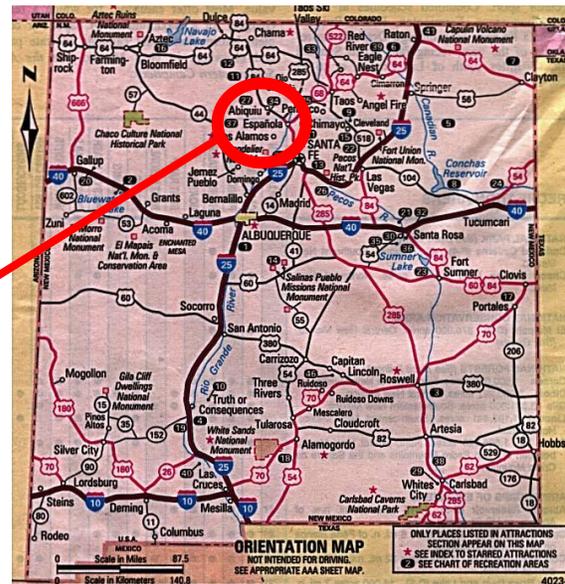


# GIS planning, analyzing business needs and Products Description of Valles Caldera National Preserve

## 1- Introduction

The Valles Caldera national preserve is an 89,000-acre federal property located in volcanic area in the Jemez Mountains of northern New Mexico. Within its bowl-shaped (named caldera in Spanish), it is the largest grass valley (valle) and the only one with a paved road. On July 2000, the Valles Caldera Preservation Act, created the Valles Caldera National Preserve (VCNP), Santa Fe National Forest and established and assigned to be administered by the Valles Caldera Trust (Valles Caldera Trust, 2003). Figure 1 shows the location of VCNP.



**Figure 1: Location of Valles Caldera National Reserve inside the New Mexico State (From Wikipedia, the free encyclopedia)**

This document is a remainder of 3 parts of GIS design assignments at New Mexico State University and tries to review the GIS basic planning, Analysis business needs and Information products description (DeMers, 2010).

## 2- GIS planning basics

### 2-1- Real or expected applications for the Valles Caldera GIS

Investigating the Valles Caldera National Preserve (VCNP) reports shows different aspects of this park like:

- Geology
- Vegetation

- Ecological units
- Aerial photo
- Topography
- Soils type
- Hydrological and water resources data
- Boundaries and ownership
- Buildings and utilities
- Pastures, corrals and grazing enclosures
- Hunting units, fishing areas, equestrian
- Recreation areas like hiking, skiing trails, van and wagon tours
- Infrastructures and highways and roads location

Obviously, the GIS designers should have mentioned to these aspects in their design so the expectation of GIS designing of this area is to have overall GIS model which covers all of these aspect and also the possibility of dynamic programming for new data entry and processing, i.e. GIS modeling and design for the live national park which changes day by day, needs to be live and can be changed due to corresponding aspects.

Also these two main categories have been reported for landscaping: 1- Natural landscape and 2- cultural landscape. Natural landscape includes geology, aquatic and riparian communities, grasslands, forests, vegetation and floristic diversity, wildlife and weeds. Meanwhile cultural landscape consists of archaeology, traditional uses, twentieth-century uses and a land of inspiration, prehistoric cultural chronology and historical chronology.

Furthermore, because of self-sufficient goals of this park, economical aspects and legal aspects and political aspects which are always important for every modeling and design should be taken place.

More detailed features like highway, corridors administrative facilities, hunting, hiking and others are discussed in programs chapter. So it means more processed data is available through this modeling.

## **2-2- business plan for the Valles Caldera GIS**

Usually the business plan should describe the scope, goals, objectives and the possible methods and resources to achieve those. This is usually programmed in a time schedule with different levels that shows which objectives would be attained on the dedicated time and resources. It may also contain background information about the organization or team attempting to reach those goals (DeMers, 2010).

Although, long-term vision for the VCNP has been defined with three parts of the changes in the ecological condition, the future public uses and the physical infrastructure that will be needed to develop in order to support those uses, the framework of VCNP is not a technical report, there is no stratified scope, goals and objective which have been declared. Instead, it is stated that goals and values are implicitly in the management principles which are not common (Valles Caldera Trust, 2003, pp53). They can just use these principles as a first set of criteria to evaluate the program.

Fortunately, financial self sufficient is not the main goal of the trust. It is just a challenge which Trust would face to that and it is true, because as an ecological body, sometimes, it is not possible to reach a self sufficient level, for example, taking care of a baby, never is going to be self sufficient and most of the time uncountable money should be spend for that. This challenge would proceed during 15 years and “it is not in the long-term interest of the trust or the preserve

to base decisions solely on a revenue motive.” (Vallse Caldera Trust, 2003, pp55). Stewardship is the main goal.

Finally, because there is no real business plan in framework there is nothing to discuss more. By the way, According to the start time of this program (2001), and present time (2010), there is good possibility to evaluate the program using GIS.

### **2-3- Set of data inputs and spatial information products**

The general data input for the VCNP GIS design consists of:

- Soils type
- Geology
- Vegetation
- Ecological units
- Aerial photo
- Scanned topographic map
- Hydrological data including streams, lakes, wetlands and watersheds
- Preserve boundaries/ownership information
- Fence lines and gates, cattle guards, and road drainage (structures)
- Buildings and utilities
- Pastures, corrals and grazing enclosures
- Elk hunting units, fishing areas, equestrian, hiking and skiing trails, van and wagon tours
- Highway and road locations and information

Based on the input data file, the information or outputs after processing would be:

Using this data the expected result and output should be produced as a map, database, graphs or just an answer for a question.

The examples of maps can be like:

- Rivers, surface water, streams and other water bodies and information for fresh water for human
- Fauna habitat
- Geologic units and type
- Transportation and roads
- Mountains and elevated area
- Trails
- Recreation area
- Animal departure map
- Ranches and farms

The example of graphs can be like:

- Timely availability or permit of any animals for hunting, or fishing
- Timely prices of hunting, recreation, hiring and ...
- Distribution of human population and animals
- Distribution of vegetation
- Productivity volume of ranches and farms

The example of lists can be like:

- Vegetation species, trees and plant
- Animals and fauna
- List of ranch production
- List of soil types

- Incomes and costs
- Infrastructure
  - The example of final answer can be like:
- Length of roads
- Income, Cost and annual balance
- Area

## **2-4- The overall GIS design for the Valles Caldera GIS**

The principle of designing GIS looks around these questions: “who? What? When? Where? and why?” But there is something real that cannot be ignored: budget and time. For the project with infinite amount of money and time, discussion about the ideals, but essentially, reality could force something difference.

## **3- Analyzing business needs**

Analyzing the business needs is taking the first step. This process needs to answer the following questions: What data are needed to create SIPs? What data are available? Where are the data we need? What new (non-existent) data are needed? What data handling functions are necessary to convert data to information?

Other steps in analyzing business needs are including review of organization’s strategic business plan, system requirements, conceptual design and implementation planning.

Also technology seminar introduction, GIS team and their responsibilities and the requirement products are necessary as described below:

### **3-1- Technology Seminar Introduction**

- I. Greeting to the attendance and General introduction of the seminar
- II. Overview of the current GIS status for the VCNP:
  - Introduce the available GIS model and how it works. Also give some general information about executive problems and costs which is there.
  - Discuss the available features classes in the current GIS database
  - Discuss the current applications of the current GIS database
- III. Introduction to GIS by
  - GIS Definition
  - GIS components ( data )
  - GIS components ( Information )
  - GIS functions
- IV. Logic of the functional requirements:
  - Describing of the functional requirements study
  - Discussing of the importance of the roles of staff
  - Discussing about updating GIS
- V. Explanation of spatial information product descriptions:
  - How to create
  - How to develop
  - How to apply
- VI. Opportunity to clarify terms
  - Question about information
  - Question about data
  - Question about functions

### **3-2- List of the current management team members**

The list of VCNP members are:

1. Communications Manager
2. Information Technology Manager
3. Geospatial Information Systems Coordinator
4. Natural Resources Coordinator
5. Cultural Resources Coordinator
6. Landscape Architect
7. Outdoor Recreation Coordinator/Landscape Architect
8. Recreation Specialist
9. Ranch Foreman
10. Controller
11. Law Enforcement
12. Preserve Scientist
13. Executive Director
14. Preserve Manager

Also as an example the GIS output requirement for preserve manager are: locations map(1:100,1000) , infrastructure map(1:50,000, 1:1000), vegetation(1:50,000), hunting and fishing (1:25,000), various additional recreation opportunities including hiking (1:10,000), horseback riding(1:10,000) and skiing trails (1:10,000), working ranch (1:25,000, 1:5000), land use monitoring (1:10,000), inventory and monitoring sites (1:1000), historical sites (1:10,000), geological sites(1:10,000), and biological sites environmental and vulnerability studies(1:10,000), utility projects (1:5,000) including construction/route planning, maintenance and related activities, forest (1:25,000), water bodies map (1:25,000)

### **3-3- The actual role of the team members**

- Stewarding of the preserve's natural and built resources
- Serving as primary contact for the surrounding community and
- Promoting and managing increased levels of public use.
- Physically perform, as needed, any and all tasks necessary for the successful management of the Preserve and to work weekends, evenings, and holidays as requested to fulfill his responsibilities.
- Perform comparable management work on other preserves owned or managed by the Trust as requested by his or her supervisor.
- Work effectively with Preserve users, neighbors and partners to help promote land conservation, cultivate supporters and reinforce the Trust's overall mission.
- Reports directly to the Regional Director of Land Stewardship.
- Leadership role in a discrete specialized field that is important to preserve stewardship activities.”
- Ability to maintain and safely operate all equipment necessary to properly manage the preserve including: tractors, mowers, chainsaws, and other land and building management equipment
- Regular and consistent attendance
- Adherence to VCNP's stringent safety program and appropriate use of Personal Protective Equipment
- Serve as a community liaison to cultivate positive relationships, build support, elevate general understanding of the VCNP mission and role of the preserves and promote appropriate public use
- Help facilitate organization-wide efforts to expand membership and volunteer programs
- Effectively communicate with staff, constituents, neighbors and preserve users in a positive manner

### **Specific Duties:**

- **Stewardship**
- Maintenance of woodlands, grasslands and other natural areas, restoration of degraded natural areas
- Routine patrol to monitor for unauthorized use of the Preserve (including vandalism to land and structures) and to install/maintain boundary signs.
- Removal of snow on preserve roads, parking areas and walks
- Select and purchase materials, supplies, and equipment within budget guidelines
- Annual monitoring of a number of VCNP
- Transfer of heavy equipment via truck and gooseneck trailer
- Participation in prescribed fire management program
- Building stewardship to include repairs, and maintenance of preserve structures and assisting with renovations and/or construction of preserve structures
- **Public Use & Community Outreach**
- Engage preserve users in a positive manner to educate them on the Trust's conservation goals and appropriate preserve activities
- Determine whether preserve activities will impact neighbors and/or preserve users, educate affected parties on the rationale for the activity and take steps to mitigate negative effects.
- Contact local schools and environmental education organizations to encourage their use of the preserve
- Install and maintain public use amenities to encourage appropriate use of the preserve
- **Administration**
- Attendance at designated educational or safety workshops, seminars, courses and meetings
- Administration of a controlled hunting program and any building or land leases
- Complete and submit timesheets, mileage logs and preserve reports on a timely basis.
- Recruit, train, and supervise part-time personnel when authorized
- Develop an annual budget and maintain appropriate accounting and other financial records"

[www.sfr.psu.edu/Employment/Job\\_Descriptions/592.pdf](http://www.sfr.psu.edu/Employment/Job_Descriptions/592.pdf)

### **3-4- Products needed to meet responsibilities**

The list of production for Preserve manger is:

- Maps for locations(1:100,1000) & Earth's Critical Zone, Digital Elevation Models,
- Sensitive areas ma (variable scale)
- Infrastructure map(1:50,000, 1:1000)
- Vegetation and drought index map (1:50,000)
- Ecological units map (variable scale)
- Hunting and fishing (1:25,000)
- Various additional recreation opportunities including hiking (1:10,000), horseback riding(1:10,000) and skiing trails (1:10,000)
- Working ranch (1:25,000, 1:5000)
- Land use monitoring (1:10,000)
- Inventory and monitoring sites (1:1000)
- Historical sites (1:10,000)
- Geological sites(1:10,000),
- Environmental and vulnerability studies(1:10,000),
- Utility projects (1:5,000) including construction/route planning, maintenance and related activities,
- Water bodies map (1:25,000)
- Income resource Map (1:100,000)

#### **4- Describing information products**

The potential output of information products is sketch map. This product includes: Title, Data layers to display, Map annotations, Legend, Special symbology, Colors required, Scale bar and North arrow. Also non-map information product is the other product of SIP which consist of lists, tables, and reports.

Two examples for information product and the way of presentation for Preserve manager is presented below:

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#### **PRODUCT DESCRIPTION**

**TITLE:** Valles Caldera's Infrastructure

**REQUIRED BY:** Preserve Manager

**PRODUCT #:** 1003052010

**NAME:** Amir M. Samani

#### **SUMMARY**

**Infrastructure of VCNP are included cabins, buildings, Fences, Boundaries, and part of ranching and recreation like hunting and grazing based on what has been described in Geog 481. They are sources of services and income for VCNP. Also it seems that the Road maps should be a part of infrastructure which has been produced for this purpose.**

**Some of other users of GIS in VCNP will use these information products as the layers for additional information products. The map will show the geographic location, area of the preserve and adjacent land owners.**

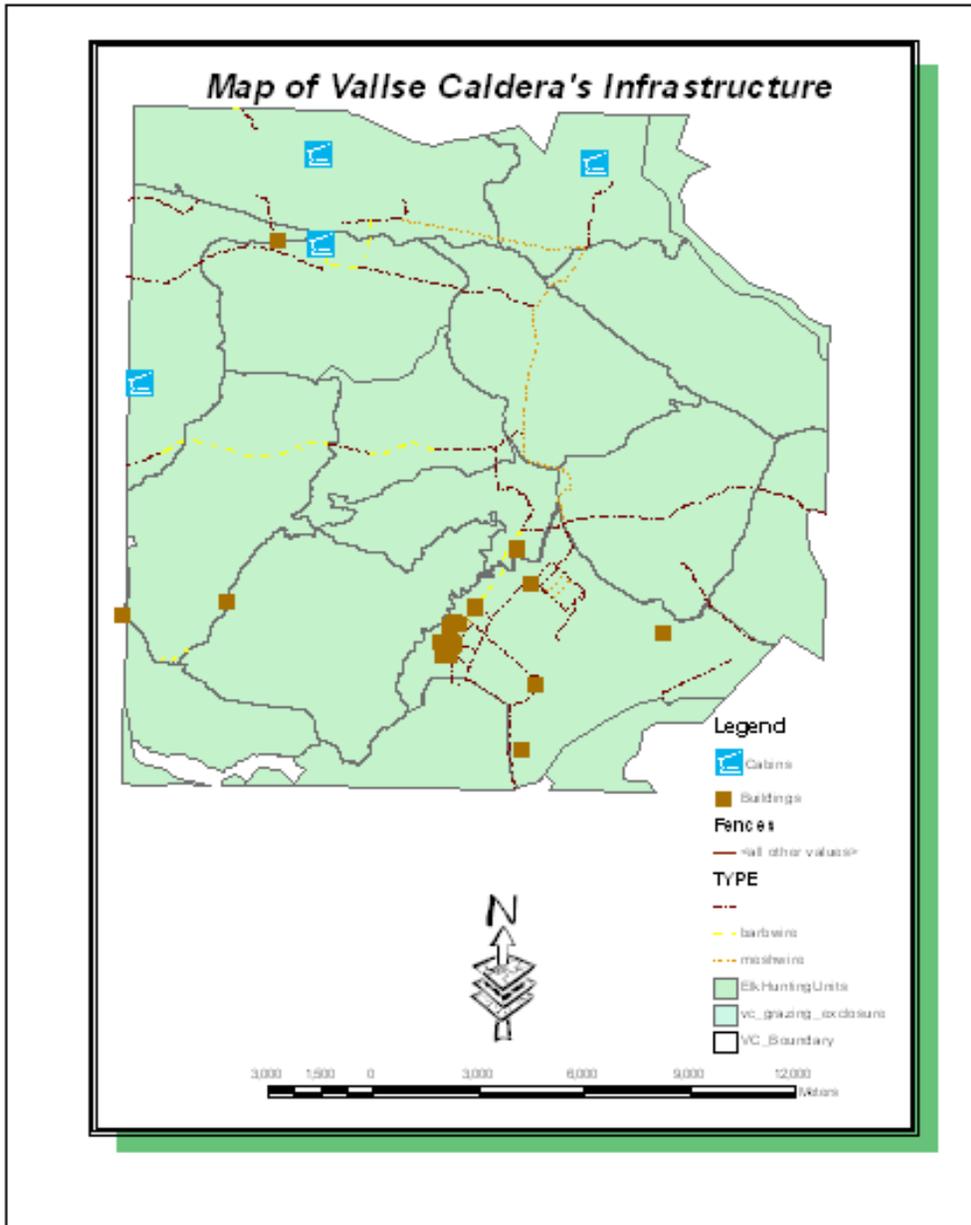
## PRODUCT DESCRIPTION

TITLE: Valles Caldera's Infrastructure

REQUIRED BY: Preserve Manager

PRODUCT #: 1003052010

NAME: Amir M. Samani



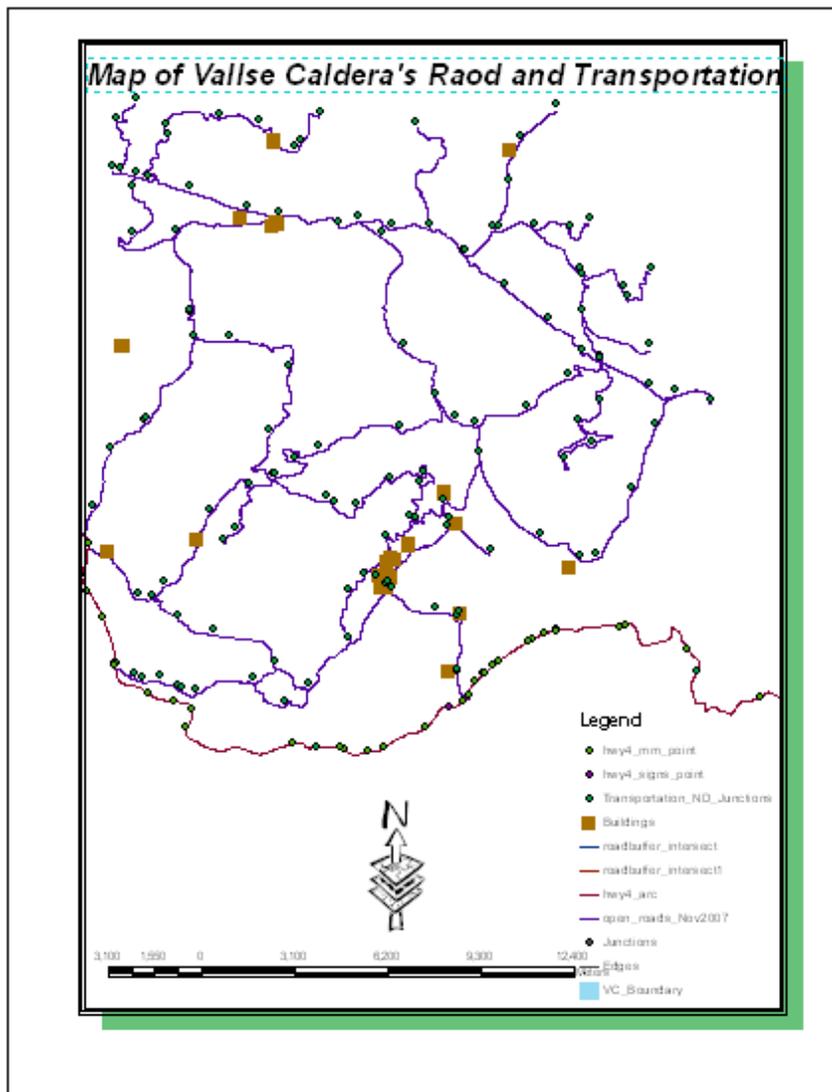
## PRODUCT DESCRIPTION

TITLE: Valles Caldera's Infrastructure

REQUIRED BY: Preserve Manager

PRODUCT #: 1013052010

NAME: Amir M. Samani



**PRODUCT DESCRIPTION**

**TITLE:** Valles Caldera’s Infrastructure

**REQUIRED BY:** Preserve Manager

**PRODUCT #:** 1003052010

**NAME:** Amir M. Samani

**DOCUMENTS**

<b>#:</b> 1003052010		<b>DATA SET NAME:</b> Infrastructures
<b>Document Title:</b>		
<b>No. of Pages per Retrieved Document</b>	<b>Typical:</b> 6	<b>Maximum:</b> 13
<b>Search Keys (All)</b> Infrastructure, Cabins, buildings, Roads,  <b>Spatial:</b>  Digitize location of infrastructure of preserve and  <b>Attribute:</b>		
<b>Data Elements (Required to be seen)</b>		
<b>ACTION:</b> (tick as appropriate)	*	Visually Observe – Read only
	*	Copy Whole – Hardcopy
	*	Copy Whole – Digital
	*	Copy Part – Hardcopy
	*	Copy Part – Digital
<b>CHANGE:</b> (tick as appropriate)	*	Add Data – Which Elements
		Delete Data – Which Elements
	*	Edit Data – Change Errors:
<b>NO CHANGE</b>		

**PRODUCT DESCRIPTION**

**TITLE:** Valles Caldera's Infrastructure

**REQUIRED BY:** Preserve Manager

**PRODUCT #:** 1003052010

**NAME:** Amir M. Samani

**LIST #**

<b>LIST TITLE: HEADINGS</b>	VCNP infrastructure					
<b>TYPICAL ENTRIES</b>						
<b>SOURCE</b>						

**LIST #**

<b>LIST continued: HEADINGS</b>	VCNP infrastructure					
<b>TYPICAL ENTRIES</b>						
<b>SOURCE</b>						

**IST #**

<b>LIST continued: HEADINGS</b>	VCNP infrastructure					
<b>TYPICAL ENTRIES</b>						
<b>SOURCE</b>						

**PRODUCT DESCRIPTION**

**TITLE:** Valles Caldera's Infrastructure

**REQUIRED BY:** Preserve Manager

**PRODUCT #:** 1003052010

**NAME:** Amir M. Samani

**STEPS REQUIRED TO MAKE PRODUCT**

**DATA NEEDED:**

Legal description of Valles Caldera Preserve

Project coordinate system.

Determine long & lat for a point or,

**STEPS TO MAKE PRODUCT:**

(Using System Functions)

Select geographic coordinates & or scanned maps for digitizing or georeferencing

scanned maps a point of beginning for georeferencing or digitizing.

## PRODUCT DESCRIPTION

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### ERROR TOLERANCE:

Type of error:	Possible occurrences	Result of Error	Impact on benefits	Error tolerance
<b>REFERENTIAL</b>	Elevation from sea level	Wrong data production	Wrong length and cost calculation	Less than 5%
<b>TOPOLOGICAL</b>	Feature	Data processing	Loosing infrastructure positions	Less than 10 items
<b>RELATIVE</b>	Spatial reference	Incorrect distance	Boundaries	10%
<b>ABSOLUTE</b>	Coordination	Wrong location	Costs	5%

## PRODUCT DESCRIPTION

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**NAME:** Amir M. Samani

### FREQUENCY:

<b>YEAR</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>MAPS</b>	3	3	3	3	3	3	3	3	3
<b>LISTS</b>	10	10	10	10	10	10	10	10	10
<b>DOCUMENTS</b>	2	2	2	2	2	2	2	2	2

### FUNCTIONS INVOKED:

<b>Function</b>	<b>Number</b>
Data gathering	2
Digitizing	5
Analyzing	3
Data entry	2
Discussion and meeting	56

### WAIT TOLERANCE:

<b>Wait Tolerance Category</b>	<b>Time</b>
Payments	3 months

## PRODUCT DESCRIPTION

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### COSTS:

(to produce product using existing methods)

	<b>HOURS</b>	<b>\$ COST</b>
<b>LABOR</b>	<b>2400</b>	<b>24000</b>
<b>Professional</b>	<b>850</b>	<b>17000</b>
<b>Technical</b>	<b>1650</b>	<b>18500</b>
<b>MATERIALS:</b>		<b>4500</b>
<b>TOTAL COST:</b>		<b>52000</b>

### PROGRAM/PROCESS RELATED:

Digitizing the existence maps of roads, tertian and  
Scan maps  
Aerial photography  
Floor photography  
Online Cameras  
Create new maps

## **PRODUCT DESCRIPTION**

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### **BENEFITS:**

#### A) Savings:

**The required materials for designing the GIS of infrastructure need to be revised, specially due to one Trust goal to make a economic self-sufficient preserve. If some type of income source and were cleared, it could be analyzed and optimized, so in this way so much money would be saved.**

#### B) Benefits to Agency:

**Described method for saving has great benefit for Trust and gives a strong tool to them to manage the preserve. The most important advantage of this method is the flexibility of the method. Since during the prepared SIP, all of the users can update the database, manager can change some issues in order to save money and get the other benefits.**

#### C) Future and External:

**All of the products which are processed by the other groups should be linked to the infrastructure product. All of them either need the infrastructure of VCNO or would work with them.**

## **5-References**

- 1- DeMers M. N. 2010. GIS design, Lectures for Course Geog 581, NMSU
- 2- Valles Caldera Trust, 2003. Valles Caldera National Preserve, Framework and strategic guidance for comprehensive management. The Valles Caldera Trust
- 3- [www.sfr.psu.edu/Employment/Job\\_Descriptions/592.pdf](http://www.sfr.psu.edu/Employment/Job_Descriptions/592.pdf)