5 A Process for Earthworks Management

Introduction

Successful earthworks management depends on an approach that balances careful resource management with maintenance and interpretation goals. Within the current environment of uncertain funding levels for earthworks landscape management, it is more critical than ever that each manager develop comprehensive earthworks planning, which establish clear priorities. While management must be tailored to meet the unique needs of each park or organization, there are several basic components that should be present in any approach. In this section, a process for earthworks management that includes these basic components is proposed. The following seven steps are recommended:

1. Define the management area
2. Identify the resource
3. Establish management objectives
4. Describe management strategies
5. Develop implementation and maintenance plans
6. Develop good records
7. Monitor and evaluate earthworks management

1. Defining the Management Area

Identifying the boundaries of the area of earthworks that will be managed is an important early step in the planning process. A *management area* is a zone that includes the earthworks or system of earthworks that will be managed. Defining a management area(s) for earthworks helps organize and focus management efforts. How an area is identified depends on the complexity and size of the resource and ultimately the management approach. The boundary of the management area may be selected because it is the historic boundary of a battlefield or because it defines a unified concentration of related earthworks structures, such as an individual fort within a system of forts.

Within an earthworks management area, there may be several sub-areas based on management objectives and associated strategies. A management sub-area is a discrete part of a larger management area. These may include areas that require different levels of maintenance or have a different interpretive approach. The management area(s) and sub-areas should be clearly identified on a basemap. Boundaries may be modified as the process of management planning progresses and more information is collected. It is important, however, to establish the general area that is likely to be managed to focus early research and inventory efforts.

2. IDENTIFYING THE RESOURCE

Successful earthworks management depends upon a clear understanding of what the resource is, including its location, extent, type, and condition. This is accomplished through a combination of historical research, field inventory, and mapping.

Historical Research

Historical research helps a manager understand the significance of the earthworks and the role they played in a particular military event. Research should establish the types of earthworks and particular structural features that may have been built in the area. Views and vistas critical to the military strategy along with the general character of the area also may be identified during the research phase. Historical research is best completed by a qualified historian who is familiar with the resource and the material available. Typical resources to consult when completing a history of the an earthworks management area include battle histories, first hand military accounts, troop movement maps, soldiers' diaries, and historic photographs. This information may guide ultimate treatment decisions for the earthworks.

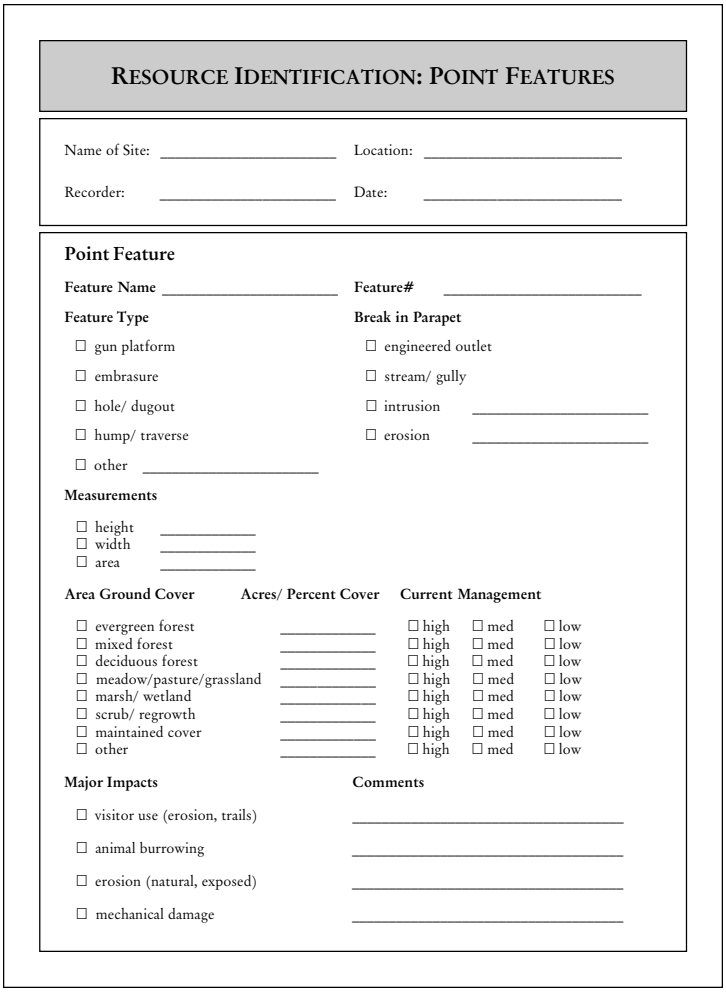
Field Inventory

Field inventory is essential to understand the location and extent of the resource, identify various earthworks types and their parts, and assess current condition. Include general contextual information as well as specific information. Collecting general field information helps establish the broad picture of what kinds of earthworks exist in a management area and in what general condition they may be found. Collecting specific information about individual point and line features gives a clearer picture of the condition of the resource and the level of effort needed for its maintenance. The following information should be collected to provide a complete picture of the resource:

1. quantity and location of line and point features,
2. type of each point and line feature,
3. type of construction for each point and line feature,

4. condition of each point and line feature,
5. the ground cover (vegetation and/or litter),
6. the current type and level of management for the general area as well as each point and line feature.

Specialists in natural resources, archeology, and historical landscape architecture may be needed to assist with this phase. (Technical Support Topic #3 - *GPS Mapping Methodology for Earthworks* contains a detailed dictionary of data that should be collected during the inventory phase -See Technical Support Topic #2 - *Field Forms* for ways of organizing this information). All field data should be keyed to a map drawn to an accurate scale. This map can be developed by hand or computer from current existing conditions maps or it can be generated using more sophisticated mapping technologies.



RESOURCE IDENTIFICATION: POINT FEATURES

Name of Site: _____ Location: _____

Recorder: _____ Date: _____

Point Feature

Feature Name _____ **Feature#** _____

Feature Type

- ☐ gun platform
- ☐ embrasure
- ☐ hole/ dugout
- ☐ hump/ traverse
- ☐ other _____

Break in Parapet

- ☐ engineered outlet
- ☐ stream/ gully
- ☐ intrusion _____
- ☐ erosion _____

Measurements

- ☐ height _____
- ☐ width _____
- ☐ area _____

Area Ground Cover	Acres/ Percent Cover	Current Management
☐ evergreen forest	_____	☐ high ☐ med ☐ low
☐ mixed forest	_____	☐ high ☐ med ☐ low
☐ deciduous forest	_____	☐ high ☐ med ☐ low
☐ meadow/pasture/grassland	_____	☐ high ☐ med ☐ low
☐ marsh/ wetland	_____	☐ high ☐ med ☐ low
☐ scrub/ regrowth	_____	☐ high ☐ med ☐ low
☐ maintained cover	_____	☐ high ☐ med ☐ low
☐ other	_____	☐ high ☐ med ☐ low

Major Impacts

- ☐ visitor use (erosion, trails)
- ☐ animal burrowing
- ☐ erosion (natural, exposed)
- ☐ mechanical damage

Comments

_____

_____

_____

_____

Figure 5.1. A sample of the field forms for documenting features found in Chapter 7: Technical Support Topics.

Mapping

Mapping is important tool in earthworks management. A clear, scaled, existing conditions basemap graphically portrays the earthworks system and locates it within a regional and local context. This map should be developed early in the research and inventory phase. Roads, natural systems, topography, current vegetation cover, urban and suburban development are all important related features that help put earthworks into context. All data collected on earthworks is keyed to this map with an identifying number (current or proposed) or name (see field forms and maps for examples). There are three basic techniques for mapping earthworks; each technique has different advantages. The choice of mapping technique should be based on the extent of the earthworks system, management objectives, available resources, and cost. The critical characteristic of all maps is that they accurately show the location and extent of the resource in relation to other natural and manmade features.

Mapping Techniques

1. GPS Mapping
2. Hand-drawn or computer-aided map
3. Professionally surveyed map

GPS/GIS (Geographic Positioning System/ Geographic Information System) mapping provides an ideal framework for plotting the inventory data. Critical information regarding earthworks can be gathered in the field using a GPS unit; this information is then downloaded into a GIS computer program and made into a basemap with attached data information. The advantage of GPS/GIS technology is that it can collect data relatively quickly and easily for earthworks within a particular area. In fact, this technology has been determined to be the most cost effective, efficient means of collecting data on large systems of earthworks. (See Technical Support Topic #3 - *GPS Mapping Methodology*)

In the absence of such technology, *computer-aided or hand-drawn* diagram maps can be developed to create an adequate working basemap. Both GPS generated maps and hand drawn diagrams are most useful as a planning tool for earthworks management.

A *professionally surveyed map* uses a transit or total station technology to accurately locate landscape features and collect topographic information. Professionally surveyed maps are required for any earthworks management plan that includes extensive intervention, such as large scale clearing or construction of a path system. Maps generated from GPS data and hand drawn/computer generated maps are extremely useful for planning, but they

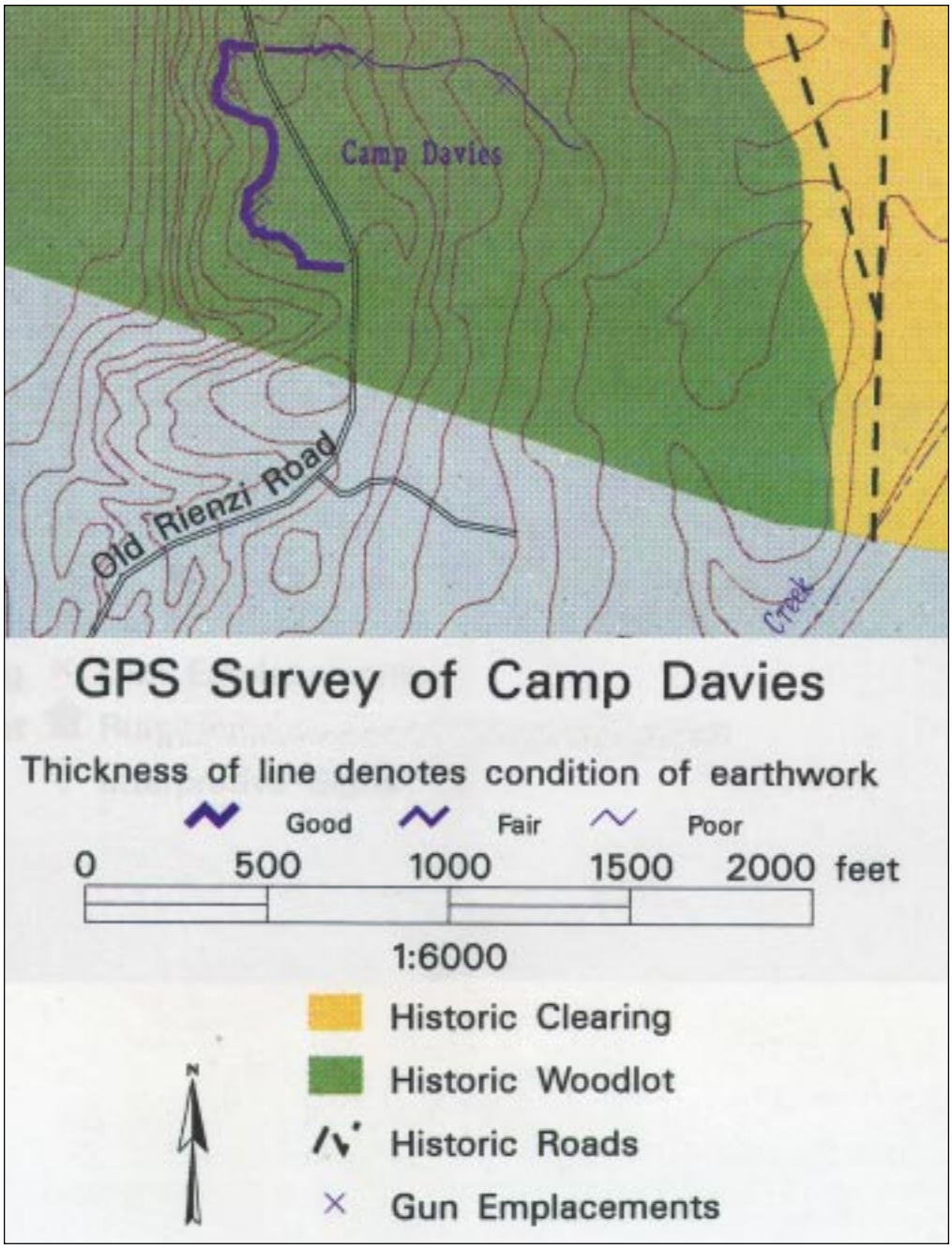


Figure 5.2. Detail from GPS survey map of Camp Davies near Corinth, Mississippi

may not have the accuracy necessary for construction projects.

3. Establishing Management Objectives

Management objectives state the desired results and provide the basic framework for establishing a management strategy described in Part 4 below. Once historical research has been completed and inventory data is portrayed on maps, objectives for earthworks management may be established. This is

best done by a team that includes historians, interpretive staff, historical landscape architects, natural resource specialists, and maintenance personnel. Objectives for management should reflect the three over-arching principles of earthworks management explained in Chapter Two:

1. The management approach should protect and preserve the resource
2. The management approach should be sustainable
3. The management approach should consider earthworks' legibility and aesthetic qualities with interpretation goals.

Within a management area, there may be several objectives - some that relate to the whole resource and some that relate to individual sub-areas. For example, the objective to preserve and protect earthworks by nurturing a healthy, vegetative cover may apply to an entire management area. The objective to interpret earthworks to the public through programs and waysides may apply to discrete sub-areas only.

4. DEVELOPING MANAGEMENT STRATEGIES

Once objectives are established, an earthworks landscape management strategy may be developed for the area and sub-areas. The strategy describes the physical treatment the management area will receive to achieve the stated objectives. Strategies may range from very low impact approaches, such as maintaining an established forest cover intact to high intervention approaches such as clearing forest cover to establish an open condition with a circulation system of wooden boardwalks. The following provides an example of a simple management strategy for a system of breastworks and six forts currently under forest cover.

Objectives:

- To preserve and protect system of earthworks through low maintenance vegetation management.
- To provide public access and interpretation to the two principal forts within the system.

Management Strategy:

- Manage breastworks and non-interpreted forts in forest cover while removing all large canopy trees growing directly on the structures.
- Manage open condition at identified forts by removing forest cover using low impact tree removal techniques. Plant sustainable grass cover to prevent erosion and enhance visibility and legibility of fort structures.
- Develop perimeter pedestrian trail system with wooden viewing platforms at forts.

- Rehabilitate historic vista to the west by thinning forest from Fort A to the adjacent agricultural fields.

Management strategies must balance resource preservation with interpretation needs and they must be developed with a clear understanding of the long-term maintenance implications. All management strategies should be described in writing and identified graphically on a basemap. For additional examples of management strategies, see Chapter6.

5. Developing implementation and maintenance plans

An implementation plan provides clear directions for executing the management strategies. The implementation plan identifies the process, techniques, designs, details, and the work items that are needed to accomplish the strategy described for each management area and sub-area. This plan should also include a schedule and a budget, personnel to do the work, provisions for complying with NEPA and/or Section 106 as appropriate, and a list of items needed to get the project(s) underway (e.g., plans, specifications, details.)

A maintenance plan is developed to provide direction for ongoing preservation maintenance activities of an earthworks management area. A typical plan may include regular inspections, identification of work needed, methods for recording the results of regular earthworks inspections, and a seasonal calendar of earthworks preservation activities. This information should be compiled into a sortable database. The *Guide to Developing a Preservation Maintenance Plan for a Historic Landscape* by the Olmsted Center for Landscape Preservation is a good model to consider when developing such a plan for earthworks management.

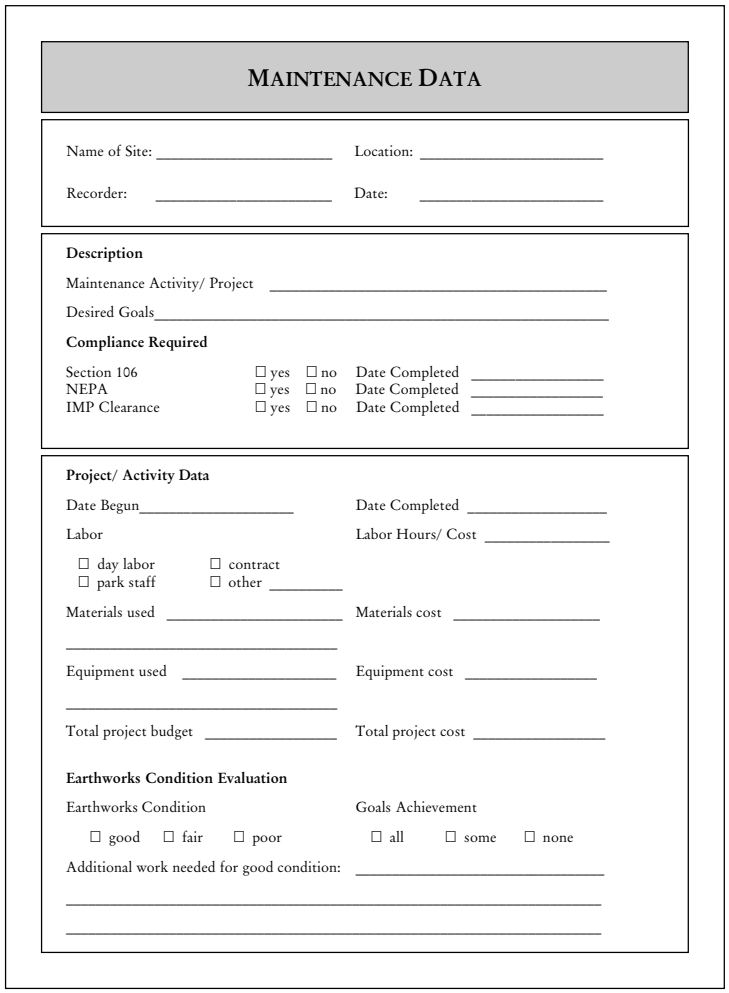
6. Developing Good Maintenance and Management Records

Keeping good maintenance and management records is critical to the process. This includes recording all information from earthworks inspections and collecting information about maintenance activities, labor, materials, equipment and costs. This information may be collected on simple field forms then entered into a maintenance database. The frequency of field inspections and maintenance activities should be identified in the maintenance plan. For earthworks under forest cover, activities and/or inspections may only occur once every two or three years. Earthworks and associated areas managed in open conditions will require more frequent activity.

7. Monitoring and Evaluating Earthworks Management

Monitoring and evaluating the effectiveness of any management plan is a critical step to ensure successful earthworks preservation. The evaluation of the management plan should be based upon its success in meeting all stated objectives and in meeting other management requirements such as budget, labor, materials and equipment. If there is a significant difference, for example, in the cost of actually implementing the strategy versus what was budgeted,

there may be a need to modify your plan either by increasing funding, changing techniques, or reexamining the boundaries of a particular management area. Similarly, if maintaining your earthworks using a core team of student volunteers is not working well, then a new way of obtaining appropriate staff must be considered. A process that works for one manager may not work for another. The efficiency and cost effectiveness of a process largely depends on the resources and capabilities of an individual organization.



MAINTENANCE DATA

Name of Site: _____ Location: _____

Recorder: _____ Date: _____

Description

Maintenance Activity/ Project _____

Desired Goals_____

Compliance Required

Section 106	☐ yes	☐ no	Date Completed _____
NEPA	☐ yes	☐ no	Date Completed _____
IMP Clearance	☐ yes	☐ no	Date Completed _____

Project/ Activity Data

Date Begun_____ Date Completed _____

Labor Labor Hours/ Cost _____

☐ day labor ☐ contract
☐ park staff ☐ other _____

Materials used _____ Materials cost _____

_____

Equipment used _____ Equipment cost _____

_____

Total project budget _____ Total project cost _____

Earthworks Condition Evaluation

Earthworks Condition Goals Achievement

☐ good ☐ fair ☐ poor ☐ all ☐ some ☐ none

Additional work needed for good condition: _____

_____

_____

Figure 5.3. A sample of the field forms for documenting maintenance data found in Chapter 7: Technical Support Topics.

SUMMARY

Successful earthworks preservation depends on a integrated management approach that balances resource preservation with maintenance and interpretation goals. While a management plan must be tailored to meet the unique needs of each park or organization, there are several components that form the basis of the management process: a thorough identification and understanding of the resource, clear management objectives, a clear management strategy, an approach to implementing and maintaining treatments developed from the strategy, keeping good records, and a willingness to modify unsuccessful management strategies.