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# POTENTIAL USEFULNESS OF CARETS DATA FOR ENVIRONMENTAL IMPACT ASSESSMENT

By

Peter J. Buzzanell

U.S. Geological Survey

FINAL REPORT—VOLUME 11  
CENTRAL ATLANTIC REGIONAL ECOLOGICAL TEST SITE  
(CARETS) PROJECT



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POTENTIAL USEFULNESS OF CARETS DATA FOR ENVIRONMENTAL IMPACT ASSESSMENT

By Peter J. Buzzanell

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Robert H. Alexander, 1975, Principal Investigator

- Volume 1.
1. CENTRAL ATLANTIC REGIONAL ECOLOGICAL TEST SITE: A PROTOTYPE REGIONAL ENVIRONMENTAL INFORMATION SYSTEM by Robert H. Alexander
  2. NORFOLK AND ENVIRONS: A LAND USE PERSPECTIVE by Robert H. Alexander, Peter J. Buzzanell, Katherine A. Fitzpatrick, Harry F. Lins, Jr., and Herbert K. McGinty III
  3. TOWARD A NATIONAL LAND USE INFORMATION SYSTEM by Edward A. Ackerman and Robert H. Alexander
  4. GEOGRAPHIC INFORMATION SYSTEM DEVELOPMENTS ASSOCIATED WITH THE CARETS PROJECT by Robin G. Fegeas, Katherine A. Fitzpatrick, Cheryl A. Hallam, and William B. Mitchell
  5. INTERPRETATION, COMPILATION AND FIELD VERIFICATION PROCEDURES IN THE CARETS PROJECT by Robert H. Alexander, Peter W. DeForth, Katherine A. Fitzpatrick, Harry F. Lins, Jr., and Herbert K. McGinty III
  6. COST-ACCURACY-CONSISTENCY COMPARISONS OF LAND USE MAPS MADE FROM HIGH-ALTITUDE AIRCRAFT PHOTOGRAPHY AND ERTS IMAGERY by Katherine A. Fitzpatrick
  7. LAND USE INFORMATION AND AIR QUALITY PLANNING: AN EXAMPLE OF ENVIRONMENTAL ANALYSIS USING A PILOT NATIONAL LAND USE INFORMATION SYSTEM by Wallace E. Reed and John E. Lewis
  8. REMOTELY-SENSED LAND USE INFORMATION APPLIED TO IMPROVED ESTIMATES OF STREAMFLOW CHARACTERISTICS by Edward J. Pluhowski
  9. SHORE ZONE LAND USE AND LAND COVER: CENTRAL ATLANTIC REGIONAL ECOLOGICAL TEST SITE by R. Dolan, B. P. Hayden, C. L. Vincent
  10. ENVIRONMENTAL PROBLEMS IN THE COASTAL AND WETLANDS ECOSYSTEMS OF VIRGINIA BEACH, VIRGINIA by Peter J. Buzzanell and Herbert K. McGinty III
  11. POTENTIAL USEFULNESS OF CARETS DATA FOR ENVIRONMENTAL IMPACT ASSESSMENT by Peter J. Buzzanell
  12. USER EVALUATION OF EXPERIMENTAL LAND USE MAPS AND RELATED PRODUCTS FROM THE CENTRAL ATLANTIC TEST SITE by Herbert K. McGinty III
  13. UTILITY OF CARETS PRODUCTS TO LOCAL PLANNERS: AN EVALUATION by Stuart W. Bendelow and Franklin F. Goodyear (Metropolitan Washington Council of Governments)

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## POTENTIAL USEFULNESS OF CARETS DATA FOR ENVIRONMENTAL IMPACT ASSESSMENT

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By Peter J. Buzzanell

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### Abstract

The National Environmental Policy Act of 1969 requires that Federal agencies prepare environmental impact statements (EIS) for all proposed actions that significantly affect the quality of the environment. The EIS builds a predictive model of beneficial or adverse changes resulting from an action. Environmental impact statement preparation requires identification of environmental, social, and economic conditions likely to change and also requires prediction of intensity and spatial dimensions of changes. The Central Atlantic Regional Ecological Test Site (CARETS) project has produced land use data that can be of value for such assessment.

To ascertain the types of proposed actions requiring EIS's, all EIS's prepared for proposed actions in the test site between January 1970 and June 1974 were reviewed. The actions were divided into seven categories: (1) construction of transportation and communication facilities; (2) construction of power plant, powerline, and fuel line facilities; (3) urban renewal, new town development projects, and multi-story building construction; (4) construction of facilities for watershed

protection and development; (5) construction of waste treatment and disposal facilities; (6) maintenance dredging, navigation improvements, and beach erosion control and replenishment projects; and (7) establishing or enhancing land and water conservation areas. Examples of actions from each category were selected for more detailed study. In view of the types of projects being proposed, an approach to environmental impact assessment using land use and water data as central inputs was recommended. The viability of such an approach as well as other approaches depends upon the availability of quantitative data such as those produced by the CARETS project.

## INTRODUCTION

The Central Atlantic Regional Ecological Test Site (CARETS) project is designed as a regional monitoring system to assist in the assessment of the effects that past, present, and potential land and water use changes have on the environment. Given that purpose, CARETS data have been integrated into a useful regional environmental information system that includes resource inventory as well as change detection capabilities. The goal of the project is to demonstrate the feasibility of providing accurate and timely environmental information to those who make decisions affecting the use of land and water resources.

Federal departments, bureaus, and agencies have major roles in national environmental decision making. A score of these organizations have direct responsibility over the management and use of public land and water resources (table 1), and their actions have significant impacts on environmental quality. In 1969 Congress passed the National Environment Policy Act (PL 91-190), which requires these organizations to explore the environmental ramifications of their actions. Section 102 of the act requires that environmental impact statements (EIS) be prepared by responsible officials in all Federal agencies preceding any major actions that significantly affect the quality of the environment (Council on Environmental Quality, 1973).

Since the enactment of the legislation, over 4,000 environmental impact statements have been filed with the Council on Environmental

Table 1--Jurisdiction of Federal agencies relating to land use and land resource management \*

LAND USE CHANGES, PLANNING AND REGULATION OF LAND DEVELOPMENT

DEPARTMENT OF AGRICULTURE

Forest Service (forest lands)

Agriculture Research Service (agricultural lands)

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

DEPARTMENT OF THE INTERIOR

Office of Land Use and Water Planning

Bureau of Land Management (public lands)

Bureau of Indian Affairs (Indian lands)

Bureau of Sport Fisheries and Wildlife (wildlife refuges)

Bureau of Outdoor Recreation (recreation lands)

National Park Service (NPS units)

DEPARTMENT OF TRANSPORTATION

ENVIRONMENTAL PROTECTION AGENCY (pollution effects)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (remote sensing)

RIVER BASINS COMMISSIONS (as geographically appropriate)

PUBLIC LAND MANAGEMENT

DEPARTMENT OF AGRICULTURE

Forest Service (forests)

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

Bureau of Indian Affairs (Indian lands)

Bureau of Sport Fisheries and Wildlife (wildlife refuges)

Bureau of Outdoor Recreation (recreation lands)

National Park Service (NPS units)

FEDERAL POWER COMMISSION (project lands)

GENERAL SERVICES ADMINISTRATION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (remote sensing)

TENNESSEE VALLEY AUTHORITY (project lands)

\*Source: Council on Environmental Quality, 1973

Table 1--Continued\*

REDEVELOPMENT AND CONSTRUCTION IN BUILT-UP AREAS

## DEPARTMENT OF COMMERCE

Economic Development Administration (designated areas)

## DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

## DEPARTMENT OF THE INTERIOR

Office of Land Use and Water Planning

## DEPARTMENT OF TRANSPORTATION

## ENVIRONMENTAL PROTECTION AGENCY

## GENERAL SERVICES ADMINISTRATION

## OFFICE OF ECONOMIC OPPORTUNITY

PROTECTION OF ENVIRONMENTALLY CRITICAL AREAS - FLOOD PLAINS, WETLANDS,  
BEACHES AND DUNES, UNSTABLE SOILS, STEEP SLOPES, AQUIFER RECHARGE AREAS, ETC.

## DEPARTMENT OF AGRICULTURE

Agricultural Stabilization and Conservation Service

Soil Conservation Service

Forest Service

## DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration (coastal areas)

## DEPARTMENT OF DEFENSE

Army Corps of Engineers

## DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (urban and flood plain areas)

## DEPARTMENT OF THE INTERIOR

Office of Land Use and Water Planning

Bureau of Outdoor Recreation

Bureau of Reclamation

Bureau of Sport Fisheries and Wildlife

Bureau of Land Management

Geological Survey

## ENVIRONMENTAL PROTECTION AGENCY (pollution effects)

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (remote sensing)

## RIVER BASINS COMMISSION (as geographically appropriate)

## WATER RESOURCES COUNCIL

\*Source: Council on Environmental Quality, 1973

## Table 1--Continued\*

LAND USE IN COASTAL AREAS

## DEPARTMENT OF AGRICULTURE

Forest Service

Soil Conservation Service (soil stability, hydrology)

## DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration (impact of marine life and coastal zone management)

## DEPARTMENT OF DEFENSE

Army Corps of Engineers (beaches, dredge and fill permits, Refuse Act permits)

## DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (urban areas)

## DEPARTMENT OF THE INTERIOR

Office of Land Use and Water Planning

Bureau of Sport Fisheries and Wildlife

National Park Service

Geological Survey

Bureau of Outdoor Recreation

Bureau of Land Management (public lands)

## DEPARTMENT OF TRANSPORTATION

Coast Guard (bridges, navigation)

## ENVIRONMENTAL PROTECTION AGENCY (pollution effects)

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (remote sensing)

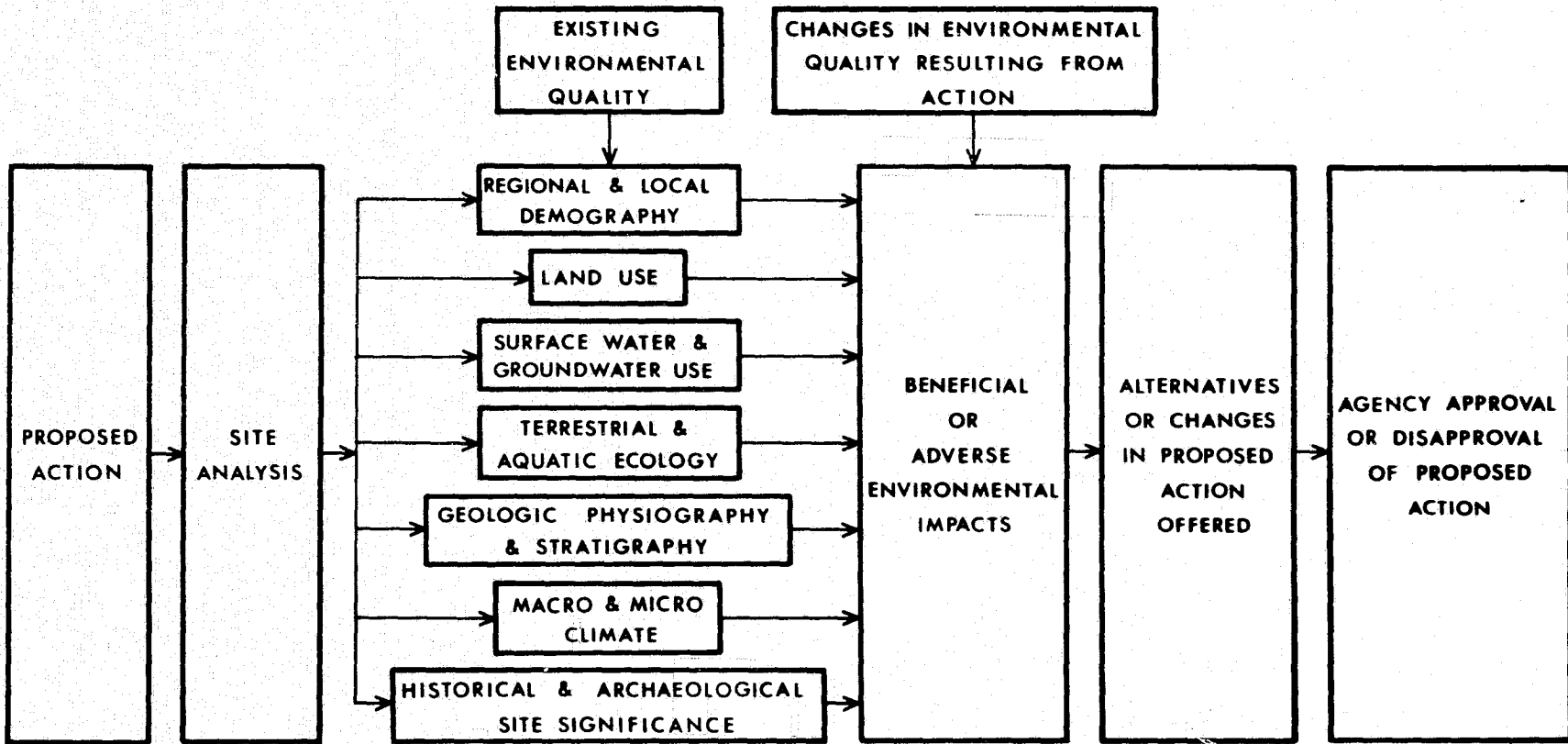
\*Source: Council on Environmental Quality, 1973

Quality (Twiss, 1973). Between January 1970 and June 1974, 20 Federal agencies prepared over 150 statements for projects within the CARETS region. A review of these statements is valuable for two reasons. First, it reveals the types of actions that significantly affect the environment and reveals the spatial distribution of proposed actions and their potential impacts. Second, such a review can provide an established set of methodologies for assessing environmental impact, which facilitates evaluating the utility of CARETS data for these environmental assessments.

The National Environmental Policy Act (NEPA) provides that EIS's be prepared before major Federal actions are undertaken so that (1) decision makers and the public will have an understanding of the potential environmental effects of proposed actions; (2) adverse effects will be avoided or minimized; (3) alternative actions will be researched; (4) long- and short-term implications of proposed actions will be evaluated; and (5) environmental assessments will be considered along with assessments of the net economic, technical, and other benefits of proposal actions.

Council on Environmental Quality guidelines (CEQ, 1973) have sought to standardize the environmental impact assessment process. The EIS's prepared under these guidelines provide environmental situation reports for particular sites and review a project site's existing environmental quality in terms of biological and physical parameters as well as man's present and past interaction with land and water resources (figure 1). The EIS builds a predictive model of

# Environmental Impact Assessment



Based on Council on Environmental Quality guidelines of 1971 and 1973.

Figure 1



the beneficial or adverse environmental impacts of changes in existing environmental quality resulting from the proposed action. In light of these changes, the EIS recommends alternatives to the action or changes in project design. The responsible agency then either approves or disapproves of the proposed project. Ideally, then, the EIS plays an integral role in establishing qualitative and quantitative criteria for evaluating the proposed project during the project planning and decisionmaking process.

The utility of a given EIS in the planning process depends on several variables, including the expertise of those preparing the statement, the time and money allotted for that preparation, and the availability of appropriate data. Expensive and time consuming, field data collection is held to a minimum and usually represents a small percent of funds allotted for the preparation of the statement. The EIS preparers thus rely heavily on existing data, which often are spotty and result in impact statements of variable quality.

Commonly the difference between a good environmental impact statement that benefits all parties concerned and a poor EIS that benefits no one can be traced to the availability of information needed to analyze and describe the implications of the project under consideration. Although the required information varies from project to project, two sets of issues are common to all EIS's:

- 1) The need to identify the environmental, social, and economic conditions that may be changed by the project, and
- 2) The need to predict the intensity and spatial dimensions of the changes likely to occur.

Documentation of these points requires quantitative data on population and land use distribution and change trends--the type of data generated by the CARETS project (table 2).

In addition to site specific data, the CARETS design provides Federal and State agencies with an opportunity to monitor and investigate areas of existing and potential environmental change, both natural and manmade. Table 3 lists activities and actions that have an impact on the environment.

Between 1970 and 1974, 150 environmental impact statements were filed with the Council on Environmental Quality for proposed actions in the CARETS region. These statements are representative of the many EIS's prepared nationwide each year for proposed actions in large urban areas. They may be grouped into seven categories:

- 1) Construction of highways, bridges, transportation, or communication facilities;
- 2) Construction of power plants, powerline and pipeline facilities;
- 3) Urban renewal or new town development projects and multistory building construction;
- 4) Construction of facilities for watershed protection and development;
- 5) Construction of waste treatment disposal facilities;
- 6) Maintenance dredging, navigation improvement, and beach erosion control and replenishment projects;
- 7) Establishing or enhancing land and water conservation areas.

Representative actions for each of the seven categories have been selected for critique and discussion in the following sections. Accompanying maps show the locations of the various actions.

Table 2--CARETS products, available or potentially available

\*I. Raw data products

High-altitude color infrared photography, 1:120,000, 1970, 1972, 1973  
 ERTS imagery, 70-mm and 9.5-inch transparencies at 18-day intervals  
 ERTS imagery, black and white prints of single bands, 1:100,000  
 ERTS diazochrome, color transparencies, 1:1,000,000  
 ERTS black and white single band prints, 1:250,000  
 ERTS color-composite transparencies, color infrared format, 1:250,000  
 1972, 1973

\*II. Processed graphics

Photomosaic with UTM grid, black and white, 1:100,000, 1970  
 Land use map 1:100,000, Level II, aircraft data, 1970, 1972  
 1970-72 land use change 1:100,000  
 Major drainage basins overlay, 1:100,000  
 Census tract overlay in SMSA's county boundaries, outside SMSA, 1:100,000  
 Culture and locational feature, overlay, 1:100,000  
 1970 land use 1:250,000 derived from ERTS Level I  
 Landforms and surface materials maps  
 Orthophotoquads 1:24,000, 1:50,000  
 Land use overlay to orthophotoquads, 1:24,000, 1:50,000  
 ERTS gridded image, 1:500,000  
 ERTS location and county boundary overlay

III. Computer plots of land use

1:250,000 ERTS and 1:100,000 data plots  
 Plot of all land uses: 1970 - 1:100,000; 1972 - 1:100,000; 1972 - 1:250,000;  
 1973 - 1:250,000  
 Plot of urban and built up land only, 1970 and 1972, ERTS 1972  
 Plot of urban and built up change, 1970-72  
 Plot of agricultural land only, 1970, 1972, ERTS 1972  
 Plot of agricultural land change, 1970-72  
 Plot of forest land only, 1970, 1972, ERTS 1972  
 Plot of forest land change, 1970-72  
 Plot of nonforested wetlands only, 1970, 1972, ERTS 1972

---

\*Presently available

## Table 2--Continued

Plots of nonforested wetland change, 1970-72

Plot of barren land only, 1970, 1972 ERTS, 1972

Plot of barren land change, 1970-72

IV. Data listings and summaries

1. \*Area measurements of land use Level II from 1:100,000 aircraft data 1970:

\*By county and independent city

By major drainage basin

\*By census tract

By geologic map units

By individual polygons

By kilometre cells

2. Area measurements of land use change estimated from 1972-73 from ERTS imagery, 1:250,000:

By county or independent city

By census tract

By geologic map units

By individual polygons

By kilometre cells

Other data summaries or computations

V. Analytical reports

\*Interpretive analysis of land use patterns and changes

Analysis of regional land use trends in regions adjacent to user's area of interest

\*Analysis of accuracy of region's land use data

\*Sources and interpretation of remote-sensing data

\*Procedures for developing and maintaining remote-sensing-based land use information system

Description of Federal, State, and local governmental programs involving land use data, affecting the user's region of interest

Hydrologic impact of land use patterns and changes in the region of interest

\* Geological factors affecting land use in the region of interest

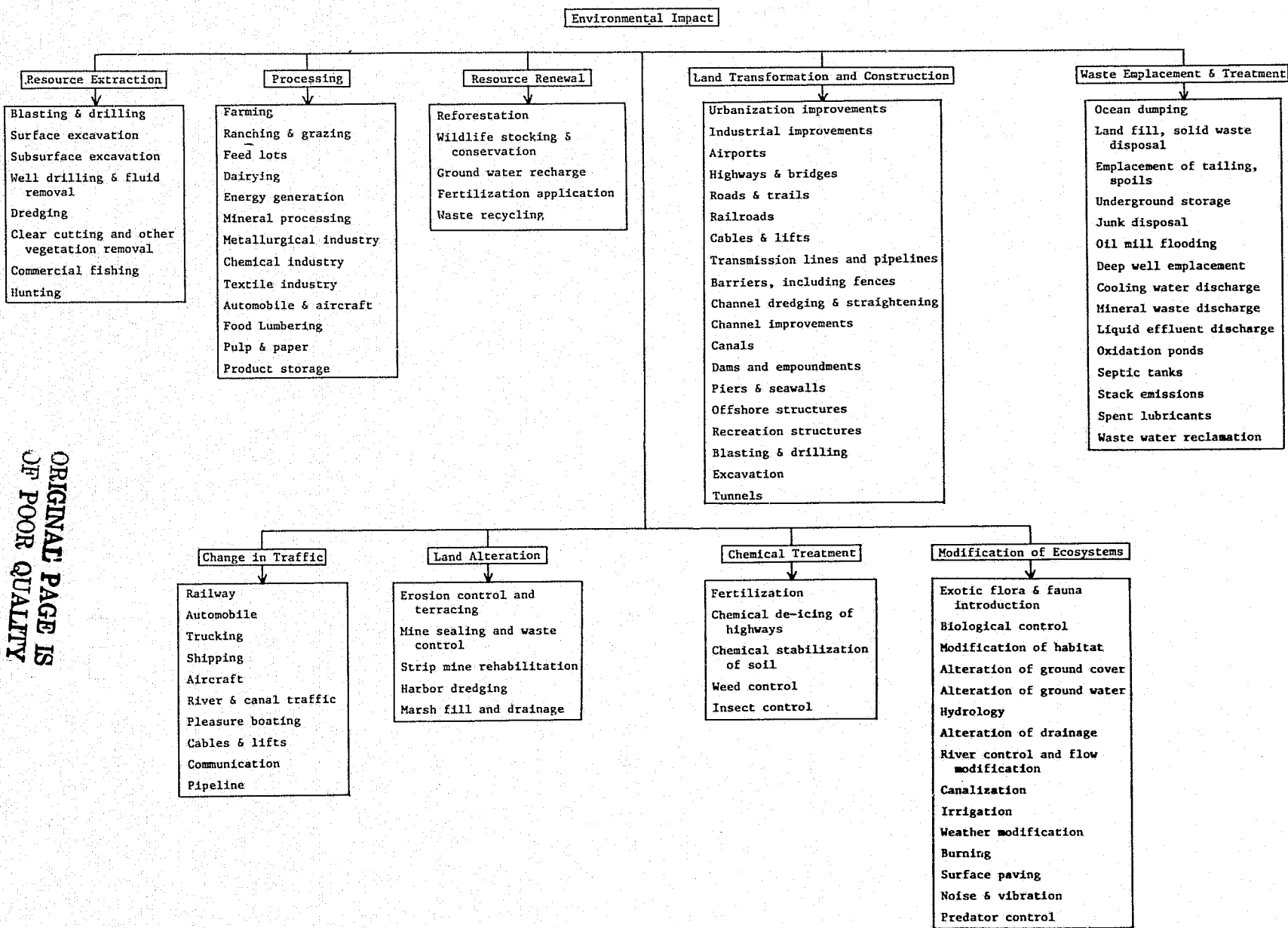
\* Interpretation of coastal and wetland environmental problems associated with land use patterns and change

\* Air quality impact of land use patterns and change in the region of interest

---

\*Presently available

Table 3--Actions that may cause environmental impact\*



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\*Adapted from Twiss, 1972

## CONSTRUCTION OF TRANSPORTATION AND COMMUNICATION FACILITIES

Construction projects involving transportation and communication facilities are significant in number and in aggregate areal extent; 48 such projects were filed for the CARETS area through June 1974 (table 4). Varying from regional highway corridor projects to mass transportation systems, these actions are concentrated in urban areas, especially in the Baltimore-Washington corridor (figure 2). The U.S. Department of Transportation and the State departments of transportation are responsible for the planning of these projects and the preparation of the environmental impact statements.

Transportation project actions are often characterized by linear dimensions, usually resulting in the distribution of environmental and socioeconomic impacts along a "corridor." Land use changes resulting from these actions vary with the size of the project. The indirect effect on land use also be dramatic as exemplified by "strip" commercial and residential development resulting from the construction or improvement of a highway. The proposed rapid rail system in Philadelphia and the relocation of U.S. Route 140 in Baltimore typify these types of actions.

The city of Philadelphia has proposed the construction of a rapid rail system between Suburban Station/Penn Center and the passenger terminal at Philadelphia International Airport (U.S. Department of Transportation, 1974). The rail line will be 15 km long, and much of the alignment will use existing Penn Central Railroad tracks and rights-of-way. The city's Department of Public Property is seeking an 80 percent capital grant assistance under the

Table 4--CARETS area environmental impact statements relating to the construction of highways, bridges, transportation and communication facilities

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	New Castle	Delaware Route 141, Center Road	07-09-73	DOT	Highway improvement
Delaware	New Castle	Delaware Route 397, Ott's Chapel Road	10-18-73	DOT	Highway improvement and widening
Delaware	New Castle	Penn Central and B&O Railroad Grade Separations	05-02-74	DOT	Construction of trans- portation facilities
Delaware	New Castle	Relocation of DuPont Road, Route 100	04-24-73	DOT	Highway reconstruction
Delaware	New Castle	Ruthby Road, Delaware	11-12-73	DOT	Highway improvement
Delaware	New Castle	South Chapel Street	04-24-73	DOT	Highway improvement
Delaware	Sussex	Fenwick Island, State Road 14	10-30-70	DOT	Highway construction and improvement
D.C.		I-95, Center Leg of the Inner Loop Freeway	03-18-74	DOT	Highway construction
D.C.		Washington Metro System	02-28-73	DOT	Construction of mass transportation system
Maryland	Anne Arundel	I-75 and S.R. 5	05-24-72	DOT	Highway construction
Maryland	Anne Arundel	Maryland Route 100	03-07-73	DOT	Highway construction
Maryland	Baltimore	Baltimore Region Rapid Transit System	10-02-72	DOT	Construction of trans- portation facilities
Maryland	Baltimore	Bridge Across Patapsco River from Hawkins Point to Sollers Point	05-19-72	DOT	Bridge and highway construction

Table 4--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Maryland	Prince Georges	Route 193 (relocated)	03-14-73	DOT	Highway construction
Maryland	Prince Georges	Route 210	04-25-73	DOT	Highway improvement
Maryland	Prince Georges	Route 197	05-10-73	DOT	Highway construction
Maryland	St. Mary's	Route 235	05-25-73	DOT	Highway construction
Maryland	Worcester	Route 113	06-11-73	DOT	Highway construction
New Jersey	Atlantic	U.S. 206 Freeway-Hammonton Bypass	10-31-72	DOT	Highway construction
New Jersey	Burlington	Route 130	05-17-72	DOT	Highway construction and improvement
New Jersey	Burlington	Route I-895 from Route I-95 in Bucks Co. to Route I-295 in Burlington Co.	06-27-73	DOT	Highway construction
New Jersey	Gloucester	Route 55-Freeway	06-14-72	DOT	Highway construction
New Jersey	Gloucester	Route 322-Freeway	08-28-72	DOT	Highway construction
New Jersey	Ocean	Wills Hole Crossing, Point Pleasant Beach	09-22-70	DOT	Highway and bridge construction
Pennsylvania	Delaware	I-95, Delaware Expressway	08-20-73	DOT	Highway construction
Pennsylvania	Delaware	Mid-County Expressway	08-30-72	DOT	Highway construction
Pennsylvania	Philadelphia	Rapid Rail System: Penn Central to International Airport	01- -73	DOT	Construction of a mass transportation system



Table 4--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Maryland	Baltimore	I-70N	11-17-72	DOT	Highway construction
Maryland	Baltimore	I-170, Pulaski Street to Pine Street	01-10-73	DOT	Highway construction
Maryland	Baltimore	I-95, Canton Avenue to Russell Street	04-17-74	DOT	Highway construction
Maryland	Baltimore	Relocated Route 140	03-01-73	DOT	Highway construction
Maryland	Baltimore	Whitemarsh Blvd., S.R. 43	04-07-73	DOT	Highway construction
Maryland	Calvert	Maryland Route 2 and Maryland Route 4	09-11-73	DOT	Highway construction
Maryland	Calvert	Patuxent River Bridge	08-19-70	DOT	Bridge and highway construction
Maryland	Charles	Route 210, Indian Head Highway	04-25-73	DOT	Highway construction
Maryland	Dorchester	Route 16	05-16-72	DOT	Highway construction
Maryland	Frederick	U.S. Route 15	12-19-72	DOT	Highway construction
Maryland	Howard	I-95 and S.R. 5	05-24-72	DOT	Highway construction
Maryland	Montgomery	Route 183, Randolph Road	09-04-73	DOT	Highway construction
Maryland	Montgomery	Route 198	08-10-73	DOT	Highway construction
Maryland	Montgomery	Shady Grove Road	08-31-73	DOT	Highway construction
Maryland	Prince Georges	Route 414 and I-495	09-22-72	DOT	Highway construction

Table 4--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Virginia	Arlington	I-66 Corridor Transportation Alternatives	11-16-73	DOT	Study of transportation modes
Virginia	Arlington	Route 595	06-28-73	DOT	Highway construction
Virginia	Fairfax	Fairfax County Airport	12-31-70	DOT	Transportation planning statement
Virginia	Isle of Wight	Bridge and Approaches to Cypress Creek	07-27-72	DOT	Highway and bridge construction
Virginia	Norfolk	Route 164	06-14-72	DOT	Highway construction
Virginia	York	Interstate 64	02-14-73	DOT	Highway construction and improvement

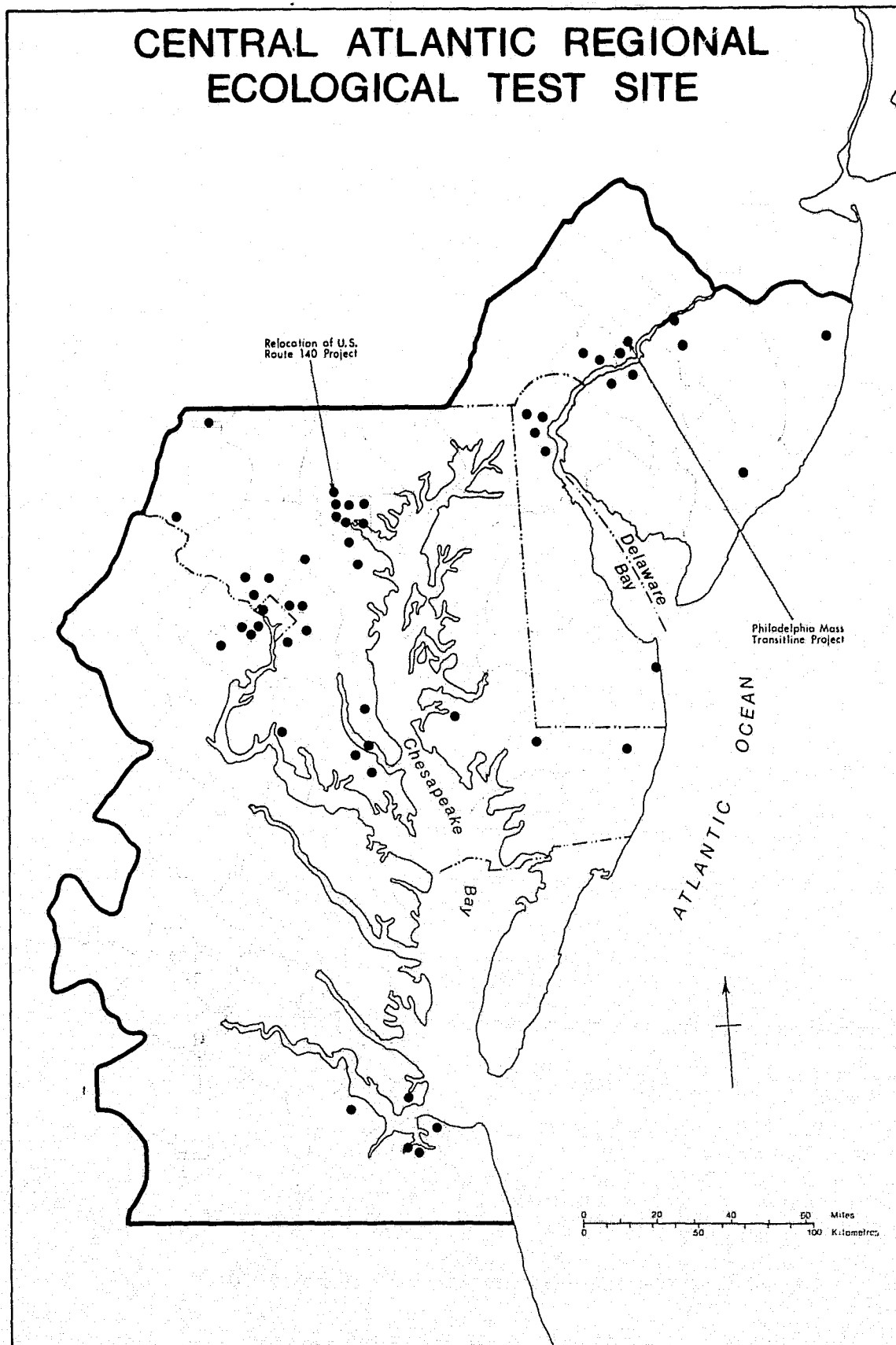


Figure 2--Distribution of projects requiring EIS relating to the construction of highways, bridges, transportation, and communication facilities.

Urban Mass Transportation Act of 1964 (PL 88-365). The total cost of the project is expected to be more than \$60 million. The projected environmental impacts are listed in figure 3. The long term gains from the potential improvement in traffic flow, fuel savings, and reduced air pollution are balanced against the adverse impacts related to the system's noise pollution and short-term construction impacts. The viability of the project and its alternatives (i.e. exclusive downtown airport busway lines) must be weighted in a detailed cost-benefit analysis. Since the system will largely use existing railroad right-of-ways, the impact on existing land use should be small.

The Maryland State Highway Administration and the U.S. Urban Mass Transportation Administration have prepared a comprehensive environmental impact statement for U.S. Route 140 (U.S. Department of Transportation, 1973). The action calls for the construction of a six-lane divided highway for U.S. Route 140 from Wabash Avenue in Baltimore City to the intersection of U.S. Route 30, north of Reisterstown, a total length of 23 km. The highway administration sees the project as providing a safer, more efficient transportation system with accompanying increased social and economic opportunities. The displacement of residents, conflict with a potential stream valley park along Gwynn's Falls, and increases in noise levels appear to be the major adverse effects (figure 4). According to the State, however, relocation assistance services and payments, effective sediment control measures, landscaping, and noise barriers will minimize these negative impacts.

The types of land use along the corridor differ considerably. The area from Baltimore City to the Baltimore beltway is almost completely developed with medium density residential housing and scattered commercial

Figure 3

## Airport - Penn Central Mass Transportation Line

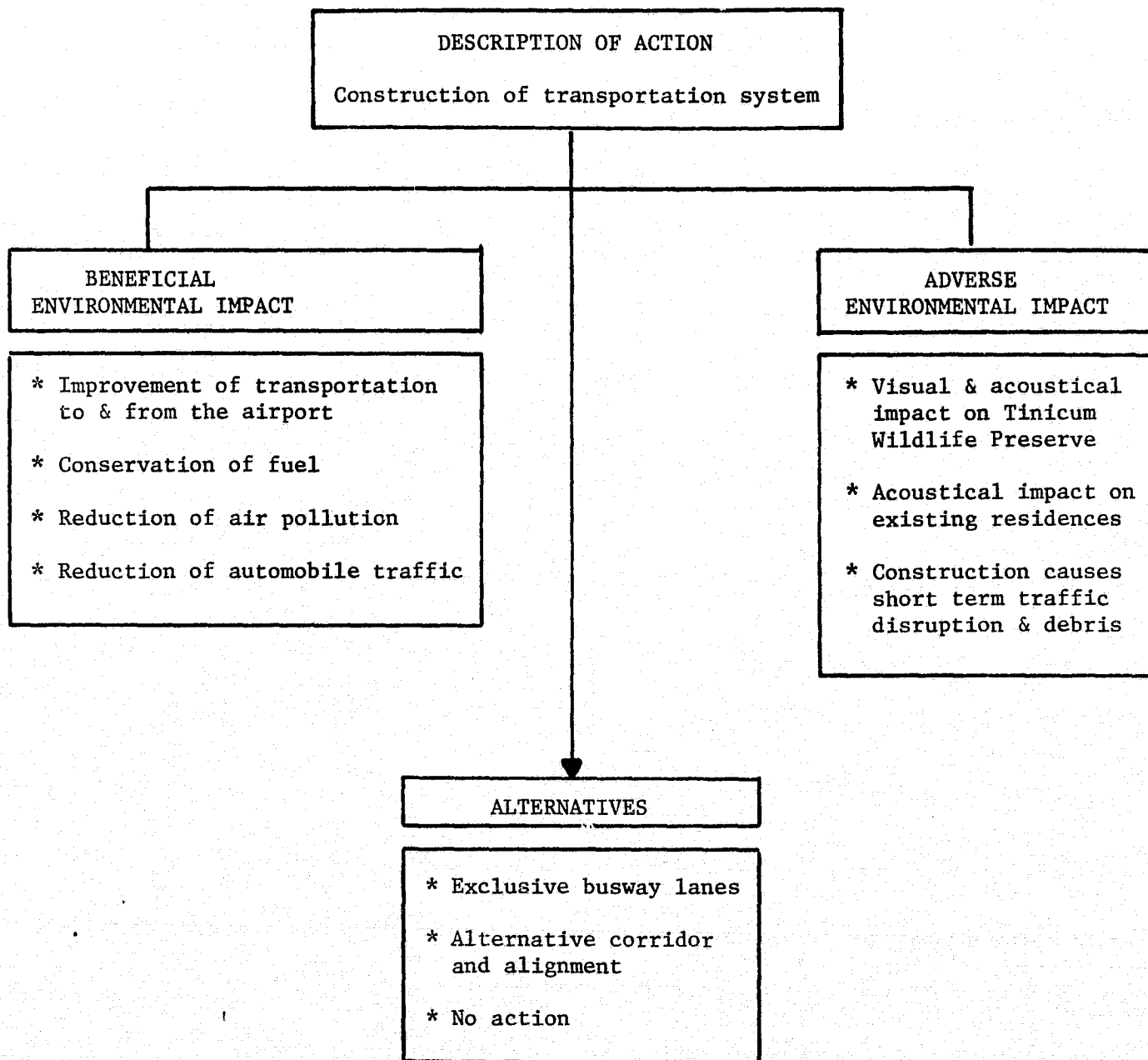
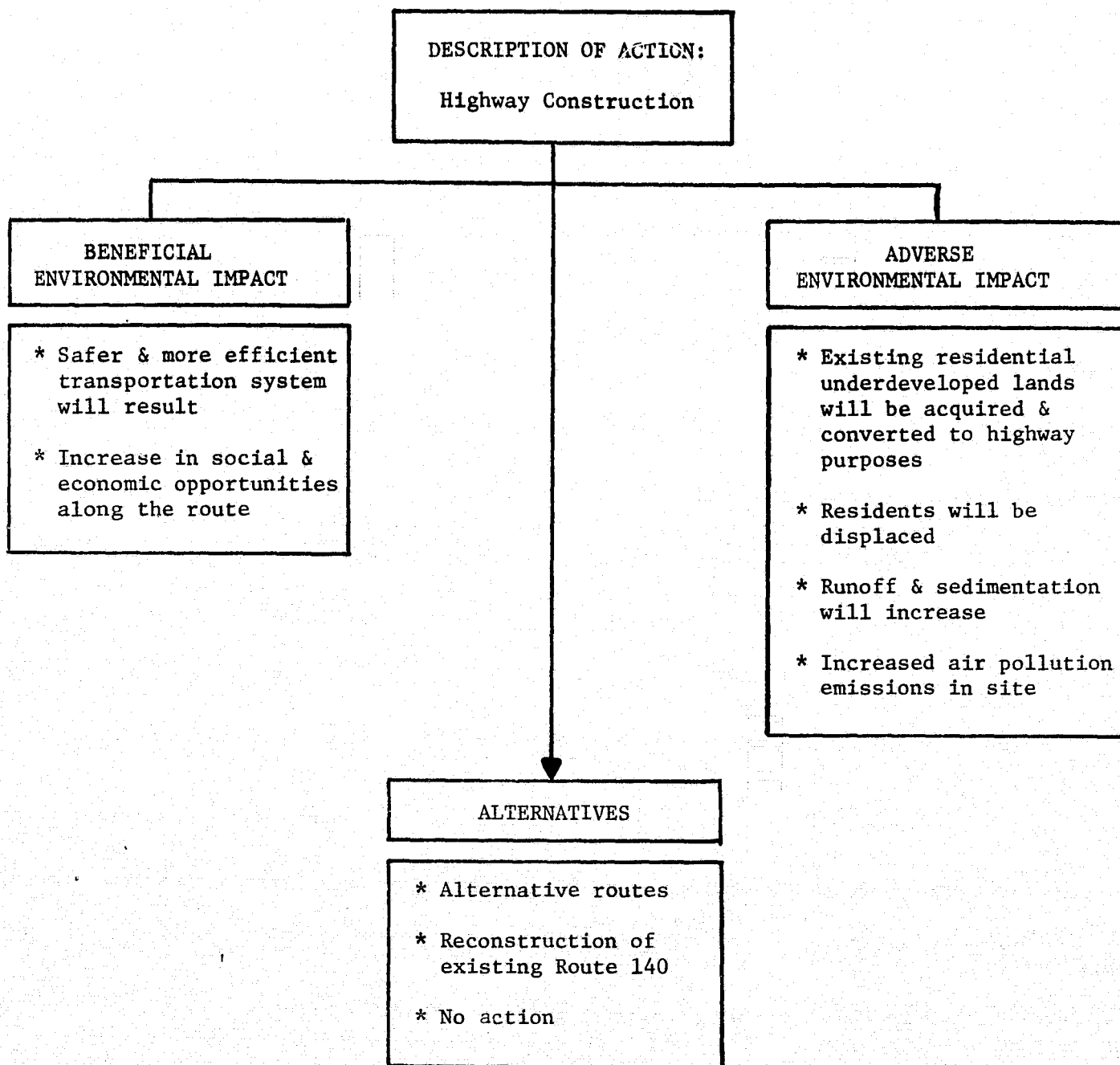


Figure 4

Relocation of U. S. Route 140 (Northwest Expressway)

Baltimore City Line to Reisterstown



establishments. Existing land use in the area from the Baltimore beltway to Owings Mills consists of scattered low- and medium-density housing and strip commercial and industrial development. In the area from Owings Mills to Reisterstown, residential development and strip areas are confined to the project corridor. Proposed development west of Reisterstown Road will be residential with planned commercial centers serving the area's needs (U.S. Department of Transportation, 1973). The entire corridor from Baltimore City to Reisterstown will become increasingly vehicle-oriented as the project is implemented. Land use inventory, monitoring of change, and planning are essential to the development of a quality intraurban setting and the maintenance of environmental quality.

#### CONSTRUCTION OF POWER PLANT, POWERLINE, AND PIPELINE FACILITIES

The construction of power plant, powerline, and pipeline facilities are of high relevance in meeting the nation's energy problems. The need for increased energy supplies has led to a rapid increase in these types of actions (table 5). The push for nuclear energy is particularly evident in the CARETS study area (figure 5), where several nuclear power plants have been proposed or are under construction. Two examples of these types of actions are the proposed pipeline in southeastern Pennsylvania and the nuclear power plant at Calvert Cliffs, Maryland.

A proposed 139-km interstate insulated pipeline to be routed through Bucks, Chester, Delaware, Montgomery, and North Hampton Counties, Pennsylvania, will originate at a marine docking facility in Marcus Hook

Table 5--CARETS area environmental impact statements relating to the construction of power plant and power and fuel line facilities

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	New Castle	Edgemoor Stream Electric Generating Station	04-05-73	Delaware River Basin Commission	Construction of power plant facilities
Delaware	New Castle	Summit Power Station: Units 1 and 2	07-12-72	Atomic Energy Commission	Construction of a nuclear power plant
D.C.		Capital Power Plant	02-13-73	Atomic Energy Commission	Construction of power plant
New Jersey	Burlington	Newbold Island Nuclear Generating Station	12-22-72	Atomic Energy Commission	Construction of nuclear power plant
New Jersey	Ocean	Forked River Nuclear Generating Station	08-19-70	Atomic Energy Commission	Construction of nuclear power plant
New Jersey	Ocean	Oyster Creek Nuclear Generating Station	07-10-73	Atomic Energy Commission	Construction of nuclear power plant
New Jersey	Salem	Salem Nuclear Generating Stations - Units 1 and 2	04-09-73	Atomic Energy Commission	Construction of nuclear power plant
New Jersey	Salem	Delaware River Power Line Crossing	05-04-73	Corps of Engineers	Construction of power lines
Maryland	Calvert	Calvert Cliffs Nuclear Power Plant	04-09-73	Atomic Energy Commission	Construction of nuclear power plant
Maryland	Charles	Douglas Point, Nuclear Generating Station	05-14-74	Atomic Energy Commission	Construction of nuclear power plant
Maryland	Charles	Transmission Line, Ryceville to Lexington Park	03-18-74	USDA	Construction of 230KV powerline



Table 5--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Pennsylvania	Bucks, Chester, Delaware, Montgomery	Proposed Interstate Energy Company Pipeline	01-02-74	Delaware River Basin Commission	Interstate energy company fuel oil pipeline
Pennsylvania	Delaware	Eddystone Generating Station	06-06-72	Delaware River Basin Commission	Construction of power plant facilities
Pennsylvania	Montgomery	Limerick Station, Units I and II	11-14-73	Atomic Energy Commission	Construction of power plant facilities
Virginia	Surry	Surry Power Station, Units 1-4	06-03-74	Atomic Energy Commission	Construction of a power station

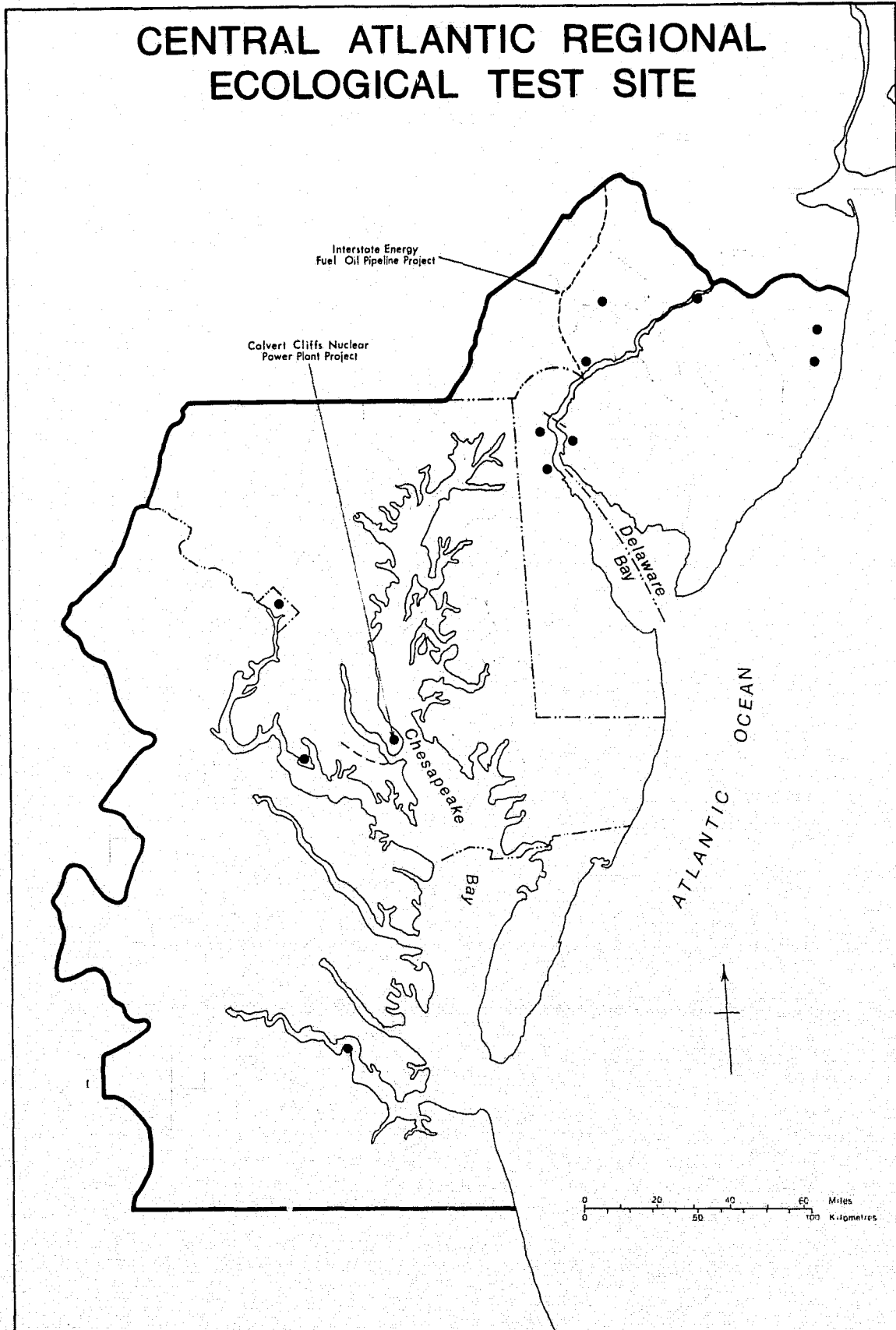


Figure 5--Distribution of power plant and power and pipeline facility construction projects requiring environmental impact statements.

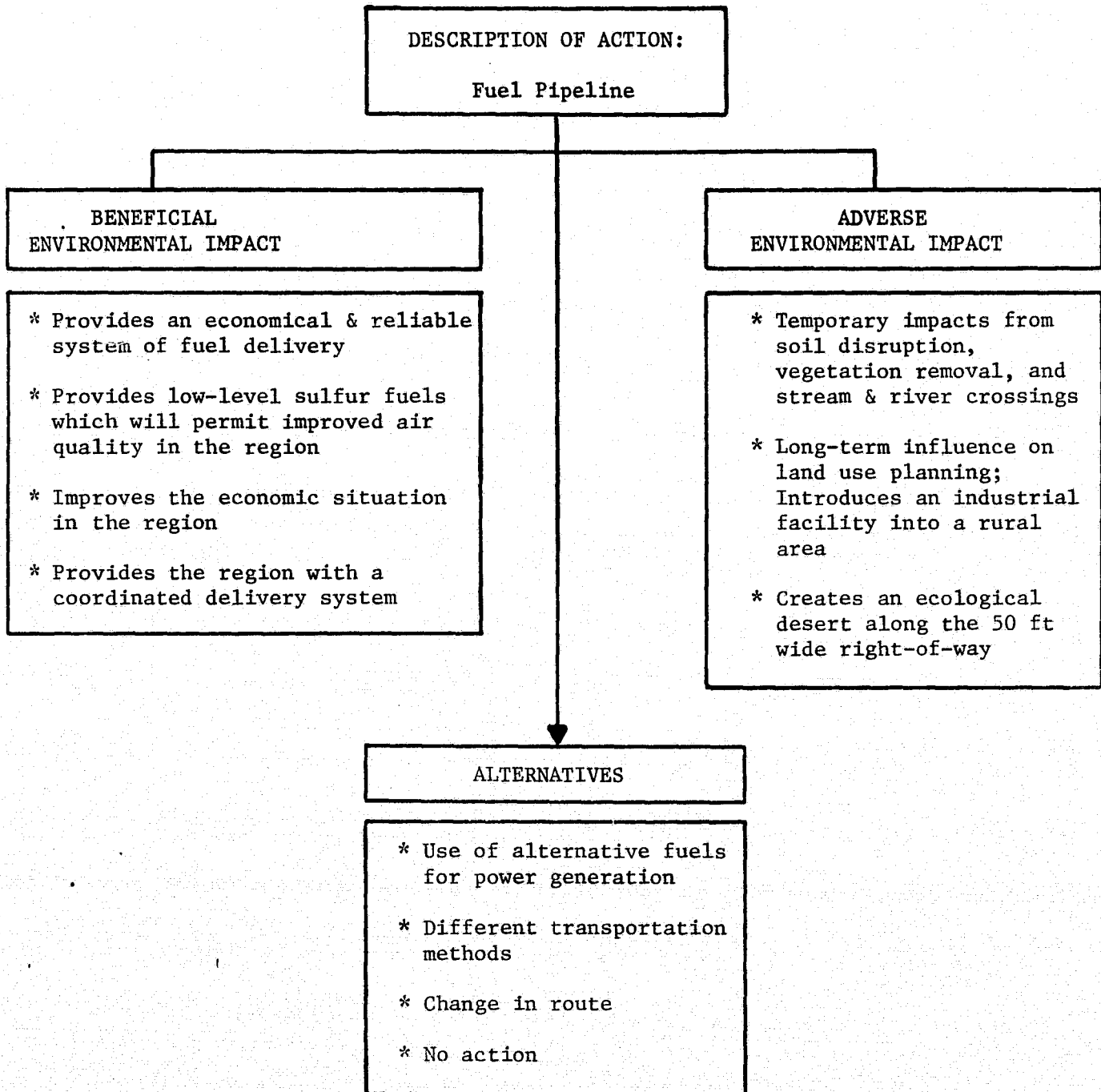
and terminate at the Pennsylvania Power and Light Company's Martin's Creek Power Plant (Delaware River Basin Commission, 1974). The pipeline will transport 36 million barrels of low-sulphur fuel oil per year. The Delaware River Basin Commission has prepared the draft environmental impact statement on the project. The system will be monitored from a central station and will incorporate automatic shutdown devices and waste water treatment facilities to minimize damage from a possible pipeline break. The use of low-sulphur fuel oil should minimize the amount of sulphur-related air pollution generated at the Martin's Creek Plant.

The economic and environmental impacts projected for this project are shown in figure 6. The adverse environmental impacts relating to the construction of the pipeline are the disruption of soil and vegetation along the route and the long-term influence of the 16-m wide right-of-way on land use and the local ecology. In the right-of-way maintenance, vegetation will be restricted to annual grasses, and the development of natural climax vegetation will be prevented by the use of herbicides and periodic clear-cutting. This artificial ecological condition will have a significant impact on wildlife along the route.

Several proposed and operational nuclear power plants are located in the study area (figure 5). The Calvert Cliffs plant provides an excellent example of the potential and actual environmental impacts resulting from the construction and operation of such plants (U.S. Atomic Energy Commission, 1973). This plant is located on the western shore of the Chesapeake Bay in a primarily rural area. The total area of the plant

Figure 6

## Interstate Energy Company Fuel Oil Pipeline



site is 460 ha. Approximately 40 ha of forest land bordering the shoreline have been converted to industrial uses, and another 40 ha of a forested ravine are being filled with dredge spoils. The Atomic Energy Commission provides a detailed description of the plant's operation:

"The Calvert Cliffs plant uses a pressurized-water reactor having a core power rating of 2,560 megawatts thermal (MWt) with a net power output per unit of 845 megawatts electrical (MWe). The total waste heat to be dissipated during full power operation of the two units will be about 3,500 MWt (12 billion British thermal units per hour). Waste heat will be dissipated by pumping about 5,500 cubic feet per second (cfs) (2,400,000 gallons per minute) of saltwater from the Chesapeake Bay through steam condensers, elevating the water temperature by 10°F, and returning the water directly to the Bay." (U.S. Atomic Energy Commission, 1973).

Figure 7 presents the projected environmental impacts for this project. The Atomic Energy Commission (AEC) in its assessment has determined that no serious environmental or human problems will arise from the plant's normal operations. The AEC has developed biological, hydrological, and radiological monitoring programs that will provide data on the plant's impact, particularly as it relates to the ecology of the Chesapeake Bay.

#### URBAN RENEWAL, NEW TOWN DEVELOPMENT PROJECTS

#### AND MULTISTORY BUILDING CONSTRUCTION

Urban construction actions, though differing considerably in basic objectives, are aggregated here on the basis of their similar impacts on the environment (table 6). The projects are fairly well distributed throughout the CARETS region (figure 8).

Figure 7

## Calvert Cliffs Nuclear Power Plant

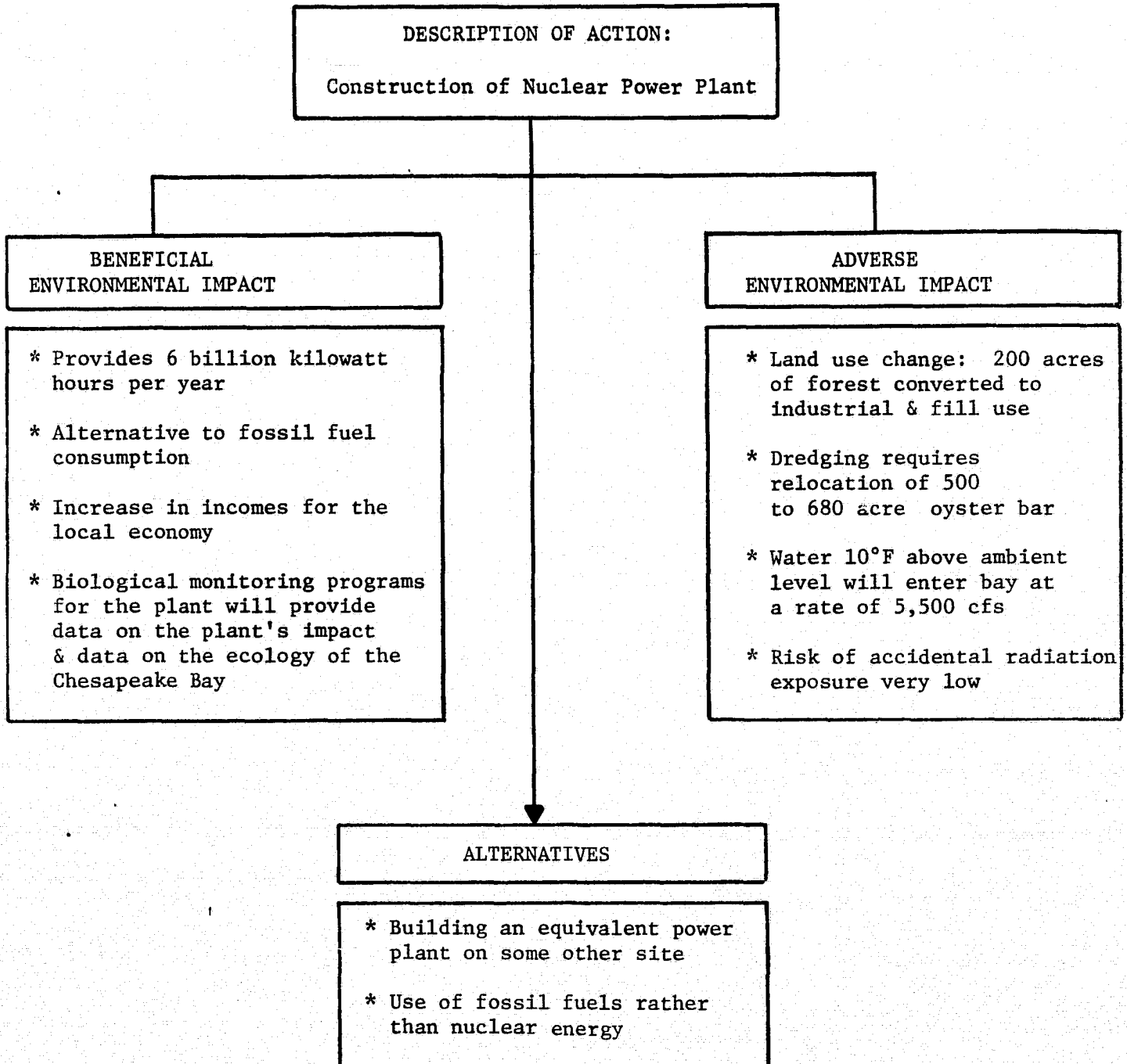


Table 6--CARETS area environmental impact statements relating to urban renewal and new town development projects and construction of multistoried buildings

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	New Castle	U.S. Customs House, Wilmington	05-06-74	GSA	Restoration of historic buildings and sites
D.C.		Bolling/Anacostia Base Development	06-12-73	National Capital Planning Commission	Construction of multi-storied buildings
D.C.		Defense Office Buildings, Bolling AFB	04-23-71	U.S. Navy	Construction of multi-storied buildings
D.C.		Downtown Urban Renewal Area	05-25-73	HUD	Urban development planning
D.C.		Dwight D. Eisenhower Civic Center	10-01-73	National Capital Planning Commission	Construction of convention facilities
D.C.		Federal Home Loan Bank Board	01-04-74	GSA	Construction of multi-story office building
D.C.		Federal Triangle Development	02-28-72	GSA	Development of multi-storied buildings
D.C.		14th Street Urban Renewal Area	05-25-73	HUD	Urban renewal activities
D.C.		Fort Lincoln Urban Renewal Area	09-15-72	HUD	Urban renewal plan
D.C.		Gallaudet College	07-26-72	HEW	Construction of multi-storied buildings
D.C.		H Street Urban Renewal Area	05-25-73	HUD	Urban renewal area plan

Table 6--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
D.C.		Shaw School Urban Renewal Area	05-25-73	HUD	Urban Renewal Area Plan
D.C.		Walter Reed General Hospital	09-03-71	U.S. Army	Construction of multi- storied buildings
D.C.		Washington National & Dulles International Airports	02-12-73	DOT	Construction of multi- storied buildings
New Jersey	Gloucester	Beckett New Community	05-15-73	HUD	Construction of a new community
Maryland	Baltimore	Coldspring New Town	03-06-73	HUD	Construction of a new town development
Maryland	Baltimore	Social Security Admin- istration Headquarters	01-12-73	GSA	Construction of multi- storied facilities
Maryland	Charles	St. Charles New Community	12-18-70	HUD	Construction of new town development
Maryland	Montgomery	Deamond Laboratories	05-11-72	U.S. Army	Construction of multi- storied buildings
Maryland	Prince Georges	Federal Law Enforcement Center	05-12-71	GSA	Construction of multi- storied buildings
Maryland	Prince Georges	Lakeland Urban Renewal Project	03-06-73	HUD	Urban renewal project
Maryland	Montgomery	Lister Hill National Center for Biomedical Communications	08-11-73	HEW	Construction of multi- storied buildings



Table 6--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Pennsylvania	Delaware	Community College of Delaware County	02-14-73	HEW	Construction of multi-storied buildings
Pennsylvania	Philadelphia	Metropolitan Correctional Center	02-05-73	GSA	Construction of multi-storied buildings
Virginia	Accomack	Wallops Island NASA Station	06-26-72	NASA	Study of impact of NASA activities on Wallops Island environment
Virginia	Accomack	Captain's Cove Development, Chincoteague Bay	04-01-74	Corps of Engineers	Resort development
Virginia	Henrico	Randolph Urban Renewal Area	05-11-73	HUD	Urban renewal project

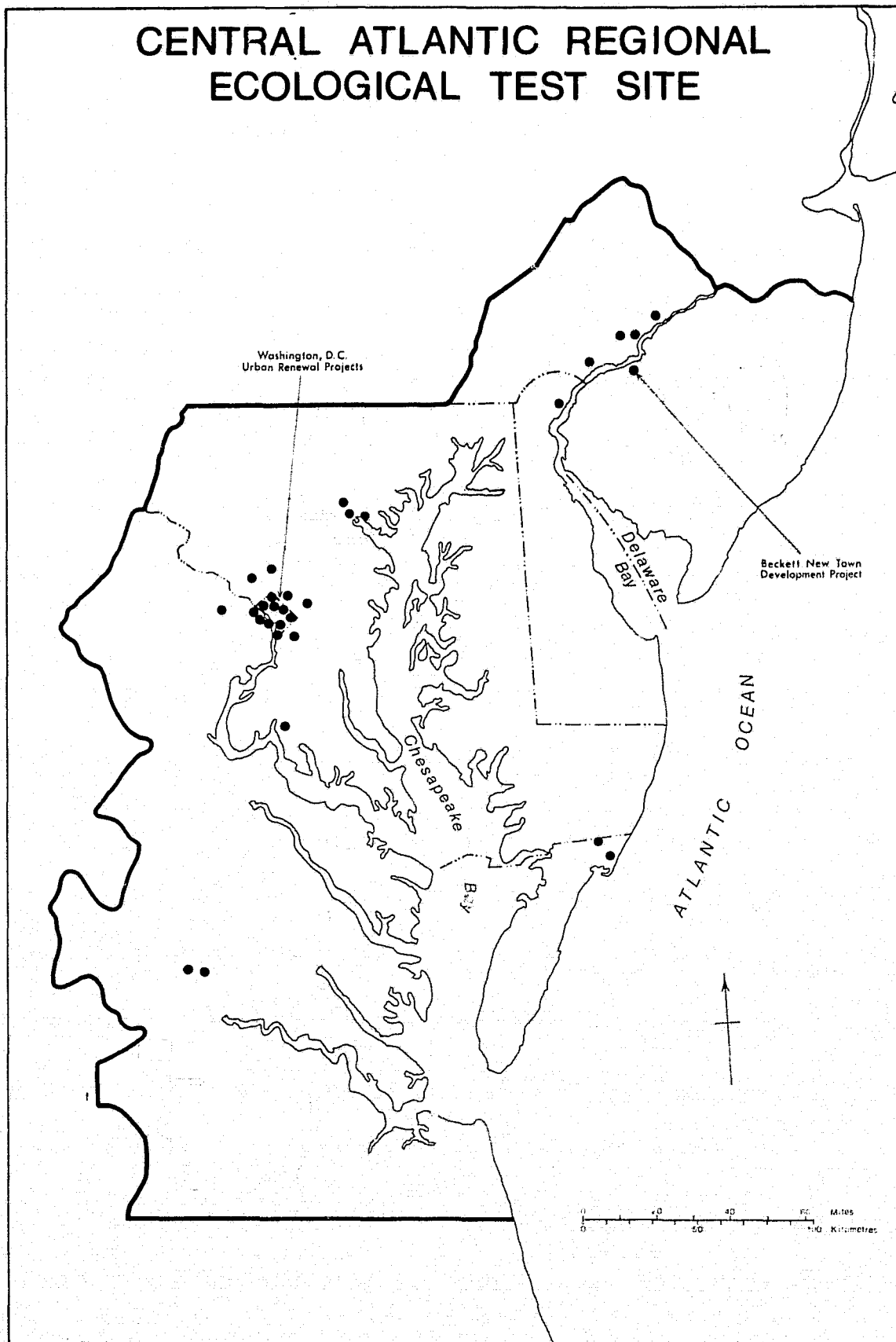


Figure 8--Distribution of urban renewal, new town development, and multi-storied building construction projects requiring environmental impact statements.

The Beckett New Community, Gloucester County, New Jersey, provides a case study of a new town that never came into being. Although developers submitted plans and environmental statements for the project, they later decided not to develop the area as a new community. Beckett was to be located on a tract of 6,100 acres, approximately 18 miles south of central Philadelphia and was designed to be a partially self-sufficient satellite community within the Philadelphia-Camden SMSA (U.S. Department of Housing and Urban Development, 1973b). The land use plan for the community provided a balance of dwelling units, commercial and community facilities, and open space. The project, however, would have had adverse impacts on the existing land uses and would have contributed to urban sprawl (figure 9). Nevertheless, alternatives to disorderly urban growth are desired.

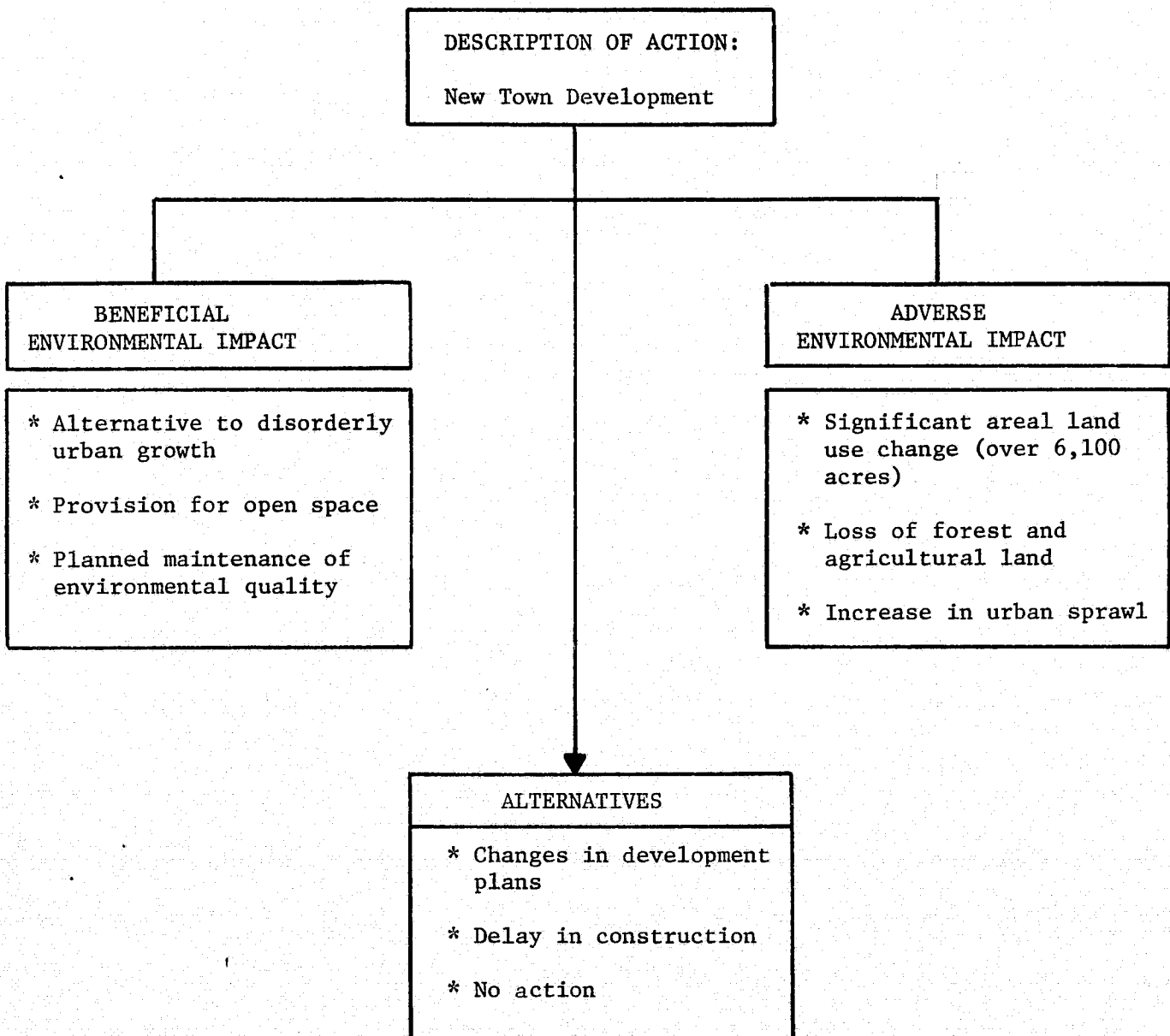
The recently enacted Urban Growth and New Community Development Act (PL 91-609) is designed to assist private and public efforts like Beckett in the development of well planned, comprehensive new communities. Among other things, the act seeks to assist the development of actions that contribute to a better man-land relationship, add to the supply of housing for low and moderate income groups, and promote sound economic growth, including employment (U.S. Department of Housing and Urban Development, 1970).

To receive such assistance as authorized under the act, the developer must assure compliance with statutory and regulatory requirements. The developer and HUD must then negotiate a project agreement that includes a comprehensive development plan with detailed commitments regarding environmental and land use planning.

Urban renewal projects proposed for the District of Columbia also deserve review. Authorized under the Neighborhood Development Program, these actions include four renewal areas: Downtown, Shaw, H Street, and

Figure 9

Beckett New Community  
Gloucester County, New Jersey



14th Street (U.S. Department of Housing and Urban Development, 1973a, 1974a, 1974b, 1974c). The National Capital Planning Commission reports that the project areas include 777 gross ha (excluding public streets and alleys), estimated to have a population of 77,559; 14,000 buildings; 32,413 housing units and 7,125 businesses employing approximately 105,000 persons. The Fort Lincoln urban renewal plan can also be included in this group; it will encompass 145 ha of Federal land (U.S. Department of Housing and Urban Development, 1972).

The downtown area includes a major portion of the central business district of Washington. The Shaw School, H Street, and 14th Street areas are predominantly residential with some strip commercial and retail uses. These areas have substandard building and housing condition and deterioration, including incompatible land uses. In addition, the 14th Street, 7th Street (Shaw) and H Street corridors were extensively damaged during civil disorders in 1968. The environmental impact statement for the H Street project (U.S. Department of Housing and Urban Development, 1974b) provides the land use improvement objectives typical of the four projects:

- 1) Construction and rehabilitation of sound rental and resident-owned housing, encouraging home ownership;
- 2) Design of traffic circulation to accommodate high volume of through and local traffic and to safeguard pedestrian movement in the area;
- 3) Development of a community business shopping center and of conveniently located neighborhood shopping facilities;

- 4) Improvement and coordination of facilities for health, recreation and social services;
- 5) Replacement of obsolete schools and public facilities with community facilities of superior design; and
- 6) Development of new employment, job training, ownership, and business opportunities for the residents.

The Fort Lincoln Project differs from the others in its utilization of 146 ha of Federal land to develop economically and functionally inclusive community malls, local community services, a campus for Federal City College, and residential areas to be distributed to meet varying local slope, drainage, and microclimate conditions (U.S. Department of Housing and Urban Development, 1972). Figure 10 lists the environmental impacts of these urban renewal actions. Negative impacts include the displacement of households, businesses, and transportation lines, whereas positive impacts include the rejuvenation of the physical and economic downtown retail core and the upgrading of the socioenvironmental quality of these residential areas. Project alternatives call for deciding between rehabilitation or redevelopment, on one hand, or redefining project areas on the other. Action on these projects has been slow to materialize.

#### CONSTRUCTION OF FACILITIES FOR WATERSHED PROTECTION AND DEVELOPMENT

In the CARETS region, environmental impact statements have been filed for eight projects involving watershed protection, flood prevention, and drainage (table 7). These actions range from relatively large watershed

Figure 10

District of Columbia  
Urban Renewal Project

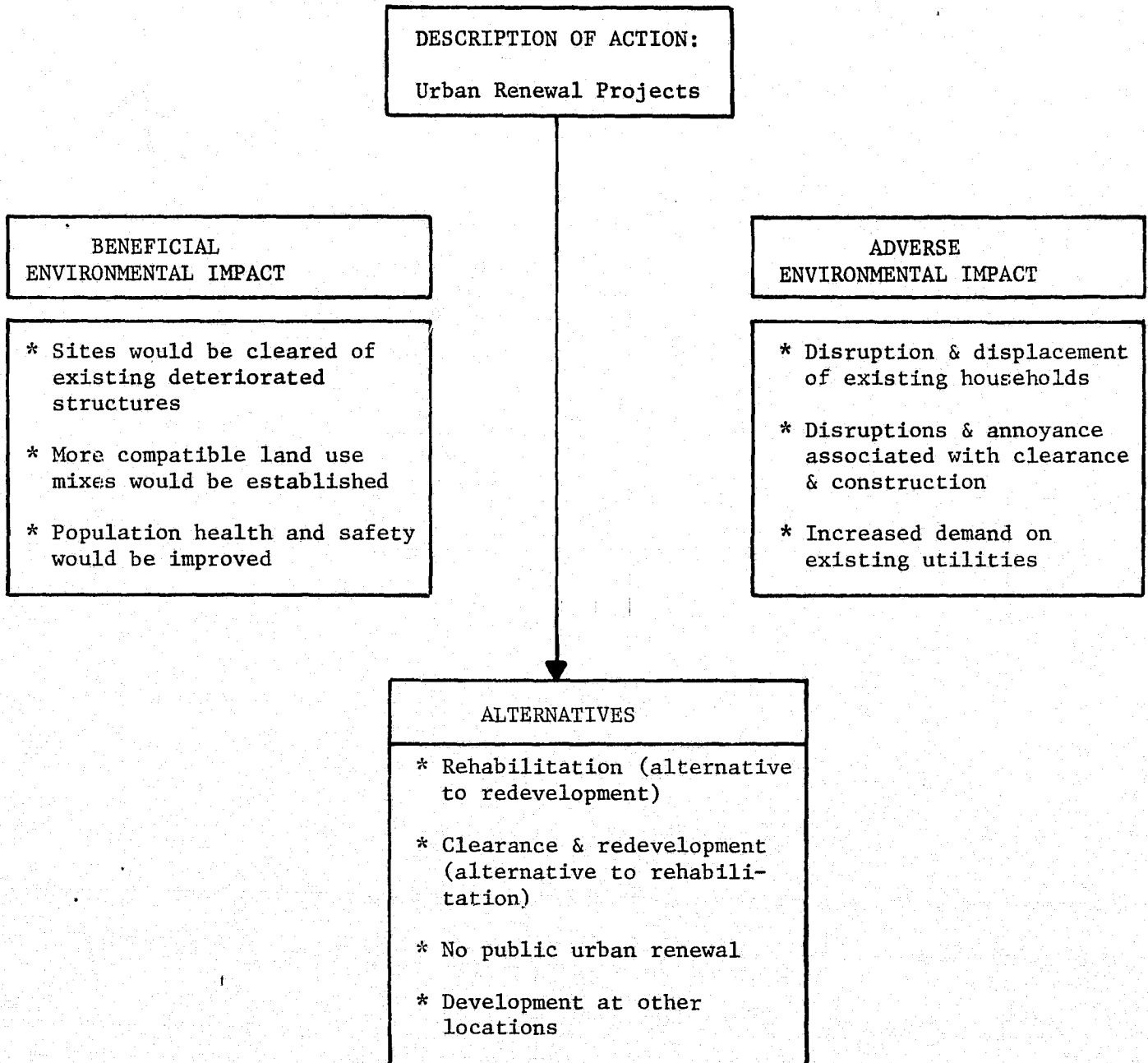


Table 7--CARETS area environmental impact statements relating to watershed development and protection

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	Kent	Little Mill Creek Flood Control Project	10-01-73	Corps of Engineers	Construction of flood control facilities
D.C.		Emergency Water Pumping Station-Potomac Estuary	09-28-73	Corps of Engineers	Construction of water pumping station
Maryland	Queen Anne	Chesapeake Bay Hydraulic Model	08-14-72	Corps of Engineers	Construction of a shelter to house a hydraulic model
Maryland	Wicomico	Dividing Creek Watershed Project	01-02-74	USDA	Construction of facilities for watershed protection, flood prevention & drainage
Pennsylvania	Bucks/Montgomery	Point Pleasant Diversion Plan	02-08-73	Delaware River Basin Commission	Construction of a water pumping station
Pennsylvania	Delaware	Darby Creek-Cobbs Creek Watershed	12-08-72	Corps of Engineers	Construction of facilities for watershed protection, flood control, erosion control
Virginia	Alexandria/Arlington	Four Mile Run Local Flood Protection	04-25-74	Corps of Engineers	Report to determine if improvements in flood control measures are advisable
Virginia	Chesapeake	Indian Creek Watershed Project	01-02-74	Corps of Engineers	Construction of watershed, flood prevention, & drainage facilities



projects in rural counties of southeastern Virginia and the Eastern Shore of Maryland to small-area flood protection and water pumping station projects in the Washington metropolitan area (figure 11). The Dividing Creek Watershed Project and the Four Mile Run Flood Protection Project provide excellent examples of such proposed actions.

The planning for the Dividing Creek Watershed Project was implemented under the authority of the Watershed Protection and Flood Prevention Act (PL 83-566). The project is directed at correcting land use problems in the watershed caused by flooding, poor drainage, and sheet erosion. The Soil Conservation Service reports that seasonal high water adversely affects 71 percent of cropland and 93 percent of forest land in the watershed (U.S. Department of Agriculture, 1974). Moreover, out-of-bank flooding, occurring 1 year in 5, and the accumulation of surface water reduce crop and silviculture yields. Homeowners in the area, as well, face serious sewage problems caused by periodic flooding and poorly functioning septic fields. Poor drainage also affects the efficient use of land, preventing farmers from meeting desired planting and harvesting schedules, limiting crop diversification, and precluding the implementation of modern farming technology.

Sheet erosion in the watershed is significant. The Soil Conservation Service estimates that annual gross erosion losses amount to 50,066,400 kg from cropland; 4,172,200 kg from forests; 35,373 kg from pastures; 5,443,000 kg from stream banks; and 79,816,000 kg from roads (U.S. Department of Agriculture, 1974). Ten percent of this eroded soil is transported out of the watershed annually. The remaining eroded soil contributes to the

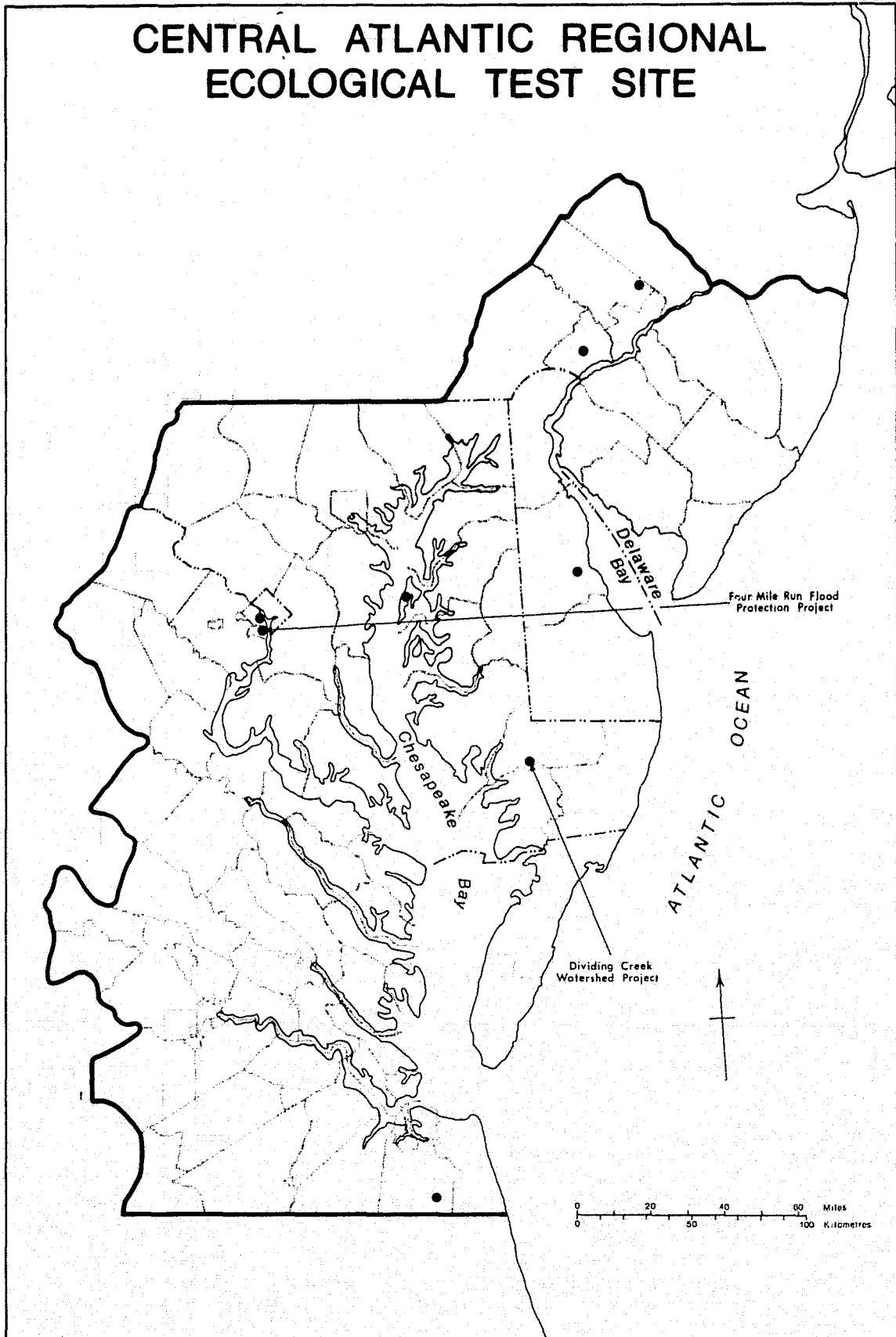


Figure 11--Distribution of watershed development and protection projects requiring environmental impact statements.

soil nutrients in the fields and forests that lie at lower elevations than the sources of the materials.

The action planned by the Soil Conservation Service (SCS) to ameliorate these land use problems calls for the installation of land treatment measures for 2,095 ha and the installation of 131.84 km of multiple-purpose channel work. The environmental impacts of these actions are listed in figure 12. From a cost-benefit viewpoint, the project cost (SCS estimates \$1,900,000) will be justified by the increased productivity of the land in the watershed.

In contrast to the agricultural needs prompting the actions at Dividing Creek, increased urbanization has led to the Four Mile Run Local Flood Protection Project, authorized under the Flood Control Act of 1965 (PL 89-298, Section 201). The project area is located along Four Mile Run in Arlington County, Virginia, from Interstate 95 to the Potomac River. The Corps of Engineers reports that improved drainage and the greater imperviousness of the basin's land surface have increased the percent of runoff and decreased the lag time necessary for runoff to reach the stream (U.S. Army Corps of Engineers, Baltimore District, 1973a). Thus, the basin is increasingly subject to flooding, which threatens the population and commerce located on the flood plain.

The project calls for the construction of facilities that will upgrade channels, walks, and levee dimensions and configurations and revise interior drainage facilities. The environmental impacts are listed in figure 13. The adverse impacts of the action include the further denaturalization of the basin; the main beneficial impact is flood

Figure 12

## Dividing Creek Watershed Project

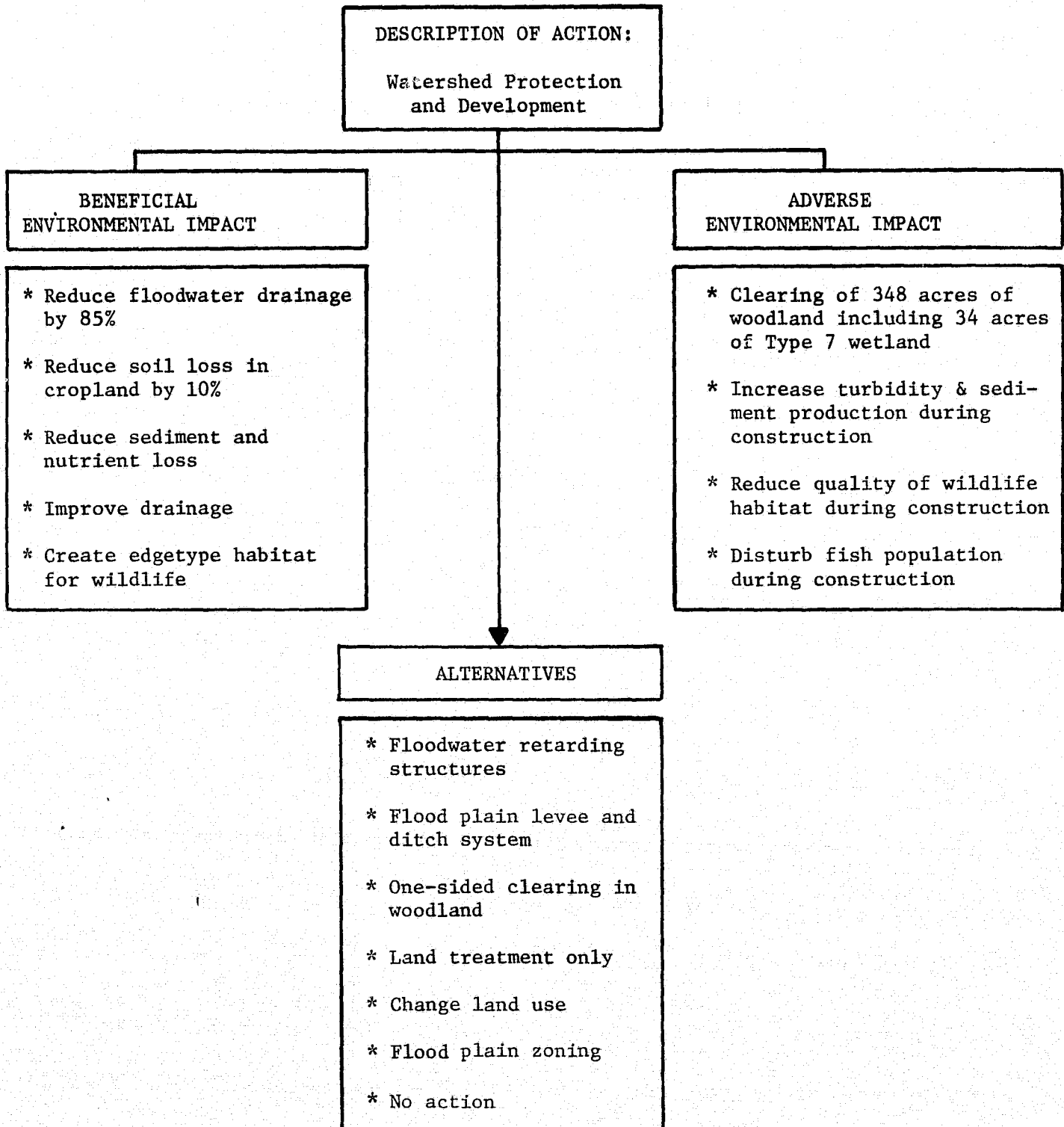
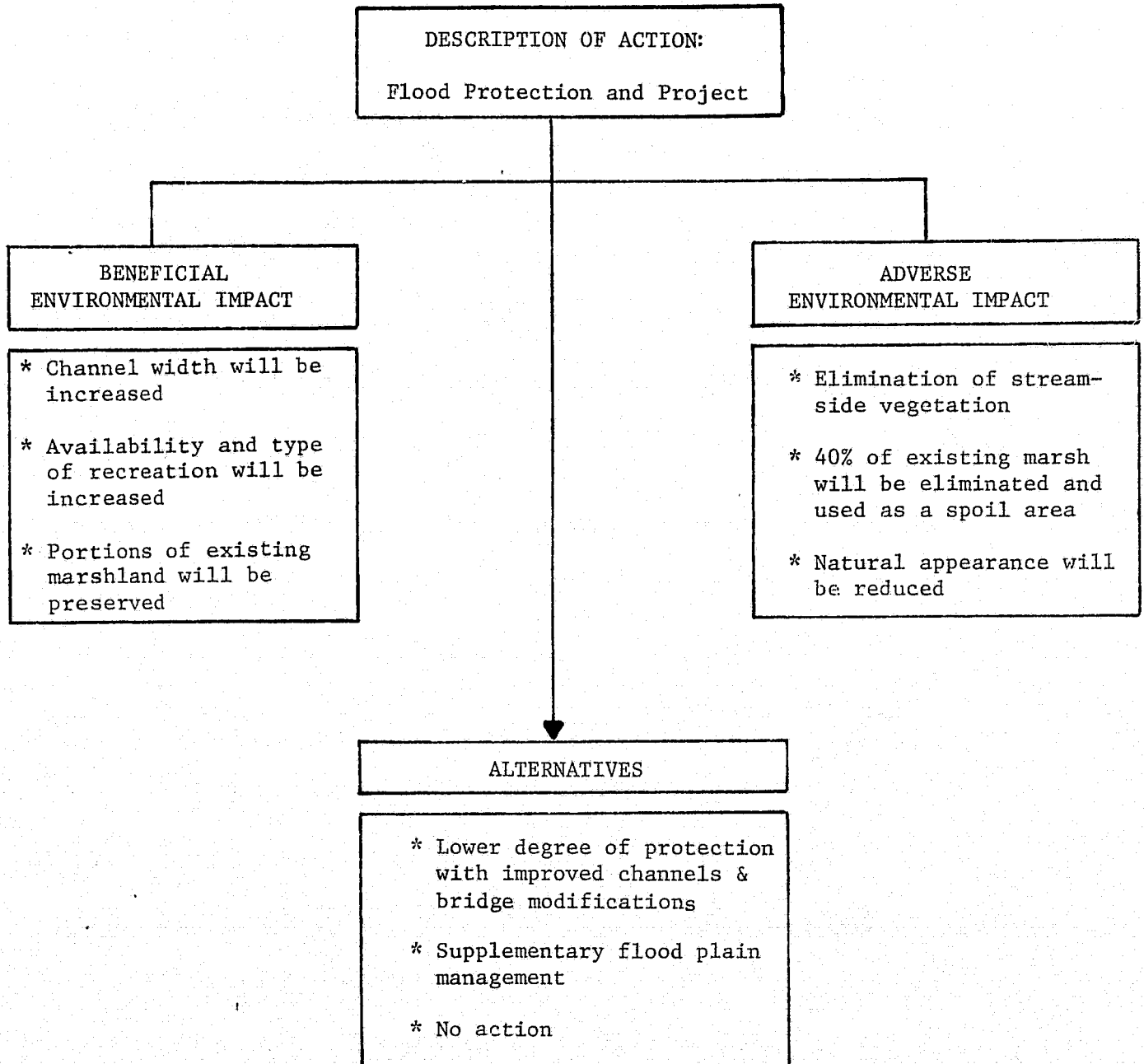


Figure 13

## Four Mile Run Local Flood Protection Project



prevention. Strong community and commercial pressure has been applied to preserve investments in the area (U.S. Army Corps of Engineers, Baltimore District, 1973a).

#### CONSTRUCTION OF WASTE TREATMENT AND DISPOSAL FACILITIES

The U.S. Environmental Protection Agency is responsible for preparing environmental impact statements for waste treatment and disposal facility actions. Such statements specifically address the impact of the actions on water resources as they relate to the Federal Water Pollution Control Act (PL 84-660). The actions proposed for the CARETS region are listed in table 8, and their locations shown in figure 14. Examples of such facilities for Bethany Beach, Delaware and Ocean County, New Jersey are discussed below.

The proposed construction of public sewage facilities in Bethany Beach, Delaware (Sussex County), could result in significant land development. Since the area's high water table poses limitations for the use of septic tanks, residential development is contingent on the installation of a public sewage system. The local environment of the area would be adversely affected by problems that sometimes accompany population increases such as overcrowding of beaches, destruction of open land and wildlife areas, water supply deficiencies and solid waste disposal problems.

The plan to construct a secondary treatment plant and ocean outfall facilities in eastern Ocean County, New Jersey presents another good

Table 8--CARETS area environmental impact statements relating to the construction of waste treatment and disposal facilities

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	Sussex	Bethany Beach Sewage Treatment Facility	01-02-73	EPA	Construction of waste treatment facilities
Maryland	Montgomery	Tri-Service Incinerator	04-03-73	HEW	Construction of incinerator facilities
Maryland	Prince Georges	Municipal Waste Composting Project	01-24-74	USDA	Study of project feasibility
Maryland	Prince Georges	Piscataway Wastewater Treatment Facility	02-11-74	EPA	Upgrading and expansion of waste treatment facilities
Maryland	Prince Georges	Sewage Treatment, Agriculture Research Center	03-06-74	USDA	Construction of waste treatment facilities
New Jersey	Ocean	Wastewater Treatment Facilities Construction	04-09-74	EPA	Construction of a waste treatment plant
Pennsylvania	Chester	Valley Forge Waste Treatment Facility	12-17-73	EPA	Construction of waste treatment facilities
Pennsylvania	Philadelphia	Removal and Disposal of Digested Sludge	11-01-72	EPA	Removal and construction of waste treatment facilities
Virginia	York	Shore Facility for Ship Generated Oily Wastes	06-15-73	Dept. of Commerce (Maritime Administration)	Construction of facilities for processing

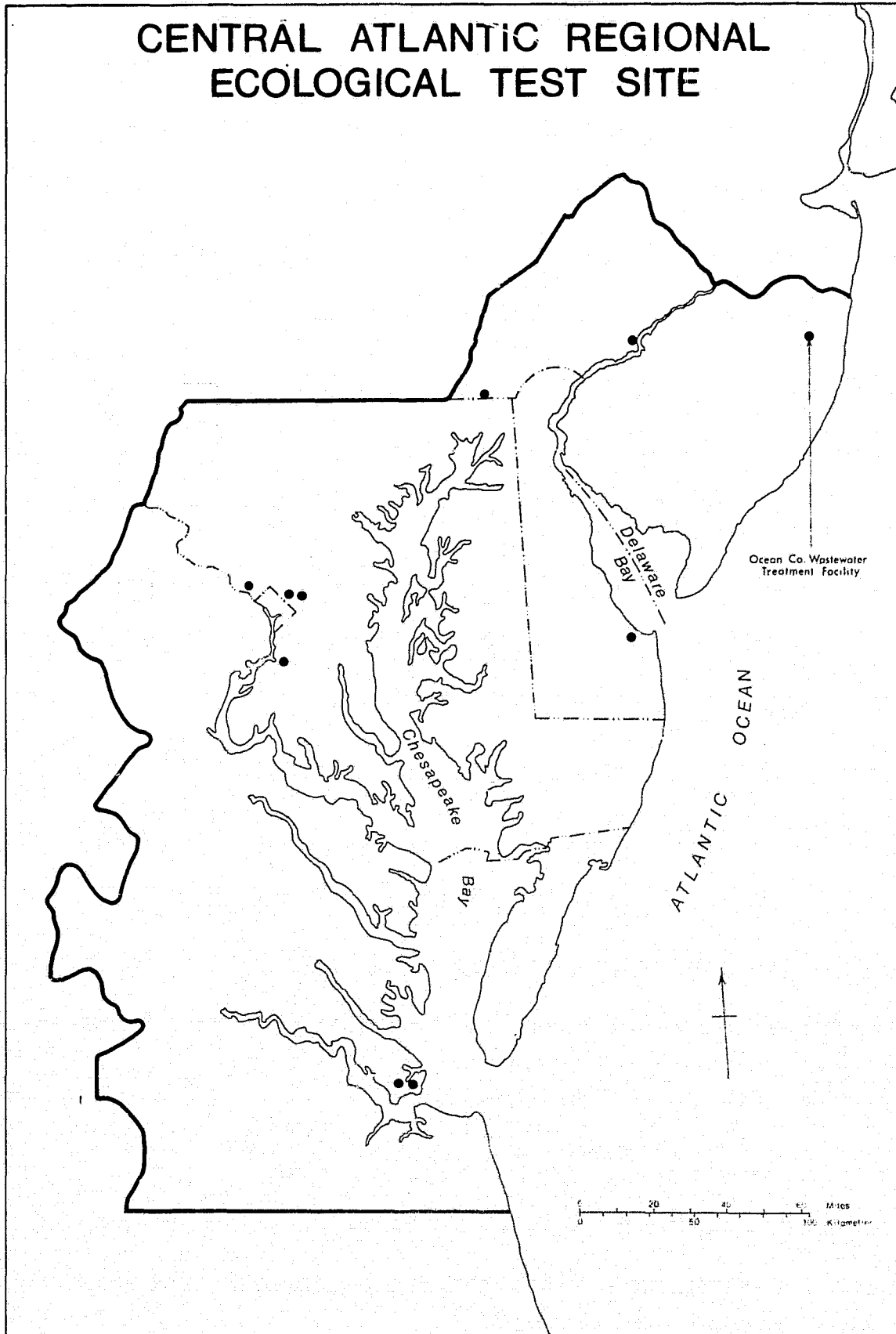


Figure 14--Distribution of construction projects for waste treatment and disposal facilities requiring environmental impact statements.



example of positive and negative environmental impacts. This project is designed to improve the quality of receiving waters by providing secondary treatment of waste water prior to discharge, by eliminating waste water discharge into inland streams with low assimilative capacities, and by providing the Ocean County Sewerage Authority service area with centralized sewage treatment. On the other hand, project implementation will reduce ground water discharge and increase saltwater encroachment. Effluent disposal may result in site contamination. Alternatives to the planned project are changes in basic waste water treatment subsystems (figure 15).

MAINTENANCE DREDGING, NAVIGATION IMPROVEMENTS,  
AND BEACH EROSION CONTROL AND REPLENISHMENT PROJECTS

Navigation improvement and beach preservation actions are used extensively in CARETS; 25 such actions are underway or proposed for the Chesapeake and Delaware estuaries and coastal inland waterways (table 9). With a navigation improvement and beach protection mission, the U.S. Army Corps of Engineers is responsible for evaluating the impact of such actions. Three actions have been selected as representative of the range of impacts: the Inland Waterway Project (Chesapeake and Delaware Canal), the New Jersey Intracoastal Waterway Project, and the Virginia Beach Erosion Control Project (figure 16).

The Inland Waterway Project proposes to enlarge the Chesapeake and Delaware Canal to a depth of 10.7 m and a width of 137.3 m (U.S. Army Corps of Engineers, Baltimore District, 1974). In 1973 the Army Corps of Engineers reported that 87 percent of the project had been completed and that only the enlargement by dredging of 3.2 km of the canal's eastern end,

Figure 15

Waste Water Treatment Facilities for the Central Service  
Area of the Ocean County Sewerage Authority

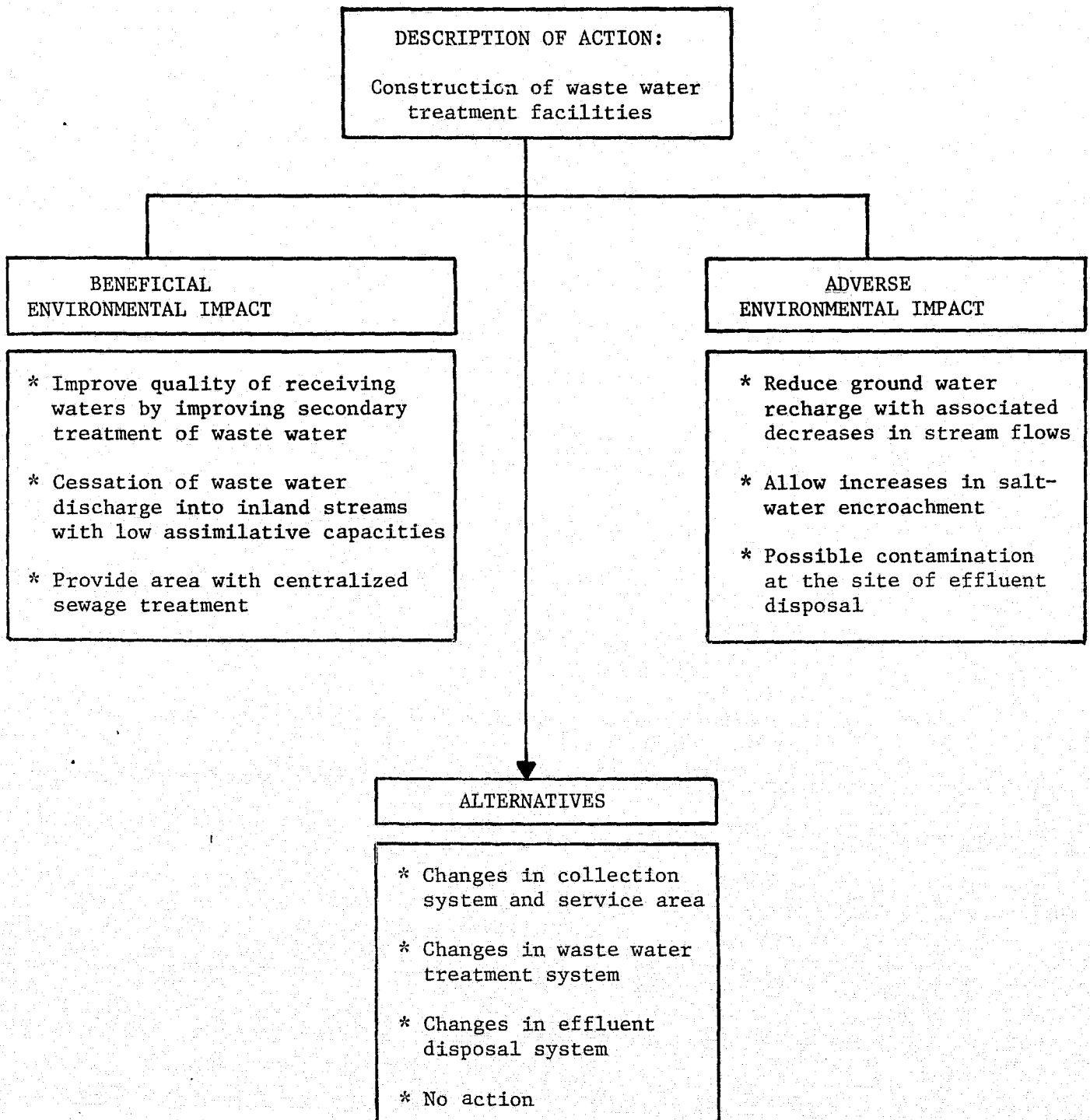


Table 9--CARETS area environmental impact statements relating to dredging, navigation improvement projects and beach erosion control and replenishment projects

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	New Castle	Inland Waterway, Delaware River to Chesapeake Bay	05-02-74	Corps of Engineers	Enlarging and deepening channel
Delaware	Sussex	Beach Erosion Control, Lewes	03-23-73	Corps of Engineers	Restore and stabilize a portion of the shoreline
Delaware	Sussex	Broadkill Beach	02-09-73	Corps of Engineers	Restore and stabilize a portion of the shoreline
Delaware	Sussex	Indian River Inlet, Project Maintenance	01-28-74	Corps of Engineers	Maintenance of navigable portions of the inlet
Delaware	Sussex	Nanticoke River	10-13-72	Corps of Engineers	Dredging to restore 12-foot navigation channel
New Jersey	Cape May	B. L. England Station	03-22-73	Corps of Engineers	Construction and dredging of a cooling water intake channel
New Jersey	Cape May	N.J. Coastal Inlets and Beaches, Hereford Inlet to Delaware Bay	05-15-74	Corps of Engineers	Beachfill and dunefill to control beach erosion, and aid navigation
New Jersey	Cape May	N.J. Intracoastal Waterway	01-15-74	Corps of Engineers	Construction of jetties and dredging to improve navigation
New Jersey	Ocean	N.J. Coastal Inlet and Beaches	11-13-70	Corps of Engineers	Placement of beachfill and dunefill to control erosion and aid navigation
Maryland	Baltimore	Diked Disposal Island - Hart and Miller Islands	04-08-73	Corps of Engineers	Use of disposal islands for dredge materials

Table 9--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Maryland	Kent	Inland Waterway, Delaware to Chesapeake	05-02-74	Corps of Engineers	Enlarging of channel
Maryland	St. Marys	St. Catherine Sound	05-26-72	Corps of Engineers	Maintenance dredging
Maryland	Talbot	Tred Avon River	07-05-73	Corps of Engineers	Channel dredging
Pennsylvania	Philadelphia	Pennypock Marine Terminal		Corps of Engineers	Construction of a marine terminal
Virginia	Accomack	Deep Creek	04-12-72	Corps of Engineers	Maintenance dredging
Virginia	Accomack	Chincoteague Inlet	03-20-73	Corps of Engineers	Maintenance dredging
Virginia	Accomack	Starlings Creek Navigation Project	04-25-74	Corps of Engineers	Maintenance dredging
Virginia	Gloucester	Arberdeen Creek	01-28-74	Corps of Engineers	Maintenance dredging
Virginia	Norfolk	Craney Island Rehandling Basin	01-28-74	Corps of Engineers	Maintenance dredging
Virginia	Norfolk	Norfolk Harbor	11-28-73	Corps of Engineers	Maintenance dredging
Virginia	Northhampton	Navigation Regulation Area	01-10-74	DOT	Navigation study
Virginia	Va. Beach	Beach Erosion Control and Hurricane Protection	09-21-72	Corps of Engineers	Construction of structures to maintain the beach and protect inland property
Virginia	York	Hampton Creek	10-18-72	Corps of Engineers	Maintenance dredging for navigation
Virginia	York	Shoreline Protection for Hampton Institute	06-28-74	Corps of Engineers	Construction of stone revetment to protect eroding shoreline

Table 9--Continued

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Virginia	York	Thimble Shoal Channel	09-07-73	Corps of Engineers	Maintenance dredging of a navigation channel
Virginia	York	York River Navigation Project	12-12-72	Corps of Engineers	Channel improvement

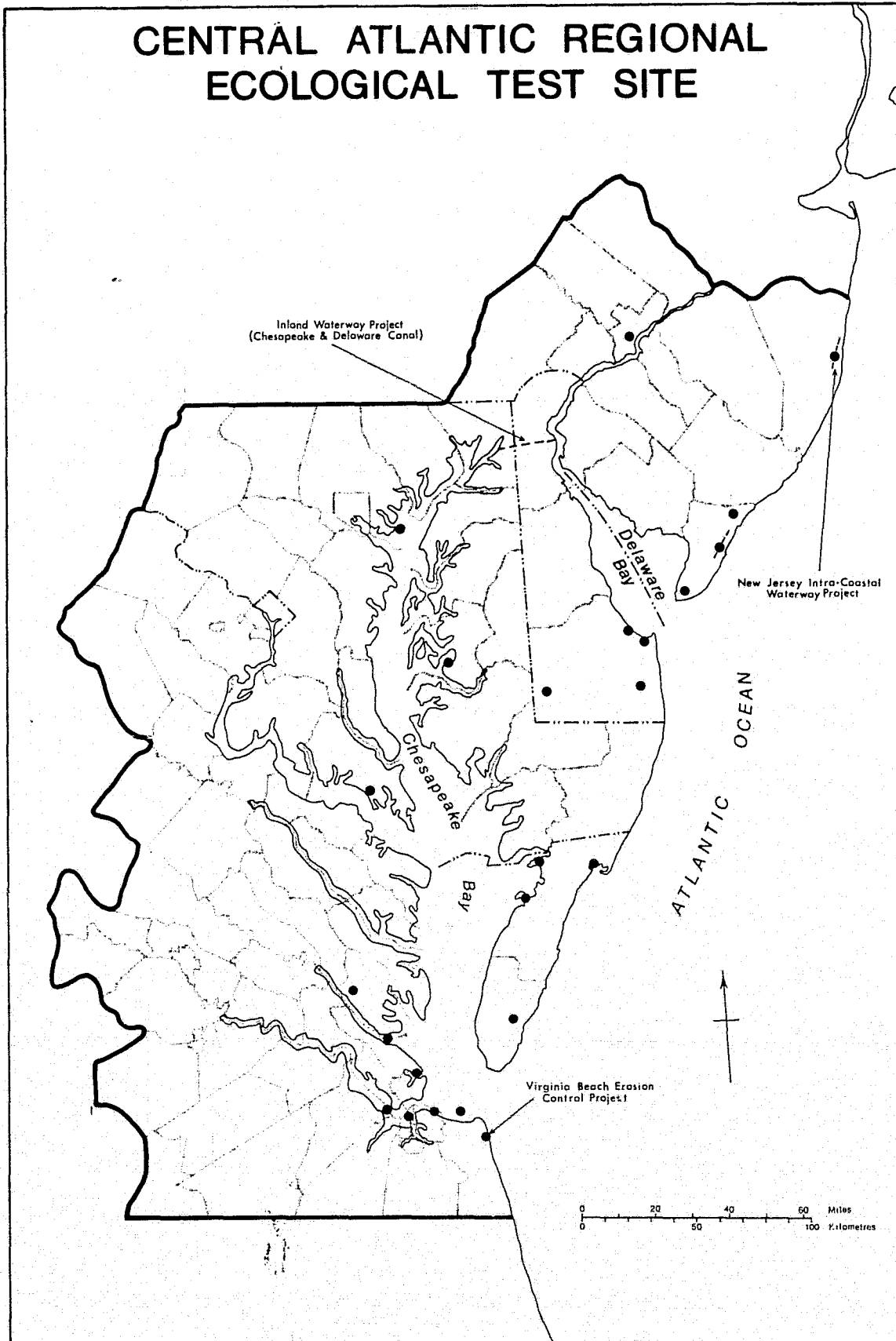


Figure 16--Distribution of dredging, navigation improvement, and erosion control and replenishment projects requiring environmental impact statements.

construction of recreational facilities, and the landscaping of adjacent areas had not yet been completed. The project provides a considerable savings in fuel and increases operating safety for commercial vessels moving between the Chesapeake Bay and ports to the north. The dredge material has created some new land that is being landscaped and reforested. On the negative side, the actions have caused the loss of wetlands, change in salinity levels and the loss of wildlife habitat (figure 17). The economic benefits derived from the actions tempered by the environmental restoration (i.e. landscaping of land disposal areas) appear to outweigh the adverse environmental impacts. The alternatives to the project's completion do not appear as viable as the project itself.

The New Jersey Intracoastal Waterway Project provides for the improvement of Manasquan River and Inlet and the existing New Jersey Intracoastal Waterway by dredging a channel 3.7 m deep and 30.5 m wide and by the construction of a canal of similar dimensions from Cape May Harbor to Delaware Bay. Sport fishing vessels, pleasure craft, and commercial ships use this waterway. Because continuous shoaling occurs, particularly inside the ocean inlets, maintenance dredging is required to maintain the level of safety for the waterway's multiple uses. Although the dredging is conducted on a basis of need, the State of New Jersey has opposed the dumping of dredge spoils (U.S. Army Corps of Engineers, Philadelphia District, 1975).

The adverse environmental impacts of the dredging are shown in figure 18. The permanent loss of coastal wetland ecosystems due to dredge disposal has been considerable. Salt marshland in Ocean and Atlantic Counties

Figure 17

Inland Waterway From Delaware River to Chesapeake Bay  
[Chesapeake and Delaware Canal]

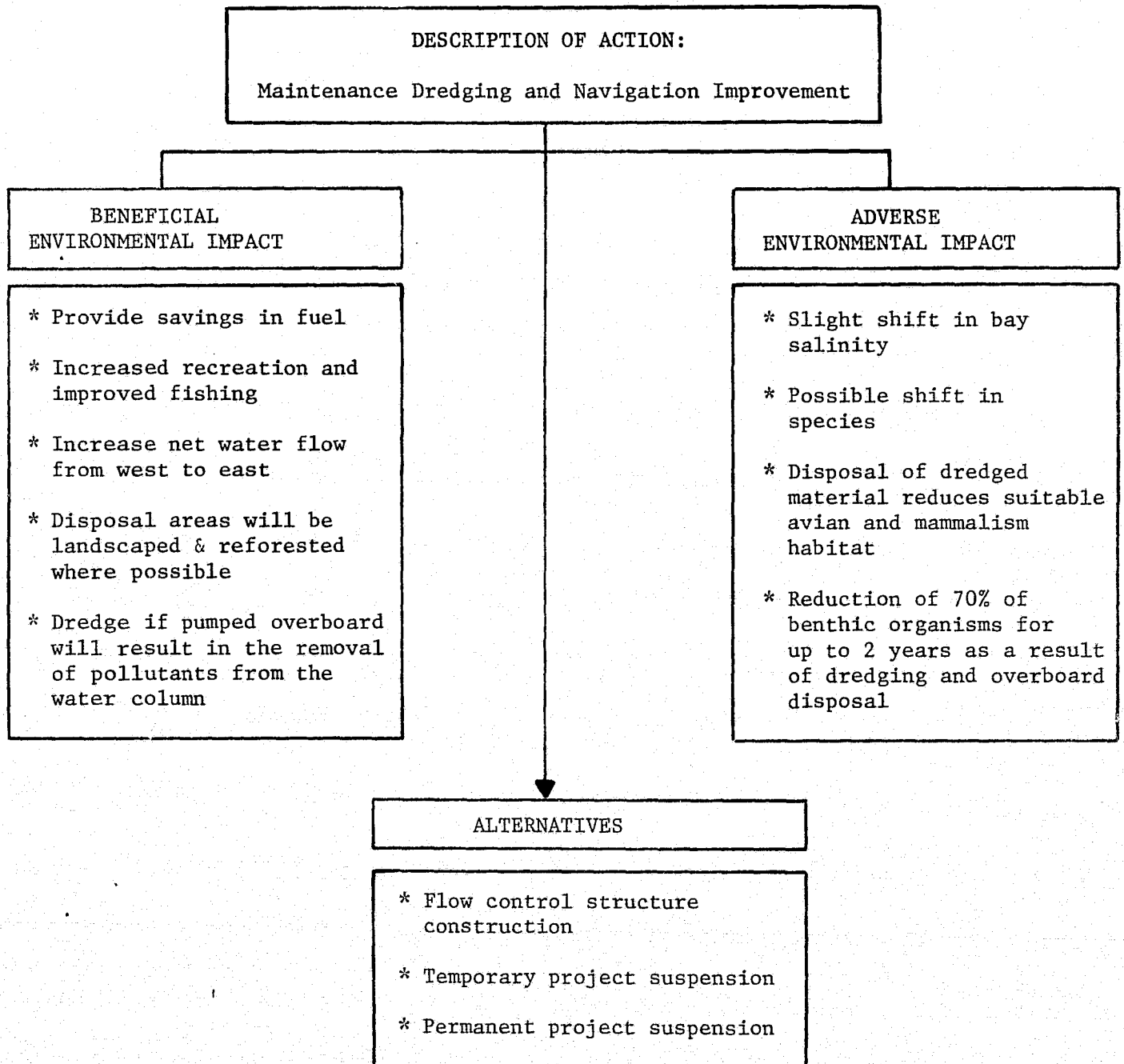
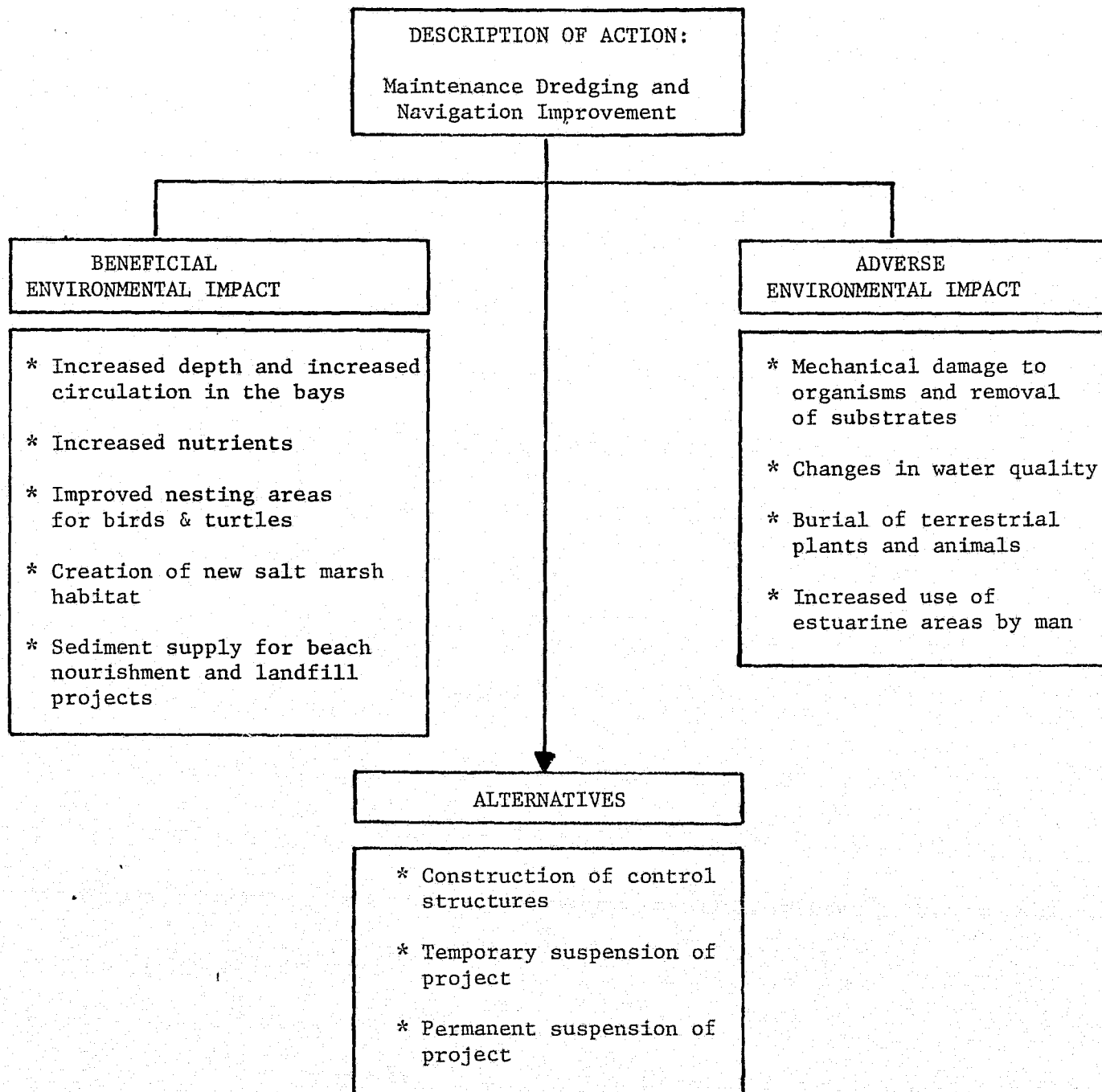




Figure 18

## New Jersey Intracoastal Waterway



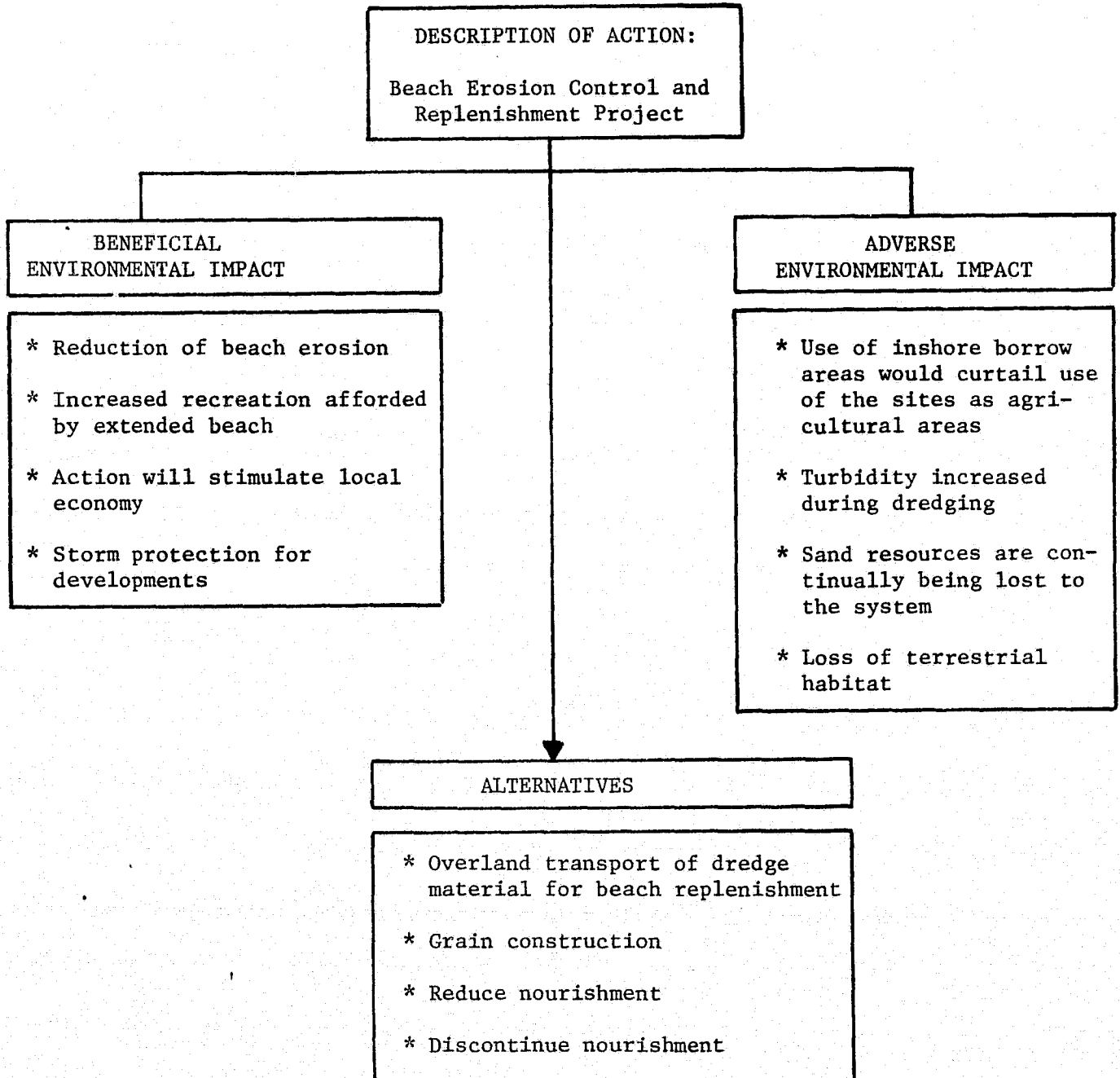
adjacent to the Intracoastal Waterway have been extensively filled to provide sites for the construction of a score of lagoon home developments. Cape May County, however, has not experienced extensive lagoon home construction, and the salt marshlands, presently used for small game and waterfowl hunting and for the harvesting of sea hay, have remained unspoiled. Dredge spoildumping on these remaining wetlands is under careful scrutiny. The environmental and economic tradeoffs of maintenance dredging vs. preservation of the State's remaining coastal wetlands are complex.

Beach erosion control projects are also supervised by the Army Corps of Engineers. The Virginia Beach environmental impact statement is an update on comprehensive studies begun in the 1940's. The action calls for the continued nourishment of 5.3 km of Virginia Beach shoreline by hydraulic dredging at a rate of 114,683 m<sup>3</sup> of sand annually to replace the sand lost every year.

The environmental impacts for the project are listed in figure 19. The adverse impacts include the removal of approximately 0.8 ha of marsh and associated biota at Rudee Inlet, turbidity increases during dredging, and loss of terrestrial habitat. On the other hand, the action allows for the continued use of extensive public recreation areas, maintenance of a quality natural setting for tourism thus favorably affecting the local economy, and storm protection for 5.3 km of oceanfront development (U.S. Army Corps of Engineers, Norfolk District, 1973). The alternatives to the action are the reduction or discontinuing of nourishment or the hauling of sand from borrow areas by truck.

Figure 19

## Virginia Beach - Beach Erosion Control Project



The Army Corps of Engineers reports that continued beach nourishment will have several long-term impacts on the area's environment (U.S. Army Corps of Engineers, Norfolk District, 1973):

- 1) Borrow areas will be exhausted in the near future;
- 2) Truck hauling of source material from sites at the Eureka Brick Property, Lynnhaven Inlet, Oceana Naval Air Station, Pungo Ridge, and Themble Shoal Channel is becoming increasingly uneconomical;
- 3) Removal of nourishment material from the Eureka site will necessitate the loss of 4 ha of wooded highland;
- 4) The future truck-haul operation of Lynnhaven Inlet will require covering about 10 ha of sandy shore with dredged soil.

#### ESTABLISHING OR ENHANCING LAND AND WATER CONSERVATION AREAS

A wide range of proposals may be grouped into the category of actions relating to establishing or enhancing land and water conservation areas, including proposals to set aside a portion of Assateague Island as a wilderness area, to develop additional land in Philadelphia as a National Historical Park, and to construct a multipurpose dam and lake project in western Maryland.

Agencies of the U.S. Department of the Interior have responsibility over natural resource conservation and have prepared many of the environmental impact statements in this category. Table 10 presents a list of statements for such actions filed in the CARETS region and figure 20 shows the distribution of the proposed actions within the region. The Assateague Island wilderness area and the Sixes Bridge Dam and Lake projects provide excellent examples of this type of action.

Table 10--CARETS area environmental impact statements relating to establishing or enhancing land and water conservation areas

<u>State</u>	<u>County</u>	<u>EIS Title</u>	<u>Date Filed</u>	<u>Agency of Origin</u>	<u>Type of Action</u>
Delaware	Kent	Bombay Hook Wilderness Area	04-23-74	Bureau of Sport Fisheries & Wildlife	Establishing a wilderness area
Maryland	Carroll, Frederick	Sixes Bridge Dam and Lake	11-16-70	Corps of Engineers	Construction of a dam for water supply, stream enhancement and recreation
Pennsylvania	Adams				
Maryland	Worcester	Assateague Island Wilderness Area	03-21-74	Bureau of Sport Fisheries & Wildlife	Establishing a wilderness area
Virginia	Accomack				
Pennsylvania	Philadelphia	Independence National Historical Park	10-05-73	National Park Service	Acquisition of land for a public parking facility
Virginia		Construction of artificial reefs off Cape Henry, Va.	08-28-72	NOAA	Construction of artificial reefs to create habitat attractive to sport fishes
Virginia	New Kent	Walker Dam Impoundment Aquatic Plant Control Project	03-28-72	Corps of Engineers	Chemical control of aquatic plant growth
Virginia	Prince William	Featherstone National Wildlife Refuge	05-10-73	Bureau of Sport Fisheries & Wildlife	Establishing a national wildlife refuge
Virginia	Virginia Beach	Back Bay National Wildlife Refuge	04-28-72	Bureau of Sport Fisheries & Wildlife	Elimination of unauthorized motor vehicles from refuge

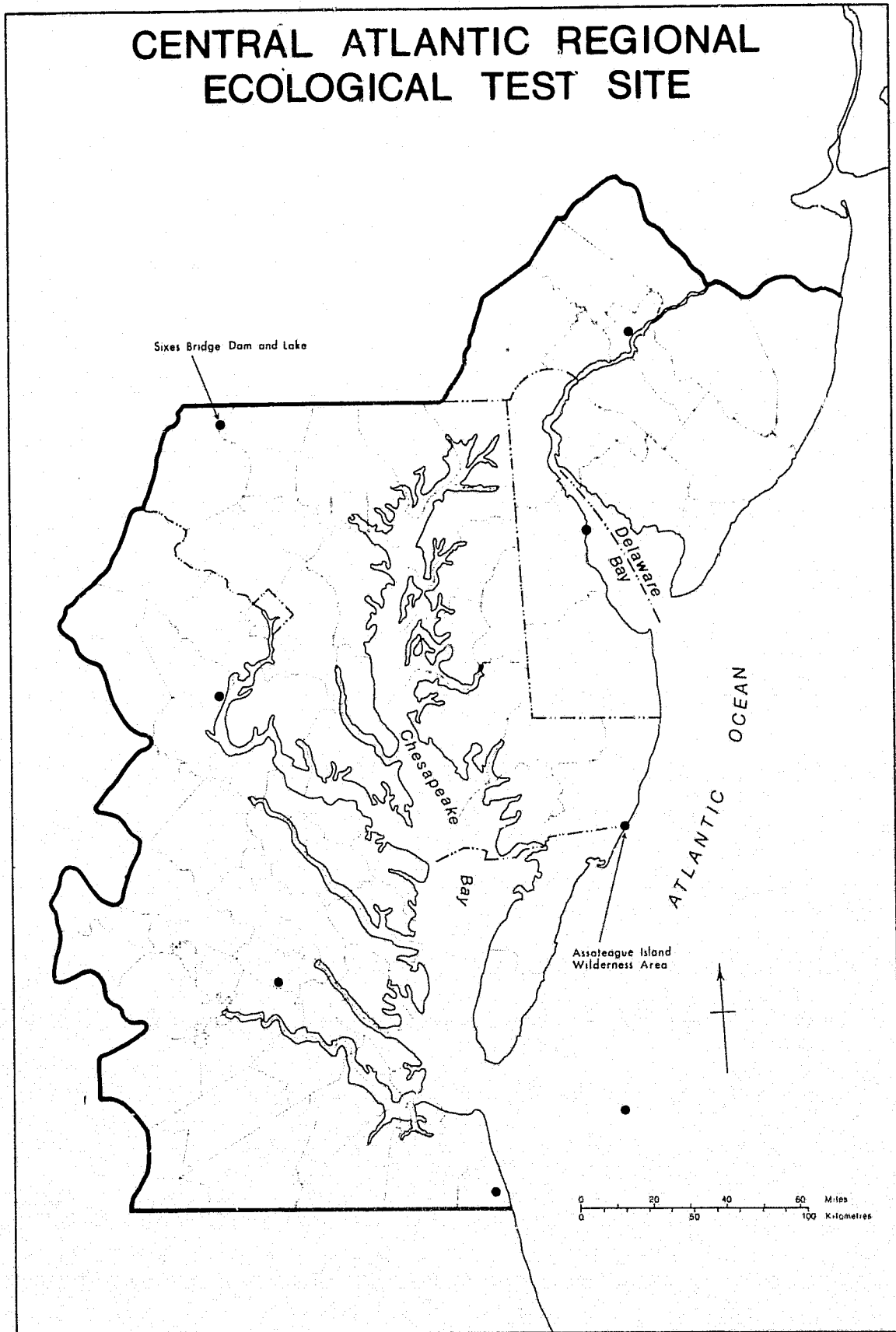


Figure 20--Distribution of actions relating to establishing or enhancing land and water conservation areas.

The U.S. Bureau of Sport Fisheries and Wildlife and National Park Service have proposed that 2,633 ha (6,500 acres) of Assateague Island be designated as a wilderness unit within the National Wilderness Preservation System, an action authorized under the Wilderness Act of 1964 (PL 88-577). The proposal calls for the maintenance of this area in its natural state to preserve existing vegetative types, geographic features typical of barrier islands, and habitat for wildlife and waterfowl (U.S. Bureau of Sport Fisheries and Wildlife and National Park Service, 1974). No significant immediate or long-range environmental change will occur in the area as a result of the proposed action, but the action will remove the land from potential private use and development (figure 21).

The Sixes Bridge Dam and Lake proposal is formulated as a multipurpose water supply, stream enhancement, and recreation project. Although this project is still in the planning stages, its final environmental impact statement has been filed by the Corps of Engineers. Construction is scheduled to begin in 1980, but land use changes (i.e. land clearing) will commence before that time. The action calls for the construction of a concrete gravity dam on the Monocacy River in Frederick County, Maryland, 3.2 km west of Keysville. The lake's recreation pool will occupy 1,400 ha and extend 20 km upstream (U.S. Army Corps of Engineers, Baltimore District, 1973b).

The positive and negative environmental impacts and the project alternatives are listed in figure 22. The action's impact on regional land use will be significant. Over 1,400 ha of woodland and cropland will be inundated, 70 farm families will be displaced, and the historic sites will be destroyed. On the other hand, the project will increase the available flow of the Monocacy by 321,725 m<sup>3</sup> per day and will generate 625,000 visitor days annually for recreation.

Figure 21

Assateague Island Wilderness Area

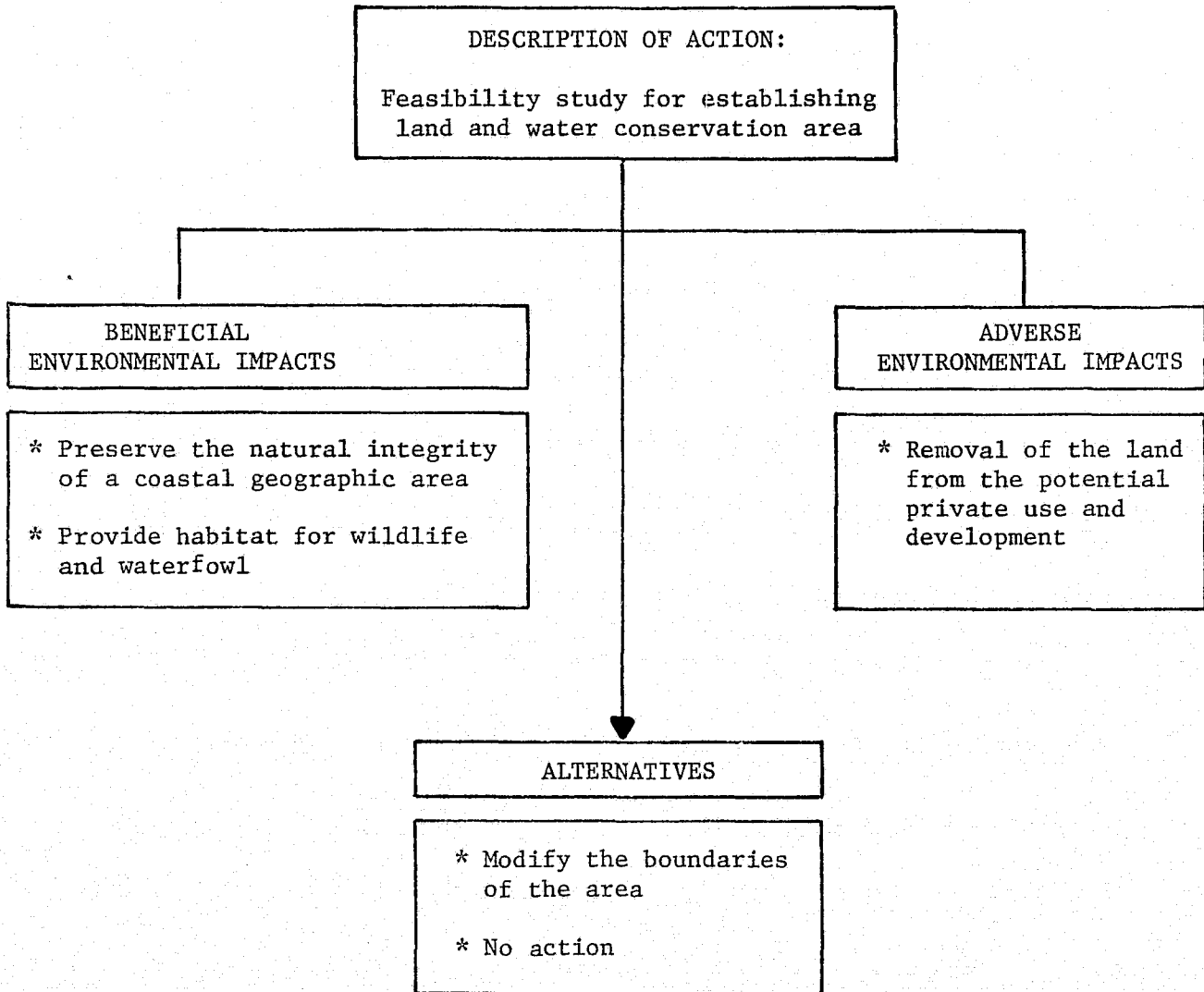
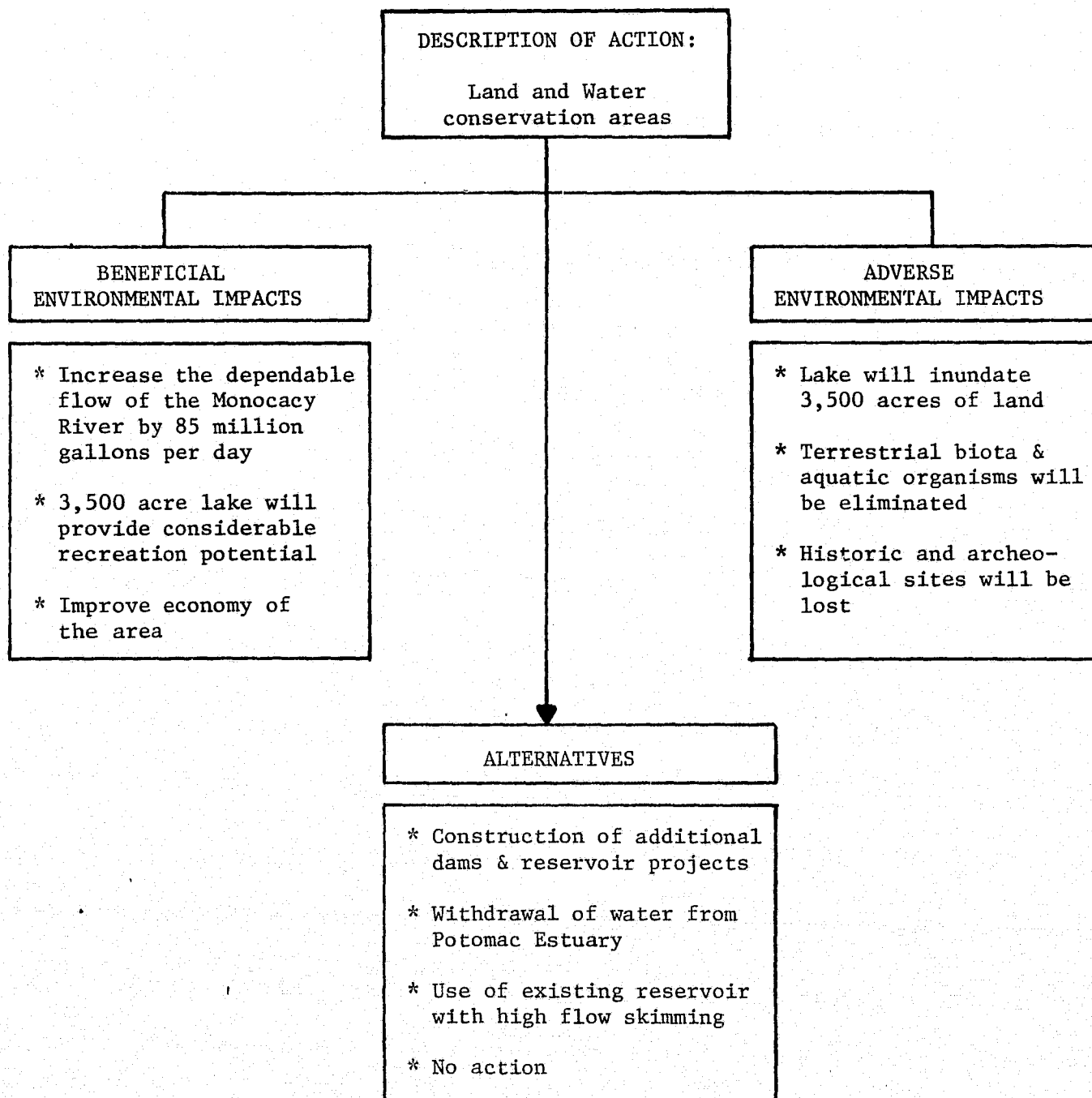




Figure 22

## Sixes Bridge Dam and Lake Project



CARETS type data provide an inventory of existing land resources and a historical file from which to study the long-term regional land use changes resulting from the dam's construction.

#### CONCLUSIONS

The EIS's filed for the CARETS study area are typical of the types of actions proposed by Federal agencies for the nation. They are project-oriented and thereby require site specific data for adequate assessment of environmental impacts. Complete and exhaustive evaluation of impacts related to a given action have been limited by time and budget constraints as well as the assessment methodologies used in EIS preparation. The lack of available quantitative data for analysis of the existing environmental quality of project sites has also hindered the overall analytical viability of given EIS's and the predictive capabilities of the EIS to assess quantitatively the potential impacts resulting from a given project.

In general three categories of adverse environmental impacts result from Federal actions: environmental pollution, vanishing open space, and disruption of natural systems. All three categories involve land use directly or indirectly. Figure 23 presents an approach to environmental assessment that applies land use and water data as central inputs into the assessment process. The several types of actions all require analysis of the existing state-of-the-environment. A focus on land and water description, activity, intensity or use, ownership, compatible and/or incompatible land use associations would be invaluable. This approach provides a model on which to evaluate the environmental impacts of actions.

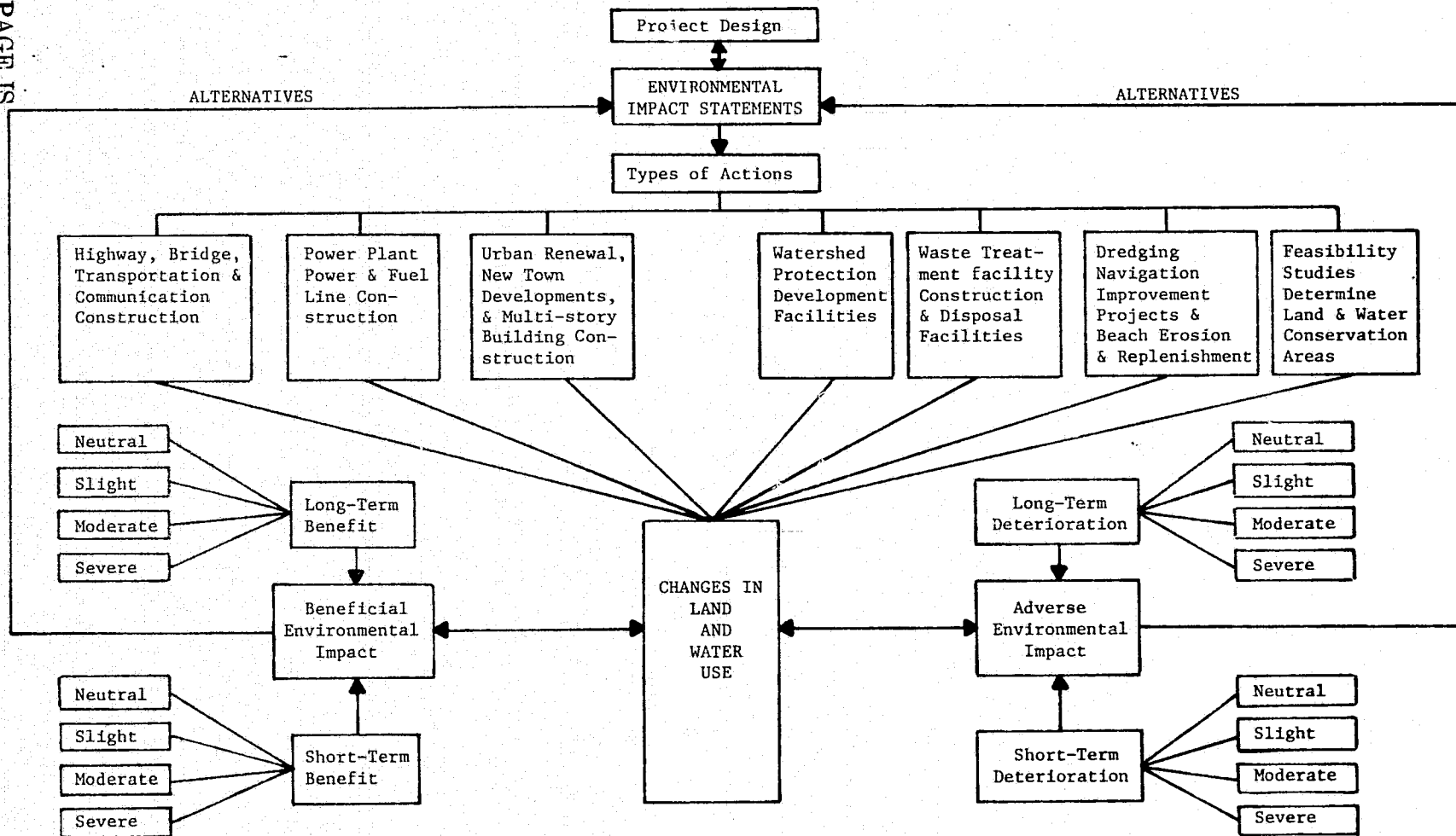
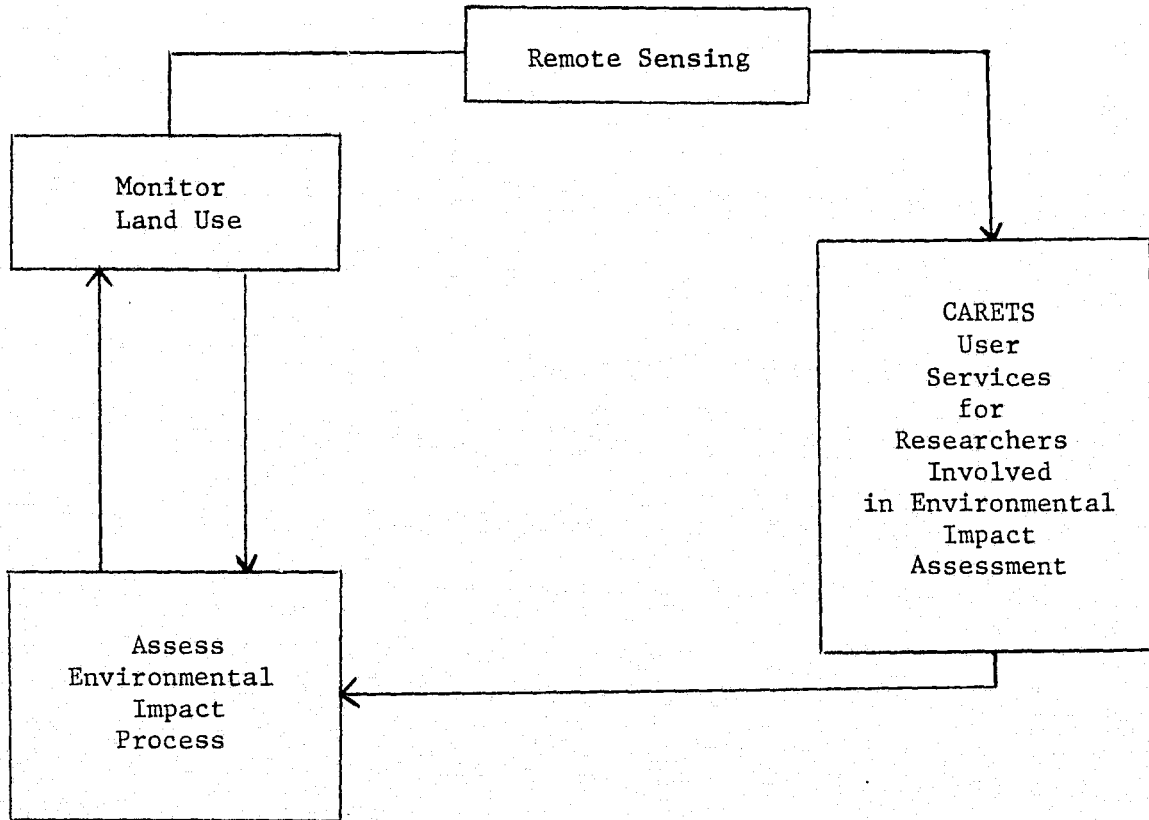


Figure 23--An approach to environmental impact assessment using land use and water data as central inputs

Ultimately, the viability of this approach depends on the availability of land use and geographic information to the investigators involved in the EIS preparation. The CARETS model (figure 24) provides a regional data base that could have been utilized in the preparation of EIS's in the CARETS study area. In the near future, the Land Use Data and Analysis (LUDA) Program of the USGS will generate quantitative land use data nationwide that will provide a strong data base potentially invaluable to the environmental impact assessment process.

Figure 24

CARETS INFORMATION SYSTEM MODEL



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