CHAPTER 3 OVERVIEW OF STUDY METHODOLOGIES FOR SITE-SPECIFIC ANALYSES

3.1 Introduction

This MTS Environmental Evaluation documents the assessment of the potential social, economic, and environmental effects that may result from the MTS Conversion Program and identifies measures that could be applied to mitigate potentially adverse impacts. These impact assessments were guided by standards, regulations, and guidelines established under SEQRA (6NYCRR Part 617) and CEQR (Executive Order No. 91, Chapter 5: Rules of Procedure for CEQR, the 2001 CEQR Technical Manual). The conditions against which the effects of the MTS Conversion Program are assessed are the Existing Conditions, as defined below, and Future No-Build Conditions (2006) at the specific sites and the respective study areas (defined later in this chapter). For purposes of evaluating the effect of the MTS Conversion Program on DSNY's waste collection and transfer operations (exclusive of waste disposal operations), Future No-Build Conditions are assumed to be the same as Existing Conditions. Where other developments or changes outside of the MTS Conversion Program are expected to occur at a site by 2006, they are discussed in the applicable sections of Chapters 4 through 11.

This chapter describes the issues pertaining to, and the data collection and analysis methods used for each type of environmental analysis documented in this MTS Environmental Evaluation. The assumptions made and methods used for each type of environmental analysis were applied consistently to all sites, except as noted otherwise in Sections 3.2 through 3.19. Discussions of methodology are not repeated in Chapters 4 through 11, which document the site-specific environmental analyses.

3.2 Analysis Years and Future No-Build Conditions

An environmental evaluation typically determines the potential impacts of implementing a proposed action in a particular build year by comparing that action to the conditions that would likely exist in that build year if the action were not implemented (Future No-Build Condition). A Future No-Build Condition is a projected baseline for the Build Year (which in this case is 2006) that assumes the continuation of relevant Existing Conditions, realization of other known planned development activity, and expected changes in population and traffic.

The City has been taking interim export actions to assure that all DSNY-managed Waste is exported out of the City following the closure of Fresh Kills Landfill in December 2001. Existing Conditions reflect interim export of waste from each of the five boroughs to out-of-City disposal sites as of January 2003. The Future No-Build Condition developed for the MTS Environmental Evaluation consists of: (1) Existing Conditions, (2) known planned development activity; and (3) updated traffic and population data. Future No-Build Conditions are the conditions against which potential site-specific impacts associated with the MTS Conversion Program are identified and to which they are compared for each site (presented in Chapters 4 through 11).

3.3 Definition of Sites and Study Areas

3.3.1 Site Definition

As noted in Section 2.1.1, the definition of site boundaries for purposes of environmental review may extend beyond the boundaries of the primary parcel in which the Converted MTSs would be located.

The sites are illustrated in the figures presented in Chapter 2. These site boundaries may differ from the sites described in permits for the existing MTS facilities, as provided in DSNY engineering reports. It is also important to note that the sites for the Converted MTSs may not include all DSNY facilities and/or operations in contiguous properties, such as salt sheds and garages.

3.3.2 Study Area Delineation

Assessments of Existing Conditions, anticipated Future No-Build Conditions, and potential effects of the MTS Conversion Program focused on study areas and sensitive receptors. Study areas for each type of environmental analysis were defined to include areas and sensitive receptors that could be affected by the MTS Conversion Program and, therefore, vary among the different environmental assessments performed.

For the analysis of land use and zoning, community facilities, open space, and historic resources, the study areas were delineated in a conventional manner according to a radial distance measured from the boundaries of each site. For land use, zoning and public policy, and community facilities, the primary study area is defined as the area within a ¼-mile radius of the site, and a secondary study area is defined as the area between ¼ mile and ½ mile of the site. Detailed descriptions are provided and detailed analyses were performed for the primary study areas, while generalized descriptions are given and generalized analyses were performed for secondary study areas. Open space and parklands and historic resources conditions are analyzed within a single study area defined by a ½-mile radius.

There are some deviations to these conventional study areas, however. If community facilities, historic resources, and open spaces and parklands were within 250 feet (the length of the short side of a typical city block) of the outside boundary of the secondary study area, they were included in the inventory. The study area for archaeological sensitivity and potential impact—one component of the cultural resources analysis—is comprised of only the site, however, because any project-related subsurface disturbance would be limited to the site.

The study areas for the remaining analyses vary from these limits to comply with specific regulatory requirements and to reflect the reasonable foreseeable potential for significant impacts, given the sensitivity of existing land uses. Study areas for socioeconomic conditions, urban design, and neighborhood character analyses were defined in a manner that is consistent within each type of analysis, as appropriate to the available data (e.g., census data) and/or to encompass the area of potential impact in its entirety. Methods of defining these particular study areas are described in greater detail in Sections 3.5, 3.9, and 3.10.

Analyses of traffic and transportation, air quality, odor, and noise were performed without the utilization of such study areas, per se. Rather, these environmental analyses were undertaken in a manner that incorporates data describing various points. These may be the locations of sensitive receptors related to specified screening criteria or modeling protocol, as in the case of on-site noise, air quality, and odor or, as in the case of traffic and off-site noise and air quality analyses, of critical intersections within a reasonable distance of the site.

The study areas for the remaining analyses—infrastructure and energy/solid waste, natural resources, water quality, waterfront revitalization and hazardous materials—vary to comply with specific regulatory requirements and to reflect the reasonable foreseeable potential for significant impacts, given the sensitivity of Existing Conditions.

Sections 3.4 through 3.19 provide descriptions of analytical methodologies for each category of environmental analysis. Some methods of defining study areas are also described in greater detail where necessary.

3.3.3 Maps and Figures

The graphic figures in this MTS Environmental Evaluation are derived from computerized GIS base maps developed by the DCP. This mapping information, contained on the BYTES of the BIG APPLE (TM) disks, was initially compiled for government use by DCP. The City and DCP make no representation as to the accuracy of the information or its suitability for any purpose. The City, DCP and DSNY disclaim any liability for errors that may be contained therein.[1]

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[1]
- Map Sources: The files on these disks are derived from the tax block/lot geography files,. The tax lot files are digitized and maintained by the DCP Computer Information Services/Geographic Systems Section. The primary sources for these files are the Department of Finance (DOF) Tax maps, the Borough President topographic maps, and the DCP sectional Maps. These files are schematic representations of the tax lot outlines and should not be used for applications that require precise measurements.
- Spatial Accuracy: The tax lot files were created for thematic mapping for planning applications at the DCP. Spatial accuracy was not of primary concern in their creation. A limited set of control points was used to loosely fit the lines to the New York East State Plane Coordinate System.
- Legal vs. Physical features: These files are a representation of the City's tax blocks. Tax blocks are not identical to physical locks. Boundaries of tax blocks are not usually located at the curb line of a street. Many properties include areas under bodies of water. Most highways and many other features are not represented in these files because their depiction does not arise from the delineation of tax blocks.

3.4 Land Use, Zoning, and Public Policy

Land uses, zoning, and development trends on the site and in the primary and secondary study areas, as well as pertinent public policies, are characterized and then assessed to determine whether the MTS Conversion Program would be compatible with and/or could affect these conditions. If necessary, mitigation measures were then identified.

Data were collected on existing land uses, zoning patterns, recent development trends, and proposed developments in the sites' primary and secondary study areas through consultation with the Borough offices of the DCP, community district liaisons, and the NYCEDC; research of published sources of information; and field reconnaissance. The descriptions of Future No-Build Conditions reflect the development potential of underdeveloped sites in the study areas, as well as information obtained from the DSNY, DCP, and the OEC concerning planned and programmed improvements in the study areas.

The Converted MTSs are considered "Use Group 18" land uses according to the City Zoning Resolution. According to the zoning code, "Use Group 18 consists primarily of industrial uses that: (1) either involve considerable danger of fire, explosion or other hazards to public health or safety, or cannot be designed without appreciable expense to conform to high performance standards with respect to the emission of objectionable influences; and (2) normally generate a great deal of traffic, both pedestrian and freight."

Maps of existing land uses and zoning on the sites and within the primary and secondary study areas appear in the site-specific discussions in Chapters 4 through 11. Table 3.4-1 provides information from the City Zoning Resolution summarizing the characteristics of the types of zoning districts that are found at the sites analyzed. It is presented here as a reference for all zoning discussions in the subsequent chapters.

Table 3.4-1
Zoning District Characteristics

<table>
<tr><th colspan="10">Manufacturing Districts</th></tr>
<tr><th>Zone</th><th>Type of Zone</th><th>Description</th><th>Typical Uses</th><th>Max. Permitted FAR</th><th>Initial Setback Distance</th><th>Max. Permitted Height of Front Wall of Building within Permitted Setback (Standard)</th><th>Sky Exposure Plane (ratio) Dictating Max. Permitted Height of Front Wall or Building beyond Setback (Standard)</th><th>New Community Facility and Residential Uses Permitted</th></tr>
<tr><td>M3-2</td><td>Central manufacturing area</td><td rowspan="2">M3 districts permit heavy industries that generate noise, traffic, and pollutants. Usually located near the waterfront, they are buffered from residential areas by light and medium industrial M1 and M2 districts.</td><td rowspan="9">In theory, nearly all industrial uses can locate in any manufacturing zone if they meet the respective performance standards required in the Zoning Resolution for each M1, M2, or M3 zone. For example, more noise and vibration are allowed in M2 districts than M1 districts except when they border on a residential district; smoke is permitted and industrial activities need not be entirely enclosed.</td><td rowspan="3">2.0 for commercial or manufacturing</td><td rowspan="9">15-foot setback for wide streets; 20 feet for narrow streets</td><td rowspan="3">60 feet high (or 4 stories)</td><td rowspan="8">5.6 to 1 vertical distance for wide streets; 2.7 to 1 for narrow streets.</td><td rowspan="5">No</td></tr>
<tr><td>M3-1</td><td>Heavy manufacturing use</td></tr>
<tr><td>M2-3</td><td>Typically located only in Manhattan CBD</td><td rowspan="3">M2 districts occupy the middle ground between light and heavy industrial areas. Permits commercial and general industrial uses.</td></tr>
<tr><td>M2-2</td><td>Waterfront manufacturing area</td><td>5.0 for commercial or manufacturing</td><td>85 feet high (or 6 stories)</td></tr>
<tr><td>M2-1</td><td>Most widely mapped M2 districts; Mainly in older manufacturing areas</td><td>2.0 for commercial or manufacturing</td><td rowspan="2">60 feet high (or 4 stories)</td></tr>
<tr><td>M1-4</td><td>Located mainly in Manhattan CBD</td><td rowspan="4">M1 permits low-bulk commercial and light industrial uses and requires high performance standards that limit impacts from noise, vibration, smoke and other effects.</td><td>2.0 for commercial or manufacturing
6.5 for community facilities</td><td rowspan="4">Yes</td></tr>
<tr><td>M1-3</td><td>Older industrial areas</td><td>5.0 for commercial or manufacturing
6.5 for community facilities</td><td>85 feet high (or 6 stories)</td></tr>
<tr><td>M1-2</td><td>Light industrial District</td><td>2.0 for commercial or manufacturing
4.8 for community facilities</td><td>60 feet high (or 4 stories)</td></tr>
<tr><td>M1-1</td><td>Located adjacent to low density residential areas</td><td>1.0 for commercial or manufacturing
2.4 for community facilities</td><td>30 feet high (or 2 stories)</td><td>1 to 1 vertical distance for narrow and wide streets.</td></tr>
</table>

Table 3.4-1 (continued)
Zoning District Characteristics

Commercial Districts								
Zone	**Type of Zone**	**Description**	**Typical Uses**	**Max. Permitted FAR**	**Initial Setback Distance**	**Max. Permitted Height of Front Wall of Building within Permitted Setback (Standard)**	**Sky Exposure Plane (ratio) Dictating Max. Permitted Height of Front Wall or Building beyond Setback (Standard)**	**New Community Facility and Residential Uses Permitted**
C8-3	Automobile showrooms and offices	C8 districts form a bridge between commercial and manufacturing uses, and are appropriate for heavy uses that are land consuming but not labor intensive. These districts are mainly mapped along major traffic arteries where concentrations of automotive uses have developed.	Automobile showrooms, automotive service facilities and warehouses. Housing is not permitted.	2.0 for commercial 6.5 for community facilities	15-foot setback for wide streets; 20 feet for narrow Streets.	85 feet high (or 6 stories)	5.6 to 1 vertical distance for wide streets; 2.7 to 1 for narrow streets.	New community facilities are permitted; No new residential uses
C8-1	Automotive sales and service			1.0 for commercial 2.4 for commercial facilities		30 feet high (or 2 stories)	1 to 1 vertical distance for narrow and wide streets.	
C3	Waterfront recreation areas	C3 zones permit waterfront recreation and uses related to boating and fishing.	Marinas, boat repair shops and public or private beaches (with dressing rooms and refreshment stands).	0.5 for commercial 1.0 for community facilities 0.5 for residential				Yes
C2-2 on R8	Commercial overlay	C2 zones are Local Service Districts	Residential and Commercial (Retail and Services).	2.0 for commercial; 6.5 for community facilities; 4.8 to 6.0 for residential		85 feet high (or 6 stories)	5.6 to 1 vertical distance for wide streets; 2.7 to 1 for narrow streets.	
C2-2 on R7-2				2.0 for commercial; 6.5 for community facilities; 2.8 to 3.4 for residential		60 feet high (or 4 stories)		
C2-2 on R7-1								
C2-2 on R5				1.0 for commercial; 2.0 for community facilities; 1.0 to 1.25 for residential		30 feet high (or 2 stories)	1 to 1 vertical distance for narrow and wide streets.	
C2-2 on R4								
C1-2 on R8		C1 zones are Local Retail Districts		2.0 for commercial; 6.5 for community facilities; 4.8 to 6.0 for residential		85 feet high (or 6 stories)	5.6 to 1 vertical distance for wide streets; 2.7 to 1 for narrow streets.	
C1-2 on R7-2				Same as C2 on R7		60 feet high (or 4 stories)		
C1-4 on R7-1								
C1-2 on R7-1								
C1-4 on R6				2.0 for commercial; 4.8 for community facilities; 2.0 to 2.4 for residential				
C1-3 on R6B								
C1-3 on R6								
C1-1 on R6								
C1-3 on R5				Same as C2 on R5		30 feet high (or 2 stories)	1 to 1 vertical distance for narrow and wide streets.	
C1-1 on R5								

Table 3.4-1 (continued)
Zoning District Characteristics

<table>
<tr><th colspan="9">Residential Districts</th></tr>
<tr><th>Zone</th><th>Type of Zone</th><th>Description</th><th>Max. Permitted FAR</th><th>Initial Setback Distance</th><th>Max. Permitted Height of Front Wall of Building within Permitted Setback (Standard)</th><th>Sky Exposure Plane (ratio) Dictating Max. Permitted Height of Front Wall or Building beyond Setback (Standard)</th><th>New Community Facility and Residential Uses Permitted</th></tr>
<tr><td>R8</td><td>General residence district</td><td>R8 is a high-density district – the highest density mapped in the Bronx – served by mass transit.</td><td>4.8 to 6.0</td><td rowspan="5">15-foot setback for wide streets; 20 feet for narrow.</td><td>85 feet high (or 9 stories)</td><td rowspan="5">5.6 to 1 vertical distance for wide streets; 2.7 to 1 for narrow streets.</td><td rowspan="11">Yes</td></tr>
<tr><td>R7-2</td><td>General residence district</td><td>R7 is a medium density apartment house district.</td><td rowspan="2">2.8 to 3.4</td><td rowspan="4">60 feet high (or 6 stories)</td></tr>
<tr><td>R7-1</td><td colspan="2">Differs from R7-2 only in the amount of parking required for new dwelling units.</td></tr>
<tr><td>R6</td><td rowspan="2">General residence district</td><td>R6 districts are appropriate for medium density housing. Typical R6 development usually is between three and twelve stories.</td><td rowspan="2">2.0 to 2.4</td></tr>
<tr><td>R6B</td><td>Differs from R6 primarily in lot coverage and height and setback regulations</td></tr>
<tr><td>R5</td><td>General residence district</td><td>R5 designation applies to medium density districts containing apartment buildings, and two- and three-family row houses. R5 districts, which allow a variety of housing types, provide another transitional step from low to higher density areas.</td><td>1.0 to 1.25</td><td rowspan="6">None</td><td rowspan="6">Street level</td><td rowspan="6">1 to 1 vertical distance for narrow and wide streets.</td></tr>
<tr><td>R4-1</td><td>Detached and Semi-Detached Residence District</td><td rowspan="2">R4 district permit the same variety of housing type as R3-2 zones, but with a 50 percent increase in building bulk.</td><td rowspan="2">0.75</td></tr>
<tr><td>R4</td><td>General residence district</td></tr>
<tr><td>R3-1</td><td>Detached and Semi-Detached Residence District</td><td>Permits only detached or semi-detached. Generally mapped to follow existing patterns of development.</td><td rowspan="3">0.5</td></tr>
<tr><td>R3-2</td><td>General residence district</td><td>Allows for a variety of housing types, including garden apartments, row houses and an occasional apartment house surrounded by extensive open space.</td></tr>
<tr><td>R3X</td><td>Detached Residence District</td><td></td></tr>
</table>

Table 3.4-1 (continued)
Zoning District Characteristics

Special Purpose Districts	
Zone	**Description**
BR	This Special Purpose District is the "Bay Ridge District." It was established to protect the existing scale and character of the Bay Ridge community. It distinguishes the scale of development in the midblock from that on the avenue frontage, encouraging two- and three-family homes in the midblock. Special setbacks, curb cuts, open space, tree planting and ground floor commercial requirements have been included to preserve the character of the existing street wall.
NA-1	This Special Purpose District is "Natural Area District 1." The purpose of a special natural area district is to preserve unique natural characteristics, such as aquatic, biologic, geologic, and topographical features having ecological and conservation values. The City Planning Commission must certify that all new development in mapped natural area districts meets applicable preservation standards.
SRD	This Special Purpose District is the "South Richmond Development District." It was established to guide the development of predominately vacant land in the southern half of Staten Island. The special district maintains the densities established by the underlying zones and ensures that new development is compatible with existing communities.

3.5 Socioeconomic Conditions

Demographic characteristics of the sites and study areas are based on the most current, publicly-available data from the United States Census Bureau and data collected from DCP, NYMTC, NYCEDC, and other agencies. To reflect the study area conditions as accurately as possible with existing data, each demographic study area is comprised of all census tracts that meet any of the following criteria: 1) the tract in which the site lies; 2) a tract which lies entirely within ¼ mile of the site; or 3) a tract with at least 50 percent of its area lying within ¼ mile of the site as long as that portion of the tract contains residential areas that share connectivity with the site (i.e., transportation and pedestrian access).

Public plans and policies relevant to the sites and study areas were reviewed to determine consistency with the various facilities under consideration. These typically include:

- DCP Plans for the Borough Waterfronts ("Reach Plans");
- FY 2002/2003 Community District Needs Statements;
- NYCEDC Strategic Plan for the Redevelopment of the Ports of New York;
- 197-a Plans;
- Rezoning proposals; and
- Other local DCP studies and plans.

Data selected to describe the demographic conditions of the site and study area include current estimates and future projections of population (by age, race, and sex), as well as household, housing, income, poverty, and employment characteristics. Existing and Future No-Build demographics conditions of the study area (including the site) are compared among the City and the borough(s) containing a census tract that is included in the study area. The data for census tracts comprising the study area were summed or averaged, as appropriate, except for median values (such as median incomes), which were reported only for the most populous census tract in the study area. Although discussed in Chapters 4 through 11, only general and brief tables describing socioeconomic conditions are included within the text, while tables containing greater detail are presented in Appendix B and referred to throughout the text.

The economic conditions description and impact assessment was based on a larger area, usually within ½ mile of the site. This entailed the review of available economic information typically retrieved from public policy data sources described in Section 3.4: Land Use, Zoning, and Public Policy. Other specific economic and policy sources include:

- State EZ Policy;
- City EDZ Policy;
- City Industrial Retention Program Policies (e.g., IDA); and
- DCP Information on Major Economic Development Projects.

3.6 Community Facilities and Services

Community facilities are public or publicly funded facilities, including schools, hospitals and other medical centers, libraries, day care centers, religious institutions, fire, police, and emergency medical services. Adverse effects generally could result when a project either:

- Alters the use or the conditions of a community facility (e.g., disrupts existing traffic patterns within communities near the facility and, thereby, alters the facility's access/egress routes); or
- Causes a change in population that could affect the types and/or levels of service needed by a community.

The analysis of community facilities utilizes the primary and secondary study areas, including any facilities within 250 feet of the outside boundary of the secondary study area and community facilities along truck routes where a significant number of project-generated trucks would converge. An inventory of community facilities and services was based on data available in the latest (1999) Selected Facilities & Program Sites in New York City and Community District Needs Statement (FY 2002/2003), and the Sanborn Building and Property Atlas. This inventory was used to determine if any community facilities would be displaced by the MTS Conversion Program or would potentially experience other adverse impacts due to proximity to or use on the sites. Information concerning police, fire and emergency medical services, including their capacity to accommodate projected demand, was obtained from the responsible agencies. (Letters from the New York City Fire Department are contained in Appendix A).

3.7 Open Space and Parklands

Open space and parklands are defined as publicly or privately owned land that is publicly accessible for active and/or passive recreational pursuits. In accordance with CEQR guidelines, an analysis of both direct and indirect impacts to open space and parklands was conducted. A direct impact would physically change, diminish, or eliminate an open space or parkland or reduce its utilization or aesthetic value. (This would include a facility siting that causes increased air or noise emissions, odors, or shadows that could adversely affect use of the resource.) An indirect impact could result from a facility siting that would introduce a substantial new user population that would create or exacerbate over-utilization of existing open spaces.

CEQR requirements for a full open-space analysis are related principally to new residential or commercial projects with significant numbers of additional residents or employees who may utilize open spaces. Because the Converted MTSs would employ fewer than the CEQR screening threshold of 500 employees, no quantitative assessment is required. However, the potential impact the Converted MTSs would have on traffic, air, odor, and noise conditions of nearby open spaces are assessed.

The study area for analysis of potential parkland/open space impacts includes the area located within a ½-mile radius of the site boundary (or within 250 feet of it) and the outside boundary of the secondary study area.

The inventory of parks and open spaces is based on information provided through consultation with DPR, including the Parklands Office, Parks' Capital Division, and GreenThumb.[2] Field visits were used to verify the locations of the public parks and to identify passive open spaces and privately owned open spaces that may not have been identified through initial inventory procedures. (A letter from DPR is attached in Appendix A.)

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[2] Playgrounds were included on the list of publicly accessible open space only if they were operated, at least in part, by DPR. Similarly, only those community gardens listed on the registers of GreenThumb as remaining indefinitely as public access gardens were included in this inventory of public open spaces.

The Future No-Build Conditions of open spaces and parks are assumed to be the same as Existing Conditions except for those parks identified by DPR as currently funded for improvement. Future No-Build Conditions include those planned improvements for which funding has been identified by DPR but not those "wish-listed" improvements for which funding has not been identified.

3.8 Cultural Resources

According to CEQR, cultural resources include:

- Buildings, structures, sites, objects, districts and landscapes of architectural, aesthetic, historic, and/or archaeological significance;
- Properties listed or eligible for listing on the National and/or State Registers of Historic Places or for local landmark designation.

In general, the cultural resources analysis (excluding archaeological resources) is based on the primary and secondary study areas and includes those resources within 250 feet of the outside boundary of the secondary study area. The study area for archaeological sensitivity and potential impact is comprised of only the sites, however, because any Converted MTS-related subsurface disturbance would be limited to the site.

Information on cultural resources was obtained through an inspection of the sites and study areas, through research of available archival documentation and data available from the City LPC and SHPO. (Agency correspondence is provided in Appendix A.) The assessment of potential impacts on historic and archaeological resources includes:

- Research and documentation of the historic overview of the study areas;
- Identification of historic resources on site and in the study areas and determination of any direct or indirect project-related effects;
- A Stage IA report defining the site's archaeological potential, where required by SHPO, based on review of available literature, historic atlases, and state files on areas of archaeological sensitivity; and
- A Stage IB report defining an archaeological testing plan, as necessary, prepared in consultation with the LPC and SHPO.

If mitigation is required, the appropriate measures would be developed in consultation with LPC and SHPO.

3.9 Urban Design and Visual Quality

The urban design and visual quality of an area are defined by both built and natural features. Though manufacturing zones typically do not possess sensitive urban design features or visual resources, a waterfront site or unique setting (even if industrially zoned) may contain a significant view shed or other visual resource requiring assessment for potential impacts. Study area boundaries generally are coterminous with the boundaries of the neighborhood character study area for each respective site. The study area includes the site and adjacent properties, as well as the area encompassing the broader development pattern, urban design context, and view corridors, of which the site may be an integral part.

The following components of the site and site environs were considered in the urban design/visual quality assessment:

- Existing buildings (massing, bulk, materials, orientation), structures, and open spaces on the site;
- Existing buildings, structures, and open spaces adjacent to the site;
- Existing neighborhood context of the site, with special consideration given to both the built environment (including building types/functions, styles, materials, orientation, and massing) and the unbuilt environment (including the widths of roads, open space, landscaping, and borders/buffers);
- Areas that are linked to the site visually (i.e., the area is visible from the site or the site is visible from the area); and
- Existing view corridors, including views through the site to aesthetically important objects and places, and views of the site from public areas such as parks or other important places.

Other issues specific to a site may also be considered in urban design and visual quality assessment. For example, if there are plans for public parks, access improvements, community facilities, or economic development projects within visual proximity of the site, the study area includes these locations for consideration of potential project-related impacts on these planned public developments. Additionally, the aesthetic character of areas traversed by truck routes within the study area is described generally, in accordance with CEQR guidelines. Existing and future views of historic properties in the study area from residential areas and other sensitive locations (e.g., parks) are also described, as applicable. Since the Converted MTSs would be relatively low in height and situated in relatively inaccessible, non-sensitive manufacturing districts, they would not be expected to cast new or substantially increase shadows on neighboring uses. Therefore, no shadow studies were conducted. The impacts of shadows from the Converted MTSs on the water are addressed in the natural resources section of Chapters 4 through 11. The analysis of potential urban design and visual quality includes the following:

- An inventory of the site and study area to identify sensitive visual resources;
- Identification of an impact and description of appropriate mitigation if the Converted MTS would eliminate or substantially limit views from an adjacent waterfront neighborhood, public park, landmark structure or district, or natural resource (e.g., vegetation, topography, geologic formations, wetlands, rivers, or other water resources) that is deemed to have aesthetic value;
- Assessment of the effects of increased truck activity at visually sensitive locations along truck routes and description of any significant impacts.

3.10 Neighborhood Character

For each site, a unique set of major contributing factors, including some of the conditions assessed for other environmental categories, creates the integral context and feeling of a neighborhood. Typically, a site's immediate neighborhood is defined in terms of population, urban design and visual characteristics, area history, on-site and proximal land uses, and the transportation network that supports these uses and often defines the physical boundaries of the neighborhood. Other conditions that may characterize the neighborhood of a particular site could include parks, public access to the waterfront, community facilities, and/or economic development projects.

Each site-specific neighborhood character study area or "neighborhood" is defined as the area that contains the site, possesses the defining neighborhood character, and does not extend beyond physical buffers (e.g., major arterial corridors) that effectively separate the area from its surroundings. Additionally, for truck-based facilities, these neighborhoods were defined to include the truck routes analyzed in the Traffic and Transportation section of Chapters 4 through 11. The dimensions and shape of study areas for analysis of neighborhood character, therefore, vary from site to site.

Assessment of potential effects of the Converted MTSs on neighborhood character is derived from the other pertinent environmental analyses documented in this MTS Environmental Evaluation and from field reconnaissance of the study area. If the Converted MTSs would potentially result in significant direct or indirect change(s) to a factor contributing to the study areas' neighborhood character, the degree and type of such change is reported and necessary mitigation measures are identified. The potential for an adverse cumulative effect of individual impacts is examined.

3.11 Traffic and Transportation

3.11.1 Introduction

Traffic and transportation analyses determine if the Converted MTSs would generate measurable additional traffic in or near the areas surrounding the sites, when additional traffic would be generated, and what impacts it would have on intersections and roadways. The results of the analysis are also used in determining impacts on air quality, noise quality, socioeconomic conditions, neighborhood character, community facilities and open space and parklands. The 2001 CEQR Technical Manual guidelines state that if a proposed action generates additional traffic, further analysis may be required. Pursuant to these guidelines, analyses were performed to quantify what impacts, if any, the Converted MTSs would have upon traffic conditions. The approach taken was to:

- Quantify the level of vehicle trip generation projected for each Converted MTS;
- Determine whether detailed traffic analysis is required, based upon the 2001 CEQR Technical Manual guidelines, given the level of trip generation projected;
- Define Existing and Future No-Build Conditions in the study areas of each applicable site;
- Identify and quantify any potentially significant impacts on intersections and approaches to intersections in the study areas of each site;
- Suggest reasonable mitigation measures to alleviate traffic impacts that would be generated by the proposed facilities;
- Identify high accident locations where safety is a concern based upon the 2001 CEQR Technical Manual guidelines; and
- Suggest reasonable mitigation measures to improve safety at high accident locations.

3.11.2 Background

All of the Converted MTSs would generate an increase in employee vehicle trips, and an increase in DSNY and other agency collection vehicle traffic from Existing Conditions.

New vehicle trips generated by the Converted MTSs could potentially cause deterioration in the LOS at intersections along the facility access routes in the vicinity of the site and along local roads near district garages. LOS levels are based upon the average stopped delay calculated for an intersection.

3.11.2.1 CEQR Guidelines

To determine if a detailed traffic analysis is required, the 2001 CEQR Technical Manual guidelines propose comparing the volume of new vehicle trips generated by the proposed action with the analysis thresholds that are specified in the 2001 CEQR Technical Manual. If the proposed action is projected to generate 50 or fewer peak hour vehicular trip ends, conservatively considered herein as PCE, further analysis may not be required.

Table 3.11-1 indicates the number of inbound and outbound DSNY and other agency collection vehicles projected to occur during the peak hour at each of the Converted MTSs as well as the total peak hour PCEs. The 2000 HCM defines a PCE as "the number of passenger cars displaced by a single heavy vehicle of a particular type, under specified roadway, traffic and control conditions." The CEQR Technical Manual defines waste collection vehicles as a light truck with a PCE factor of 1.5. As the table indicates, all of the Converted MTSs required detailed traffic analyses to be conducted based on peak hour PCEs greater than 50.

3.11.3 Operational Assumptions

3.11.3.1 Existing DSNY Operations

DSNY has designated 59 collection districts (CDs) in the City from which waste is collected and transported by truck to a designated facility. Currently, waste is exported to local commercial waste vendors in and around the City under interim export activities. DSNY schedules its collections and deliveries based upon three operational periods: priority, non-priority and relay.

Priority loads are assumed to originate in the center of the CD and be delivered by collection vehicles to the transfer station; then the collection vehicles return to the CD to collect additional residential waste. Non-priority loads are also assumed to originate in the center of the CD, and be delivered to the transfer station by collection vehicles; then DSNY collection vehicles return to the district garage. Relay loads are collected and returned to the district garage. The loaded collection vehicles return to the district garage, deposit their loads at a transfer station and then waste is exported 24 hours per day.

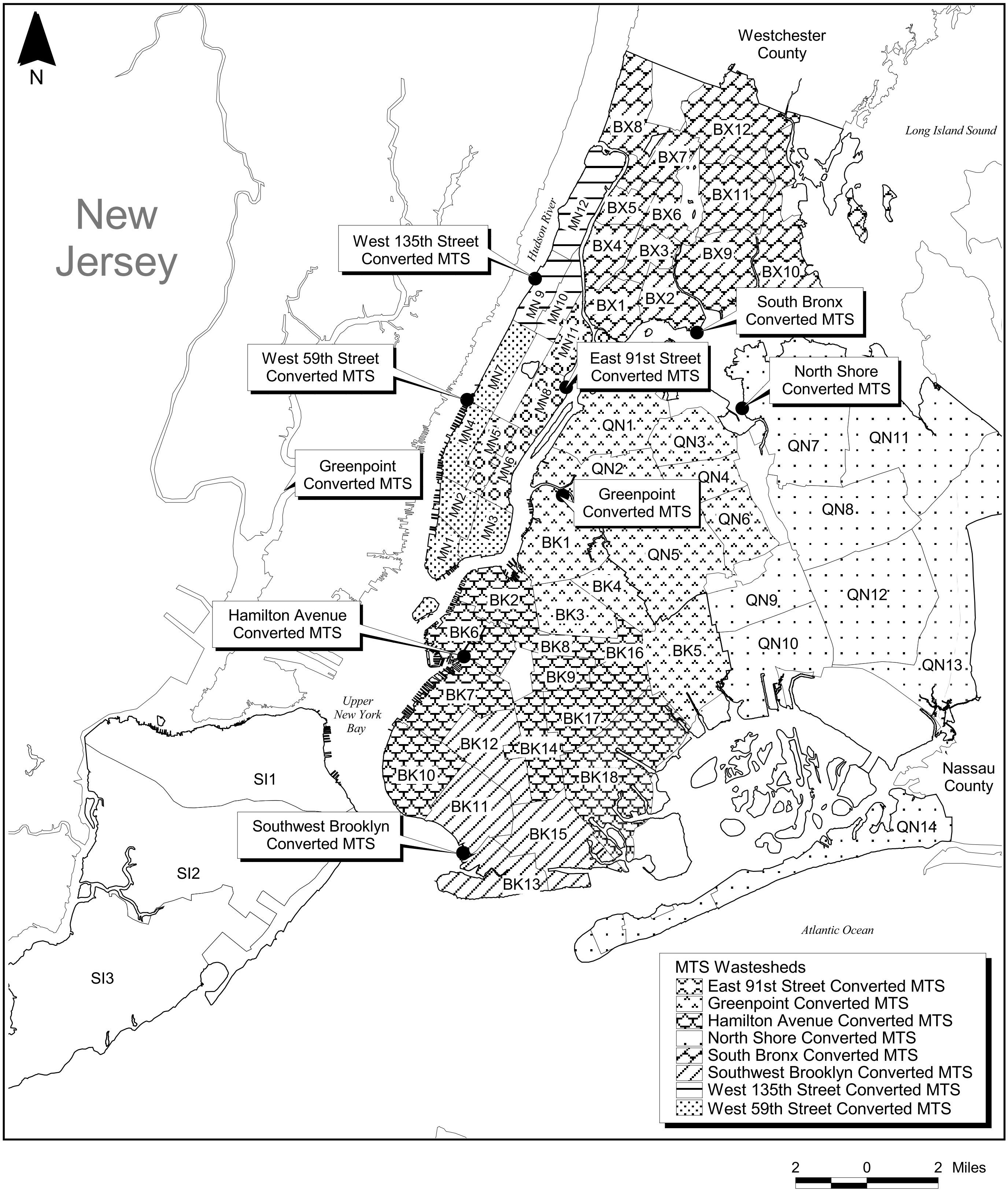
Table 3.11-1
Peak Hour Trips

Facility	Facility Peak Hour	Peak Hour Department Collection Vehicles Inbound[1]	Peak Hour Department Collection Vehicles Outbound[2]	Total Peak Hour PCEs Generated[3]
West 135th Street Converted MTS	9:00 a.m. – 10:00 a.m.	30	30	90
East 91st Street Converted MTS	9:00 a.m. – 10:00 a.m.	28	28	84
West 59th Street Converted MTS	9:00 a.m. – 10:00 a.m.	21	21	63
South Bronx Converted MTS	11:00 a.m. – 12:00 p.m.	64	58	183
North Shore Converted MTS	10:00 a.m. – 11:00 a.m.	39	38	116
Greenpoint Converted MTS	9:00 a.m. – 10:00 a.m.	61	54	173
Hamilton Avenue Converted MTS	9:00 a.m. – 10:00 a.m.	32	30	93
Southwest Brooklyn Converted MTS	10:00 a.m. – 11:00 a.m.	27	27	81

Notes:
(1) Represents the number of collection vehicles the Proposed Action would generate during the peak hour traveling to the MTS.
(2) Represents the number of collection vehicles the Proposed Action would generate during the peak hour leaving the MTS.
(3) Department collection vehicles must be multiplied by a factor of 1.5 to convert to PCEs.

Relay loads comprise the bulk of the load deliveries to commercial vendors in Manhattan, Brooklyn and Queens. Most commercial waste vendors do not fall within a travel distance that allows priority and non-priority loads from CDs in these three boroughs. Non-priority loads comprise the bulk of the loads delivered to commercial waste vendors in the Bronx.

Based upon the capacity and location of the Converted MTSs, DSNY developed allocations of the total number of loads that would be delivered to each facility from each CD, and the tonnage associated with the loads. Figure 3.11-1 shows the proposed wastesheds for the Converted MTSs. DSNY would continue to schedule its collections and deliveries based upon the three operational periods described in Section 3.11.3.1. To account for the difference in daylight hours, DSNY's main collection shift would be from 6:00 a.m. to 2:00 p.m. from April 16 through November 14 and from 7:00 a.m. to 3:00 p.m. from November 15 through April 15.



HDR PB EEA HydroQual

Figure 3.11-1 Wastesheds for Converted MTSs

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There would be a decrease in the number of relay loads used by the DSNY under Future Build operations compared to current interim operations. Although large numbers of relay loads would still be used in Queens and Brooklyn, there would be an increased emphasis on both priority and non-priority loads in Manhattan, Queens and Brooklyn. Bronx load distributions would remain relatively similar to interim operations with an increase in priority loads.

The Converted MTSs would receive waste 24-hours a day six days a week (Monday through Saturday) with a peak day each week (typically Monday or Tuesday depending on the Converted MTS) when the tonnage is, on average approximately 10 percent to 15 percent higher than the weekly average. The loads and tons allocated to the Converted MTSs were based upon this average peak tonnage, which represents typical worst-case conditions in terms of DSNY collection vehicle deliveries.

3.11.4 Trip Generation

Using DSNY's 1998 MTS scale data for all Converted MTSs (except for the South Bronx Converted MTS which is based on Fiscal Year 1997 data), the temporal distribution of waste deliveries to the Converted MTSs was calculated for the average peak day. It was assumed that Converted MTSs would have a waste delivery temporally distribution similar to the waste delivery temporal distribution of the existing MTSs when they were in operation in 1998. Using this average temporal distribution and the load allocation for the Converted MTSs, the temporal distribution of waste deliveries to the facilities was calculated in terms of priority, non-priority, and relay loads. To be conservative, trip totals were increased by 20% to account for daily and seasonal variations. Following the approach described above, the facility's peak delivery hours and corresponding projected peak hour with the highest number of collection vehicles were identified. The number of loads each facility would generate on an average peak day are listed in Table 3.11-2.

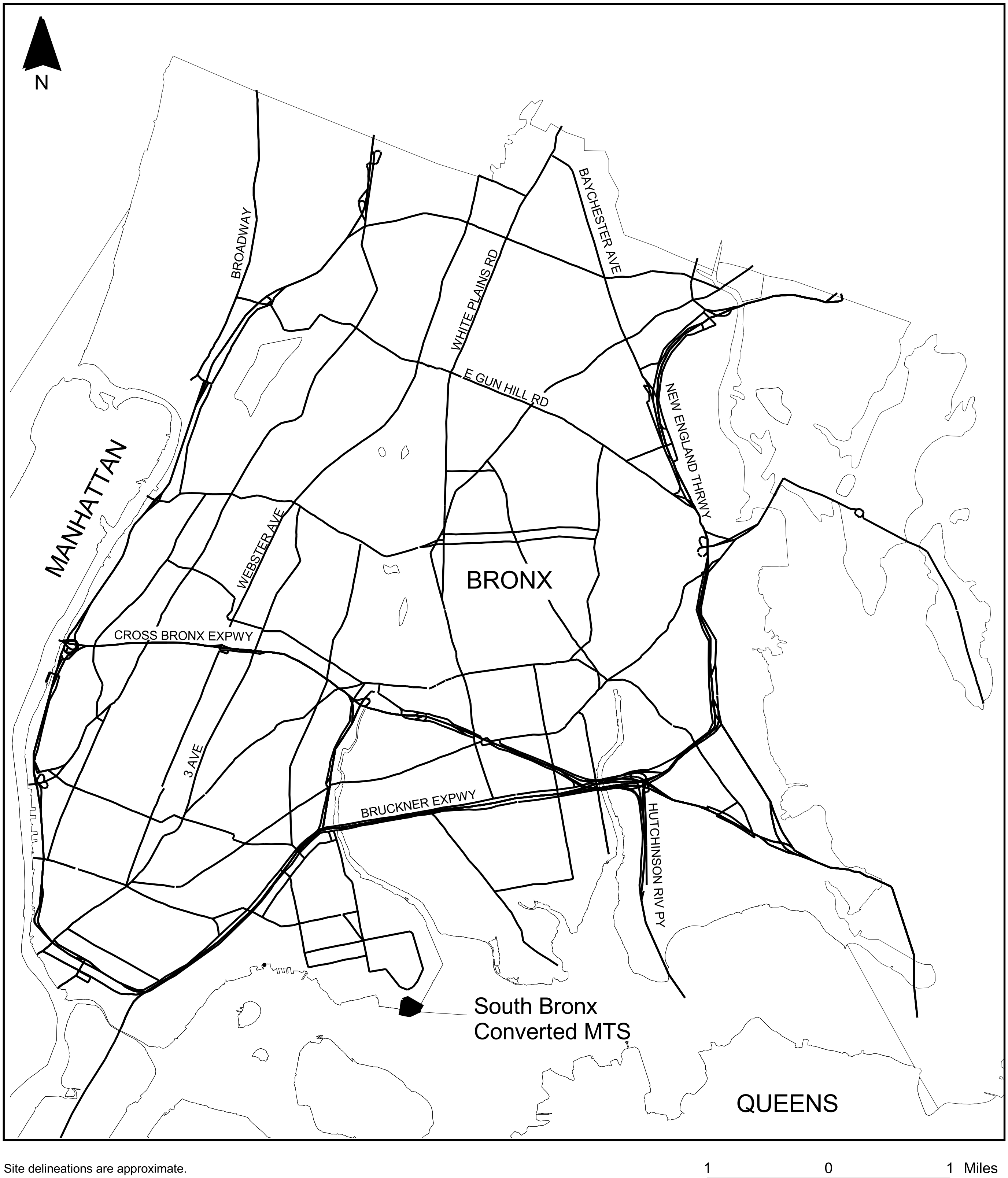
Table 3.11-2
Average Peak Day Facility Load Allocation

Facility	Total Number of Loads from Department Collection Vehicles
West 135th Street Converted MTS	222
East 91st Street Converted MTS	130
West 59th Street Converted MTS	124
South Bronx Converted MTS	363
North Shore Converted MTS	329
Greenpoint Converted MTS	423
Hamilton Avenue Converted MTS	267
Southwest Brooklyn Converted MTS	166

Additionally, Converted MTSs would generate vehicles trips from employees traveling to and from the facility during a shift change. Converted MTSs are assumed to operate in the future using a 3-shift operational structure: 12:00 a.m. to 8:00 a.m., 8:00 a.m. to 4:00 p.m., and 4:00 p.m. to 12:00 a.m. Employee shift changes are assumed to occur one half hour before and one-half hour after the start of a shift. For conservative purposes, all arriving employees are assumed to arrive one-half hour before the start of their shift and all exiting employees are assumed to depart within one-half hour after the end of their shift. The number of employee trips was quantified based on the staffing plans of the Converted MTSs. All Converted MTSs were conservatively assumed to generate 44 trips per shift change, one trip per employee for all employees traveling to and leaving from the Converted MTSs.

3.11.4.1 Traffic Study Area

The study areas include DSNY assigned collection vehicle routes from each CD and district garage to each facility. The study areas include areas in close proximity to the district garages as well as areas close to the facilities. Figures 3.11-2 through 3.11-5 depict the NYCDOT major and local truck routes for each borough of the City analyzed in the MTS Environmental Evaluation. Employee routes were assumed to be along major highways and local roadways.



Site delineations are approximate.

Figure 3.11-2 NYCDOT Designated Truck Routes - Bronx

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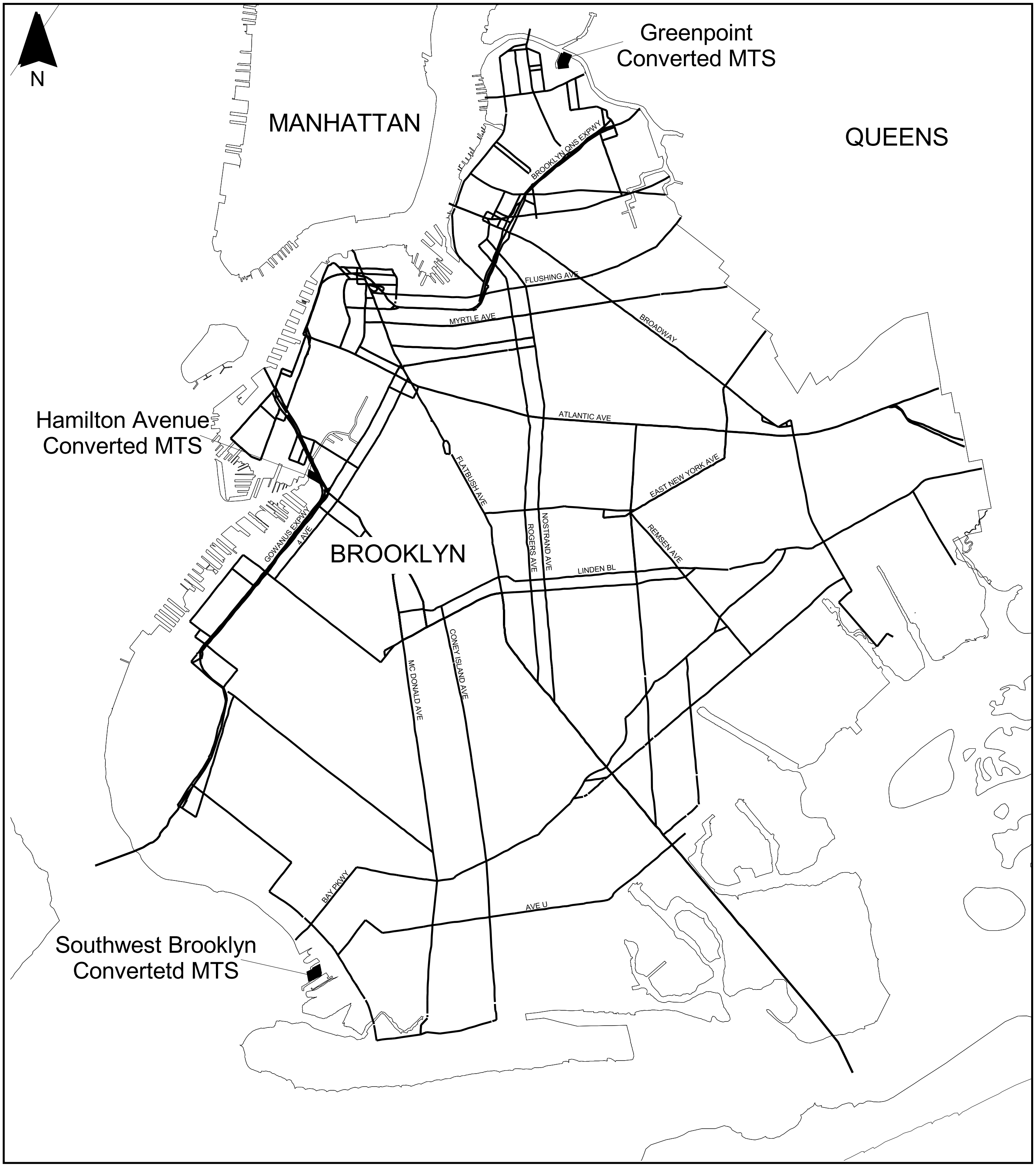

Site delineations are approximate.

1 0 1 Miles

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Figure 3.11-3 NYCDOT Designated Truck Routes - Brooklyn

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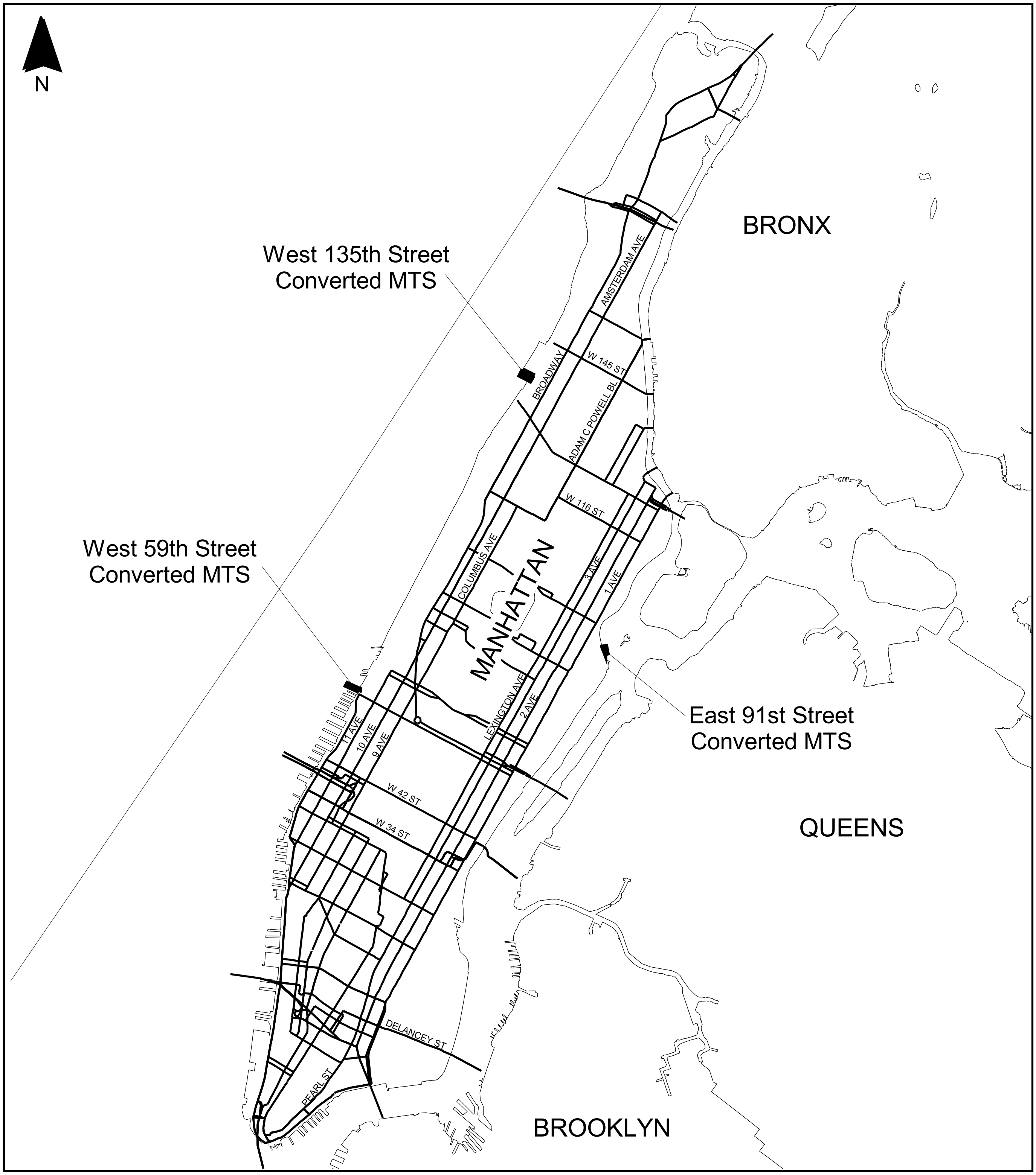

Site delineations are approximate.

1 0 1 Miles

Figure 3.11-4 NYCDOT Designated Truck Routes - Manhattan

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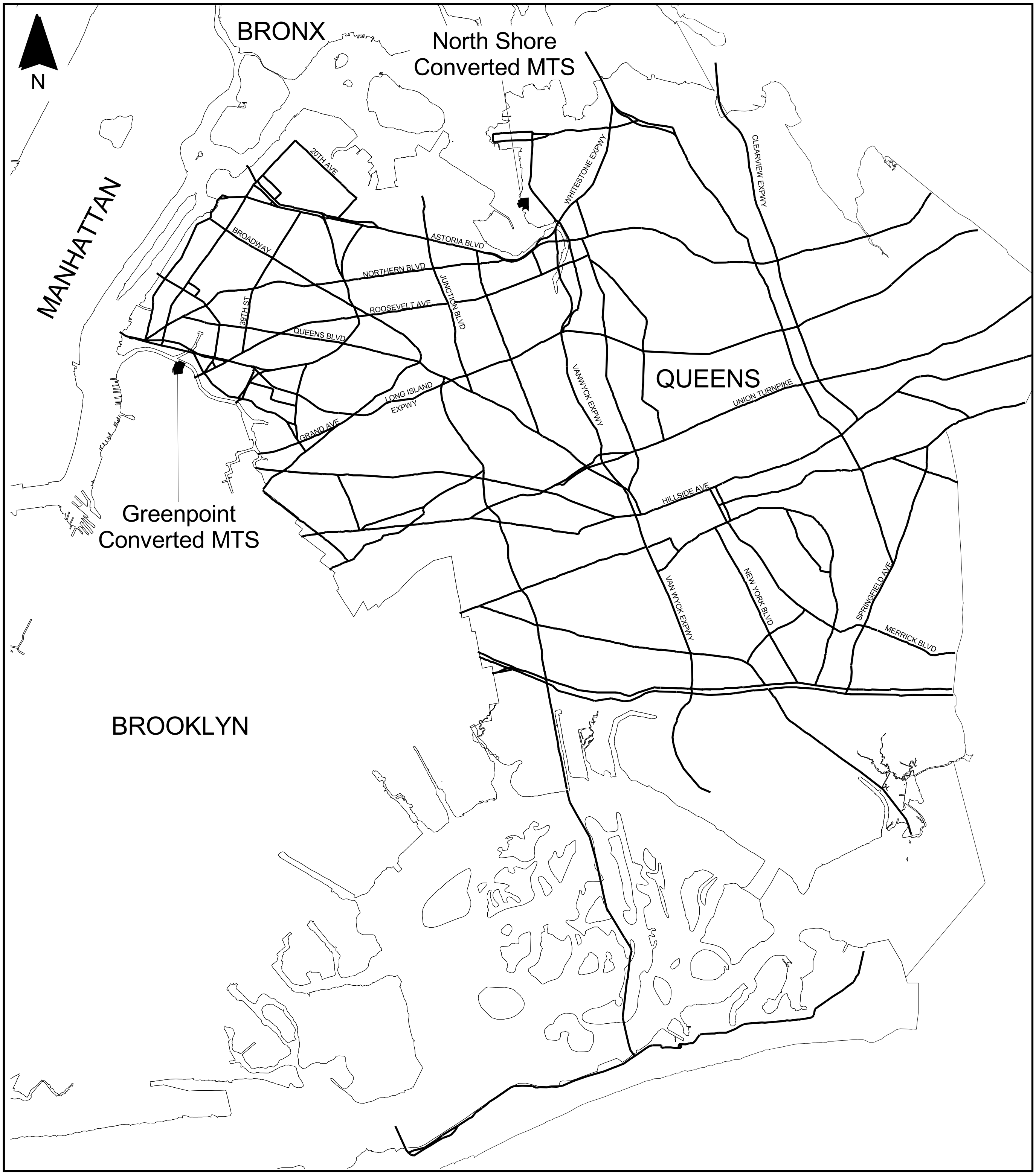

Site delineations are approximate.

1 0 1 Miles

Figure 3.11-5 NYCDOT Designated Truck Routes - Queens

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The traffic study area also included intersections and locations that could be considered high accident locations and problematic from a safety viewpoint. "A high accident location is one where five or more pedestrian accidents occur in any one year in the most recent 3-year period for which data is available" as defined by the 2001 CEQR Technical Manual.

3.11.4.2 Traffic Assignment in Study Area

After the initial routes to the facilities were determined, the following steps were taken:

1. The location of the centroid of each CD and the location of each district garage were plotted.
2. Existing routes to commercial waste vendors under interim export from the centroid of each CD and the district garages were plotted on a site-specific map, as were any CEQR defined areas of concern or critical intersections.
3. Proposed routes to the facilities from the centroid of each CD and the district garages were plotted on the same site-specific map as the existing truck routes.
4. Existing and future collection vehicle routes were compared to determine the portions of the routes that overlapped.
5. The study area was finalized once the routes were finalized. The study area included an area around the facility where additional collection vehicle traffic would be generated in excess of the CEQR specified analysis threshold. Intersections within the study area were screened for further analysis using the procedure described in Section 3.11.5.
6. NYCDOT reviewed and approved the proposed routes and the site-specific study areas and provided information from prior studies for these areas, if available. NYCDOT also provided information on changes to traffic patters that would be implemented prior to the build year of 2006 due to other projects in the vicinities of the facilities.

3.11.5 Screening Methodology

Intersections along truck routes and district garage routes were screened using three different criteria. The first identifies intersections through which 50 or more additional PCEs are assigned during peak hours; the second identifies intersections in which significant increases in delay result from less than 50 additional PCEs based on the type of traffic control and characteristics of the intersecting streets; and the third identifies intersections that are high accident locations as defined in the 2001 CEQR Technical Manual. All intersections that met one or more of the above criteria were considered critical intersections and subject to a traffic or safety analysis.

A summary of all critical intersections along CD routes and district garage routes meeting the above screening criteria are presented in each applicable site-specific chapter in this MTS Environmental Evaluation. No intersections or locations were identified for safety analysis at the Converted MTSs. Likewise, no intersections located near district garages met the above criteria and were note, therefore, considered for further traffic analysis. NYCDOT reviewed and approved the selected intersections.

3.11.6 Data Collection

The following data was obtained for intersections identified for further analysis:

- Data available from prior studies (within a 3-year period) conducted for the DSNY or submitted to and/or conducted by the NYCDOT; and
- Signal timing and phasing, and intersection as-built drawings of signalized intersections from the NYCDOT. The timing and phasing of each intersection was then field verified. Geometrics for intersections were field verified.

Where recent data were unavailable or unusable, the following data were obtained in the field:

- Three- or one-day turning movement counts, depending upon the specific study area, schedule, and weather constraints. If one-day turning movement counts were obtained, they were adjusted for a three-day average using ATR counts.

- Full turning movement counts for traffic analysis:
  - Time periods: 7:00 a.m. to 7:00 p.m. (Data collection times may vary from site to site but are consistent for all intersections studied for a particular site.);
  - Vehicle classifications: autos, trucks, buses (3 or more axles); and
  - Inventories: full physical inventories and intersection operations observation.

- Short-term counts for air quality and noise studies:
  - Time periods: 15 or 20-minute counts per hour during the above hours at each location;
  - Vehicle classifications: six category classification counts by direction; and
  - Inventories: full physical inventories and intersection operations observation.

- Travel time surveys:
  - Time periods: 7:00 a.m. to 7:00 p.m.;
  - Coverage: Six to nine runs per direction per time period; and
  - Procedure: Checkpoints at each signalized intersection, record stopped delay.
- ATR Counts:
  - Duration: Tuesday to Thursday minimum, seven days preferred for 24 hours each day.
- Accident information at intersections
  - Source: Appendix 1; 2001 CEQR Technical Manual; and
  - Source: State DOT Accident Records

3.11.7 Data Compilation

Using data collected in the field, the baseline traffic volumes were calculated for the average weekday at each intersection. ATR data were used to adjust the manual turning movement counts to obtain a more representative measure of the existing hourly traffic volume at each intersection. Future No-Build Conditions were calculated for the Future Build year by applying the CEQR specified growth rates (Table 3.11-3) to the Existing Conditions. These Future No-Build traffic projections included traffic from any known future developments within or near the study area that have environmental and regulatory approvals in place. Information on future developments was obtained from local community boards and DCP. Finally, the future build traffic volumes were calculated by adding the net increase in collection vehicles and employee vehicles to the Future No-Build Condition for each intersection.

Table 3.11-3
Annual Growth Rates for Studied Areas

Facility	Location	Growth Rate (%)
West 135th Street MTS	Manhattan	0.5
East 91st Street MTS	Manhattan	0.5
West 59th Street MTS	Manhattan	0.5
South Bronx MTS	Bronx	0.5
North Shore MTS	Queens	1.0
Greenpoint MTS	Brooklyn	1.0
Hamilton Avenue MTS	Brooklyn	1.0
Southwest Brooklyn MTS	Brooklyn	1.0

3.11.8 Analysis

Three time periods were selected for analysis based upon the vehicle trips to be generated by the operations at each facility:

- The AM peak hour that would experience the greatest impact from the projected net increase in collection vehicles (AM Facility Peak Hour or AM Background Peak Hour) during the Future Build Year;
- The PM peak hour that would experience the greatest impact from the projected net increase in collection vehicles (PM Facility Peak Hour or PM Background Peak Hour) during the Future Build Year; and
- The Facility Peak Hour.

The peak time periods remained constant for all intersections analyzed in a study area. The time periods may have differed, however, from site to site. Employee vehicles were added to the analysis if such trips occurred during the peak time period analysis hours.

No weekend analyses were conducted because: (1) The facilities would not receive DSNY-managed waste on Sundays; and (2) The Saturday background traffic and project-induced traffic are lower than the weekday traffic for the Converted MTSs.

The primary measure of an intersection's general operational state is its LOS. The 2000 HCM defines LOS as "A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience." For all intersections, the 2000 HCM specifies six levels of service: LOS A through LOS F. LOS A generally describes an intersection where there is little or no delay time and progression is extremely favorable. LOS F generally describes poor progression and long delay times and also indicates over-saturation of the intersection. For signalized intersections, LOS is characterized by delay in a lane group or overall at an intersection. The 2000 HCM[3] defines delay as "The additional travel time experienced by a driver, passenger, or pedestrian." Table 3.11-4 displays the delay for signalized and unsignalized intersections as specified by the 2000 HCM to characterize each of the six levels of service.

[3] The methodologies for analyzing signalized and unsignalized intersections have limitations noted for their specific sections: 1) The signalized methodology "does not take into account the potential impact of downstream congestion on intersection operation", nor does the methodology "detect and adjust for the impacts of turn-pocket overflows on through traffic and intersection operation." 2) The unsignalized methodology is "for steady-state conditions"; "the methods are not designed to evaluated how fast or how often the facility transitions from one demand/capacity state to another."

Table 3.11-4
LOS Criteria for Signalized and Unsignalized Intersections

Level of Service	Stopped Delay Per Vehicle (sec)	
	Signalized Intersection	**Unsignalized Intersection**
A	≤ 10	≤10
B	> 10 or ≤20	> 10 or ≤ 15
C	> 20 or ≤35	> 15 or ≤25
D	> 35 or ≤ 55	> 25 or ≤ 35
E	> 55 or ≤ 80	> 35 or ≤50
F	> 80	> 50

3.11.9 Impact Analysis Methodology

CEQR states that generally "deterioration in level of service within the clearly acceptable range (LOS A through LOS C) is not considered a significant impact." However, CEQR further states that the level of service must be disclosed and may constitute significant impacts on neighborhood character should they occur on residential streets. Furthermore, "Levels of service that deteriorate from clearly acceptable LOS A, B, or C in the Future No-Build Condition to marginally unacceptable mid-LOS D or unacceptable LOS E or F in the Future Build Condition would be considered significant impacts." The same criteria are applied to unsignalized intersections as to signalized intersections. CEQR also states "For the minor street to trigger significant impacts, 90 PCEs must be identified in the Future Build Condition in any peak hour." Table 3.11-5 presents the CEQR defined significant impacts for signalized and unsignalized intersections that have a Future No-Build Condition of LOS D or worse.

Table 3.11-5
Significant Impacts for Signalized and Unsignalized Intersections

Future Baseline LOS	Significant Impact Delay Time (sec)
LOS D	5
LOS E	4
LOS F	3
LOS F with delay > 120 seconds	1

In addition to delay time, CEQR also specifies the use of v/c (volume-to-capacity) ratios as an indicator of intersection LOS, with high v/c ratios (approaching 1.0) indicating the development of problem conditions. CEQR requires the disclosure of both v/c ratios and average vehicle delays for each lane group at an intersection.

All analyses were performed using the Highway Capacity Software Model version 4.1(c). Model runs were conducted for the Existing Conditions traffic levels, Future No-Build traffic levels, and the traffic levels in the Future Build year. For both signalized and unsignalized intersection analysis, impacts were calculated by comparing the Future No-Build intersection delay and LOS with the intersection delay and LOS in the Future Build Condition. For both the signalized and unsignalized intersection analysis, the changes were compared with the 2001 CEQR Technical Manual criteria to test whether or not the impacts can be classified as significant. Individual study area findings are presented in the site-specific sections of this MTS Environmental Evaluation.

For safety impact analyses, the 2001 CEQR Technical Manual states that "assessment of impacts can generally be made at a qualitative level, but should indicate the nature of the impact, the volumes affected by or affecting such impacts, and the likelihood of its severity, if possible." Increasing pedestrian traffic at high accident locations can lead to increasingly unsafe conditions, and generating measurable pedestrian crossings at non-controlled locations leads to unsafe conditions. If high accident locations were identified, mitigation measures were explored based on the types and frequency of accidents.

3.11.10 Typical Mitigation Measures

If significant impacts are found under the Future Build year analysis, CEQR requires the identification and evaluation of suitable mitigation measures that would restore traffic to the Future No-Build Conditions or to acceptable levels. For example, if the Future No-Build Conditions are determined to be LOS D, E, or F, then a return to the Future No-Build Conditions in the Future Build year is required. If the Future No-Build LOS is A, B, or C, and the LOS in the Build year deteriorates to D, E, or F, then mitigation to mid LOS D is required under the 2006 Build Conditions. The mitigation analysis varied by study area and individual intersections based on the severity of the impacts and the existing operation of the intersection. In general, all mitigation measures were evaluated for suitability based upon severity of impact, relative cost of mitigation (defined below as low, moderate or high), and the ease of implementation. Mitigation measures with a high associated cost were considered only to mitigate the most severe impacts when all other alternative mitigation measures were deemed inadequate. Mitigation measures evaluated were:

- Low Cost:
  - Signal phasing and timing modifications;
  - Parking regulation modifications;
  - Lane restriping and pavement marking changes; and
  - Street direction and other traffic flow related changes (i.e., signage).
- Moderate Cost:
  - Intersection channelization improvements; and
  - Traffic signal installation.
- High Cost (where applicable):
  - Street widenings.

Mitigation measures were also considered for locations identified as high accident intersections. Pedestrian safety mitigation measures were considered on the same basis as traffic mitigation measures in terms of Existing Conditions, severity on impact, cost, and ease of implementation. Pedestrian safety mitigation measures evaluated were:

- Low Cost:
  - Advanced stop lines;
  - Addition/ modification of signs; and
  - High visibility crosswalks.
- Moderate Cost:
  - Traffic signal enhancements; and
  - Addition of pedestrian safety areas (i.e., raised medians and crossing islands).
- High Cost (where applicable):
  - Pedestrian signal upgrade or installation; and
  - Roadway redesigns to benefit pedestrians.

For each study area, a summary of the mitigation measures identified and evaluated for intersections where significant impacts or high accidents were found are presented in the appropriate site-specific chapters of this MTS Environmental Evaluation.

3.12 Air Quality

3.12.1 Introduction

Although located in manufacturing-zoned districts, operations that would occur within the Converted MTSs would generate some air pollutant emissions within and near each site and potentially alter local air quality conditions. Also, the addition of DSNY and other agency collection vehicles to roadways in the vicinity of the Converted MTSs would affect local traffic conditions and air quality levels near these roadways. The air quality analyses determine whether and to what extent the Converted MTSs would affect air quality levels at nearby sensitive land uses during construction and operations.

Pursuant to CEQR, the air quality analyses performed for each Converted MTS:

- Describes Existing and Future No-Build air quality conditions in the New York Metropolitan Region; and
- Identifies and quantifies any potentially significant air quality impacts at the Converted MTS sites.

Two types of analyses were conducted to estimate the air quality effect of each Converted MTS. The first estimates the impacts associated with emissions generated by on-site operations and the second estimates the potential impacts associated with off-site DSNY and other agency collection vehicle operations.

The following emission sources were considered for the analysis of on-site operations:

- Combustion emissions of diesel engines of operational equipment, including tugboats and moving and queuing collection vehicles, and municipal solid waste handling equipment (i.e., wheel loaders) that would operate inside or outside of the processing building;
- Fugitive dust emissions from municipal solid waste material handling operations (i.e., loading, unloading, transferring) that would occur inside the processing buildings;
- Re-entrained dust resulting from collection vehicles that would travel on paved roads inside and outside the processing buildings; and
- Heating plant and/or space heater emissions released from stacks on the processing buildings.

For off-site analyses, the effects of the DSNY and other agency collection vehicles traveling to and from each Converted MTS were determined by estimating pollutant concentrations at roadway intersections that would be most affected by such vehicles.

Both the on-site and off-site analyses were designed to determine whether Converted MTS operations would cause or exacerbate violations of applicable ambient air quality standards and/or exceed appropriate air quality guideline values or impact thresholds.

3.12.2 Air Quality Standards and Impact Significance Criteria

3.12.2.1 Ambient Air Quality Standards and Guidelines

3.12.2.1.1 National and State Ambient Air Quality Standards

NAAQS have been established by USEPA for six major air pollutants: CO, NO_2, O_3, $PM_{2.5}$, PM_{10}, SO_2, and Pb. The air pollutants identified by USEPA as being of concern nationwide are CO, HC, NO_2, O_3, PM, SO_x, and Pb. Of these, pollutants, those considered in this MTS Environmental Evaluation are:

- **CO.** CO is a colorless and odorless gas that is generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. In the City, more than 80 percent of CO emissions are from motor vehicles. The addition of collection or other trucks to roadways that are already congested may reduce overall vehicular operating speeds and increase CO emissions.

- **HC**. HC compounds are also referred to as volatile organic compounds (VOC). While no NAAQS have been established, this class of chemicals can act as a precursor to the formation of O_3, for which there is a NAAQS. Impacts of the Converted MTSs on ozone formation are not addressed in this analysis because these impacts occur on a larger, regional scale and any changes in emissions on a regional basis from waste disposal operations would not be significant. However, HC emissions were evaluated for the purpose of assessing human health risks due to the applicable individual toxic air pollutants, for which no NAAQS exist.

- **NO_x.** Nitrogen oxides include nitric oxide (NO) and nitrogen dioxide (NO_2). NO_x is emitted by motor vehicles and stationary sources due to the combustion of fuels. While most NO_x emissions leave the stack or exhaust pipe in the form of NO, they gradually convert to NO_2 in the atmosphere, which is the form of NO_x regulated by a NAAQS. NO_x also acts as a precursor to the formation of O_3; however, because such activity occurs on a large, regional scale and Converted MTS emissions would be insignificant on such a scale, the O_3 precursor effects of NO_x were not considered.

- **PM.** Respirable particulate matter with an aerodynamic diameter smaller than 10 microns in diameter (including both PM_{10} and $PM_{2.5}$) is emitted to the atmosphere by sources such as industrial facilities, power plants, construction activity, wind erosion from paved roadways, and diesel-powered vehicles, such as collection vehicles and other heavy trucks and buses. The addition of DSNY and other agency collection vehicles to, from, and within a Converted MTS may result in potential impacts from particulates due to tail pipe exhaust and increases in dust particles from truck travel on paved roads (i.e., re-entrained dust). Although there is a state standard for total suspended particulates (TSP), it is no longer enforced and potential impacts of TSP were not considered in this analysis because PM_{10} and $PM_{2.5}$ impacts are more representative of the health-related effects of particulate emissions.

- **Sulfur dioxide (SO_2).** Emissions generated from the combustion of sulfur-containing fuels, primarily oil and coal, for power generation, space heating, or transportation are associated mainly with stationary sources. Potential SO_2 impacts from the operation of on-site diesel fuel-fired equipment were considered.

Lead impacts were not analyzed in this MTS Environmental Evaluation. Lead emissions, which historically were influenced primarily by motor vehicle activity, have been reduced substantially due to the elimination of lead from gasoline. As a result, a quantitative analysis of lead is no longer warranted.

The NAAQS specify concentrations of criteria pollutants that are not to be exceeded at ambient air quality receptor sites. NAAQS have been established for various averaging times based on how each pollutant affects human health. The estimated concentrations of criteria pollutants resulting from Converted MTS operations combined with the background concentrations discussed later in this document are compared to the NAAQS. The total amount of each applicable criteria pollutant generated by on-site non-fugitive sources was also estimated to determine if the total exceeds major emission source threshold values (as defined in Part 201 of NYCRR). If so, a facility would be subject to major source permitting requirements. The NAAQS are summarized in Table 3.12-1.

Table 3.12-1
National and State Ambient Air Quality Standards (μg/m^3)

Contaminant	Averaging Period	Federal Primary	Federal Secondary
Carbon Monoxide (CO)	8 hour[1]	10,000 (9 ppm)	10,000
	1 hour[1]	40,000 (35 ppm)	40,000
Sulfur Dioxide (SO_2)	Annual	80 (0.03 ppm)	--
	24 hour[1]	365 (0.14 ppm)	--
	3 hour[1]	--	1,300 (0.5 ppm)
Nitrogen Dioxide (NO_2)	Annual	100 (0.05 ppm)	100
Ozone (O_3)[2][3]	1-hour[3]	235 (0.12 ppm)	235
	8-hour[1][4]	0.08 ppm	0.08 ppm
PM_{10}	Annual	50	50
	24 hour[2]	150	150
$PM_{2.5}$[4]	Annual[6]	15	15
	24 hour[5]	65	65
Lead (Pb)	Three mo. (Calendar quarter)	1.5	--

Sources: USEPA, *National Primary and Secondary Ambient Air Quality Standards* (40 CFR 50)

Notes:

(1) Not to exceed more than once per year, per monitor location, over a three-year period.

(2) During any 12 consecutive months, 99 percent of the values shall not exceed 150 μg/m^3.

(3) The number of days with hourly levels greater than standard shall not exceed one per year.

(4) Standards for 8-hour ozone and for particulate matter smaller than 2.5 microns in diameter were promulgated in 1997, but are not yet fully implemented by the USEPA.

(5) During any 12 consecutive months, 98 percent of the values shall not exceed 65 μg/m^3.

(6) Spatial average standard, applied by USEPA over a neighborhood scale.

3.12.2.1.2 Significant Impact Thresholds

USEPA is currently implementing procedures for complying with the $PM_{2.5}$ NAAQS, and has not yet made a formal determination on which areas of the U.S. will be classified as meeting these relatively new standards. Until areas are designated and appropriate background levels established, comparison with the $PM_{2.5}$ NAAQS is not feasible. As an alternative, impacts were compared with interim significant thresholds established by NYSDEC and NYCDEP. The following approach was applied to $PM_{2.5}$:

- Potential incremental 24-hour and annual impacts from Converted MTS operations were estimated using the same modeling methodologies used for other criteria pollutants.
- Results from the receptor having the highest 24-hour concentration were compared to an STV of 5 $\mu g/m^3$ to determine if the facility and/or collection vehicle traffic have a significant short-term (24-hour) impact.
- Results from the receptor having the highest annual concentration were compared to an STV of 0.3 $\mu g/m^3$ to determine if the facility and/or collection vehicle traffic have a significant annual impact at a single receptor.
- To evaluating annual impact, the potential incremental impacts from on-site operations were evaluated on a spatial-average basis, (neighborhood scale) as follows:

  - A 1 km x 1 km Cartesian receptor grid centered at the receptor having the highest estimated annual $PM_{2.5}$ concentration from the previous analysis (with 25-meter spacing in all directions) was developed. All receptors within the grid but within the Converted MTS property fence line were eliminated from the model input.
  - The results estimated at all receptors within the receptor grid for the on-site emissions were averaged. This value was added to the maximum annual receptor concentration obtained in the off-site analysis. If there were no intersections within the 1 km x 1 km receptor grid, an analysis was performed on the roadways within the 1 km x 1 km grid by simulating them as line sources.
  - The total on-site plus off-site concentration was compared to an annual STV of 0.1 $\mu g/m^3$.
  - If the neighborhood averaged impact rounded to the nearest tenth (i.e., 0.15 rounds up, while lower values round down) was greater than the 0.1 $\mu g/m^3$ STV, the analysis was refined further by combining the emissions from the on-site sources and off-site roadways, including intersections, into a single ISCST3 model run to determine the neighborhood average using the same methodology as above.

- The maximum incremental impact from off-site operations on an annual basis based on concentrations estimated at 15 meters from the edge of affected roadways was added to the impact from the on-site model receptor and compared to the 0.1 $\mu g/m^3$ spatial average STV, as a conservative estimate of a spatial average concentration increment.

In addition to the NAAQS and $PM_{2.5}$ interim significance thresholds, CO incremental impact criteria known as "*de minimis*" criteria have been established under the NYCDEP's CEQR guidelines to estimate the significance of impacts from projects affecting mobile source operations. These are:

- An increase of 0.5 ppm or more for the eight-hour period, when baseline CO concentrations are above 8.0 ppm; and
- An increase of one half the difference between the baseline and the standard concentration (9 ppm) for the eight-hour period when baseline CO concentrations are below 8 ppm.

3.12.2.1.3 Toxic Air Pollutants

Small quantities of a wide range of the non-criteria air pollutants, known as toxic air pollutants, that are emitted from diesel-fueled vehicles are also of concern. These pollutants can be grouped into two categories: *carcinogenic* air pollutants; and *non-carcinogenic* air pollutants. Carcinogenic pollutants in diesel exhaust emissions include formaldehyde, benzene, benzo(p)pyrene, 1,3 butadiene, and acetaldehyde; non-carcinogenic pollutants include toluene, xylenes, acrolein, and various polycyclic aromatic hydrocarbons.

No federal standards have been promulgated for toxic air pollutants; however, NYSDEC has established acceptable ambient levels for these pollutants based on human exposure criteria in the *Guidelines for the Control of Toxic Ambient Air Contaminants*. In this document, NYSDEC outlines SGCs and AGCs. Estimated concentrations of toxic pollutants were compared with these values.

USEPA has developed approaches that can be used to assess the potential impacts associated with carcinogenic and non-carcinogenic air pollutant releases. USEPA's "Hazard Index Approach" together with NYSDEC guidelines was used to assess the potential impacts associated with chronic and acute risk from the release of non-carcinogenic toxic air pollutants from each converted MTS. The potential impacts of non-carcinogenic air pollutant releases from on-site operating diesel-powered equipment, collection vehicles and tugboats were assessed as follows:

- Ratios of the maximum estimated pollutant concentration, divided by its respective health-related NYSDEC Guideline Values (SGCs and/or AGCs), were estimated for each applicable non-carcinogenic toxic pollutant;
- Short-term (1-hour) ratios were developed to assess the potential for acute risk exposure, and annual ratios were developed to assess the potential for chronic risk exposures;
- The short-term and annual ratios for each of these pollutants were summed to obtain total short-term and annual ratios of all pollutants combined;
- The total short-term and annual ratios were compared with a hazard index of 1; and
- If the total ratios were found to be less than 1, then no significant air quality impacts would occur due to these non-carcinogenic pollutant releases.

NTSDEC cancer risk thresholds, which are based on USEPA's IRIS database, were used for this analysis. The potential cancer risk associated with each pollutant was estimated, and the total incremental cancer risk associated with the release of all of the carcinogenic toxic pollutants was estimated by summing the risk associated with each of the carcinogenic pollutants on a receptor-by-receptor basis.

USEPA considers that an overall incremental cancer risk from a proposed action of less than **one-in-one million** is not significant. If the total combined incremental cancer risk of all of the carcinogenic toxic pollutants at the sensitive receptor locations was less than one-in-one million, cancer-related air quality impacts were determined to be insignificant.

Based on the types of pollutants associated with the Converted MTSs, 15 toxic compounds that have been identified as emissions from diesel equipment and that have emission factors developed by USEPA were considered in this analysis, along with their respective NYSDEC guideline values, revised in 2000 (Table 3.12-2). The emission factors used for each of the toxic compounds were obtained from USEPA's AP-42 Compilation of Air Pollutant Emission Factors, Table 3.3-2 Speciated Organic Compound Emission Factors for Uncontrolled Diesel Engines, revised in October 1996.

Table 3.12-2
Annual and Short-term Guideline Concentrations

No.	Toxic air Pollutant	Short-term (1-Hour) Guideline Concentration (SGC) μg/m3	Annual Guideline Concentration (AGC) μg/m3
Carcinogenic			
1	Benzene	1,300	0.13
2	Formaldehyde	30	0.06
3	1,3 Butadiene	--	0.0036
4	Acetaldehyde	4,500	0.45
5	Benzo(a)pyrene	--	0.002
6	Propylene	--	3000
Non-Carcinogenic			
7	Acrolein	0.19	0.02
8	Toluene	37,000	400
9	Xylenes	4,300	700
10	Anthracene	--	0.02
11	Benzo(a)Antracene	--	0.02
12	Chrysene	--	0.02
13	Naphthalene	7,900	3.0
14	Pyrene	--	0.02
15	Phenanthrene	--	0.02
16	Dibenz(a,h)anthracene	--	0.02

Source: NYSDEC Division of Air Resources-1 (DAR-1) AGC/SGC Tables, July 12, 2000

3.12.3 Regulatory Setting

3.12.3.1 Monitored Air Quality and Background Concentrations

Air pollutant levels in the New York City Metropolitan area are monitored by a network of sampling stations operated under the supervision of NYSDEC. Monitored ambient air quality levels for each borough were provided by NYCDEP for use in each Converted MTS site-specific analysis. NAAQS attainment status is based on a three-year period of monitoring, so despite the more recent data that shows no violation of NAAQS, the area contains NAAQS non-attainment designations for some pollutants, as detailed below.

Background concentrations (i.e., pollutant levels due to emission sources not accounted for in the modeling analysis) of the criteria pollutants for the on-site and off-site air quality impact analyses were obtained primarily from NYCDEP on April 18, 2003. These values are based on ambient monitored values for the last few years of data from NYSDEC's ambient monitoring system. More recent data from the NYSDEC Monitoring Network were used where appropriate. The background concentrations were added to the on-site and off-site modeling results to estimate the total pollutant concentrations. The background concentrations presented in Table 3.12-3 and Table 3.12-4, as well as the technical back up submitted to NYCDEP, were used for each site-specific analysis.

$PM_{2.5}$ background levels were not used in this analysis because they have not yet been established by NYSDEC or NYCDEP. Instead, facility-related $PM_{2.5}$ impacts were compared to interim "significance impact thresholds" to determine the likelihood of significant impacts. Maximum modeled incremental $PM_{2.5}$ impacts (due to on-site and off-site operations only) for the 24-hour, annual neighborhood and annual maximum periods were compared against interim "significance thresholds" of 5 $\mu g/m^3$, 0.1 $\mu g/m^3$ and 0.3 $\mu g/m^3$, respectively.

Table 3.12-3
Background Concentrations[1]

	SO_2					PM_{10}			NO_2
	Annual[2] (μg/m³)	24-hour[3] (μg/m³)		3-hour (μg/m³)		Annual[2] (μg/m³)	24-hour[3] (μg/m³)		Annual[2] (μg/m³)
NAAQS	**80**	**365** **1st Max**	**365** **2nd**	**1300** **1st Max**	**1300** **2nd**	**50**	**150** **1st Max**	**150** **2nd Max**	**100**
Manhattan									
Mabel Dean	34	139	118	246	212	22	61	49	70
PS 59	34	139	121	265	228	34*	88*	74*	77
Queens									
Queens College	---	---	---	---	---	---	---	---	---
Queensboro Comm. College	18.3	107	87	186	165	---	---	---	51
College Point Post Office	---	---	---	---	---	---	---	---	56
Bronx									
IS 155	26	113	100	215	194	24*	75*	55*	---
Morrisania	31	144	113	325	233	25*	73*	55*	68
Botanical Garden	---	---	---	---	---	---	---	---	58
IS 52	---	136	126	254	233	---	53	45	---
Brooklyn									
Greenpoint	21	87	84	189	147	23[2]	57 [3]	50[3]	---
PS 321	24	94	94	152	144	22*	82*	48*	---
PS 314	---	---	---	---	---	27*	91*	57*	---
Staten Island									
Susan Wagner	16	89	73	157	123	17	64	46	---
PS 26	---	---	---	---	---	23*	89*	57*	---
Port Richmond	---	---	---	---	---	---	84*	55*	---

Note:
(1) Pollutant background concentrations provided by NYCDEP on April 18, 2003.
(2) annual data is based on 2 years (1998-1999)
(3) 24-hr Avg. are based on 3 years (1997-1999)
(*) Based on data collected from (1996-1998)

Table 3.12-4
CO Background Levels

Study Area	1-hour Concentration (ppm)	8-hour Concentration (ppm)
Midtown Manhattan	4353	3322
Downtown Brooklyn and Long Island City	3321	2635
Rest of the City	3781	2635

Source: New York State Department of Transportation (NYSDOT) *Environmental Procedures Manual* (January 2001).

No background values were considered for the toxic pollutant analysis because toxic pollutant impacts were assessed from a project incremental risk standpoint.

3.12.3.2 Regulatory Status

The federal Clean Air Act Amendment (CAAA) defines non-attainment areas as geographic regions that have been designated as not meeting one or more of the NAAQS. The New York Metropolitan Region is currently designated as being a severe non-attainment area for O_3 and a maintenance area (i.e., a previously designated/ re-designated non-attainment area that has been based on demonstrated compliance with the NAAQS) for CO. In addition, New York County (Manhattan) is designated as being a non-attainment area for PM_{10}.

3.12.3.3 Major Stationary Source Requirements

Under federal permitting rule 40 CFR 52.21(b)(1), a new or modified facility within the New York Metropolitan Region is considered a "Major Stationary Source," (i.e., a source subject to major stationary source construction permitting requirements) if the stationary source emissions released from that facility have the potential to emit 25 tons per year or more of NO_x or VOCs, 250 tons per year or more of CO, 100 tons per year or more of PM_{10} in Manhattan and 250 tons per year or more of PM_{10} elsewhere in the New York City area. NYSDEC is proposing amendments to its permitting regulations (i.e., 6 NYCRR Part 231) that may impose additional permitting requirements. Potential SO_2 emissions of 250 tons or more per year would classify a source as "major" under construction permit rules.

Following the guidelines presented in NYCRR Part 201 (Permits and Registrations, Subpart 201-3. Exemptions and Trivial Activities), only emissions released within the Converted MTS processing buildings should be considered in these estimates. Emission estimates would be prepared for each Converted MTS that would be constructed as part of its air permitting process. If a Converted MTS is determined to be a major source for a pollutant, which the area is designated as non-attainment, emission offsets may need to be obtained.

3.12.4 Methodology Used to Estimate Potential On-site Impacts

3.12.4.1 Analytical Approach

Atmospheric dispersion analyses were conducted to estimate pollutant levels at air quality receptors (i.e., points at or beyond the site fence line, as discussed in Section 3.12.4.5) surrounding each facility. The USEPA's ISCST3 model was used for this analysis. ISCST3 is a versatile model that is often used to predict pollutant concentrations from continuous point, area, volume, and open pit sources. This model is often preferred by USEPA because of its many features that enable users to estimate concentrations from nearly any type of source emitting non-reactive pollutants.

The following dispersion modeling options and assumptions were applied:

- Unless the topography surrounding a study area included substantial changes in elevation, flat terrain was assumed;
- As only smaller particulate matter and gaseous pollutants were considered, gravitational settling and deposition of particulate matter was not included;
- Possible wake effects on point source plume dispersion from the Converted MTS and/or other nearby buildings were considered; and
- For each pollutant, an appropriate set of point, area and volume emission source parameters associated with each operation at each Converted MTS was developed.

ISCT3 uses different dispersion coefficients and mixing heights in rural vs. urban settings. The Auer land use technique was applied to each site to determine whether the rural or urban dispersion coefficients and mixing heights should be applied.

Four types of emission sources that were anticipated to operate inside of processing buildings were considered in the analysis. These include emissions from diesel engines for equipment used in waste handling operations, diesel-fueled collection vehicles, heating equipment, and particulate emissions from waste handling operations. Emission sources operating outside of the processing building that were considered included diesel-fueled street sweepers, collection vehicles and tugboats.

The mechanical ventilation system of each Converted MST would be designed to force emissions generated in the building into the atmosphere through rooftop vents, which were input into the ISCST3 model as point sources. To negate the effects of plume rise for horizontally-vented emissions, a velocity of 0.001 m/s and a stack diameter of 0 m was used based on CEQR guidance. If the facility's heating plant had a separate exhaust stack, its emissions were considered as a separate point source.

Moving collection vehicles were considered as emission sources located along the internal roadway system of each Converted MTS and modeled using the volume source algorithm incorporated into the ISCST3 model. Emissions from vehicles operating within 50 meters of each site boundary were modeled together with the emissions from the on-site sources. It was assumed that all vehicles moving on-site were traveling at 5 mph. Street sweepers exhaust emissions were considered as area sources, with emissions distributed evenly over the paved area of each Converted MTS. Tugboats were also considered area sources. Their emissions were distributed evenly over the area of tugboat operations.

The concentrations of each pollutant were estimated by modeling all of the sources of each pollutant from each Converted MTS in one modeling run.

3.12.4.2 Meteorological Data

Detailed dispersion analyses were conducted using a set of meteorological conditions representative of the New York Metropolitan area for the latest available five consecutive years of compiled meteorological data. Meteorological data used consisted of LaGuardia Airport surface data and Brookhaven mixing height data for the years 1997 and 2001.

3.12.4.3 Emission Sources and Stack Parameters

In general, vendor-supplied information was used to identify site-specific emission source parameters for use in the dispersion analysis. However, in the absence of vendor-supplied data, the following assumptions relating to source (stack) parameters for Converted MTSs were applied (unless otherwise specified):

- For outdoor moving and idling/queuing collection vehicles, emissions were input as adjacent volume sources with a release height of 6 feet above the elevation of the internal Converted MTS roadway or ramp. In some cases, however, to refine the analysis the idling emissions were separated from the volume sources and input as point sources with a release height of 12 feet. The dimension of volume sources were determined on a case-by-case basis considering roadway geometry of each site;
- For tugboats, release heights were assumed to be ten meters (32.81 feet) above the water level based on exhaust heights above water and a minimum amount of expected plume rise. Area source dimensions were determined for each site based on the size and shape of the operational area anticipated;
- For street sweepers operating outside of processing buildings, emissions release heights were assumed to be three meters (10 feet) above the internal roadway. The dimensions were determined on a case-by-case basis based on the size and shape of the paved areas; and
- Heating plant exhaust stack emissions and processing building exhaust were modeled as point sources.

Due to the fact that only approximately six employee vehicles are anticipated to operate on-site for a small fraction of time during the analysis periods considered, emissions from the vehicles were not considered.

The following assumptions were applied to emission sources at each Converted MTS:

- CO, NO_2, and total HC emission factors for all moving and idling vehicles were estimated using the USEPA MOBILE5b vehicular emission factor model. To estimate the emission rates of CO, NOx, and HC for moving vehicles, emission factors (based on anticipated travel speeds for moving vehicles) were multiplied by the distance that an average vehicle will travel and then by the number of moving vehicles.

- Each collection vehicle was considered a heavy, heavy duty diesel vehicle (HHDDV) with a gross vehicle weight of 64,000 pounds when full and 44,000 pounds when empty.
- Exhaust and fugitive dust PM_{10} emission factors for moving vehicles (i.e., re-entrained dust, exhaust, brakes, and tires) were estimated using the USEPA Publication AP-42, Section 13.2.1. For queuing vehicles (exhaust PM_{10}), the emission factors were estimated using PART 5, A Program for Calculating Particle Emissions from Motor Vehicles (1995). To estimate the emission rate (g/hr), the emission factor for moving vehicles (g/veh-mile) was multiplied by the distance that an average vehicle would travel and then by the number of moving vehicles. In some cases, because of low speed (i.e., less than the 10 mph minimum speed for which the AP-42 equation is applicable), emission factors were reduced by a factor of 50 percent to account for the fact that speeds would be restricted to 5 mph on-site.
- A silt loading factor of 0.4 (i.e., factors that are a function of the dust of the roadway that influence resuspended dust emission rates) was used for calculating PM_{10} emissions from collection vehicles.
- In Manhattan and the Bronx, low sulfur fuel is used in collection vehicles, so a reduction from 500 ppm to 15 ppm was applied in these boroughs to the direct sulfate portion of the PM_{10} emission factors.
- $PM_{2.5}$ emission rates for collection vehicles were estimated using a similar methodology as used for PM_{10} except that re-entrained dust was not considered for $PM_{2.5}$. This is because re-entrained $PM_{2.5}$ emissions from traffic are considered by New York regulatory agencies to be negligible. If no $PM_{2.5}$ emission factor was available for a particular type of source, PM_{10} emission factors were conservatively utilized.
- SO_2 emission factors for diesel fueled equipment and idling collection vehicles were estimated based on the allowable sulfur content in diesel fuel and estimated fuel utilization rates. These factors were calculated using the following equation from USEPA's "Exhaust Emission Factors for Nonroad Engine Modeling – Compression Ignition."

$$SO_2 = BSFC \times 453.6 \times (1 - 0.022) - HC \times sulfur\ \ weight\ \ fraction \times 2$$

where:

SO_2	=	SO_2 emission factors in g/hp-hr;
BSFC	=	In-use adjusted Brake-Specific Fuel Consumption in lb/hp-hr (from Table 1 of the abovementioned document, for different engine powers and years);
453.6	=	The conversion factor from pounds to grams;
1-0.022	=	An adjustment for sulfur converted to direct PM;
HC	=	The in-use adjusted hydrocarbon emissions in g/hp-hr;

Sulfur weight fraction = The weight fraction of sulfur (0.003 for nonroad diesel fuel, 0.000015 for on-road diesel fuel used for collection vehicles in the Bronx and Manhattan and 0.0005 for on-road diesel fuel used elsewhere); and

2 = Grams of SO_2 formed from a gram of sulfur.

Regarding the operation of these engines, the following assumptions were made:

- All engines were operating at an average of 70 percent of maximum engine horsepower during both peak hour and annual average conditions; and
- All engines were operating at an average of 20 percent of maximum engine horsepower while idling.
- SO2 emissions from moving collection vehicles were estimated using the USEPA PART 5 program. A ratio of 15/500 is applied to the SO2 emission factors to reflect the use of low sulfur fuel in Manhattan and Bronx.
- Emission factors for space heaters and boilers were obtained from USEPA's AP-42 for natural gas-fired facilities. (Table 1.4-1 for CO and NO_X and Table 1.4-2 for PM, SO_2 and VOC [or HC]).
- The quantity of dust (PM_{10} and $PM_{2.5}$) emissions generated by waste handling (transfer) operations were estimated based on Converted MTS throughput and the following USEPA AP-42 (Section 13.2.4, Equation 1) equation:

$$EF = k \times (0.0032) \times \frac{\left(\frac{u}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

where:

EF = The emission factor in lb/ton;

k = The particle size multiplier (0.35 for PM_{10} and 0.11 for $PM_{2.5}$);

u = Mean wind speed (miles per hr), assumed to be 2.2 miles per hour (equivalent to 1.0 m/sec); and

M = Material moisture content, is assumed to be 10% for residential solid waste. This is a conservative estimate based on available data from DSNY's 1992 Solid Waste Management Plan, lower than the moisture content of several low-moisture content categories (i.e., paper, plastics, textiles, wood).

3.12.4.3.1 Emissions from Tugboats

Emissions rates of diesel-fueled tugboats were estimated as follows:

- Values provided in Table 3.5 of the USEPA document, *Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (February 2000)*, were used to determine the emission factors for CO, NO_X, HC, PM_{10} and SO_2. A rated horsepower of 1,800 horsepower and a load factor of 0.2 for each tugboat maneuvering at each Converted MTS were assumed. Tugboat emission factors used in this analysis are provided in Table 3.12-5.

- It was assumed that emissions from tugboats were released as area sources located within a tugboat *operating* area. This area was determined site-by-site basis depending on the layout of each facility.

Following CEQR Guidance, a diesel fuel sulfur content of 0.3 percent was assumed for tugboats.

Table 3.12-5
Tugboat Emission Factors

Contaminant	Emission Factor (g/kw-hr)
CO	4.344
NO_X	17.634
$PM_{10}/PM_{2.5}$	0.321
HC	1.132
SO_2	1.968

Based on design assumptions, tugboats were assumed to operate for five hours per day under peak 8-hour and 24-hour conditions and four hours per day under average annual conditions. Peak hour emission rates were estimated by assuming that one tugboat would be operating for the entire hour. Annual average rates were estimated by assuming that one tugboat was operating at the Converted MTS for four hours per day 302 days per year.

3.12.4.4 Coordinate System and Receptors

A UTM coordinate system was used to establish geographic coordinates of buildings, sources and receptors for each Converted MTS. These coordinates were input into to the modeling analysis for each Converted MTS location.

Locations of ambient air receptors (i.e., sensitive land uses where air quality concentrations are estimated) surrounding each Converted MTS were developed. These included locations outside of property and fence line boundaries where the general public has access. Areas over water that were within either the tugboat operating areas or the bulkhead lines were excluded. The following sets of receptors were developed around each Converted MTS:

- A Cartesian ground-level (i.e., at 1.8 meters above the ground) receptor grid out to a distance of approximately 500 meters from the site property line in all directions, in 50-meter increments, including over-water;
- Discrete elevated receptors (i.e., windows, balconies, or air intakes), if any;
- Discrete sensitive land uses, such as playgrounds, schools and residential areas; and
- Property line or boundary receptors that were located in 15-meter increments around each site.

3.12.4.5 Operating Scenarios

Emission rates of each pollutant from all sources of that pollutant were estimated for each operation that would occur at each Converted MTS. Separate analyses were conducted to estimate short-term (1-hour, 3-hour, 8-hour, and 24-hour) pollutant levels and long-term (annual average) pollutant levels. Short-term emission estimates were based on peak one-hour activity levels at each site; long-term estimates were based on annual average activity levels at each site. It was possible that some of the short-term emission rates, especially for the 24-hour estimates as determined in this manner, would significantly overestimate maximum values. If 24-hour impacts based on the peak 1-hour emission rates exceeded the thresholds of concern, more realistic hourly distributions or period average estimates of emissions were developed to refine the analysis on a case-by-case basis.

Based on anticipated operating scenarios from DSNY, it was assumed that each Converted MTS would operate an average of two shifts per day, 302 days per year. Evaluations were made for a 2006 analysis year using appropriate emission factors, background values, and traffic estimates. Because vehicular emission factors are projected to decrease in future years as a result of increasingly stringent emission control requirements, concentrations were anticipated to decrease in future years.

The assumptions made regarding the operation of each piece of equipment at each Converted MTS are presented in the air quality technical back up documentation submitted to NYCDEP.

3.12.5 Methodology Used to Estimate Potential Off-site Impacts

3.12.5.1 Analytical Approach

Mobile source analyses were conducted to estimate concentrations of CO, PM_{10} and $PM_{2.5}$ at locations (i.e., congested intersections) near each Converted MTS that might be affected by the addition of DSNY and other agency collection vehicles. Analyses were conducted for roadways in the vicinity of each Converted MTS to estimate whether changes in the number, routing, and/or scheduling of the collection vehicles would cause or exacerbate violations of applicable NAAQS and/or exceed applicable CEQR impact thresholds. With the exception of the South Bronx Converted MTS, employee trips did not occur during the hour of greatest impact and were not included in the analysis (see Section 4.10 for the South Bronx Converted MTS mobile source analysis).

Maximum 1-hour and 8-hour CO concentrations and maximum 24-hour and annual PM_{10} and $PM_{2.5}$ concentrations were estimated as appropriate at analysis sites near each Converted MTS using procedures provided by the CEQR Manual and by NYCDEP. While pollutant levels were estimated at multiple receptor locations near each analysis site, only the highest levels predicted at any of these locations were reported as an indication of the maximum levels for the analysis site as a whole.

3.12.5.2 Selection of CO Analysis Sites

The selection of analysis sites for detailed microscale modeling of CO impacts was completed based on the number of Converted MTS-generated collection vehicles that would be added to signalized intersection locations during peak 1-hour traffic conditions, and a comparison of these values to CEQR screening impact thresholds. These thresholds were established to identify locations where air quality levels might be potentially affected by the addition of such vehicles. These impact thresholds, which are region-specific, are provided in Table 3.12-6.

Table 3.12-6
CEQR CO Screening Thresholds

Location	Incremental 1-hour Vehicular Trips (Per Intersection)
Manhattan between 30th and 61st Streets	75 or more new auto trips
Downtown Brooklyn	50 or more new auto trips
Long Island City	50 or more new auto trips
All Other Areas	100 or more new auto trips

These thresholds were established for Converted MTS-generated passenger cars. An appropriate factor of 1.5 was applied to account for the difference in traffic operations (i.e. affect on approach capacity, queuing and operating speed from larger vehicles). This factor is based on the information provided in the 2000 Highway Capacity Methodology, which states that a heavy-duty vehicle is equivalent to approximately 1.5 passenger cars.

Locations exceeding the traffic impact thresholds were identified, and for each Converted MTS, up to four sites were selected for a detailed microscale analysis using the following criteria:

1. Locations with high traffic volumes under the future No-Build Condition that would experience the largest increases in incremental, Converted MST-generated traffic volumes. Changes in traffic volumes are the major factor in the selection of PM_{10} and $PM_{2.5}$ analysis sites.

2. Locations with a Future No-Build LOS of C or worse that would experience a change in LOS between the Future No-Build and Future Build Conditions.

3. Locations with a change in delay of any approach link of 10 seconds or more between future No-Build and Future Build Conditions, where the V/C ratios are greater than 0.85 and surveyed travel speeds are less than 10 mph.

If the microscale analysis had indicated potential violations of the NAAQS at any of the analysis sites selected, then additional representative locations in the vicinity would have been analyzed based on the site selection criteria described above. This, however, was not the case.

The analysis sites considered near each Converted MTS are presented in the site-specific analysis sections of this MTS Environmental Evaluation.

3.12.5.3 Selection of PM_{10} Analysis Sites

PM_{10} analyses were conducted at up to five intersections with the highest volumes of Converted MTS-generated collection vehicles. Where appropriate, these locations were the same as those for the CO analysis.

3.12.5.4 Selection of $PM_{2.5}$ Analysis Sites

Detailed mobile source $PM_{2.5}$ analyses were performed for intersections that would experience a Converted MTS-related increase of 21 trucks per hour or greater for the peak project traffic demand hour. Prior sensitivity studies by NYCDEP have found insignificant $PM_{2.5}$ impacts with a facility-generated increase of less than 21 trucks per hour.

3.12.5.5 Analysis Years

Analyses were conducted for the following years:

- 2002/2003 (based on when traffic data were collected) to estimate air quality concentrations under Existing Conditions; and
- 2006 to estimate air quality concentrations under Future No-Build and Future Build Conditions.

3.12.5.6 Traffic Data

Traffic data were developed for peak analysis periods for each set of analysis conditions. The HCM 2000 methodology and field monitoring data were used to develop the following traffic data necessary for the air quality analysis for all the roadway links within 1,000 feet of each of the selected analysis sites:

- Peak hour traffic volumes (traffic volumes for the daily 1-hour period with the highest morning (AM) and afternoon (PM) background volumes) obtained from traffic analysis;
- Traffic volumes during periods with the highest number of Converted MTS-generated vehicles;

- Average peak hour free flow travel speeds for signalized approaches and average travel speeds for unsignalized roadway approaches;
- Vehicle classifications (percent autos, sport-utility vehicles (SUVs), medallion taxis (where applicable), light-duty and heavy-duty trucks and buses);
- Width of traveled roadways (the effective width of the roadway);
- Signal timing data (cycle length, red time length);
- Number of effective moving lanes and exclusive turn lanes;
- Saturation flow rates (i.e., the maximum amount of vehicular throughput) per lane; and
- Arrival rate at signalized approaches.

The CO and PM_{10} analyses were conducted for up to three traffic periods (AM peak, facility (or midday) peak and PM peak). The $PM_{2.5}$ analysis was conducted for facility-peak periods. It was generally assumed for these analyses that the traffic volumes during these traffic periods would occur for every hour of the 24-hour and annual average analysis periods. At these locations where exceedances of either the NAAQS or significance thresholds were estimated using this conservative assumption, Tier II analyses were conducted using hour-by-hour traffic conditions.

3.12.5.7 Vehicular Emissions

3.12.5.7.1 Carbon Monoxide

Mobile source CO emissions were estimated using the USEPA MOBILE 5B (EPA-AA-AQAB-94-01) emission factor program. The most current state and City approved input parameters were used to estimate existing and future emission factors. Input files for the 2003 and 2006 analysis years, showing parameters recommended by NYCDEP including local vehicular age-distribution rates, inspection/maintenance and anti-tampering program credits, and low emission vehicle (LEV) program credits are presented in the air quality technical back up submitted to NYCDEP.

Taxi emissions for 2002/2003 and 2007 were modeled where appropriate (i.e., near the East 91st Street and West 59th Street Converted MTSs) by using the latest version of MOBILE 5B obtained from NYCDEP for new medallion taxis. Specific vehicle age and mileage accumulation distribution for taxis were also incorporated, and the inspection and maintenance, anti-tampering and LEV program credits that are applicable to light-duty medallion taxis were applied.

3.12.5.7.2 Particulates

Mobile source PM_{10} and $PM_{2.5}$ emissions were estimated using USEPA's PART5 for idling vehicle emissions and AP-42 for moving vehicle emissions. The most current state and City approved input parameters at the time of the analysis were used to estimate existing and future emission factors. Parameters recommended by NYCDEP included local vehicular age-distribution rates. Emissions from moving and idling vehicles were estimated for all vehicle types, idle exhaust PM_{10} and $PM_{2.5}$ emissions were estimated only for heavy-duty diesel trucks and buses because emissions from idling vehicles could not be calculated for non-heavy duty diesel vehicles using USEPA's PART5. Idle PM_{10} and $PM_{2.5}$ emissions from non-HDDVs are considered to be negligible in comparison to the other idling and moving vehicle emissions estimated for this analysis.

Emissions of fugitive dust (i.e. emissions caused by the re-entrainment of dust into the air by moving vehicles) are primarily dependent on vehicle weight and on the surface silt loading. At the direction of the NYCDEP, the following silt loading factors were used for estimating PM_{10} and $PM_{2.5}$ emissions:

- 0.16 for roadways with more than 5,000 vehicles per day (NYSIP, 1995);
- 0.10 for principle and minor arterials with more than 5,000 vehicles per day (NYSDEC & NYCDEP, 2002);
- 0.015 for expressways (NYSDEC); and
- 0.4 for roadways with fewer than 5,000 vehicles per day (AP-42, 1997).

An average vehicle fleet weight of 6,000 pounds was used for all analyses (NYSIP, 1995).

Re-entrained dust was considered for the 24-hour $PM_{2.5}$ analysis (incremental contribution at receptors 3 meters away from the edge of the roadway). However, re-entrained dust was not included in the $PM_{2.5}$ annual neighborhood analysis due to the fact that existing neighborhood-scale ambient air monitoring data indicates that on a long-term (annual) average very little paved road dust is collected by $PM_{2.5}$ monitors. Most $PM_{2.5}$ samples collected in the City have been found to consist primarily of combustion-related emissions, although on a short-term (24-hour) basis, especially near road fugitive sources, this may not always be the case.

3.12.5.7.3 Ambient Temperature

Following CEQR guidance, CO mobile emission rates were computed with the MOBILE 5B model using ambient temperatures for winter conditions of 50˚F for Manhattan and 43˚F for the rest of the City. Ambient temperatures are not a required input for particulate matter analyses.

3.12.5.7.4 Vehicle Classification

Vehicle classification data required to determine composite emission factors were based on traffic survey data and included percentages of LDGV, SUVs, medallion taxis, light-duty trucks, heavy-duty trucks and buses. Based upon current CEQR guidance, SUVs were classified as light-duty gasoline trucks with 75% of SUV emissions modeled as LDGT1, while the remaining 25% were LDGT2. The two groups (LDGT1 and LDGT2) are based on local registration data. The registered split between LDGT1 and LDGT2 used in the analysis was 73 percent to 27 percent, respectively. The split between HDGV and HDDV was based on values presented in NYCDEP's Report #34 for each borough during a particular time period. All MTA and private commuter buses and DSNY and other agency collection vehicles were considered as HDDV. Traffic-related data used in this analysis are presented in the air quality technical back-up submitted to NYCDEP and traffic technical back-up submitted to NYCDOT.

3.12.5.7.5 Thermal State Data

Hot and cold vehicle thermal state conditions for background automobile traffic were obtained from NYCDEP’s Report #34 (see Table 3.12-7). Based upon current CEQR guidance, SUVs are assumed to have the same thermal states as automobiles. These data were input into the

MOBILE 5B model for each borough for each applicable time period and roadway type. Light duty truck operating conditions (excluding SUVs) were based on data supplied by the New York Metropolitan Transportation Coordinating Council (NYMTC), as presented below. All taxis and heavy-duty trucks were assumed to be operating in a hot-stabilized mode.

Table 3.12-7
Thermal State Conditions for Light Duty Gasoline Trucks

Location	% Cold Non Catalytic	% Hot Start	% Cold Catalytic
Manhattan	3.2	45.3	4.1
Rest of City	5.4	50.5	5.1

3.12.5.8 Dispersion Modeling

The CO dispersion analysis was conducted using USEPA's dispersion model, CAL3QHC, which uses worst-case meteorological data to estimate 1-hour CO concentrations. Eight-hour maximum CO concentrations were estimated by multiplying the 1-hour maximum concentrations by a "persistence factor" (see below). The CAL3QHCR dispersion model was used to estimate peak 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations. The CO, PM_{10} and 24-hour $PM_{2.5}$ analyses followed USEPA's Intersection Modeling Guidelines (EPA-454/R-92-005) for modeling methodology and receptor placement. These air quality dispersion analyses for CO, PM_{10}, and 24-hour $PM_{2.5}$ were conducted as follows:

- All major roadway segments (links) within approximately 1,000-feet of each intersection were considered. Elevated sources were included where appropriate.
- Receptors were placed: (1) near the midpoint of the adjacent sidewalks (generally 6 to 7½-feet from the curb line) and set back from the corner of the intersection in accordance with USEPA's modeling guidelines; (2) adjacent to queued approaches at the corner of each intersection and set back at 25, 50, and 75 meters from the corner, as well as at the mid-block location, if appropriate; and (3) near sensitive land uses (schools, hospitals, etc).
- Receptor heights were 1.8 meters (6.0 feet) above ground level.

In addition to the above receptors, for the annual neighborhood average $PM_{2.5}$ analysis, receptors were placed at a distance of 15 meters (49-feet) from the curb line and set back from the corner of the intersection in accordance with USEPA's modeling guidelines (e.g., at the corner of each intersection and set back at 25, 50, and 75 meters from the corner, as well as at the mid-block location, as appropriate).

3.12.5.9 Meteorological Conditions

Reasonable worst-case meteorological conditions shown in Table 3.12-8 were used to estimate peak 1-hour CO concentrations.

Table 3.12-8
Reasonable Worst-Case Meteorological Conditions[1]

Condition	Worst Case
Wind Speed	1 m/s (2.25 mph)
Stability Class	D (neutral stability, meaning moderate mixing)
Temperature	50°F for Manhattan, 43°F for the rest of NYC
Mixing Height	1000 meters (0.6 mile)
Wind Angles	5 degree increments from 0 degrees to 360 degrees
Surface Roughness Factor[1]	▪ 321 cm for Manhattan CBD; ▪ 370 cm for Hunts Point, Bronx and Southwest Brooklyn; and ▪ 175 cm for Greenpoint, Hamilton Avenue, Brooklyn, North Shore and Queens

Note:
(1) Source: EPA-454/R-92-006, User's Guide to CAL3QHC version 2.0, Table 1.

Peak 24-hour and annual average PM_{10} and $PM_{2.5}$ concentrations were estimated using five consecutive years of meteorological data from LaGuardia Airport (1997 to 2001).

3.12.5.10 Persistence Factors

Peak 8-hour concentrations of CO were obtained by multiplying the highest peak hour CO estimates by persistence factor values presented in Table 3.12-9 for each affected area. These factors, obtained from NYCDEP, account for the fact that over the eight-hour periods, vehicle volumes will fluctuate downwards from the peak, vehicle speeds may vary, and meteorological conditions including wind speed and wind direction will vary as compared to the very conservative assumptions used for the single hour.

Table 3.12-9
Eight-Hour Persistence Factors

Location	Factor
Midtown Manhattan	0.77
Rest of the City	0.70

Maximum modeled incremental $PM_{2.5}$ impacts (due to project-induced traffic only) for the 24-hour and annual periods were compared against interim "significance thresholds" of 5 $\mu g/m^3$ and 0.3 $\mu g/m^3$, respectively.

3.12.6 Mitigation Measures

3.12.6.1 On-site Air Quality

Mitigation measures could include changes: (1) to the number and/or types of operating pieces of equipment to lower emissions; (2) in operations to limit the length of time a piece of equipment is operating; or (3) to the Converted MTS design to modify the location of a source or sources with respect to off-site receptors. If required, site-specific mitigation is addressed in Chapters 4 through 11 of this MTS Environmental Evaluation.

3.12.6.2 Off-site Air Quality

Mitigation measures could include changes to DSNY and other agency collection vehicle routes and/or temporal distribution. If required, site-specific mitigation is addressed in Chapters 4 through 11 of this MTS Environmental Evaluation.

3.13 Odor

3.13.1 Introduction

Design of a modern solid waste transfer facility includes environmental controls within the processing building to minimize odors emitted from on-site waste transfer operations. Effective odor control is implemented through a variety of facility design features, such as maintaining negative air pressure in the tipping floor area of the processing building to prevent untreated odors from escaping to the outdoors, and operational procedures. NYSDEC Part 360 Solid Waste Facility Regulations require that odors be controlled effectively so that they do not constitute a nuisance or hazard to health, safety or property.

An odor analysis was conducted to estimate the potential impacts of the odor sources in the vicinity of each Converted MTS and determine if additional design or operational measures would be required for odor mitigation.

3.13.2 Background

Typically odors, such as those generated from wastewater treatment plants, composting operations and landfills, can be evaluated by obtaining air samples and analyzing them to identify the odorous compounds, such as ammonia, sulfides, mercaptans, and others. Concentrations of these compounds can be compared to published odor detection thresholds to determine if the compounds would be detected. Many odor studies have been conducted at wastewater treatment plants, composting facilities and landfills to identify the types and concentrations of compounds present from these operations. For example, the *Final Generic Environmental Impact Statement for the New York City Sludge Management Plan* dated May 1992 (Sludge Composting EIS) characterized odors and non-criteria air pollutants from the City Sludge Composting Facilities using indicator compounds (such as sulfides, ammonia and hydrogen sulfide), and the June 2003 FEIS for the Newtown Creek WPCP Track 3 Upgrade characterized odors using hydrogen sulfide (H_2S) as an indicator compound.

Odors generated from residential MSW are dependent upon the composition of the waste disposed, which can vary widely from day to day and from household to household (as opposed to odors from decomposed MSW in landfills that are attributed to specific chemical compounds, such as hydrogen sulfide, as the waste undergoes decomposition). The odors are also affected by factors such as the residence time of the waste before it is disposed, the moisture content of the waste, and ambient temperature. In addition to the residential MSW, waste from other City and state agencies (i.e., office waste, brush, and furniture) would be transported to the Converted MTSs and mixed in with the MSW.

The 2001 FEIS odor study included odor sampling from the following types of sources:

- Full barges (containing uncovered, loose, solid waste) moored outdoors;
- Empty barges (with solid waste debris) moored outdoors;
- Process building vents/stacks; and
- Shipping container (containing compacted waste) vent openings.

Only the last two types of sources are relevant to the Converted MTSs because open-top barges with loose, uncovered waste would not be used for waste transport. Only sealed containers would be loaded on barges and shipped to out-of-city disposal sites. Sampling of the MTS vents in the prior study yielded detectable odors, while sampling of the shipping container vents found no significant odor emissions. Therefore, the modeling analysis for this MTS Environmental Evaluation considered odor emissions from the Converted MTS exhaust vents.

Table 3.13-1 presents several odor classes, chemical types and examples of the odors from these chemical types, many of which relate to odors that may emanate from the Converted MTS exhaust vents.

Table 3.13-1
Odor Classes and Examples[(1)]

Odor Class	Chemical Types	Examples
Acidic	Acid anhydrides Organic acids Sulfur dioxides	Vinegar, perspiration, rancid oils, resins, body odor, garbage
Sulfury	Selenium compounds Arsenicals Mercaptans Sulfides	Rotting fish and meat, cabbage, onion, sewage
Basic	Vinyl monomers Amines Alkaloid Ammonia	Feces, manure, fish and shellfish

Note:
(1) Source: ASTM D 1292 – 86 (Reapproved 1995): Standard Test Method for Odor in Water.

3.13.3 Regulations and Thresholds

There are no federal standards that establish acceptable ambient odor levels. Some states have dilutions-to-threshold ratio (D/T) (Section 3.13.5.3) odor recommendations for specific processes. For example, the Massachusetts Department of Environmental Protection developed an odor policy for composting facilities that specifies a one-hour D/T limit of 5 to be achieved at a facility's property boundary, but there is no promulgated regulation and the policy is still in draft form. New York State does not set D/T limits for solid waste handling facilities. Title 6 NYCRR Part 360-1.14(m) specifies: "Odors must be effectively controlled so that they do not constitute nuisances or hazards to health, safety or property." Therefore, a comparison of odor results to quantitative regulatory standards cannot be made. Hydrogen sulfide H_2S results can be compared to the NYSDEC Air Quality Standards Part 257-10.3 hourly 0.01 ppm standard.

3.13.4 Odor Analysis

In accordance with procedures recommended by USEPA and the Air Waste Management Association (AWMA), a scientific organization involved in reviewing and reporting on quantitative procedures for testing and evaluating odors, several methods can be used to collect odor samples from each source. All methods involve capturing odorous source air in a sealed Tedlar® sample bag. The evaluation of air samples for odor is conducted by a trained panel of individuals, referred to as an "odor panel," who quantify odor concentration, odor intensity and odor persistence and determine equivalent butanol concentrations. H_2S concentrations are measured on-site using a portable hydrogen sulfide analyzer.

Odor panel members are selected and odor analyses conducted by a laboratory in accordance with the following established protocols and standards set by the ASTM:

- Selection and training of sensory panel members (Standard of Practice 758);
- Determination of odor and taste thresholds by a forced-choice ascending concentration series of limits (Standard of Practice E679-91); and
- Standard practice for referencing suprathreshold odor intensity (E544-75/88).

The analysis was conducted to:

- Determine concentrations, emission rates and persistence of odors from Converted MTS ventilation exhausts;
- Evaluate the effect of these odor sources at off-site sensitive receptors (i.e. residences, schools, churches, parks), if any; through atmospheric dispersion modeling and
- Based on dispersion modeling, determine whether the Converted MTS designs need to include mitigating measures to prevent the escape of odors from exhaust fans.

3.13.5 Sampling Program

Conditions were evaluated in 1999 at three existing MTSs in Brooklyn (Southwest Brooklyn, Hamilton Avenue and Greenpoint), one in Queens (North Shore) and a private facility in the City to identify those facilities most suitable for sampling odors from residential MSW. Sampling data from the selected facilities were then used to estimate odor emission rates from facilities.

Details of the sampling program are described in the Sampling Protocol for the Department Barge Odor Study prepared by HDR, finalized, based upon comments received from DSNY on October 2, 1998 and updated on June 18, 1999 (Sampling Protocol). NYCDEP was provided with a copy of the Sampling Protocol on July 29, 2003. The measurement methodology allows samples to be taken in a manner that isolates source air from ambient air. Results from the samples obtained from the exhaust points at the MTS before and after a neutralizing agent was applied and with and without barge slip doors closed were used in this MTS Environmental Evaluation analysis.

Fall sampling was conducted at the Greenpoint MTS, North Shore MTS and the Fresh Kills Landfill during the week of October 5, 1998, with follow-up sampling conducted at the Southwest Brooklyn MTS on October 26, 1998. Summer sampling was conducted at the Greenpoint MTS and the Fresh Kills Landfill during the week of June 21, 1999, with follow up and sampling of full containers of compacted waste from a private transfer station in the City during the week of July 12, 1999. After collection, samples were sent to an off-site laboratory for odor panel evaluation as described below. H_2S readings were taken during the summer sampling event during the week of July 12, 1999. Additional samples could not be collected for this MTS Environmental Evaluation because the MTSs were closed subsequently and no one facility in or near the City accepts and processes only residential MSW from DSNY currently.

3.13.5.1 Sample Collection

In accordance with guidance documents published by USEPA and AWMA and procedures described in the Sampling Protocol, a total of 32 odor samples and 15 H_2S samples were obtained from area sources using an equilibrium chamber and from point sources from exhaust fans. The 15 H_2S samples were composites of several readings taken at 15 different times and/or locations.

For all sources sampled for odor panel evaluation, tygon vinyl tubing was used to connect the air sampling location to the sample pump inlet and the sample pump outlet to the sample bag. The tygon vinyl tubing was replaced between samples or the line was flushed with ambient air at a rate of five liters per minute (liters/min) for several minutes between samples. Tygon vinyl tubing was used because it is tasteless and odorless and is formulated specifically for use in peristaltic pumps (pumps used for sampling a media that does not come in contact with the pump itself). Air samples were drawn through the tubing into 25-liter Tedlar® sample bags. Tedlar® bags are recommended for use by the AWMA Subcommittee on the Standardization of Odor Measurement (AWMA Odor Subcommittee) because they have a low permeability that results in minimal sample loss or outside infiltration (thus maintaining sample integrity), and they have the lowest background odor. For sources analyzed for H_2S, tygon vinyl tubing was used to connect the air sampling location directly to the Jerome analyzer.

In keeping with practices recommended by the AWMA Odor Subcommittee, the sampling line and sample bags were pre-conditioned with a sample of the odorous air being evaluated, and then the air was evacuated from the bag prior to collecting the actual sample. Bags were filled to approximately 75% to 80% of capacity to prevent decompression during shipping. All samples were presented to the odor panel for evaluation within 24 hours of collection. Due to restrictions at the laboratory on the time it takes to analyze the odor sample, a maximum of six samples were collected each day.

Exhaust (point sources) air samples were obtained by using a funnel attached to the tip of the tubing and held up to the face of the exhaust point. The flow rate of the sampling pump for these sources was set at 5 liters/min, which is low enough to prevent ambient air from being pulled into the sample bag given the exhaust vent flow rate.

3.13.5.2 Sample Analysis

As described in the ASTM Standards of Practice E679-91 (see Section 3.13.4), the odor panel evaluation uses a dynamic dilution binary scale butanol olfactometer. Air is passed through a vessel containing n-butanol (1-butanol) liquid, which allows the air stream to become saturated with n-butanol. Specific measured amounts of fresh air are also added to the odor-saturated air samples to vary the dilutions in each of eight sniffing ports of the olfactometer. When analyzing an odor sample, a member of the odor panel is asked to match the intensity of the odor in the air sample with the diluted odor level in a given port on the olfactometer. The odor panel's results are reported as D/T and odor intensity (provided as a butanol equivalent concentration). H_2S samples were analyzed on site using the hand held Jerome analyzer.

3.13.5.3 Odor Concentration

The D/T, which is an indication of the relative concentration of an odor, is a number derived from the laboratory dilution of a sample odor using an olfactometer. The D/T is an estimate of the number of dilutions needed to make an odor just detectable and is synonymous with other terms used in odor studies, such as "Detection Threshold (DT) value." In theory, however, there is a slight difference between D/T and DT. An odor at the detection threshold that would be reported as 0 D/T would be reported as 1 DT. For comparison purposes, the DT value is one unit higher than the D/T value.

The D/T is usually defined as the point at which 50 percent of the panelists will detect an odor and 50 percent will not. A higher ratio indicates a more concentrated odor source. A D/T ratio of 100 means that the odorous air must be diluted 100 times before 50 percent of the panelists will not detect the odor. Therefore:

- A D/T of 1 is defined as the point at which a person of average sensitivity just begins to detect the presence of an odor in an otherwise odor-free environment;
- A D/T of 5 is a level at which a person of average sensitivity will readily detect odors, and will be able to distinguish the type of odor; and
- A D/T of 10 is a level at which a person of average sensitivity will detect relatively strong odors.

3.13.5.4 Odor Intensity

Odor intensity is the relative strength of an odor referenced to an equivalent sensation from a reference odorant (in this case, butanol). In other words, odor intensity is the perceived strength of an odor. An olfactometer is used to determine the characteristic of equivalent butanol intensity. Each of the eight sniffing ports of the olfactometer was supplied with a successively higher concentration of butanol to establish a range of odor intensities for comparison with odor samples. Panelists were asked to judge the intensity of an undiluted odor sample with the samples from the butanol olfactometer to determine which concentration was most similar to the actual sample. Responses from each panelist were recorded and used to calculate the equivalent butanol intensity value, or concentration. Odor intensity is expressed in parts per million (ppm) of equivalent butanol. A larger value of equivalent butanol means a more intense (stronger) odor.

3.13.5.5 Odor Persistence

Odor persistence is a term used in conjunction with odor intensity. While the perceived intensity of an odor will change in relation to its concentration, the rate of change in intensity versus concentration is not the same for all odors. This rate of change of intensity, termed the persistence of the odor, is represented as a dose-response function. The dose-response function is determined from intensity measurements of an odor at full strength and at several dilution levels above the threshold level. The dose-response function is determined from the dose-response curve that is a logarithmic plot of the equivalent butanol intensity dilutions (x-axis) versus the equivalent butanol intensity concentrations (y-axis).

The slope of this line defines the odor's persistence. A steeper slope (approaching –1) means that the odor intensity decreases rapidly as dilutions occur, so, in essence, the odor will dissipate rather rapidly. A flatter slope (closer to 0) means that the odor intensity persists even as dilutions occur, therefore, the odor will linger longer than that with a steeper slope.

3.13.5.6 Sampling Results

Table 3.13-2 contains a summary of the odor samples (types and source/locations) obtained and the analytical results (in D/T) for each of the samples. After all sampling was completed, the maximum concentration of the values from summer samples was used to calculate emission rates of odors from the sources at each facility. Table 3.13-3 contains a summary of the H_2S results obtained on site using a portable analyzer.

As noted previously in Section 3.13.2, odors from certain operations can be evaluated by analyzing air samples for specific odorous compounds. H_2S is commonly used as a surrogate for odors at wastewater treatment plants. While not necessarily the primary odorous compound present from solid waste transfer stations, measurements were obtained at the request of NYCDEP. The average H_2S concentration of samples collected from fan exhausts without the addition of neutralizing agent are below the New York Ambient Air Quality Standard for H_2S of 0.01 ppm.

The average H_2S concentration of samples obtained from four containers of waste stored for four to six days are above the New York Ambient Air Quality Standard for H_2S of 0.01 ppm. However, the container samples were taken by inserting the sample tubing directly into the container vents after sealing all vents on the container. To obtain a sample of the air from the sealed containers, a pump was used to draw air out of the containers at a rate of 0.5 to 1.0 liters per minute, which is much higher than the natural airflow from the containers. Airflow measurement from the same vents on a full container indicated that over the course of a day, there was an extremely small amount of air that was forced out of the vent (presumably due to diurnal heating), which is much lower than the sampling rate of the pump. In addition, the age of waste in the containers was greater than would be expected for normal operations at the Converted MTSs. The very low resulting H_2S emission rate means that the rapid dilution by atmospheric turbulence would quickly reduce the concentration of H_2S to below the 0.01 ppm standard by the time the emissions are a few feet from the container. The result from the fan exhaust without the addition of neutralizing agent was 0.0117 ppm H_2S, slightly above the standard. The very low H_2S emission rate that results from the barges means that the rapid dilution by atmospheric turbulence will rapidly reduce the concentration of H_2S to below the 0.01 ppm standard by the time the emissions are only a few feet from the fan exhaust. Therefore, no dispersion modeling was performed for H_2S because concentrations would be below 0.01 ppm at off-site locations.

The NYCDEP measures H_2S from its WPCPs and compares modeled concentrations at off-site residential receptors to a 1 ppb guideline. Because emission rates are so low, containers are stored on-site, and facilities are located in industrial areas with the nearest residential receptors located several hundred feet away, it is expected that H_2S concentrations would be below the 1 ppb guideline at any residential receptor.

Table 3.13-2
Summary of Odor Panel Evaluation Results
Fall 1998 and Summer 1999 Sampling Event

Sample Date	Sample Location	Identification	Sample Point	Sample Type	Neutralizing Agent Added?	D/T
October 5, 1998	Greenpoint MTS	PTMTS-01	Fan Exhaust	Point	No	13
October 7, 1998	Greenpoint MTS	PTMTS-02	Fan Exhaust	Point	No	14
		PTMTS-03	Fan Exhaust	Point	Yes	11
October 26, 1998	Southwest Brooklyn MTS	PTMTS-04	Fan Exhaust	Point	No	32
		PTMTS-05	Fan Exhaust	Point	No	43
June 23, 1999	Greenpoint MTS	PTMTS-02	Fan Exhaust[(1)]	Point	No	122

Notes:
D/T = Dilutions-to-threshold
[(1)] A second fan exhaust sample was obtained, but the air leaked out of the sample bag during shipment.

Table 3.13-3
H_2S Sampling Results

Sample Date (1999)	Sample Location	Sample Point	Residence Time of Waste	H_2S Concentration (ppm) Range	H_2S Concentration (ppm) Average
July 16	Private Transfer Station	Container vent	6 days	0.011 to 0.44	0.20
		Container vent	4 days	0.007 to 0.17	0.07
July 22	Greenpoint	Fan exhaust without neutralizing agent		0.011 to 0.012	0.0117
		Fan exhaust with neutralizing agent		0.005	0.005

3.13.6 Odor Modeling Methodology

Potential impacts of odors on nearby receptors were estimated by:

- Calculating the emission rates based on the highest D/T for exhaust vents;
- Entering the emission rate for each point (exhaust vent) source into USEPA's Industrial Source Complex Short-Term (ISCST3) (version 97363) dispersion model;
- Inputting the coordinates of buildings for the Converted MTSs;
- Inputting coordinates of receptors at 50-meter (150-foot) intervals around the site boundary; and
- Conducting air dispersion modeling using historical meteorological data to determine whether odors, if any, would be detected by off-site receptors.

3.13.6.1 Mass Emission Rate Calculation

Sensory data alone cannot be used to conclude whether a specific odor source can become an odor problem. Although a specific release point may have a high odor concentration and/or intensity, it may not be the primary cause of the odor if that source has a low air release rate. Also, depending upon the downwind distance from the source to a receptor, odor emissions may be diluted through atmospheric dispersion to levels that are not a concern.

Sources are characterized as either area, volume or point. An area source is a low-level or ground-level emission from a two-dimensional area with no plume rise. A volume source, much like an area source, is also typically a ground-level emission source with no plume rise that originates in a three-dimensional space. For example, shipping containers are best characterized as volume sources because emissions could emanate from various locations around the sides of the containers. A point source is a single localized source, such as a stack, vent or exhaust fan.

3.13.6.1.2 Exhaust Vent (Point) Source Emission Rate

The results of the sampling and laboratory analyses described in the section above were reviewed and used to estimate odor emission rates. Although, there is a slight difference between D/T and DT, the difference between the two for the sample used to calculate emission rates for each Converted MTS was less than 1%. Therefore, D/T reported by the laboratory was used in the calculation.

Air samples obtained from the exhaust vents of the facilities were considered point sources. Calculation of the point source emission rate (expressed in OU/sec) of the facility exhaust vents was based upon the volumetric flow rate (m^3/sec) of the exhaust system and D/T (OU/m^3) of the collected samples. Although, the odor emission factors used for the analysis are expressed as "Odor Units" (OU) per second, where one OU is defined as the amount of mass of odor needed to generate a concentration at the detection threshold (where 50% of the population can detect the odor) in a volume of one cubic meter of air. The laboratory analysis by an odor panel, as described above, provided the concentration of odor for each sample in D/T. The D/T value for a sample was then multiplied by the air exhaust flow rate from the vent sampled to estimate the OU emission rate for that vent.

Table 3.13-4 provides a summary of the estimated odor emission factors based on all odor samples analyzed for this MTS Environmental Evaluation. These data show that the emission factors ranged from 125 OU/sec to 1,382 OU/sec.

Table 3.13-4
Summary of Emission Rates

Sample Date	Sample Location	Location/ Facility	Operating Rate (tons/hour)	Odor Panel D/T	All Fans Total Exhaust Flow (m^3/sec)	Calculated Emission Rate (OU/sec)
October 5, 1998	Greenpoint MTS	PTMTS-01	86	13	11.3	147
October 7, 1998	Greenpoint MTS	PTMTS-02	86	14	11.3	159
		PTMTS-03	86	11	11.3	125
October 26, 1998	Southwest Brooklyn MTS	PTMTS-04	125	32	17.7	566
		PTMTS-05	125	43	17.70	761
June 23, 1999	Greenpoint MTS	PTMTS-02	86	122	11.3	1,382

It is assumed that odor generation (and the resulting emission rate) is proportional to the amount of waste processed. Therefore, based on the sample data for exhaust vents and the solid waste processing rates for the sampled facilities, the calculated odor emission rate for each exhaust vent sample was divided by the facility's measured solid waste processing rate to estimate an emission factor in units of OU/sec/(ton of solid waste processed/hr). This emission factor was then multiplied by the peak design capacity of each facility to obtain an estimated odor emission rate that is scaled to each facility's capacity.

The summer 1999 exhaust vent (point) sample data generated the highest emission factor. The maximum emission factor was used as the basis for exhaust vent emissions from all Converted MTSs. This value is 16.1 OU/sec/(ton of solid waste processed/hr).

The shortest averaging period accommodated by the ISCST3 model is one hour. Because odor can be detected on an instantaneous basis by the human nose, it was necessary to apply a multiplication factor -- referred to as a "peak-to-mean" factor -- to the ISCST3 one-hour concentration predictions. This peak-to-mean factor was set at 2.5, based on data contained in the publication *"Meteorology and Atomic Energy"* (Slade, et. al., 1968). However, because the ISCST3 concentration predictions are proportional to the emission rate for a single source, the emission rates were simply multiplied by 2.5 for input to the ISCST3 model so that ISCST3 output concentrations would be adjusted for peak -- rather than one-hour average -- odor impacts.

Because the model input emission rates are actually in units of "OU/second" and the output concentrations are in units of "micrograms/cubic meter," one can simply move the decimal point six places to the left in the model emission rates. The peak-to-mean adjustment and decimal place adjustment in emission rates make it possible to have the model output show directly the predicted number of odor units (multiples of the detection threshold) at each receptor location. As an example, a facility processing 4,290 tpd of waste would have an estimated emission rate of 7,195 OU/sec ([4,290 ton of solid waste processed per day x 16.1 OU/sec/(ton of solid waste processed/hr)/(24 hrs/day)]x2.5).

The air release height for the point source is based on the height of the exhaust fans on the roofs of the facilities.

3.13.6.1.3 Container (Volume) Source Odor Emission Rate

Estimated odor emission rates from shipping containers were based on the sampling of odors from inside vent openings on the sides and/or rear of the containers. The D/T for these samples were generally higher than those obtained for exhaust vents. Due to the tightly compacted waste inside a shipping container, however, there is little air space within these containers. Winds cannot force air through the containers and, consequently, there is very little airflow out of these vents. Whatever airflow does exit the vents is probably due to diurnal heating of the small vapor space left after the compacted waste is placed in the container.

As a test of potential airflow out of a container due to diurnal heating effects, all openings on a container were sealed with tape and an empty one-liter sample bag was attached to an orifice installed in the taped opening. The bag was set in place early in the morning on a sunny day during the summer 1999 odor sampling program. Observation of the bag at intervals over the daytime period revealed that only a very small portion of the bag was filled due to the diurnal heating or other potential off-gassing effects of the waste. The conclusion, based on this test, is that much less than a liter of airflow is emitted from diurnal heating of a shipping container with tightly compacted waste.

This conclusion may not apply for all containers because the air space in containers could vary, depending on the compaction method. Also, while every effort was made to seal all vents and openings for the flow test, it is possible that there was a small amount of air leakage during the one-liter bag test. To provide a more conservative estimate of airflow and resulting emission rates for shipping containers, a theoretical flow estimate was developed based on an assumed maximum diurnal heating effect. This estimate was based on the following assumptions:

- The vapor space in a container is 10 percent of the container volume, and 10 percent of this vapor is close enough to the container edges to be affected by diurnal heating effects;
- At the coolest point in the diurnal cycle, the air temperature of the affected (heated) vapor inside the container is at 293 °K (68 °F); and,
- Over a diurnal cycle, the affected vapor is heated by up to 10 °K from 293° K (68°F), to 303 °K (86°F).

Based on the Ideal Gas Law, the amount of airflow out of the container would be equal to the affected (heated) volume of vapor multiplied by the incremental amount of increase in the absolute temperature (i.e. (303°K –293°K)/293°K). The vapor volume available for expansion was estimated separately for each size (volume) of shipping container that would be used at the facilities. As shown in Table 3.13-4, there was no discernable trend in sampled odor concentrations over several days after waste placement into the containers.

Table 3.13-4
Modeled Odor Emission Rates/Factors

Source Type	Unit Emissions	ISCST3 Emissions
Facility Exhaust Vents	16.1 OU/sec/(ton of solid waste processed/hr)	0.0072 OU/sec [(1)]
Shipping Containers	$5x10^{-4}$ OU/sec/container	$7x10^{-8}$ OU/sec [(3)]

Notes:
OU/sec = odor units per second
g/sec = grams per second
(1) Based on a 4,290 tpd facility.
(2) Emissions for a single barge based on a barge 150 feet long and 37.5 feet wide.
(3) Based on a maximum of 655 shipping containers at a facility.

Therefore, an average of the odor concentrations from all container samples (416 ppm butanol equivalent) was used along with the conservatively estimated flow rates to estimate butanol emission rates. The maximum butanol emission from any size container was less than $5x10^{-4}$ OU/sec. When this emission is multiplied by the worst-case maximum number of shipping containers (655) on any site, the total maximum volume-source emission rate is $7.0x10^{-8}$ OU/sec. This value is approximately four orders of magnitude (10^4 times) lower than the estimated emissions from facility exhaust vents.

3.13.6.1.4 Emission Rate Summary

Table 3.13-4 contains a summary of the emission rates or factors used for each type of sampled source. Note that the shipping container emission rate is so low that container emissions were not included in the dispersion modeling analyses. The equivalent butanol emission rates or factors for these sources were based on summertime odor measurements, which are expected to represent the worst-case emission conditions on an annual basis.

3.13.6.2 Dispersion Modeling

Based upon emission rates, exhaust parameters, building design and site characteristics for each Converted MTS, atmospheric dispersion modeling was used to assess the distance at which the odor would not be detected and the odor unit level at the property line and off-site receptors. While dispersion models are used typically by regulatory agencies to determine compliance with air quality regulations, odor modeling techniques have been developed using these same air quality dispersion models. Using the emission characteristics of the facility, USEPA's ISCST3 model was used to assess worst-case estimates of maximum short-term concentrations from a single point, area or volume source, and from combinations of multiple point, area and volume sources. The odor dispersion modeling followed the same basic approach as that for criteria and toxic pollutants of on-site sources.

The purpose of using dispersion modeling for the odorous emissions was to determine the distance from the Converted MTSs at which the modeled emission rates had resulting concentrations that were equal to or less than an odor unit of 5. For comparison purposes, an average person in a laboratory setting could just barely detect that there was something different about a sample that contained a concentration of 1 OU (1 DT) in comparison to clean, filtered, background air. However, an odor concentration impact at 1 OU would not likely be detected in outdoor air within New York City which, based on background measurements taken during the 2003 Commercial Waste Management Study, had on the order of a 5 DT, or 5 OU concentration, even without local source impacts. Adding a concentration of 1 OU to such air would probably not make a detectable difference to the average observer. It is expected that an added impact of 5 OU from a Converted MTS would be a more likely level of odor impact that would begin to be detected by an average observer.

3.13.6.3 Modeling Procedures

The following procedures were followed for modeling the odor sources:

1) BPIP-The EPA Building Profile Input Program (BPIP) was used to determine dimensions for simulating building downwash effects on the plume of the stack/vent located on the roof of the processing building. The ISCST3 model takes the output generated by the BPIP program and simulates downwash effects by limiting any plume rise and by increasing the rate of vertical and horizontal plume spread. The BPIP program calculates 36 projected building widths and heights (one set for every 10° of arc, 360° total, with respect to a point source).

2) ISCST3 Model-The source emission rates in odor unit per second (OU/sec) was input into ISCST3 along with all other necessary input data. Model inputs were set to calculate and output the peak value that was representative of how odors are detected by humans.

Several modeling assumptions were used for the analysis of each Converted MTS site:

- Stack heights were set at 0.91 meters above the process building roofline with an exit velocity of 0.001 m/s, to simulate horizontally-directed exhaust.
- Calm wind conditions were not represented in the ISCST3 results since the USEPA regulatory default option was used. Calm wind conditions are a worst-case dispersion condition and tend to keep odors closer to the source and show higher impacts at or near the facility property line. However, calm wind conditions only occur at a maximum of 3% of the time on an annual basis for the 1997 through 2001 LaGuardia Airport meteorological data set.
- A Cartesian coordinate system was developed to encompass all emission sources the process building stack as well as the receptor points, which are the locations where the model calculates odor concentrations. The receptor grid was developed out to a distance of 500 meters (approximately 1640 feet) from the property boundary in all directions over land in 50-meter (approximately 164-foot) increments. This allowed creation of contour plots to help define any areas of predicted detectable odors and to determine whether these areas overlapped any sensitive receptors.
- The building ventilation exhaust stack(s) were modeled as a point source(s) located at the top of the process building, unless otherwise specified. The emission rate for the point sources were modified for facility capacity and number of emission points, if applicable. The ISCST3 model is the same as that used to determine compliance with applicable air quality standards and guidelines. The emission rates from each source were determined by converting the sampled concentrations into odor emission rates calculated in units of OU/sec. In addition, physical parameters of the sources and surrounding structures, such as exhaust fan height, were incorporated into the model.

3.13.7 Mitigation Measures

Examples of design features that may be associated with facilities to mitigate odor problems include:

- Installation of building exhaust fans and filter systems (i.e., bag houses and cyclones) to create negative air pressure that would minimize the escape of fugitive odors from the Converted MTS; and
- Installation of an automatic spray system that would disperse odor neutralizing agents within the building and into the ducts of the exhaust air system.

Operational procedures that have been shown to be effective at reducing odors include:

- Regulations that require all waste handling operations to be conducted within the enclosed facility and limit the length of time solid waste can be retained on site;
- The requirement that the doors in the waste receiving area be closed except during waste deliveries; and
- The use of covered or enclosed trucks for all waste delivery and transfer operations.

3.14 Noise

3.14.1 Introduction

This section briefly outlines the methodology that will determine the extent to which Converted MTS operations could affect noise levels. Each site is located in manufacturing-zoned districts but has the potential to generate noise that could affect nearby noise sensitive receptors, such as residential land uses and outdoor areas (i.e., parks). Noise sources evaluated include both mobile and stationary sources operating within the site boundary and collection and employee vehicles traveling on roads leading to and from the facility. The analysis includes:

- A screening step to determine if further analysis is warranted; and
- If warranted, a detailed analysis including a monitoring task to determine existing noise levels near the site and at noise sensitive receptors, based upon guidance found in the 2001 CEQR Technical Manual, City Noise Code, and modeling techniques for on and off site noise.

The on-site noise analysis used a spreadsheet with standard noise calculations that accounts for multiple indoor noise sources, attenuation provided by building walls, multiple outdoor sources, attenuation due to propagation (geometric spreading) toward off-site receptors, equipment utilization factors and shielding provided by intervening buildings.

The FHWA Traffic Noise Model Version 2.1 (TNM 2.1) or field simulations of DSNY or other agency collection vehicles along routes near sensitive receptors were used to predict potential off site noise impacts.

3.14.2 Background

Noise is often described as unwanted sound. Factors affecting the physical characteristics of sound when it is perceived subjectively as noise by the human ear are:

- Actual level of the sound (perceived loudness);
- Distribution of sound energy among individual frequency bands in the audible range;
- Period of exposure to the noise; and
- Changes or fluctuations in the noise levels during the period of exposure.

The human ear does not perceive all sound frequencies equally well, so measured sound levels are adjusted or weighted to correspond closely to human hearing. The adjusted basic measurement unit is known as the A-weighted decibel (dBA). Community noise levels in urban areas usually range between 45 dBA and 85 dBA, 45 dBA being the daytime noise level in a typical quiet living room, and 85 dBA being the approximate noise level near the sidewalk adjacent to heavy traffic. Figure 3.14-1 illustrates noise levels from typical fluctuating and non-fluctuating (steady) noise sources, based on the A-weighted decibel measure of noise.

Because dBA describes a noise level at just one moment and very few noises are constant, other methods of describing noise over extended periods are used. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period as if it has been a steady, unchanging sound. For this condition, a descriptor called the equivalent sound level, L_{eq}, is computed. An L_{eq} is the constant sound level that conveys the same sound energy as the actual time-varying sound in a given situation and time period, 1 hour for example.

The 1-hour L_{eq}, as recommended by CEQR and the City Noise Code, is used as the noise descriptor. Maximum 1-hour L_{eq} sound levels are used to provide an indication of expected sound levels during the loudest hour of facility operations. Minimum 1-hour L_{eq} sound levels provide a basis for impact assessment during the quietest hour of operations. The 1-hour L_{eq} sound level allows for comparison with federal and local noise standards and indicates to what extent local residents will be affected by changes in facility-related noise levels. In addition to the L_{eq}, statistical descriptors of L_{10}, L_{50}, and L_{90} are also used in this analysis. These descriptors represent noise levels that are exceeded 10 percent, 50 percent, and 90 percent of the time. Therefore, an L_{10} of 60 dBA means that during 10 percent of the measurement period, the noise levels will be higher than 60 dBA. Similarly, an L_{50} of 60 dBA means that during 50 percent of the measurement period, the noise levels will be higher than 60 dBA.

The average person's ability to perceive changes in noise levels is well documented. Generally, changes in noise levels of less then 3 dBA will barely be perceived by most people, whereas a 10 dBA change is perceived as a doubling (or halving) of noise levels. The general principle on which most noise acceptability criteria are based is that a change in noise is likely to cause annoyance whenever it intrudes upon the existing noise from all other sources. Essentially, annoyance depends upon the noise that exists before the start of a new noise-generating project or an expansion of an existing project.

Ways for expressing noise emission levels for equipment are SWL and SPL. A decibel is defined as:

$$Lw = 10 \times \log(W/Wref)$$

where:	W	=	Watts, a unit of power;
	Wref	=	a reference power (usually 1 x 10-12 W); and
	Lw	=	sound power level.

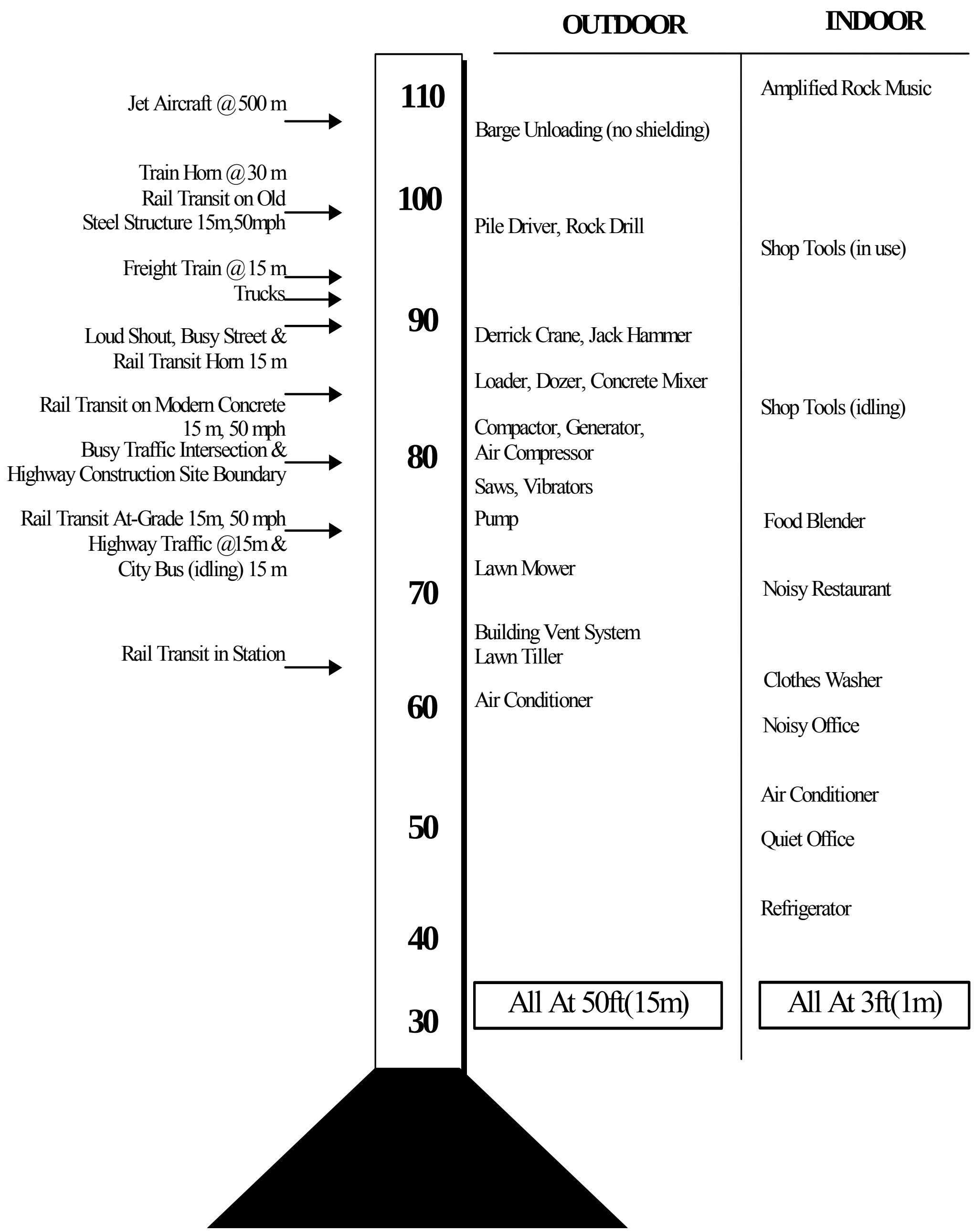
Sound power can be thought of as the amount of energy generated and propagated per unit of time. Sound pressure level is a variation in pressure above and below atmospheric pressure and is proportional to sound power level. For example, two piston cylinders of different diameters can be driven so that they put out the same amount of sound power. The sound power per unit area, or sound intensity, in the smaller tube will be greater than that in the larger tube because the same amount of energy is distributed over a smaller area. This means that the sound pressure disturbances in the smaller tube are larger because the sound intensity is higher.

3.14.3 Criteria

The noise analyses are based upon CEQR standards and the City Noise Code sections that set limits on facility-generated noise levels at adjacent properties. The criteria used include a determination of the following:

- If the existence of the Converted MTS and related activities would raise the existing hourly minimum plant noise levels by 3 dBA or more;
- If the general external exposure level classification according to the CEPO-CEQR Noise Exposure Standards (see Figure 3.14-1 of the 2000 FEIS) before and after the Converted MTS is built, would preclude achieving an acceptable acoustic environment for noise sensitive receptors (such as residential land uses and certain outdoor areas). The noise levels are classified by the following external exposure categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable; and
- Full adherence to the City Noise Code requirements in all facilities.

Figure 3.14-1
Common Indoor and Outdoor Noise Levels



Sources: Parsons Brinckerhoff Quade & Douglas, Inc., July 1998
FTA Report DOT-T-95-16. "Transit Noise and Vibration Impact Assessment: Final Report", April 1995
Hudson River Waterfront Transportation Corridor DEIS, November 1992

3.14.3.1 New York City Noise Code

City Noise Code 24-243 (Ambient Noise Quality Zone), which specifies a 24-hour L_{eq} (1-hour) level less than or equal to 70 dBA for noise emitted from land uses zoned for manufacturing s at the property line of the Converted MTS site was applied.

3.14.3.2 CEPO-CEQR Noise Standards

The noise analysis is based on Section R of the 2001 CEQR Technical Manual, which includes definitions of environmental acoustics concepts, guidance for determining if a noise analysis is appropriate, assessment methods, impact thresholds, and mitigation guidance. The noise requirements of the CEQR Manual, are as follows:

- Off-Site Noise
  - If the Future No-Build Condition traffic noise level is less than 60 dBA L_{eq} (1-hour), and the analysis period is during the day, the threshold for significant impact will be an increase of 5 dBA L_{eq} (1-hour).
  - If the Future No-Build Condition traffic noise level is equal to or greater than 62 dBA L_{eq} (1-hour), or if the analysis period is during the nighttime, the threshold for significant impacts will be an increase of 3 dBA.

- On-Site Noise
  - The threshold for significant impacts is an increase of 3 dBA or more, over the existing minimum noise at the nearest sensitive receptor, when impacts are analyzed for cumulative noise effects from facility-related truck traffic and noise.

A screening analysis was performed for on-site and off-site noise sources to evaluate the potential for noise impacts and to determine if additional refined noise analyses were required. Refer to Section 3.14.5 for a discussion of the screening analyses, Section 3.14.7 for a discussion of the detailed noise analyses and impact thresholds, and Section 3.14.8 for a discussion of typical mitigation measures for impacted locations.

3.14.3.3 Other Standards

City Zoning Regulations also address noise emissions. The following section of the City Zoning Regulation was applied: City Zoning Regulations 42-213, which specify maximum permissible octave band sound pressure levels for manufacturing districts M1 and M3 (See Table 3.14-1) from plant equipment operations, including the operation of rooftop ventilators and air circulation devices.

Table 3.14-1
New York City Zoning Regulation
Maximum Permitted
Sound Pressure Level
(in decibels)

Octave Band (cycles per second)	District	
	M1	M3
20 to 75	79	80
75 to 150	74	75
150 to 300	66	70
300 to 600	59	64
600 to 1,200	53	58
1,200 to 2,400	47	53
2,400 to 4,800	41	49
Above 4,800	39	46

The octave bands provided above are "old" and can no longer be measured with the noise monitoring equipment available. The ANSI has promulgated a standard for the conversion of the old octave bands to the current octave bands. (See Table 3.14-2).

Table 3.14-2
New York City Zoning Regulation
Maximum Permitted
Sound Pressure Level
(Current Octave Band)
(in decibels)

Octave Band (cycles per second)	District	
	M1	M3
63	80	79
125	76	74
250	68	69
500	60	63
1000	54	57
2000	48	52
4000	41	48
8000	41	45

3.14.4 Noise Sources

3.14.4.1 On-Site Noise Sources

Solid waste management facilities may include a variety of on-site noise sources, such as gantry cranes and ventilation equipment. For practical purposes, certain mobile sources were modeled as on-site sources, including collection vehicle loading/unloading at the Converted MTSs, front-end loaders moving waste on-site, barge loading/unloading equipment, and street sweepers. To be conservative, it was assumed that typical daytime facility operations occur 24 hours per day.

3.14.4.2 Off-Site Noise Sources

For the purposes of this analysis, collection and employee vehicles were considered as off-site mobile sources.

3.14.5 Screening Methodology

3.14.5.1 On-Site Source Screening Analysis

Both stationary and mobile equipment operate indoors and outdoors. The Converted MTSs and operations within the facility boundary were treated as stationary sources for the purpose of the screening analysis. The locations of equipment and activities at each site at each facility's peak capacity were drawn on a scaled layout map. A reference noise level for each piece of equipment, both indoor and outdoor, was obtained and added together. The combined noise levels were used to identify the 55 dBA noise contour line (e.g., the point at which on-site noise would attenuate to 55 dBA). As 55 dBA is a generally acceptable nighttime noise level, it was used as a threshold for screening purposes. Noise sensitive receptors located between the facilities and the 55 dBA contour, if any, were identified.

To calculate the 55 dBA contour line, a -6 dBA drop-off rate (i.e., level of attenuation per doubling of distance from the source) was assumed. The shielding effects of intervening buildings was accounted for by applying 5 decibels of shielding for each row of buildings that provides 70 to 90 percent coverage (of the line of sight), with a 10-decibel limit (FHWA-RD-77-108, page 33). A 10-decibel attenuation was used for buildings providing more complete coverage.

If noise sensitive receptors were not located within the 55 dBA contour line, the facilities were screened from further analysis and a qualitative discussion is provided. If noise sensitive receptors exist within the 55 dBA contour line, a detailed stationary noise source analysis was performed. If the nearest noise sensitive receptor was located outside of the 55 dBA contour line, background noise levels were measured at that noise sensitive receptor to determine if they were below 55 dBA. If the noise level was below 55 dBA, a contour line for that noise level was determined and a detailed stationary noise source analysis performed.

The following were considered to be noise sensitive receptors:

- Parks/playgrounds;
- Schools and educational facilities;
- Residences;
- Churches and other places of worship;
- Outdoor performance facilities;
- Indoor performance facilities with windows;
- Healthcare facilities; and
- Libraries and community centers.

Noise analyses were also be conducted at noise sensitive receptors that were non-conforming uses in particular zoning districts.

3.14.5.2 Off-Site Source Screening Analysis

CEQR includes guidelines for a screening-level analysis of off-site sources to determine if additional refined analyses are required. The only off-site sources for the Converted MTSs are collection and employee vehicles on local roads traveling to and from the MTSs.

Noise screening was performed in a two level process. The first level consisted of converting the Future No-Build traffic volume and the collection vehicle and employee traffic volume to Passenger Car Equivalents (PCEs). The Future No-Build traffic volume was converted to PCEs using New York State Department of Transportation (NYSDOT) site-specific axle factors. These categorize the traffic volume into two classes: 1) Automobile/Light Truck/Medium Truck/Bus; and 2) Heavy Trucks. The CEQR PCE factors for the vehicles in Class 1 range from 1 to 18, per Section R 332.1 in the CEQR Technical Manual. A conservative PCE factor of 1 was used for Class 1, therefore resulting in a lower Future No-Build traffic PCE volume that cannot be doubled, per the CEQR screening threshold. The CEQR PCE factor for the vehicles in Class 2 is 47, which was also used to convert the collection vehicles traffic volume to PCEs.

Employee vehicles were converted to PCEs using the CEQR PCE factor of 1 for cars. The two PCE values (Future No-Build and Future Build) were then compared. If the Future Build PCEs (collection vehicles PCEs plus employee vehicle PCEs) were double the Future No-Build PCEs, the collection vehicles and employee vehicles would cause a possible impact. A second level screening process was then required.

For the second-level screening, the hour for which the greatest ratio of Future Build PCEs to Future No-Build PCEs was analyzed for each roadway that resulted in a doubling of PCEs based on the first-level screening. If the first-level screening resulted in possible impacts during the daytime (7:00 a.m. to 10:00 p.m.), as well as the nighttime (10:00 p.m. to 7:00 a.m.), both the hour with the greatest ratio from the daytime and the hour with the greatest ratio in the nighttime were further analyzed in the second-level screening.

Similar to the first level screening, the collection vehicle traffic volume and employee vehicle traffic volume was converted to PCEs using a PCE Factor of 47 for Heavy Trucks and 1 for cars, respectively, for this level. However, for this level, Future No-Build PCEs were calculated using: (1) the field obtained vehicle classification count for the hour(s) being screened or a vehicle classification count representative of the vehicle distribution expected during that time of the day; and (2) the following conversion factors from CEQR Section R 332.1:

- Each Automobile or Light Truck: 1 PCE;
- Each Medium Truck (gross vehicle weight from 9,900 pounds to 26,400 pounds): 13 PCEs;
- Each Bus: 18 PCEs; and
- Each Heavy Truck (gross vehicle weight more than 26,400 pounds): 47 PCEs.

As a result of the second level screening process, if the Future No-Build PCEs were either doubled or nearly doubled along a roadway due to an increase in traffic volume from the addition of collection and employee vehicles at any time there is a possible impact and, then a detailed noise analysis was required per CEQR, Section R 311.1.

3.14.6 Noise Monitoring

3.14.6.1 On-Site Monitoring

Noise sensitive receptors near each site were identified using a combination of land use and zoning maps, aerial photography, and field visits to each site. Noise monitoring was conducted continuously for 24 hours to establish Future No Build noise levels at the facility property line closest to the nearest sensitive receptor. Monitoring results were expressed as L_{eq}, L_{min} (the minimum sound level), L_{max} (the maximum sound level), and the statistical descriptors of L_{10}, L_{50}, and L_{90}. For sites located near highways or airports, Future No Build noise levels might include noise generated by these existing sources. Because the Converted MTSs are on waterfront sites, Future No Build noise levels might include noise generated by marine activities, such as pleasure boats and tugboats, etc. If the screening process identified the need for a detailed on-site analysis, then short-term, 20-minute readings were taken at the closest noise sensitive receptor during the hour in which the greatest difference between Converted MTS-related noise and background noise levels occurred in order to estimate the maximum potential impacts on that receptor.

3.14.6.2 Off-Site Monitoring

If the screening analysis task for off-site sources determined that PCEs either doubled or nearly doubled along a roadway due to an increase in traffic volume resulting from the addition of collection and employee vehicles, a detailed off-site noise source analysis was performed. The detailed off-site noise source analysis consisted of noise monitoring and modeling to predict noise levels during the hours expected to receive the largest change in noise levels (when the difference between traffic noise and background noise levels is greatest). For each location in which PCEs doubled, noise monitoring was performed to determine the existing background noise level at the representative nearest sensitive receptors along the study area. The Future No Build condition noise level and the Future Build condition noise level predicted by the FHWA's TNM 2.1 was calibrated using the background noise level (measured). The difference of the calibrated Future No Build condition noise level and the calibrated Future Build condition noise level was compared with CEQR Manual noise impact thresholds and reported in a tabular format. If the TNM predicted an impact at a site, noise simulations were performed that included noise monitoring of the existing background noise level and simulation of DSNY collection vehicles passing through the site during all hours that the screening resulted in a possible impact.

3.14.7 Impact Analysis

3.14.7.1 On-Site Impact Analysis

On-site noise impacts were evaluated during the hour in which the greatest difference between project-related noise and background noise levels would occur (on-site noise analysis hour). If the greatest incremental difference would occur at night, activities at the on-site sources would be largely, but not entirely, indoor operations with occasional collection vehicles delivering waste to the facility. However, to be conservative, typical daytime operations were also assumed to occur at nighttime. Indoor activities include collection vehicles dumping waste on the tipping floor, loaders moving waste toward the hoppers, the tamping down of waste into containers, and housekeeping. The outdoor analysis accounts for trucks queuing on-site, container handling activities, barge loading by gantry cranes, and housekeeping activities by street sweepers.

3.14.7.1.1 CEQR Analysis

Because operations were conservatively assumed to occur 24 hours per day, the quietest background hour was the hour during which the greatest difference between facility noise levels and background noise levels occurred (the hour during which the greatest impact would occur). To determine this hour, the 24-hour background noise levels measured at the site boundary nearest to the closest noise sensitive receptor were reviewed for the lowest L_{eq}(h). Short-term 20-minute readings were taken at the closest noise sensitive receptor during this hour to estimate the maximum potential impacts upon that receptor.

Noise levels were from indoor and outdoor on-site activities were predicted at the nearest noise sensitive receptor and combined logarithmically. Table 3.14-3 lists equipment and noise emissions used to evaluate noise emissions from facilities.

Table 3.14-3
Noise Levels for Use in Refined Noise Analysis

Equipment	Noise Level (SPL)	Data Source
Wheel Loaders (i.e., Caterpillar 966G)	81 dB(A)	Caterpillar
Tamping Crane (excavator w/grapple attachment) (i.e. Caterpillar 330C)	81 dB(A)	Caterpillar
Bridge Crane (for lid removal/replacement)	70 dB(A)	Atlantic Crane & Hoist, Inc.
Mini-Sweeper	76 dB(A)	Caterpillar
Waste Delivery Truck Indoors	73 dB(A	Field Measurements
Waste Delivery Truck Outside (idling)	67 dB(A)	Field Measurements
Container Car Pullers	45 dB(A)	Field Measurements
Gantry Cranes	78 dB(A)	Field Measurements
Tug Boats	73 dB(A)	Field Measurements

Boilers would be located within the processing buildings but are not a significant noise source. Roof exhaust fans are located on top of the processing buildings; however, manufacturers' data for a typical roof exhaust fan has a sound pressure level (L_p) of 45 dBA at 50 feet. Even with 10 roof exhaust fans, the L_p would be 55 dBA at 50 feet, which would not change the overall noise level calculated for each Converted MTS. Therefore, noise contributions from roof exhaust fans were not included in the analysis.

The steps involved in performing a CEQR detailed stationary analysis were as follows:

- **Step 1**: Calculate the cumulative boundary noise levels from equipment located inside the plant building during the on-site noise analysis hour. For each piece of equipment:

  a) Establish the sound power level (SWL);
  b) Calculate the sound pressure level (SPL) at the inside of the building wall;
  c) Determine the SPL in the outside areas of the building by applying a 20 dB reduction to the SPL at the inside of the building wall due to transmission through the wall;
  d) Use the outside SPL and area of the wall to calculate the SWL of the wall; and

e) Convert the wall SWL to an SPL at selected distances to the plant boundary taking into account multiple pieces of equipment of the same type and the equipment utilization factor (when equipment utilization is 100 percent during 1-hour, the SPL is equivalent to L_{eq} (1-hour).

- Repeat steps (a) through (e) for all plant equipment operating indoors during the on-site noise analysis hour.

▪ **Step 2**: Calculate the noise level contributions from all of the outside equipment in operation during the on-site noise analysis hour at the closest noise sensitive receptor. For each piece of outside equipment, including on-site DSNY and other agency collection vehicles:

a) Establish the SPL at 50 feet from the noise source, the reference distance. (A reference noise level at a reference distance is required to predict noise levels at certain distances from a source);

b) Convert the SPL at 50 feet to the SPL at the distance to the closest noise sensitive receptor, taking into account multiple pieces of equipment of the same type and the equipment utilization factor. This calculation utilizes a –6 dB/distance doubled drop-off rate to express noise propagation on-site. This drop-off rate is generally assumed to occur close to (in the near field of) a point source;

c) Make appropriate corrections for factors such as shielding.

- Repeat steps (a) through (c) for all outside equipment.

▪ **Step 3:** Calculate the overall facility predicted noise level at the closest sensitive receptor by logarithmically adding the Leq contributions from plant equipment operating indoor and outdoors at that location.

The overall facility predicted noise level was logarithmically combined to the background (measured) noise levels to determine an overall predicted combined noise level. The difference between the overall predicted combined noise level at the receptor and the background (measured) noise level was compared with noise impact CEQR thresholds defined in Section 3.14.3.2.

3.14.7.1.2 Noise Code Analysis

Noise levels from indoor and outdoor on-site activities were combined logarithmically at selected locations around the Converted MTS boundary. The steps involved in performing a Noise Code analysis were as follows:

- **Step 1**: Calculate the cumulative boundary noise levels from equipment located inside the plant building during the on-site noise analysis hour. For each piece of equipment:

  a) Establish the sound power level (SWL);

  b) Calculate the sound pressure level (SPL) at the inside of the building wall;

  c) Determine the SPL in the outside areas of the building by applying a 20 dB reduction to the SPL at the inside of the building wall due to transmission through the wall;

  d) Use the outside SPL and area of the wall to calculate the SWL of the wall; and

  e) Convert the wall SWL to an SPL at selected distances to the plant boundary taking into account multiple pieces of equipment of the same type and the equipment utilization factor (when equipment utilization is 100 percent during 1-hour, the SPL is equivalent to L_{eq} (1-hour).

  \- Repeat steps (a) through (e) for all plant equipment operating indoors during the on-site noise analysis hour. To determine the total projected plant boundary noise levels from all indoor plant equipment at the selected locations, logarithmically add the Leq contributions from each piece of indoor equipment.

- **Step 2**: Calculate the cumulative plant boundary noise level contributions from all of the outside equipment in operation during the on-site noise analysis hour. For each piece of outside equipment, including on-site DSNY and other agency collection vehicles:

  a) Establish the SPL at 50 feet from the noise source, the reference distance. (A reference noise level at a reference distance is required to predict noise levels at certain distances from a source);

  b) Convert the SPL at 50 feet to the SPL at distances to selected plant boundary locations, taking into account multiple pieces of equipment of the same type and the equipment utilization factor. This calculation utilizes a –6 dB/distance doubled drop-off rate to express noise propagation on-site. This drop-off rate is generally assumed to occur close to (in the near field of) a point source;

  c) Make appropriate corrections for factors such as shielding.

- Repeat steps (a) through (c) for all outside equipment. To determine the total projected plant boundary noise levels from the outside equipment at the selected locations, logarithmically add the Leq contributions from each piece of outside equipment.

- **Step 3**: Calculate the total L_{eq} at selected locations around the property line by logarithmically adding the L_{eq} contributions from plant equipment operating indoors.

These total L_{eq} at selected boundary locations around the property lines were compared to the noise code criteria defined in Section 3.14.3.1.

3.14.7.1.3 Performance Standards for Zoning Code Analysis

Spectral noise levels from indoor and outdoor on-site activities were combined logarithmically at selected locations around the Converted MTS boundary. Outdoor DSNY and other agency collection vehicles were not included in this analysis, in accordance with the City Zoning Code Performance Standards for Manufacturing Districts. The steps involved in performing a Zoning Code analysis were similar to those performed for the Noise Code Analysis but on a spectral noise basis. The spectral noise levels predicted at selected boundary locations around the property lines were compared to the performance standards for the Zoning Code Analysis defined in Section 3.14.3.2.

3.14.7.2 Off-Site Impact Analysis

As mentioned previously, the off-site analysis used the FHWA TNM 2.1 or field simulations of DSNY and other agency collection vehicles along routes near sensitive receptors to predict traffic noise levels for the Future Build Condition. At study areas where TNM was used, sensitive receptors within 200 feet and with an unobstructed view of the roadway was identified and modeled to determine the predicted traffic noise levels for the Existing, Future No-Build and Future Build Condition. In most cases, this limited the analysis to the first row of buildings along a roadway. If necessary, the FHWA shielding methodology was applied if buildings obstructed the line of site between a roadway and a sensitive receptor.

If the TNM analysis predicted an impact at a site, noise measurements were performed at the same site that included simulation of DSNY and other agency collection vehicles passing through the site during all hours that the second screening resulted in a possible impact. For this procedure, two sets of noise measurements were taken, with and without DSNY collection vehicles, by routing a set number of such trucks during the affected nighttime hours past the sensitive receptor. The difference between the noise levels with and without DSNY collection vehicles were compared the CEQR standards. In addition, TNM was used to determine the existing and the existing plus DSNY collection vehicle (project related traffic) noise level for comparison purposes.

From these two sets of measurements obtained during the simulations, it was possible to calculate the average acoustic energy from each individual truck movement in terms of $L_{eq\ (1hour).}$ The individual truck noise energy which was calculated for each site was used to estimate number of trucks that could be allowed on a street without causing noise impact, per CEQR guidelines.

The existing noise level predicted by TNM and the existing noise level estimated from simulation tests (as described above) did not always agree. In cases where such differences were less than 3 dBA the TNM predicted noise levels were adjusted so that it agreed with the estimated existing noise level. However, for purposes of CEQR analysis it is the difference between the future build and future no-build that matters and this difference will not change following the adjustment to the future build and future no-build noise levels.

In cases where the disagreement between the TNM predicted existing noise level and the estimated or measured existing noise level was more than 3 dBA such disagreements were attributed to the fact that, the existing noise level in some areas of the city during the quietest hours of the night are not entirely from road traffic but are dominated by other noise sources which include sirens, window air conditioners, activities in bus garages and in the general community. Under these circumstances the TNM modeling may not strictly be applicable though it was performed for comparison purposes.

For those locations in which detailed on and off-site source analyses were performed, a combined source analysis may also be conducted if the potential impacts affected the same sensitive receptor. The combined analysis study area was defined by the 55 dBA isopleth contours from the on-site source and the bottom driveway entrance to the Converted MTS. The other limits for the combined analysis study area were defined by the first row of buildings along the roadway between the 55 dBA contour and the driveway entrance to the Converted MTS.

If noise sensitive receptors were not located in the study area a combined analysis was not performed. If noise sensitive receptors exist in the study area, then the TNM was used to predict mobile traffic noise levels at that receptor. Noise levels from the on-site source were estimated at each receptor using the spreadsheet model employed in the on-site analysis. The combined noise level was calculated using a spreadsheet. The combined analysis was performed during the on-site noise analysis hour.

3.14.8 Typical Mitigation Measures

Mitigation measures available were limited to those that affect the source, the propagation path, or the receiver. Typical mitigation measures at the source include: (1) changes in operations schedules to reduce nighttime noise emissions; (2) using noise mufflers for the exhaust pipes of material handling equipment (i.e., side loaders, yard tractors, etc.); and (3) maintaining the equipment through regularly scheduled maintenance and repairs. The typical mitigation measure for the path of noise between source and receiver is a noise wall. Noise walls can be designed to provide noise attenuation for noise sensitive areas located relatively close to the wall. Noise attenuation provided by the wall decreases as distance from the wall increases. Receiver treatments may include the construction of noise walls at residential property lines or the installation of replacement windows and air conditioning. The latter two mitigation measures are suggested in the 2001 CEQR Technical Manual.

If significant impacts were identified, noise attenuation measures were explored and either included in the Converted MTS design or operations plans, if feasible, or evaluated to identify if the mitigation measures would avoid, lessen or mitigate the impacts.

3.15 Infrastructure and Energy

3.15.1 Introduction

The MTS Environmental Evaluation evaluates the potential impacts associated with the development of the Converted MTSs on existing sewage, energy and solid waste systems for each site in accordance with CEQR guidelines. The analyses include:

- An inventory of existing utility infrastructure (water, sewer, electric and gas) servicing each site;
- A comparison of the estimated Converted MTS-generated demand on water, sewage, electric, gas and solid waste systems with the infrastructure available to meet these demands;
- A qualitative examination of the need for additional infrastructure and utilities and the generation of solid waste during the construction period; and
- Identification of any significant impacts on the existing infrastructure and energy systems and examination and recommendation of mitigation measures, where appropriate.

3.15.2 Water Supply

The description below of the existing water supply distribution system and its conditions is based upon drawings and information from NYCDEP Bureau of Water and Sewer Operations. For sites currently staffed or in use, the water demand was based upon the current number of on-site employees and a per capita (gallons per day (gpd) per employee) water usage. For the Converted MTSs, water demand was based upon the number of employees and the volume of water to be used for tipping floor wash-down and dust control. The employee demand would be 25 gpd for all shifts, with an average demand of 180 gpd required for tipping floor wash-down and dust control. The process water estimates, obtained from the CEQR Technical Manual for comparable facilities, were compared to the amount of water supplied by the system and their effects on the system's capacity analyzed.

3.15.3 Sanitary Sewage and Stormwater

For each WPCP affected by the Converted MTSs, the dry weather flow for the latest 12 months was used. Sewage generation was based upon all water used on the sites being sent to the WPCP, along with an estimate of process or MTS water usage. The incremental generation was estimated with regard to both the average annual and the highest monthly dry weather flows, and the impact on the WPCP's ability to meet the flow limits of its State Pollution Discharge Elimination System (SPDES) permit was analyzed.

3.15.4 Solid Waste

The effects of the each Converted MTS on the City's solid waste infrastructure and the conduct of City solid waste management activities were examined. In addition, a review was conducted of each Converted MTS's conformance with the regulations and permitting of solid waste management facilities by NYSDEC and DSNY.

The future daily volumes of solid waste generated were estimated based on each employee generating 1.3 pounds per day for each shift. This solid waste generation was based on estimates provided within the 2001 CEQR Technical Manual for similar facilities. This volume of waste was compared to the estimated volume of waste, and the impacts analyzed.

3.15.5 Energy

Consolidated Edison's capacity to supply electricity to the Converted MTSs was determined, and the current on-site demand estimated. Electricity consumption projections for the Converted MTSs were calculated for the processing equipment (cranes, shuttle cars, etc.), auxiliary equipment and facility lighting. Power consumption projections for the Converted MTSs was determined from data provided by the vendors and consultants for the MTSs and equipment suppliers, based on the 24-hour operation of the process and ancillary equipment. Comparisons were made between this estimated new demand and available capacity for the area network. At Converted MTSs in which anticipated incremental electrical demands would exceed 1.5 percent of the network projections, modifications to the network may be required.

Natural gas requirements for the Converted MTSs were compared with infrastructure capacities projected by Consolidated Edison and Brooklyn Union Gas (Keyspan Energy). The possible impacts of the Converted MTSs and the policies governing the conduct of solid waste management activities in the City were also assessed.

3.16 Natural Resources

3.16.1 Introduction

The sites are located in manufacturing-zoned areas and are, therefore, unlikely to contain significant ecologically sensitive areas or appropriate habitats for threatened and endangered species. However, because many of these sites are on the City's waterfront, potential effects to surface water bodies and habitats were considered. Existing terrestrial and water resources were characterized based on information derived from site visits, data research, and coordination with the NYSDEC Natural Heritage Program. Any significant effects of the facilities (i.e., from the in-water construction of piers or bulkheads) is noted in Chapters 4 through 11 and appropriate mitigation measures identified.

A natural resource is defined by CEQR as "plant and animal species and any area capable of providing habitat for plant and animal species or capable of functioning to support environmental systems and maintain the City's environmental balance." Natural resources consist of water resources, wetland resources, upland resources, built resources, and significant, sensitive or designated resources. The types of natural resources present on each site vary, depending on location, and required evaluation on an individual basis. For the purposes of CEQR assessment, the City's natural resources are categorized as follows:

- Wetlands: freshwater and tidal wetlands;
- Water Resources: surface waters (oceans, rivers, bays, streams, estuaries, ponds, lakes) and groundwater, drainage systems and floodwater systems/floodplains;
- Terrestrial Resources: beaches, dunes, bluffs, thickets, grasslands, old meadows, fields, woodlands and forests, gardens and other ornamental landscaping;
- Built Resources: piers, waterfront structures and ruins that are habitats for marine species and nesting and foraging areas for birds, beach and flood protection structures and other structures offering habitat to various species; and
- Plant and Animal Species and Habitats.

The limits of the study area for the assessment of natural resources of each site were determined by the potential effects of the facility and the resource in question. In all cases, the entire project site was inventoried for these resources based on NYSDEC mapping and information from the NYSDEC's Natural Heritage Program. If such resources were identified on the site and were determined likely to be disturbed by the Converted MTS, additional assessments were made, including the following activities:

- Collection of detailed identification of natural resources that could be impacted directly or indirectly by the Converted MTS siting or modification;
- Field studies and documentary research to determine the value of the affected natural resource, and its relationship to neighboring resources and to the overall area ecosystem;
- Detailed analysis of the construction and operation activities of the Converted MTS and its interaction with, and impacts on, the affected natural resource and the environmental support systems; and
- Development of construction-period and long-term mitigation, which could include techniques to control siltation and erosion during construction, revegetation programs, slope and surface protection, water pollution controls, wetlands replacement, etc.

3.16.2 Previous Studies and Literature – Types and Sources of Information Collected

Field investigations of all the sites were conducted during the period January 1999 through July 1999 by a team of terrestrial and aquatic ecologists who observed the extent of the resource, the context of its surrounding, and the area where the Converted MTS would be. Field notes and observations were used to characterize the resources in the study area. A literature search was also conducted to identify any potentially valuable or sensitive resources. U.S. Geological Survey Topographic Maps, FEMA Flood Plain Maps, National Wetland Inventory, and State Wetland Maps were used to identify and outline potential natural resource areas, wherever appropriate.

Information and data pertaining to the aquatic resources at each site were obtained from the literature and from the results of prior field studies. Over the past 20 years, Converted MTS sites have had extensive aquatic biology programs conducted either on-site, substantially contiguous to the site, or in sufficiently close proximity to warrant inclusion. The existing database covering marine resources of the Converted MTS sites is sufficient to make scientifically sound judgments on the relative project impacts for each of the facilities, given the comparatively modest alterations to the local marine resources.

Each site was examined for the presence or absence of tidal wetlands. The tidal wetlands assessment combined aerial photographic analyses, topography mapping, and tidal wetlands mapping. Field investigations were conducted to determine consistency with these data sources.

Additionally, the NYSDEC NHP was contacted to determine whether rare species of plants and wildlife or unique habitats were reported as occurring on or adjacent to each site. NHP provides a database listing that identifies the species and/or habitats with State, Heritage and Global rankings and other information related to the species. The database list is confidential and cannot be released without written permission from NHP.

The USF&WS was also contacted for any federally listed endangered or threatened species known to be within any of the project areas. Notification of project activity follows the guidelines under Section 7 of the Consultation of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 531 et seq). Response letters from both the USF&WS and NHP typically indicated the presence or absence of rare species and whether further on-site analyses were required. Pertinent species information provided by these agencies is included in each of the site descriptions in this MTS Environmental Evaluation, as are separate narrative descriptions. Essentially, these sections were tailored to the amount of background information available pertaining to each site and to the severity of expected impacts.

3.16.3 Current Ecological Field Studies - Types and Sources of Information Collected

During the fall of 2002, DSNY conducted ecological field studies at the Converted MTS sites. This decision reflected the desire to have sufficient data available to answer any potential regulatory agency questions or concerns. A scope of ecological studies was developed, presented to the relevant review agencies, their comments incorporated, and a final version published. The field studies started in January 2003, and were completed in December 2003. Results are currently being analyzed.

3.16.4 Screening Methodology

Each site was assessed for Existing and Future No-Build Conditions to determine the value of the natural resource as demonstrated by the variety and density of its species; its use for recreation, open space, or commerce; its relationship to neighboring resources and to the overall area ecosystem, or its role in ecosystem cleansing or storm and flood management. Environmental systems that support the natural resources in the study area were examined for each site. A detailed description of the construction and operational activities associated with each Converted MTS along with an analysis of its interactions with the natural resources and the environmental system that supports it is provided in Chapters 4 through 11.

3.16.5 Impact Analysis Methodology

Both the short- and long-term impacts of the Converted MTSs on the natural resources were evaluated. Direct impacts are identified as those that intervene or alter the resource immediately by impacting the site conditions, such as filling or draining areas, construction of bulkheads, piers, and other structures in the water, or removal of vegetation. Indirect impacts are those that affect a natural system or another resource that supports the resource under study, such as alterations of groundwater flow or quality, and increases in the transport of silt and sediments. The direct or indirect physical effects of the Converted MTSs were assessed because they modify the functioning of the resource. In addition, the effects were evaluated and expressed in the context of the scarcity or abundance of the resource.

Impacts were predicted by analyzing changes that resulted from similar programs in the past. Where there was no direct comparison to a past project was available, the impacts were predicted based upon generalized experience and modeling calculations.

3.16.6 Typical Mitigation Measures

Mitigation techniques can be applied during construction to control erosion and siltation, maintain existing drainage patterns, and avoid activities that unnecessarily cause temporary or permanent damage. Such techniques include:

- Using silt fences, hay bales, mulches, and other covers to limit areas of soil exposure and to stabilize slopes;
- Installing temporary drainage systems including sediment traps for the duration of the construction;
- Avoiding dredging in contaminated areas. Where this is not practical or feasible, such techniques as silt screens, turbidity curtains and modified dredging methods, such as restricting dredging to the areas of low current velocity, can be used;
- Limiting de-watering wherever possible; disposing of such waters properly so as to maintain the existing drainage system and avoid surface water pollution; and
- Limiting construction to periods during which breeding or spawning does not take place.

3.17 Water Quality

3.17.1 Introduction

The water quality analysis evaluates the impacts that the Converted MTSs would have on surface water and identified mitigation, if applicable. For each site, Existing Conditions, No-Build Conditions and potential impacts associated with the Converted MTS (Future Build Conditions) were evaluated. Recent water quality data in the vicinity of each site was summarized and compared to local water quality standards. A mathematical model of New York Harbor was used to predict the potential impacts of the Converted MTS upon future water quality conditions. The water quality study area includes the receiving water body that is adjacent or as close as possible to each site.

3.17.2 Review of Existing Water Quality Data

As part of the Harbor Survey Program, NYCDEP designated monitoring stations throughout New York Harbor, including the Hudson and East Rivers, which are sampled routinely. Water samples are typically analyzed for conventional pollutants and additional water quality parameters. In addition, ambient metals concentration data are available from sampling conducted by Battelle Ocean Sciences for Region 2 of the USEPA during 1991. For each of the sites, data from the nearest monitoring stations were compiled and summarized to develop a profile of No-Build water quality Conditions. These data were compared to the corresponding NYSDEC Water Quality Standards and guidance values. In addition, NYSDEC information on existing permitted discharges in the vicinity of each site was investigated.

3.17.3 Pollutant Loadings

At each Converted MTS, stormwater runoff would be discharged directly into the adjacent surface waters after passing through an oil/water separator. The volume of stormwater runoff and the associated pollution loading were calculated using precipitation data and available databases on stormwater pollutant concentrations. The estimated pollutant loading was developed for each site by calculating a runoff flow and assigning an average stormwater concentration for each water quality parameter. The runoff flow was calculated using the following equation:

$$Q_R = CIA;$$

where:

Q_R = Runoff flow (cfs);
C = The runoff coefficient;
I = The average rainfall intensity (in/hr); and
A = Site area (acres).

The runoff coefficient, C, is directly related to the amount of impervious surface, such as buildings, roads, parking lots, or other similar features that water does not infiltrate. To be conservative in the analysis of potential impacts to surface water, it was assumed that all site runoff would discharge to surface waters; therefore, the runoff coefficient is equal to one. The average rainfall intensity, I, is calculated from rainfall data measured at Central Park between 1969 and 2002. These data were analyzed to determine statistics on the duration and intensity of storm events.

For each site, pollutant loading for each water quality parameter was calculated by assigning a pollutant concentration to the runoff flow. Table 3.17-1 presents average concentrations for conventional pollutants and selected metals in urban stormwater runoff. Pollutant concentrations have been determined from the NURP and additional stormwater databases. These additional databases included studies funded by the Washington Council of Governments, FHWA and Santa Clara County, California. Studies in Jamaica Bay (Jamaica Bay Combined Sewer Overflow Facility Planning Project, O'Brien and Gere, 1994), Alley Creek (East River Combined Sewer Overflow Facility Planning Project, URS Consultants and Lawler, Matusky &

Table 3.17-1
Stormwater Runoff Quality for Various Studies

Pollutant	National Storm Water Data				NYC Storm Water Data			Average
	I[1]	II[2]	III[3]	IV[4]	V[5]	VI[6]	VII[7]	
Conventional Pollutants (mg/l)								
BOD	9	5	14	8	12	10	18	11
Total Suspended Solids	100	26	93	66	25	–	55	61
NH3-N	--	0.26	--	–	–	–	0.41	0.34
(NO3+NO2)-N	0.68	0.50	0.66	0.62	–	–	0.79	0.65
Total Phosphorus	0.33	0.26	0.29	0.29	–	–	0.53	0.33
Dissolved Phosphorus	0.12	0.16	--	–	–	–	–	–
Coliform Bacteria (MPN/100ml)								
Total Coliform	--	--	--	–	175,000	75,000	265,000	172,000
Fecal Coliform	21,000	--	--	2,000	37,000	20,000	92,000	34,000
Heavy Metals (g/l)								
Copper	34	–	39	31	–	–	–	35
Lead	144	18	234	37	–	–	–	28[8]
Zinc	160	37	217	200	–	–	–	154

Notes:

(1) USEPA, 1983. Final Report of the Nationwide Urban Runoff Program. USEPA Water Planning Division, Washington, D.C.

(2) T.R. Schueler, 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments. Washington D.C.

(3) E.D. Driscoll, 1990 Pollutant Loadings and Impacts from Highway Stormwater Runoff. Volume III: Analytical Investigation and Research Report. Federal Highway Administration, McLean, VA.

(4) Loads Assessment Report, Santa Clara County Urban Runoff Program, Woodward Clyde Consultants, 1991.

(5) Jamaica Bay Combined Sewer Overflow Facility Planning Project. O'Brien & Gere Engineers, Inc., 1993.

(6) Outer Harbor CSO Facility Planning Project. Hazen and Sawyer, P.C. and HydroQual, Inc., 1993.

(7) East River Combined Sewer Overflow Facility Planning Project. URS Consultants, Inc. & Lawler, Matusky, & Skelly Engineers, 1996.

(8) Lead concentrations monitored in the 1970s and early 1980s reflect leaded gasoline use. As a result, stormwater data for II and IV were used to develop average concentrations.

Skelly, 1996) and the Outer Harbor areas of the City (Outer Harbor CSO Facility Planning Project, Hazen and Sawyer and HydroQual, Inc., 1993) provided additional stormwater runoff data. The average data from these programs were deemed representative of stormwater from the sites. The three metals analyzed—copper, lead and zinc—are the predominant metals typically found in stormwater.

3.17.4 Modeling Evaluation of Stormwater Impacts

For each site, the impacts of estimated stormwater pollutant loadings were evaluated using the New York Harbor Seasonal Steady State Water Quality 208 Model (208 Model). This model was developed under Section 208 of the Clean Water Act to help state and local water quality management agencies integrate water quality activities and goals into a predictive tool. The 208 Model was used to predict incremental changes in dissolved oxygen levels caused by BOD and incremental increases in the concentrations of other pollutants, such as fecal coliforms, nutrients, total suspended solids and heavy metals. The application of the 208 Model to heavy metals is deemed conservative because only dispersion is considered in determining concentrations. Other reactions that decrease ambient metal concentrations were not included in the analysis. These other chemical and physical reactions may include complexation, oxidation, absorption and settling to sediments.

To evaluate the potential impacts of operations at each site, Future Build water quality Conditions were estimated by combining the incremental difference in water quality calculated by the model with the existing data. These estimated water quality conditions were compared with applicable NYSDEC water quality standards and guidance values for the applicable waterways.

3.18 Waterfront Revitalization Program

3.18.1 Introduction

All sites are located within the designated coastal zone boundary established by the New York DSNY of State, pursuant to the Federal Coastal Zone Management Act of 1972 and the New York State Waterfront Revitalization and Coastal Resources Act of 1981.

3.18.2 Governing Policy

"The New Waterfront Revitalization Program," prepared by the NYCDCP, identifies ten primary coastal policies that provide for local implementation of the State Coastal Management Program (CMP) in the event that a municipality adopts a local WRP, as is the case with the City.

Developed by the City, the goal of WRP is to foster responsible development of the City's waterfront. The WRP embodies the policies of federal and state coastal management legislation. Its policies cover a comprehensive range of waterfront planning and environmental issues that address the waterfront's important natural, recreational, industrial, commercial, ecological, cultural, aesthetic and energy resources.

Under the WRP, there are ten primary policies that address: (1) residential and commercial redevelopment; (2) water-dependent and industrial uses; (3) commercial and recreational boating; (4) coastal ecological systems; (5) water quality; (6) flooding and erosion; (7) solid waste and hazardous substances; (8) public access; (9) scenic resources; and (10) historical and cultural resources. These ten policies are further broken down into several subpolicies under each primary policy. The new policies and subpolicies simplify and clarify the consistency review process without eliminating any policy components required by federal and state law.

Each of the sites were evaluated for compliance and consistency with these ten primary waterfront policies and the 32 subpolicies set forth within the WRP. These evaluations include consistency with the WRP and additional discussion or clarification. As necessary and required, appropriate mitigation measures to achieve consistency of a facility with applicable WRP policies were identified and discussed.

In general, each of the WRP policies are either applicable to any of the Converted MTSs, not applicable to any of them or applicable on a strictly site-specific basis. A description of all of the policies and subpolicies and their general applicability to the Converted MTSs is provided in Table 3.18-1. In general, under the WRP, the consistency of a of a Proposed Action needs to be demonstrated with respect to each applicable policy or subpolicy. Policies or subpolicies that are identified as not applicable are those in which the consistency of a Proposed Action does not need to be demonstrated.

In addition, a comprehensive plan for the management of the City's waterfront has been set forth in "The New York City Comprehensive Waterfront Plan – Reclaiming the Water's Edge" prepared by NYCDCP. Likewise, individual waterfront plans for the boroughs have also been developed to address activities and the development of facilities within the coastal zone boundary and provide recommendations for future activities within this zone. These are also considered with regard to solid waste management activities that may occur within the coastal zone boundary area.

Table 3.18-1
Local Waterfront Revitalization Policies and Subpolicies and Their Applicability

Policy Number	Policy Description	Applicability
Policy 1	Support and facilitate commercial and residential redevelopment in areas well suited to such development.	
	1.1 Encourage commercial and residential redevelopment in appropriate coastal zone areas.	Never
	1.2 Encourage non-industrial development that enlivens the waterfront and attracts the public.	Never
	1.3 Encourage redevelopment in the coastal area where public facilities and infrastructure are adequate or will be developed.	Always
Policy 2	Support water-dependent and industrial uses in New York City coastal areas that are well suited to their continued operation.	
	2.1 Promote water-dependent and industrial uses in Significant Maritime and Industrial Areas.	Site Specific
	2.2 Encourage working waterfront uses at appropriate sites outside the Significant Maritime and Industrial Areas.	Site Specific
	2.3 Provide infrastructure improvements necessary to support working waterfront uses.	Always
Policy 3	Promote use of New York City's waterways for commercial and recreational boating and water-dependent transportation centers.	
	3.1 Support and encourage recreational and commercial boating in New York City's maritime centers.	Never
	3.2 Minimize conflicts between recreational, commercial, and ocean-going freight vessels.	Always
	3.3 Minimize impact of commercial and recreational boating activities on the aquatic environment and surrounding land and water uses.	Always

Table 3.18-1 (continued)
Local Waterfront Revitalization Policies and Subpolicies and Their Applicability

Policy Number	Policy Description	Applicability
Policy 4	Protect and restore the quality and function of ecological systems within the New York City coastal area.	
	4.1 Protect and restore the ecological quality and component habitats and resources within the Special Natural Waterfront Areas, Recognized Ecological Complexes, and Significant Coastal Fish and Wildlife Habitats.	Always
	4.2 Protect and restore tidal and freshwater wetlands.	Always
	4.3 Protect vulnerable plant, fish and wildlife species, and rare ecological communities. Design and develop land and water uses to maximize their integration or compatibility with the identified ecological community.	Always
	4.4 Maintain and protect living aquatic resources.	Never
Policy 5	Protect and improve water quality in the New York City coastal area.	
	5.1 Manage direct or indirect discharges to water bodies.	Always
	5.2 Protect the quality of New York City's waters by managing activities that generate nonpoint source pollution.	Always
	5.3 Protect water quality when excavating or placing fill in navigable waters and in or near marshes, estuaries, tidal marshes, and wetlands.	Site Specific
	5.4 Protect the quality and quantity of groundwater, streams, and the sources of water for wetlands.	Always
Policy 6	Minimize loss of life, structures and natural resources caused by flooding and erosion.	
	6.1 Minimize losses from flooding and erosion by employing non-structural and structural management measures appropriate to the condition and use of the property to be protected and the surrounding area.	Always

Table 3.18-1 (continued)
Local Waterfront Revitalization Policies and Subpolicies and Their Applicability

Policy Number	Policy Description	Applicability
Policy 6	6.2 Direct public funding for flood prevention or erosion control measures to those locations where investment will yield significant public benefit.	Never
	6.3 Protect and preserve non-renewable sources for beach nourishment.	Never
Policy 7	Minimize environmental degradation from solid waste and hazardous substances.	
	7.1 Manage solid waste material, hazardous wastes, toxic pollutants, and substances hazardous to the environment to protect public health, control pollution and prevent degradation of coastal ecosystems.	Always
	7.2 Prevent and remediate discharge of petroleum products.	Always
	7.3 Transport solid waste and hazardous substances and site solid and hazardous waste facilities in a manner that minimizes potential degradation of coastal resources.	Site Specific
Policy 8	Provide public access to and along New York City's coastal waters.	
	8.1 Preserve, protect and maintain existing physical, visual and recreational access to the waterfront.	Always
	8.2 Incorporate public access into new public and private development where compatible with proposed land use and coastal location.	Always
	8.3 Provide visual access to coastal lands, waters and open space where physically practical.	Site Specific
	8.4 Preserve and develop waterfront open space and recreation on publicly owned land at suitable locations.	Always
	8.5 Preserve the public interest in and use of lands and waters held in public trust by the state and city.	Never

Table 3.18-1 (continued)
Local Waterfront Revitalization Policies and Subpolicies and Their Applicability

Policy Number	Policy Description	Applicability
Policy 9	Protect scenic resources that contribute to the visual quality of the New York City coastal area.	
	9.1 Protect and improve visual quality associated with New York City's urban context and the historic and working waterfront.	Always
	9.2 Protect scenic values associated with natural resources.	Always
Policy 10	Protect, preserve and enhance resources significant to the historical, archaeological, and cultural legacy of the New York City coastal area.	
	10.1 Retain and preserve designated historic resources and enhance resources significant to the coastal culture of New York City.	Always
	10.2 Protect and preserve archaeological resources and artifacts.	Always

3.19 Hazardous Materials

3.19.1 Introduction

As part of the CEQR process, this MTS Environmental Evaluation includes a hazardous materials assessment that determines if:

- The Converted MTSs could lead to the increased exposure of people or the environment to hazardous materials;
- There is any presence of existing hazardous materials on the sites (some sites may have hazardous materials from existing uses or residual contamination from past uses when there was less regulation of uses and disposal of such materials);
- Construction activities associated with the Converted MTSs could result in human exposure to hazardous materials or a threat to the environment; and
- The Converted MTSs could introduce an "at-risk population" to exposure to hazardous materials.

Activities that could lead to exposure include:

- Excavation or grading that creates fugitive dust from contaminated soils;
- Demolition of buildings or structures that contain hazardous materials;
- The introduction of new activities or processes that use hazardous materials; and
- The introduction of a new population to an area that contains hazardous materials.

3.19.2 Definition of Study Area

The site is the focus of the study area in the CEQR evaluation of hazardous materials exposure to humans and the environment; however, potential contamination by hazardous materials is not limited by property boundaries. Chapter J (Hazardous Materials), Section 310 of the 2001 CEQR Technical Manual indicates that the study area for hazardous materials includes all other areas that might have affected or that might be affecting the site. This is defined to include at least the adjacent properties and, generally, properties within 400 feet of the site. The study area for record searches of spills and hazardous waste sites is defined as that which is within a 1,000 foot radius from the site. The study area for record searches of underground storage tanks includes the site and adjacent properties. If the facility involves excavation for utilities, the path of those utilities would become part of the study area. Final design plans would determine the need for additional underground utilities.

3.19.3 Types and Sources of Information Collected

In accordance with Chapter J, Section 322 of the 2001 CEQR Technical Manual, federal and state agency database searches were performed for all sites and properties within a minimum of a 1,000-foot radius of the sites. Many of the federal and state records were available on computer databases through commercial service firms. Local records (i.e., NYCFD, DSNY, NYCDEP) were obtained as a result of filing Freedom of Information requests. Detailed maps and tables of the record searches were compiled and reviewed.

3.19.4 Screening Methodology

The screening methodology applied for hazardous materials follows the guidelines set forth in Chapter J, Section 320 of the 2001 CEQR Technical Manual, which includes:

- Historical land use review;
- Regulatory agency list review; and
- Site and surrounding area reconnaissance.

3.19.5 Historical Land Use Review

The historical land use review seeks to identify past activities on the sites and adjacent properties that may have involved the use or disposal of hazardous materials. In accordance with Chapter J, Section 321 of the 2001 CEQR Technical Manual, this review extends back for at least 50 years at each site. The Sanborn historical fire insurance atlases are valuable sources for identifying historical land use in the City. Historical atlases for each of the sites were either purchased or reviewed in the New York City Public Library. These documents (generally available since the early 1900s) indicate the structures present, buried gasoline tanks that exist, and the identification of uses (i.e., company name for industrial properties) at the time of preparation.

A search of the City Building DSNY's records was made to identify new building applications, records of major alterations, demolition records, certificates of occupancy, and other records of or plans for additions and changes on file for the subject property. In addition, a search of NYCFD records for each site was conducted to identify the presence of underground or aboveground storage tanks.

Where feasible, interviews with individuals knowledgeable of past uses at the subject site were conducted. Based upon the abovementioned information sources, history of site uses that identifies the potential for the prior usage of hazardous materials was complied and presented in Chapter 4 through 11.

3.19.6 Regulatory Agency List Review

The regulatory agency list review involves accessing records of City, state and federal agencies that regulate the storage, handling, emissions and spill cleanup of hazardous materials. These records include:

- USEPA's NPL and CERCLIS list, which was reviewed to determine if the property or surrounding properties within the search radius appear on the lists. The NPL contains sites that are targeted for USEPA-mandated cleanup under the federal CERCLA, which authorizes identification and remediation of uncontrolled hazardous waste sites. The CERCLIS list contains potential hazardous waste sites for which there is not enough information to determine if the site should be included on the NPL;

- The RCRIS list identifies registered hazardous waste generators, transporters and treatment, and storage and disposal facilities, as defined by the federal RCRA, which regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed, or distributed. Inclusion on the RCRIS Notifiers List does not, in and of itself, indicate that the site is a source of contamination. For example, all dry cleaning establishments in the City are on the RCRIS list;

- The ERNS, a compilation of hazardous substance spills reported to federal and state authorities; and

- NYSDEC databases, which will be reviewed to determine if: (1) The site or nearby sites are on the Inactive Hazardous Disposal Site Registry and are therefore subject to a state consent order for assessment and possible cleanup; (2) There have been any large-scale landfilling operations on or near the site; and (3) There are records of leaking underground storage tanks, major oil storage facilities, petroleum bulk storage facilities, chemical bulk storage facilities, or solid waste management facilities. Records of spills are listed as Active (under investigation) or Closed (no further action required).

This review is a routine part of the initial assessment that, as defined in the 2001 CEQR Technical Manual, is often referred to as a Phase I Environmental Site Assessment and does not include any testing for contamination. If warranted, Phase II subsurface testing will be recommended to confirm the presence of or to characterize the extent of potential contamination. Phase II is described in more detail in Section 3.19.9.

3.19.7 Site and Surrounding Area Reconnaissance

Following completion of the historical land use review and the review of regulatory agency records, visits were made to the sites to observe and document Existing Conditions and note any signs of the presence of potential hazardous materials, their usage and contamination. A reconnaissance survey of surrounding properties was also taken, though it was less detailed than the site survey. The reconnaissance surveys were performed in accordance with the guidelines of Chapter J, Section 323 of the 2001 CEQR Technical Manual.

3.19.8 Impact Analysis Methodology

The 2001 CEQR Technical Manual indicates that the following two questions be applied in determining if a significant adverse impact would occur from the presence of hazardous materials:

- Is there the potential for human exposure to contaminants? This includes future on-site occupants, off-site occupants, and construction workers; and
- Is there the potential for environmental exposure to the contaminants? This includes contaminants entering on-site and surrounding natural resources or exacerbating existing environmental contamination.

If both questions can be answered "no," it is unlikely that a potential for significant impacts exists. If the answer to either question is "yes," then a significant impact might occur.

The potential risk is dependent upon the nature and extent of contamination and the Proposed Actions at the site. The methodology outlined in the 2001 CEQR Technical Manual (Chapter J Section 400) was used in assessing the significance of impacts. If a potential for contamination was found during this Phase I Assessment, then Phase II surface and subsurface investigations may be recommended as part of the construction phase of project implementation in order to confirm the presence and extent of the contamination and to identify appropriate mitigation measures.

Given that the transfer and export of municipal solid waste are not inherently hazardous activities and that Existing Conditions are not likely sources of soil or groundwater contamination, it is anticipated that any potential impact identified during an individual site's Phase I evaluation would rise to a level of significance only if on-site construction was undertaken. In these instances, a process of further detailed analysis, referred to as a Phase II investigation, would conducted. Phase II investigations would be necessary if soil disturbance from new construction occurs and the Phase I investigation identified the likelihood of hazardous material contamination from previous land uses. Project land parcels that have yet to be acquired would also be properly tested prior to any grading/excavation or construction activities.

The Phase II investigation may include several physical investigations that confirm the presence, type, and extent of potential contamination. A Phase II sampling and testing plan is prepared based on findings resulting from the Phase I or Preliminary Assessment (which indicates the potential presence of contaminants of concern). Subsurface testing may include the following: (1) Soil gas sampling with probes to test for volatile compounds; (2) Soil borings to sample and test for a full range of potential contaminants; and (3) The installation of groundwater monitoring wells to test for groundwater contamination. Magnetometer or ground penetrating radar may be useful in locating buried storage tanks, underground piping, etc. The Phase II sampling protocol would be submitted to NYCDEP/NYSDEC for review and approval prior to conducting the investigation.

The results of the Phase II Investigation would be the basis for determining the necessity to mitigate contamination prior to commencing construction. If elevated levels of contamination exist, the soil would require appropriate remediation to ensure that no significant impacts to on- and off-site occupants would occur. If unexpected contamination is encountered during construction (i.e., discovery of leaking underground tanks, etc.), then mitigation measures would be developed with the concurrence of regulatory agencies that have the appropriate jurisdiction (NYSDEC, NYCDEP, NYCFD).

Construction on the site without the proper precautionary measures (i.e., worker Health and Safety Plan) and removal of associated contaminated material and USTs can also result in exposure to hazardous vapors or workers could come into contact with potentially contaminated soils. Therefore, a NYCDEP- and/or NYSDEC-approved site specific Health and Safety Plan would be prepared on the basis of the site sampling analysis and the expected risk of worker exposure to the above listed contaminants prior to any site disturbance (grading/excavation) or construction activities.

If any excavated soil was removed from a site, the soil would be properly tested in accordance with all applicable NYSDEC regulations prior to determining reuse and/or disposal options. Any tanks discovered during excavation would be removed in accordance with all applicable regulations, prior to construction. The contractor would maintain appropriate remediation measures, such as dust suppression, during grading/excavation and construction activities at the site.

Demolition and construction activities may disturb surfaces with lead-based paint and asbestos-contaminated material. Lead and asbestos would be handled in accordance with all applicable rules and regulations of OSHA, the city, state, and federal governments.

3.19.9 Typical Mitigation Measures

Mitigation of potential adverse impacts to eliminate or reduce the sources of impacts to acceptable levels can include reduction or removal of contamination or altering the Converted MTS. Appropriate mitigation measures would be selected on a case-by-case basis. Consultation with the NYCDEP and/or NYSDEC would be advised in selecting appropriate mitigation measures. In the case of a Phase II Investigation, such investigation results in recommended mitigation measures that are specific to a project. If contaminated soil exists or is found, it will be removed and disposed of at a regulated disposal facility in a manner that minimizes exposure to workers and the public, in general.

In the City, inactive, underground fuel oil tanks can be closed by first removing any residual fuel oil and tank bottoms, then by either filling the tank with a concrete slurry or other approved inert material, or excavating and disposing it off-site following applicable standards.