



Smithsonian *National Zoological Park*

FACILITIES MASTER PLAN

ENVIRONMENTAL ASSESSMENT

Smithsonian Institution

Office of Planning and Project Management

600 Maryland Avenue SW, Suite 5001

Washington, DC 20013-7012

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FACILITIES MASTER PLAN ENVIRONMENTAL ASSESSMENT NATIONAL ZOOLOGICAL PARK WASHINGTON, DC

PROPONENT ORGANIZATION FOR THE ACTION:

THE SMITHSONIAN INSTITUTION

Office of Planning and Project Management
Attn: Debra Nauta-Rodriguez, AIA, Project Executive
600 Maryland Avenue SW, Suite 5001
MRC 511 PO Box 37012
Washington, DC 20013-7012
202.633.6548
nautad@si.edu

LEAD RESPONSIBLE FEDERAL AGENCY:

THE NATIONAL CAPITAL PLANNING COMMISSION

ABSTRACT

The Smithsonian Institution (SI) has prepared this Environmental Assessment (EA) to evaluate the proposed Comprehensive Facilities Master Plan (the Master Plan) for the National Zoological Park (the National Zoo) at its Rock Creek site in the District of Columbia. This document integrates environmental and cultural resource considerations consistent with the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA). In the EA, SI analyzes the potential impacts of feasible alternatives (including the No-Action Alternative) for facilities improvements identified within the Master Plan. The Master Plan emphasizes creating large land areas for exhibit renewal and making site-wide improvements to circulation, entry/arrival experience, service access, and parking. Government agencies and the public are encouraged to review and comment on this EA. Comments must be submitted during the 30-day public review period, beginning on May 19, 2008 and concluding on June 19, 2008.

Please direct written comments on this EA, via U.S. mail or email, to:

National Zoo Master Plan EA
c/o Greenhorne & O'Mara, Inc
810 Gleneagles Court, Suite 106
Baltimore, MD 21286
jwiser@g-and-o.com

Comments may also be posted online at:

<http://nationalzoo.si.edu/AboutUs/FuturePlans/masterplan.cfm>

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I. PURPOSE AND NEED FOR THE PROPOSED ACTION

A. Introduction

The Smithsonian Institution (SI) is currently undergoing a comprehensive process to identify facilities and infrastructure needs at the National Zoological Park (the National Zoo), and proposes to implement strategies for the two decades through a master planning process. The Comprehensive Facilities Master Plan (The Master Plan) will help guide facilities renewal at the National Zoo related to animal welfare, research, exhibits, visitor services, and circulation. The master planning effort compasses two National Zoo sites, the public zoological park at Rock Creek Park in Washington, D.C. and the Conservation Research Center in Front Royal, Virginia. This Environmental Assessment (EA) describes and addresses the plan elements of the alternatives for the National Zoo Rock Creek site under consideration for the Master Plan.

Recognizing its stewardship responsibilities as an independent trust created by Congress, SI is committed to integrating environmental considerations into its planning and decision-making activities consistent with the spirit of the National Environmental Policy Act (NEPA) of 1969. SI is the lead entity responsible for the preparation of this EA, with the National Capital Planning Commission (NCPC) serving as the responsible federal agency. To the extent possible at the master planning phase, this project is also undergoing a review of the project's potential effects on historic resources consistent with Section 106 of the National Historic Preservation Act (NHPA).

Although the SI is not a "federal agency" within the purview meaning of NEPA and CEQ, the SI works with federal agencies on NCPC compliance when "federal actions" occur by those agencies as a result of an SI undertaking. In this case, NCPC's approval of the National Zoo Rock Creek master plan can be deemed a federal action. The SI has prepared this EA to be consistent with NEPA requirements, as amended, and the Council on Environmental Quality's (CEQ's) regulations on implementing NEPA. The latest NCPC environmental guidelines have been used in preparing this EA.

B. Purpose and Need

The purpose of the Master Plan is to affirm SI's mission at the National Zoo and provide a physical framework for implementing the Strategic Plan for the next 20 to 25 years. Facilities at the National Zoo are deteriorating due to age. Furthermore, the Master Plan would identify infrastructure needs and develop an implementation strategy that helps guide facilities renewal related to animal welfare, research, exhibits, visitors services, and circulation at the National Zoo.

The Master Plan is needed to address the following facilities concerns:

- Animal habitats require constant renewal to keep pace with new knowledge of animal health and well-being;
- New science infrastructure, such as laboratories, is necessary to support the National Zoo's mission and keep the National Zoo at the forefront of conservation science;

- Visitor facilities have not been upgraded to accommodate expanded programs and visitation, and do not match SI's high standards; and
- The topography of the site and visitor entry experience makes navigation and circulation difficult and physically challenging for visitors.

A new Master Plan is also necessary to update the existing plan, last revised in 1986, but also to embody the vision of the new Strategic Plan. This plan implements a mission that emphasizes the National Zoo's "leadership in animal care, science, education, and sustainability" (SI, 2006b). To reach the National Zoo's goal of becoming an international leader, the Strategic Plan emphasizes the necessity for the National Zoo to upgrade its current facilities. It is noted that "animal habitats require constant renewal to keep pace with new knowledge about animal health and well-being" (SI, 2006b). The Strategic Plan calls for a "visionary master plan" proposing development while understanding the importance of sound land-use strategies to complement the existing zoo and the need to increase visitor amenities (SI, 2006b).

The number one goal of the National Zoo identified in the Strategic Plan is to ensure the highest quality of animal care and management. This can be achieved through applying the latest knowledge and using best practices in the areas of veterinary medicine, nutrition, animal husbandry, animal behavior, and habitat design. Specifically, the Strategic Plan recognizes that the operation of the National Zoo is not limited to visitor hours, but is a 24-hour/7-day operation. The facilities are aging and some are deteriorating in quality. The Strategic Plan further states that, with the constantly expanding knowledge regarding animal health and well-being, the animal enclosures require regular renewal. In order to achieve the goals of the Strategic Plan, the National Zoo intends to use the Master Plan to identify ways to enhance the unique characteristics of its land and facilities while applying sound land-use practices and using environmentally sound materials.

The second goal of the Strategic Plan is to maintain international recognition of the National Zoo's science-based approach to conservation, exhibitions, and education.

The third goal of the Strategic Plan is to increase public knowledge and awareness. Several avenues are proposed to meet this goal, including providing an inspiring and dynamic science-based zoo experience while ensuring the National Zoo's audiences feel welcome and are well-served by superior visitor amenities such as shading, restrooms, food service, sitting areas, recycling, and trash collection points.

The master planning process provides the opportunity for the transformation of the National Zoo's infrastructure and facilities to reflect the NZP Strategic Plan and mission and SI-wide goals and objectives. The Master Plan emphasizes six primary areas:

- Renew park infrastructure and facilities to create large, adaptable land areas to meet future collection planning goals;
- Clarify the entry and arrival experience by consolidating visitor entry and exit points, enhancing visitor facilities, and providing iconic entry points;

- Simplify and ease circulation around the site by mitigating the topography and separating vehicular and pedestrian circulation whenever possible;
- Revitalize and strategically add visitor and park facilities, special event venues, education facilities, and research, administrative, and operational space;
- Embody the National Zoo’s sustainability goals and conservation mission by celebrating, protecting, and enhancing the Rock Creek ecosystem; and
- Celebrate the National Zoo’s history by protecting and revitalizing the historic structures and cultural landscapes.

To help further define the facilities needs at the National Zoo, the Master Planning team conducted a series of workshops and interviews with National Zoo staff, other SI staff, Friends of the National Zoo (FONZ)* staff, and outside interested parties. Through these workshops and interviews, the master planning team gained further understanding of the different needs of the National Zoo. The team then developed concepts and alternatives to help resolve issues related to: entry and arrival; navigating the site; internal circulation; visitor amenities; topography; site accessibility; conflicts between service and visitor access; exhibit renewal; staff and guest facilities, and parking. The workshops and interviews confirmed the needs of the National Zoo as identified in the Strategic Plan.

C. Background

The National Zoo Rock Creek site consists of 163 acres (65.9 hectares) and is located east of Connecticut Avenue and west of Rock Creek in Northwest Washington, DC (see Figure 1). Land use around the National Zoo is mostly residential, with an area for commercial use near the Connecticut Avenue entrance and Rock Creek Park abutting the northern and southern extents of the property. The Rock Creek stream valley meanders through the eastern portion of the National Zoo, contributing to the steep and uneven topography. The National Zoo houses approximately 2,000 animals from 400 species, has a staff of 350 Smithsonian employees, 15 visiting researchers, approximately 350 full-time, part-time and seasonal FONZ employees, and over 1,500 volunteers. The site contains 644,000 square feet (59,829 square meters) of buildings within the 104 acres (42 hectares) of the developed portion of the site.

The National Zoo was created by an Act of Congress in 1889 for “the advancement of science and instruction and recreation of the people.” Its founding motive was illustrative of the growing consciousness in the United States for the preservation of the natural wilderness and wildlife. The original plan and layout is reflective of this concept as the National Zoo was more of a wildlife refuge than a recreational facility and was influenced by the directions and collaborations of the noted landscape architect, Frederick Law Olmsted, and Smithsonian Director, S. P. Langley. Olmsted is renowned for his ability to create picturesque landscape plans that use native plants and manipulate the existing land to form scenic vistas. His designs boast a natural appearance that belongs to the landscape and contain the appearance of having been a part of it for many years. Secretary Langley had a clear vision for the aesthetic appeal with the desire to use architecture to communicate the culture and landscape from which an animal originates,

*FONZ is an active partner of the National Zoo consisting of staff, volunteers, and members who provide concessions, educational programs and fundraising efforts in support of the National Zoo’s mission and programs.

an idea itself originating from the philosophy of Associationism (Farrell, 2004). These influences intermingled: the natural through Olmsted’s plan, using an old quarry to house bears, to Langley’s attention to aesthetics illustrated through the rusticated architectural style of the 1891 Lion House and for North American animals, a distinctly North American style of architecture – a log cabin styled barn for buffaloes.

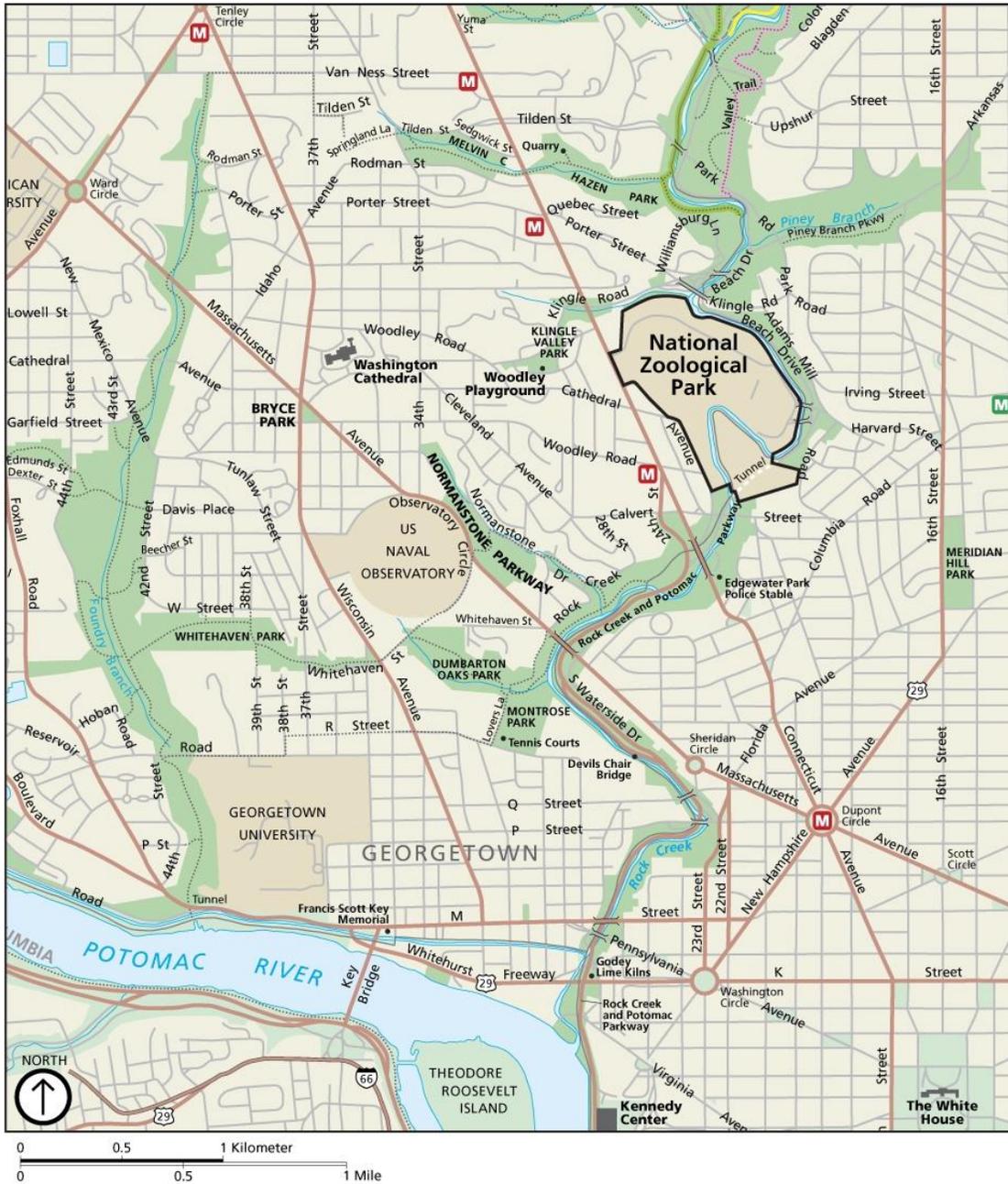


Figure 1. Location Map

Through the following decades, however, the National Zoo began to lose the original naturalistic design and started to take on the appearance of a typical zoo, with menagerie style cages. A transformation had begun as the National Zoo became a recreational destination with more picnic shelters, public restrooms, drinking fountains and adjacent tennis courts, a bridle path, and a playground constructed.

The 1920s ushered in a new way of thinking. Architecture should not blend in with the natural environment, but actively bridge the public to the animals through its design. For example, the door to the Reptile House is adorned with classical architectural building elements, until one gets close and sees that the capital is topped with a lizard, or the base of a column rests on a tortoise. The 1930s brought a plethora of projects as the SI greatly benefited from the Depression era governmental work programs. Buildings that housed the animals continued in the distinctive architectural design, while support buildings settled for the earlier structural tradition of using local Rock Creek gneiss in a loosely interpreted Colonial Revival style. By the end of the 1930s, the National Zoo was once again examining not just the buildings that housed the animals, but the site itself. Cars and parking were becoming an issue in the forefront.

The 1940s through 1950s saw a decline in the National Zoo's ability to keep up with the rising maintenance costs and began to see other zoos surpass it in terms of modernity. As the lack of funds became more pressing, a group of local citizens formed the FONZ in 1958. FONZ lobbied Congress to fund the National Zoo's budget entirely through the SI; previously the budget was divided between the SI and Washington, DC's appropriations.

The year 1961 saw the formation of the first master plan since the original Olmsted plan. The Master Plan, developed in 1961 by architects Daniel, Mann, Johnson, and Mendenhall, presented a plan that echoed the original intent of the National Zoo. One of the main goals of the 1961 Master Plan was to present the animals in a landscape surrounding that is consistent with their native landscape using modern facilities that do not detract from the natural setting of the park. Whereas the architecture with the first generation of National Zoo buildings was designed to look rustic and appropriate with the setting, the 1961 plan provided that the architecture should blend in with the land (i.e., the buildings were constructed to look like the land).

During this phase of growth and development, it became clear that the landscape had not been fully integrated into the National Zoo Master Plan. In reaction, the 1972 Master Plan addressed the buildings and landscape by placing buildings behind landscaped hills and used underground structures to expand exhibit space without impacting the landscape. The 1972 Master Plan fully intended to update all exhibitions to modern standards. With regards to the footpath, the 1972 Master Plan resurrected the Olmsted idea of a unifying circulation path and included his original 1890 plan in the study. By the mid-1980s, the Olmsted Walk was completed.

The Master Plan of 1986 suggested a conceptual change for the National Zoo, separating exhibit groups by their ecological relationship into thematic zones. A 1996 study

examined National Zoo facilities and identified areas that were failing as exhibit areas. These were incorporated into a 10-year renewal plan in 2000.

D. Planning Policies

Over the years, planning policies and focus have changed with the National Zoo. Often these alterations have been reflections of various directors' ideals. They have also been adjusted to resemble trends of an era, but most often planning policies have been updated to make the most of new advances and knowledge about the animals exhibited at the National Zoo and the world around them.

Washington, DC has a guiding planning document, *The Comprehensive Plan for the National Capital*, which states goals, objectives, and planning policies to direct and manage growth in Washington, DC. This plan contains both Federal Elements and Washington, DC Elements.

The Federal Elements of the Comprehensive Plan are directed at existing and future federal lands and facilities in the National Capital Region, and contain recommendations for growth and development. These elements contain policy guidelines for: federal facilities, federal employment, foreign missions and international organizations, parks and open space, visitors to the Capital, natural environment, and preservation and historic features. The National Capital Planning Commission administers the Federal Elements (NCPC, 2004).

Ongoing Renewal Efforts

Prior to the development of the most recent Strategic Plan, renewal efforts have been taking place throughout the National Zoo. Thematic zones have been used to blend the National Zoo's pre-existing priorities of education, research, and conservation into a single interpretive experience that focuses on one animal or group of animals. Not only do these exhibits provide an interactive and fun experience to the visitor, they prompt one to ask questions and become involved in the research and conservation method (Cooper-Lecky Architects, et al., 1986).

The Think Tank is one example of these animal programs. The Think Tank forces visitors to ask themselves, "what is thought?", while fostering conservation by teaching one to view species as cognitive beings. The Amazonia Science Gallery has proven itself an exceptional avenue to bridge the gap between scientist and visitor. Individuals get to see the work being done by researchers and communicate with them directly to have a greater concept of what daily work in the sciences is like. The Kid's Farm exhibit opened in 2004. Here children are able to see where the foods they eat every day come from; this is a hands on exhibit that explains the abstract concept of species interaction. The first phase of the Asia Trail is another program which recently opened to the public (in late 2006) (SI/FONZ, 2006a). All animals in the Asia Trail Exhibit are endangered species and the National Zoo is involved in interior situ and exterior situ research on many of them.

1986 Revised Master Plan

The most recent update to the Master Plan was presented in 1986. This Plan emphasized displays of both plants and animals together with aquatic and terrestrial species. Zones were developed to showcase themes. These allowed for a more interpretive experience to educate visitors about species and their eco-geographic area. This experience would compare animals' adaptations to their environment and interrelationships between species. The 1986 Revised Master Plan conceptualized the development of three of these zones, Aquatic Habitats, Forests, and Grasslands; development of more zones at a later date was also emphasized (Cooper-Lecky Architects, et al., 1986).

With the intention to push the National Zoo to become a "Biopark," the animals' comfort was stressed. Efforts were made to ensure that each inhabitant of the National Zoo was provided with adequate and accessible food, water, sleeping facilities, and health care (Cooper-Lecky Architects, et al., 1986).

The comfort of the National Zoo's visitors was also taken into account. Visitor services and the restructuring of concessions were a primary focus of the 1986 Revised Master Plan. Plans were made to eliminate all temporary facilities and replace them with permanent fixtures that architecturally worked in harmony with nearby exhibits. Panda Plaza was designed to become the major visitor service hub. The expansion of dining facilities as well as gift shops was planned to alleviate the congestion that was being experienced at peak periods. Along with visitor concessions, it was proposed that a Loop Trail be established to link both ends of Olmsted Walk, enhancing pedestrian circulation while expanding exhibition area. This trail would also provide an important connection to exhibits that were located "off the beaten path," (Cooper-Lecky Architects, et al., 1986).

Included in the plans for expansion, new plans for parking areas and bus circulation were established according to necessity. With the growth of exhibition areas, it was noted that parking areas would be swallowed up. Plans for a parking garage over Parking Lot C and the elimination of Parking Lot B were initiated, but the expected Metro rail expansion would help reduce the need for additional parking space (Cooper-Lecky Architects, et al., 1986).

These updates were a revision of the previous 1972 Master Plan.

1972 Master Plan

The Master Plan for the National Zoo that had been presented in 1972 intended to increase spaces for the animals while using natural elements to create the exhibit areas. Water features were introduced to enhance animal habitat, and incorporated as natural barriers between the animals and visitors. New construction was to be designed underground to preserve the continuity of the designed landscape, thus decreasing visual impacts for the visitor. The 1972 Master Plan was the first time many ignored issues from prior strategies were assessed (Farrell, 2004):

- Detailed studies were conducted to evaluate the need for new parking;

- Architectural sites were appraised for their historic value and the need to preserve them; and
- Olmsted's innovative blueprint was reevaluated and utilized in the redesigned plan for Olmsted Walk, a tribute to the National Zoo's original designer.

Upgrades to the National Zoo's Olmsted Walk and entry points at Rock Creek Park and Connecticut Avenue were constructed in 1984. These upgrades and redesigns maintained and enhanced the original Olmsted concept of curvilinear design. Beaver Valley was developed to simulate the natural flow of a mountain stream into the ocean. As visitors wound their way through exhibits, they were prompted to experience animals in environments that more closely mirrored their natural habitats, and were educated about the links between differing natural environments (Cooper-Lecky Architects, et al., 1986).

1961 Master Plan

Through the 1950s and into the early 1960s, the National Zoo had plummeted into disrepair, primarily due to lack of funds. This was largely a response to our country's involvement in World War II and then the Korean War. There was a tragic accident in 1958 involving a 2½-year old girl being killed by a lion at the Lion House. This forced the National Zoo to rapidly reevaluate its safety and policies. The product of that examination was the development of the 1961 Master Plan. Animal health and public safety became the focal points of this planned modernization. The prior establishment of FONZ and the following decision by Congress to fund the National Zoo entirely through the SI provided much needed financial security. The National Zoo began to modernize its on-site facilities as well as develop education, volunteer, and research programs to help promote conservation throughout the 1960s. The principles behind this plan paved way for new projects such as:

- The Conservation and Research Center – est. 1975, an off-site conservation center;
- New on-site hospital and research facilities, with an updated and modern administration building; and
- Animal housing designed to resemble caves or grottos, disguising that they are buildings, (Farrell, 2004).

The Olmsted Concept

The National Zoo, established in 1889, was built to house a small collection of animals donated to SI. SI commissioned the firm of renowned landscape architect Frederick Law Olmsted to design the National Zoo. Olmsted's design planned a naturally scenic park that worked with the steep and winding topography of Rock Creek Valley. He stayed away from the linear standard of his period to avoid sharp edges and provide for focal points and natural vistas along pathways, showcasing the exhibits (Cooper-Lecky Architects, et al., 1986).

Although the National Zoo was initially designed with a very naturalist ideal, it didn't take long before the park-like setting gave way to more menagerie-type displays. The method coincided with the exhibiting standards of the early part of the 20th century, one

where replication of a species natural environment was forfeited in order to house one or two examples of many different exotic species. Although this provided a very diverse range of display specimens, it did not promote animal health or well-being, issues that were largely not understood in this period (Farrell, 2004).

E. Public Involvement

SI has actively engaged the public in the planning process for the development of the Master Plan. Up to the point of this EA, SI has held two public meetings: a Scoping Informational Workshop and an Alternatives Informational Workshop. A third public meeting will be held during the public review period for this Environmental Assessment. The outreach efforts from the two informational meetings and comments received from the public are summarized in this section.

Scoping Informational Meeting

The public participation process for this EA was initiated by the circulation of a scoping information package to interested citizens, including nearby residents and FONZ members. Information contained in the scoping package was also available on the National Zoo website. Scoping is a process prescribed by NEPA that provides the public, agencies, and other interested parties with an opportunity to comment on a proposed action, and identify issues and concerns that should be addressed. The scoping package explained the proposed project, stated the SI's intent to prepare an EA, and described the environmental review process. It also invited all interested citizens to attend a Public Scoping Informational Open House, and indicated where comments regarding the scope of the EA could be submitted.

The Public Scoping Informational Open House was held at the National Zoo's Visitor Center on February 15, 2006. Members of the public were encouraged to ask questions on topics of interest at several stations set up to address different aspects of the master planning process. Approximately 16 attendees signed in, and 13 written comments were received during the Open House and/or public comment period. A summary of the comments received follows:

One individual expressed support for enhancing the visitor experience and many agreed that enhancement to internal circulation was necessary. Additional interest was expressed in a surface tram to make the National Zoo more accessible to individuals with disabilities, those with strollers, and others who found traversing the steep terrain problematic.

Multiple suggestions were made to enhance the visitor experience. These included the expansion and improvement of restaurants and restroom facilities, making them more family-friendly, and the installation of a health unit to treat potentially injured visitors and staff (although the National Zoo already has a visitor first-aid unit, this was unknown to the commenter). Concern was also expressed that the existing signage and trails offered inadequate guidance and should be expanded to enhance the National Zoo experience.

A common theme among all of the comments received was concern for the welfare and health of the animals. Many noted the importance of education to the continued conservation of many of these rare and endangered species. Some felt expanded hands-on displays and exhibits highlighting the local environment would best convey a message of conservation to the National Zoo's visitors. Others felt it was the National Zoo's duty to represent as much of the natural world's diversity as feasible within its facility, citing the surrounding Rock Creek Park as a vehicle to educate individuals on local ecology. One individual expressed concern that the National Zoo needed to improve its method of communication with its local neighbors while being more attentive to the effects of the National Zoo's actions on its surrounding communities.

Alternatives Informational Meeting

An Alternatives Informational Meeting was held on June 28, 2007, and was conducted in an open house format at the National Zoo's Visitor Center. The purpose of this meeting was to introduce Alternatives A and B under consideration and to engage interested citizens to submit comments on the Master Plan. Approximately 17 attendees signed in, and 4 written comments were received during the Open House; an additional 98 comments were received during the public comment period by e-mail.

Each of the comments received expressed the need to elevate the National Zoo to international status; however, differences in how this would be accomplished varied throughout the public comments.

Improvements to the visitor experience were cited in comments regarding overall enhancement of the National Zoo. Many comments endorsed the construction of the aerial tram as presented with Alternative A. Primarily, the comments received reflected a view that the aerial tram option presented in Alternative A would best fulfill the need to assist visitors who have difficulty traversing the topography of the National Zoo. Additionally, comments in support of the aerial tram suggested that it would provide a memorable experience, unlike any other, and could be incorporated into exhibits highlighting the Golden Lion Tamarins, the existing aviary, or a rain forest exhibit. Conversely, there were comments expressing concern that the aerial tram would not be able to meet the needs of those with disabilities or it would introduce an amusement park-like element to the National Zoo, detracting from the natural beauty of the National Zoo's landscape. These comments also cited the potential for increased operational noise and the cost of installation and maintenance as reasons not to install an aerial tram. Some of the parties providing comments were against the installation of an aerial tram, but supported a ground tram along North Road (Alternative B). Others preferred no tram at all.

Parking needs were also a commonly expressed concern. While many were in favor of underground parking garages, others were in support of building multi-level parking facilities. Residents of neighborhoods directly adjacent to the National Zoo voiced strong opposition to eliminating any parking. They cited already crowded side streets in a city with limited parking being filled by the present National Zoo parking lot overflow. In

contrast, several parties providing comments emphasized the need for further use of the Metro system by Zoo visitors and staff.

The necessity for additional restroom facilities was expressed by numerous individuals. Multiple comments were received that indicated current signage at the National Zoo is uninteresting and not helpful in guiding visitors through exhibits. Other suggestions for visitation improvement included popcorn stands, fine dining facilities, and a proposal for a bird friendly coffee/espresso bar in the existing Panda Café that would serve the dual function of highlighting the Migratory Bird Center's research and produce revenue within the National Zoo.

Issues regarding exhibits and the animals featured by the National Zoo were also discussed at length in the comments. Many expressed concern that both Alternatives A and B would redevelop the present Great Ape House, but neither offered a solution for where the apes might be relocated to or if the apes would remain at the National Zoo Rock Creek site. Additionally, many were concerned that future plans at the National Zoo to offer expanded exhibit areas would limit the diversity of species the National Zoo would be able to showcase, citing the recent removal of the giraffes and polar bears. Concern was expressed that there must be balance between giving the animal inhabitants of the National Zoo ample living space and allowing visitors to the National Zoo the opportunity for close interaction with its inhabitants. Many compared the National Zoo exhibits and their presentation with others such as the San Diego and Bronx Zoos. Other parties providing comments suggested removing large animals such as elephants from their Rock Creek facility and opening the National Zoo's CRC site at Front Royal to visitors to see these large animals in a more sanctuary oriented environment. Funding for the developments presented in each Alternative was also a question of concern. Many noted that the changes proposed in each action alternative would be very dependent on the National Zoo's ability to fund them and neither alternative offered a suggestion as to how these funds would be procured.

F. Agency Coordination

Through a series of meetings and presentations, SI and the National Zoo staff consulted several pertinent resource agencies and organizations to obtain information and solicit input on the scope of the EA. During the scoping meetings, SI explained the Master Planning process and stated the intent to prepare an EA. After considering the collective participation of the various agencies, the planning team then developed and presented the preliminary alternatives.

Members of the consulting team and the National Zoo Master Planning Working Group met with the National Capital Planning Commission, the Washington, DC Historic Preservation Office (DC HPO), and the U.S. Commission of Fine Arts (CFA) on July 8, 2005, for an informal discussion. The purpose of this meeting was to review and consult with agency staff on the proposed project scope, the approach to the Master Plan, NEPA and Section 106 compliance, and public participation. Additionally the team reviewed NCPC requirements for the EA and Master Plan.

On December 19, 2005, SI met with NCPC to discuss project specific requirements for compliance activities and master plan submittal.

SI met with the DC Department of Transportation (DDOT), DC Office of Planning, the Washington Metropolitan Area Transit Authority (WMATA), and DC HPO on February 16, 2006, to provide the agency staff with a general overview of the Master Plan and schedule. Additional projects near the National Zoo were discussed during this meeting, as well as area transportation and traffic circulation.

On March 13, 2006, members of the consulting team met with the DC Department of Health (DOH) to introduce DOH staff to the Master Plan project, and to discuss Washington, DC requirements and approval processes for stormwater management and erosion control. Green Design opportunities for the Rock Creek site were also investigated.

On May 16, 2006, SI met with agency representatives from NCPC, CFA, and the DC Office of Planning to provide an update of the Master Plan for the National Zoo. The planning team gave a presentation of the activities leading up to the development of the preliminary alternatives and provided the agencies with an opportunity to offer feedback on the draft alternatives prior to presenting them to the public.

On May 30, 2006, SI met with DC HPO and NCPC to present and discuss the preliminary alternatives and review the Master Plan schedule and important dates in the planning and EA/Section 106 processes. During the meeting, an overview of the historic resources at the National Zoo was presented.

On November 21, 2007, SI met with NCPC to discuss submittal requirements and provide an update on the status of alternatives being considered. SI gave NCPC an update on the status of the Master Planning alternatives and an overview of the public comments received, and asked for clarification on the appropriate level of assessment for different concepts being considered, such as the Parking Structure at Parking Lot C and the aerial tram concept.

On January 2, 2008, SI met with DC HPO to update the agency with the status of the Master Planning alternatives, review public comments received to date, and get clarification on the appropriate level of assessment for different concepts being considered, such as the Parking Structure at Parking Lot C and the aerial tram concept. SI gave a presentation showing the potential viewshed that may be affected at the National Zoo.

On April 1, 2008, SI met with DC HPO to discuss inclusion of a historic preservation review component in the Master Planning and EA processes. It was noted that more detailed design information would be needed in order to make a conclusive and complete historic preservation statement, however, DC HPO will comment on the Draft EA in a letter to SI. The letter will point out elements of the Master Plan where they feel adverse

effect is probable, and will state that final determination, concurrences, and/or agreements will occur when a detailed design is developed later in the process.

On April 11, SI met with the National Park Service to provide an update on the master planning process and proposed alternatives. At this meeting, NPS expressed concerns if any project would have viewshed impacts and requested to be involved as project planning and design proceeds for some of the concepts in the master plan such as the aerial tram and parking structure.

G. Workshops/Planning Process

The Master Planning team conducted a series of workshops, design charettes, and interviews with National Zoo, other SI, and FONZ staffs to identify facilities needs and come up with concepts to address their concerns. During the course of the Master Planning process between June 2005 and July 2007, 11 multi-day workshops were conducted: eight workshops were dedicated to the Rock Creek site and three workshops to the Front Royal site. Additional strategic meetings and work sessions were also held during the process as needed.

The Observations Phase of work began with a pre-planning methodology in June 2005 to outline the methodology for the planning process and to identify major opportunities and constraints at both facilities. The design team along with SI and National Zoo staff documented the existing conditions at each facility by conducting tours of the facilities and grounds, interviewing key staff and stakeholders, and reviewing previous studies and reports. Workshops were conducted on both sites in order to gain insight into the existing building and site conditions and facilities needs and desires. Interviews with staff (representing scientific research, animal care, visitor services, education, and operations) and field reconnaissance were conducted in order to gain a comprehensive understanding of the existing facilities. A public scoping meeting was held on March 15, 2006.

During this phase of work, the design team also worked closely with the National Zoo team to bring a group of nationally-recognized visionaries to the sites to inspire the staff, provide guidance to the Master Planning process, and discuss trends relevant to a science-based organization like the National Zoo.

Because the Collection Planning effort is a separate process with its own schedule, the Master Planning team recognized the need for the flexibility in order to accommodate current and future collection and exhibit goals. Because animal collection requires specialized planning, it was important to create a flexible Master Plan in which future exhibit designs could be incorporated. This would allow for an integrated, but independent, Collection Planning effort that could also be modified over time to best serve the National Zoo and animal welfare needs.

The Concept Planning and Alternatives Development Phase of work began in November 2005 with an emphasis on the Rock Creek site. Conceptual ideas were tested and more analyses were conducted on the topics of visitor entry and arrival, circulation, and sustainability. Alternative development strategies were evaluated and presented to the

National Zoo community and public at a public meeting on June 28, 2007. National Zoo leadership weighed various plan elements and public comments, and selected a preferred direction for the Master Plan. At the same time, an EA and Section 106 documentation evaluated the impacts of the development plan on the natural and cultural resources of the park. A final site development plan was the basis for further technical study and detailed planning and design, including the urban design context, landscape plan, stormwater management, cost estimate, and phasing plan.

II. DESCRIPTION OF ALTERNATIVES

A. Process for Alternative Development

The Master Planning Team developed a Conceptual Framework based on the analysis of existing conditions and the facilities needs. Six major elements were emphasized as a way to test the broad design concepts and development scenarios, and to guide discussion to the core topics of this Master Plan for facilities and infrastructure renewal (and away from exhibit planning and design, detailed programming, etc). The six objectives of the Master Plan are:

- Renew park infrastructure and facilities to create large, adaptable land areas to meet future collection planning goals;
- Clarify the entry and arrival experience by consolidating visitor entry and exit points, enhancing visitor facilities, and providing iconic entry points;
- Simplify and ease circulation around the site by mitigating the topography and separating vehicular and pedestrian circulation whenever possible;
- Revitalize and strategically add visitor and park facilities, special event venues, education facilities, and research, administrative, and operational space;
- Embody the National Zoo's sustainability goals and conservation mission by celebrating, protecting, and enhancing the Rock Creek ecosystem; and
- Celebrate the National Zoo's history by protecting and revitalizing the historic structures and cultural landscapes.

Based on this Conceptual Framework, the planning team developed two concepts for the future development of the National Zoo, keeping in mind visitor experience, circulation, and conservation goals. Two primary concepts, the "urban park" and the "peninsula," were introduced and tested. These two concepts were presented at the scoping public informational open house on February 15, 2006 and were the framework for the development of more detailed alternatives presented in this Environmental Assessment.

Urban Park Concept

The urban park concept (see Figure 2) emphasizes a new circulation system with a focus on visitor entry from Connecticut Avenue and a new mid-point entry experience. Visitors arriving by car and bus leave their vehicles at a new parking structure and enter the park at the mid-point, allowing them to experience the upper and lower zones of the park while still maintaining their orientation at the mid-point. The Connecticut Avenue entrance and a smaller entry at Harvard Street Bridge/Beach Drive would serve visitors and employees arriving by mass transit or who park at satellite/partnership locations. Beaver Valley is restructured as part of a Conservation Zone along Rock Creek; exhibits and programming emphasize conservation, the Rock Creek ecosystem, and education. Administrative uses are consolidated within the new parking structure at the mid-point. Research and support functions are not relocated. Large land areas are created for exhibit renewal, regaining flat land from surface parking lots and revitalizing existing exhibit areas.

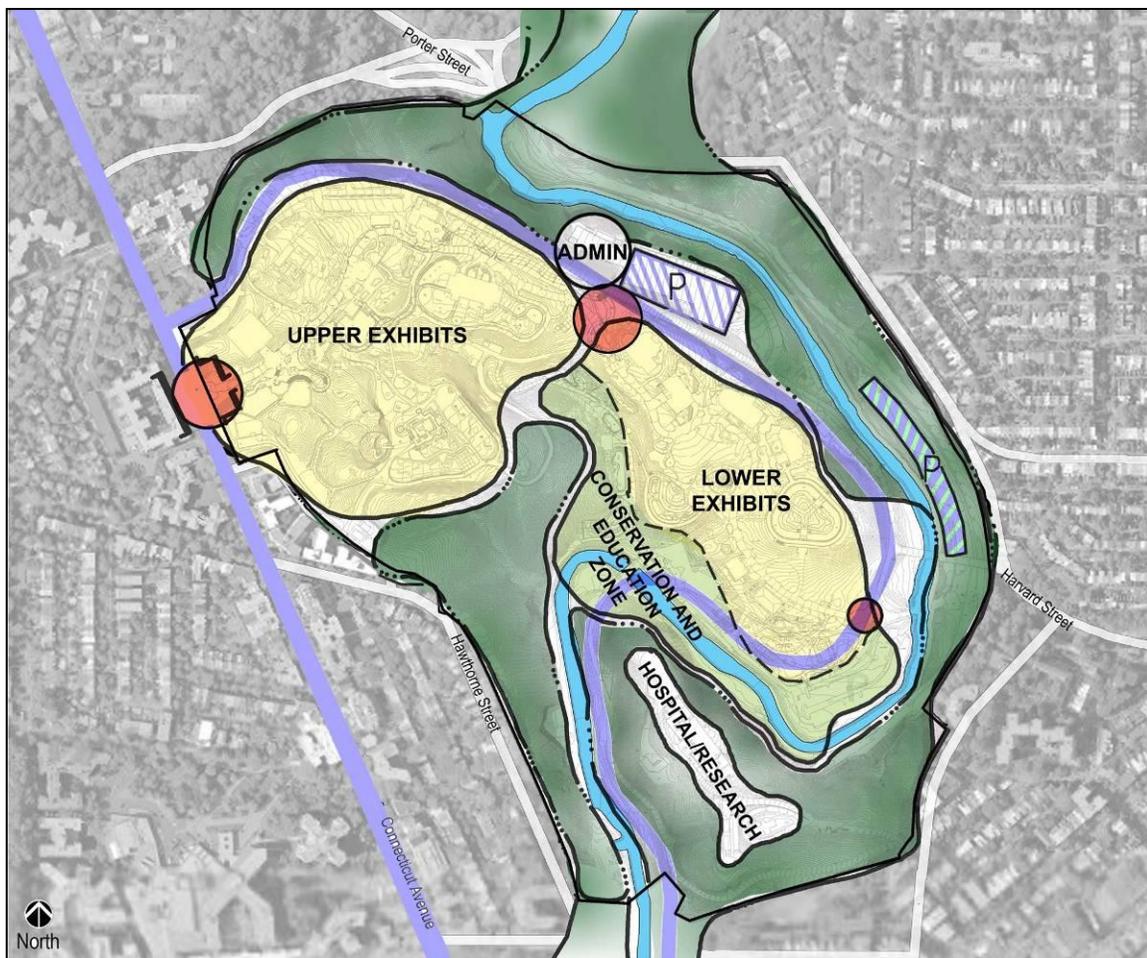


Figure 2. Urban Park Concept

Peninsula Concept

The peninsula concept (see Figure 3) emphasizes a linear circulation pattern between two entry points at either end of the National Zoo, Connecticut Avenue and Harvard Street Bridge/Beach Drive. General public access along North Road is limited. Visitor parking is available at both entry points, providing easier access from the city streets and limiting congestion within the park and along North Road. Visitors arriving by mass transit or walking in from Connecticut Avenue or Adams Morgan have clear entrance points and visitor facilities. Exhibits and circulation follow Olmsted Walk and the natural ridgeline as they do today. Beaver Valley is converted to an Education Zone, dedicated to school groups and other programs, limiting general visitor access and circulation. Research and support functions, including veterinary care, become a focal point at the center of the park and visitor experience, relocating to the historic core and the Parking Lot C areas. Administrative uses are consolidated and relocated to the peninsula off of Adams Mill Road. Large land areas are created for exhibit renewal by revitalizing existing exhibit areas.

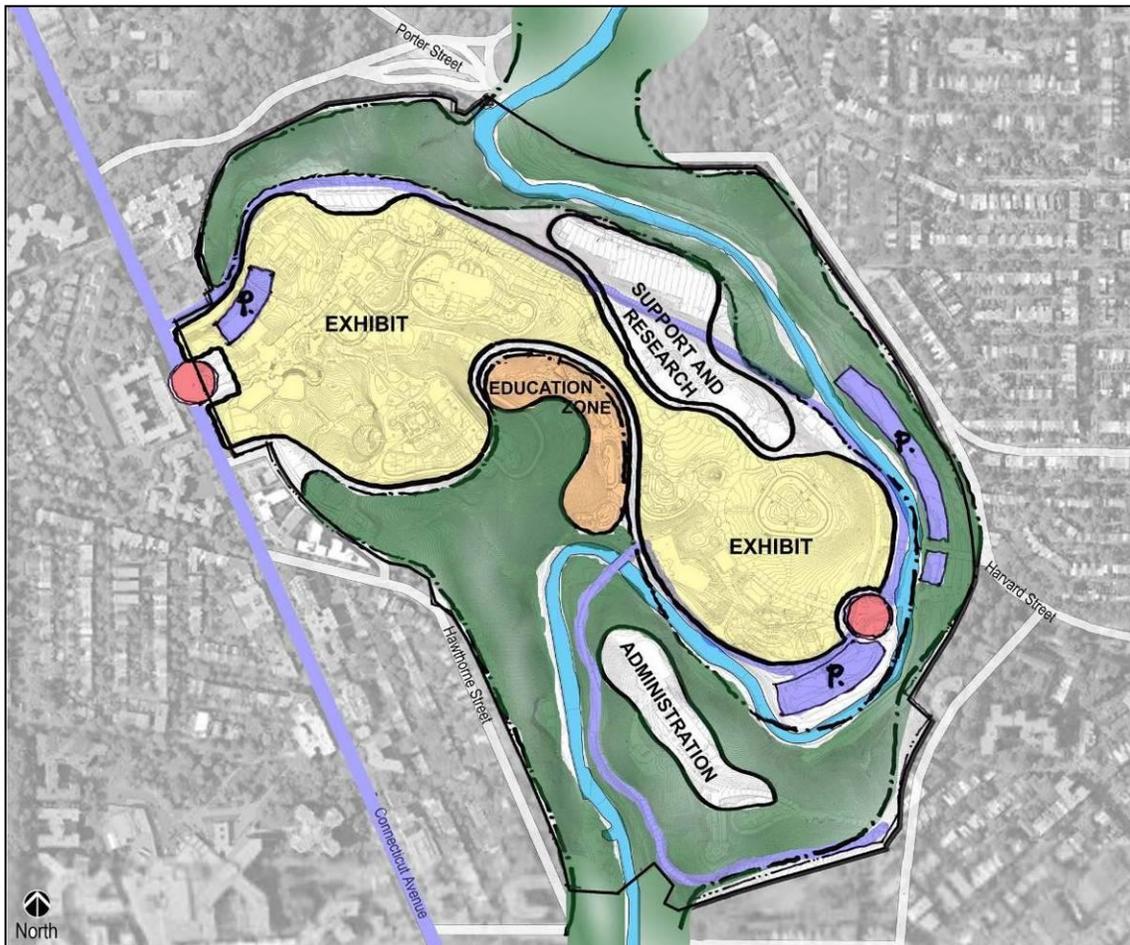


Figure 3. Peninsula Concept

Process: Evolution of Alternative Concepts

The planning team presented these concepts at a public meeting (June 28, 2007) and during numerous presentations to National Zoo staff and the Master Planning Work Group to gather input and comments. Various planning and design scenarios were drafted based on the Conceptual Framework. The planning team developed the following points as key elements of any development scenario moving forward:

1. Large multi-species exhibits can be achieved through strategic renewal of the National Zoo. Flat land adjacent to exhibit areas that is currently used for surface parking should be recaptured for exhibit expansion and renewal.
2. The upper (Connecticut Avenue) end of the site is a major entry point that takes advantage of the urban location and public transportation. This area should be rejuvenated as an exciting, fun, intensively developed area, with large, multi-species exhibits as well as visitor services and special events venues.
3. The mid-point of the site should become a major visitor hub. The Small Mammal building or Great Ape building could be renovated into a Visitor Center with visitor services such as park orientation services, retail and restrooms.
4. The lower end of the park, closer to Rock Creek, is the most environmentally-sensitive area of the National Zoo. This end of the site should be developed with this in mind, with exhibits, structures, and activities that are sustainably-designed and conservation-oriented. Dynamic hands-on experiences in the natural environment and opportunities for reflection and contemplation should be created.
5. An internal park conveyance or transportation system is necessary in all scenarios. It is critical that visitors and employees have an option for traversing the park and mitigating the topography.
6. With goals to enhance visitation, it is critical to distribute guests throughout the park. Exhibits, visitor services, and activity areas should be spread out throughout the park to minimize the actual and perceived crowding conditions on peak days. This will also increase the time that the visitor spends in the park and/or encourage repeat visitation.
7. Discovery zones, or other conservation-oriented interpretive exhibit areas, should be created throughout the National Zoo. If possible, these areas should create opportunities for education pertaining to the Rock Creek ecosystem.
8. Rock Creek should be reintegrated into the site and part of the visitor experience as the Olmsted design originally intended.
9. Elements of fun and discovery should be incorporated into the National Zoo.
10. The National Zoo's historic structures and existing elements of the original Olmsted design should be respected and celebrated.

11. Facilities and operations should embody the conservation mission and sustainable practices.
12. The current concept plan for the Elephant Trails is integrated into the Master Plan as an existing project. The Master Plan would address service issues into the site as well as the size and location visitor facilities.
13. Parking remains on the site, but alternative transportation should be encouraged and will be necessitated as visitation increases.
14. Parking Lot E remains as a parking resource, but is updated to achieve best management practices of stormwater management. Parking management solutions may vary within the development alternatives.
15. Complete renewal of visitor services (restrooms, retail, and food service) should be dispersed throughout the park, with major hubs at Connecticut Avenue and new mid-point gateway.
16. An external shuttle that travels between the National Zoo and the Metro rail stations is a necessary component of any plan, and could be accomplished immediately.

After gathering public input, interviewing the National Zoo and FONZ staff, testing various development schemes, and conducting detailed technical analysis, the planning team developed three action alternatives and a No-Action Alternative for the renewal of facilities at the National Zoo that were carried forward to assess potential effects of each alternative in accordance with NEPA.

B. Actions Common to All Alternatives

Described below are elements common to all of the alternatives:

- NZP Strategic Plan goals are supported and implemented to every extent possible.
- “Elephant Trails” site planning and exhibit design is underway and is considered an existing condition for each alternative.
- Olmsted Walk remains the central circulation spine with improvements made to accessibility through individual project design.
- Exhibit areas continue to be renewed for multi-species exhibits; Collection Planning efforts will determine future exhibits.
- Attendance increases are expected to reach peak attendance levels of the year 2001 (3 million visitors) and increases to visitation beyond past levels would occur by extending the shoulder seasons or visitor hours through special events. The peak day visitation and National Zoo carrying capacity would not change under any of the action alternatives.
- Visitor services and education spaces are revitalized.
- Transit incentives are offered to promote alternative transportation and to accommodate an increase in visitation.
- Partnerships for satellite parking are maintained and increased.

- Parking policies are implemented for staff.
- North Road and Blue Road become the service backbone of the National Zoo; Hawthorne Street is used for emergency access.
- A new hay storage facility located near the Kids' Farm is considered an existing condition.

In conjunction with the NEPA and NHPA processes of assessing potential impacts of the action and No-Action Alternatives, the alternatives will also be evaluated for funding and implementation feasibility. These alternatives are discussed below with illustrative mapping to further clarify each alternative. More detail for each concept is provided at the end of the alternatives section to allow the public to visualize the possible concepts that the team has developed.

C. No-Action Alternative

Under the No-Action Alternative (see Figure 4), current programs and projects would continue to develop as planned. Attendance would grow to exceed the peak levels of 2001 (3 million visitors per year). Ongoing improvements would include building rehabilitation and facility updates related to animal safety, health, and welfare. The renewal of exhibits at the northwest end of the park would carry on with the completion of Asia Trail and Elephant Trails. Because these exhibits are concentrated in the vicinity of the Connecticut Avenue entrance, visitors would be most likely to congregate in this northwestern quadrant of the National Zoo. Without the availability of the large land areas necessary for the development of inclusive habitats such as the Asia Trail exhibits, additional exhibit planning would continue on a site-by-site basis.

The Connecticut Avenue entrance would be maintained as the primary source for visitor orientation and information; however, visitors would continue to access the National Zoo by way of ten different pedestrian entrances and one dedicated bus passenger entry. Minor improvements to visitor services, such as retail outlets and information kiosks, would be implemented as currently planned. Sections of the park would continue to be non-Americans with Disabilities Act (ADA) compliant. An in-park transportation system would not be feasible with current infrastructure, offering no relief from the hilly topography of the National Zoo. Service conflicts would continue to be mitigated by scheduling and limiting service hours, so as not to interfere with the visitor experience.

The Holt House would continue to be unusable real estate while space for administrative offices, research, and education would remain inadequate.



Figure 4. The No-Action Alternative

D. Alternative A

Alternative A (see Figure 5) would involve the development of large, multi-species exhibits throughout the National Zoo, distributing visitors evenly across the National Zoo’s facilities. Entrances would be consolidated into three visitor service hubs. This would include revitalization of the existing Connecticut Avenue entry (1), the addition of a Mid-Point entry (2), and reworking of the Harvard Street Bridge/Beach Drive entry (3). The current Bus Lot (5) would be reclaimed for exhibit space. Two turnarounds along

North Road (20) would provide flexibility in the circulation systems. An aerial tram (4) would be utilized to connect the lower and upper ends of the National Zoo.

Exhibit Strategies/Visitor Experience

Through the reclamation of surface parking, large multi-species exhibits would be developed throughout the park. This distribution of exhibits would allow visitors to spread more freely throughout the National Zoo and permit opportunities for more direct exposure to the species and exhibits along Olmsted Walk. Older exhibits would be revitalized and the flat land, once used for surface parking, would be developed as exhibits. Current Parking Lot B (7) would be reclaimed for exhibit space. The visitor and arrival sequence would be enhanced through the revitalization and construction of three major visitor hubs: Connecticut Avenue, a new Mid-Point entry from Parking Lot C, and Harvard Street Bridge/Beach Drive. The aerial tram (4) would make stops at these three entry points to assist visitors in traversing the steep topography of the National Zoo and provide a unique interpretive experience with aerial views of the National Zoo and its tree canopy.

The current Amazonia Science Gallery (12) would be modified so that the main entrance would be located on Olmsted Walk. Beaver Valley exhibits and walkways (13) would be redesigned to separate service from visitor circulation and allow universal access through a series of bridges, structures, lifts, and ramps that mitigate the topography. Stronger connections would be made between the existing Beaver Valley and Olmsted Walk. A children's discovery area or entertainment zone (14) would be located near the Kids' Farm.

Entry/Arrival/Parking

Connecticut Avenue – The Connecticut Avenue entrance (1) serves as the major entry point for pedestrians and visitors coming from WMATA buses and trains. This would be revitalized with a defined plaza for events and informal gatherings. Current Parking Lot A (6) would be relocated to the interior of a realigned North Road to increase vehicular flow along the road while decreasing risks to pedestrian safety to and from the parking lot. The current Bus Lot (5) would be reconfigured slightly to better accommodate the safe and efficient pick-up of passengers. The Connecticut Avenue visitor center (8) would be enlarged, renovated, and reprogrammed (8), including visitor services such as restrooms, information kiosks, educational facilities, retail and dining, a FONZ membership office, event space, and a tram station.

Mid-Point Entry – The new Mid-Point entry (2) would be the entrance used primarily by patrons arriving to the National Zoo by personal vehicles. The new parking structure on the existing Parking Lot C (9) would be linked to a new entrance pavilion (2) by an access bridge over North Road. The entrance pavilion would be constructed at the site of the existing Great Ape House and would provide numerous visitor amenities such as restrooms, information kiosks, educational facilities, retail, and dining. The pavilion would face a new pedestrian plaza (10). This pedestrian plaza would be flanked by the Small Mammal House, the Reptile House, and the mid-point tram station. The new

structure on Parking Lot C would also have a small bus drop-off area for efficient mid-park bus loading and unloading.

Harvard Street Bridge/Beach Drive – A third entry near Harvard Street Bridge / Beach Drive (3) on the east side of the Rock Creek site would provide an entrance for visitors parking in Parking Lot E, pedestrians entering from Adams Morgan, or visitors coming from a WMATA shuttle or bus. The entry would be reconfigured and revitalized to provide visitor services such as information kiosks, educational facilities, rental, retail, event space, and a tram station. The Mane Restaurant would continue to provide dining and event support. The National Zoological Park’s conservation message would be enhanced with the reclamation of surface parking (Parking Lot D) and the creation of a visitor experience focused on the Rock Creek ecosystem (11).

Transportation/Circulation/Service

Congestion along North Road would be mitigated through a comprehensive traffic and parking management strategy. This would include two traffic circles (20) and a limited-use turn lane on North Road. During peak times and events, the traffic circles would be used for passenger drop-off vehicular turnarounds, and information dissemination.

Service vehicle and visitor conflicts would be minimized by separating the visitor and service paths in Beaver Valley and by limiting service from Olmsted Walk when possible.

An aerial tram system (4) would be installed, to connect the upper and lower ends of the National Zoo and give visitors an introductory interpretive experience. The aerial tram would permit more universal access to the various exhibits with loading and unloading stations at each visitor center to assist visitors in traversing the steep topography.

Administrative/Operational/Service

A new administrative, support, and operations hub (15) would be constructed adjacent to the parking structure located at the Parking Lot C site. Additions to the General Services Building would provide new administrative offices for the National Zoo and FONZ employees. Additions to the research buildings near the hospital would include new office and lab space (16). A new greenhouse (17) would be constructed near the existing Parking Lot C driveway and the Genetics Building (18) would be renovated for other purposes. In the future, the Holt House (19) would be renovated for National Zoo uses, including a Meeting/Training Center with guest housing.



Figure 5. Alternative A

E. Alternative B

Under Alternative B (see Figure 6), the development of large, multi-species exhibits would occur throughout the National Zoo. This development would distribute visitors more evenly across the National Zoo’s facilities. Older exhibits would be revitalized and the flat land, once used for surface parking, would be developed as exhibits. The entry and arrival sequence would be enhanced and consolidated through the revitalization of two existing visitor entrances, one at Connecticut Avenue (1), the other at Harvard Street Bridge/ Beach Drive (2). A smaller dedicated entry for those arriving by bus would be located at Parking Lot B (3). The current Bus Lot (4) would be reclaimed for exhibit space. A surface tram along the North Road (5) would connect the entries at the upper

and lower ends of the park to assist visitors in traversing the National Zoo's steep topography.

Exhibit Strategies/Visitor Experience

The Great Ape House (11) would be renovated to provide enhanced visitor services and education space at a central point in the National Zoo. Amazonia Science Gallery (12) would be modified so that the main entrance would be located on Olmsted Walk. Beaver Valley exhibits and walkways (13) would be designed to separate service from visitor circulation and allow universal access through a series of bridges, structures, lifts, and ramps that would mitigate the topography. A children's discovery area or entertainment zone (14) would be located near the current Kids' Farm.

Entry/Arrival/Parking

Connecticut Avenue – The Connecticut Avenue entry (1), the major entry for pedestrians and visitors coming from WMATA buses and trains, would be revitalized with a defined plaza for events and informal gathering and a new underground parking garage (6). Current Parking Lot A (7) would be reclaimed for exhibit space. The current visitor center (8) would be enlarged, renovated, and reprogrammed to include visitor services such as restrooms, information kiosks, educational facilities, retail, dining, a FONZ membership office, and event space.

Harvard Street Bridge/Beach Drive – The entry near Harvard Street Bridge/ Beach Drive (3) on the east side of the Rock Creek site would provide an entrance for visitors parking in Parking Lots D or E (9), pedestrians entering from Adams Morgan, or visitors coming from a WMATA shuttle or bus. The entry would be reconfigured and revitalized to provide visitor services such as information kiosks, educational facilities, rental, retail, event space, and a tram station. The Mane Restaurant would continue to provide dining and event support. Surface Parking Lots D and E (9) would remain at the lower end of the park.

Transportation/Circulation/Service

Congestion along North Road would be mitigated through a comprehensive traffic and parking management strategy. This would include the addition of two traffic circles (17) and a limited-use turn lane on North Road. During peak times and events, the traffic circles would be used for passenger drop-off, vehicular turnarounds, and information dissemination.

A park-based shuttle system running on North Road (5) would connect the lower and upper traffic circles (17). This would provide an alternative to mitigating the steep topography within the park for visitors. The efficiency of this service would be based on traffic conditions on North Road.

Service vehicle and visitor conflicts would be minimized by separating the visitor and service paths in Beaver Valley and by limiting service from Olmsted Walk when possible.



Figure 6. Alternative B

Administrative/Operational/Service

A new administrative, support, and operations hub (10), including staff parking, would be constructed on the General Services Building/Parking Lot C site. At the administrative, support, and operations hub, the General Services Building would be expanded to provide new administrative offices for the National Zoo and FONZ employees. Additional space for service and support functions such as security, health services, storage, a new boiler, and physical plants would also be constructed here. Current Parking Lot C would be dedicated to staff parking and the motor pool. No visitors would enter from the middle of the park. Additions to the research buildings (15) near the hospital would include new

office and lab space. In the future, the Holt House (16) would be renovated to provide a meeting and resource center.

F. Alternative C (Preferred Alternative)

Alternative C (see Figure 7) would include revitalization of older exhibits throughout the National Zoo. Areas, once dedicated to surface parking, would be reclaimed and utilized in the development of large, multi-species exhibits similar in form to Asia Trail. This development would distribute visitors more evenly across the National Zoo's facilities. Under Alternative C, the National Zoo's entrances and visitor service hubs would be consolidated in four entry points. This would include revitalization of the existing Connecticut Avenue entry (1), the addition of a Mid-Point entry (2), the reworking of the Harvard Street Bridge/Beach Drive entry (3), and the bus drop-off area (6). Traffic Circles at the Connecticut Avenue and Harvard Street Bridge/Beach Drive entrances (23), along North Road, would provide flexibility in circulation systems. Visitor transportation would be incorporated with a surface level tram on North Road (7), bus drop-off area (6), and an aerial tram (4) with stations near each entry point.

Exhibit Strategies/Visitor Experience

Through the reclamation of surface parking, large multi-species exhibits would be developed throughout the park and older exhibits would be revitalized. The completion of an underground parking garage (8) would allow for the recapture of square footage currently utilized by Parking Lot A (9). Parking Lot D (14) would also be recaptured to incorporate into the visitor experience a discovery zone and stormwater management exhibit. Additional Exhibit Space would be explored and noted throughout the National Zoo.

The visitor and arrival sequence would be enhanced through the revitalization and construction of three major visitor hubs. An aerial tram (4) would make stops at these three entry points to assist visitors in traversing Rock Creek and to provide a unique interpretive experience and views of the National Zoo and its' tree canopy. An additional dedicated entry for visitors arriving by bus would be located at the existing Parking Lot B (5); this would provide a unique entry experience, incorporating the reuse of Panda Plaza with this bus entry point.

The current Amazonia Science Gallery (15) would be modified so that the main entrance would be located on Olmsted Walk. Beaver Valley exhibits and walkways (16) would be redesigned to separate service from visitor circulation and allow universal access through a series of bridges, structures, lifts, and ramps that mitigate the topography. Stronger connections would be made between the existing Beaver Valley and Olmsted Walk. A children's entertainment zone (17) would be located near the Kids' Farm and include amenities such as a carousel and concession area

Entry/Arrival/Parking

Connecticut Avenue – The Connecticut Avenue entry (1), the major entry for pedestrians and visitors coming from WMATA buses and trains, would be revitalized

with a defined plaza for events and informal gathering. The current visitor center (10) would be enlarged, renovated, and reprogrammed to create an education hub with a classroom and auditorium along with restrooms, a retail area, a concession center, and visitor information/orientation space. The aerial tram would have a station at this point.

Mid-Point Entry – The new Mid-Point entry (2) would be the entrance used primarily by patrons arriving to the National Zoo by personal vehicles. The new parking structure on the existing Parking Lot C (11) would be linked to a new entrance pavilion (2) by an access bridge over North Road. The entrance pavilion would be constructed at the site of the existing Great Ape House. The Great Ape House would be razed and, through exhibit planning efforts, the great ape exhibit would be moved. The entrance pavilion would provide numerous visitor amenities such as restrooms, information kiosks, educational facilities, retail, and dining. The pavilion would face a new pedestrian plaza (12). This pedestrian plaza would be flanked by the Small Mammal House, the Reptile House, and the mid-point tram station. The new structure on Parking Lot C would also have a small bus drop-off area for efficient mid-park bus loading and unloading.

Harvard Street Bridge/Beach Drive – A third entry near Harvard Street and Beach Drive on the east side of the Rock Creek site (3) would provide another entrance for visitors parking in Parking Lot E, pedestrians entering from Adams Morgan, or visitors coming from a WMATA shuttle or bus. The entry would be reconfigured and revitalized to provide visitor services such as information kiosks, educational facilities, rental, retail, event space, and a tram station. The Mane Restaurant would continue to provide dining and event support. The National Zoological Park's conservation message would be enhanced with the reclamation of surface parking (Parking Lot D) (14) and the creation of a visitor experience focused on the Rock Creek ecosystem, a wetlands living garden.

Transportation/Circulation/Service

Congestion along North Road would be mitigated through a comprehensive traffic and parking management strategy. This would include the addition of two traffic circles (23) and a limited-use turn lane on North Road. During peak times and events, the traffic circles would be used for passenger drop-off, vehicular turnarounds, and information dissemination.

A park-based shuttle system running on North Road (7) would connect the lower and upper traffic circles (23). This would provide an alternative to mitigating the steep topography within the park for visitors. The efficiency of this service would be based on traffic conditions on North Road.

An aerial tram system (4) would be installed to connect the upper and lower ends of the National Zoo and give visitors an introductory interpretive experience. The aerial tram would permit more universal access to the various exhibits, with loading and unloading stations at each visitor center to assist visitors in traversing the steep topography.

Service vehicle and visitor conflicts would be minimized by limiting service vehicles from Olmsted Walk when possible and with the construction of a new service road to access the bird hill plateau (24).

Administrative/Operational/Service

A new administrative, support, and operations hub (18) would be constructed adjacent to the parking structure located at the Parking Lot C site. Additions to the General Services Building would provide new administrative offices for the National Zoo and FONZ employees. Additions to the research buildings near the hospital would include new office and lab space (19) and a new greenhouse (20) would be constructed. Additionally, the Genetics Building (22) would be renovated for other purposes and approximately 20 parking spaces added near the Holt House. The Police Station would be relocated to the new General Services Building. The existing Police Station building would then become FONZ space. In the future, the Holt House (21) would be renovated for National Zoo uses, including a Meeting/Training Center with guest housing.



Figure 7. Alternative C

G. Alternative Concepts

This section provides more detailed information supported by illustrations for concepts being considered in Alternative A through Alternative C in this EA and the Master Plan, such as the Connecticut Avenue entry, mid-point entry, Harvard Street Bridge/ Beach Drive entry, aerial and road trams, Parking Lot C structure, and exhibit renewal at Beaver Valley. It should be noted that these are intended to be viewed as concepts for master planning purposes. Additional planning, design, and engineering would occur to further define each concept.

Connecticut Avenue Entry Concept

The Connecticut Avenue entrance (see Figure 8) would be revitalized with a defined plaza for events and informal gatherings. Visitor services, such as information, membership sales, and rentals, would be provided in permanent linear stalls that flank the entry plaza, providing an immediate and exciting visitor interaction. This entry would continue to serve visitors coming from Metro rail stations and adjacent neighborhoods. An introduction to the conservation message and an introductory animal experience would also be part of the entry.



Figure 8. Connecticut Avenue Entry Concept

The plaza would continue to the Visitor Center where two building additions and a total renovation would enhance visitor services and education capabilities. Restrooms, information kiosks, a renovated auditorium, educational facilities, enlarged retail facilities, and event space would be located within the Visitor Center. Destination dining and a unique venue would attract visitors outside of normal zoo operating hours and the peak season, and provide increased capacity for special events. Administrative uses would be relocated to the new administrative building at the mid-point, freeing space for educational programming. A new traffic roundabout on North Road would facilitate visitor drop-off and management of traffic on peak days when the road is congested and parking is limited.

Mid-Point Entry Concept

The new Mid-Point entry (see Figure 9) would provide an exciting new focal point at the National Zoo, allowing visitors to begin their visit in the middle of the park, an area rich in history and poised for new projects. Visitors arriving by vehicle would park in a new parking structure on Parking Lot C and enter the National Zoo on a footbridge that extends over North Road, connecting the garage and the National Zoo. Visitors would enter directly into a new pavilion/visitor center on the site of the Great Ape House, which would either be reused or demolished. The new structure would be set back to



Figure 9. Mid-Point Entry Concept

provide a visual connection between the historic buildings from the original Olmsted plan. A grand pedestrian plaza would provide an orientation point and gathering place for visitors, along with an introduction to the conservation message and an initial animal experience. This plaza would also serve as a primary location for special events. A full range of visitor services, including restrooms, informational kiosks, educational facilities, retail, and dining would be offered at the Mid-Point entry. The new plaza would be framed by two of the National Zoo's distinctive historic buildings, the Small Mammal House and the Reptile House, and an aerial tram station serving the mid-point. This iconic entry would serve as an orientation point both for visitors entering at the mid-point and those navigating Olmsted Walk. A parking structure would be constructed atop Parking Lot C, eliminating the need for several surface lots around the National Zoo. An intermittent turn lane would be added to portions of North Road to mitigate congestion when vehicles are turning into the parking structure or accessing the new dedicated service lane between the new discovery zone and the Small Mammal House.

Harvard Street Bridge/Beach Drive Entry Concept

The new visitor entry at the crossroads near Harvard Street Bridge/Beach Drive (see Figure 10) would provide a unique visitor entry experience that builds off of the natural setting of Rock Creek and the adjacent urban neighborhoods. Visitors arriving at this entry would arrive on foot, by car, and also by Metro shuttle. The actual entry onto Olmsted Walk would be reconfigured and revitalized to direct visitors into the National Zoo from the traffic roundabout. Visitor services such as restrooms, information kiosks, rental, retail, and event space would be available.



Figure 10. Harvard Street Bridge/Beach Drive Entry Concept

The Mane Restaurant would continue to provide dining and event support, and the bandstand and event area would be upgraded. An aerial tram station would be located near the lower entry, providing access to alternative transportation to the top of the hill and the Connecticut Avenue entrance. Immediately upon entering the gates, visitors wishing to utilize the aerial tram would be directed on a path below the Kids' Farm and the tram station. A traffic roundabout would be added to facilitate vehicular entrance and exit from Harvard Street, Beach Drive, and North Road. Pedestrian safety and access improvements would be made with the addition of sidewalks and crosswalks leading into the National Zoo.

Parking Lot C Detail

The new Mid-Point entry, the major entry for patrons arriving by vehicle, would provide a parking structure on Parking Lot C connected to the National Zoo by a new access bridge over North Road. The Parking Lot C parking structure would provide a total of 1,128 spaces. A new administrative, support, and operations hub would also be constructed on the Parking Lot C site with the parking garage.

Exhibit Renewal at Beaver Valley

The Beaver Valley area (see Figure 11) is environmentally sensitive and provides a shaded, quiet respite from Olmsted Walk. Exhibits would be redeveloped to maximize environmental sensitivity and create a visitor interpretive experience that plays off of this natural yet dynamic setting. Revitalized exhibit areas would create more options for visitors and alleviate crowding on busy days. Exhibits and walkways would be designed to allow universal access through a series of bridges, structures, lifts, and ramps that flow between the Beaver Valley and Olmsted Walk exhibits. This system would allow a visitor to easily navigate the substantial grade change in this area. The Amazonia Science Gallery building and exhibit would be modified so that the main entrance is located on Olmsted Walk. An upper addition to the building would allow a bridge to connect to a new building in Beaver Valley, providing access from Beaver Valley. The new visitor building would also be connected by a bridge to another new exhibit building on the site of the former Lower Bear exhibit and a new visitor building at the site of the former Upper Bear exhibit. The buildings would have opportunities for outdoor viewing and interior exhibit space with the potential for a year-round experience. At grade, an accessible path would connect to the renovated Seal and Sea Lion exhibits. Renovation of the Seal and Sea Lion exhibits and the addition of new animal exhibits that use the naturally forested slopes of the valley would attract visitors and allow crowds to distribute to areas outside of Olmsted Walk. Elevated boardwalks would likely reduce the current at-grade conflict between pedestrians and service vehicles in Beaver Valley. However, a ground-level experience would still be open to visitors. Service vehicles and visitors would continue to share the Beaver Valley path, but service hours would be limited whenever feasible. Improvements would be made to the path in the Upper Beaver Valley, and the connection to Olmsted Walk and the new Elephant Trail project would remain. In order to minimize the reliance on public streets and to create emergency and service access to Bird Hill, a service road is proposed that would connect Beaver Valley to Bird Hill.



Figure 11. Beaver Valley Exhibits

North Road Tram Concept

The existing road-based shuttle service that runs on North Road (see Figure 12) would be upgraded to an accessible, alternative fuel vehicle. Service would be offered on a daily basis at regularly scheduled intervals between the two traffic roundabouts. The tram would help to mitigate the effect of the National Zoo's steep topography on the visitors' experience. The effectiveness of the service would be dependent on traffic conditions along North Road.



Figure 12. North Road Tram Concept

Aerial Tram Concept

An aerial tram system (see Figure 13) would provide an interpretive experience while providing transportation through the National Zoo. This transportation system would assist in distributing visitors throughout the National Zoo, alleviating crowding conditions on Olmsted Walk during busy days. The aerial tram system would consist of three stations, gondola cars on a cable, and poles. The cars would run in a clockwise direction and be situated low within the tree canopy to the extent feasible to minimize visual impacts. Each station would accommodate a queue area and a load/unload platform, and mechanical equipment. The upper and lower tram station would also accommodate gondola storage. Each gondola car would be able to hold four to six passengers. The system would provide ADA and stroller access. More detail analysis would be needed to determine the exact location, size, and capacity of the system and the general location and concept is provided for master planning purposes. An aerial tram would be an alternative transportation solution to help mitigate the effect of the steep topography on the visitor experience and offer a unique perspective to see animal exhibits.



Figure 13. Aerial Tram Concept

H. Comparison of Alternatives with Master Plan Objectives

The purpose of the master planning process is to compliment the priorities and goals identified in the National Zoo's mission. These goals include ensuring the highest quality of animal care and management; achieving international recognition through a science-based approach to conservation, exhibitions, and education, and increasing public knowledge and awareness. Through the planning process and assessing the needs for the National Zoo, six primary objectives for the Master Plan were identified:

1. Renew park infrastructure and facilities to create large, adaptable land areas to meet future collection planning goals;
2. Clarify the entry and arrival experience by consolidating visitor entry and exit points, enhancing visitor facilities, and providing iconic entry points;
3. Simplify and ease circulation around the site by mitigating the topography and separating vehicular and pedestrian circulation whenever possible;
4. Revitalize and strategically add visitor and park facilities, special event venues, education facilities, and research, administrative, and operational space;
5. Embody the National Zoo's sustainability goals and conservation mission by celebrating, protecting, and enhancing the Rock Creek ecosystem; and
6. Celebrate the National Zoo's history by protecting and revitalizing the historic structures and cultural landscapes.

Table 1 presents a comparison of the alternatives that were developed during the master planning process. Each concept within the alternatives was developed to help meet the purpose and need for the Master Plan. A brief discussion on how each alternative fulfills the six primary objectives of the Master Plan follows.

The No-Action Alternative does not provide a framework to renew park infrastructure that would help meet future collection planning goals. Visitor experience and circulation throughout the park would not be clarified through the consolidation of entry points. Movement through steep topography would not be alleviated and vehicular and pedestrian circulation would not be separated. Visitor and park facilities would be planned on a site-by-site basis, and research, operational and administrative space would continue to be inadequate. The National Zoo would not have a plan to reach sustainability goals, and conservation efforts would continue to be unconsolidated. The Great Ape House and the Orangutan Line (O-Line) would continue to detract from the more prominent historic structures in the park. Holt House would continue as unusable space. The No-Action Alternative would not fulfill any of the six master planning objectives.

The implementation of Alternative A would renew park infrastructure by reclaiming flat and gently sloping areas. These larger exhibit areas would better accommodate future collection planning and provide for the highest quality of animal care and management. New exhibit areas would also enhance visitor experience. Available parking would be increased and multiple entries would be consolidated to three primary areas. Each area would include visitor amenities such as restrooms, kiosks, retails and dining and other services. A new Mid-Point visitor hub would enhance the visitor experience by expanding special event venues and educational areas, and would provide a stop

accessible to all visitors for clarification and comprehensive interpretation of the National Zoo's mission, goals, and exhibits. Circulation would be eased with the introduction of an aerial tram system. A new service drive would separate service vehicles and visitors on Olmstead Walk. Operational and administrative facilities would be expanded to increase the efficiency of park services, and research space, including labs and offices, would be expanded to better support the National Zoo's scientific efforts. The Great Ape House would be demolished, and the O-Line would be removed for the construction of the new visitor hub. The new facility would better compliment and emphasize the historic structures and views throughout the park. The Holt House would also be rehabilitated, serving the dual purpose of providing more meeting and training space and restoring this historic resource. In conclusion, Alternative A fulfills the six objectives of the Master Plan.

Alternative B would also renew park infrastructure by reclaiming flat and gently sloping areas that could be utilized for exhibits and visitor use. These exhibit areas would enhance visitor experience, while providing space for future animal habitats that could consider the newest animal care knowledge and practices. Entry and arrival would be enhanced through the consolidation of multiple points of entry to three main areas that would include restrooms, dining, retail and other visitor amenities. The Connecticut Avenue visitor center would be renovated and reprogrammed. The conversion of the Great Ape House into a visitor and educational center would also provide a consolidated area for educational and interpretive experiences. Visitor circulation would be improved through the design of the new exhibit areas and steep topography would be mitigated with the introduction of a ground-based tram that would run back and forth on North Road. Additional park facilities and special event venues would be included under Alternative B. The Holt House would also be rehabilitated and utilized as a meeting and resource center, fulfilling the goal of revitalizing historic structures. In conclusion, Alternative B fulfills the six objectives of the Master Plan.

The implementation of Alternative C would reclaim flat and gently sloping areas, such as parking lots, which could be better utilized for visitor use and exhibit space. These exhibit areas would enhance visitor experience by renewing outdated or aging facilities. They would also allow flexibility for future exhibit planning to incorporate the newest animal care knowledge and management practices. Available parking would be increased with the addition of a structured parking deck. Multiple entries throughout the park would be consolidated to three primary areas and a dedicated bus entry, improving visitor entry and arrival. Each primary entry would include amenities such as restrooms, kiosks, retail, and dining. A new Mid-Point visitor hub would replace the Great Ape House, further enhancing the visit by providing additional special event venues and educational areas. This area would also serve as a stop accessible to all visitors for a clarified and comprehensive interpretation of the zoo's mission, goals, and exhibits. Circulation would be eased with the introduction of both aerial and ground-based trams. A new service drive would separate service vehicles and visitors on Olmstead Walk. Operational and administrative space would be expanded to increase the efficiency of park services, and additional research offices and lab space would better support the National Zoo's scientific efforts. The demolition of the Great Ape House and the

removal of O-Line would compliment and emphasize the historic structures and views within the park. Rehabilitation of the Holt House for zoo uses would further accomplish the goal of protecting and celebrating historic resources within the park. In conclusion, Alternative C fulfills the six objectives of the Master Plan, and has been identified as the “Preferred Alternative.”

Table 1. Comparison of Alternatives

	No-Action Alternative	Alternative A	Alternative B	Alternative C
Exhibit Strategies/ Visitor Experience	Additional exhibit planning would occur on a site-by-site basis	Great Ape House demolished and a new Mid-Point entry becomes a visitor hub Parking Lots A, B, D, and Bus Lot reclaimed for new animal exhibit space/ revitalization of older exhibits	Great Ape House converted to visitor/ educational center Parking Lot A and Bus Lot reclaimed for new animal exhibit space/revitalization of older exhibits	Great Ape House demolished and a new Mid-Point entry becomes a visitor hub Parking Lots A, B and D reclaimed for animal exhibit space/revitalization of older exhibits
Entry/ Arrival/ Parking	Entry points not consolidated, Connecticut Ave would remain primary entry, multiple pedestrian entrances would remain throughout the park, and one bus entry Existing parking facilities would remain	Three visitor entries at Connecticut Avenue, a Mid-Point entry from Parking Lot C and Harvard Street Bridge/Beach Drive Structured parking deck at Parking Lot C would provide 1,128 spaces New underground parking structure at Connecticut Avenue entry would provide 300 spaces	Three visitor entries at Connecticut Avenue, a bus entry at current Lot B, and Harvard Street Bridge/Beach Drive Parking Lots D and E remain Staff parking at Parking Lot C site New underground parking structure at Connecticut Avenue entry would provide 300 spaces	Three primary visitor entries at Connecticut Avenue, a Mid-Point entry from Parking Lot C and Harvard Street Bridge/Beach Drive Bus Lot incorporated with Panda Plaza for bus entry Above-ground parking structure at Parking Lot C would provide 1,128 spaces New underground parking structure at Connecticut Avenue entry would provide 300 spaces Small staff parking lot near Holt House
Transportation/ Circulation/ Service	In-park transportation system would not be implemented All roads will continue to be used for service vehicles, conflicts with visitor access would continue to be mitigated by limiting service hours	Aerial tram connecting upper and lower ends of park Traffic circles on North Road North Road and Blue Road are main service roads, Hawthorne Street used for emergency access New service road near current Parking Lot C site	Ground-based tram along North Road Traffic circles on North Road North Road and Blue Road are main service roads, Hawthorne Street used for emergency access New service road from Amazonia Science Gallery to Bird Hill and near current Parking Lot C site	Aerial tram connecting upper and lower ends of park and ground-based tram along North Road Traffic circles on North Road North Road and Blue Road become main service roads, Hawthorne Street used for emergency access New service road from Amazonia Science Gallery to Bird Hill
Administrative/ Operational/ Service	No new administrative, research or education offices.	New administrative, support and operations structure at Parking Lot C site Additions to research buildings to include office and lab space, new greenhouse Holt House rehabilitated for Zoo uses	New administrative, support and operations structure at Parking Lot C site Additions to research buildings to include office and lab space, new greenhouse Holt House rehabilitated for Zoo uses	New administrative, support and operations structure at Parking Lot C site Additions to research buildings to include office and lab space, new greenhouse Holt House rehabilitated for Zoo uses

III. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The description of the affected environment is intended to document the existing conditions of the National Zoo Rock Creek site, and includes those resource disciplines that have the potential to be affected by the proposed alternatives. These descriptions provide a technical baseline standard for the subsequent evaluation of impacts of each proposed action alternative and the No-Action Alternative. The analysis of the environmental consequences or “impacts” of the Facilities Master Plan alternatives as well as the No-Action Alternative immediately follows the existing conditions description of each resource discipline.

Alternatives are described in Chapter II of this Environmental Assessment (EA). The No-Action Alternative provides a baseline for assessing the environmental effects of the action alternatives. In this EA, SI has made a reasonable effort consistent with NEPA to assess the potential effects of the feasible and practical alternatives outlined in the Master Plan. As it is a master plan, the alternatives described in Chapter II are conceptual and site layouts and/or building plans have not been finalized. Therefore, impacts in this EA have been assessed assuming that development activities could affect all the resources within a development zone. However, as more detailed design proceeds, SI would seek to further minimize impacts.

Direct, indirect, and cumulative impacts have also been assessed in this chapter. Direct impacts are caused by a particular action and occur at the same time and place. Indirect impacts are caused by the actions and are later in time or further removed in distance, but are still reasonably foreseeable. Cumulative impacts are the impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non federal) or persons undertake such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

Potential impacts are described in terms of:

- *Intensity*, the effects are negligible, minor, moderate, or major;
- *Type*, the effects are beneficial or adverse;
- *Duration*, the effects are short-term, lasting through construction or less than one year, or long-term, lasting more than one year; and
- *Context*, the effects are site specific, local, or regional.

The thresholds of change for the intensity of impacts are defined as follows:

- *Negligible*, the impacts is localized and not measureable or at the lowest level of detection;
- *Minor*, the impact is localized and slight but detectable;
- *Moderate*, the impact is readily apparent and appreciable; or
- *Major*, the impact is severely adverse and highly noticeable.

At the end of each section when applicable, SI provides information on mitigation measures that would be employed to help avoid, minimize, or mitigate an adverse impact on a given resource.

A. Natural and Biological Resources

A.1 Soils, Geology, and Topography

The soils of the National Zoo are classified as urban land soils, which are soils that have been previously excavated and filled with other soil materials. Some of the site soils have been historically disturbed for construction, and covered with impervious materials such as asphalt, concrete, and building materials. In steeply sloped areas of the site, soils may be mixed with bluestone for stabilization. In other areas, extensive fill may have been used to create level surface areas for construction of structures. Therefore, the depth to undisturbed soils on the site varies; the natural soils overlie bedrock at depths of 12 to 15 feet below the natural soil surface. The source of historical fill material has not been documented in most instances; however, previous excavations in fill materials at the National Zoo have not detected any signs of contamination.

The National Zoo lies within the physiographic province of the Eastern Piedmont Region. The underlying rocks in this province consist primarily of granite, gneiss and schist. The depth to bedrock on the site is approximately 12 to 15 feet below the natural soil surface (USGS, 2008).

The topography of the National Zoo consists of a moderate to steeply sloping basin descending eastward from the Connecticut Avenue entrance, at approximately 210 feet in elevation to mean sea level, to the eastern boundary at Rock Creek, at approximately 55 feet in elevation. The natural topography of the site has been modified over time by the introduction of fill material to create level surfaces areas for built structures. One unique aspect of the topography on site is that Olmsted's design utilized the natural ridge line affecting the placement of many of the exhibits and circulation.

Impacts to Soils, Topography, and Geology

No-Action Alternative

Additional exhibit planning outside of the on-going Elephant Trails project would continue on a site-by-site basis without the availability of large land tracts, preferable for new exhibits. Other small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. The impacts to soils, topography, and geology from exhibit renewal and other improvements would be localized to small areas. With erosion and sediment control measures to minimize soil runoff and loss, impacts to soils would be minor and short-term. There would be no impact to topography or geology because construction activities such as surface grading, drilling, pile driving, etc. would not occur; therefore, there would be no change to existing topography or geology.

Alternative A

Under Alternative A, facilities improvements would result in construction activities requiring land disturbance that would alter topography and disturb soils, including the construction or renovation of facilities and exhibit areas. Construction would occur mostly within previously disturbed and developed areas of the National Zoo. Impacts associated with each activity would include minor and localized soil loss during construction. Some activities would require fill or excavation that would have minor changes to the topography. Negligible impacts to geology are anticipated, however further investigation would be needed prior to constructing the proposed underground parking structure.

Activities effecting soils, topography, and geology under Alternative A include:

- Reclamation of Parking Lots A, B and the Bus Lot for the creation of new large multi-species exhibit areas and ;
- New Beaver Valley exhibits and walkways;
- Revitalization/expansion of visitor entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive;
- New above ground parking structure at current Parking Lot C site,
- Two-story underground parking structure near the Connecticut Avenue entry;
- Addition of two new traffic circles on North Road;
- Construction of an aerial tram system;
- The construction of a new administrative, support and operations hub near the Parking Lot C site; and
- Additions to research buildings near the hospital, and a new greenhouse.

Parking Lots A, B and the Bus Lot would be reclaimed and older exhibits and flat land areas would be revitalized. Land clearing and grading would be required to construct five new large multi-species habitat and exhibit areas throughout the park to enhance animal exhibits and visitor experience. It should be noted that collection planning for animal exhibits at the National Zoo is a separate process from the master planning process. In order to provide flexibility for exhibit renewal to keep pace with the latest knowledge of animal health and well-being, the exact designs and uses of these new exhibits is unknown at this time. The reclamation of Parking Lots A, B and the Bus Lot, and revitalization of older exhibits and flat land areas would cause land disturbance, minor soil erosion, and alteration of existing topography.

The new Beaver Valley exhibits and walkways would be designed to separate park service from visitor circulation through a series of bridges, structures, lifts, and ramps. Minor soil loss would occur due to land disturbance activities. The Beaver Valley walkways would be designed to work within the existing landscape contours, and therefore would have negligible impacts to topography and geology. Although construction would occur within previously disturbed areas, the creation of new animal exhibits would also have minor adverse impacts to soils, geology, or topography due to activities such as site clearing, excavation, grading, and fill.

Revitalization of entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive would occur within previously disturbed areas of the park. Construction activities would have minor adverse impacts to soils, resulting in localized soil loss.

The new parking structure at Parking Lot C would have negligible impacts to geology, topography, or soils because the structure would be built on top of the existing structure. Some stabilization and earthwork would be necessary for construction, but the land disturbance would be minor. The underground parking garage near the Visitor Center at the Connecticut Avenue entry would have minor impacts to soil and topography from the excavation necessary to construct this facility. Minor localized impacts would also occur to geology. More detailed analysis during preliminary design and planning would occur to quantify potential impacts.

The addition of two new traffic circles on North Road would require minor earth disturbance that would result in soil loss and erosion. With sediment and erosion control measures, the impacts to soils would be minor and localized to the area of construction.

The aerial tram and three drop-off/pick-up stations would cause minor to moderate, localized adverse impacts to soils due to earth disturbance activities. Negligible impacts to topography and geology would occur.

The construction of a new administration support and operations center at the current Parking Lot C site, additions to the research buildings near the hospital, and the addition of a greenhouse would have minor impacts to soils due to land disturbance. Land-grading activities would cause negligible to minor long-term impacts to topography.

Alternative B

Under the Alternative B scenario, activities associated with the new construction and renovation of existing facilities and exhibit areas would alter topography and disturb soils. Construction would occur mostly within previously disturbed and developed areas of the National Zoo, and impacts associated with each activity would include minor and localized soil loss due to land clearing activities, and minor and localized impacts to topography due to grading, fill and excavation activities. In accordance with Washington, DC requirements, erosion and sediment control measures would be implemented to minimize soils loss and erosion. Negligible impacts to geology are anticipated, but further investigation would be needed prior to constructing a new underground parking structure.

Activities effecting soils, topography, and geology under Alternative B include:

- Reclamation of Parking Lot A and the Bus Lot for creation of new large multi-species exhibit areas;
- New Beaver Valley exhibits and walkways;
- Revitalization of visitor entrances at Connecticut Avenue and Harvard Street Bridge/Beach Drive;

- Construction of a two-story underground parking structure at the Connecticut Avenue entrance;
- Addition of two new traffic circles on North Road;
- Construction of a new service road from Amazonia Science Gallery to Bird Hill;
- The construction of a new administrative, support and operations hub near the Parking Lot C site; and
- Additions to research buildings near the hospital, and construction of a new greenhouse.

Parking Lot A and the Bus Lot would be reclaimed and older exhibits and flat land areas would be revitalized. Land clearing and grading would be required to construct five new large multi-species habitat and exhibit areas throughout the park to enhance animal exhibits and visitor experience. The larger exhibit areas would help the National Zoo to provide the highest quality animal care and management. It should be noted that collection planning for animal exhibits at the National Zoo is a separate process from the master planning process. The reclamation of Parking Lot A and the Bus Lot, and revitalization of older exhibits and flat land areas would cause land disturbance, minor soil erosion, and alteration of existing topography.

The new Beaver Valley exhibits and walkways would be designed to separate park service from visitor circulation through a series of bridges, structures, lifts, and ramps. Minor soil loss would occur due to land disturbance activities. The Beaver Valley walkways would be designed to work within the existing landscape contours, and therefore would have negligible impacts to topography and geology. Although construction would occur within previously disturbed areas, the creation of new animal exhibits would also have minor adverse impacts to soils, geology, or topography due to activities such as site clearing, excavation, grading, and fill.

Revitalization of visitor entrances at Connecticut Avenue and Harvard Street Bridge/Beach Drive, as well as a minor entry at Parking Lot B would occur within previously disturbed areas of the park. Construction activities would have minor adverse impacts to soils, resulting in localized soil loss during construction activities.

The new underground parking garage near the Connecticut Avenue entry would likely have minor impacts to soil and topography due to the excavation necessary to construct this facility. Moderate localized impacts would also occur to geology. More detailed analysis during preliminary design and planning would occur to quantify potential impacts.

Construction of a new service road from Amazonia Science Gallery to Bird Hill would have minor to moderate adverse impacts to soils and topography due to vegetation clearing, excavation, grading and fill activities.

The addition of two new traffic circles on North Road would require minor earth disturbance that would result in soil loss and erosion. With sediment and erosion control measures, the impacts to soils would be minor and localized to the area of construction.

The construction of a new administration support and operations center at the current Parking Lot C site, additions to the research buildings near the hospital, and construction of a new greenhouse would have minor impacts on soils due to land disturbance. Land-grading activities would cause negligible to minor long-term impacts to topography.

Alternative C (Preferred Alternative)

Under Alternative C, new construction and renovation of existing facilities and exhibit areas would alter topography and disturb soils. Construction activity would occur mostly within previously disturbed and developed areas of the National Zoo, and impacts associated with each activity would include minor to moderate localized soil loss due to land clearing activities, and minor and localized impacts to topography due to grading, fill and excavation activities. In accordance with Washington, DC requirements, erosion and sediment control measures would be implemented to minimize soils loss and erosion. Negligible impacts to geology are anticipated, but further investigation would be needed prior to constructing a new underground parking structure.

Activities effecting soils, topography, and geology in the Alternative C concept include:

- Reclamation of Parking Lots A, B, D, and the Bus Lot for the creation of new large multi-species exhibit areas;
- New Beaver Valley exhibits and walkways;
- Revitalization/expansion of visitor entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive;
- New above ground parking structure at current Parking Lot C site;
- Two-story underground parking structure near the Connecticut Avenue entry;
- Addition of two new traffic circles on North Road;
- Construction of an aerial tram system;
- Construction of a new service road from Amazonia Science Gallery to Bird Hill;
- The construction of a new administrative, support and operations hub near the Parking Lot C site; and
- Additions to research buildings near the hospital, a new greenhouse, and a small staff parking lot near Holt House.

Parking Lots A, B, D, and the Bus Lot would be reclaimed and older exhibits and flat land areas would be revitalized. Land clearing and grading would be required to construct five new large multi-species habitat and exhibits areas throughout the park to enhance animal exhibits and visitor experience. The larger exhibit areas would help the National Zoo provide the highest quality animal care and management. It should be noted that collection planning for animal exhibits at the National Zoo is a separate process from the master planning process. The reclamation of Parking Lots A, B, D, and the Bus Lot, and revitalization of older exhibits and flat land areas would cause land disturbance, minor soil erosion, and alteration of existing topography.

The new Beaver Valley exhibits and walkways would be designed to separate park service from visitor circulation through a series of bridges, structures, lifts, and ramps. Minor soil loss would occur due to land disturbance activities. The Beaver Valley

walkways would be designed to work within the existing landscape contours, and therefore would have negligible impacts to topography and geology. Although construction would occur within previously disturbed areas, the creation of new animal exhibits would also have minor adverse impacts to soils, geology, or topography due to activities such as site clearing, excavation, grading and fill.

Revitalization and expansion of visitor entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive would occur within previously disturbed areas of the park. Construction activities would have minor adverse impacts to soils, resulting in localized soil loss.

The new parking structure at Parking Lot C would have negligible impacts to geology, topography, or soils because the structure would be built on top of the existing structure. Some stabilization and earthwork would be necessary for construction, but the land disturbance would be minor. The underground parking garage near the Visitor Center at the Connecticut Avenue entry would have minor impacts to soil and topography from the excavation necessary to construct this facility. Minor localized impacts would also occur to geology. More detailed analysis during preliminary design and planning would occur to quantify potential impacts.

The addition of two new traffic circles on North Road would require minor earth disturbance that would result in soil loss and erosion. With sediment and erosion control measures, the impacts to soils would be minor and localized to the area of construction.

The aerial tram and three drop-off/pick-up stations would cause minor to moderate, localized adverse impacts to soils due to earth disturbance activities. Negligible impacts to topography and geology would occur.

Construction of a new service road from Amazonia Science Gallery to Bird Hill would have minor to moderate adverse impacts to soils and topography due to vegetation clearing, excavation, grading, and fill activities.

The construction of a new administration support and operations center at the current Parking Lot C site, additions to the research buildings near the hospital, addition of a greenhouse, and a small staff parking lot near the Holt House would have minor impacts on soils due to land disturbance. Land-grading activities would cause negligible to minor long-term impacts to topography.

Mitigation for the Preferred Alternative

As projects identified in the Master Plan are implemented, and more detailed design occurs, erosion and sediment control plans will be prepared. Each erosion and sediment control plan will include project-specific measures to avoid and/or minimize soil erosion and transport due to ground-disturbing activities, such as vegetation clearing and grading. Specific best management practices, such as the use of temporary sediment traps and filtering devices, will be detailed in individual plans.

A.2 Vegetation

The National Zoo's Rock Creek site is surrounded by an urban environment, with varying stages of vegetative succession within the park itself. Vegetation throughout the park ranges from areas in an herbaceous stage, to maturing and mature forested areas.

Undeveloped areas of the National Zoo consist primarily of deciduous forest. A tree survey was conducted on the grounds in 2003 in order to categorize the value of the trees for insurance purposes. Over 60 tree species were identified during this survey, including a mixture of native and introduced species such as boxelder (*Acer negundo*), American holly (*Ilex opaca*) and tree of heaven (*Ailanthus altissima*). Numerous native and non-native plants are also present throughout the park within horticultural collections and exhibit plantings, and are important to the health and welfare of many of the animals on exhibit. Non-native plants are considered invasive if they have no natural controls, and have the ability to out-compete or displace native plants. Such species occurring within the park include English ivy (*Hedera helix*), running bamboos (*Phyllostachys*, *Bambusa*, *Pseudosasa*) and common reed (*Phragmites australis*).

Impacts to Vegetation

No-Action Alternative

Under the No-Action Alternative, additional exhibit planning outside of the on-going Elephant Trails project would continue on a site-by-site basis. Other small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. Minor impacts to vegetation would occur to existing landscaped areas and no new construction is anticipated in undisturbed and natural areas of the National Zoo property. With landscaping of new exhibits or habitats, vegetation would be replaced. Under the No-Action Alternative, negligible adverse impacts to vegetation would occur because small scale site improvements related to safety, health and maintenance could impact existing landscaping.

Alternative A

Under Alternative A, facilities improvements would result in construction activities requiring land disturbance that would impact vegetation. Construction occurring within previously disturbed and developed land areas of the National Zoo would impact current landscaping, which would be replaced in the context of the new facilities and exhibits. Some undeveloped forested areas would also be cleared under Alternative A with the construction of the aerial tram. Impacts associated with each activity would include minor to moderate, site-specific losses to trees and shrubs during construction and revitalization of facilities and exhibits. Similar to past activities at the National Zoo, SI would use tree protection measures to the extent practicable to save larger tree specimens that are indigenous to Rock Creek and the surrounding area.

Activities most likely to impact park vegetation under Alternative A include:

- Reclamation of Parking Lots A, B and the Bus Lot for the creation of new, large multi-species exhibit areas;
- Revitalization of the Connecticut Avenue visitor entrance;

- New Beaver Valley exhibits and walkways;
- Addition of two new traffic circles on North Road;
- Construction of an aerial tram system;
- The construction of a new administrative, support and operations hub near the Parking Lot C site; and
- Additions to research buildings near the hospital, as well as a new greenhouse.

Parking Lots A, B and the Bus Lot would be reclaimed in order to construct new animal exhibit areas and enhance visitor experience. Older exhibits and flat land areas would be revitalized, creating five new, large multi-species habitat and exhibit area located throughout the park. The larger exhibit areas would further support the National Zoo in providing the highest quality animal care and management. Some localized minor vegetation disturbance would occur due to construction activities. Native vegetation would replace exotic or invasive species in the new visitor areas. Any exotic vegetation planted within animal habitat areas would be non-invasive. An overall long-term beneficial impact to vegetation would result. Collection planning for animal exhibits at the National Zoo is a separate process from the master planning process.

Revitalization of the Connecticut Avenue entrance would have impacts to both landscape and native vegetation that exist at the entrance. Native vegetation would be replanted within the construction zone, and overall impacts to vegetation would be localized and minor.

Revitalization of older exhibit areas and walkways in Beaver Valley would disturb existing landscaping. Current invasive species would be replaced with native species in the visitor areas, and native and non-invasive exotic species would be planted in the habitat areas. This would result in beneficial impacts to vegetation.

The addition of two new traffic circles and shift of North Road would require clearing and minor earth disturbance that could potentially impact existing landscaping, resulting in site-specific minor impacts to vegetation within construction areas.

The pathway of the proposed aerial tram, particularly from Amazonia Science Gallery to Bird Hill would require clearing of undeveloped forested area, fragmenting an uninterrupted tract of forest and causing moderate localized adverse impacts to vegetation.

The construction of a new administration support and operations center at the Parking Lot C site, additions to the research buildings near the hospital, and the addition of a greenhouse could potentially disturb existing landscaping. Native vegetation would be used in any new landscaping, and overall impacts to vegetation due to these activities would be site-specific and negligible.

Alternative B

Under Alternative B, land clearing activities occurring during new construction and renovation of existing facilities would impact vegetation. Construction occurring within

previously disturbed and developed land areas of the National Zoo would impact current landscaping, which would be replaced in the context of the new facilities and exhibits, and so adverse impacts would be negligible to minor. Construction activities requiring land clearing of trees and shrubs in undeveloped areas would cause site-specific, minor to moderate impacts to vegetation. Similar to past activities at the National Zoo, SI would use tree protection measures to the extent practicable to save larger tree specimens that are indigenous to Rock Creek and the surrounding area.

Activities that could potentially impact vegetation under Alternative B include:

- Reclamation of Parking Lot A and the Bus Lot for creation of new large multi-species exhibit areas;
- New Beaver Valley exhibits and walkways;
- Revitalization of entrance at Connecticut Avenue;
- Construction of a two-story underground parking structure at the Connecticut Avenue entrance;
- Addition of two new traffic circles on North Road;
- Construction of a new service road from Amazonia Science Gallery to Bird Hill;
- The construction of a new administrative, support and operations hub near the Parking Lot C site; and
- Additions to research buildings near the hospital, and a new greenhouse.

Parking Lot A and the Bus Lot would be reclaimed for the construction of new animal exhibit areas in order to enhance visitor experience. Older exhibit areas would be revitalized, creating five new, large multi-species habitat and exhibit area located throughout the park. The larger exhibit areas would further support the National Zoo in providing the highest quality animal care and management. Some localized minor vegetation disturbance would occur during construction. Native vegetation would replace exotic or invasive species in the new visitor area. Any exotic species planted in the animal habitats would be non-invasive. This would result in an overall beneficial impact to park vegetation. Collection planning for animal exhibits at the National Zoo is a separate process from the master planning process.

Revitalization of the Connecticut Avenue entrance would have impacts to both landscape and native vegetation that exist at the entrance. Native vegetation would be replanted within the construction zone, and overall impacts to vegetation would be localized and minor.

Revitalization of older exhibit areas and walkways in Beaver Valley would potentially disturb existing landscaping. Invasive species currently present at this site would be replaced with native species in the visitor areas, and native and non-invasive exotic species would be planted in the revitalized habitat areas. This would result in beneficial impacts to vegetation.

The addition of two new traffic circles on North Road would require clearing and minor earth disturbance that could potentially impact landscaping, resulting in site-specific minor impacts to vegetation, limited to the immediate construction areas.

Construction of a new service road from Amazonia Science Gallery to Bird Hill would require clearing of undeveloped forested area, fragmenting an uninterrupted tract of forest and causing moderate localized adverse impacts to vegetation.

Construction of a new administration support and operations center at the current Parking Lot C site, additions to the research buildings near the hospital, and construction of a new greenhouse could potentially disturb current landscaping. However, new landscaping would be planted in the context of the new and expanded facilities, and overall impacts to vegetation would be negligible.

Alternative C (Preferred Alternative)

Land clearing activities occurring during new construction and renovation of existing facilities under Alternative C would impact vegetation. Construction occurring within previously disturbed and developed land areas of the National Zoo would impact current landscaping, which would be replaced in the context of the new facilities and exhibits. Adverse impacts to vegetation in these areas would be negligible to minor. Construction activities requiring land clearing of trees and shrubs in undeveloped areas would cause site-specific, minor to moderate vegetation impacts. Similar to past activities at the National Zoo, SI would use tree protection measures to the extent practicable to save larger tree specimens that are indigenous to Rock Creek and the surrounding area.

Activities effecting vegetation under Alternative C concept include:

- Reclamation of Parking Lots A, B, D, and the Bus Lot for the creation of new large multi-species exhibit areas;
- Revitalization of entrance at Connecticut Avenue;
- New Beaver Valley exhibits and walkways;
- Addition of two new traffic circles on North Road;
- Construction of an aerial tram system;
- construction of a new service road from Amazonia Science Gallery to Bird Hill;
- The construction of a new administrative, support and operations hub near Parking Lot C; and
- Additions to research buildings near the hospital, a new greenhouse, and a small staff parking lot near Holt House.

The reclamation of Parking Lots A, B, D, and the Bus Lot for new animal exhibit areas and visitor experience enhancement would disturb vegetation. Older exhibit areas would be revitalized, creating five new, large multi-species habitat and exhibit area located throughout the park. The larger exhibit areas would further support the National Zoo in providing the highest quality animal care and management. Some localized minor vegetation disturbance would occur during construction. Exotic invasive species would be replaced with native vegetation in visitor areas. Any exotic vegetation planted within animal habitat areas would be non-invasive, resulting in an overall beneficial impact to vegetation. Collection planning for animal exhibits at the National Zoo is a separate process from the master planning process.

Revitalization of the Connecticut Avenue entrance would have impacts to both landscape and native vegetation that exist at the entrance. Native vegetation would be replanted within the construction zone, and overall impacts to vegetation would be localized and minor.

Revitalization of older exhibit areas and walkways in Beaver Valley would potentially disturb existing landscaping. Invasive species currently present at this site would be replaced with native species in the visitor areas, and native and non-invasive exotic species would be planted in the revitalized habitat areas. This would result in beneficial impacts to vegetation.

The addition of two new traffic circles on North Road would require clearing and minor earth disturbance that could potentially impact landscaping, resulting in site-specific minor impacts to vegetation, limited to the immediate construction areas.

The pathway of the proposed aerial tram, particularly from Amazonia Science Gallery to Bird Hill would require clearing of trees and shrubs from an undeveloped forest, segmenting the forest stand and causing moderate adverse impacts to vegetation. Construction of a new service road from Amazonia Science Gallery to Bird Hill would also require clearing an undeveloped area of forest, causing additional segmentation and resulting in moderate adverse impacts on vegetation. On their own, these actions would fragment existing wildlife habitat by disconnecting the forest into two segments. Combined, these actions would break the continuous forest tract into three segments.

The construction of a new administration support and operations center at the current Parking Lot C site, additions to the research buildings near the hospital, addition of a greenhouse, and a small staff parking lot near the Holt House would cause negligible impacts to vegetation.

Mitigation for the Preferred Alternative

Within visitor areas, non-native and invasive vegetation will be removed and replaced with native species on a project by project basis. Within the animal exhibits, native vegetation will be planted where feasible, and non-invasive exotic species will be utilized where required to simulate native habitats. To the extent practical, SI will implement measures to avoid impacts to larger tree specimens indigenous to Rock Creek and the surrounding area. Such protection may include, but would not be limited to, the installation of tree protection fencing and incorporation of stress reduction measures such as root pruning trenches. More detailed planting plans and tree save measures will be prepared with individual projects.

A.3 Wildlife including Rare, Threatened, and Endangered Species

Rock Creek Park and the National Zoo grounds provide a green corridor in the urban setting of Washington, DC, within which a number of transient wildlife species are supported. Such species include a variety of birds, small mammals, reptiles and amphibians. Bird species may also use the forested areas of the National Zoo and Rock Creek Park for breeding and in stops during the spring and fall migration periods.

In addition, the National Zoo hosts a number of undesirable feral animals, such as wild dogs and cats that can easily enter and exit the grounds. These animals are likely attracted to the availability of animal food, as well as the presence of other captive and wild animal species within the National Zoo grounds, and have been known to prey upon them.

The U.S. Fish and Wildlife Service (USFWS), and the DC Department of Health Fish and Wildlife Division are responsible for collecting data and tracking species in the Washington, DC area that are federally protected by the Endangered Species Act (ESA). Maryland state-listed species are also protected in Washington, DC. These agencies were consulted for information regarding federally protected species occurring at the National Zoo.

Threatened and endangered animal species listed by USFWS are exhibited at the National Zoo, and one species occurs naturally both at the National Zoo and in the adjacent Rock Creek Park. The Hay's Spring amphipod (*Stygobromus hayi*), also known as Hay's Spring Scud, is a macroscopic crustacean recorded exclusively in Washington, DC, specifically in the Rock Creek Valley. The Hay's Spring amphipod's only known occurrences are located in three springs, one spring on the south end of the National Zoo grounds, and two additional springs within Rock Creek Park. These "island populations" are the criteria for the amphipod's listing under the ESA (USFWS, 1982). The amphipod is located outside of any areas identified for construction in the Facilities Master Plan.

Impacts to Wildlife, Including Rare, Threatened and Endangered Species

No-Action Alternative

Under the No-Action Alternative, additional exhibit planning outside of the on-going Elephant Trails project would continue on a site-by-site basis. Other small scale projects would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. However, with no new construction anticipated in undisturbed and natural areas of the National Zoo property, impacts to wildlife would be negligible.

Alternative A

Under Alternative A, facilities improvements and construction activities could potentially impact wildlife. Reclamation of parking lots and flat areas for exhibits and visitor walkways, consolidation and revitalization of entrances, and renovation/expansion of older exhibits and park administration facilities would occur mainly within previously developed areas. Within the urban context of the park, impacts to wildlife and wildlife habitat due to these activities would be negligible. However, some undeveloped forested areas would also be disturbed under Alternative A, causing an adverse impact to wildlife.

The pathway of the proposed aerial tram, particularly from Amazonia Science Gallery to Bird Hill would require clearing of undeveloped forested area, disrupting the canopy where various birds and tree-dwelling species may occur, and fragmenting an uninterrupted tract of forest. Disturbance of the forest corridor could also potentially

effect ground migration of species such as reptiles and amphibians. The adverse impact to wildlife due to the construction and operation of the aerial tram would be moderate.

The creation of the Discovery Zone and Stormwater Management exhibit at the current Parking Lot D site would replace current impervious surface with a functioning wetland. This is likely to attract waterfowl and amphibious species, for a minor long-term beneficial impact to wildlife.

None of the proposed improvements under Alternative A are located within known areas of the Hay's Spring amphipod, and erosion and sediment control measures would ensure the amphipod's habitat would not be impacted during construction activities.

Alternative B

Construction of improvements proposed under Alternative B could potentially impact wildlife. Reclamation of parking lots and flat areas for exhibits and visitor walkways, consolidation and revitalization of entrances, and renovation/expansion of older exhibits and park administration facilities would occur mainly within previously developed areas. Any site-specific or localized impacts to wildlife and/or wildlife habitat would be negligible.

Construction of a new service road from Amazonia Science Gallery to Bird Hill would require clearing of undeveloped forested area, permanently disrupting an uninterrupted forest stand. This could potentially segment migration corridors used by tree and land-dwelling species, which would cause moderate localized adverse impacts to wildlife.

None of the proposed improvements under Alternative B are located within the vicinity of known occurrences of the Hay's Spring amphipod. Erosion and sediment control measures would ensure the amphipod's habitat would not be impacted during construction activities.

Alternative C (Preferred Alternative)

Under Alternative C, facilities improvements and construction activities could potentially impact wildlife. Most of the proposed improvements, including the reclamation of parking lots and flat land areas for exhibits and visitor walkways, consolidation and revitalization of entrances, and renovation/expansion of older exhibits and park administration facilities would occur mainly within previously developed areas. Within the urban context of the park, impacts to wildlife and wildlife habitat due to these activities would be negligible.

The pathway of the proposed aerial tram, particularly from Amazonia Science Gallery to Bird Hill would require clearing of trees and shrubs from an undeveloped forest, segmenting the forest habitat and causing moderate adverse impacts to wildlife. Construction of a new service road, also from Amazonia Science Gallery to Bird Hill would require further clearing of the same undeveloped area of forest, causing additional segmentation and resulting in moderate adverse impacts to wildlife. Separately, these actions would fragment existing wildlife habitat by disconnecting the forest into two

segments. Combined, these actions would break the continuous forest tract into three segments.

The creation of the Discovery Zone and Stormwater Management exhibit at the current Parking Lot D site would replace current impervious surface with a functioning wetland. This is likely to attract waterfowl and amphibious species, for a minor long-term beneficial impact to wildlife.

None of the proposed improvements under Alternative C are located within the vicinity of known occurrences of the Hay's Spring amphipod. Erosion and sediment control measures would ensure the amphipod's habitat would not be impacted during construction activities.

Mitigation for the Preferred Alternative

Best management practices and tree protection measures will be utilized to avoid preventable impacts to forest habitat. More detailed tree save plans will be prepared for individual projects. Implementation of erosion and sediment control plans, which will also be prepared individually for during construction activities will help to minimize potential soil erosion and sediment transport that could impact aquatic habitat in Rock Creek Park.

A.4 Water Resources

The National Zoo is cradled by Rock Creek, a tributary of the Potomac River that surrounds the National Zoo almost completely on three sides. Rock Creek is a perennial stream. Surface waters from the National Zoo property drain to Rock Creek, which then flows to the Potomac River. The Rock Creek watershed is a large urbanized surface drainage area consisting of older, high density residential land use. The average impervious surface in the watershed is 50 percent. Based on the review of National Wetland Inventory mapping, three small wetlands were identified. However, based on field inspection, it was determined that these wetlands do not exist. There are no naturally occurring wetlands at the National Zoo, but manmade ponds which serve as animal habitats within exhibits are found throughout the park. Stormwater runoff from the site drains into Rock Creek. Runoff from the animal exhibits is retained in a central holding tank to allow settling of sediments prior to discharge into the Washington, DC wastewater main located near Rock Creek. Based on the review of FEMA Flood Insurance Rate Maps, the lower portion of the National Zoo is within the 100-year floodplain (FEMA, 1985). Figure 14 presents the natural resources found within the National Zoo Rock Creek site.



Figure 14. Natural Resources

Impacts to Water Resources

No-Action Alternative

Under the No-Action Alternative, additional exhibit planning outside of the on-going Elephant Trails project would continue on a site-by-site basis. Other small scale projects would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. No new construction is anticipated in undisturbed and natural areas of the National Zoo property. Erosion and sediment control measures would be required during any construction activities, and impacts to water resources in the No-Action Alternative would be negligible.

Alternative A

Under Alternative A, reclamation of parking lots and flat areas for exhibits and visitor walkways, consolidation and revitalization of visitor entrances, and renovation/expansion of older exhibits and park administration facilities would occur mainly within previously developed areas. During construction, erosion and sediment control measures would be implemented according to Washington, DC requirements, and impacts to water resources due to these activities would be negligible. The overall reduction of impervious surface

throughout the National Zoo under Alternative A would have a minor beneficial impact to water quality.

The construction of an aerial tram would require clearing of a section of undeveloped forest within close proximity to Rock Creek. The loss of vegetation could potentially cause minor adverse impacts to water quality.

The creation of the Discovery Zone and Stormwater Management exhibit at the current Parking Lot D site occurs within the Rock Creek floodplain. The replacement of impervious surface with a functioning wetland at this location would have a minor long-term beneficial impact to water quality.

Alternative B

Alternative B improvements, including reclamation of designated parking lots and flat areas for exhibits and visitor walkways, consolidation and revitalization of visitor entrances, and renovation/expansion of older exhibits and park administration facilities, would also occur mainly within previously developed areas. During construction, erosion and sediment control measures would be implemented according to Washington, DC requirements, and impacts to water resources due to these activities would be negligible. The reduction in the total amount of impervious surface throughout the National Zoo would have a net beneficial impact to water quality.

The construction of a new service road from Amazonia Science Gallery to Bird Hill through an intact forest area would require a crossing over a Rock Creek tributary. Erosion and sediment control measures would be in place during construction, however, the addition of new impervious surface to this undeveloped area would have minor adverse impacts to water quality.

Alternative C (Preferred Alternative)

Under Alternative C, reclamation of parking lots and flat land areas for exhibits and visitor walkways, consolidation and revitalization of visitor entrances, and renovation/expansion of older exhibits and park administration facilities would occur mainly within previously developed areas. During construction, erosion and sediment control measures would be implemented according to Washington, DC requirements, and impacts to water resources due to these activities would be negligible. The reduction of impervious surface throughout the National Zoo under Alternative C would have a net beneficial impact to water quality.

The construction of an aerial tram would require clearing of a section of undeveloped forest within close proximity to Rock Creek. The loss of vegetation could potentially cause minor adverse impacts to water quality.

Construction of a new service road from Amazonia Science Gallery to Bird Hill through an intact forest area would require a crossing over a Rock Creek tributary. Erosion and sediment control measures would be in place during construction, however, the addition

of new impervious surface to this undeveloped area would have minor adverse impacts to water quality.

The creation of the Discovery Zone and Stormwater Management exhibit at the current Parking Lot D site occurs within the Rock Creek floodplain. The replacement of impervious surface with a functioning wetland at this location would have a minor long-term beneficial impact to water quality.

Mitigation for the Preferred Alternative

As individual projects are constructed, implementation of erosion and sediment control practices, such as sediment trapping, filtering, and other best management practices, will help avoid temporary impacts to water quality. Stormwater management plans will also be prepared on a project by project basis to address long-term runoff and pollutant discharge.

A.5 Air Quality

The guidelines outlined by the Clean Air Act (CAA), 23 CFR Part 771. 49 CFR Part 622, and the NEPA require an air quality analysis to document existing air quality conditions and an analysis to evaluate any potential impacts that may occur as a result of the proposed project. Under the authority of the CAA, the U.S. Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for six criteria pollutants deemed harmful to public health and the environment. These pollutants include: nitrogen (NO₂), sulfur dioxide (SO₂), carbon dioxide (CO₂), ozone (O₃), particulate matter equal to or less than 10 microns in size (PM₁₀), fine particulate matter (PM_{2.5}), and lead (Pb). Areas where concentrations of criteria pollutants are below the NAAQS are designated as being in “attainment” and areas where a criteria pollutant level exceeds the NAAQS are designated as “nonattainment” by the EPA. According to the Metropolitan Washington Council of Governments (MWCOG, 2007a), the National Zoo lies within the Washington, DC region non-attainment area for ground-level ozone and PM_{2.5}.

In nonattainment areas the CAA requires the region to achieve attainment by June 2010 (MWCOG, 2007b). MWCOG has developed a State Implementation Plan (the SIP) to guide in improvements to air quality in the Washington, DC region. The SIP provided an inventory of existing air emissions and accounts for planned projects within the region that have potential to increase pollution emissions. The SIP accounts for general increases in vehicular travel throughout the region as well as anticipated changes in land use and demographic/employment patterns.

Impacts to Air Quality

Development activities can affect air quality in three ways: 1) through airborne dust generated by the construction process; 2) by introducing new stationary sources of pollutants, such as heating plants and boilers for new facilities; and 3) through increasing vehicular traffic to the site, which raises vehicle emission levels near the site and possibly the region.

No-Action Alternative

Additional exhibit planning outside of the on-going Elephant Trails project would continue on a site-by-site basis. Other small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. SI would maintain its current operations at the National Zoo and negligible changes in emissions are expected to occur. Therefore, the No-Action Alternative would have negligible impact to air quality.

Alternatives A, B, and C

In general, the impacts on air quality of the three action alternatives are similar and therefore, have been grouped together in this section. Construction activities under each alternative would have an effect on air quality from construction equipment emissions, fugitive dust caused by land disturbance, and additional trips to the site by construction workers. The duration and intensity of construction activities for each action in Alternatives A, B, and C varies and is not known at this time; however, with appropriate best management practices during construction to minimize dust and vehicles emission, adverse impacts from construction activities to air quality is expected to be minor, and short-term.

Operational activities most likely to impact air quality under Alternatives A, B, and C include the addition of the road tram and stationary sources for new or renovated facilities. For the road tram, SI is exploring the use of alternative fuel vehicles that have lower emissions. The number of trips of the road tram would vary seasonally and would represent a very small portion of the total trips in the National Zoo operations. The road tram emissions would be well below the *de minimis* threshold levels and less than 10 percent of the areas annual emission budget. The aerial tram would run on electricity producing no emissions. Infrastructure improvements in Alternatives A, B, and C could generate pollutant emission from stationary sources such as the burning of natural gas for space and water heating of facilities. The impacts of emission from building operations and stationary sources are anticipated to be negligible because no large emission generators are anticipated.

Under all the alternatives including the No-Action Alternative, visitation at the National Zoo is expected to steadily climb and exceed the annual visitation of three million visitors per year, which was the annual visitation prior to September 11th 2001. In 2006, the National Zoo annual attendance was approximately two million. Implementation of Alternatives A, B, and C would not change the carrying capacity of the National Zoo. The addition of the new underground parking structure in Alternatives A, B, and C would add additional parking (200 spaces) but the carry capacity of the National Zoo is more determined by the physical space of the facilities and its amenities. As a result, Alternatives A, B, and C is not anticipated to increase vehicular trips over that of the No-Action Alternative and therefore, emissions levels would be same. As more detailed information is available for each project such as the parking structures, a more detailed quantitative air quality analysis may be warranted.

The National Zoo is proposing an incentive for employees to use public transportation that could result in reduced vehicle trips by employees to the Zoo and therefore, reduce emissions.

Overall, Alternatives A, B, and C would have minor short-term adverse impacts from construction activities associated with exhibit and facilities renewal. Implementation of Alternatives A, B, or C would not be expected to generate an increase in vehicular traffic, change land use, or affect employment patterns at the National Zoo; therefore, no long-term impact on air quality would occur.

Mitigation for the Preferred Alternative

Best management practices will be utilized during construction of individual projects to avoid and/or minimize the release of airborne pollutants. Such practices could include, but would not be limited to, the use of water to control airborne dust in active grading areas and material stockpiles, and the use of temporary vegetative cover and/or barriers on inactive areas. To the extent possible, commercial power will be used over portable generators during construction of projects to reduce temporary impacts to air quality. More detailed air quality mitigation will be prepared during the conceptual design phase of individual projects.

A.6 Noise

The extent to which individuals are affected by noise is controlled by several factors, including:

- The duration and frequency of sound;
- The distance between the sound source and the receptor;
- The intervening natural or man-made barriers or structures; and
- The ambient environment.

The “A-weighted” decibel (dBA) is a unit of measure used to express the relative loudness of sounds in the air as perceived by the human ear. The dBA scale de-emphasizes the very low and the very high frequencies and emphasizes the middle frequencies, thereby closely approximating the frequency response of the human ear. Common noise sources and their sound levels are described in the table below.

Table 2. Common Noise Sources and Their Sound Levels

Source	Sound Level (dBA)
Near large jet at takeoff	140
Air-raid siren	130
Threshold of pain	120
Thunder or sonic boom	110
Garbage or trailer truck at roadside	100
Power lawn mower at 5 feet	90
Alarm clock or vacuum cleaner	80
Freeway traffic at 50 feet	70
Conversational speech	60
Average residence	50
Bedroom	40
Soft whisper at 15 feet	30
Rustle of leaves	20
Breathing	10
Threshold of hearing	0

Source: Adapted from U.S. National Bureau of Standards Handbook 119, 1976.

Human ability to perceive change in noise levels varies widely from person to person, as do responses to perceived changes. Generally, a three dBA change in noise level would be barely perceptible to most listeners, whereas a ten dBA change is normally perceived as doubling (or halving) of noise levels and is considered a substantial change. These thresholds permit direct estimation of an individual's probable perception of changes in noise levels.

Section 5 of the Washington, DC Noise Control Act of 1977 permits noise resulting from construction or demolition (excluding pile drivers) activity between 7:00 am and 7:00 pm on any weekday. Noise levels are not permitted to exceed 80 dBA unless granted variance.

FHWA has established noise abatement criteria (NAC) that define limits beyond which noise abatement measures must be considered. Since the proposed action is not a FHWA project, these standards are not directly applicable. However, they provide a convenient benchmark to assess the level at which noise becomes a marked source of annoyance. Thresholds vary depending on the type of land use in an area. These are summarized in the table below. Land use Category B, which represents moderately sensitive land uses, including residents, churches, and hospitals, best characterizes land uses near National Zoo. The NAC for Category B land uses is a Leq(1) of 67 dBA.

Table 3. Noise Abatement Thresholds

Activity Category	Description of Activity Category	Leq(1)
A	Land for which serenity and quiet area of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose	57 (exterior)
B	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.	67 (exterior)
C	Developed land, properties, or activities not included in Categories A or B above	72 (exterior)
D	Undeveloped lands.	N/A
E	Residences, motels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.	52 (interior)
Note: The Leq(1) designations represent hourly A-weighted sound levels expressed in dBA.		

Source: FHWA, June 1995

Additionally, sensitive receptors on the project site include the National Zoo's animal exhibits. These exhibits are designed to encourage the natural behaviors of their inhabitants such as social interaction, sleeping, and breeding. Presently, the predominant source of noise within the National Zoo vicinity is vehicular traffic along Connecticut Avenue and surrounding roadways. Other less contributing noise sources at the National Zoo include small generators, animals, and maintenance activities such as snow blowers, street vacuums, or mowers.

Noise Impacts

No-Action Alternative

Under the No-Action Alternative, SI would maintain its current operations at the National Zoo and no new noise sources would be created. Therefore, there would be no direct or indirect impacts to noise levels resulting from the No-Action Alternative.

Alternatives A, B, and C

In general, the impacts on noise of the three action alternatives are similar and therefore, they have been grouped together in this section. Construction activities under each alternative would have effect on existing noise levels. With any large construction projects, areas around the construction site are likely to experience varied periods and degrees of noise impacts. Construction activities associated with the exhibit renewal, entrance revitalizations, the aerial tram, and the parking structures would result in changes to noise levels. For construction activities, the contractor would have to comply with the Section 5 of the Washington, DC Noise Control Act of 1977 that only permits noise resulting from construction or demolition (excluding pile drivers) activity between

7:00 am and 7:00 pm on any weekday. Noise levels are not permitted to exceed 80 dBA unless granted variance. For each larger development activities, SI would assess the potential impacts to noise and seek to minimize noise levels during construction.

Operationally, Alternatives A, B, and C would not result in any substantial changes that would affect noises levels at the National Zoo or to the surrounding properties. The road and aerial trams would add a new noise source but the long-term impacts resulting from each would be minor. For comparison purposes, the aerial tram noise would be equivalent to that of a manual typewriter. Additional evaluation would occur to further assess the impacts associated with the aerial tram. Renovation or the addition of additional building systems such as heat pumps, air condition units, generators, etc. could add an additional noise source to the environment that might be perceptible to nearby residents at night. In each instance, SI would consider screening or noise abatement measure to reduce noise levels from sensitive noise receptors such as nearby residences.

Overall, impacts associated with Alternatives A, B, and C would have minor short-term and long-term adverse impacts on noise levels at the National Zoo because noise generated from construction activities and other facilities improvements such as the road and aerial trams could be perceptible from outside the National Zoo.

Mitigation for the Preferred Alternative

Temporary noise impacts will be minimized during construction or demolition activities of individual projects by utilizing BMPs, as necessary, to meet the requirements of the Washington, DC Noise Control Act of 1977. In accordance with the standards, construction and demolition activity would be limited to between 7:00 am and 7:00 pm on weekdays. If necessary, noise abatement would be used to attenuate excessive construction noise in proximity of noise sensitive receptors. In addition, it is recommended that construction specifications require selection of construction truck routes that would minimize the potential for noise impacts to residences. Before beginning construction on larger projects, a noise study will be performed and a construction noise mitigation plan will be required. The plan will detail specific actions to be taken by the contractor in order to minimize noise impacts and comply with DC noise regulations.

B. Cultural Resources

B.1 Cultural Landscapes

The National Zoo is listed in the National Register of Historic Places (NRHP) as a historic site. It is significant under National Register Criteria A and C as one of the earliest zoological parks developed in the United States, and as a premier recreational area for Washington, DC. Moreover, the National Zoo's original plan was prepared by Frederick Law Olmsted, whose idea of allotting a space for each type of animal that is appropriate to its needs and indigenous habitat, revolutionized zoo design. As a cultural landscape, the *National Register Bulletin No. 18, How to Evaluate and Nominate Designed Historic Landscapes* details various types of designed historic landscapes. The National Zoo has these characteristics of a cultural landscape:

- The National Zoo was consciously designed and laid out by a master gardener, landscape architect, architect, or horticulturist to a design principle;
- The National Zoo is associated with historical trends and events defining the growth of zoos as a conservation area, versus continuing the tradition of a menagerie type of exhibition, typical of the time period; and
- The National Zoo set the standard for other zoos in terms of its design features, significantly enhancing theory of landscape architecture.

Further guidance concerning specific characteristics of cultural landscapes can be found in *National Register Bulletin No. 30, Guidelines for Evaluating and Documenting Rural Historic Landscapes*. The following list of characteristics contains those items, which pertain to the National Zoo in defining its current historic landscape:

- Land uses and activities
- Patterns of spatial organization
- Response to the natural environment
- Circulation networks
- Vegetation related to land use
- Buildings, structures, and objects
- Archeological sites
- Small-scale elements

The interplay of these elements adds to the depth and intricacy of the National Zoo as a cultural landscape. The land use and associated activities have been associated with the National Zoo for over one-hundred years. The patterns of the spatial organization relate to how the National Zoo was originally laid out – the paths and the cluster of buildings constructed on the relatively flat portion of the parcel – are in turn a response to the natural environment. Moreover, with more than 100 years of the public circulating the site in various ways to view the animals and exhibits, the National Zoo has transformed from horse and buggy paths to fully modern roads, parking lots, bus stops, and the various walking paths including the Olmsted Walk. These physical aspects of the landscape, the roads, the paths, the facilities, and how they work together constitutes a rich interaction between people, animals, and the surrounding vegetation that forms the National Zoo.

The original plan as devised by Olmsted that currently survives as part of the cultural landscape includes:

- Integration of existing topography, views, and woodland vegetation into the site design;
- Portions of the alignment of Olmsted’s primary circulation route that formed the original spine of the National Zoo’s master plan now survive in these portions of the Olmsted Walk (1) between the Rock Creek entrance and the Reptile House; (2) between the Small Mammal House and the Elephant House; and (3) the curve between the Elephant House and the Cheetah exhibit; and
- Pastoral recreational use of the banks of Rock Creek, and the hillside below the knoll.

Outside of the Olmsted plan, other cultural landscape features include the small-scale features such as stone entry piers and gates, and sculptures that were erected during the period of significance that are interspersed throughout the park (Tumbling Bears 1935 and Bronze Anteater 1938). Circulation features include the Valley Trail, and the National Zoo Staff Drive. Spatial features such as the open lawn for outdoor events and the picnic areas add an expansive feeling to the site in comparison to the winding, wooded paths. Buildings and structures are components of the cultural landscape as well including the stone retaining walls near the Holt House and the stone flood gates near the Rock Creek corridor.

Impacts to Cultural Landscapes

No-Action Alternative

Under the No-Action Alternative, small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. There would be only minor changes to the landscape that would not diminish the integrity of the cultural landscape. The No-Action would have no impacts on the cultural landscape of the National Zoo.

Alternative A

Under Alternative A, facility improvements would result in revitalization of older exhibits including renovation of exhibits, revitalization of entrances into the National Zoo, installation of new transportation facilities and construction of new administrative facilities. These improvements could have physical and visual impacts to the cultural landscape features of the National Zoo. As a result, Alternative A could result in direct and indirect, long-term, moderate adverse impacts to cultural landscapes. Under Section 106, Alternative A would have an adverse effect. SI has initiated consultation with the Washington, DC Historic Preservation Office through the Section 106 process. As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to the cultural landscape.

Projects under Alternative A that could have an adverse effect to cultural landscapes include:

- Creation of new larger multi-species exhibit areas;
- Revitalization of entries at Connecticut Avenue, Mid-Point entry, and Harvard Street Bridge/Beach Drive with the addition of a new aerial tram;
- Transportation improvements including construction of two traffic circles and the separation of visitor and service vehicle traffic; and
- Construction of a new administrative, support, and operations hub.

The creation of new larger, multi-species exhibit areas will physically impact the cultural landscape components of the National Zoo. New exhibit spaces may cause changes to the land use and activities, patterns of spatial organization, and circulation networks of the

National Zoo. New construction would also introduce new visual features to the viewshed.

The rehabilitation of older exhibits would impact the cultural landscape by altering a portion of the existing circulation pattern and impact spatial relationships. The Beaver Valley exhibits and walkways would remove the eastern part of the Valley Trail alignment. The alignment dates from the early twentieth century and was included in Frederick Law Olmsted's plan for the National Zoo as "Missouri Valley." Olmsted designed this portion of the trail using the existing topography to enhance the visitor experience. While the remaining historic alignment of the Valley Trail will be retained, access to the Valley Trail will be limited to service vehicles.

The revitalization of the Mid-Point entry would restore the historic spatial relationship between the Small Mammals House and the Reptiles through the demolition of the non-contributing Great Ape House. The subsequent new construction would be setback further and designed with a smaller scale to retain this important spatial relationship.

Other transportation improvements that would impact the cultural landscape, especially North Road, through Alternative A's comprehensive traffic and parking management strategy include the construction of two traffic circles and a limited-use turn lane on North Road at the Harvard Street Bridge/Beach Drive entrance. The traffic circle would physically and visually impact the Open Lawn. Visual impacts will be minimized through existing vegetation. The traffic circles will also alter the alignment of the southern portion of the historic North Road alignment.

The proposed parking structure and administrative hub on North Road would have visual impacts to the National Zoo Historic Site.

In summary, Alternative A would have minor to moderate long term adverse impacts to the National Zoo through the proposed new construction as it would physically and visually impact several character defining features of the cultural landscape including the land uses and activities, spatial organization, circulation networks, small-scale features, and the designed response to the natural environment. As a result of the demolition of the Great Ape House, there would be a minor long term beneficial impact to the cultural landscape through the restoration of spatial organization and views between the Small Mammals House and the Reptile House.

Alternative B

Under Alternative B, facility improvements would result in revitalization of older exhibits including renovation of exhibits, construction of new entrances into the National Zoo, installation of new transportation facilities and construction of new administrative facilities. These improvements could have physical and visual impacts to the cultural landscape features of the National Zoo. As a result, Alternative B could result in direct and indirect, long-term, moderate adverse impacts to the cultural landscape. Under Section 106, Alternative B would have an adverse effect. SI has initiated consultation with the Washington, DC Historic Preservation Office through the Section 106 process.

As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to the cultural landscape.

Projects under Alternative B that could have an adverse effect to cultural landscapes include:

- Creation of new larger multi-species exhibit areas;
- Revitalization of entrances at Connecticut Avenue and Harvard Street Bridge/Beach Drive;
- Transportation improvements including construction of two traffic circles and the separation of visitor and service vehicle traffic; and
- Construction of a new administrative, support, and operations hub.

The creation of new larger, multi-species exhibit areas will physically impact the cultural landscape components of the National Zoo. New exhibit spaces may cause changes to the land use and activities, patterns of spatial organization, and circulation networks of the National Zoo. New construction would also introduce new visual features to the viewshed.

The rehabilitation of older exhibits would impact the cultural landscape by altering a portion of the existing circulation pattern and a design feature. The Beaver Valley exhibits and walkways could remove the eastern part of the Valley Trail alignment. The alignment dates from the early twentieth century and was included in Frederick Law Olmsted's plan for the National Zoo as "Missouri Valley." Olmsted designed this portion of the trail using the existing topography to enhance the visitor experience. While the remaining historic alignment of the Valley Trail will be retained, access to the Valley Trail will be limited to service vehicles.

Other transportation improvements that would impact the cultural landscape, especially North Road, through Alternative A's comprehensive traffic and parking management strategy include the construction of two traffic circles and a limited-use turn lane on North Road at the Harvard Street Bridge/Beach Drive entrance. The traffic circle would physically and visually impact the Open Lawn. Visual impacts will be minimized through existing vegetation. The traffic circles will also alter the alignment of the southern portion of the historic North Road alignment.

The expansion of the General Services Building on North Road would have visual impacts to the character-defining cultural landscape of the National Zoo.

In summary, Alternative A would have minor to moderate long term adverse impacts to the National Zoo through the proposed new construction as it would physically and visually impact several character defining features of the cultural landscape including the land uses and activities, spatial organization, circulation networks, small-scale features, and the designed response to the natural environment.

Alternative C (Preferred Alternative)

Under Alternative C, facility improvements would result in the renovation of older exhibits, construction of new entrances to the National Zoo, installation of new transportation facilities, and construction of new administrative facilities. These improvements would have physical and visual impacts to resources that contribute to the significance of the National Register-listed National Zoo. As a result, Alternative C could result in direct and indirect long-term, moderate adverse impacts to the cultural landscape. Under Section 106, Alternative C would have an adverse effect. SI has initiated consultation with the Washington, DC Historic Preservation Office through the Section 106 process. As a result of this consultation, a programmatic agreement will be sought that identifies future requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to character-defining cultural landscape features.

Projects under Alternative C that could have an adverse effect to cultural landscape include:

- Creation of new larger multi-species exhibit areas;
- Revitalization of entrances at Connecticut Avenue, Mid-Point entry, and Harvard Street Bridge/Beach Drive;
- The addition of a new aerial tram;
- Transportation improvements including construction of two traffic circles, shift of North Road, and the separation of visitor and service vehicle traffic; and
- Construction of a new administrative, support, and operations hub.

The creation of new larger, multi-species exhibit areas will physically impact the cultural landscape components of the National Zoo. New exhibit spaces may cause changes to the land use and activities, patterns of spatial organization, and circulation networks of the National Zoo. New construction would also introduce new visual features to the viewshed.

The revitalization of the Mid-Point entry would restore the historic spatial relationship between the Small Mammals House and the Reptiles through the demolition of the non-contributing Great Ape House. The subsequent new construction would be setback further and designed with a smaller scale to retain this important spatial relationship.

The rehabilitation of older exhibits would impact the cultural landscape by altering a portion of the existing circulation pattern and a design feature. The Beaver Valley exhibits and walkways could remove the eastern part of the Valley Trail alignment. The alignment dates from the early twentieth century and was included in Frederick Law Olmsted's plan for the National Zoo as "Missouri Valley." Olmsted designed this portion of the trail using the existing topography to enhance the visitor experience. While the remaining historic alignment of the Valley Trail will be retained, access to the Valley Trail will be limited to service vehicles.

Other transportation improvements that would impact the cultural landscape, especially North Road, through Alternative A's comprehensive traffic and parking management

strategy include the construction of two traffic circles and a limited-use turn lane on North Road at the Harvard Street Bridge/Beach Drive entrance. Visual impacts will be minimized through existing vegetation. The traffic circles will also alter the alignment of the southern portion of the historic North Road alignment.

The proposed parking structure and administrative hub on North Road would have visual impacts to the National Zoo Historic Site.

In summary, Alternative C would have minor to moderate long term adverse impacts to the National Zoo through the proposed new construction as it would physically and visually impact several character defining features of the cultural landscape including the land uses and activities, spatial organization, circulation networks, small-scale features, and the designed response to the natural environment.

Mitigation for the Preferred Alternative

As design for individual projects commences, SI will continue to consult with NCPC, CFA, and DC HPO regarding impacts to cultural landscapes. When applicable, specific mitigation measures will be detailed as part of the conceptual design process.

B.2 Historic Structures

The National Zoo is listed in the NRHP and the Washington, DC's Inventory of Historic Sites as it contains very unique architecture relating to its individual function and its surrounding environment. The range in styles reflect the changing theories of how to best care for the animals and meet their needs while providing a safe, educational, and entertaining experience for the visitor. The period of significance for the National Zoo begins in 1889 with the founding of the National Zoo and the implementation of the picturesque exhibits and landscapes that guided the design of the National Zoo to 1960. After 1960, there was a shift in the focus from the architecture and recreational function of the National Zoo buildings towards an emphasis on the animals in a naturalistic environment.

The Holt House is located within the confines of the National Zoo and it is also individually listed in the National Register under Criterion C as it is one of the few remaining houses in Washington, DC with a five-part Georgian plan.

When the National Zoo was nominated for inclusion in the National Register in 1972, character defining and non-character defining resources were not identified as thoroughly as the practice is today. Therefore, as part of this planning process, the National Zoo has identified the following structures that may be considered character defining resources:

1. 1901 Harvard Bridge
2. 1906 Think Tank (Small Mammal House)
3. 1908 Bear Yards –1913 Stone Bridge
4. 1912 Boiler House
5. 1928 Bird House
6. 1931 Reptile House/Reptile Discover Center
7. 1937 Elephant House

8. 1937 Small Mammal House
9. 1937 Stone Shop Building or Propagation Building
10. 1940 Mane Restaurant
11. Stone Guard House
12. Camel Building
13. Peccaries
14. Police Station/Public Restrooms
15. Holt House
16. Holt House stone retaining wall
17. Stone Flood Gate House (Rock Creek Parkway)
18. Hoofed Stock Exhibit (1937)

Several design philosophies characterize the buildings at the National Zoo. Historically, the early years of the National Zoo and its philosophical direction was to provide a natural animal preserve for those endangered species of North American animals that were quickly disappearing. Buildings were constructed to blend in with the natural environment, but also to be distinctive to the animal's heritage. For example, the Buffalo Barn was constructed in the fashion of a log cabin – rustic, and stereo-typically American. The Lion House was also rustic – a rough cut stone masonry building with a low profile, but strong, majestic, and massive – words that also come to mind when describing lions. While neither of these buildings remain today, the philosophy of balancing the structures with the environment is an on-going theme that architects and planners have wrestled with over the last century.

The 1920s saw a change in the direction of the principle structures and their architectural style. The National Zoo had shifted from more of a natural preserve, to an entertainment and recreational venue. The wellbeing of the animals was still at the forefront, however, the method of presenting and blending the architecture with the environment took on a different form. Instead of the buildings blending into the environment, the theory was to engage the public openly with the architecture, and that the architecture should bridge and beckon the public to the animals. Buildings of this period are fanciful – the door to the Reptile House is adorned with classical architectural building elements, until one gets close and sees that the capital is topped with a lizard, or the base of a column rests on a tortoise.

The National Zoo benefited from the national work programs that were established during the Depression to stimulate the economy. During the 1930s, several major buildings were constructed including the completion of the Bird House, the Small Mammal House and the Elephant House as well as several support structures. Building on the success of the public's reaction to the fanciful Reptile House and the Bird House, the Small Mammal House and Elephant House held similar design elements such as massing and scale, but are more restrained in details. The 1930s doubled the amount of permanent buildings on the National Zoo site.

With the onset of World War II, assets and resources were diverted into the war effort and the National Zoo worked with reduced personnel and a smaller budget. The only

historic structure of merit that was constructed of this period is the Mane Restaurant. The 1950s proved to be a similar strain on the National Zoo and it soon became apparent that the National Zoo was unable to keep up with maintenance and other zoos started surpassing the National Zoo in modernization efforts. Improvement efforts were limited. The Police/Public Restrooms building was constructed in 1956 in a loosely interpreted stone-colonial style in keeping with other support structures.

1961 ushered in the first master plan since 1905 and the formation of the FONZ. Both of these worked in conjunction to bring direction and relief to the National Zoo. Buildings that were constructed after 1960 fall outside of the period of significance as it relates to the National Zoo as a historic site (see Figure 15).



Figure 15. National Zoo Exhibit Periods

Impacts to Historic Structures

No-Action Alternative

Under the No-Action Alternative, small scale site improvements would continue for facilities updates related to safety, health, and maintenance. Exhibit renewal would occur on a site-by-site basis with large land tracts not readily available. There would be only minor changes to the resource's location, design, setting, materials, workmanship, feeling, or association and these actions would not diminish the integrity of the National Zoo Historic Site. The individually National Register-listed Holt House would not be rehabilitated and would remain unusable space and structurally deficient. The No-Action would have minor to moderate long term adverse impacts because the Holt House would continue to deteriorate.

Alternative A

Under Alternative A, facility improvements would result in renovation of older exhibits, construction of new entries into the National Zoo, installation of new transportation facilities, and rehabilitation of administrative facilities. These improvements could have physical and visual impacts to resources that contribute to the significance of the National Register-listed National Zoo Historic Site. As a result, Alternative A would result in direct and indirect, long-term, moderate adverse impacts to historic resources. Under Section 106, Alternative A would have an adverse effect. SI has initiated consultation through the Section 106 process with the Washington, DC Historic Preservation Office. As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to National Zoo Historic Site and the historic structures that comprise the site, such as following the principles outlined in *The Secretary of the Interiors Guidelines for the Treatment of Historic Properties*.

Projects under Alternative A that could have an adverse effect to historic resources include:

- Creation of new larger multi-species exhibit areas;
- Rehabilitation of older exhibits in historic buildings;
- Revitalization of entries at Connecticut Avenue, Mid-Point entry, and Harvard Street Bridge/Beach Drive with the addition of a new aerial tram;
- New Parking structure; and
- Rehabilitation of the service buildings such as Propagation Building and the Holt House.

The creation of new larger multi-species exhibit areas will physically impact the National Zoo Historic Site because new exhibit spaces could cause changes to the setting, feeling, and association. New construction also introduces new visual features in the viewshed.

The rehabilitation of older exhibits, such as the rehabilitation of the Small Mammal House, the Reptile Discovery Center, the Think Tank, the Bird House, and the Great Flight Cage, could impact these buildings as they are character defining features to the National Zoo Historic Site. However, it is anticipated that rehabilitation of these buildings would generally be restricted to interior modifications to include upgrading the

building systems, interior renovations, and exhibit renewals. Exterior changes to the buildings' character-defining features are not anticipated. However, if such work were needed, rehabilitation efforts would strive for final designs that retain architectural features that make each building unique as well as retain the massing, exterior materials, and fenestration pattern which is in keeping with the *Secretary of the Interior's Guidelines for the Treatment of Historic Properties*.

The revitalization of older exhibits will physically impact the Camel Building and the Peccaries Building, as they will be relocated.

The revitalization of the entries at Connecticut Avenue, the Mid-Point entry, and Harvard Street Bridge/Beach Drive would have physical and visual effects on the design, setting, feeling, and association of the National Zoo Historic Site. The revitalization of the entry at Connecticut Avenue would impact the setting through the expansion of the existing visitor center and the construction of the aerial tram. In particular these actions may diminish the setting in the area of the Stone Guard Shack and may require the removal of the stone entry piers. The construction of an aerial tram station would physically and visually impact the National Zoo Historic Site through the introduction of a new visual feature.

The revitalization of the Mid-Point entry would physically and visually impact the setting, feeling, and association of the National Zoo Historic Site. In Alternative A, the Great Ape House would be demolished. The Great Ape House is located between two of the National Zoo's most notable historic structures—the Small Mammals House and the Reptile House. The result of the demolition of a non-contributing building would restore the original viewshed between these two historic structures; the subsequent new construction would be setback further and designed with a smaller scale to retain this important spatial relationship. In addition, the O-Line would be moved or relocated depending on future collection planning. As well, the National Zoo's setting would be impacted visually through the construction of the aerial tram. However, it is anticipated that the aerial tram would not be higher than the existing the O-Line and that visual impacts would be minimized through existing vegetation.

The rehabilitation of service buildings would impact the setting, feeling, and association of the National Zoo Historic Site. Alternative A proposes the rehabilitation of the Propagation Building and the Holt House. It is anticipated that rehabilitation of the Propagation Building will generally be restricted to interior modifications to include upgrading the building systems, interior renovations, and exhibit renewals. Exterior changes to the buildings' character-defining features are not anticipated. However, if such work were needed, rehabilitation efforts would strive for final designs that retain architectural features that make it unique as well as retain the massing, exterior materials, and fenestration pattern which is in keeping with the *Secretary of the Interior's Guidelines for the Treatment of Historic Properties*.

The Holt House is individually listed in the National Register. Plans to rehabilitate this structure, which derives its significance as one of the remaining 5-part Georgian plan

homes, would follow the *Secretary of the Interiors Guidelines for the Treatment of Historic Properties*.

In summary, Alternative A would have minor to moderate long term adverse impacts to the National Zoo Historic Site, as the proposed new construction would physically and visually impact several character-defining features. Alternative A would also have minor to moderate long term beneficial impacts to the National Zoo Historic Site through the restoration of the setting between the Small Mammal House and Reptile House and the rehabilitation of the Holt House.

Alternative B

Under Alternative B, facility improvements would result in renovation of older exhibits, construction of new entrances into the National Zoo, installation of new transportation facilities, and rehabilitation of administrative facilities. These improvements would have physical and visual impacts to resources that contribute to the significance of the National Register-listed National Zoo Historic Site. As a result, Alternative B would result in direct and indirect, long-term, moderate adverse impacts to historic resources. Under Section 106, Alternative B would have an adverse effect. SI has initiated consultation through the Section 106 process with the Washington, DC Historic Preservation Office. As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to the National Zoo Historic Site and the historic structures that comprise the Site, such as following the principles outlined in *The Secretary of the Interiors Guidelines for the Treatment of Historic Properties*.

Projects under Alternative B that could have an adverse effect to historic resources include:

- Creation of new larger multi-species exhibit areas;
- Rehabilitation of older exhibits in historic buildings;
- Revitalization of entries at Connecticut Avenue and Harvard Street Bridge/Beach Drive; and
- Rehabilitation of the service buildings, such as Propagation Building and the Holt House.

The creation of new larger multi-species exhibit areas will physically impact the National Zoo Historic Site because new exhibit spaces would cause changes to the setting, feeling, and association. New construction also introduces new visual features in the viewshed.

The rehabilitation of older exhibits, such as the rehabilitation of the Small Mammal House, the Reptile Discovery Center, the Think Tank, the Bird House, and the Great Flight Cage could impact these buildings as they are contributing structures to the National Zoo Historic Site. However, it is anticipated that rehabilitation of these buildings will generally be restricted to interior modifications to include upgrading the building systems, interior renovations, and exhibit renewals. Exterior changes to the buildings' character-defining features are not anticipated. However, if such work were needed, rehabilitation efforts would strive for final designs that retain architectural

features that make each building unique as well as retain the massing, exterior materials, and fenestration pattern which is in keeping with the *Secretary of the Interior's Guidelines for the Treatment of Historic Properties*.

The revitalization of older exhibits will physically impact the Camel Building and the Peccaries Building, as they will be relocated.

The revitalization of the entries at Connecticut Avenue and Harvard Street Bridge/Beach Drive would have physical and visual effects on the design, setting, feeling, and association of the National Zoo Historic Site. The revitalization of the entry at Connecticut Avenue would impact the setting through the expansion of the existing visitor center and the construction of the aerial tram. In particular these actions may diminish the setting in the area of the Stone Guard Shack and may require the removal of the stone entry piers.

The rehabilitation of service buildings would impact the setting, feeling, and association of the National Zoo Historic Site. Alternative B proposes the rehabilitation of the Propagation Building and the Holt House. It is anticipated that rehabilitation of the Propagation Building will generally be restricted to interior modifications to include upgrading the building systems, interior renovations, and exhibit renewals. Exterior changes to the buildings' character-defining features are not anticipated. However, if such work were needed, rehabilitation efforts would strive for final designs that retain architectural features that make it unique as well as retain the massing, exterior materials, and fenestration pattern which is in keeping with the *Secretary of the Interior's Guidelines for the Treatment of Historic Properties*.

The Holt House is individually listed in the National Register. Plans to rehabilitate this structure, which derives its significance as one of the remaining 5-part Georgian plan homes, should follow the *Secretary of the Interiors Guidelines for the Treatment of Historic Properties*.

In summary, Alternative B would have minor to moderate long term adverse impacts to the National Zoo Historic Site through the proposed new construction as it would physically and visually impact several character-defining features. Alternative B would also have minor to moderate long term beneficial impacts through the rehabilitation of the Holt House.

Alternative C (Preferred Alternative)

Under Alternative C, facility improvements would result in renovation of older exhibits, construction of new entries into the National Zoo, installation of new transportation facilities, and rehabilitation of administrative facilities. These improvements could have physical and visual impacts to resources that contribute to the significance of the National Register-listed National Zoo Historic Site. As a result, Alternative C would result in direct and indirect, long-term, moderate adverse impacts to historic resources. Under Section 106, Alternative C would have an adverse effect. SI has initiated consultation through the Section 106 process with the Washington, DC Historic Preservation Office.

As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to National Zoo Historic Site and the historic structures that comprise the Site, such as following the principles outlined in *The Secretary of the Interiors Guidelines for the Treatment of Historic Properties*.

Projects under Alternative C that could have an adverse effect to historic resources include:

- Creation of new larger multi-species exhibit areas;
- Rehabilitation of older exhibits in historic buildings;
- Revitalization of entries at Connecticut Avenue, Mid-Point entry, and Harvard Street Bridge/Beach Drive with the addition of a new aerial tram;
- New Parking structure; and
- Rehabilitation of the service buildings such as Propagation Building, the Police/Public Restroom building, and the Holt House.

The creation of new larger multi-species exhibit areas will physically impact the National Zoo Historic Site because new exhibit spaces would cause changes to the setting, feeling, and association. New construction also introduces new visual features in the viewshed.

The rehabilitation of older exhibits, such as the rehabilitation of the Small Mammal House, the Reptile Discovery Center, the Think Tank, the Bird House, and the Great Flight Cage, could impact these buildings as they are character defining features to the National Zoo Historic Site. However, it is anticipated that rehabilitation of these buildings will generally be restricted to interior modifications to include upgrading the building systems, interior renovations, and exhibit renewals. Exterior changes to the buildings' character-defining features are not anticipated. However, if such work were needed, rehabilitation efforts would strive for final designs that retain architectural features that make each building unique as well as retain the massing, exterior materials, and fenestration pattern which is in keeping with the *Secretary of the Interior's Guidelines for the Treatment of Historic Properties*.

The revitalization of older exhibits will physically impact the Camel Building and the Peccaries Building, as they will be relocated.

The revitalization of the entries at Connecticut Avenue and Harvard Street Bridge/Beach Drive would have physical and visual effects on the design, setting, feeling, and association of the National Zoo Historic Site. The revitalization of the entry at Connecticut Avenue would impact the setting through the expansion of the existing visitor center and the construction of the aerial tram. In particular these actions may diminish the setting in the area of the Stone Guard Shack and may require the removal of the stone entry piers.

The rehabilitation of service buildings would impact the setting, feeling, and association of the National Zoo Historic Site. Alternative C proposes the rehabilitation of the Propagation Building, the Police/Public Restroom Building, and the Holt House. It is

anticipated that rehabilitations of the Propagation Building and the Police/Public Restroom Building will generally be restricted to interior modifications to include upgrading the building systems, interior renovations, and exhibit renewals. Exterior changes to the buildings' character-defining features are not anticipated. However, if such work were needed, rehabilitation efforts would strive for final designs that retain architectural features that make it unique as well as retain the massing, exterior materials, and fenestration pattern which is in keeping with the *Secretary of the Interior's Guidelines for the Treatment of Historic Properties*.

The Holt House is individually listed in the National Register. Plans to rehabilitate this structure, which derives its significance as one of the remaining 5-part Georgian plan homes, should follow the *Secretary of the Interiors Guidelines for the Treatment of Historic Properties*.

In summary, Alternative C would have minor to moderate long term adverse impacts to the National Zoo Historic Site through the proposed new construction as it would physically and visually impact several character-defining features. Alternative C would also have minor to moderate long term beneficial impacts to the National Zoo Historic Site through the restoration of the setting between the Small Mammal House and Reptile House and the rehabilitation of the Holt House.

Mitigation for the Preferred Alternative

As design for individual projects initiates, SI will continue to consult with NCPC, CFA, and DC HPO regarding impacts to historic structures. When applicable, specific mitigation measures will be detailed as part of the conceptual design process.

B.3 Archeological Resources

An archeological assessment was performed by comparing historic and existing conditions maps to identify locations with natural (and undisturbed) topography coupled with interviews with the National Zoo's staff who is familiar with recent grading and filling related to construction at the National Zoo and a reconnaissance-level field survey. Landscaping and construction has altered terrain thereby destroying archeological resources in many areas within the National Zoo. Based on the research and field survey, 16 locations were identified as areas likely to include archeological resources. These locations have not been confirmed through subsurface excavation.

Six areas with high archeological potential are located in the main part of the National Zoo grounds, at the head of the valley and around the Lion House. Nine areas are located on the floodplain along Rock Creek, and one is on a bench of land above the creek. All of the locations have potential for pre-historic deposits, and one is also a historic site of the former site of the Columbia Mills. Five locations have been identified as potential prehistoric quarries.

Any location identified as likely to include archeological resources that are to be subjected to ground disturbance warrants subsurface testing to determine whether or not archeological resources are present.

Archeological evidence from the region suggests that Native Americans occupied various areas in what is now Washington, DC. The lands along the Potomac and Anacostia Rivers, Rock Creek, Tiber Creek, and the many tributaries that ran through the Washington, DC area offered game animals and fish, a variety of plant foods, and lithic resources. The early archeological investigations of Washington, DC revealed a number of village, camp, and quarry sites within the present boundaries of the city.

Locations along streams were often selected by Native Americans for camp or village sites and for the exploitation of food resources. Areas with rock outcrops were generally exploited for lithic resources, quarrying quartz and quartzite for tools, points, and blades, and quarrying soapstone for the manufacture of vessels for cooking and storing food.

One of the main quarrying and workshop areas was the Piney Branch quarry that was found in 1880 by Mr. Gill of the US Geologic Survey. The Piney Branch quarry included several workshops including one below the junction of Piney Branch with Rock Creek, near the northeast boundary of the National Zoo. Also, along Harvard Street, overlooking the National Zoo and on its grounds, Dr. Titus Ulke found evidence of the manufacture of stone tools and of a village site, represented by anvils, pestles, concave stone vessels, and pre-forms of quartz and quartzite. The presence of many quarries in the area meant that abundant lithic resources were available for manufacturing tools and vessels. The many quarrying spots located in the vicinity of the National Zoo indicate that prehistoric use or occupation of the area is probable. The absence of reported prehistoric archeological sites on the National Zoo grounds may be a reflection of site destruction due to landscaping and construction of the National Zoo or to the lack of archeological survey on zoo property.

The Rock Creek valley area north of Georgetown remained rural and undeveloped through the Civil War era and for nearly a quarter of a century afterward. A topographical survey map of the future vicinity of the National Zoo was made in 1867 that shows the sparse, estate-centered development of the Rock Creek valley, dominated by large landowners. Within the perimeter of the future National Zoo grounds, only a few landowners are noted – such as Dr. Henry Holt.

The Holt House was constructed by Roger and/or George Johnson between 1810 and 1830 and they also owned the Columbia Mills located on the sharp bend in Rock Creek. To satisfy debtors, the Columbia Mills was sold off from the Holt House parcel in 1823. The Columbia Mills was constructed in the 1790s by Benjamin Stoddert, and later owned by John Quincy Adams. The complex included a plaster-of-paris mill, a grist mill, and several other buildings to house workers and a stable for horses (Quinn Evans, 2003). It is not clear if any archeological remains of the mills survive.

The land around the Holt House has been graded, removing any archeological deposits that may have been associated with the nineteenth-century use of the house. The rest of the level land on the Holt property has been developed and is occupied by National Zoo

buildings. Construction disturbance likely destroyed evidence of any early outbuildings associated with the nineteenth-century occupation of the Holt House.

Impacts to Archaeological Resources

No-Action Alternative

Under the No-Action Alternative, small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. There would be only minor changes that would include ground disturbance. Such disturbance is unlikely to affect the integrity of the archeological resources. Thus, the No-Action Alternative is not likely to impact archeological resources.

Alternative A

Under Alternative A, facility improvements would result in revitalization of older exhibits including renovation of exhibits, construction of new entrances into the National Zoo, installation of new transportation facilities and construction of new administrative facilities. These improvements could have physical impacts to prehistoric archeological resources or resources that contribute to the significance of the National Register-listed National Zoo Historic Site. As a result, Alternative A could result in direct long-term moderate impacts to areas of high archeological potential. SI has initiated consultation with the Washington, DC Historic Preservation Office through the Section 106 process. As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to areas of high archeological potential, such as following the principles outlined in *The Secretary of Interiors Guidelines for the Treatment of Historic Properties*.

Projects under Alternative A that could have an adverse effect to areas of high archeological potential include:

- Creation of new larger multi-species exhibit areas;
- Revitalization of the entrance at Harvard Street Bridge/Beach Drive; and
- Transportation improvements including construction of two traffic circles and the separation of visitor and service vehicle traffic.

The creation of new multi-species exhibit areas, specifically at the Lion-Tiger Hill, could physically impact areas of high potential for prehistoric archeological resources (A004 and A005). Ground disturbance in these areas could damage or destroy archeological resources.

The revitalization of the Harvard Street Bridge/Beach Drive entrance, with new facilities, could physically impact areas A007, A008, and A009. The reclamation of surface parking (Parking Lot D) and the creation of a visitor experience focused on the Rock Creek ecosystem could disturb areas A010. Ground disturbance in these areas could damage or destroy archeological resources.

The improvements proposed to alleviate congestion along the North Road through a comprehensive traffic and parking management strategy include the construction of two traffic circles and a limited-use turn lane on North Road at the Harvard Street Bridge/Beach Drive entrance. The traffic circle would physically impact areas A007, A008, and A009. Ground disturbance in these areas could damage or destroy archeological resources.

In summary, before any ground disturbance associated with Alternative A improvements, the presence or absence of archeological resources in these areas of high archeological potential needs to be verified by testing. Alternative A may have minor to moderate long term adverse impacts through the proposed new construction as it would physically impact areas of high potential for prehistoric archeological resources. As the final designs for these improvements have not been fully developed, consultation with the Washington, DC Historic Preservation Office through the Section 106 process should establish appropriate testing and mitigation efforts.

Alternative B

Under Alternative B, facility improvements would result in revitalization of older exhibits including renovation of exhibits, construction of new entrances into the National Zoo, installation of new transportation facilities and construction of new administrative facilities. These improvements could have physical impacts to prehistoric archeological resources or resources that contribute to the significance of the National Register-listed National Zoo Historic Site. As a result, Alternative B could result in direct, long-term, moderate impacts to areas of high archeological potential. SI has initiated consultation with the Washington, DC Historic Preservation Office through the Section 106 process. As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to areas of high archeological potential, such as following the principles outlined in *The Secretary of Interiors Guidelines for the Treatment of Historic Properties*.

Projects under Alternative B that could have an adverse effect to areas of high archeological potential include:

- Creation of new larger multi-species exhibit areas;
- Revitalization of the entrance at Harvard Street Bridge/Beach Drive; and
- Transportation improvements including construction of two traffic circles and the separation of visitor and service vehicle traffic.

The creation of new multi-species exhibit areas, specifically at the Lion-Tiger Hill, could physically impact areas of high potential for prehistoric archeological resources (A004 and A005). Ground disturbance in these areas could damage or destroy archeological resources.

The revitalization of the Harvard Street Bridge/Beach Drive entrance, with new facilities, could physically impact areas A007, A008, and A009.

The improvements proposed to alleviate congestion along the North Road through a comprehensive traffic and parking management strategy include the construction of two traffic circles and a limited-use turn lane on North Road at the Harvard Street Bridge/Beach Drive entrance. The traffic circle would physically impact areas A007, A008, and A009. Ground disturbance in these areas could damage or destroy archeological resources.

In summary, before any ground disturbance associated with Alternative B improvements, the presence or absence of archeological resources in these areas of high archeological potential needs to be verified by testing. Alternative B may have minor to moderate long term adverse impacts through the proposed new construction as it would physically impact areas of high potential for prehistoric archeological resources. As the final designs for these improvements have not been fully developed, consultation with the Washington, DC Historic Preservation Office through the Section 106 process should establish appropriate testing and mitigation efforts.

Alternative C (Preferred Alternative)

Under Alternative C, facility improvements would result in revitalization of older exhibits including renovation of exhibits, revitalization of new entrances, installation of new transportation facilities, and construction of new administrative facilities. These improvements could have physical impacts to prehistoric archeological resources or resources that contribute to the significance of the National Register-listed National Zoo Historic Site. As a result, Alternative C could result in direct, long-term, moderate impacts to areas of high archeological potential. SI has initiated consultation with the Washington, DC Historic Preservation Office through the Section 106 process. As a result of this consultation, a programmatic agreement will be sought that identifies future review requirements and mitigation to be employed during project development. Future design would consider ways to minimize impacts to areas of high archeological potential, such as following the principles outlined in *The Secretary of Interiors Guidelines for the Treatment of Historic Properties*.

Projects under Alternative C that could have an adverse effect to areas of high archeological potential include:

- Creation of new larger multi-species exhibit areas;
- Revitalization of the entrance at Harvard Street Bridge/Beach Drive; and
- Transportation improvements including construction of two traffic circles and the separation of visitor and service vehicle traffic.

The creation of new multi-species exhibit areas, specifically at the Lion-Tiger Hill, could physically impact areas of high potential for prehistoric archeological resources (A004 and A005). Ground disturbance in these areas could damage or destroy archeological resources.

The revitalization of the Harvard Street Bridge/Beach Drive entrance, with new facilities, could physically impact areas A007, A008, and A009. The reclamation of surface parking (Parking Lot D) and the creation of a visitor experience focused on the Rock

Creek ecosystem could disturb areas A010. Ground disturbance in these areas could damage or destroy archeological resources.

The improvements proposed to alleviate congestion along the North Road through a comprehensive traffic and parking management strategy include the construction of two traffic circles and a limited-use turn lane on North Road at the Harvard Street Bridge/Beach Drive entrance. The traffic circle would physically impact areas A007, A008, and A009. Ground disturbance in these areas could damage or destroy archeological resources.

In summary, before any ground disturbance associated with Alternative C improvements, the presence or absence of archeological resources in these areas of high archeological potential needs to be verified by testing. Alternative C may have minor to moderate long term adverse impacts through the proposed new construction as it would physically impact areas of high potential for prehistoric archeological resources. As the final designs for these improvements have not been fully developed, consultation with the Washington, DC Historic Preservation Office through the Section 106 process should establish appropriate testing and mitigation efforts.

Mitigation for the Preferred Alternative

As design for individual projects commences, SI will continue to consult with NCPC, and the DC HPO regarding potential impacts to archeological resources. In areas of high archeological potential, testing will occur prior to any ground disturbing activities. When applicable, specific mitigation measures for impacts to archeological resources will be detailed as part of the conceptual design process.

C. Socioeconomics

C.1 Aesthetics/Visual Resources

The area of visual influence a project may have on its surrounding environs is determined by estimating the visibility of the proposed action to viewers from public places. Factors that help determine the viewshed include the scale of a project, its proposed location, and the surrounding topography. The location of visual resources can be described in terms of foreground, middleground, and background. Resources that may have particular sensitivity include animal exhibits, historic structures, and background resources such as Rock Creek Park.

Views that are considered important to the character of the National Zoo and the visitor experience include:

- Views from Olmsted Walk at the top of the hill east towards Adams Morgan (see photo 1)
- View near visitor center looking southeast to Adams Morgan, and further south to the views of the Washington, DC skyline (see photo 2)
- View along Olmsted Walk looking to the Great Lawn (see photo 3)
- A southern view down Rock Creek from Beaver Valley (see photo 4)
- View near Small Mammals House looking southeast to Adams Morgan

- Views from near the Kids Farm Exhibit towards the picnic areas along Rock Creek Parkway
- Views along the original portion of Olmsted Walk that are looking toward the historic buildings, in particular the Small Mammal House and the Reptile House (see photo 5 and 6)

There are also filtered views from outside the National Zoo looking toward the National Zoo. One such view is from Rock Creek Park where trail and parkway users get a glimpse of the Reptile House and its distinctive roof.



East View to Adams Morgan



Southeast View of Adams Morgan



View of the Great Lawn



South View down Rock Creek from Beaver Valley



View of the Small Mammal House



View of the Reptile House



Figure 16. Visual Resources Photo Locations

Impacts to Aesthetics/Visual Resources

No-Action Alternative

Under the No-Action Alternative, small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. There would be no changes to the landscape that would diminish the existing views within the confines of the park, or impact views to the surrounding neighborhoods, Rock Creek Park, or the Washington, DC skyline. Therefore, the No-Action Alternative would have no impacts on aesthetics/visual resources

Alternative A

Under Alternative A, facility improvements have the potential to be visually impacting by introducing new elements to the viewshed that could alter or block an existing view. Projects under Alternative A that could have an impact to the notable views include:

- Creation of new larger multi-species exhibits;
- Revitalization of entries at Connecticut Avenue, Mid-Point entry, and Harvard Street Bridge/Beach Drive;
- Construction of a parking structure on Parking Lot C; and
- Addition of an aerial tram.

The creation of new larger, multi-species exhibits has the potential to impact views because of changes to the landscape necessary to construct new animal habitats or exhibit space. Impacts for exhibit renewal could be adverse or beneficial pending on the design, massing, and nature of the exhibit. The revitalization of Beaver Valley with a series of bridges, structures, lifts, and ramps to mitigate the topography may impact views to and from Rock Creek depending upon the size and location of this project. Care would be taken during the design process to clearly articulate the presence of views for all exhibit creations and renewals.

The revitalization of the entries at Connecticut Avenue, Mid-Point, and Harvard Street Bridge/Beach Drive could impact views within the National Zoo. Another aspect of the revitalization of the Mid-Point entry is the removal of the Great Ape House. Currently the Great Ape House is located between the Small Mammals House and Reptile House and partially blocks the views from Olmsted Walk to these two buildings. Removing this structure would open up views to the Small Mammals House and the Reptile House.

The addition of four to five stories parking structure to the top of Parking Lot C would have an adverse impact to views because of the mass of the structure. The impacts would be minimized through context sensitive design. Filter views of the structure during the winter months would be visible from Rock Creek Park. The impacts to viewsheds are anticipated to be minor to moderate, long-term and adverse because of the added mass of this facility to the views.

The aerial tram's height would likely not exceed the height of the existing O-Line. The aerial tram will provide a new and different opportunity to view the skyline. At the same time, the aerial tram would add a new element to the viewshed and maybe visual from properties outside of the zoo. The aerial tram poles, cable, and gondola cars would be

small in mass and designed in such a manner to be within the existing tree canopy to the extent possible to minimize being present from properties outside the National Zoo. The placement of the aerial tram near the Mid-Point entry would not impact the views to and from the Small Mammals House or Reptile House from Olmsted Walk as the tram would be on the opposite side of Olmsted Walk.

In summary, Alternative A would have minor long term adverse impacts to aesthetics/visual resources at the National Zoo and surrounding properties because the parking structure and aerial tram. Alternative A would also have minor long term beneficial impacts to viewsheds from the National Zoo by providing new viewing opportunities to view the Adams Morgan and Washington, DC skyline with the construction of the aerial tram and removal of the Ape House and O-Line.

Alternative B

Under Alternative B, the development of large, multi-species exhibits would occur throughout the National Zoo. Older exhibits would be rehabilitated, and the flat land once used for parking would be developed into new exhibits. The Connecticut Avenue entrance and the Harvard Street Bridge/Beach Drive entrances would be revitalized. A surface tram would be utilized to assist visitors traversing the steep terrain.

Projects under Alternative B that could have an impact to the viewshed include:

- Creation of new, larger, multi-species exhibits; and
- Rehabilitation of older exhibits.

The creation of new larger multi-species exhibits has the potential to impact views that are confined to the interior of the National Zoo and views from the exterior looking toward the National Zoo. The revitalization of Beaver Valley with a series of bridges, structures, lifts, and ramps to mitigate the topography may impact views to Rock Creek depending upon final design. Care should be taken during the design process to clearly articulate the presence of viewsheds. In summary, Alternative B would have negligible to minor long term adverse impacts to viewsheds.

Alternative C (Preferred Alternative)

Alternative C would include the revitalization of older exhibits throughout the National Zoo. Areas once dedicated to surface parking would be reclaimed and utilized in the development of large, multi-species exhibits. Alternative C also provides for four entry points, including revitalization of the existing Connecticut Avenue entry, the Mid-Point entry, the Harvard Street Bridge/Beach Drive entry, and a bus drop-off area. A surface level tram and aerial tram would provide flexibility in the circulation system and help visitors navigate the steep terrain.

Projects under Alternative C that would impact the viewsheds associated with the National Zoo include:

- The creation of new large, multi-species exhibits;
- Revitalization and creation of four entry points;
- Construction of a parking structure at Parking Lot C; and

- Addition of an aerial tram.

The creation of new larger, multi-species exhibits has the potential to impact views that are confined to the interior of the National Zoo and views from the exterior looking toward the National Zoo. The revitalization of Beaver Valley with a series of bridges, structures, lifts, and ramps to mitigate the topography may impact views to Rock Creek depending upon final design. Care should be taken during the design process to clearly articulate the presence of views.

The aerial tram's height would likely not exceed the height of the existing O-Line. The aerial tram will provide a new and different opportunity to view the skyline. At the same time, the aerial tram would add a new element to the viewshed and maybe visual from properties outside of the zoo. The aerial tram poles, cable, and gondola cars would be small in mass and designed in such a manner to be within the existing tree canopy to the extent possible to minimize being present from properties outside the National Zoo. The placement of the aerial tram near the Mid-Point entry would not impact the views to and from the Small Mammals House or Reptile House from Olmsted Walk as the tram would be on the opposite side of Olmsted Walk.

The placement of the aerial tram would not impact the Olmsted Walk in this area, or the views to and from the Small Mammals House or Reptile House as the tram would be shielded through the tree canopy. Another aspect of the revitalization of the Mid-Point entry is the removal of the Great Ape House. Currently the Great Ape House is located between the Small Mammals House and Reptile House and partially blocks the views between these two buildings. Removing this structure would restore the historical views between the Small Mammals House and the Reptile House.

In summary, Alternative C would have minor long term adverse impacts to aesthetics/visual resources at the National Zoo and surrounding properties because of the parking structure and aerial tram. Alternative C would also have minor long term beneficial impacts to viewsheds from the National Zoo by providing new viewing opportunities to view the Adams Morgan and Washington, DC skyline with the construction of the aerial tram and removal of the Ape House and O-Line.

Mitigation for the Preferred Alternative

As design for individual projects commences, SI will continue to consult with NCPC, CFA, DC HPO, and the National Park Service regarding impacts to viewshed and specific mitigation measures. When appropriate, design of individual projects would incorporate vegetative screening and other practices to minimize visual impacts.

C.2 Land Use and Zoning

The National Zoological Park is approximately 163 acres of land located in the northwest quadrant of Washington, DC. The National Zoo's east side is bordered by Rock Creek. Rock Creek also defines the National Zoo's northern and southern borders, adjacent to several residential communities (Figure 7). Land uses are directly related to the National Zoo's function as an educational, research, conservation, and animal care facility. This

includes exhibit areas to display and house the collection of approximately 3,000 animals, a visitor center, administrative buildings, service roads, parking areas, and pedestrian paths for visitor use. The National Zoo also preserves the natural environment surrounding it, highlighting the varied topography provided by Rock Creek Valley and native species to maintain its setting as a beautiful urban park.



Figure 17. Existing Land Use

Land uses adjacent to the National Zoo are historically residential. Woodley Park, to the west, includes multi-storied apartment buildings and single family attached homes that border the National Zoo, with a small section dedicated to a low density community business center. The neighborhoods of Mount Pleasant, Lanier Heights and Adams Morgan all border the National Zoo to the East. These residential communities consist primarily of low to moderate density apartment housing and single family attached homes (Washington, DC, 2001). The National Zoo is bounded immediately on the north and south ends by Rock Creek Park, which is dedicated to open space and conservation. Rock Creek Park, which is administered by the National Park Service, extends as far north as the Maryland border and connects at its southern boundary with the Potomac River.

The National Zoo property is zoned GOV, Government (Washington, DC, 2001). As a Federal property, the National Zoo is not subject to local zoning regulations. The area immediately west of the National Zoo is zoned for medium to high density apartment housing as well as row dwellings and flats, with a small area reserved for low to moderate density community business. The areas to the east of the site are zoned mostly for moderate density apartment housing. Areas north of the site and to the far south are zoned for single family detached dwellings.

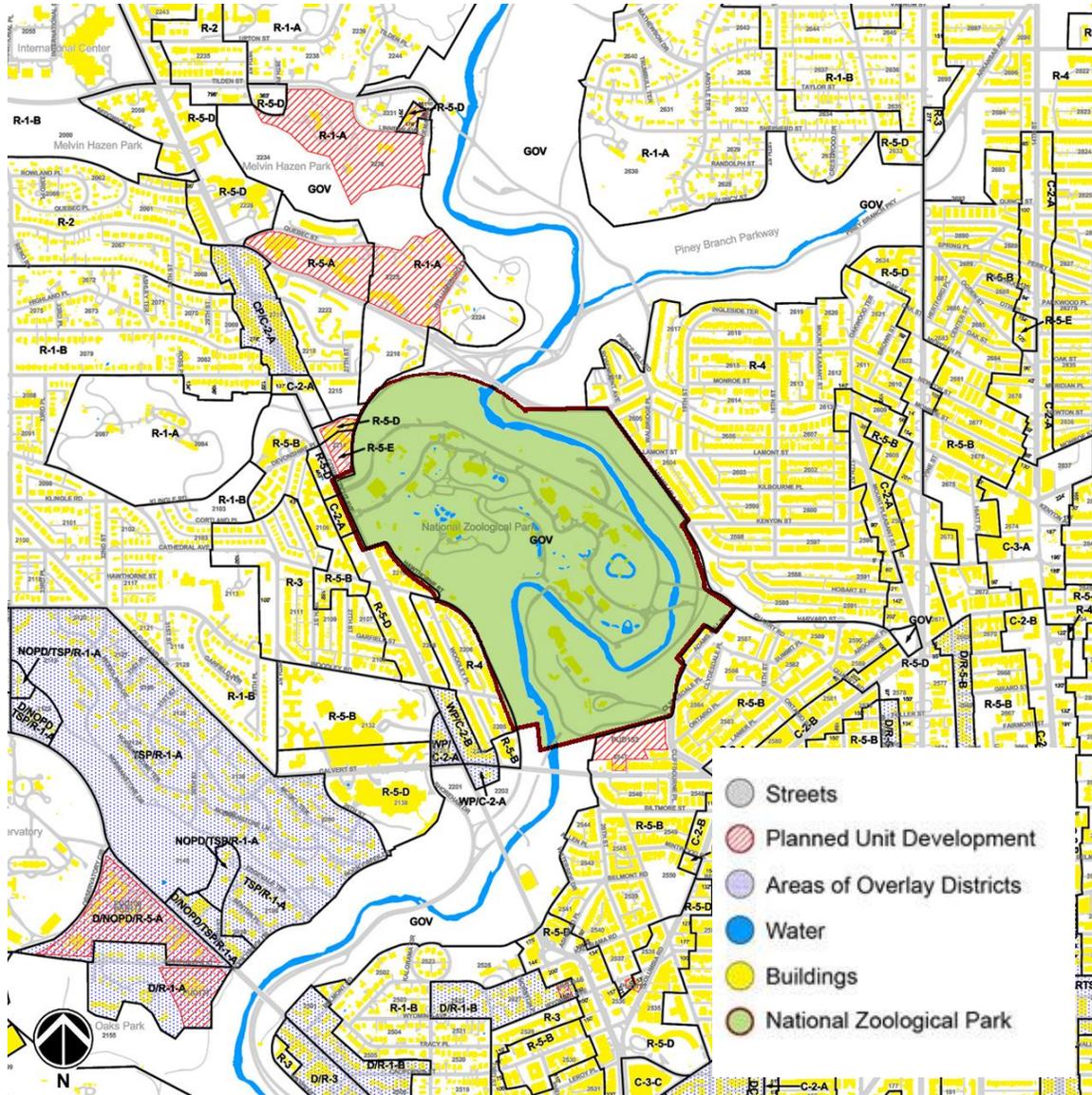


Figure 18. Existing Zoning Map

Impacts to Land Use and Zoning

No-Action Alternative

Under the No-Action Alternative, small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. There would be no changes to existing land use or zoning under the No-Action Alternative; therefore, there would be no impact.

Alternatives A, B and C

Under Alternatives A, B, and C, there would be only minor internal changes to the use of land within the Zoo. For instance, parking lots would be reclaimed and use for animal exhibits. Alternatives A, B, and C would have no effect on Washington, DC designated land uses or zoning. Alternatives A, B, and C would have no impacts to land use or zoning because development activities are consistent with the present use and zoning for the site.

C.3 Demographics

Information regarding the current population data for the project area was gathered from the 2000 Census. Census numbers do not reflect National Zoo population, as there is no residing human population; however, the National Zoo is located within Census Tract 5.01. Adjacent neighborhoods relevant to the project area include Woodland-Normanstone Terrace, Woodland Park, Cleveland Park, Forest Hills, Crestwood, Mt. Pleasant, Columbia Heights, Lanier Heights, Adams Morgan, and Kalorama Heights. As of the 2000 Census, The National Zoo and surrounding Census Tracts had a collective population of 35,648 people, (NeighborhoodInfoDC, 2000).

As shown on Table 4, the predominant race in the census tracts surrounding and including the National Zoo is white, with percentages in many tracts much higher than that of the rest of Washington, DC. There are a few excepted neighborhoods from this trend. One of these is Crestwood, located to the north of the National Zoo. Crestwood more closely reflects the racial population make-up of the rest of Washington, DC with approximately 64 percent black, 30 percent white, 1.6 percent Hispanic, and four percent other races. It may also be noted that Mt. Pleasant, Columbia Heights, and Lanier Heights hold a significant concentration of the Hispanic population. Their Hispanic populations are approximately 28 percent, 34 percent, and 19 percent, respectively. These numbers are comparative to Washington, DC's racial composition of approximately 61 percent black, 27 percent white, 7.9 percent Hispanic, and 3.5 percent other races, (NeighborhoodInfoDC, 2000).

The median household income for Washington, DC is \$78,192. This number is much lower than the majority of the project area for The National Zoo, which maintains a median income of \$145,646.33. However, it is significant to note that the neighborhoods of Mt. Pleasant, Columbia Heights, and Lanier Heights have median incomes of \$64,261, \$74,170 and \$70,573 respectively. With regards to the poverty rate, all neighborhoods within our project area maintain percentages below that of Washington, DC's median of 20 percent. Though, reflecting median incomes, Mt. Pleasant has a poverty rate of 17

percent and Columbia Heights has a poverty rate of 19 percent. This is much nearer the Washington, DC average than that of the surrounding communities which have an average poverty rate among them of 5.7 percent, (NeighborhoodInfoDC, 2000).

Private residential areas surround the National Zoo. Most areas are zoned row dwellings and low to moderate apartment housing (Washington, DC, 2001). Home ownership rates fluctuate throughout the census tracts with a median rate of 40.56 percent; the Washington, DC has a median homeownership rate of 41 percent. Most fluctuation can be correlated with the proportion of areas zoned for apartment housing versus the zoning of single family dwellings (NeighborhoodInfoDC, 2000).

Impacts to Demographics

No-Action Alternative

Under the No-Action Alternative, there would be no changes to the area's population or demographics; therefore, there would be no impact.

Alternatives A, B, and C

Implementation of Alternatives A, B, and C would have no effect on the area's population because the actions would be confined to the National Zoo property. There would be no impact on demographics.

Table 4. Site Area Demographics

	Washington, DC	Census Tract	Census Tract 5.01	Census Tract 4.00	Census Tract 5.02	Census Tract 13.02	Census Tract 26.00	Census Tract 27.01	Census Tract 27.02	Census Tract 39.00	Census Tract 40.01
		Included Neighborhood	The National Zoo and Woodley Place	Woodland-Normanstone Terrace	Woodley Park	Forest Hills	Crestwood	Mt. Pleasant	Columbia Heights	Lanier Heights	Adams Morgan
Population	275,059		2,774	1,501	3,062	6,350	2,193	5,742	6,052	4,643	3,331
Race											
White	61%		77%	90%	85%	81%	30%	32%	38%	54%	81%
Black	28%		5%	4.7%	3.6%	6.1%	64%	32%	22%	21%	5%
Hispanic	7.9%		8.9%	1.7%	6.3%	6.9%	1.6%	28%	34%	19%	6%
Other Race	3.5%		9.4%	3.8%	5.3%	6.1%	4.0%	8.2%	6.0%	6.8%	7.9%
Poverty Status	20%		6.0%	3.0%	4.3%	4.3%	8.5%	17%	19%	8.4%	5.2%

* Census Tract demographics and neighborhood correspondence are estimated. Census Tracts do not reflect exact neighborhood boundaries. (NeighborhoodInfoDC, 2000)

C.4 Environmental Justice

Executive Order (EO) 12898 directs Federal agencies to identify and address as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The process to identify potential disproportionate impacts associated with the proposed action was as follows:

- Identification of the potentially affected population in the study area;
- Characterization of the study area with respect to minorities and low-income populations;
- Determination of potentially significant adverse impacts of the proposed action and alternatives; and
- Evaluation of the potential for disproportionately high and adverse impacts on minority populations and low-income populations in proximity of the alternate sites.

There are minority groups and low-income populations within the study area. The demographic makeup of the Census Tracts within and adjacent to the project area is shown in the Table 4.

The Hispanic minority group in the Mt. Pleasant, Columbia Heights, and Lanier Heights neighborhoods of the study area is significantly higher in proportion to the total population of Hispanics in Washington, DC (NeighborhoodInfoDC, 2000).

Impacts to Environmental Justice Communities

No-Action Alternative

Under the No-Action Alternative, small scale site improvements would continue for site improvements, building rehabilitation, and facilities updates related to safety, health, and maintenance. There would be no changes or activities that would impact low-income or minority populations.

Alternatives A, B, and C

There are minority populations in the vicinity of the National Zoo. No concentrations of minority populations have been identified that would be affected by any of the proposed development scenarios under Alternatives A, B, and C. Construction activities associated with exhibit and building renewals in Alternatives A, B, and C, could be minor short-term impacts to adjacent residents to the National Zoo. Construction activities would be limited to the National Zoo property. Potential noise impacts could occur from construction activities and traffic impacts from construction vehicles accessing the site. There is no evidence that low-income or minority populations would be adversely affected by Alternatives A, B, and C because concentration of these populations have not been identified adjacent to the site.

C.5 Community Facilities and Services

The National Zoo is within the Washington, DC's Second Police District, located at 3320 Idaho Ave., NW. The rate of reported crime in the Fifth Police District has declined steadily from 11,166 crimes in 1993 to 2,945 crimes in 2003. These trends are consistent with declining crime rates throughout Washington, DC (Washington, DC, 2006b).

The Washington, DC Fire and Emergency Medical Services Department provides fire and rescue services for the AFRH-W. The closest station, located at 1763 Lanier Place, NW, houses the Engine 21 Station (Washington, DC, 2006a).

Washington, DC is divided into eight Wards which are then subdivided into 37 Advisory Neighborhood Commissions. These divisions are for legislative purposes to provide direct contact by the residents of a neighborhood to the government. The project site is located in Ward Three, Advisory Neighborhood Commission Area C (Washington, DC, 2006a)

Impacts to Community Facilities and Services

No-Action Alternative

Under the No-Action Alternative, there would be no change in operations or new facilities that would have an effect on existing emergency response, fire, police or other services. The No-Action Alternative would have no impact on community facilities and service.

Alternatives A, B, and C

Under Alternatives A, B, and C, facility improvements would result in revitalization of older exhibits including renovation of exhibits, revitalization of entrances, installation of new transportation facilities, and construction of new administrative facilities. No activities or change in operations have been identified that would have an effect on community facilities and services. Existing services such as emergency response, fire, police and other services would continue to be able to serve the National Zoo.

C.6 Infrastructure

The National Zoo completed a Utility Infrastructure Master Plan for the Rock Creek site in 2006. The Utility Infrastructure Master Plan did not include evaluation of high voltage electric distribution systems. The Master Plan also included recommendations for improvements to the utility systems. Those recommendations are not repeated here and should be reviewed in the context of the complete Utility Infrastructure Master Plan. The Utility Infrastructure Master Plan investigated/analyzed the following site utilities:

- Telecommunications (copper and fiber)
- Steam
- Natural Gas
- Water
- Storm and Contaminated Storm Sewer
- Sanitary Sewer

Telecommunications

There is an extensive existing copper network providing good connectivity between the various buildings. There is limited fiber and in many instances the distribution system is poor or substandard with some of the primary buildings not connected to one another. Currently, the telecommunications conduits are 80-100 percent full.

Steam

Steam is the primary heating medium at the National Zoo; it is currently used in fourteen buildings and exhibits. High-pressure steam is produced by three gas-fired boilers located in the National Zoo's central boiler plant. The boilers are in good shape and capacity is available for future needs. The plant is currently located in a flood plain which has a negative impact upon its ongoing operation.

The high-pressure steam is distributed in four ways: (1) tunnels, (2) shallow concrete trenches, (3) direct buried, pre-insulated piping, and (4) piping through crawl spaces at individual buildings. There was no observed deterioration of the steam tunnel or the concrete trenches.

In many cases the steam distribution system is over 50 years old (the commonly recognized end of its useful life) and is in poor condition. The direct buried piping, while expedient to install, deteriorates relatively quickly in our local corrosive soils. There is abandoned steam piping in two locations; piping in a shallow concrete trench that formerly served the Bird House and direct-buried piping that formerly served the crocodile exhibit.

There are sixteen steam pressure reducing stations. Based on analysis of the steam connected demand loads for each National Zoo building or exhibit, numerous stations are not optimally sized and have numerous safety concerns.

Natural Gas

Natural gas is the secondary heating medium used at the National Zoo. The high-pressure natural gas system enters the National Zoo at two locations; from the northwest at Klinge Road and from the southeast via Adams Mill Road. There are three main branches: (1) the North Service Road, (2) the Cheetah and Hardy Hoof House, and (3) the Asia I/Bird House. In addition, the natural gas system extends to numerous buildings and exhibits. Gas piping is direct buried. There are reducing regulators at each building that reduce the high pressure to low pressure service for extension to the building's gas-consuming appliances and terminal units.

High-pressure gas enters the boiler plant through a multiple-staged pressure reducing station to supply gas to the 3 gas-fired steam boilers. Gas is also delivered to gas-fired emergency generators in many locations.

Additional capacity is available and is highly adaptable and flexible as future needs are determined.

Water (Domestic and Fire)

The water service at the National Zoo is divided into two systems: (1) the Main Water Distribution System (MWDS) serving the largest portion of the National Zoo, including all of the public spaces; and (2) the Annex Distribution Water System (ADWS) serving the hospital. The MWD is divided into two zones, the upper served from Connecticut Avenue and the lower from Harvard Street. While the two zones are connected, the interconnection valve is currently opened.

The largest distribution pipe within the National Zoo has a diameter of ten inches, with the majority of the system consisting of six-inch and smaller piping. For reference, modern development standards for developments of similar size would include twelve to sixteen inch distribution mains with eight to twelve inch looped connections. Much of the existing piping dates to pre-1940 (some to 1891) and there hasn't been a major renovation or replacement of the original piping. The typical design life for a modern water distribution system is generally 50 to 75 years, suggesting that the majority of the system at the National Zoo is in a state of advanced deterioration. Over time, the insides of the pipe become constricted for multiple reasons and the water flow decreases.

Both the condition and capacity of the existing water system are poor. There are an inadequate number of fire hydrants and there is insufficient water supply.

Impacts to Infrastructure

No-Action Alternative

Under the No-Action Alternative, there would be no change in operations or new facilities that would have an effect on existing infrastructure. The National Zoo would continue to make improvements as needed to keep the National Zoo functional and operational. The No-Action Alternative would have no impact on existing infrastructure.

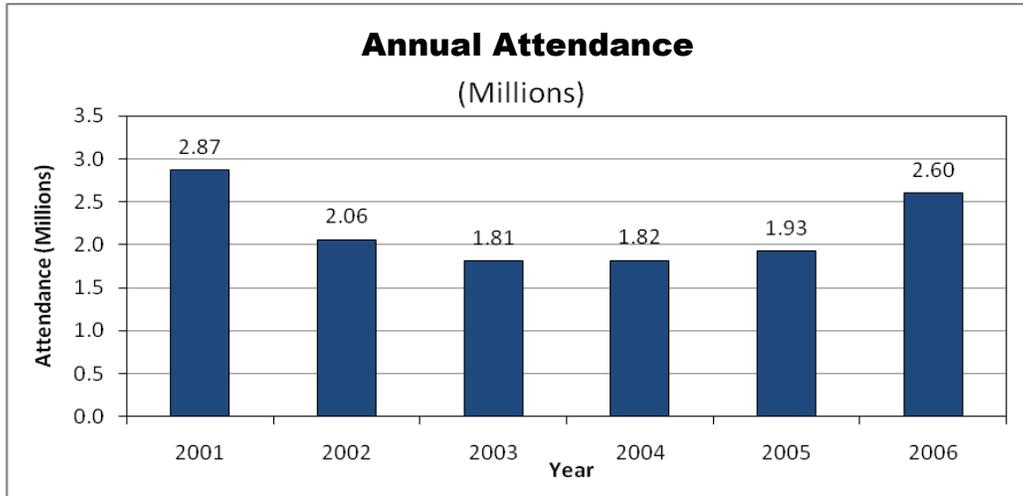
Alternatives A, B and C

Under Alternatives A, B, and C, facility improvements would result in revitalization of older exhibits including renovation of exhibits, revitalization of entrances, installation of new transportation facilities, and construction of new administrative facilities. Facility and exhibit renewal activities are confined to the existing Rock Creek site. As more detailed programming, planning, and preliminary design of improvements to each portion of the National Zoo is completed, SI would coordinate with the appropriate utilities to identify daily demand, peak demand, and supply. These enhancements would give the National Zoo in some cases an opportunity to enhance utilities and other infrastructure with the revitalization of older exhibits and structures. There are no activities that have been identified at the master planning stages that would cause an adverse impact on existing infrastructure outside the National Zoo property; however, additional study would occur during project planning and design for utility and other infrastructure needs.

C.7 Visitor Use and Experience

In August 2005, ORCA Consulting Group conducted a study to assess National Zoo visitor use during a regular day. Based on the data gathered during this study the

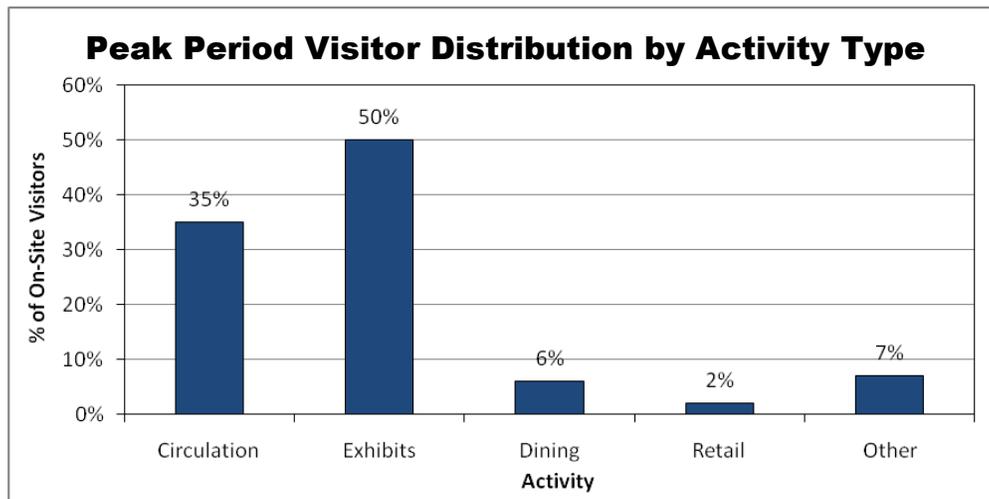
following observations were made. From 2001 to 2003, visitor attendance dropped off significantly, averaging about 1.9 million visitors annually (ORCA Consulting Group, 2005). Attendance for the last two years has steadily risen with the opening of Asia Trail and other ongoing efforts to revitalize the National Zoo.



Ref: ORCA, National Zoological Park - Visitor Use Study, 2006

Figure 19. Annual Attendance

According to this study the peak hours for visitation span the timeframe of 1:00 pm to 5:00 pm. During this peak period approximately 50 percent of visitors can be expected to be viewing exhibits. The disbursement of visitors to other activities is illustrated below:



Ref: ORCA, National Zoological Park - Visitor Use Study, 2006

Figure 20. Peak Period Visitor Distribution by Activity Type

In addition to educating visitors through exhibits, the National Zoo’s facilities are utilized for multiple purposes. Many of these sponsored activities take place outside the scope of regular business hours and include social events, meeting facilities, entertainment and recreation. “Sunset Serenades” is one such series of events. It is a summer evening

concert series held on Tiger/Lion Hill multiple Thursdays throughout the summer. “ZooFari” is an annual fundraising gala that invites area restaurants and chefs to show off their creations while supporting the National Zoo. The National Zoo is also available for birthdays, sleepovers, receptions, and numerous other private events (SI/FONZ, 2006).

One existing site condition that has a bearing on visitor use and experience is the topography. Figure 20 depicts the continuous slope from the top of the National Zoo near Connecticut Avenue down to the bottom of the National Zoo near Rock Creek. Olmsted Walk is approximately three-quarters of a mile long (1.2 km). Over this distance, the vertical raise/decline is approximately 160 feet (49 meters), which is the equivalent of a 12 to 15 story building. It is estimated that it takes 23 minutes to walk down hill from Connecticut Avenue to the end of Olmsted walk by Harvard Street Bridge. The existing topography affects visitor experience, particularly for the elderly or people visiting with small children.

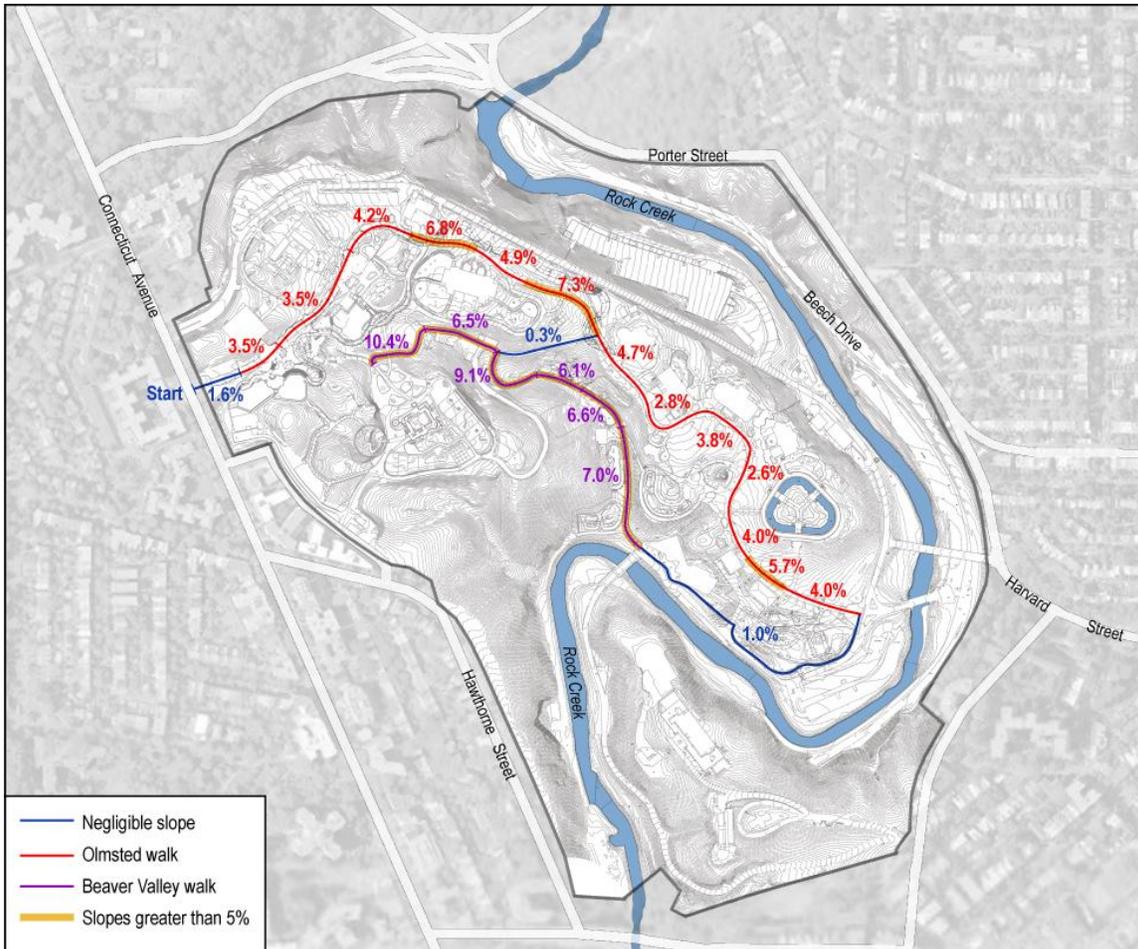


Figure 21. Existing Slopes at the National Zoo

Impacts to Visitor Use and Experience

No-Action Alternative

Under the No-Action Alternative, additional exhibit planning would occur on a site-by-site basis. It is anticipated that visitor use at the Zoo would reach and exceed preexisting levels of three million visitors, which was the visitation level prior to September 11, 2001. The visitor entries would not be consolidated, and visitors would continue to enter the National Zoo in up to 13 different locations. As a result, the visitor would not have a clear sense of arrival and visitor services at the entry points would not be readily available. An in-park transportation system that would provide relief from the steep topography would not be implemented and service vehicles would continue to use the same roads as National Zoo visitors. The visitor experience at the National Zoo would continue to be adversely affected by not having a clear sense of arrival, lack of visitor amenities at clearly defined entry points spread evenly throughout the National Zoo, lack of internal transportation to help mitigate the steep topography, and continued conflicts between service vehicles and visitors. Therefore, the No-Action Alternative would have minor adverse long-term impacts to the visitor experience.

Alternative A

Under Alternative A, new exhibits would be added and existing exhibits revitalized. Parking would be increased, and revitalized entrances, including visitor amenities and services, would improve the arrival and interpretive experience. Circulation and navigation throughout the National Zoo would be improved.

Activities most likely to affect visitor use and experience under Alternative A include:

- Reclamation of Parking Lots A and B and the Bus Lot for the creation of new large multi-species exhibit areas,
- New Beaver Valley exhibits and walkways;
- Renewal of older exhibits;
- Revitalization of visitor entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive;
- New parking deck structure at current Parking Lot C site and two-story underground parking structure near the Connecticut Avenue entry; and
- Construction of an aerial tram system.

The implementation of Alternative A would renew park infrastructure by reclaiming flat and gently sloping areas for utilization as exhibit areas. Parking Lots A and B and the Bus Lot would be reclaimed and older exhibits and flat land areas would be revitalized for visitor use. The addition of large exhibits in areas with more favorable topography would have a long-term beneficial impact to the visitor experience.

The new Beaver Valley exhibits and walkways would be designed to separate park service from visitor circulation through a series of bridges, structures, lifts, and ramps. A new service drive would separate service vehicles and visitors on Olmstead Walk. This action would enhance the visitor experience both through new exhibits, and by dedicating the walkways exclusively to visitor use, without conflicts with service vehicles. The

separation of visitor use and service vehicles would have long-term beneficial impacts to visitor use and experience.

Consolidation and revitalization of entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive would replace the multiple entrances presently found throughout the National Zoo site. This action would improve the entry and arrival experience for visitors by providing iconic entry points. Each area would include visitor amenities such as restrooms, kiosks, retails and dining and other services. A new Mid-Point visitor hub would further enhance the visit by providing special event venues and educational areas, as well as provide a stop accessible to all visitors for clarification and more comprehensive interpretation of the zoo's mission, goals, and exhibits. The revitalized entrances under Alternative A would have long-term beneficial impacts to visitor use and experience.

The new underground and above ground parking structures would be located near the consolidated visitor entry points. The structures would increase overall parking capacity would also ensure the visitors pass through one of the entry points for a more cohesive arrival than under current parking conditions. The increased parking capacity and the location of the new structures would have long-term beneficial impacts to the visitor experience.

The proposed aerial tram would mitigate the steep topography of Olmstead Walk and help to ease circulation throughout the park. In addition, passengers of the aerial tram would enjoy the unique perspective of viewing the National Zoo from above, an opportunity which is not currently available. The aerial tram would have long-term beneficial impacts to visitor use and experience.

Alternative B

Under Alternative B, new exhibits would be added and existing exhibits revitalized. Parking would be increased, and revitalized entrances, including visitor amenities and services, would improve the arrival and interpretive experience. Circulation and navigation throughout the National Zoo would be improved.

Activities with potential impacts to effect visitor use and experience under Alternative B include:

- Reclamation of Parking Lot A and the Bus Lot for the creation of new large multi-species exhibit areas,
- New Beaver Valley exhibits and walkways;
- Renewal of older exhibits;
- Revitalization/expansion of visitor entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive;
- Construction of a service road from Amazonia Science Gallery to Bird Hill;
- Implementation of a ground-based tram that would travel back and forth along North Road.

Parking Lot A and the Bus Lot would be reclaimed and older exhibits and flat land areas would be revitalized for visitor use. The new Beaver Valley exhibits and walkways, and the addition of a dedicated service road from Amazonia Science Gallery to Bird Hill would be designed to separate park service from visitor circulation. The creation of large exhibit areas and separation of visitors and service access would enhance the visitor experience.

Revitalization of visitor entrances at Connecticut Avenue and Harvard Street Bridge/Beach Drive, as well as a minor entry at Parking Lot B would enhance visitor use and experience through the consolidation of multiple points of entry to three main areas that would include restrooms, dining, retail and other visitor amenities. Additional park facilities and special event venues would also be included under Alternative B. The Connecticut Avenue visitor center would be renovated and reprogrammed. The conversion of the Great Ape House into a visitor and educational center would also provide a consolidated area for educational and interpretive experiences, causing a long-term beneficial impact to visitor use and experience.

Visitor circulation would be improved through the design of the new exhibit areas and steep topography would be mitigated with the introduction of a ground-based tram that would run back and forth on North Road, having a long-term beneficial impact to visitor use and experience.

Alternative C (Preferred Alternative)

Under Alternative C, new construction and renovation of existing facilities and exhibit areas would have an effect on visitor use and experience. Available parking would be increased, and multiple entries throughout the park would be consolidated to three primary areas, and a dedicated bus entry. A new Mid-Point visitor hub would replace the Great Ape House, enhancing the visit by providing special event venues and educational areas. Circulation would be eased with the introduction of both aerial and ground-based trams.

Activities likely to impact visitor use and experience in the Alternative C concept include:

- Reclamation of Parking Lots A, B and D for the creation of new large multi-species exhibit areas;
- New Beaver Valley exhibits and walkways;
- Revitalization/expansion of visitor entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive;
- New above ground parking structure at current Parking Lot C site; and a two-story underground parking structure near the Connecticut Avenue entry;
- Addition of two new traffic circles on North Road;
- Construction of an aerial tram system and implementation of a ground-based system on North Road;
- Construction of a new service road from Amazonia Science Gallery to Bird Hill;
- The construction of a new administrative, support and operations hub near the Parking Lot C site; and

- Additions to research buildings near the hospital, a new greenhouse, and a small staff parking lot near Holt House.

The implementation of Alternative C would renew park infrastructure by reclaiming Parking Lots A, B, and D for use as exhibit areas. Older exhibits and flat land areas would be revitalized, accommodating future collection planning and enhancing visitor experience. The addition of large and new exhibits in areas with more favorable topography would have a long-term beneficial impact to visitor use and experience.

The new Beaver Valley exhibits and walkways, as well as new service roads, would be designed to separate park service from visitor circulation. This would enhance the visitor experience both through the addition of new animal exhibits, and by dedicating the walkways exclusively to visitor use, without conflicts due to service vehicles. The revitalized Beaver Valley and separation of service from visitor areas would have long-term beneficial impacts to visitor use and experience.

Consolidation and revitalization of entrances at Connecticut Avenue, Midpoint entry, and Harvard Street Bridge/Beach Drive would replace the multiple entrances presently found throughout the National Zoo site. This would improve the entry and arrival experience for visitors by providing iconic entry points. Each area would include visitor amenities such as restrooms, kiosks, retails and dining and other services. A new Mid-Point visitor hub would replace the Great Ape House and further enhance the visit by providing special event venues and educational areas, as well as provide a stop accessible to all visitors for clarification and more comprehensive interpretation of the National Zoo's mission, goals, and exhibits. The revitalized entrances under Alternative C would have long-term beneficial impacts to visitor use and experience.

The new underground and above ground parking structures would be located near the consolidated visitor entry points. The structures would not only increase overall parking capacity, but would also ensure the visitors pass through one of the entry points for a more cohesive arrival than under current parking conditions. The increased parking capacity and the location of the new structures would have long-term beneficial impacts to visitor use and experience.

The proposed aerial and ground-based trams would each help to mitigate the steep topography of Olmstead Walk and help to ease circulation throughout the park. In addition, passengers of the aerial tram would enjoy the unique perspective of viewing the National Zoo from above, an opportunity which is not currently available. These actions would have long-term beneficial impacts to visitor use and experience.

Mitigation for the Preferred Alternative

To the extent possible, construction routes for individual projects will be designed to avoid conflicts with pedestrian traffic. Arrival/departure times will typically be scheduled around normal visitor hours, and visitors will be redirected around construction areas. When renovations are underway at entrances, shops, and locations that provide amenities, similar services will be offered elsewhere on the site to avoid disruptions to

visitor use and experience. As individual projects are initiated, more detailed mitigation measures will be identified as part of the design process.

C.8 Traffic/Transportation/Parking

Plans were outlined in the 1986 Revised Master Plan for a completed parking garage over Parking Lot C, the removal of Parking Lot B, and a centralized Bus Drop-off Area at Panda Plaza with the widening of North Road to prevent congestion. None of these plans have been carried through to completion.

Access by vehicle to the National Zoo is provided by three main points. These are located at the Connecticut Avenue and North Road intersection, the intersection of Harvard Street and North Road, and by way of Beach Drive. Transportation around the National Zoo is provided for primarily by North Road. This road is a two lane, undivided route that provides access to all five of the National Zoo's parking locations. Throughout the National Zoo, Olmsted Walk is the primary pedestrian pathway. This curvilinear designed pathway meanders from the Connecticut Avenue pedestrian entrance east to the Rock Creek Parkway entrance. Secondary footpaths link various animal exhibits and visitor services to Olmsted Walk (see Figure 22).

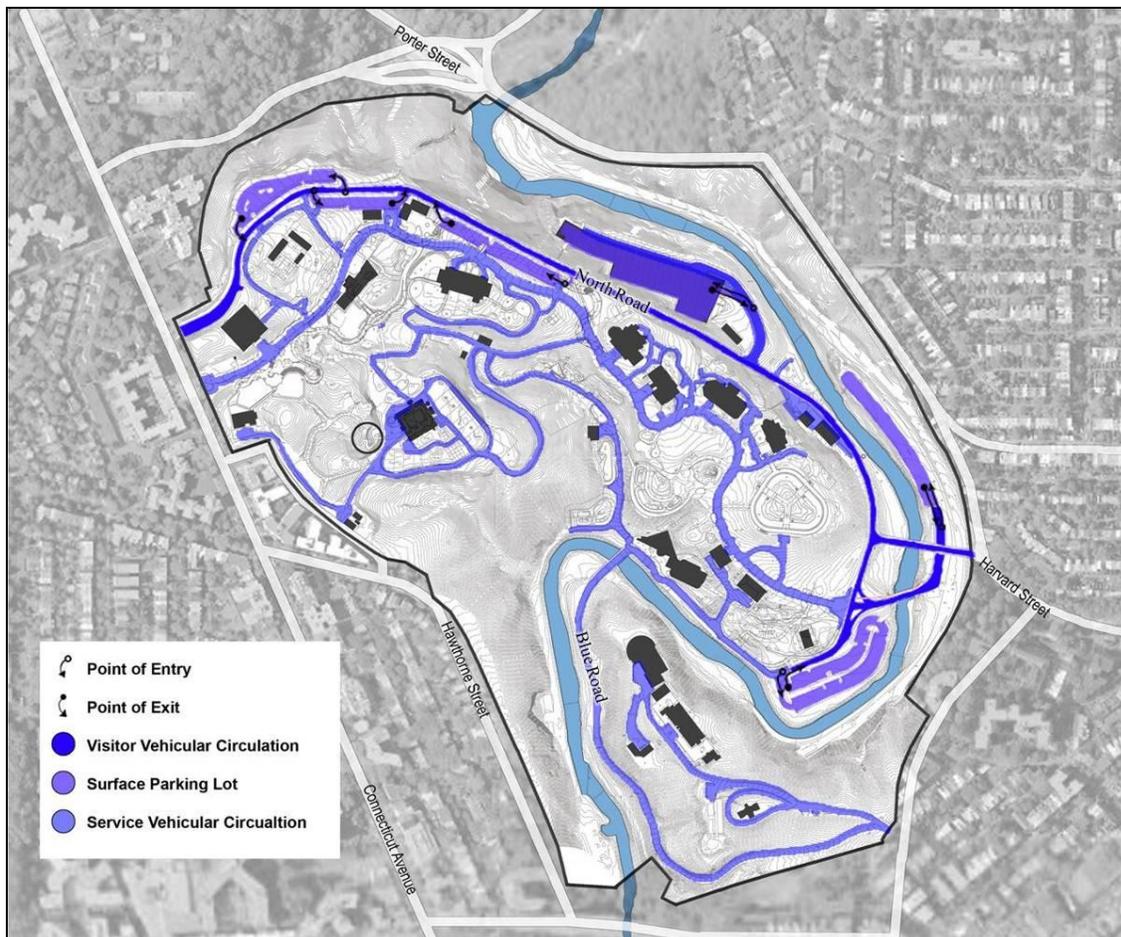


Figure 22: Internal Transportation Map

Based on surveys conducted by Rummel, Klepper, & Kahl, LLP (RK&K, 2006), 65 percent of National Zoo Visitors arrive by automobile. In this same survey it was estimated that 22 percent of visitors arrive by Metrorail, while 12 percent of visitors walked. There are 868 parking spaces available on-site. These are distributed through 5 separate parking locations, as illustrated in Figure 23. Twenty of these spaces are designated as handicapped parking. These spaces must be shared by visitors, National Zoo staff, and volunteers. Presently, when demand for parking exceeds what is available visitors are forced to find parking in the adjacent neighborhoods (RK&K, 2006). It was determined that in 2007, there were 87 days in which the National Zoo closed its access gates during peak attendance hours due to lack of available parking.

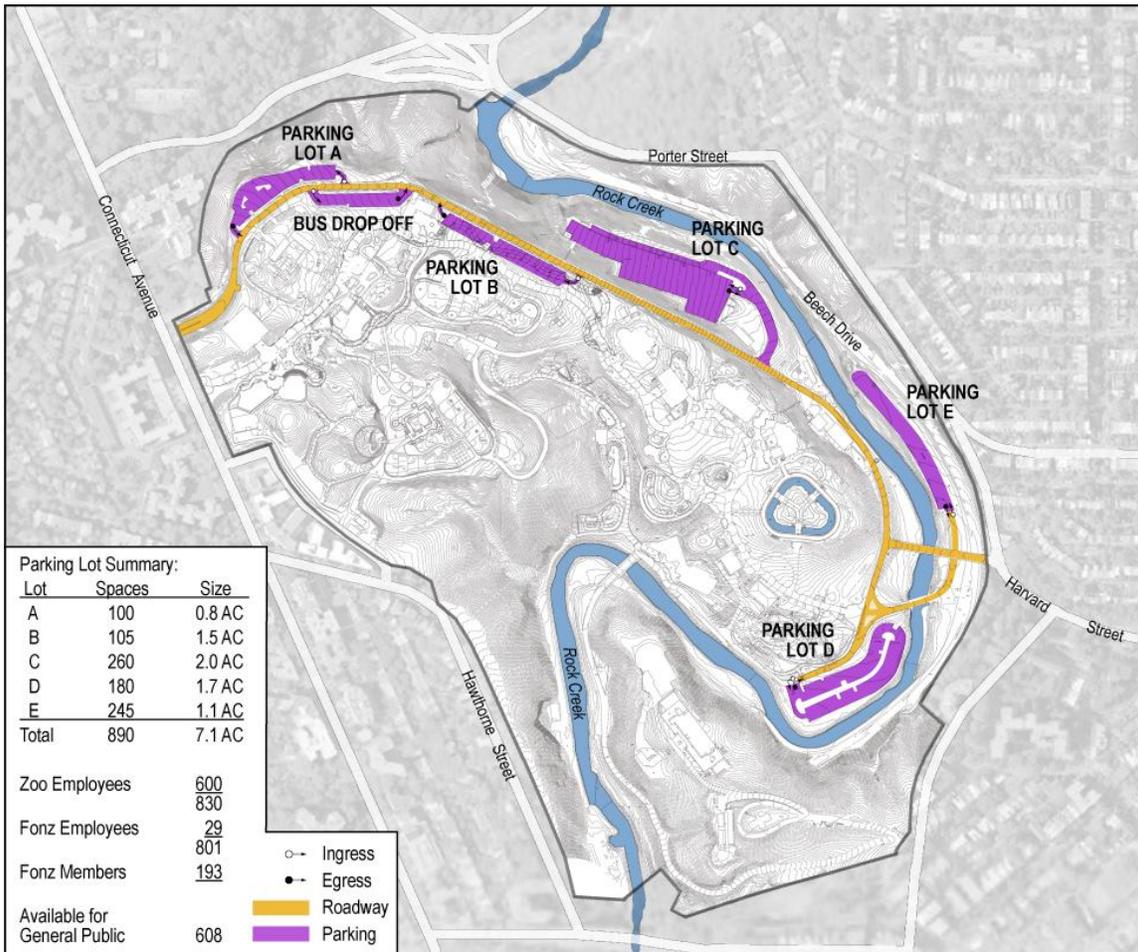


Figure 23. Parking Areas for the National Zoo

The location of Parking Lots A, C, D, and E require visitors to cross North Road. Access to the National Zoo from Parking Lot B does not require visitors to cross public roads (RK&K, 2006).

Vehicular access intersections are currently located at 5 points bordering the National Zoo. Rummel, Klepper & Kahl, LLP evaluated these intersections in terms of the Level of Service (LOS). The LOS system grants lanes a grade between A and F. LOS A is intended to describe ideal conditions with little to no delay for motorists. A LOS of D is the lowest acceptable grade in the District of Columbia, with LOS F representing excessive delay and intersection failure. As shown in Table 5, during the evaluation no intersections granting access to the National Zoo received a LOS lower than B (RK&K, 2006).

Connecticut Avenue at North Road	LOS A
Adams Mill Road at Harvard Street Bridge	LOS A
Beach Drive at Lower Zoo Entrance	LOS B
North Road at Lower Zoo Entrance	LOS A
North Road at Harvard Street Bridge	LOS A
Ref: RK&K, Facilities Master Plan Transportation Management Program, 2006	

Regarding the assessment of traffic it is important to note three ongoing projects in the vicinity of the National Zoo:

- Connecticut Avenue, NW Bridge – a planned rehabilitation of the structure carrying Connecticut Avenue over Klinge Valley, near the northwest portion of the National Zoo, and an improvement of the roadway there is planned to begin soon (A&M, 2006).
- Klinge Road – an environmental impact statement is being prepared regarding the permanent closing or repair and reopening of this roadway that passes near the northeast corner of the National Zoo (The Louis Berger Group, Inc., 2006).
- 18th Street/Adams Morgan – currently a Transportation and Parking Study is taking place in this vicinity located to the southeast of the National Zoo to assess current pedestrian safety and parking issues and determine any necessary improvements (HTNB, 2006).

Impacts to Transportation

No-Action Alternative

National Zoo attendance is expected to continue to increase to preexisting levels of 3 million visitors per year by 2016. Under the No-Action Alternative, no steps would be taken to manage potential congestion along North Road due to this anticipated increase. Current congestion along Connecticut Avenue during peak school bus and charter bus days would not be mitigated and steps would not be taken to increase parking capacity to manage the number of peak parking overflow days. Current conditions would remain with regard to pedestrian circulation and safety. The No-Action Alternative would have minor long-term adverse impacts to the transportation system.

Alternative A

Under Alternative A, a comprehensive traffic and parking management strategy would be implemented and additional parking spaces would be available.

Activities affecting transportation in the Alternative A concept include:

- New parking garage structure at current Parking Lot C site, and a two-story underground parking structure near the Connecticut Avenue entry;
- Addition of two new traffic circles on North Road;
- A limited-use turn lane at North Road;
- A new aerial tram system; and
- Dedicated service roads.

Two new parking structures would replace the current A, B and Bus Lots. An underground parking structure near the Connecticut Avenue entrance would provide 300 parking spaces, and the parking garage at the current Parking Lot C site would provide an additional 1,128 spaces. Based on future attendance expectations, parking under Alternative A would be adequate for all but 87 days of the year.

The upper level of the parking garage at the current Parking Lot C would be dedicated to bus drop-off, pick-up and parking, which would increase pedestrian safety at North Road and Connecticut Avenue.

The traffic management strategy would include the addition of two new traffic circles and a limited-use turn lane at North Road. During peak times and events, the traffic circles would be used for passenger drop-off, vehicular turnarounds and information dissemination.

The introduction of an aerial tram system, as well as new dedicated service roads would improve park circulation and ease overall traffic congestion.

Implementation of Alternative A would have long-term beneficial impacts on transportation and parking because of infrastructure and program improvements that would provide additional parking, ease internal circulation, and reduce visitor/service conflicts.

Alternative B

Under Alternative B, a comprehensive traffic and parking management strategy would be implemented, Parking Lot C would be dedicated exclusively to staff parking, and the current Bus Lot would be utilized as a bus entry.

Activities affecting transportation and parking in Alternative B include:

- Dedicated staff parking at the current Parking Lot C site, and a two-story underground parking structure near the Connecticut Avenue entry;
- Addition of two new traffic circles on North Road;
- A limited-use turn lane at North Road;
- Introduction of ground-based tram system; and

- Dedicated service roads.

Current Parking Lot A would be reclaimed for exhibit space, and an underground parking structure near the Connecticut Avenue entrance would provide 300 parking spaces. Parking Lots D and E would remain for visitor parking. Changes to current parking requirements would be negligible, but future parking needs would not be accommodated under Alternative B.

The introduction of a ground-based tram system, as well as new dedicated service roads would improve park circulation and ease overall traffic congestion.

The traffic management strategy would include the addition of two new traffic circles and a limited-use turn lane at North Road. During peak times and events, the traffic circles would be used for passenger drop-off, vehicular turnarounds and information dissemination. Implementation of Alternative B would have long-term beneficial impacts on traffic and transportation because of infrastructure and program improvements that would provide additional parking and ease of circulation.

Alternative C (Preferred Alternative)

Similar to the plans outlined in the 1986 Revised Master Plan, Alternative C would include a parking garage at the current Parking Lot C site, the removal of Parking Lot B, and a centralized Bus Drop-off Area at Panda Plaza.

The following activities would also impact traffic, transportation and parking:

- New above ground parking structure at current Parking Lot C site; and a two-story underground parking structure near the Connecticut Avenue entry;
- Small staff parking lot near Holt House;
- Addition of two new traffic circles on North Road;
- A limited-use turn lane at North Road;
- Introduction of ground and aerial-based tram systems;
- Dedicated service roads; and
- Bus Lot will be incorporated with Panda Plaza for a bus entry.

Two new parking structures would replace the current A, B, and D Parking Lots. An underground parking structure near the Connecticut Avenue entrance would provide 300 parking spaces, and the parking garage at the current Parking Lot C site would provide an additional 1,128 spaces. A small staff parking lot would be built near Holt House. Based on future attendance expectations, parking under Alternative A would be adequate for all but 87 days of the year.

The current Bus Lot would be incorporated with Panda Plaza and dedicated to bus drop-off, pick-up and parking, increasing pedestrian safety at North Road and Connecticut Avenue.

The introduction of an aerial and ground-based tram system, as well as new dedicated service roads would improve park circulation and ease overall traffic congestion.

Congestion and safety issues along North Road would be mitigated through a comprehensive and parking management strategy including two traffic circles and an intermittent turn lane. Zoo shuttles and Metro shuttles would use the traffic circles for flexible passenger handling and for accommodating vehicles that need to turn around.

If implemented, the strategies outlined under Alternative C would have long-term beneficial impacts to traffic, transportation, and parking because of infrastructure and program improvements that would provide additional parking, ease circulation, and reduce visitor/service conflicts.

Mitigation for the Preferred Alternative

In order to minimize temporary impacts to transportation, construction routes will be designed to minimize conflicts with vehicular traffic, and arrivals/departures will be scheduled around normal visitor hours. Traffic will be redirected when construction activities occur in areas currently dedicated to vehicular travel and parking. Additional and more detailed mitigation for transportation impacts will be identified as conceptual design for individual project is initiated.

D. Cumulative Effects

CEQ regulations, which implement the NEPA, require assessment of cumulative effects in the decision-making process for projects that are federally funded or require a federal action. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively moderate or major actions taking place over a period of time. Cumulative effects are considered for all alternatives and are summarized in this section.

Cumulative effects were determined by combining the impacts of the alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or foreseeable future projects within the National Zoo and, if necessary, the surrounding region. Cumulative effects are evaluated in a regional context, which varies for each impact topic. Impacts associated with the National Zoo are generally limited to the Rock Creek site property (such as soils and topography), its abutting properties in the case of traffic and noise impacts and the Rock Creek watershed for water quality. Impact topics that would have no or negligible impacts have been dismissed from this discussion (such as noise, air quality, geology, socio-economic, infrastructure, community facilities, etc.) because the incremental impact associated with the impact would be so small or short-term that when added to other past, present, or reasonably foreseeable actions, it would have no effect on the resource.

Past, present and future projects that have been identified in the vicinity or within the National Zoo considered in the cumulative effects scenario include the Elephant Trails project, Asia Trail, and nearby road projects such as Klingle Road, reconstruction of the nearby bridge on Connecticut Avenue and 18th Street/Adam Morgan’s transportation

improvements. A description of these road projects is provided in the transportation section of this EA.

Since most of the actions associated with the alternatives are similar and collectively have similar impacts on the environment, cumulative effects associated with the implementation of the National Zoo Master Plan have been grouped together by resource. There are very little to no differences in the overall cumulative effect of each alternative considered by SI. Alternatives A, B, and C would have beneficial impacts on transportation infrastructure and the visitor experience at the National Zoo and therefore, there would be no adverse cumulative effects of the action alternatives.

Natural Resources

Alternatives A, B, and C would have minor impacts on soils, topography, vegetation, wildlife, and water resources associated with site improvements related to reclamation of parking lots for new expanded exhibit areas, revitalization of visitor entrances, renovation/expansion of older exhibits and administration facilities, and transportation improvements such as traffic circles and trams as described throughout this Environmental Assessment. In general, these impacts to natural resources are minor short-term and long-term, and adverse. The incremental impact to natural resources is very small when compared to the existing resources in the project vicinity. For instance, the total affect to vegetation is negligible when compared to existing vegetation and forest cover nearby. Other projects such as Asia Trail and Elephant Trail have impacted or will impact vegetation at the National Zoo. The cumulative effect on natural resources of Alternatives A, B, and C when added to impacts from other projects identified in the cumulative impact scenario is minor, long-term and short-term, and adverse.

Cultural Resources

Alternatives A, B, and C have minor to moderate impacts on the cultural landscape, historic structures, and archeology associated with site improvements related to reclamation of parking lots for new expanded, exhibit areas, revitalization of visitor entrances, renovation/expansion of older exhibits and administration facilities and transportation improvements and trams as described throughout this Environmental Assessment. In general, these impacts to cultural resources are minor to moderate, long-term, and adverse with some beneficial impacts such as the case for the rehabilitation of the Holt House. The incremental impact to cultural resources is small when compared to the existing resources in the project vicinity. For instance, the total affect to the cultural landscape is negligible when compared to existing cultural landscape features that make up the National Zoo Historic Site. Other projects such as Asia Trail and Elephant Trail have impacted or will impact cultural resources at the National Zoo. These impacts have been relatively minor when considering the entire resource. The incrementally small cumulative effect on cultural resources of Alternatives A, B, and C when added to impacts from other projects identified in the cumulative impact scenario is minor to moderate, long-term, and adverse. With mitigation, proper planning, and design of new facilities that are sensitive to the cultural resources, the integrity of the National Zoo Historic Site would not be diminished to the point that the resource would no longer be recognized for listing in the National Register of Historic Places.

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V. LIST OF PREPARERS

GREENHORNE & O'MARA, INC.

810 Gleneagles Court, Suite 106
Baltimore, MD 21286

John Wisner
Senior Project Manager
B.S., Biology
Eckerd College, 1991

Rebecca A. Reich
Architectural Historian
M.A., Heritage Preservation
Georgia State University, 1993
B.S., Business Management
The Georgia Institute of Technology,
1988

Sheila Mahoney
Environmental Scientist
M.S., Environmental Sciences & Policy
Johns Hopkins University, 2005
B.A., English
LaSalle University, 1996

Brett Schrader
Environmental Scientist
B.S., Environmental Science & Geology
Susquehanna University, 2003

Alexis Zimmerer
Environmental Scientist
B.S., Environmental Science
Barton College, 2003

Julie Liptak
Senior Graphic Artist
B.S., Graphic Design
University of Cincinnati, 1976
Assoc. Civil Engineering
Cincinnati Technical College, 1984

Theresa Black
Environmental Scientist
M.S., Environmental Science
Towson University, 2007
B.S., Biology
Lycoming College, 2005

Deb Daly
Technical Writer
B.A., Journalism
University of Maryland

AYERS SAINT GROSS ARCHITECTS & PLANNERS

1040 St. Hull Street, Suite 100
Baltimore, MD 21230

Luanne Greene, AIA, LEED AP
Principal
M.A., Architecture
University of Virginia, 1988
B.S., Architecture
University of Virginia, 1984

Karla Aghajanian
Senior Associate
M.R.P, City and Regional Planning
University of North Carolina at Chapel
Hill, 1998
B.A., Environmental Studies
Denison University, 1995

Glenn Neighbors, AIA, LEED AP
Senior Associate
Bachelor of Architecture
University of Maryland, 1982

Amelle Schultz, RLA, ASLA, LEED AP
Senior Associate
Bachelor of Landscape Architecture,
Pennsylvania State University, 1998

Jessica L. Leonard
Master of Architecture, Certificate in
Urban Design
University of Maryland, 2007
B.S., Architecture
University of Maryland, 2005

**JOHN MILNER AND ASSOCIATES,
INC.**

5250 Cherokee Avenue, Suite 300
Alexandria, VA 22312

Donna J. Seifert, Ph.D.
Ph.D., Anthropology
University of Iowa, 1977
M.A., Anthropology
University of Iowa, 1975
B.A., Anthropology
University of Iowa, 1972

VI. DISTRIBUTION LIST

NATIONAL CAPITAL PLANNING COMMISSION

Marcel Acosta
Executive Director
National Capital Planning Commission
401 9th Street, NW
Suite 500 – North Lobby
Washington, DC 20576

Gene Keller
Environmental Review Officer
National Capital Planning Commission
401 9th Street, NW
Suite 500 – North Lobby
Washington, DC 20576

Nancy Witherell
Historic Preservation Officer
National Capital Planning Commission
401 9th Street, NW
Suite 500 – North Lobby
Washington, DC 20576

COMMISSION OF FINE ARTS

Thomas Luebke
Commission of Fine Arts
National Building Museum
441 F Street, NW
Suite 312
Washington, DC 20001-2195

Fred Lindstrom
Commission of Fine Arts
National Building Museum
441 F Street, NW
Suite 312
Washington, DC 20001-2195

NATIONAL PARK SERVICE

Peter May
Associate Regional Director
Division of Lands, Resources,
and Planning
National Capital Region
National Park Service
1100 Ohio Drive, SW
Washington, DC 20242

Adrienne Applewhaite-Coleman
Superintendent
Rock Creek Park
National Park Service
3545 Williamsburg Lane, NW
Washington, DC 20008

Steven Potter
Regional Archeologist
Rock Creek Park
National Park Service
3545 Williamsburg Lane, NW
Washington, DC 20008

OTHER FEDERAL AGENCIES

John M. Fowler
Executive Director
Advisory Council on Historic
Preservation
1100 Pennsylvania Avenue, NW
Room 8809
Washington, DC 20004

Horst Greczmiel
Associate Director for NEPA Oversight
Council on Environmental Quality
722 Jackson Place, NW
Washington, DC 20503

Barbara Rudnick
EPA Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

DISTRICT

Harriet Tregoning
Director
D.C. Office of Planning
801 North Capital Street, NE
Suite 4000
Washington DC 20002

Jennifer Steingasser
Deputy Director
DC Office of Planning
801 North Capital Street, NE
Suite 4000
Washington DC 20002

David Maloney
Office of State Historic Preservation
801 North Capital Street, NE
3rd Floor
Washington DC 20002

Andrew Lewis
Office of State Historic Preservation
801 North Capital Street, NE
3rd Floor
Washington DC 20002

Emeke C. Moneme
Director
D.C. Department of Transportation
2000 14th Street, NW
6th Floor
Washington, DC 20009

William O. Howland, Jr.
Director
D.C. Department of Public Works
2000 14th Street, NW
6th Floor
Washington, DC 20009

Captain Richard D. Fleming
DC Fire and EMS Department
441 4th Street, NW
Suite 370
Washington, DC 20001

James Ashe
Manager, Environmental Planning and
Compliance
WMATA
600 5th Street, NW
Washington, DC 20001

The Honorable Jim Graham
Councilmember, Ward 1
Council of the District of Columbia
1350 Pennsylvania Avenue, NW
Washington, DC 20004

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National Zoological Park Visitor Center
3001 Connecticut Avenue, NW
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901 G Street, NW
Washington, DC 20001

Cleveland Park Branch Library
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Washington, DC 20008