developed extensions).
- Assistance with locating data or interpreting variation in similar datasets, including fulfilling data requests for non-corporate data.

- Analytical or cartographic (including ArcIMS) requests which exceed the abilities or available time of the user.

This support is provided to users who have no access to desktop GIS applications (i.e., ArcView 3.x), as well as those who have access to and some level of functionality with ArcView. The type of assistance also ranges greatly, from fairly straightforward with an ArcView functionality question to a one-day turn-around map request through to a multi-week support request. The wide variation in user abilities and types of requests for assistance makes it difficult to tailor processes for streamlining or standardizing the process. Support to these users is relatively informal and unstructured, which has certain advantages in flexibility but which can also lead to uncoordinated, inefficient support and to inadequate or uneven distribution of services.

Through 2001, division GIS managers retained control on the design and protocols for assigning work to their staff. This was required in order to provide a control path for decisions regarding workload distribution and workload conflict resolution. However this has resulted in several challenges to effectively supporting DNRP GIS clients, including:

- 'Casual' GIS users may not recognize DNRP GIS support staff as their first and best contacts for assistance with GIS data needs or GIS software assistance.
- There is no established review process in place to use in determining whether GIS projects should be completed in-house rather than by outside consultants at increased time and cost.
- Development and deployment of ArcView projects and specialized extensions for 'casual' GIS users is difficult since users make use of several varying network ArcView executables and pull data from varying data servers.
- 'Casual' GIS users now must confine their assistance requests to division-specific GIS analysts since so much depends on a particular divisional setup.

The consolidation in 2002 of division GIS staff into a centrally-managed DNRP GIS Unit should reduce or eliminate most of these challenges.

The situation for delivery of GIS services, as of December 2001, is described below for each DNRP division being actively supported.

Parks Division

Parks GIS has installed ArcView on the Parks network for use by any Parks Administration employee. Employees are encouraged to make use of the ArcView application ParkView for basic Park information queries. Employees submit map and data requests as needed. This process is relatively informal. It is asked that all requests include a cc to the Parks GIS supervisor. Training is conducted occasionally to ensure that employees are aware of the services and applications available to them.

Wastewater Treatment Division

Key business functions are allocated among the four WTD GIS analysts, with each staff member having lead responsibility for a given area of focus. Though there is crossover among the staff, each analyst focuses primarily on support for those clients associated with their respective business function. An estimated 65 to 75 percent of each analyst's time is associated with support for clients within their primary business area focus. Another 10 to 25 percent of their time is associated with crossover user support to assist other analysts in their areas of focus.

Water and Land Resources Division

Formal requests for GIS analytical and cartographic products are initiated through a non-automated request system with tracking done on hardcopy forms. This method provides a mechanism for the user to think through the request and for cost coding to be performed. Though this system can assist in

documenting the work to be done, it does not necessarily perform a significant role in workload planning, since many requests are made with very little lead time and very tight deadlines.

Estimates of GIS analyst workload related to client requests vary from 55 to 80 percent of the analyst's time, depending on the overall position requirements for each analyst. The consistency of these estimates is complicated by the large number of project requests made with little or no lead time, and by projects that start small but grow significantly larger as the work progresses.

As the GIS analysts affiliated with each of these divisions transition to working within the DNRP GIS Unit, the processes and tools used for initiating, coordinating, and tracking projects will be reviewed by the Technology Unit Manager, division program managers, and the KCGIS Center staff. Changes to these processes and tools will be made where necessary to improve consistency and efficiency in dealing with GIS clients and in completing projects successfully.

4.5 Department of Public Health

4.5.1 Business Functions

Currently the Department of Public Health does not have a coordinated GIS program. Three divisions are using GIS in support of their business: Environmental Health (EH), Epidemiology, Planning & Evaluation (EPE), and Emergency Medical Services (EMS). The Department also does not have any person with full-time GIS responsibilities. Overall, there are three employees who are using GIS (ArcView) on almost everyday basis (power users) and another 9 people who have ArcView installed on their desktops.

4.5.2 GIS Program Overview

Environmental Health

Environmental Health has been using ArcView software for several years. In the past, most of the support for GIS in EH was received from DDES GIS in an arrangement between DDES and Health. At the administration level of both departments an understanding was reached that GIS was for mutual benefit of both. Since DDES had the expertise, a plotter for large maps, as well as a handy customized ArcView project called “base2”, the staff at DDES trained and installed the data for ArcView use at EH.

With the move of the KCGIS Center to DNRP, a mandate also came down suspending the arrangement between DDES and EH. All GIS support must now come from the KCGIS Center. The availability of the free plotter, the updates of base2 files, extra training and other tasks once performed without direct cost to EH now must be brokered through the KCGIS Center. Since EH has not needed any of these services in some time, there have been no immediate consequences. As far as support for the user is concerned, the KCGIS Center staff have quickly answered all email messages requesting help. Plotting large maps may still be a service that EH will have to pay for, unless a plotter is purchased at the Health Department.

Many of the EH staff members that were originally trained by DDES have either left the department, or are only using GIS on an occasional basis. One staff member does the bulk of GIS tasks in EH at this time. Several staff use GIS on an occasional basis, and several more access information via the KCGIS Center Internet mapping site. EH currently owns 5 licenses for ArcView 3.1 and one license for ArcView 3.2 that was awarded by a Livable Cities grant from ESRI Software. The 5 licenses are shared over the local server with staff from EPE, as well as the several occasional EH users. The ArcView 3.2 license is installed locally for the one staff member who uses GIS on a daily basis. EH would like to upgrade the local software to ArcView 3.2, or would like to upgrade to ArcView 8 in the near future. Since other staff members in other Health Department Divisions (EPE) are accessing the software locally, it is expected that a sharing agreement can be reached to distribute the costs of any upgrades to those users with a business need for the software.

Epidemiology, Planning & Evaluation

Until recently, EPE has used GIS primarily for creating static thematic maps to display data on health events in King County and Washington State. EPE receives requests for these descriptive maps from other Health Department units that have no GIS capability of their own, and from community, research and health care organizations and the general public. EPE also produces a number of reports each year that include thematic maps on topics such as the distribution of childhood asthma hospitalization rates by ZIP code in King County.

Within the last year we've transitioned from MapInfo as our mapping software to ArcView. We've also started using ArcView for geocoding large, annually updated data sets such as King County birth and death records.

EPE is currently exploring possibilities for expanding our GIS capacity and further integrating GIS into its core assessment functions. In particular, we're searching for additional software that could be used in conjunction with ArcView to do spatial statistical analysis on disease distribution and trends, and exposure events. There are also plans to add an interactive mapping function to an analytical software package (VistaPH) that was developed in EPE and is now being used by local and state health jurisdictions throughout Washington.

Presently, there are only two people in EPE using ArcView. Both received basic training through a course offered by King County GIS. We rely primarily on the King County data library as our source of geospatial data.

Emergency Medical Services

EMS is utilizing GIS capabilities to produce timely thematic maps for the customers (Fire Departments, Paramedic Services) as well as to perform quality control, data analyses and planning. The requests for maps are generated by EMS stuff, research organizations, hospitals and, general public. Annual and semi-annual reports with cartographic materials are published and distributed among all Seattle-King County Fire Departments, Paramedic providers, County Council, etc.
Currently there is one person in EMS using ArcView on a regular basis and another for specific projects. The Division is using GIS Public Library to access geographic data.

4.5.2.1 Training

- Three Power Users
- Several occasional desktop users
- Several more Internet mapping users

There is an interest in additional Basic and Advanced GIS training in the Department

4.5.2.2 Staffing Requirements

Currently, the Department does not have a dedicated GIS staff member.

4.5.2.3 Hardware and Software

- ArcView 8.1, one copy
- ArcView 3.1 –3.2, 7 copies in the Department

4.5.3 Spatial Data

N/A

4.5.3.1 Maintenance

EH has data in Envision that would be appropriate to share via central server or warehouse.

4.5.3.2 Enhancements

Assistance needed in acquiring spatial data that is not currently available through Public Library (including historic data)

4.5.3.3 Development

Envision data available for mapping purposes.

4.5.3.4 Metadata

N/A

4.5.4 Spatial Applications

Different programs have specific needs for some customized applications either desktop, laptop (mobile), and/or web based.

4.5.4.1 Maintenance

No applications besides base2. However there may be some tie-ins to some of the I-map projects currently being developed. Envision data development involved.

4.5.4.2 Enhancements

N/A

4.5.4.3 Development

Envision Data

4.5.4.4 Documentation

N/A

4.5.5 System Integration

N/A

4.5.5.1 RDBMS Backend Support

N/A

4.5.5.2 Other Department Data Management Activity

N/A

4.5.6 Client Services and User-Base Support

- Support has been an email away.
- Some consultations are desirable on spatial statistical analysis.
- EH has a web-based permit application that will give the restaurant inspection reports for your favorite restaurant. It would be a dream to include a mapping function to this web site.

4.6 Department of Public Safety

King County Sheriff's Office Geographic Information System

Vision

To create a Geographic Information System (GIS) with advanced mapping capabilities to serve the citizens of King County, the King County Sheriff's Office and its contract cities.

Mission

To work collaboratively with other King County departments and their GIS units to stay aware of GIS standards and to produce and provide data and applications that are as accurate as possible, consistent, accessible, affordable and comprehensive for both internal and external customers, while meeting the unique business needs of the King County Sheriff's Office.

Objective

To demonstrate to staff and customers that GIS is an important tool for a modern law enforcement agency, by delivering/providing tools/products that are powerful, flexible and relevant to the mission of the King County Sheriff's Office.

4.6.1 Business Functions

Primary responsibility for GIS in the King County Sheriff's Office is vested with the Supervisor of the Research, Planning & Information Services Unit (RP&IS). RP&IS is an important part of the Technical Services Division and is a multidisciplinary unit with crime analysis being a key responsibility. While KCSO and RP&IS do not have any personnel with full-time GIS responsibilities, 4 RP&IS Unit staff members are well versed in ArcView 3.1 and use it on a regular basis.

4.6.2 GIS Program Overview

The KCSO has been using ArcView software for the last 3 years. The primary use is for crime mapping. Several members of the RP&IS Unit are power users and have produced a variety of map products. RP&IS recently took delivery of a crime analysis ArcView extension written by The Omega Group called CrimeView. Work is currently in progress on an Intranet/Internet version of CrimeView.

4.6.2.1 Training

4 RP&IS power users have received ArcView training. KCGIS Center Client Services training has been used as a training source. CrimeView software is currently being integrated into KCSO and RP&IS GIS users have received initial CrimeView training.

4.6.2.2 Staffing Requirements

The KCSO and RP&IS do not have any personnel with full-time GIS responsibilities. The RP&IS Supervisor coordinates the use of GIS and related technology within KCSO. Currently there are 4 RP&IS crime analysts who are power GIS users.

4.6.2.3 Hardware and Software

ArcView 3.1, 4 licenses in regular use
Spatial Analyst extension, 4 licenses in regular use
CrimeView extension, 4 licenses in regular use

4.6.3 Spatial Data

Current data sources include computer aided dispatch information, follow-up/investigative data and registered sex offender information. KCSO & RP&IS are very much involved in regional information sharing with other law enforcement agencies. Data from these agencies is becoming available and will also be used.

4.6.3.1 Maintenance

Data and applications are backed up on a regular interval.

4.6.3.2 Enhancements

KCSO would benefit from improved accuracy and completeness in the KCGIS street network data.

4.6.3.3 Development

No internal KCSO GIS data development is currently planned.

4.6.3.4 Metadata

N/A

4.6.4 Spatial Applications

Web-based applications are planned - potentially a site that can be used by the public for basic crime information. This will likely be based on the recently acquired ArcView-based CrimeView extension.

4.6.4.1 Maintenance

N/A

4.6.4.2 Enhancements

N/A

4.6.4.3 Development

N/A

4.6.4.4 Documentation

N/A

4.6.5 System Integration

N/A

4.6.5.1 RDBMS Backend Support

Primary data sources are SQL Server or Oracle, supported by RP&IS or other KCSO staff.

4.6.5.2 Other Department Data Management Activity

N/A

4.6.6 Client Services and User-Base Support

RP&IS provides the following types of services to a variety of clients. (The client list includes Field Operations Division (patrol), Criminal Investigations Division (major crimes), 13 contract cities and other law enforcement agencies.)

- Custom map product development
- Custom data development
- Crime statistics and analysis

- End-user training

4.7 Department of Transportation

The King County Department of Transportation is committed to helping people travel around the region. The Department has about 5,000 employees who provide a wide range of transportation services to the people who live, work, shop, play or travel in King County. Specifically, the Department of Transportation

- Provides all County residents bus service, paratransit, carpool assistance, vanpools and other alternatives to driving alone.
- Designs, builds, operates and maintains roads and bridges in the County's unincorporated areas.
- Provides roadway and traffic maintenance services to incorporated cities on a contracted basis.
- Works with other jurisdictions and organizations to plan our transportation investments.
- Creates programs and facilities for pedestrians, bicyclists and horseback riders.
- Provides vehicles, equipment, maintenance and supplies to all King County departments.

The Department is structured into five Divisions: Transit, Road Services, Fleet Administration, Airport and the DOT Director's Office. Both Transit and Road Services maintain Geographic Information Systems data and applications necessary to support department and County business needs. Transit GIS activities are focused on the day-to-day operational needs to provide the County with bus service. Road Services GIS activities are focused on road inventories for unincorporated King County, and emergency response information to the public on road or bridge closures.

4.7.1 Business Functions

GIS is used throughout the Department of Transportation for a variety of core business functions that crosscut operations, planning and customer service primarily in the Transit and Road Services Divisions. GIS use varies from electronic delivery of simple x-y coordinate locations, to applications developed using off-the-shelf GIS desktop software, to complete custom-built map interfaces. GIS staff create, maintain, analyze and deliver geographic information to support department staff and automated systems. Specific knowledge of transportation related programs and business systems is critical to effective delivery of GIS functionality to end-users. For the most part, DOT GIS staff are transportation professionals first and GIS analysts second. They are experts in the application of GIS as a tool to address transportation issues.

Below are listed some of the business functions within each division that rely upon geographic information.

Road Services

- ***Capital Improvement Program*** – Identify, program, design and construct roadway, bridge projects, intersections and traffic flow improvements, including intelligent transportation systems. Projects are mapped, reported, and analyzed using GIS.
- ***Road, Bridge and Traffic Maintenance and Operations*** – regular ongoing maintenance, operations and repair activities to ensure a safe, quality roadway system in unincorporated King County. GIS tools are used for tracking facility inventories that are maintained and managed using the division's Maintenance Management Systems (MMS).
- ***Inter-jurisdictional Service Contracts*** – Reimbursable road maintenance, traffic operations, bridge inspection and maintenance, road design, project management, and sign fabrication provided to suburban cities, other jurisdictions, other county agencies and private developers on a scheduled, emergency and as needed basis. Snow and Emergency lifeline routes using GIS are integral to this service.

- ***Engineering Technical Support Services*** – In house services that support Roads CIP including, but not limited to, field surveying using GPS, materials lab analysis, Computer aided drafting design and mapping, and record management and archival support.
- ***Transportation Planning*** – Identify and prioritize transportation needs as required by the Comprehensive Plan using GIS for analytical and reporting purposes.
- ***Environmental Compliance*** – GIS is a critical tool in complying with federal, state, and local environmental laws, regulations and policies. The federal Endangered Species Act, as well as the Clean Water Act, requires detailed geographical data regarding waterways habitat and storm water. Compliance with other federal environmental regulations, such as Army Corps of Engineer permit requirements, is greatly enhanced with accurate GIS data and applications. At the state level, fish and wildlife code and state water quality laws necessitate accurate geographical data in terms of roadways, fish habitat, and storm water. Adherence to the state Growth Management Act is also more easily accomplished with accurate geographic environmental data. King County codes such as the Sensitive Areas Ordinance, also requires the Road Services Division to use and update accurate GIS information and applications. The GIS data, tools, and applications necessary for the Road Services Division to achieve environmental compliance require constant update and evaluation by staff with technical expertise in roadway construction, maintenance, and engineering.
- ***Cultural Resources Protection*** – The Road Services Division and the Office of Cultural Resources are developing a GIS planning tool that will significantly increase King County's ability to manage and protect archaeological and other cultural resources.

Transit

- ***Service Planning*** – Service planning refers to the determination of changes to transit services including types of service, routing, time periods and frequency of operation. This function is also responsible for developing technical and policy analyses supporting longer-range transit planning efforts. GIS analytical tools and data are used to assist this function and are essential to create proposed alternatives for presentation to elected officials and communities to build consensus and support for proposals to change or add service.
- ***Service Development*** – This function writes and updates schedules and creates the data structures for routes and stops necessary to implement service and feed to a variety of Transit information systems. The primary input to this function is the work accomplished in the *Service Planning* function. GIS Tools developed and maintained by Transit GIS are used to create the primary GIS data structures (space) that complement the schedule data structures (time). These spatial data structures are supplied to a variety of transit systems that require knowledge of the location of transit routes, stops, and facilities. GIS Tools are also used to assist this function in the visualization of routes, stops, time points, park and rides and other transit facilities.
- ***Service Quality*** – Service Quality's primary responsibility is to provide 24-hour daily support and on-street supervision of Transit services. This includes response to transit emergencies and service disruptions, customer and employee assistance requests, adverse weather service management, short/long term route planning, construction impact mitigation, operator comfort station program (restroom) management, special event planning and response, Metro tunnel service management, and other service related investigations and activities. Staff within service quality use GIS tools and data to assist in many of these functions. In particular, a spatial database is maintained of comfort station locations and is used to identify potential new locations in areas of new transit service.
- ***Service Communications*** – This function provides a daily communications link to transit operators. Staff direct operators, make decisions regarding service, provide information such as procedures, fares, transfers and schedules, and coordinate security and safety management with emergency response personnel. Staff use the transit AVL/CAD system which operates 24 hours a day, seven days a week and provides emergency alarm processing, call management, real time bus location information for as many as 1,800 busses at any given time throughout the service area, incident logging and schedule adherence monitoring. Expected vehicle locations are determined using geographic data supplied from Transit GIS and compared with actual locations supplied by 200+

radio-based emitters that are used in tracking vehicle location. GIS analytical tools developed and supported by Transit GIS are used to assist in optimizing the placement of these emitters across King County. Also, the real-time vehicle-tracking application includes a map interface supplied with data from Transit GIS.

- ***Safety Program*** – The Transit Safety office is tasked with assuring the safe operation of fleet vehicles and providing a safe and healthy environment for employees. Responsibilities for this group include the review, investigation and determination of the cause of all accidents, identifying ways to reduce similar accidents, and insuring employee safety by conducting facility inspections. The interface, database and reporting tools used by Safety staff were developed and are supported by Transit GIS. It includes functions that allow staff to place and view an accident on the map. A spatial dataset of accident locations is automatically updated nightly with accidents from that day and made available to staff for visualizing and reporting purposes. Safety staff also use GIS tools and data to identify spatial patterns in accidents to aid in identifying strategies to reduce occurrences at accident-prone locations.
- ***Security Program*** – The Metro Transit Police group is charged with providing 'reasonable security' for all transit passengers, transit operators, and all other transit employees. This group consists of Metro Police Officers, Seattle Police Officers, the King County Sheriff's Office and contract security personnel, all of which are deployed to provide tunnel security, bike teams, boarding teams, park and ride lot security teams and transit center security teams. The interface, database and reporting tools used by Security staff were developed and are supported by Transit GIS. It includes functions that allow staff to place and view an incident on the map. A spatial dataset of incident locations is automatically updated nightly with incidents from that day and made available to staff for visualizing and reporting purposes. Security staff also use GIS tools and data to identify spatial patterns in security incidents to optimize the deployment of resources.
- ***Paratransit Operations*** – This function provides transportation services to people with disabilities and low-income seniors. It is required by King County Code, Americans with Disabilities Act (ADA), and other local, state and federal law regarding persons with disabilities and public accommodation. Failure to meet the ADA'a paratransit requirements could lead to lawsuits or loss of federal funding. GIS analytical tools and data are used within this function to identify the service area based on fixed route transit service. Also, the scheduling software includes a map interface that helps identify the eligibility of potential riders based on their home address.
- ***Design and Construction Program*** – This function provides project management, in-house design or management of design consultants, construction management activity and facilities inspections with the necessary support such as permitting, environmental planning and contract administration. Staff use GIS tools and data to assist in this function.
- ***Transit Speed and Reliability*** – This function implements low to moderate cost improvements that improve transit speed, safety and reliability along major transit corridors. Work examples include transit signal priority, intersection improvements, re-channelization, bus stop consolidation, transit lanes, transit queue jumps and signal optimization. Staff use GIS tools and data to assist in this function. In particular, this function is responsible for maintaining a spatial inventory of traffic signals within King County.
- ***Automatic Passenger Counters*** – The Automatic Passenger Counter (APC) program executes the planning, data collection, data processing, data analysis and reporting of bus ridership, travel time and schedule adherence information for a wide variety of programs and purposes. Information on passenger boardings and alightings is collected at the bus stop level and is a primary data source used for route planning, facilities planning, ridership reporting, service guidelines conformance, program evaluations, policy analysis and required federal Section 15, National Transit Database and Title VI reporting. The APC system is also a secondary source of schedule adherence information besides the Automatic Vehicle Location (AVL) system. Both actual and expected vehicle locations necessary for assigning ridership to the correct stop are determined using geographic data supplied from Transit GIS. GIS analytical tools and data are used to optimize the placement across King County of 200+ radio-based emitters that are used in tracking vehicle location.

- ***Customer Information*** – This function is critical to communicating information to customers about services and changes to services. It includes: automated "next bus" information by phone; real-time bus tracking on the Internet; trip planning services by phone and on the Internet; finding carpools, vanpools and custom bus routes for commuters interested in ridesharing; and production of a transit service map. All of these use GIS data to assist in providing this function. Many of them have map interfaces to assist call takers in providing information. Several use GIS analytical tools to evaluate spatial data or to create transfer files for input into their system.
- ***Equity in Transit and Section 15 Reporting*** – Although reporting is a function performed throughout the agency for a variety of purposes, National Transit Database/Section 15 and Equity in Transit reports are required by the Federal Transit Act and Title VI in order to apply for federal funds, including all federal grants. The Federal Transit Administration mandated equity in transit report ensures equitable service to minority and non-minority areas, and necessitates the management of data collection, analysis, map production, writing and report production. The National Transit Database Section 15 Report is also federally mandated and documents a variety of operational statistics about the agency during the previous calendar year, including numbers of safety and security incidents and miles driven on HOV lanes. Transit GIS staff use GIS data and tools to contribute to these reports.

DOT Director's Office

The Office of Regional Transportation Planning (ORTP) provides regional transportation planning and grant services for the Director's Office and the Department. Primary responsibilities of ORTP include coordinating the subarea transportation boards; representing the County on major regional transportation studies; developing, applying for and administering grants; managing the Regional Arterial Network (RAN) program and analyzing and developing policy. GIS is an essential tool both for performing analysis and in producing informational materials for meetings, presentations and written communication. Recent ORTP GIS applications include developing maps of planned and proposed Countywide transportation improvements, project proposals for grant applications, subarea transportation priorities and the Regional Arterial Network.

Airport

KCIA is implementing a GIS database system as the foundation of a division-wide document management system. This system will maintain a historical database of Airport tenant parcels, leases and related documents, maps of existing and planned capital improvements, as well as operations, engineering and administrative documentation. The Airport will also use the GIS database system for applications associated with engineering utilities development and maintenance program utilization. Further, this system will serve as a foundation for applications in the development and execution of the Airport Master Plan.

Fleet Administration

Fleet Administration currently does not make use of GIS data or applications. No plans exist to expand that usage in the near future.

4.7.2 GIS Program Overview

Despite the common theme of Transportation, the Transit and Road Services Divisions provide very different services to the public. The diverse business needs of users and systems in Transit and Road Services necessitates differing approaches to the delivery of GIS services. The support and delivery of GIS to core functions is centralized in the Transit Division and decentralized into work units located throughout the Road Services Division. The expertise of GIS staff within each of these divisions matches the needs and requirements of division-specific users and systems. Again, intimate knowledge of division-specific business needs is critical to effective delivery of GIS support services.

GIS activities that cross department lines are managed through the KCDOT GIS Coordination Committee. This Committee coordinates activities such as training, transportation network maintenance and development efforts, digital orthophotography specifications and acquisition, and other large-scale

projects that might impact the GIS of either division. The KCDOT GIS Coordination Committee also represents a mechanism for DOT to develop a single coordinated voice regarding decisions made at the County GIS level.

An overview of the reporting structure, responsibilities, services provided, and customers for the GIS program in the Road Services and Transit Divisions is described below.

Road Services

Staff assigned GIS related responsibilities are located throughout sections of the Road Services Division, which include Administration, Traffic Engineering, Maintenance, Engineering Services (including Survey Services) and Transportation Planning. Each of these sections within the Road Services Division has specific expertise required to accomplish business functions. To the extent that this specific expertise is required to collect/acquire GIS data, maintain data, and develop meaningful GIS applications, GIS staff is decentralized within the division. Additionally, the division has office space and field operations in multiple locations including three floors of the King Street Center, multiple buildings at the Renton Maintenance Complex and 12 satellite maintenance offices spread throughout the County, which has contributed to the decentralized structure.

Staff located throughout the division are responsible for the following datasets in their corresponding sections. Following are examples of applications in support of each section's core businesses:

- ***Administration Section*** – Capital Improvement Projects, Transportation Needs, Adopt-a-road, Bike map, Lifeline Routes.
- ***Traffic Engineering Section*** – Neighborhood & Pedestrian Traffic Safety Programs, Traffic Operations, Traffic Maintenance, Traffic Systems, and Development Review.
- ***Engineering Services Section*** – Bridge inventory, Road Development Standards, Road inventory reporting in compliance with state law, specialized mapping applications for specific CIP and related Engineering Services projects.
- ***Maintenance Section*** – NPDES (National Pollution Discharge Elimination System), ESA/SAO (Data Acquisition Project), RD facilities, Water quality sites, Citizen Action Requests, Road Network Inventory System, Emergency Lifeline Routes, Emergency Snow and Ice Routes, Maintenance Planning Routes, and Programmatic Permit Reporting.

Division-wide coordination, development and implementation of GIS related activities are a crucial part in improving division efficiency.

GIS coordination in the division is accomplished through committee structures led by the GIS Technical Lead, who is one of two central division-wide GIS positions in the division. The division's GIS Technical Lead is a member of the Roads Division IT Coordination Team and reports to the division's Budget and Systems Manager. The mission of the IT Coordination Team is to lead and facilitate division-wide IT coordination, development and implementation in the areas of GIS, web development, database management, infrastructure and new technology in order to improve Division efficiency. A primary work item assigned to the GIS Technical lead is to improve division coordination of the division's decentralized GIS network.

The GIS Technical Lead chairs the division's GIS Technical Committee to facilitate and coordinate GIS activities in the division. The committee meets bi-monthly. Coordination activities currently underway include development of the annual division-wide GIS work program, metadata library improvements, data inventory, GIS resource identification, licensing standardization, and equipment standardization. The division committee also coordinates hardware purchases, data development, application development resources, software support, and software licensing compliance. The division's GIS Technical Committee meets twice a month and on an as needed basis with the division's GIS Oversight Committee comprised of section managers or their designees to coordinate division GIS work items and priorities.

The second central GIS position in the division is a TLT Information Systems Analyst assigned to the GIS Technical Lead to serve in a division-wide GIS support and coordination role.

Section GIS staff support end users with GIS software applications, in the development of new GIS datasets (a listing of all available relevant GIS datasets is provided in this document), and respond to GIS related work requests. There are currently around 50 GIS end users in the Roads Services Division.

Non-GIS users in the division seldom need access to data or applications, but are often in need of map production or analysis to support requests from the Council, department directors, managers, supervisors, project managers, field staff and office staff. Roads CIP project managers are a division work group that have frequently been supported by Roads GIS staff. They are usually in need of data analysis and/or project specific location maps. This work has been done on a project-by-project basis. Most of these non-GIS user requests will now be directed to GIS Central for their support.

Transit

The Management Information and Transit Technology (MITT) section of Transit houses Transit GIS. This section is responsible for a set of core Transit functions that support management decision making, ensure the daily operation of business systems necessary to run the transit system, and guarantee the integration of technology projects into Transit's business process and operating environment. The workgroups within MITT including Transit GIS form a comprehensive team for supporting Transit's information systems infrastructure. The Transit GIS team in MITT represents the Transit Division focal point for all spatial services, data, applications, and support requests originating from within and from outside the Division.

Transit GIS is lead by a program manager who is responsible for coordinating all operations including maintenance of existing production applications and data, development and implementation of new GIS applications, serving as the Transit GIS liaison to other information systems staff within the division and at other agencies, and supervising Transit GIS staff. The Program Manager reports directly to the supervisor of the Infrastructure and Integration business unit within MITT. In addition to the GIS Program Manager, five analysts report to the GIS Program Manager and are directly responsible for data and application maintenance and development, and user support services. This includes one database administrator, two application programmers and two GIS analysts.

The proposed 2002 Transit GIS budget is as follows:

Account	
Wages and benefits	$301,689
Wages and benefits-grant	$84,974
Supplies	$3,512
Services-grants	$17,000
Other services	$7,300
Total 2002 Budget	***$414,475***

Transit GIS' primary responsibility is to provide GIS users a healthy, functioning system ensuring that the necessary infrastructure is in place and accessible for staff throughout the Division to use as required. This includes providing access to data and applications, installation of GIS tools on the desktop, training, ad hoc support, data and application maintenance, license management, and participating in server management with shared systems and server support staff. Transit's GIS team has also successfully competed for several federal grants that allow the team to keep pace with advances in technology and changing business needs. These grants provide seed money to fund new application development and to enhance existing applications with spatial interfaces. Finally, Transit GIS staff perform high-level analyses and produce some maps for management and staff, although users are largely responsible for their own map production.

Primarily, Transit GIS supports the Transit Division users of desktop GIS software, existing and planned information systems requiring geographic data, and Transit management for decision support. A historical organizational relationship with the Department of Natural Resources and Parks (DNRP) Wastewater Treatment Division (WTD) has resulted in access to Transit GIS hardware, data, and applications, basic support services, and software license coordination for WTD and other GIS users and professionals in DNRP. This relationship continues through February 2002 at which time DNRP GIS users and professionals will be transferred to DNRP provided hardware, software and support services.

A similar relationship exists between Transit GIS and DOT's Transportation Planning Division, which was absorbed in the Road Services Division and the DOT Director's Office. Transit continues to support these users. Also, recent reorganization efforts within the County have led to the inclusion of the King County Airport and staff within DOT. Transit GIS will provide GIS support services and access to these staff.

Customers and potential customers of Transit GIS obtain services by contacting any GIS team member by phone, e-mail or in-person. These requests are prioritized and distributed to the appropriate team member who can most effectively provide the service. Typically:

- *New users* are provided an account, have their desktop installed with GIS software and tools, and are given a brief introduction to available data and basic services provided.
- *Existing users* usually require technical assistance regarding server connections, application usage, or specific data layers. At the end of 2001, there were approximately 200 existing users supported by Transit GIS. These users range in expertise from occasional users of desktop software to power users who are developing their own data and scripts to support specific work tasks.
- *Project Managers* often require project participation by GIS staff to provide necessary expertise on geographic data or functions. This task usually requires significant commitment and must be budgeted for during the prior budget cycle.
- *Non-users* usually do not need access, but require one-time-only map products or analyses. These requests come from Division staff and management, but may originate in response to requests from the DOT Director, the King County Executive or the King County Council. A challenge for Transit GIS staff is to coordinate external requests that do not require business specific expertise with KCGIS Center staff that are tasked with providing these services.

4.7.2.1 Training

The Department of Transportation offers several training classes for GIS users. The first is the "Introduction to ArcView" class taught two times a year by an authorized ESRI instructor from within the County. This two-day class is available to all DOT staff on a first come-first served basis and is taught in the King Street Center training facility. It is arranged by Transit GIS, which absorbs the $75 cost per student for the manual and coordinates the installation of software on the training room computers. In 2002, an authorized ESRI instructor from within the County able to teach the ArcView class for no cost may not be available. It may be necessary to cancel this training opportunity and redirect staff to more costly alternatives. In 2002, Transit staff will discuss with the KCGIS Center the possibility of a cooperative approach that would limit costs.

The second class is "Introduction to the GIS Toolbox" – a Transit GIS application primarily geared to Transit staff. This one-day class is arranged and taught as many as six times a year by Transit GIS to existing and prospective users of the application. It is taught in the King Street Center training facility at no cost.

Training for GIS Professionals is primarily accomplished through attendance at GIS conferences, application workshops, technical symposia, and King County sponsored training classes. These are arranged and funded within each specific section. Training for users other than discussed above is individually arranged and funded within each specific section.

In 2002, it will be necessary for GIS Professionals to acquire skills with ArcGIS 8.x as the Department upgrades core GIS software to that version. User exposure to ArcGIS will be limited and training for these users will be individually arranged and funded within each specific section.

Also, GIS Professionals developing applications with existing technologies will require re-training in the Microsoft .NET ("Dot NET") development platform. .NET replaces currently used Microsoft Visual Basic and Visual C++ development technologies that will no longer be supported beginning in 2002. This transition is expected to take effect with new application development efforts. A knowledgebase in legacy development platforms will still be required to support maintenance of and enhancements to existing applications.

4.7.2.2 Staffing Requirements

GIS professionals in the Department provide primary technical support to end users and systems. They are well trained and highly knowledgeable of GIS and specific department and division-level databases, applications and business needs. In addition to supporting existing users, they are responsible for accommodating new users and business systems that require access to geographic information. The GIS professionals also identify potential future users that would benefit from access. As such, GIS professionals must have some knowledge of every part of the business so that they can appropriately recommend the level of GIS integration. GIS professionals are largely responsible for maintenance of agency data layers (e.g., street network), development of customized end user applications, production of sophisticated analysis and map products, and support of out-of-the-box client applications that provide access to data and simple analysis tools. These staff also provide technical expertise, business expertise, training, user support, vendor software installation and maintenance and business application support. GIS professionals are also end users themselves, often being called upon for sophisticated data analyses or map products that are beyond the expertise of other end users.

Specific staffing requirements for each division are listed below.

Road Services

There is eight technical staff assigned GIS roles and responsibilities throughout the Road Services Division. All of these staff undertakes activities in their jobs encompassing work not directly associated with GIS. Working titles, employee classifications and GIS FTE or TLT activity levels are described in the table below.

Funding support for these positions comes from the Roads operating budget, an appropriation unit supported by the Road Fund. The staffing configuration and assignments are appropriate given the organizational structure and different physical locations in the division. Staff working directly in the sections has a comprehensive understanding of the business activities of their work units, clear reporting relationships, and efficient communication with end users.

Coordination of division GIS activities among the eight staff and selected division management is undertaken with a committee structure that participate in regular work plan status, knowledge sharing and collaboration meetings. Improvements in GIS efforts could be accomplished my matrixing staff on projects of division-wide scope and significance. Also, additional centralized staff support may be appropriate and is being investigated for addressing these types of GIS projects and efforts.

Working Title	Employee Classification	FTE Associated With GIS Activities	TLT Associated With GIS Activities
Budget and Systems Manager	Acting Finance & Admin Mgr	.1	
GIS Technical Lead	ISA 2	.6	
GIS Technical Support TLT	ISA 1		.75
Maintenance Section Data Manager	ISA 3	.4	
Maintenance Section Data Analyst	ISA 1	.6	

Engineering Section Data Mgr	Eng 3	.6	
Engineering Section Data Analyst - Survey	Eng 2	.4	
Traffic Section Data Mgr	ISA 2	.4	

Transit

There are six GIS Professionals that make up Transit GIS. Working titles and classifications are documented below. Staff funding is supplied from a variety of sources: 4.7 FTE from Operating, 0.95 from federal grants, 0.35 from capital projects. One of the Analyst positions listed is matrixed from the King County GIS Center Client Services to assist with development and ongoing maintenance of the Transportation Network. This FTE was moved from Transit to the King County GIS Center as part of the 2001 consolidation effort and represents those work tasks that are more "enterprise" oriented. It was recognized, however, that the assignment of tasks and direct supervision of this work effort was more effectively accomplished within the Transit GIS and Transportation network development team environment. The position, therefore, was matrixed back into Transit.

Working Title	Employee Classification
Program Manager	ISA III
Database Administrator	ISA II
Senior Application Developer	ISA II
Application Developer	ISA II
Analyst	ISA I
Analyst	ISA I

The matching of staff to FTE allotment is not straightforward in the Transit GIS team. Although these staff have working titles that suggest specific job duties, there is a significant amount of overlap in expertise among these individuals. Issues are often resolved collectively as a team and the workload is distributed evenly throughout the group. Certain tasks and projects assigned to the team require management, database, application and analyst expertise, and thus all team members contribute. Although one FTE of work is funded by federal grants, another is dedicated to supporting the Paratransit function, and another is dedicated to transportation network development and maintenance, all staff members participate on these projects.

In addition to permanent staff listed above, Transit GIS takes advantage whenever possible of the use of interns from the King County Intern Program. These individuals are typically students from local colleges and the University of Washington who wish to acquire GIS expertise within the transportation industry. Interns are quickly trained in the use of menu driven applications for data maintenance. As they obtain additional knowledge and expertise of Transit systems and databases, they are assigned analytical tasks that challenge their capabilities.

Server support is provided by ITS staff for DEC UNIX hardware and will continue until the NT migration is complete. An unsigned service level agreement is in place. NT Servers are maintained by Transit's Management Information and Transit Technology Section Server Group. A signed service level agreement is in place. Transit GIS staff have much greater direct support control on the NT servers including the ability to create, maintain, and remove user accounts, install software, and monitor performance. Transit GIS staff also directly maintain several special output devices (see below).

Current staffing levels are insufficient to accommodate increased ad hoc service requests, a migration of data, applications, and users to the NT platform, supporting the migration of DNRP users off of Transit infrastructure, and the development of a new Transportation Network and maintenance strategy. In addition the recent loss of an intern and the inability to replace her have proved a major challenge for permanent staff to maintain productivity. This pressure will be relaxed somewhat in 2002 with the addition of one matrixed FTE from King County GIS Center Client Services to support Transportation Network development efforts, and with the loss of one-third of supported users as DNRP GIS users are transferred out of the Transit GIS support structure. Also, although the move to the NT platform requires

a significant amount of work from team members, it will by late 2002 eliminate an increasing UNIX-related support drain.

4.7.2.3 Hardware and Software

The Department maintains several production and development servers that include GIS software, data and applications. These are necessary to ensure uninterrupted access to users and professionals, critical linkages to other department and division information systems, connectivity between geographic and corporate business databases, and adequate processing capacity for core applications and data access.

Road Services

The Road Services Division operates mostly in a PC environment. The environment ranges from Dual Processor Pentium 4 machines to Pentium II machines running Windows 95, Windows 98, Windows NT 4.0 and Windows 2000

GIS shapefiles are located on a Windows NT Server with a SCSI external Raid Array. Other GIS related files are also stored on the same server.

Plotting devices used in the Road Services Division include:

- (2) HP DesignJet 2500CM color plotter
- (3) HP Designjet 650C's
- (3) HP InkJet ColorCad Pro's

Three ArcGIS 8.1 licenses are run from a license manager on *Denali*. Thirty five ArcView GIS 3.1 licenses are run from a mix of LAN installation and local installs. Network copies are accessible via license metering by about 45 PCs in the department. ARCINFO software licensing and maintenance are handled in cooperation with KCGIS. One ArcIMS 3.1 license is operated from a Windows NT 4.0 environment.

Ancillary software used by the section include AutoCad Map, AutoCAD 14.0, ArcCad, Adobe Illustrator 9.0, Adobe Map publisher, Adobe Acrobat 5.0, Adobe PageMaker 6.5, Adobe Photoshop 6.0, Microsoft Access 97, Microsoft Access 2000 and Cold Fusion.

Transit

During 2001-2002, Transit GIS is migrating all data, applications and users from UNIX to NT. This move will benefit the Department by significantly reducing hardware replacement costs and both internal (ITS) and external (Compaq) support costs. Moving to the NT platform also positions the Department appropriately within the direction of the GIS industry as indicated by the latest software releases from ESRI. This move also gives greater control and flexibility for user account maintenance to the GIS professional rather than systems support staff allowing the GIS professional to better and more quickly serve end users.

The move to an NT platform will occur in stages throughout this two-year time frame and therefore requires access to a production and development/test platform in both environments. After this migration, Transit GIS will no longer need access to the UNIX servers *Cougar* and *Mazama*, although data will continue to be published to the Oracle Corporate data warehouse on *Alta*. All servers were purchased with capital dollars as part of Transit's capital improvement program. Capitalized assets for the Transit Division used by GIS include four production and three development servers. All servers used by Transit GIS are shared with other information systems to maximize server capacity. Requirements for access to GIS data and applications and access to the shared systems on these servers are comparable (weekdays during business hours).

- ***Cougar***: DEC 2100, UNIX (4.0D), production, spatial database, application, and ArcInfo license server. Transit's GIS and Automatic Passenger Counter systems share this server. For GIS, it acts

as the data warehouse and it is used for all legacy ArcInfo UNIX applications including street network editing, bus route tracing, and bus stop placement. It is also used for nightly batch processing of data prior to publication in the production spatial library and the Oracle corporate database.

- ***Mazama***: DEC 4100, UNIX (4.0D), development/test server. Transit's GIS, Oracle corporate database, and Automatic Passenger Counter systems share this server for development and testing of applications and data prior to deployment in a UNIX production environment.
- ***Alta***: DEC 4100, UNIX (4.0D), production, Oracle database. This server houses Transit's corporate data warehouse including geographic data stored as coordinates. Most information systems publishing data for the Division post to this server, and many of Transit's information systems use this database, including GIS desktop data access applications querying spatial and non-spatial attribute data.
- ***Kcmolympus***: Compaq Proliant 8000, NT Server (4.0.1381), production, spatial database, application, and ArcGIS license server. Transit's GIS and route scheduling systems share this server. For GIS, it stores a copy of the GIS production library from *Cougar* and is used for primary data and application access by GIS users. After the NT migration is complete, *KCMOlympus* will be the Transit GIS production data and application server running core GIS software, data access tools, batch processing applications, and storing the spatial production data warehouse.
- ***Kcmbrutus***: Compaq Proliant 8000, NT Server (4.0.1381), development/test server. Transit's GIS and route scheduling systems share this server for development and testing of applications and data prior to deployment in a NT Server production environment.
- ***Kcmpanther***: Compaq 8000, NT Server (4.0.1381), production, database, file server, and web server. Transit's GIS and TSS teams share this server. For GIS, it acts as an intranet web application server for two production applications, Safety Accident Tracking and Security Incident Reporting.
- ***Kcmtiger***: Compaq 3000, NT Server (4.0.1381), development/test, database, file server, and web server. Transit's GIS and TSS teams share this server for development and testing of intranet web applications. In addition, the GIS team uses this server as a file server for source code, shared files and individual backups.

Access to UNIX servers is generally limited to GIS professionals and users of legacy ArcInfo applications through Exceed emulation software. Access to shape files and applications is obtained using the SMB protocol to map a network drive to the production library or personal areas on the UNIX server. SMB is free software that makes a UNIX server appear on the network as an NT server (http://us1.samba.org). Most GIS users access data and applications on the NT production server through standard TCP/IP protocol. Supported desktop configurations include Windows 95, 98, NT 4.0, and 2000.

Transit GIS also supports two specialized output devices:

- HP 2500 Plotter (large format)
- Tally 8500 Color Printer (small format)

Users have access to the plotter for map production. Usage is tracked and individual sections are charged for paper usage.

Transit GIS currently has the following license structure:

Software	Licenses
ArcInfo 7.2.1 (UNIX)	
Core	5
Network	3
TIN	1
ArcView	

Version 8.1	2
Version 3.1	
Network Installs	22
Local Installs	7
UNIX	1
Version 2.1 (unused)	15
MapObjects	
Developers Kits	
Version 1.x	1
Version 2.x	3
Deployment Licenses 2.x	40
Visual Studio Pro	1
Visual Basic	2
Exceed	5
RoboHelp Office 9.1	1

These license counts reflect totals after a license transfer to DNRP as part of the move of DNRP out of the Transit support structure. They do not reflect an intended upgrade of some licenses to ArcGIS 8 to occur in 2002. Although there are only 22 network installs for ArcView and 40 deployment licenses for MapObjects applications, Transit GIS has a concurrent license use agreement with ESRI. This allows Transit GIS to deploy any number of network ArcView installs and any number of MapObjects applications launched from a server as long as the total concurrent usage for each does not exceed the number of network licenses purchased. License usage is monitored using SoftTrack software and these applications are installed on more than 100 desktops.

4.7.3 Spatial Data

The Department of Transportation is responsible for a variety of transportation-related data layers. Most notably, this includes transit objects such as routes, stops and timepoints, as well as the street network used by DOT and other King County departments. These data are used within map based applications and as coordinate input to applications that do not use a map.

Maintenance is critical to insure accurate data is available to the public regarding road/bridge status, transit routes and stops, and other public information systems. In particular, improvement requests for the street network (configuration and addressing) are received regularly from staff within DOT and from other departments.

Data enhancements and development are usually performed as part of application development efforts within the context of a project. As such these projects are discussed below in their entirety including any application enhancements or development. In 2002, application development, and hence some data enhancements and development, are being driven by the NT migration target. The migration of all applications and spatial data off of UNIX servers (see discussion in previous section) has prompted the rewrite of several applications including core data maintenance programs for transit objects and the street network. Spatial data development and enhancement efforts accompany these application rewrites.

4.7.3.1 Maintenance

GIS staff within the Department of Transportation are responsible for the maintenance of a variety of transportation-related data layers. GIS professionals maintain some data layers directly. Specific end users within department workgroups maintain other layers using tools developed by Department GIS professionals. These are then submitted to the GIS professionals who publish the data in geographic and corporate data libraries for access by other users.

The following is a list of data layers that are maintained and that will continue to be maintained by Department of Transportation staff:

Layer Name	Layer Description	Update
Street Network Layers		
STREET (lines)	Line shapes representing the Countywide road and street network, including such related transportation links as selected driveways, transit connections, alleys, etc. The street network is key to the Department's business. Street network attributes include name, two alias designations, address (theoretical), zip code, King County road classification, HOV, barrier (to pedestrian traversal), grade (> 6%), and overhead trolley wire.	Daily
STREET (nodes)	Node shapes representing intersections of line shapes. Intersection attributes include transit time point key and traffic signal.	Daily
FREEWAY	Line shapes representing freeways derived from street and King County road classification.	Daily
PRIMARY	Line shapes representing primary arterials derived from street and King County road classification.	Daily
COLLECTOR	Line shapes representing collector arterials derived from street and King County road classification.	Daily
MINOR	Line shapes representing minor arterials derived from street and King County road classification.	Daily
LOCAL	Line shapes representing local roads derived from street and King County road classification.	Daily
SIGNAL	Point shapes representing traffic signal locations derived from streets (nodes) and traffic signal key.	Annually
Transit Core Features		
REVSERV	Line shapes representing Transit revenue service route footprint derived from street as an ordered set of links.	Daily
DEADHEAD	Line shapes representing Transit non-revenue service route footprint derived from street as an ordered set of links.	Daily
TIMEPT	Point shapes representing Transit time points derived from street (nodes) and time point key. These are locations where expected bus arrival times are calculated.	Daily
BUSSTOP	Point shapes representing Transit bus stops derived from street as a distance from an intersection along a link. Bus stop attributes include on street, cross street, stop type, accessibility, authorization, jurisdiction, date activated, date deactivated, bearing, distance from cross street, attributes pertaining to the stop sign and schedule holder and how they are affixed, usage by other transit properties, number of shelters, paint length, ride free area flag, side of the street, length of stop, fare zone, and zip code.	Daily
EMITTER	Point shapes representing Transit radio frequency emitters in support of Automatic Passenger Counter and Automatic Vehicle Location systems. Emitter attributes include on street, cross street, associated link id, and associated bus stop id.	Daily
Transit Secondary Features		
BUSBASE	Point shapes representing bus base locations (also called depots or garages). Busbase attributes include name, on street, cross street, and address.	None Planned
FREESTRT	A polygon shape representing the Transit ride-free-area derived from street.	Annually
PARKRIDE	Point shapes representing park and ride lot locations. Parkride attributes include name, on street, cross street, address, zip code, district, ownership (permanent or leased), and owner.	Monthly

Layer Name	Layer Description	Update
RECTIFR	Point shapes representing electrical distribution nodes for overhead wire trolley system. Rectifr attributes include name, address, type, supplier, label, and kilowatt-hours.	Annually
TRNSAREA	Polygon shapes representing Transit planning districts.	None Planned
TRNSCNTR	Point shapes representing transit center locations. Trnscntr attributes include name, on street, cross street, and address.	Annually
TRNSFACL	Point shapes representing transit facilities other than P&R, bus bases, and transit centers. Trnsfacl attributes include name.	None Planned
TROLLEY	Line shapes representing streets that have overhead trolley electrical lines derived from street. Trolley attributes include those attributes found on street shapes.	Annually
TUNLSTN	Polygon shapes representing Transit tunnel stations. Tunlstn attributes include the name of the tunnel station.	None Planned
TUNNEL	A polygon shapes representing the Transit tunnel.	None Planned
XFERPT	Point shapes representing locations where many bus transfers can occur. Xferpt attributes include on street and cross street.	Daily
XFERZONE	Point shapes representing bus stops associated to specific transfer points (xferpt).	Daily
Transit Support Layers		
LANDMARK	Point shapes representing landmark locations. This layer directly supports Transit's trip planning system. Landmark attributes include name, abbreviated name, address, symbolization characteristics, classification, on street, cross street, and address. Landmarks also have an associated alias table permitting a location to be referenced by multiple names.	Monthly
NHOOD	Polygon shapes representing neighborhoods. This layer directly supports Transit's trip planning system. Nhood attributes include the name of the neighborhood.	None Planned
NHOODCTR	Point shapes representing the business centers for neighborhoods. This layer directly supports Transit's trip planning system. Nhoodctr attributes include the name of the neighborhood and the address of the business center.	None Planned
Road Services Projects		
PLSS	Polygon shapes representing Road Services Division/Survey Section Public Land Survey System broken down to the ¼ section.	Annually
MONUMENT	Point shapes representing Road Services Division/Survey Section surveyed monuments.	Annually
ST_CRIS	Lines shapes representing King County's CRIS (County Road Inventory system).	Daily
Road Services Support Layers		
2002 GUARDRAIL	Line Shapes representing King County Countywide Traffic Section 2002 proposed guardrail replacement projects	Monthly
SIG_COMPLETE	Point shapes representing King County Countywide Traffic Section 2001 Signal projects completed	Monthly
SIG_EXPECTED	Point shapes representing King County Countywide Traffic Section 2001 Signal projects expected to be completed.	Monthly

Layer Name	Layer Description	Update
HARS_2001	Line shapes representing King County countywide High Accident Roadways.	Annually
HALS_2001	Point shapes representing King County countywide High Accident Locations.	Annually
CIPPLINE	Line shapes representing King County Capital Improvement Projects.	Daily
CIPPATH	Line shapes representing King County Capital Improvement Sub-Projects.	Daily
CIPPOINT	Point shapes representing King County Capital Improvement Projects.	Daily
"TNR" MANY THEMES	Point and Line shapes that represent a comprehensive list of recommended improvements to serve Countywide transportation needs through the year 2020.	Monthly
ADOPT	Line shapes representing the adopted sections of King County roadways Countywide.	Annually
PWAY_DATA	Line shapes representing Countywide School Pathway Projects.	Monthly
LIFELINE	Line shapes representing Lifeline Routes, it is a cooperative venture between the Federal Emergency Management Agency (FEMA) and King, Pierce, Kitsap, and Snohomish Counties. Its goal in the identification and coordination of lifeline routes between and among state, County and local emergency managers.	Annually
BRIDGE	Point shapes representing King County maintained Bridges.	Annually
"BY BASIN" MANY THEMES	Point and line shapes that represent King County's drainage inventory NPDES (National Pollution Discharge Elimination System).	Monthly
3P_2001	Line shapes showing King County Countywide proposed pedestrian improvement projects.	Monthly
NEP LINES	Line shapes representing King County Countywide Neighborhood Enhancement Projects.	Monthly
2000COUNT_DATA	Point shapes representing Countywide year 2000 Historical Count Location w/ data attached	Annually
RD_EIS	Point shapes representing Roads Environmental Unit's impact statements.	Monthly
RD_BA	Point shapes representing Roads Environmental Unit's biological assessments	Monthly
RD_PROP	Point shapes representing Roads Services Division owned properties.	Monthly
FREIGHT_GOODS	Line shapes representing routes designated by the state as roadways that carry freight and goods.	Annually
GUARDRAIL	Line shapes representing the King County Inventory of County-wide guardrail.	Monthly
COUNT2000	Point shapes representing Roads Traffic Sections 2000 Historical Count Locations w/o data attached.	None Planned

The following layers are not distributed to the public library because they contain sensitive business information, personal employee information, or are used for internal business purposes only:

Layer Name	Layer Description	Update
Transit Secondary Features		
INCIDENT	Point shapes representing transit security incidents. Incident attributes include date, route characteristics, on street, cross street, and items describing the incident type.	Daily

ACCIDENT	Point shapes representing transit accident locations. Accident attributes include date, time, status, reviewed, road conditions, weather, judgment, severity, route and vehicle characteristics, FTA codes, on street, and cross street.	Daily
COMFSTN	Point shapes representing transit comfort stations (driver restroom facilities). Comfstn attributes include owner and contact information, availability during the day, routes that have access on street, cross street, and address.	Monthly
DART	Polygon shapes representing Dial-a-Ride service area for Transit.	Monthly
FAREZONE	Polygon shapes representing Transit fare zones for King County Metro, Community Transit, Pierce County Transit, and Sound Transit.	Annually

4.7.3.2 Enhancements

Road Services

Shape files to be developed in the relatively near future include traffic accident data, Citizen Action Requests (Traffic and Road Maintenance sections), Street Lighting inventory, and Pavement Marking inventory.

1. Redevelop and combine CARTS and City Discretionary Services database to:
   - Provide a workflow input and tracking system that is accessed by division staff and contract cities on demand through the Internet and intranet.
   - Perform at high levels of speed and reliability, and that removes duplication and can be easily maintained and updated by division staff.
   - Develop the system to be scaleable over time and extendible to other division workflow tracking requirements and opportunities.
   - Develop the system to include location data to Support GIS mapping query and reporting capabilities.
2. The Accident Information System inventories and compiles statistics on reported accidents in unincorporated King County. Statistical accident information is used by the Traffic Engineering Section for project programming and design decisions, litigation, and for the annual publication of the Traffic Safety and Accident Rate Reports.

   New enhancements will be used to consolidate all existing mainframe and Access data into one SQL server application with data input, inquiry, and reporting available over the King County intranet and utilizing GIS mapping and query capabilities. The application will be designed to generate reports in the Traffic Safety Report format and other often used reporting formats. Ad hoc query capabilities will be provided. Current Route order location data functionality will be migrated from mainframe to SQL server platform in order to support GIS mapping of the data by accident locations. The system will be developed to accommodate State provided data when and if the State comes back on line with this function. Develop the ability to report selected “interpreted” accident data publicly on the Internet as the final step of this project.
3. The Street Lighting Inventory system has been created by the Traffic Section to create an accurate inventory of Street Lighting features within Unincorporated King County and Contract Cities. The final application will allow for query and reporting capabilities to meet the request of internal staff, other Roads staff, utility companies, that will utilize database and GIS applications for the purpose of tracking and program management functions, which will include; tracking maintenance activities, planning new installations, faster response to discretionary requests, and tracking work and personnel functions.
4. The Pavement Marking Tracking System is currently being developed by the Traffic Engineering Section that will be used to manage the installation and maintenance of roadway marking features.

Currently roadway striping routes are being developed in GIS, that when completed will allow for more efficient project management of the linear routes, easier distribution of information, and map production capabilities for planning purposes. Future additions to the inventory will include roadway buttons and thermo-plastic locations.

Transit

Data enhancement efforts for 2002 will primarily be in response to four major projects and one minor change to the street network.

1. The first project is a data enhancement project and application rewrite for Transit Security. Transit GIS developed this database, data entry application, and intranet reporting tools. Transit Operations has requested enhancements to the database to add specific functionality for tracking security incidents. Enhancements to the database will necessitate modification to the data entry application and intranet reporting tools. Transit GIS is taking this opportunity to rewrite the data entry application using web-based technology. This will simplify deployment and ongoing maintenance of the application since Transit Security staff are located at Central Base and support staff are in the King Street Center. The existing web reporting tools will also require significant development to incorporate changes in reporting needs of the agency including charts and graphs comparing incident counts for different times. The funding sourced for this effort is Transit capital dollars. There are no significant internal or inter-departmental coordination issues for this effort.
2. The second project is the enhancement of the existing database and development of a new application for tracing bus routes and placing time points. This project is currently underway and it is expected to be completed in 2002. The existing database and application were developed as part of the original GIS project for Metro in 1993-1995. The database exists as an ArcInfo route system and the application was written using AML. Both of these environments are antiquated and require rewrite as part of the NT migration target. Transit GIS is providing necessary enhancements to the database to accommodate short-term re-routes of busses due to special events, construction and emergency situations. The application is being developed in a modern Microsoft Visual Basic development environment and the database is being migrated into Oracle with new tools and a significantly improved mechanism for tracing bus routes on the transportation network. This data enhancement and application development effort is being funded with Transit GIS operating dollars. There are no significant internal or inter-departmental coordination issues for this effort.
3. The third project is the development of a bus stop information system (SIS). This project is currently underway, and it is expected to be completed in 2002. It will merge stop attribution and stop sequencing along a route with stop placement into a single map-based application. A new database design is required to support the system. Transit GIS is working with the Transit Systems Support Unit (Oracle DBAs and database architects) to develop the database. The spatial database for stops is an ArcInfo route system and the application was written using AML. Both of these environments are antiquated and require rewrite as part of the NT migration target. Stop attribution and sequencing tools are also antiquated and staff requirements have grown beyond the capacity of the technology used in these systems. The application is being developed in a modern Microsoft Visual Basic development environment and the database is being migrated into Oracle with new tools and a significantly improved mechanism for placing stops on the street network. This data and application development effort is being funded by Transit capital dollars largely for the database design and federal grant dollars for application development. There are no significant internal or inter-departmental coordination issues for this effort.
4. The fourth project is a major development effort to create a new high-resolution transportation network and a maintenance plan to ensure the continued accuracy and completeness of the data layer. The current GIS Street Network was created in 1993 by a consortium of agencies throughout King County. This fundamental data layer supports critical Transportation business needs for almost all core business functions. When first created, the GIS Street network was the best data source available at the time. Based on the free Census Tiger files, this network still contains numerous errors in street locations, names, addresses, as well as missing streets. Although minimally suitable for the applications at that time, this critical data layer has been steadily deteriorating in terms of

accuracy and coverage/completeness as King County has experienced rapid growth. At the same time, new business needs and advances in technology have created greater demands for a higher quality, more comprehensive transportation network. The new network will provide multi-modal transportation analysis capabilities including ferry, rail, vehicular, pedestrian, bike, and equestrian modes of travel. It will also support the next generation of GPS technology used within Road Services now and expected to be used by Transit for Automatic Vehicle Location (AVL) systems. The project will solicit input on data and application requirements from expected participants of a maintenance consortium. Initially this will be several King County Departments including DDES, Emergency Services, and Road Services, but will eventually include King County cities and possibly neighboring counties. Transit GIS will coordinate the effort among the participants with assistance from the KCGIS Center. The KCGIS Center will also be requested to assist in writing a sole source argument and contract with ESRI to perform much of the work. King County ITS will be involved as we expect to deliver data to participating agencies for maintenance using INET. It is expected that the maintenance application will be use ArcGIS 8.2, SDE, Oracle, and possibly Oracle Spatial. This data and application development effort is being funded by Transit capital dollars.

5. The last project includes the addition of an attribute to the street network for tracking highways of statewide significance (HSS). This project is currently underway, and it is expected to be completed in 2002. The classification of State Wide Significance is determined by the State of Washington and entitles local jurisdictions to additional budget for maintenance and improvements. Minor enhancements to the existing street network editing application will be required to accommodate the HSS attribute. Maintenance of the HSS attribute will necessitate the establishment of a new relationship between Transit GIS and Washington State DOT who maintains a listing of those highways or portions thereof that are classified as being of statewide significance. This data enhancement effort is being funded with Transit GIS operating dollars.

4.7.3.3 Development

Road Services

Data development efforts for 2002 will primarily be in response to the Cultural Resources Protection Project (described below) as well as the ESA/SAO Data Acquisition project, the Road Network Street Centerline project already described in this document, the County Road Inventory System and data development in our Traffic Engineering Section.

Cultural Resources Protection Project - King County recognizes that archaeological resources are non-renewable resources and are in jeopardy due to development brought about by increasing population densities. The goal of this project is to provide tools to allow RSD to manage and protect archaeological resources through implementation of County and State laws and policies in a consistent, comprehensive manner that also enhances the efficiency of RSD's transportation planning. As a pilot project with potential Countywide implications, OCR and RSD propose to develop the following:

- Archaeological Databases
- Countywide Archaeological Sensitivity Model
- RSD Policy
- RSD Procedures/Standards

Archaeological and other cultural resources are important to Native American groups, and to the other citizens of King County. King County recognizes that archaeological resources are non-renewable resources and are in jeopardy due to development brought about by increasing population densities. In light of this importance, King County Road Services Division (RSD) and Office of Cultural Resources (OCR) are proposing, through this pilot project, to develop a planning tool that will significantly increase King County's ability to effectively manage these resources as it designs and constructs road and bridge rehabilitation and improvement projects in the unincorporated areas of King County. Elements of this pilot project will include: gathering all existing and accessible information about cultural resources in King County; developing a sensitivity model to assist in the identification of preservation options and planning

alternatives; and establishing policies and procedures to guide the use and access to this sensitive information.

In the unincorporated areas of King County, rapid residential and commercial development and the construction of roadways to serve the development are threatening known archaeological sites, previously undisclosed sacred sites, and yet unrecorded sites. Through the proposed pilot project, RSD and OCR intend to establish a means of identifying precious and non-renewable resources, which may potentially be impacted by the County's road capital improvement projects. To meet this goal, the following three elements are proposed:

This project was originally funded by a Transportation Enhancement Act (TEA-21) grant. This grant provided $375,000 in federal funds, and was matched by $250,000 in County funds. The County's contribution consisted of a hard match of $105,000 in cash and $145,000 in in-kind contributions. The project is three years in duration, expected to be complete by December 31, 2002.

1. Development of a digital library of Cultural Resource Management reports, surveys and other documentation of King County resources currently on file in various repositories.
    - Solves immediate access issue.
    - Solves identification issue.
2. Development of an Archaeological Sensitivity Model based on set of GIS (Geographic Information System) data layers identifying cultural resources, and integrated with existing GIS data layers identifying natural resources
    - Solves long-term planning issue.
    - Incorporates tribal input up front.
3. Development of policies and procedures.
    - Solves guidance issue.
    - Solves legal mandates issue.
    - Solves tribal/stakeholder input issue.

Listed are a few of the datasets that will be enhanced and or created through this project:

Developing

- Detailed soils data for Western King County - shape files with detailed metadata.
- Ethnographic place names for King County - 400+ shape files with metadata.
- Recorded archaeological sites for King County - 160 shape files with metadata.
- Heretofore unrecorded archaeological sites for King County - 170+ shape files with metadata.
- Paleo-landscape features (late Pleistocene and Holocene) - shape files with metadata.
- Areas of traditional cultural and religious significance for Native American groups in King County - shape files - may not be any metadata.
- Government Land Office (GLO) Plat Maps 1855-1900 as image files.
- Cultural features digitized from GLO maps for use as shape files (feature data sources) - with metadata.
- Historic river channel locations (e.g., Duwamish River pre-channelization, Black River pre-Lake Washington alteration, etc.) - with metadata.

Enhancing/Enhanced

- Historic Resource Inventory (HRI) sites from the King County Office of Cultural Resources - corrected and updated for use in project.
- Historic aerial photos - georeferenced for use as image files for project.

Traffic Engineering - A significant effort is underway in our Traffic Engineering Section to coordinate data and to encourage broader utilization of GIS in the section. Phase I of the Traffic GIS program is the identification and development of key datasets into static shape files, which are currently being used by desktop users only. Phase II will be the integration of the key datasets into the Roads Data Warehousing project using GIS as a front-end, which will reside in SQL 7.0 or 2000. Phase III will focus on distribution of data to internal and external customers via desktop and web based applications.

County Road Inventory System - The Engineering Services Section recently completed a major data conversion project in collaboration with Central GIS associated with the County Road Inventory System (CRIS). CRIS (County Roads Inventory System) is a system used by Roads Services for, among other things, generation of yearly reports to the federal government. It consists mainly of a set of tables in Advanced Revelation (AREV) proprietary database with a large number of attributes on road conditions in unincorporated King County (including road log, surface type, speed limit, road width, route number, ADT's etc.)

Environmental Species Act -The ESA Data Acquisition Project is another major effort underway in the Roads Services Division that will improve accuracy, consistency and currency of King County's ESA-related data (including GIS elements), in particular the datasets describing the fundamental habitat and landscape features bearing upon the efforts of County agencies to meet the regulatory mandate to conserve ESA listed species. The datasets that will be developed or purchased are noted below:

- New Digital Elevation Model
- New Contours
- New Digital Aerial Photography

Transit

There are no Transit data development efforts scheduled for 2002.

4.7.3.4 Metadata

Spatial data documentation in the KCGIS Center public library is regularly maintained using Doctool. As a result of a loss of metadata information, several layers remain undocumented. These will be documented in 2002.

4.7.4 Spatial Applications

The Department of Transportation is responsible for a variety of transportation-related spatial applications. Most notably, this includes data maintenance applications for transit objects and the street network. Applications for nightly batch processing are also critical to insure timely data availability to end users, integrity and comparability between the spatial data warehouse and the Corporate Oracle databases. Application maintenance, enhancements and development are generally performed on a test/development server before being deployed into production.

Maintenance of AML, UNIX script, other interpreted language applications, and web-tools can generally be performed in real time after testing is complete. Compiled applications, given the time required to reinstall on user's desktops, require staged implementation of bug fixes. Bugs and enhancement requests from users for the Transit GIS Toolbox, for example, are tracked in an Access database, implemented as time permits in design code, and redeployed on user's desktops to coincide with major enhancement improvements. Users are notified of bugs that occur in the application.

Application enhancements and development are usually performed as part of data development efforts within the context of a project. As such, some of these projects were discussed in the Spatial Data section above. In 2002, the NT migration target is driving application development and some data enhancements and development. The migration of all applications and spatial data off of UNIX servers (see section above) has prompted the rewrite of several applications including core data maintenance programs for transit objects and the street network. Spatial data development and enhancement efforts often accompany these application rewrites.

4.7.4.1 Maintenance

Road Services

The following is a list of applications that are maintained and that will continue to be maintained by Roads GIS staff:

- ***Streettool for the CRIS Roadlog*** – Streettool provides an environment for editing, maintaining, quality controlling, and plotting spatial data for the County Road Inventory System (CRIS) in compliance with WAC 136-60 and King County Code. This application was created in an ArcGIS 8.1 environment using Visual Basic for Applications (VBA), Spatial Database Engine (SDE), and Oracle. This was a cooperative project between King County Department of Transportation – Road Services and KCGIS Center.
- ***BondTracker*** – BondTracker is an intranet application that tracks roadway maintenance and defect bonds for newly created King County roads. The application was created using Cold Fusion and MS-SQL database for the Maintenance and Defect Bond Program for King County DOT – Road Services Unit. A GIS link will be integrated in 1st quarter of 2002.
- ***BizDocs*** – BizDocs (pilot project) is an Internet-based document retrieval system for engineering drawings, maps, survey field book and documents. The application is being created using Cold Fusion, Microsoft SQL, and Java script. The objective is to have the end user query the database and return a scanned image of the document for reviewing or printing. Currently, King County DOT - Road Services is researching and testing new technologies for this project to provide a GIS link to the data.
- ***Mapper*** – Mapper is a customized ArcView 3.x project. The project provides ArcView users with a simple easy to use menu interface for adding GIS data to a view in a project. It also gives users a quick interface for creating layouts with a title bar, north arrow, scale bar, disclaimer, legend, date, file name and overview window. It will be replaced and or coordinated in 2002 in response to the new King County cartographic standards.

Transit

The following is a list of applications that are maintained and that will continue to be maintained by Transit GIS staff:

Name	Description	Language
User Interfaces		
AvMaps	This application is an ArcView 3.x extension. It provides all ArcView end users with a simple easy-to-use menu interface for adding layers to a view from the Transit public library. It also provides end users with a simple easy-to-use interface for creating a layout with title, north arrow, disclaimer, scale bar, date, legend and view. It is scheduled to be replaced in 2002 in response to new King County cartographic standards.	Avenue
AvTabs	This application is an ArcView 3.x extension. It provides customer information analysts with a simple easy-to-use menu interface for graphically showing bus stop signage installation routes.	Avenue
Btreport	This application provides Customer Information analysts with reports identifying data integrity and missing data issues. These reports are typically reviewed prior to an extract of data from the corporate database	AML

Name	Description	Language
	to downstream information systems. It is scheduled to be replaced in 2002 as part of the NT migration target.	
Transit GIS Toolbox	This application provides users and easy-to-use menu interface for accessing the vast array of geographic data available in Transit's GIS and corporate data available in Transit's Oracle distribution database. Together, these databases store the agency's spatial and non-spatial information for future, current and past service changes. Although designed for all Transit staff, the GIS Toolbox has several modules with functionality designed for specific work groups. These include: • Ridership – Calculates Transit ridership at user specified locations. • Stop Editor – Bus stop placement tool.	VB
GIS2ATIS	This application converts data from the GIS production library for use in the Automated Traveler Information System or Trip Planning application by customer information analysts. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
Kcsnedit	King County Street Network Editor. This application is the primary tool used by Transit GIS staff for maintaining the street network links, nodes and attributes. It is scheduled to be replaced in 2002 as part of the transportation network project and as part of the NT migration target.	AML
MoEmitter	This application provides Radio Maintenance staff with an easy-to-use menu interface for maintaining vehicle location emitters. These emitters are used within the Automatic Passenger Counter (APC) system and the Automatic Vehicle Location (AVL) system.	VB
Safety DMS	This application provides safety and operations staff with a tool for entering accident information, tracking accidents through the legal process and reporting on accidents.	HTML
Security DMS	This application provides security and operations staff with a tool for entering security incident information, tracking incidents through the legal process and reporting on incidents. It is scheduled to be replaced in 2002 as part of the Security project.	VB
Security Reports	This application provides agency staff with the ability to generate reports on security incidents. It is scheduled to be replaced in 2002 as part of the Security project.	HTML
TOE	Transit Object Editor. This application is the primary tool used by customer information analysts for maintaining route paths, bus stops and time point locations. It is scheduled to be replaced in 2002 as part of the new application for tracing routes and placing time points as part of the NT migration target.	AML

Name	Description	Language
Batch Processing Routines		
Avl_tpiupdate	This application updates several object tables in Oracle as a result of edits to those objects in GIS. These tables are specifically used by interface applications such as the GIS Toolbox to improve functionality and are not part of the corporate data. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
Avlschedbuild	This application creates transfer files for the interface application used by Automatic Vehicle Location (AVL) Coordinators. These files are necessary for the AVL application to track bus locations on a daily basis.	VB/SQL
Dbcompar	This application compares data in GIS with data in the Oracle corporate database and reports on any inconsistencies to Transit GIS staff. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
Emit_chg	This application compares emitters from the previous day and reports on any changes (inserts, updates or deletes) made by Radio Maintenance staff to APC staff. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
Kctran2nat	This application transfers Transit and street network related coverages to the King County GIS public library. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
Mnt2prd	This application transfers transit objects and the street network in the maintenance area, which has restricted access, to the production library for access by end users. The application also creates derived data layers from core data (e.g., freeways from the street network). It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
Plib2prd	This application transfers data from King County GIS public library to the Transit GIS library. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
TOEDDB	This application processes inserts, updates and deletes made using the TOE and KCSNEdit applications and sends them into the Oracle Transit corporate database for access by other systems. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML
TOETOW	This application merges transit objects modifications/additions/deletions using the TOE application with street network edits maintained using the KCSNEdit application. These applications work on copies of the street network and it is necessary to combine the separate edits onto a single network at the end of the day. It is scheduled to be replaced in 2002 as part of the NT migration target.	AML

4.7.4.2 Enhancements

Road Services

CRIS to Mobility - County Road Information System (CRIS) will go through a design change in 1st quarter of 2002. The application currently resides in an Advanced Revelation database environment. It will be moving to an Access (SQL) environment. The new application is called Mobility. Mobility is currently being beta tested at the County Road Administration Board (CRAB – WADOT).

BondTracker – BondTracker database maintenance is performed when a new roadways bond is accepted by King County DDES. BondTracker will go through a design change in 1st quarter of 2002. A GIS link will be integrated into this application.

Transit

Application enhancement efforts for 2002 will primarily be in response to five major projects.

1. The first project is a data enhancement project and application rewrite for Transit Security. Transit GIS developed this database, data entry application, and intranet reporting tools. Transit Operations has requested enhancements to the database to add specific functionality for tracking security incidents. Please see the discussion in the DOT Data Enhancement section of this chapter.
2. The second project is the enhancement of the existing database and the rewrite of an application for tracing bus routes and placing time points (TOE). This project is currently underway and is expected to be completed in 2002. Please see the discussion in the DOT Data Enhancement section of this chapter.
3. The third project is the development of a bus stop information system (SIS). This project is currently underway and is expected to be completed in 2002. It will merge stop attribution and stop sequencing along a route with stop placement into a single map-based application. Please see the discussion in the DOT Data Enhancement section of this document.
4. The fourth project is a major development effort to create a new high-resolution transportation network and a maintenance plan to ensure the continued accuracy and completeness of the data layer. Please see the discussion in the DOT Data Enhancement section of this document.
5. The fifth project is the rewrite of all legacy ArcInfo AML and UNIX scripts as part of the NT migration target. This includes the following applications: btreport, GIS2ATIS, kcsnedit, TOE, Avl_tpiupdate, Dbcompar, Emit_chg, Kctran2nat, Mnt2prd, Plib2prd, TOEDDB, and TOETOW. See above for descriptions of these applications. These applications include batch data processing programs and user interfaces. They will probably be written as COM objects and scheduled in the NT server environment using the Microsoft scheduling tools. See above for more information on the NT migration target.

It should be noted that the SIS and TOE applications will be modules of the Transit GIS Toolbox. This application will require some functionality change to accommodate the requirements of these new modules.

4.7.4.3 Development

Road Services

BizDocs – BizDocs is an Internet-based document retrieval system for engineering drawings, maps, survey field book and documents. The application is being created using Cold Fusion, Microsoft SQL, and Java script. The objective is to have the end user query the database and return a scanned image of the document for reviewing or printing. Currently, King County DOT - Road Services is researching and testing new technologies for this project to provide a GIS link to the data.

Transit

There are no Transit application development efforts scheduled for 2002.

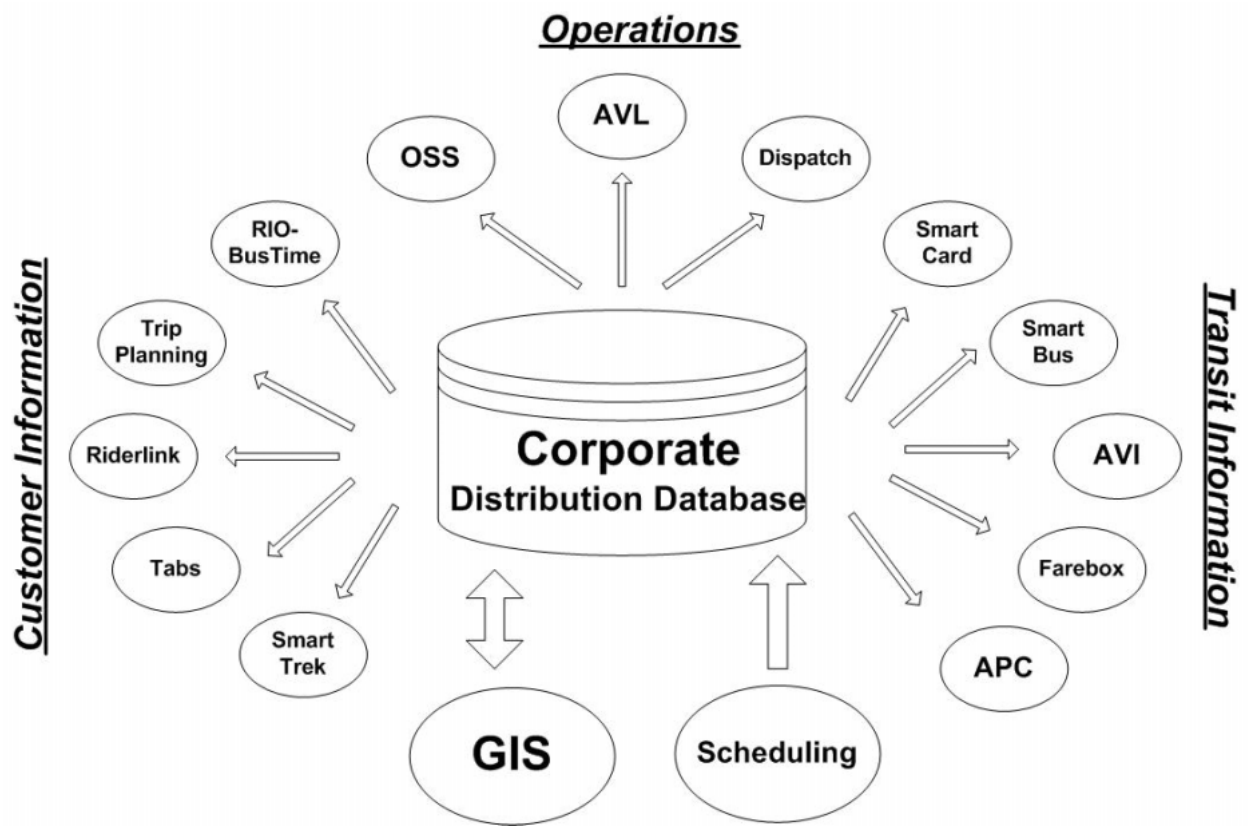
4.7.4.4 Documentation

Code level documentation including headers for scripts are generally available for all applications. These include history sections that document any application modifications. User help files have been developed using Robohelp for the Transit GIS Toolbox and all modules. This documentation will continue to be maintained. No plans exist to provide any further documentation of applications in 2002.

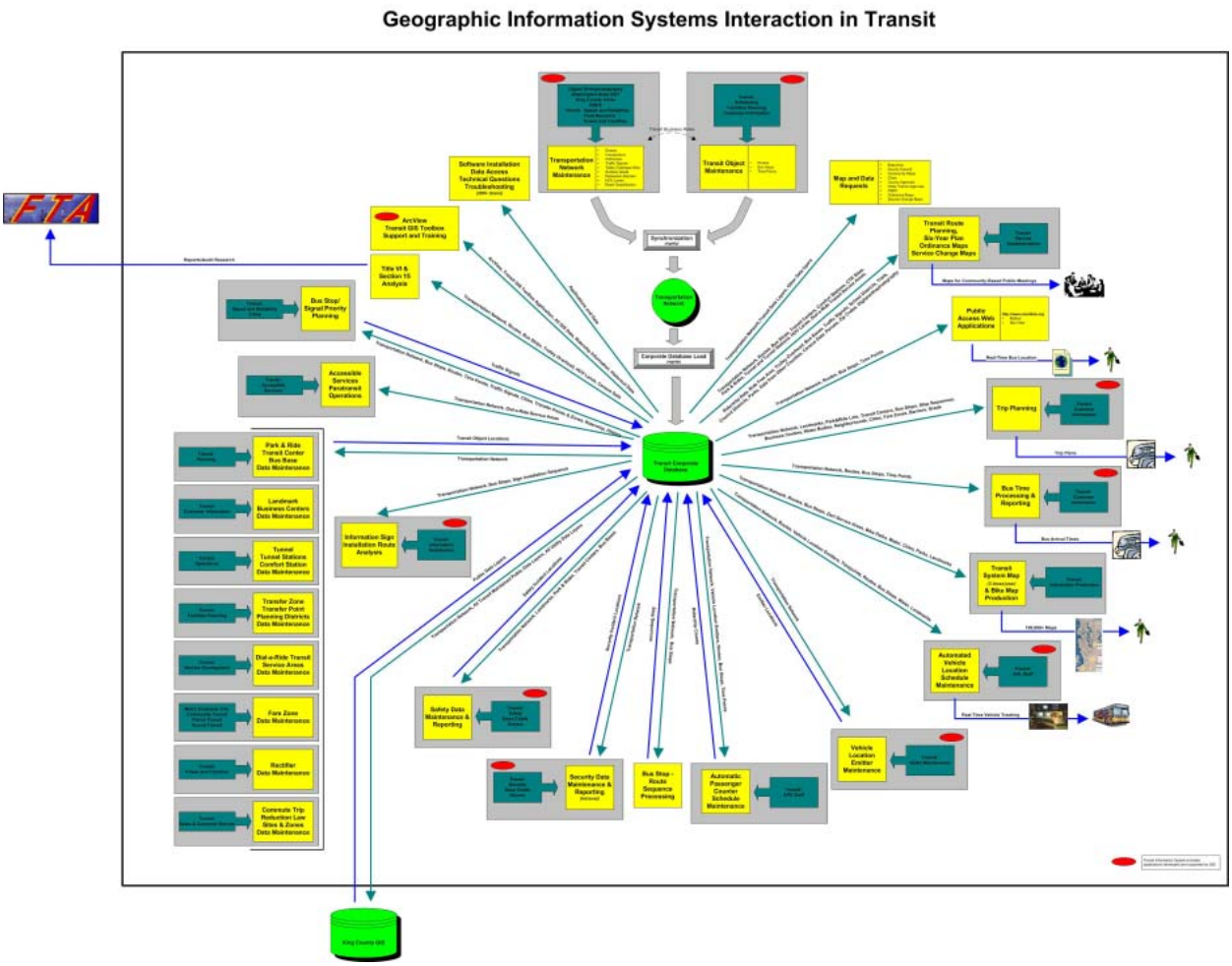
4.7.5 System Integration

System integration of geographic data occurs within both the Road Services and Transit Divisions. This is essential since spatial data is used in conjunction with non-spatial business specific data to drive many transportation information systems. Integration is facilitated through GIS staff participation on teams specifically tasked with coordinating information technology infrastructure. This was addressed in the GIS Program Overview section above.

In Transit, data coordination is further facilitated by publication of data to an Oracle corporate distributed database that allows for the synchronization, validation, and delivery of data from disparate sources, including GIS. This database is maintained outside of the GIS workgroup by fulltime database administrators that coordinate the transfer of data between systems throughout the agency. GIS and Transit Scheduling are primary stakeholders of this database and provide the core information used by many "downstream" systems (see Figure 1). GIS works very closely with all of these clients and database administrators of the corporate database to ensure that information is accurate, timely, and available. Spatial data is only one piece, but essential for the operation of these systems. Also, given GIS' unique capability to provide a spatial framework, many business data management systems are incorporating interfaces to geographic data to maintain Transit data. Transit's security and safety data maintenance systems access on-street and cross-street data for geocoding incident locations. Route tracing and bus stop placement applications use a map to assist in the placement and handling of these objects. In almost all cases, the transportation network is fundamental to providing that spatial framework. Much of Transit GIS is centered on real-time transportation network data maintenance activities, other data maintenance activities that depend upon the transportation network, applications that deliver transportation network data for use in other systems, etc. (see Figure 2). This effort is justified given the importance of the transportation network for information systems within DOT and beyond.



Schematic showing flow of information primarily from GIS and Scheduling to Transit "downstream" systems (Operations, Customer Information, and Transit Information) through the corporate distribution database.



Schematic showing the flow of primarily transportation network and transit objects from GIS to a variety of information systems and external agencies.

In 2002, the transportation network must directly support the needs and requirements of other County departments and points to a greater need for system integration between Transit GIS staff, Road Services GIS staff, and GIS staff in other agencies. Furthermore, a greater need for system integration is necessary to incorporate much of the County road-related information with transit, transportation planning, and facilities management data. The new transportation network and maintenance consortium will be the framework on which these data are integrated starting in 2002.

4.7.5.1 RDBMS Backend Support

Road Services

Currently Road Services datasets are in a mixed environment of

- Info Tables for coverages
- Dbase files for shapefiles
- Microsoft Access databases – Desktops and workstations
- SQL databases
- Microsoft Excel spreadsheets – Desktops
- Rbase databases –

- Advanced Revelations databases CRIS

Transit

Until very recently, Transit spatial data was solely maintained in ArcInfo coverages. These data were converted to static shapefiles for use in ArcView to enhance performance, and loaded to the Oracle distribution database for use by other systems. The flow of edits was always from ArcInfo to shapes and Oracle tables; changes were never made directly in Oracle or to the shapefiles.

This maintenance structure has resulted in significant effort to synchronize coverages and shapefiles as well as Oracle tables. Technical problems with this synchronization have led to the occasional delivery of bad data to client systems. Furthermore, the maintenance of spatial business data often depends on information from other systems, which must first be loaded into the distributed database, and then downloaded into GIS before spatial attributes can be assigned and loaded into the distributed database to complete the picture. This process can take days because of the need to deliver information back and forth between proprietary systems.

Over the last several years with a shift in development platforms from AML to MapObjects, Transit spatial point data maintenance (safety incidents, security incidents, emitters completed; bus stops and timepoints in 2002) has been migrated from Info to transactional processing directly in Oracle. This has allowed for real-time updates or a single nightly load to update production data. Furthermore, information in the distribution database loaded from other systems is immediately available to these applications. Maintenance of linear features such as transit routes that simply reference the transportation network is also being moved to an application that manages data directly in Oracle in 2002.

As more and more data are maintained directly in Oracle, static shapefiles will continue to be generated in support of ArcView users. Info databases will be phased out for geodatabases where topology or the maintenance of polygonal features is required. Starting in 2002, the Transit GIS team will begin testing Oracle Spatial with the ultimate goal of moving all primary geoprocessing functions and data storage into Oracle.

4.7.5.2 Other Department Data Management Activity

Transit and Road Services coordinate centralized databases for access by information systems throughout the department. GIS is one of these systems that both provides critical geographic data, but also uses core agency-specific data supplied by other workgroups. Major changes in these central databases can have an impact on GIS as a stakeholder. GIS-database interfaces may require modification, and real-time GIS applications are dependent upon the stability of central databases and associated hardware.

4.7.6 Client Services and User-Base Support

Road Services

With GIS responsibilities being spread out throughout the roads division, many different ways of tracking GIS related requests are currently implemented. This makes it very hard to track these GIS related work requests. Map requests are primarily done on an informal basis, usually an e-mail or brief discussion of what is needed on the map is all that takes place. We do not currently have any way to track the GIS related work that is being done which can result in redundancy. Roads will be working towards a common system that can track these requests throughout the division. This will lead to greater communication about work that is being done in the division and less duplication of work.

The Roads Division has no Internet presence other than a GPS basestation FTP site. Roads will be putting together an intranet web site that will be used to better promote sharing of information and as a easy means of pointing users to GIS resources in the Division, Department and County, such as the KC GIS Web site, ESRI forums, static maps and internal Roads ArcIMS projects.

Transit

Client services and user-based support were described under the GIS Program Overview section above, but are summarized here:

Customers:

- Transit Division staff, management, and systems.
- Transportation Planning staff in the Road Services Division.
- Transportation Planning staff in the DOT Director's Office.
- King County Airport.
- Wastewater Treatment Division (DNRP-WTD) (until 02/2002).
- King County Executive.
- King County Council.
- King County residents.

Services:

- Support multiple ongoing transit business systems and functions.
- Create, maintain, analyze and deliver transit geographic information to support Transit Division staff and automated systems.
- Provide transit map/data products, user support, vendor software installation and maintenance and Transit applications support.
- Ensure transit GIS tools and data are available to users through troubleshooting and updates.
- Provide division user support including technical expertise, transit business expertise, application troubleshooting and training.
- Work closely with Community Transit, Pierce Transit and King County GIS on data/application sharing and coordination.
- Serve as the Transit GIS focal point and represent the division to all other County work groups regarding GIS matters.

Service Processing:

- Requests are received through e-mail, phone, or in-person contact to any GIS team member.
- Requests are evaluated based on knowledge to complete the task, workload/availability, and priority.
- Individual staff receiving the request may complete the task, coordinate with other team members, or consult the Program Manager.
- All service requests are documented in an Excel spreadsheet.

Service Delivery:

- Requests for information, troubleshooting, training, expertise, and other such services are provided via e-mail, phone, or in person as necessary.
- An e-mail list of users with access to GIS applications and data is maintained to facilitate broadcast communications.
- SoftTrack license monitoring software facilitates broadcast messages to users currently accessing the system.

- Requests for map products are generally addressed by training and providing system access to the requesting staff.
- Long-term consultations for projects are planned and budgeted for in subsequent fiscal years.

Changes for 2002:

No specific changes are expected in 2002 other than redirecting DNRP staff requests to DNRP support analysts.

4.8 Council

The 13 member Metropolitan King County Council is the policy determining body of the County and exercises all legislative powers authorized under the King County Charter. These include, but are not limited to: the adoption and enactment of ordinances, levying of taxes, appropriation of funds, establishment of compensation levels for County employees, and the organization of administrative offices and executive departments.

GIS Services for the Council are provided by its committee staff, a group of professionals that support the Council's legislative committees.

4.8.1 Business Functions

The Committee staff uses GIS to support the Council in its policymaking role by manipulating and presenting geographic data in the form of maps, graphics, data files, reports, and spatial analysis. The objective is to provide data and information that will assist Councilmembers in their roles as policymakers in a host of issue areas, including but not limited to: land use, transportation, public health and safety, human services, utilities, technology, and the environment.

4.8.2 GIS Program Overview

The Council does not have a stand-alone GIS unit, but uses a GIS Coordinator to assist the Committee staff in utilizing GIS. The Coordinator serves as a liaison between Committee staff and the broader GIS community, and is responsible for coordinating training, procuring data, routing requests, and enlisting the help of other departments on complex projects. The GIS Coordinator also serves as the Council representative to the GIS Technical Committee.

4.8.2.1 Training

Council staff utilizing GIS participate in the KC GIS training program. Anticipated training needs for 2002 include refresher courses in the latest version of ArcView for the GIS Coordinator and for 1 or 2 additional staff. The Council anticipates similar training needs for the next few years beyond 2002. The Council pays for GIS training with resources from its general training fund. There is currently no in-house training of GIS end-users.

4.8.2.2 Staffing Requirements

The Council has one GIS Coordinator who devotes approximately 15 percent of her time to this function. A limited number of the Committee staff have received GIS training. This has proven an adequate level of staffing to this point, but may change as a result of the Countywide reorganization of the GIS function. The GIS Coordinator will work with the Council management team during 2002 to establish baseline post-reorganization staffing needs.

4.8.2.3 Hardware and Software

ArcView 3.0a is loaded locally on two Gateway 2000 workstations; correspondingly, the Council maintains two ArcView licenses. The Council GIS operates in a PC environment running on Windows 2000, and includes one plotter (HP DesignJet 755CM). The Council will upgrade to the latest version of ArcView in

2002. No new licenses are anticipated in 2002. The Council utilizes the KC GIS spatial data warehouse for its data needs, and does not store GIS data locally.

4.8.3 Spatial Data

The Council does not have responsibility for developing, maintaining, or enhancing spatial data or metadata, but utilizes data and information housed in the KC GIS spatial data warehouse to create maps and conduct spatial analysis. The most frequently used data layers include parcels, land use and zoning, sensitive areas, council district boundaries, voting precincts, city boundaries, potential annexation areas, street network and annotation, parks trails and open space, natural resources (agriculture, mining and forestry), hydrology, urban growth area boundary, and assessor tables.

The Council does not find a high degree of usability and functionality with respect to the Spatial Data Catalog metadata. It would be helpful if the metadata for each data set contained a basic, written description of is contents, and similar descriptions of attribute data. (e.g., "The King County Council District data set contains political boundaries that form 13 distinct geographic districts. The districts are updated once every 10 years as new census data is obtained. The current version shows Council District boundaries as adopted in 2001.")

4.8.3.1 Maintenance

N/A

4.8.3.2 Enhancements

N/A

4.8.3.3 Development

N/A

4.8.3.4 Metadata

N/A

4.8.4 Spatial Applications

As of the date of this document, the Council staff has not developed any spatial applications. They do, however, make use of Internet applications and other customized applications developed by departments. Access to these applications brings GIS to a group of professionals who may not have time to attend training sessions, or who use GIS so infrequently that a 1 or 2 day training course might constitute overkill. Additionally, they allow the staff quick access to important data and information via a "friendly" GUI. The most frequent use is by staff for whom access to land use and parcel information is necessary in their day to day work. One example of an application utilized by Council staff is the Base2 application developed by DDES.

4.8.4.1 Maintenance

N/A

4.8.4.2 Enhancements

N/A

4.8.4.3 Development

N/A

4.8.4.4 Documentation

N/A

4.8.5 System Integration

N/A

4.8.5.1 RDBMS Backend Support

N/A

4.8.5.2 Other Department Data Management Activity

N/A

4.8.6 Client Services and User-Base Support

The Committee staff provides GIS services to the Council on an as-needed basis, manipulating geographic data for the purposes of producing maps, graphics, data files, reports, and spatial analysis. These services are provided in order to:

1. Support the Council in its policymaking role (e.g., using ArcView to create a map showing the number, size and location of properties that would be affected by a proposed change to a King County Comprehensive Plan policy);
2. Provide information to Councilmembers regarding their constituencies (e.g., using ArcView to create a map illustrating all voting precincts within the new King County Council District boundaries); and
3. Ensure the Council is adhering to state and local laws regarding public notification of proposed Council actions (e.g., using ArcView and the Assessor database to create a mailing list of all property owners within a 500 foot radius of a proposed zoning change).

The Council manages its GIS workload by distinguishing between five types of information requests:

1. **Requests for data and information that are directly related to the Council's review of an executive proposal.** Responses to such requests are generally provided by the appropriate department(s) as a cost of doing business. This includes responding to issues raised during Committee and Council meetings, at public hearings, and in meetings with staff, major stakeholders, and community groups.
2. **Requests for data and information that are indirectly related to the Council's review of an executive proposal.** In the past, responses to requests where responsibility is unclear have been negotiated between the GIS Coordinator and the appropriate department, with ultimate responsibility dependent upon the extent of the request, time required for preparation of a response, access to data and information, current workload and level of expertise required.
3. **Requests for data and information that are unrelated to the Council's review of an executive proposal but provided as a courtesy by an executive department** (e.g., Records and Elections providing maps of the new Council Districts to each Councilmember). These requests are passed on to the appropriate department.
4. **Requests for data and information that are unrelated to the Council's review of an executive proposal.** These requests are handled by Council staff. When the level of expertise required to process such requests exceeds the capabilities of the Council staff, the GIS Coordinator has historically contacted the appropriate department for assistance.
5. **Public information requests.** Generally, simple requests are handled by Council staff. Complex requests, or requests that fall within the purview of a department or that exceed the capabilities of Council staff are passed on to the appropriate department.

As a result of the GIS reorganization, requests that fall under category 4 or 5 that exceed the capabilities of Council staff will be referred to the KCGIS Center on a cost reimbursable basis.

4.9 Office of Regional Policy and Planning

The Office of Regional Policy and Planning (ORPP) is a branch of the King County Executive Office providing broad policy analysis for the executive branch of King County government. ORPP's mission is to provide policy direction and coordinated planning on growth management and related issues within King County government to achieve livable communities.

4.9.1 Business Functions

ORPP has approximately 40 FTEs distributed in several sections and programs. One information services analyst serves half-time as a GIS analyst. GIS provides support in accomplishing all of ORPP's business functions.

The core business components are:

- **Regional Planning** – which includes updates to the King County Comprehensive Plan, Countywide Planning Policies, support for the Growth Management Planning Council and support for the "Transfer of Development Credits" Program.
- **Growth Information Team (GIT)** – The GIT is a team of four people including the GIS analyst. GIT prepares supporting data and documents about growth issues in King County including construction, land development, demographics and economics. Products include the King County Annual Growth Report, King County Benchmark Report and the Affordable Housing Bulletin. These documents are also published on the King County Web site. GIS is utilized for research, analysis and to present clear and reliable information on growth trends and issues in King County. Also to provide public information on Growth Management issues. GIS is also a key tool in responding to up to 2,000 ad hoc data requests from the Executive, the Council, King County departments, cities, businesses, media and the public. Among these requests are many for Census data, both tabular and spatial.
- **Regional Economic Development** – Support for the King County Jobs Initiative, King County Brownfields Community Showcase and used for economic analysis. GIS mapping includes designated urban centers and contaminated industrial sites.
- **Governance Transition Team –** Analyzes annexation and incorporation of all land within the Urban Growth Area and assists cities in providing urban services. GIS is a key tool to help decision makers to negotiate efficient service delivery relationships between cities and other jurisdictions.
- **Children, Youth, Families and Other Human Services** – Support for the Children and Family Commission and oversight to Human Services Framework Policies and Implementation, plus Affordable Housing Policy issues for King County and its cities.

4.9.2 GIS Program Overview

ORPP does not have a separate GIS section with a dedicated budget. The GIS work program is integrated or "weaved-in" into the office's work plan as support to all on-going projects. The GIS Analyst prepares maps or analysis upon request by ORPP staff, or she refers the request to the KC GIS Center to provide more complex services. The ORPP budget does include a client services allocation for GIS Center services. ORPP does not prepare or maintain any major KCGIS coverages. We prepare ad-hoc maps and ArcView projects primarily for internal use.

4.9.2.1 Training

ORPP's GIS Analyst participates in the KC GIS Center training program. She receives training in specific GIS applications specially each time there are significant upgrades/changes to the application, to help her work more efficiently and be current on technology. ORPP also seeks opportunities to provide broader

training to staff. ORPP staff have requested introductory training in ArcView and opportunities to use it, but resource limitations prevent this in 2002.

4.9.2.2 Staffing Requirements

Currently, ORPP only has 0.5 FTE dedicated for GIS plus another staff person who knows ArcView and acts as a back up for the GIS Analyst. Both persons are CX funded in Planner job classifications.

Working Title	Current Classification
GIS Coordinator	Planner II
Analyst and GIS backup	Planner II

In past years, DDES has provided a large proportion of ORPP's GIS service needs through interdepartmental agreement. As of 2002, DDES is no longer able to provide these services. Budget cuts prevent ORPP from expanding its own GIS program. Some of ORPP's 2002–03 GIS needs will be referred to the GIS Center; some simply will not be done.

4.9.2.3 Hardware and Software

There is one workstation dedicated for GIS use. The station operates on a PC environment running on Windows NT 4.0.

ORPP currently only has one ArcView 3.2 license.

The primary output device is an HP Designjet 2800CP. A small EPSON color printer is used occasionally when small working drafts are needed.

4.9.3 Spatial Data

ORPP does not have responsibility to develop and maintain any KC GIS coverages. However, ORPP does make use of coverages available in the KCGIS Data Warehouse to prepare maps and analyze Growth Management issues. We create, plot and maintain shapefiles derived from other departments' coverages. Although ORPP is responsible for the creation of some shapefiles, many are not conflated on KCGIS's RECDNET and we do not have authority to save them back to the PLIBRARY. Therefore, these data are only found in ORPP's server. ORPP does not store data on *Wildfire* or other KCGIS servers even though we have access to them.

ORPP relies heavily on KC GIS and other KC departments for development, maintenance and enhancements of all spatial data.

4.9.3.1 Maintenance

The following are data ORPP maintains:

Layer Name:	Layer Description:	Derived From:	Notes:	Update:
URB-V&R	King County Vacant and Redevelopable Urban Land	• PARCEL • ASSESSOR'S DATABASE • PARKS and OPEN SPACE • SENSITIVE AREAS	Analysis as defined by the Buildable Lands Act	None Planned

RUR-V&R	King County Vacant and Redevelopable Rural Land	• PARCEL • ASSESSOR'S DATABASE • PARKS and OPEN SPACE • SENSITIVE AREAS	Analysis as defined by the Buildable Lands Act	None Planned
KC-MIC	King County Manufacturing and Industrial Center Boundaries	• City of Seattle • City of Kent • City of Tukwila		
CONT-SITES	Environmentally Contaminated Sites in King County	• Washington State Environmental Protection Agency	Geocoded addresses from the US EPA	Annually
MTCA-SITES	Model Toxics Control Act Sites in King County	• Washington State Environmental Protection Agency	Geocoded addresses from the US EPA	Annually
REC-LOTS	Recorded number of Formal plat lots in King County by Section Township and Range, and by City		Data taken as recorded from the King County Recorders Office	Annually
NEWUNITS	New Housing Units Permitted in King County		Data taken as permitted from KC DDES	Annually
HSESALES	House Sales	• Multiple Listing Service	Geocoded Addresses	Annually

4.9.3.2 Enhancements

- **Land Capacity Analysis** – A major 2002 ORPP work program item is the Buildable Lands amendment to Growth Management. Residential and commercial-industrial capacity for growth on vacant and redevelopable land will be refined and reported in 2002. Layers used for Land Capacity Analysis have added another column calculating the conversion of the area square footage to acres, potential employment, and housing that can be accommodated.
- **Contaminated Sites** – Many of the sites identified by the State have "bad" addresses that need to be fixed in order to be geocoded.
- **House Sales** – Same with the contaminated sites.

4.9.3.3 Development

No development of new shapefiles is planned for 2002. ORPP has interest in development of data and applications to report the 2000 Census results in King County, and would participate with other departments in KCGIS on this subject.

4.9.3.4 Metadata

N/A

4.9.4 Spatial Applications

No spatial applications are currently maintained by ORPP.

4.9.4.1 Maintenance

N/A

4.9.4.2 Enhancements

N/A

4.9.4.3 Development

N/A

4.9.4.4 Documentation

N/A

4.9.5 System Integration

Does not apply, because ORPP does not develop or maintain its own applications.

4.9.5.1 RDBMS Backend Support

N/A

4.9.5.2 Other Department Data Management Activity

N/A

4.9.6 Client Services and User-Base Support

Every year, the King County Annual Growth Report and Benchmarks Report are published on the Web. Both documents contain maps created through GIS in ORPP.

5 Appendices

5.1 Oversight Committee

5.1.1 Charter

Purpose:

This charter establishes roles, membership and guidelines for the GIS Oversight Committee

Role:

As the GIS Oversight Committee, the committee will:

- Review and approve GIS related budgets for all agencies;
- Review and approve the Countywide GIS Business Plan;
- Review and approve all GIS work programs, including operations and maintenance plans, with associated costs identified;
- Review and approve King County GIS Standards;
- Review and approve technical and policy recommendations from GIS Technical Committee;
- Provide annual report on work program status to the Technology Management Board;
- Recommend cost allocation model for Central GIS services;
- Make recommendations to the Technology Management Board as needed;
- Resolve issues referred to the GIS Oversight Committee as needed.

Leadership:

The representative from the Department of Natural Resources and Parks will chair the committee.

Membership:

GIS Oversight Committee membership shall consist of a representative from the following County departments: DNRP, DOT, DDES and Assessments. Members must have authority for: Budget approval; GIS programs within their department; representation of customers and end users; and policy decisions. The GIS Oversight Committee will appoint at least two rotating members for a one-year term from agencies and programmatic areas that have significant involvement in GIS. Members will not serve on both the GIS Technical Committee and the GIS Oversight Committee simultaneously.

Operating Assumptions and Guidelines:

- Meetings will be held no less than quarterly and more often if necessary.
- Decisions will be made by consensus. If consensus cannot be reached within the GIS Oversight Committee, the issue will be referred to the Director of the Department of Natural Resources and Parks.
- The GIS Oversight Committee will establish ground rules.

5.2 Technical Committee

5.2.1 Charter

Purpose:

This charter establishes roles, membership and guidelines for the GIS Technical Committee.

Role:

As the GIS Technical Committee, the committee will:

- Report to the GIS Oversight Committee;
- Recommend policy for Countywide GIS technology to the GIS Oversight Committee;
- Develop an annual GIS Business Plan and work program;
- Develop and recommend GIS templates and standards for the Countywide GIS program;
- Educate departments about the value GIS will add to business practices;
- Maintain an inventory of Countywide GIS data and applications;
- Prepare quarterly reports on the status of the Countywide GIS program.

Leadership:

The committee will vote annually for chair and vice-chair positions.

Membership:

Membership will consist of one GIS technical manager or GIS professional from the following King County GIS user agencies:

GIS Center	DOT-Transit	DNRP-Wastewater Treatment
Assessments	DOT-Roads	DNRP-Water & Land Resources
Public Health	Public Safety	DNRP-Parks
DDES	DES-Records & Elections	ORPP
County Council	DES-E911	

The list of participating GIS user agencies will be reviewed and updated yearly. Members will not serve on both the GIS Technical Committee and the GIS Oversight Committee simultaneously.

Operating Assumptions and Guidelines:

- Meetings will be held at least monthly, and more often if necessary.
- Decisions will be made by consensus of members or designated alternates present. If consensus cannot be reached within the GIS Technical Committee, the issue will be referred to the GIS Oversight Committee.
- GIS Technical Committee will establish ground rules.

5.2.2 Objective Statements for Technical Committee Work Groups

5.2.2.1 Operations and Maintenance

The GIS Operations and Maintenance Workgroup will produce an annual working document which: 1) Outlines the roles and responsibilities for the Countywide GIS program; 2) Describes the current status of GIS services, applications, data and hardware; 3) Delineates the coordinated department level work plans for the coming year; and 4) Sets goals for the future technical direction of the Countywide GIS program.

5.2.2.2 Best Practices

The objective of the Best Practices Work Group is to identify and develop GIS best practices to 1) improve communication within the KCGIS community; 2) tighten data procedures and requirements; and 3) coordinate changes to hardware, software and applications.

5.2.2.3 Cartographic Standards

The GIS Cartographic Standards Workgroup will propose standards and guidelines that enable staff to produce high-quality, consistent map products for King County.

5.3 Terms and Definitions

The terms and definitions will be added to a subsequent version of the GIS Production Operations and Maintenance Plan.