A. INTRODUCTION

In accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality's implementing procedures under Title 40, Part 1502 of the Code of Federal Regulations ("CFR"), any environmental impact statement prepared pursuant to NEPA must include an analysis of both the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and of any irreversible or irretrievable commitments of resources that would occur should the action be implemented (see 40 CFR 1502.16). This chapter addresses both of these concepts for both the No Build Alternative and the Second Avenue Subway Alternative. First, the permanent commitment of resources as compared to the benefits of the project are assessed. This analysis is followed by an analysis of the relationship between expending environmental resources in the short-term and gaining productivity in the long-term.

B. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Resources that may be irreversibly and irretrievably committed to the Second Avenue Subway include construction materials, energy, labor, funds, and land. Materials, energy supplies, and labor used to construct any of the alternatives are not in short supply, and their use would not have an adverse impact on their continued availability for other projects. Furthermore, labor expenditures are consistent with governmental incentives to spur growth.

The No Build Alternative, by definition, would not irreversibly or irretrievably commit resources. However, the No Build Alternative would require a greater commitment of a variety of resources in the future due to its failure to improve the accessibility and efficiency of the transportation system (see energy consumption comparison, below).

The total commitment of funds required for construction of full-length Second Avenue Subway, including easements or other property interests and acquisitions, is estimated at $13.3 billion in 2004 dollars (or $16.8 billion in year-of-expenditure dollars). This commitment of financial resources would add to local and regional economic activity and thus add employment and tax revenues in the region.

The Metropolitan Transportation Authority (MTA) and New York City Transit (NYCT) will endeavor to minimize the use of irretrievable resources and reuse resources, wherever practicable. To that end, it has established and implemented an Environmental Management System (EMS) pursuant to ISO 14001 to demonstrate control over key issues related to raw materials consumption, energy usage, emissions, wastes, products, transport, distribution and services. The EMS requires not only a continuing compliance with relevant legislation but also that NYCT remain committed to achieving improvements in these key issues. Among other policies for the Second Avenue Subway, NYCT has adopted Design for the Environment

Guidelines for use during the project's design phase with the goal of creating an environmentally responsible subway system. Among the Design for the Environment guidelines are protocols to achieve energy efficiency, and to conserve materials, resources, and water.

An example of Design for the Environment as it applies to the Second Avenue Subway is that some of the spoils that would be removed during the tunneling process would be recovered for use elsewhere following or during construction. NYCT will develop a spoils management plan for clean excavated material to permit spoils to be reused beneficially for such uses as filling abandoned mines, building artificial offshore reefs, reinforcing bulkheads, or for use in road paving materials. The actual future use would depend on the quality and consistency of the spoils materials and on the market demand at the time the spoils are available.

Most of the subway would be constructed beneath a public roadbed, which would be fully restored following construction. At certain locations, easements or other property interests beneath or through private property would be acquired for tunnels, stations, entrances, ventilation facilities, support structures, utilities, and other subway related facilities. Currently undeveloped land may be needed for a train storage yard. With the exception of the yard site, surface structures would remain in their current use or be available for future use following construction, and so would not be irreversibly committed.

Archaeological resources along the alignment that would be disturbed by the tunneling or station construction process, but could not be recovered would be lost, and thus unavailable for future retrieval or use. However, as described in Chapter 10, "Archaeological Resources," steps would be taken to avoid or minimize adverse impacts on archaeological resources, in accordance with the requirements of Section 106 of the National Historic Preservation Act. A Programmatic Agreement developed in consultation with the State Historic Preservation Office (SHPO) and executed by the SHPO, the Federal Transit Administration, and NYCT will establish the processes for ongoing archaeological assessment and mitigation implementation as needed. Street trees along the alignment, as well as trees within Playground 96, St. Vartan Park, First Park, Sara D. Roosevelt Park, Kimlau Square, Pearl Street Playground, Fulton Street Plaza, Coenties Slip, and various greenstreets and bonus plazas could be removed during the construction process. (As a result of refinements to the project since the SDEIS was issued, trees would no longer need to be removed from Crack is Wack Playground.) While any removed trees would be replaced in consultation with the New York City Department of Parks and Recreation after construction is completed, the mature trees that are removed would be irretrievably committed, as such trees could not be replanted.

Once the subway is operational, energy consumed by vehicular modes would be reduced by approximately 160 billion BTUs per year. This represents a reduction in annual fuel consumption by approximately 1,280,000 gallons as compared to the No Build Alternative, which is attributed to a reduction in annual vehicle miles traveled by future users of the subway. When it is in operation, the full-length subway would use approximately 3 trillion BTUs of energy each year. The total commitment of energy required for construction would be approximately 15 trillion BTUs, as described in Chapter 13, "Infrastructure and Energy." However, these energy expenditures are a "short-term use" compared with the long-term productivity of the subway as described in the next section.

Overall, the resources used to construct and operate the subway would be committed to benefit residents of and commuters to Manhattan's East Side as well as existing riders on the Lexington Avenue Line. The commitment of these resources would also benefit other residents of the state and region by an improved transportation system (see long-term productivity discussion below).

The new subway would offer improved accessibility and savings in travel time, reductions in station and train crowding and operational delays on existing lines, reductions in travel by automobile and taxi (of up to 28.4 million vehicle miles each year) and related reductions in the emission of pollutants (of up to 229 tons of carbon monoxide [CO], 6.5 tons of volatile organic compounds [VOCs], and 2.2 tons of nitrogen oxides [NOx]) and greater availability of quality services, which would together outweigh the commitment of these resources. There are no other known resources that would be committed as a result of the construction of the new Second Avenue Subway.

C. RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term effects on the environment result from construction impacts. Long-term effects relate to the maintenance and enhancement of long-term productivity—in particular, the consistency of the project with long-term economic, social, regional and local planning objectives, including sustainability. The short- and long-term effects of each alternative are summarized below.

SHORT-TERM USES

The No Build Alternative would not require major construction and thus would not result in any short-term impacts, either adverse or beneficial.

The Second Avenue Subway would have more substantial impacts during construction (see the discussions in Chapter 3, "Description of Construction Methods and Activities" and construction impacts discussions of Chapters 5 through 19) than the No Build Alternative. As discussed elsewhere in this FEIS, the short-term construction impacts of the new subway would be predominantly associated with the economics of affected businesses, use of parkland, traffic and pedestrian access, on-street parking, noise and vibration, dust, and their related effects on neighborhood character, particularly near cut-and-cover portions of the work, shaft sites, and spoils removal sites. As discussed in each chapter, NYCT will endeavor to reduce these impacts wherever practicable. In addition, the Second Avenue Subway's construction would create economic benefits during construction, in the form of jobs and the direct and indirect demand for goods and services.

LONG-TERM PRODUCTIVITY

The ability of transportation systems to conveniently serve major residential and employment centers is one of the essential components in economic growth and productivity as well as a key factor in improving the livability of neighborhoods; this is particularly true for the New York metropolitan area, and for the economic engine represented by Manhattan. Currently, Manhattan contains more than 1.9 million jobs, with 45 percent of them (864,384) located in the Second Avenue Subway corridor. By 2025, employment in Manhattan is expected to grow by more than 327,000 jobs, with 47 percent (nearly 155,000 jobs) of the growth anticipated along the Second Avenue Subway corridor. The new subway would play a key role in helping the city sustain and improve its economic vitality, facilitating retention of jobs, expansion of existing businesses, and development of new businesses. Existing congestion and access problems within the subway network would be substantially reduced, and new capacity would be provided to support future economic growth and improve the quality of life on Manhattan's East Side.

By improving and expanding the transportation infrastructure, the proposed Second Avenue Subway would help maintain the city's competitive edge, as well as the city's role as a global center of finance, commerce, media, and culture. Furthermore, since the city contributes greatly to the economy of the tri-state metropolitan region and New York State as a whole, these areas would see long-term productivity benefits from the project.

For neighborhoods like East Harlem and the Lower East Side, where future development potential is the greatest, a full-length Second Avenue Subway would be an important asset in helping attract new investment to the area. At the same time, major employment centers on the Upper East Side, and in East Midtown and Lower Manhattan, would also benefit from reduced congestion and improved access. In these neighborhoods, the Second Avenue Subway would help bolster the long-term growth trends in the service sector, particularly hospitals and research centers, and would help reverse the recent decline in the Finance, Insurance, and Real Estate (FIRE) sector, particularly in Lower Manhattan. Large institutional uses located in or adjacent to the Second Avenue Subway, such as New York Hospital/Cornell Medical Center and Memorial Sloan-Kettering Cancer Center on the Upper East Side, and the United Nations, Baruch College, and NYU Medical Center in East Midtown, would benefit greatly from improved access for employees and those in need of the important services offered by these facilities. New transit connections to and from other parts of the city and region would also extend the project's economic benefits outside of Manhattan.

By attracting new residential and commercial investment within New York City and providing incentives for retention of such existing uses, the Second Avenue Subway will also contribute to future energy savings by spurring compact development and thereby reducing urban sprawl. This conclusion is supported by a number of studies. For example, in 1998, the Transit Cooperative Research Program, an ongoing research effort established under FTA sponsorship, reexamined the findings of an earlier report entitled *The Costs of Urban Sprawl.* This report was sponsored by the U.S. Council on Environmental Quality, U.S. Department of Housing and Urban Development, and the U.S. Environmental Protection Agency and released in 1974. This report linked low-density development to increased fuel consumption resulting from increased automobile use, traffic congestion, and higher heating requirements, as well as to higher costs of infrastructure and utility provisions. The follow-up study—*The Costs of Sprawl–Revisited*, reviewed many other research efforts concerning sprawl and concluded that sprawl is linked to higher infrastructure costs, less cost-efficient and effective transit, loss of fragile environmental lands, and reduced regional open space. A second phase of this investigation—*Costs of Sprawl 2000*—found that controlled growth results in lower infrastructure costs, water use, and sewage production; reduced public-service costs; and lower travel costs.

Long-term benefits to productivity, and related long-term increases in productivity, addressed by the full-length subway would include the following, as described in further detail in Chapter 5, "Transportation," Chapter 6, "Social and Economic Conditions," and Chapter 11, "Air Quality":

- Improved regional and local accessibility;
- Reduced travel time;
- Reduced congestion and overcrowding on the Lexington Avenue Line;
- Improved reliability of subway and bus service;
- Accommodation for projected future ridership;

- Support for the region's economic development;
- Reduced automobile traffic in the region; and
- Reductions in mobile source air pollutants.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

Local short-term impacts in use of resources resulting from the construction of the full-length Second Avenue Subway would be consistent with the maintenance and enhancement of long-term productivity for the city, state, and region. Some resources that would be valuable in the short term are being spent to achieve higher productivity per unit resource in the long term. By investing these resources in future productivity, and over the long term, fewer resources would be needed to achieve the same level of unit productivity. This savings in per-unit productivity in the long term would be manifest in terms of energy consumption, land use, and financial cost.

D. COST AND FUNDING

The estimated cost to construct the full-length Second Avenue Subway and all of its ancillary facilities is $13.3 billion in 2004 dollars, or $16.8 billion in year-of-expenditure dollars.

This cost includes constructing the 8.5-mile tunnel with 16 stations, purchasing 200 subway cars, building maintenance and storage facilities, moving existing utilities, acquiring real estate, and installing necessary infrastructure systems (i.e., tracks, power, telecommunications, signals, lighting, pumping, ventilation, fire protection, emergency tunnel lights, and exits).

The same local sources that have supported the MTA's current and previous capital programs (as described below) are expected to fund half the cost of the Second Avenue Subway project. The Federal Transportation Equity Act for 21st Century's (TEA-21) New Starts Program is expected to fund the other half of the construction costs. This program and the criteria the Federal Transit Administration (FTA) uses to evaluate New Starts projects are also described below. The MTA is following FTA's procedures to ensure that the Second Avenue Subway project is eligible for this FTA funding.

MTA'S CAPITAL PROGRAM

The MTA uses an integrated approach to financing operations and capital investments and continues its successful strategy of using a wide variety of funding sources to finance its capital and operating needs.

The MTA's 2000-2004 Capital Program supports the three imperatives facing the MTA: finishing the systemwide restoration job begun in 1982, preserving the investments already made through cyclical replacement of assets, and improving and expanding the MTA physical transportation network to add needed capacity for the growing regional economy.

The capital investments approved by the MTA Board in the MTA 2000-2004 Capital Program represent a continuation of the mission to rehabilitate the system and maintain the assets previously restored. Accordingly, 69 percent of the program is dedicated to ongoing rebuilding and replacement of MTA facilities, infrastructure, and rolling stock (see Table 20-1). As in the 1995-1999 program, improvements to the existing system will be made (such as building new passageways between stations), and 11 percent of the proposal program is dedicated to this work.

Table 20-1
MTA 2000-2004 Capital Program Summary
(Dollars in Millions)

Agency	Component	Cost
NYCT	Rolling Stock	$2,573
	Infrastructure	7,751
	Total NYCT	10,324
LIRR	Rolling Stock	976
	Infrastructure	1,229
	Total NYCT	2,205
MNR	Rolling Stock	543
	Infrastructure	823
	Total NYCT	1,366
Subtotal, NYCT, LIRR, MNR		$13,895
Network Expansion		3,407
MTA Bus & Rail Total		*$17,301*
Bridges & Tunnels		1,029
MTA Grand Total		*$18,330*

The balance of the program—19 percent—is for major capital improvements and initiatives. The planning begun in the 1995-1999 capital program to expand the MTA system is now reaching the "bricks and mortar" stage. During the plan period significant construction progress will be made toward the completion of the MTA Long Island Rail Road East Side Access Project. The MTA 2000-2004 Capital Program also includes $1.05 billion for the design and early construction phases of the Second Avenue Subway, which will begin in this program.

The capital program represents capital investment strategies that will protect and preserve the investments already made, while allocating additional funding to high-priority expansion projects that are necessary for the continued economic health of the region. In addition to the huge investments in the existing system that continue to be necessary, it is vital to progress investments to expand service so that the New York region can compete more effectively in a changing and challenging global economy.

FUNDING THE CAPITAL PROGRAM

The funding for the 2000-2004 Capital Plan continues to rely on the same types of funding that supported the 1995-1999 Capital Program. Table 20-2 identifies the anticipated resources to fund the 2000-2004 bus and rail capital program. The program includes $17.3 billion for transit and commuter rail investments, and an additional $1 billion for bridges and tunnels. A detailed explanation of each funding source follows the table.

Following is a summary of Capital Program funding sources.

- *Federal Title III*—The Federal Transportation Equity Act for 21st Century (TEA 21) creates transit funding authorization for the 6-year period of 1998-2003. Not only did the bill authorize more money over the 6-year period for transit than was authorized under the previous ISTEA bill, it also guaranteed levels of funding by year so that grantees could count on an annual minimum level.

Table 20-2
2000-2004 Capital Program Funding Source Projections
(Dollars in Millions)

Funding Source	Plan
Federal Title III	$4,736
Federal Title I	299
City	535
Coliseum	141
Program Income	150
TBTA Investment Income	95
TBTA Pay-as-You-Go	89
Carryover	232
Asset Leasing	116
Other	18
Insurance Recovery for WTC	162
Debt Restructuring	4,495
Bonds	7,262
Total MTA	$18,330
Bridges & Tunnels	($1,029)
Total Transit and Commuter	*$17,301*

- *Federal Title I*—TEA 21 also provides for federal highway funding to be transferred to transit for certain types of projects. This program is administered by the State and MTA is expecting to retain the same mandate as the 1995-1999 capital program, which allocated $55 million per year to Congestion Mitigation and Air Quality (CMAQ) and Surface Transportation Program (STP) MTA capital projects. In addition, $24 million of CMAQ funds tied to the projects was rolled over from the 1995-1999 Capital Program.
- *City*—The allocation from New York City is $106 million per year, which corresponds to the City's Capital Needs Statement. In addition, New York City contributed $5 million earmarked for the Atlantic Avenue Terminal Reconstruction Project. The City sells bonds to help pay for NYCT projects chosen by MTA through an annual letter agreement process.
- *Coliseum*—MTA sold the Coliseum to Related Properties in 1999 for $345 million. Of this total, $200 million is allocated to the 1995-1999 Capital Program, $141 million is available for the 2000-2004 program, and the remaining money was used for administrative costs for the transaction.
- *Program Income*—Income from invested non-bond MTA funds, such as deposits of proceeds from previous sale-leaseback agreements, real-estate sales, and operating budget contributions, will be generated for the benefit of the capital program. The amount is an estimate based on projected account balances for the 2000-2004 period, including all expected drawdowns.
- *TBTA Investment Income*—Income is generated from TBTA debt service reserves and other TBTA deposits, and is partially transferred to the MTA capital program. The funding is the same amount as what was generated for the 1995-1999 Capital Program.

- *Carryover*—Carryover comprises funds from previous capital programs that are no longer needed to support the completion of capital work. Sufficient funds have been left in the previous programs to cover any unforeseen events that may affect work under way.
- *Debt Restructuring*—MTA has developed a plan to generate $4.5 billion in additional resources without increasing annual debt service costs. This plan creates a new MTA corporate debt structure. Various elements in this restructuring would generate $3 billion in new bond proceeds and release $1 billion in reserve funds that will be used to pay for new capital projects. This will result in a $1.2 billion reduction in debt service payments between 2000-2004.
- *Bonds*—New bonds to support the proposed capital program would use the new simplified credit structure described above and would be backed by agency operating revenues and subsidies in accordance with the 2000-2004 financial plan.

MTA continues the strategies implemented in the 1995-1999 plan period to meet the mandate to be self-sustaining. As demonstrated in Table 20-3, the capital program continues its reliance on local funds.

Table 20-3
Capital Program Funding by Plan Period
(Dollars in Billions)

	1982-1994	%	1995-1999	%	2000-2004	%	1982-2004	%
Federal	$6.954	35	$3.770	30	$5.035	29	$15.759	32
Local	13.018	65	8.783	70	12.266	71	34.067	68
Total Funds	$19.972		$12.553		$17.301		$49.826	

STABILITY AND RELIABILITY OF THE 2000-2004 PLAN

The stability of the funds available to MTA is highlighted in Table 20-4, which summarizes the distribution of state funds to MTA since 1983. The significance of this summary is that the large number of dedicated taxes available to fund MTA's programs and services have funded capital and operating plans during periods of economic growth and economic downturns. It is this stability that has been the hallmark of MTA Capital and Operating Plans since 1982.

TEA-21'S NEW STARTS PROGRAM

The Federal Transit Administration's (FTA) discretionary New Starts program is the federal government's primary financial resource for supporting locally-planned, implemented, and operated transit "guideway" capital investments. From heavy to light rail, from commuter rail to bus rapid transit systems, the New Starts program has helped to make possible hundreds of new or extended transit fixed guideway systems across the country. These rail and bus investments, in turn, have improved the mobility of millions of Americans; have helped to reduce congestion and improve air quality in the areas they serve; and have fostered the development of viable, safer, and more livable communities.

The Transportation Equity Act for the 21st Century (TEA-21) has authorized $8.2 billion in New Starts funding through fiscal year 2003. An even higher level of funding is anticipated in the next Federal surface-transportation authorization beginning in 2004.

Table 20-4
State Public Transportation Funds for MTA—
Appropriated by New York State

Year*	State General Fund Section 18-b	Mass Transportation Operating Assistance Fund (MMTOA)	Dedicated Mass Transportation Trust Fund (SDF)	Additional Mass Transportation Assistance Program	Total State Funds
1983-1984	$145,580,000	$394,420,000			$540,000,000
1984-1985	115,720,000	503,865,000			619,585,000
1985-1986	115,720,000	600,752,000			716,472,000
1986-1987	115,720,000	572,132,000			687,852,000
1987-1988	212,924,800	586,478,000			799,402,800
1988-1989	212,924,800	648,493,000			861,417,800
1989-1990	212,924,800	658,024,000			870,948,800
1990-1991	210,796,000	629,088,000			839,884,000
1991-1992	187,924,000	647,500,000			835,424,000
1992-1993	199,735,000	699,647,000			899,382,000
1993-1994	187,924,000	717,644,000	129,300,000		1,034,868,000
1994-1995	187,924,000	747,818,000	220,410,000		1,156,152,000
1995-1996	59,924,000	801,400,000	228,800,000		1,090,124,000
1996-1997	91,353,000	797,028,000	241,000,000		1,129,371,000
1997-1998	77,793,000	875,505,000	252,243,000		1,205,541,000
1998-1999	77,793,000	1,003,729,000	256,700,000		1,338,222,000
1999-2000	77,793,000	1,062,295,000	252,700,000		1,392,788,000
2000-2001	77,793,000	910,296,000	324,646,000	37,000,000	1,349,735,000
2001-2002	77,793,000	910,296,000	324,646,000	37,000,000	1,349,735,000
Totals	$2,646,059,400	$13,766,400,000	$2,230,445,000	$74,000,000	$18,716,904,400

Note: * New York State Fiscal Year (April to March).

TEA-21 directs FTA to evaluate and rate candidate New Starts projects as an input to federal funding decisions and at specific milestones throughout each project's planning and development. TEA-21 further establishes a comprehensive planning and project development process which New Starts projects must follow, and which is intended to assist local agencies and decision-makers in evaluating alternative strategies for addressing transportation problems in specified corridors and select the most appropriate improvement to advance into engineering, design, and construction. Planning and project development for New Starts projects is a continuum of analytical activities carried out as part of the metropolitan planning and National Environmental Policy Act of 1969 (NEPA) review processes.

The MTA is requesting FTA New Starts funding for two projects: Second Avenue Subway and East Side Access. In FTA's Annual Report on New Starts, published in February 2003, the FTA gave both projects "Recommended" ratings.

The FTA has proposed that the MTA's East Side Access project be considered for a multiyear New Starts funding commitment (full funding grant agreement) in Fiscal Year 2004. The Environmental Impact Statement for the East Side Access project has already been finalized and the FTA has already approved the project's entry into Final Design.

Once the Record of Decision for the Second Avenue Subway is issued by FTA, the MTA will also seek a full funding grant agreement for the Second Avenue Subway project. In its February

2003 report, FTA noted that Second Avenue Subway's "Recommended" rating "is primarily attributable to the exceptionally strong transit-supportive land use along the corridor and throughout the metropolitan area, the anticipated mobility benefits within the corridor, and a sufficient financial plan."

TEA-21 identifies several specific New Starts criteria which FTA must consider in its approval to advance transit-fixed guideway projects through the project development process and enter into a long-term financial commitment to implement the proposed investments. The Act categorizes these criteria into three broad areas:

a. *Alternatives Analysis and Preliminary Engineering*. Along with Final Design, these activities constitute the planning and project development process for New Starts investments. All projects seeking discretionary New Starts funding must follow this process, and FTA must approve project entrance into all but the alternatives analysis phase of planning and development. The planning and project development process is the forum for the development and refinement of the project justification and local financial commitment New Starts criteria (see below), and for addressing other planning, environmental, engineering, and design issues and requirements.

b. *Project Justification*. TEA-21 requires that proposed New Starts projects be justified based on several project justification criteria, including the following:

- Mobility improvements;
- Environmental benefits;
- Operating efficiencies;
- Cost effectiveness; and
- Other factors.

c. *Local Financial Commitment*. TEA-21 requires that New Starts project sponsors demonstrate adequate local support for the project, as measured by:

- The proposed share of total project costs from sources other than from the New Starts program, including federal formula and flexible funds and state and local funding;
- The strength of the proposed project's capital financing plan; and
- The ability of the sponsoring agency to fund operation and maintenance of the entire system as planned once the guideway project is built.

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