ENVIRONMENTAL IMPACT EVALUATION

ORANGE RAILROAD STATION
NEW HAVEN LINE
State Project No. 106-120

prepared for

Connecticut Department of Transportation

MAY 2017

prepared by FUSS & O'NEILL

Prepared pursuant to Regulations of Connecticut State Agencies Section 22a-1a-1 to 12, inclusive

Environmental Impact Evaluation

Prepared pursuant to Regulations of
Connecticut State Agencies Section 22a-1a-1 to 12, inclusive

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New Haven Line

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Acronyms and Abbreviations

ADA	Americans with Disabilities Act
AVIS	audio visual information systems
C&D	Conservation and Development
CAAA	Clean Air Act Amendments
CCMA	Connecticut Coastal Management Act
CE	Categorical Exclusion
CEPA	Connecticut Environmental Policy Act
CEQ	Council on Environmental Quality
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CGS	Connecticut General Statutes
CO	carbon monoxide
CT NDDB	Connecticut Natural Diversity Database
CTDEEP	Connecticut Department of Energy and Environmental Protection (formerly the Connecticut Department of Environmental Protection or CTDEP)
CTDOT	Connecticut Department of Transportation
CTDPH	Connecticut Department of Public Health
dB/dBa	Decibel/A-weighted decibel
EA	Environmental Assessment
ECD	Environmental Classification Document
EIE	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Federal Farmland Protection Policy Act
FTA	Federal Transit Administration
GHG	greenhouse gas
gpd/gph/gpm	gallons per day/hour/minute
HAP	hazardous air pollutant
IRIS	Integrated Risk Information System
kv	kilovolt
kva	kilovolt amperes
LEED	Leadership in Energy and Environment Design
LEP	Licensed Environmental Professional
LOS	level of service
LUST	leaking underground storage tank
LRTP	Long Range Transportation Plan
MP	milepost
MPOs	metropolitan planning organizations
MSATs	Mobile source air toxics
MTA PD	Metropolitan Transportation Authority Police Department
NAAQS	National Ambient Air Quality Standards

NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NIMS	National Incident Management System
NO_2	nitrogen dioxide
NO_X	generic term for nitric oxide (NO) and nitrogen dioxide
NRCS	Natural Resources Conservation Service
NRF	National Response Framework
NY-NJ-CT	New York-Northern New Jersey-Long Island
O&M	operation and maintenance
O_3	ozone
Pb	lead
PM10	particulate matter ten microns or smaller in diameter
PM2.5	particulate matter two and a half microns or smaller in diameter
POCD	Plan of Conservation & Development
PTC	Positive train control
RCP	reinforced concrete pipes
RCSA	Regulations of Connecticut State Agencies
ROW	right-of-way
RSR	Connecticut Remediation Standard Regulation
SB	South Bound
SCCRWA	South Central Connecticut Regional Water Authority
SCG	Southern Connecticut Gas
SCRCOG	South Central Regional Council of Governments
SF	square feet
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO2	sulfur dioxide
SOV	Single Occupant Vehicle
STC	State Traffic Commission
STIP	Statewide Transportation Improvement Program
TASC	Toxic Air Study in Connecticut
TIP	Transportation Improvement Program
TODD	Transit Oriented Development District
TSB	Transportation Strategy Board
USDOT	US Department of Transportation
USGBC	United States Green Buildings Council
UST	underground storage tank
VMT	vehicle miles traveled
VOC	volatile organic compound
vph	vehicles per hour
WPCA	Water Pollution Control Authority
WRA	water resource area

Executive Summary

The Connecticut Department of Transportation (CTDOT) is proposing to construct a new commuter rail station along the New Haven Line in Orange, Connecticut through a public-private partnership agreement that will include a Transit Oriented Development (TOD) constructed by Orange Land Development LLC (OLD). The Proposed Action refers to the actions specifically funded by State and Federal funds. Federal funds will be used for project planning and State funds will support the following elements:

- Two new approximately 1,020-foot long and approximately 10-foot wide canopied station platforms, one on the eastbound side and one on the westbound side.
- A covered pedestrian bridge connecting the platforms via stairtowers and elevators
- A gated emergency access driveway which may connect to Connair Road, a private way that parallels the railway corridor on the south side. Final location of the access drive will be determined during design.

In addition, the following elements, which are anticipated to be shared with the adjacent TOD, are also considered part of the Proposed Action:

- Commuter drop-off/pick-up, taxi stand and bus stop areas
- 6-level, 566-space commuter parking structure that will serve the rail station
- Stormwater management system
- Utility infrastructure
- Improvements/extension of the existing Salemme Lane and cul-de-sac terminating at the new station.

The following elements are considered actions associated with the TOD, which is subject to local review and approval, and are not part of the Proposed Action, but are considered in the assessment of indirect and cumulative impacts, as appropriate:

- 4 new buildings (200 residential units and 21,500 square feet of retail/office space)
- 3-level, 233-space garage that will be dedicated parking for the TOD
- Approximately 123 surface parking spaces
- Site improvements, including the potential opportunity for future vehicular and pedestrian connection with Yale West Campus to the north and Dichello Distributors Inc. to the south.

The specifics of roles and responsibilities for these elements will be determined in negotiations between CTDOT and OLD. The TOD, which is proposed adjacent to the commuter parking garage and rail station, is wholly privately-owned,and not considered part of the Proposed Action. The roadway to the TOD and to the Orange Railroad Station will be owned by the Town of Orange. However, where relevant, the TOD is considered in the evaluation of indirect and cumulative effects within this document.

Project Location

The project site is located on the easterly end of Salemme Lane off of Marsh Hill Road, Orange, CT and is bounded on the west by residential properties, on the east by the New Haven Line, on the north by property owned by Yale University and several residential properties, and on the south by commercial

property (*Figure ES-1*). The site consists of one parcel owned by OLD and State owned land, totaling approximately 14 acres (~8 acres for TOD parcel and ~6 acres of State owned land). The undeveloped areas of the site are a mix of cleared and wooded areas, and the site slopes downward from Marsh Hill Road to the Oyster River. The boundary between Orange and West Haven is located at the eastern limit of the site.

The areas adjacent to the project site consist of residential, commercial, and open space land uses. To the south of the site, there is a large office building and a beverage distribution and bottle recycling facility (Dichello Distributors). There are four single family homes on smaller lots adjacent to the Dichello Distributors property. These residential homes do not conform to the current zoning regulations and are more than a quarter mile from other residential neighborhoods.

Purpose and Need

The purpose of the Proposed Action is to accommodate current and future ridership and parking demand, and support statewide land use and transportation planning goals through construction of a new railroad station on the New Haven Line between the West Haven station and the existing Milford station. This action is anticipated to:

- Improve access to commuter rail for area residents
- Reduce roadway congestion
- Reduce emissions and fuel consumption associated with Single Occupant Vehicle (SOV) trips
- Meet State and regional transportation planning objectives
- Improve land use/transportation synergies
- Support State policy goals for improved environmental and energy sustainability
- Improve New Haven Line parking supply to accommodate existing and future riders.

Currently, there is high ridership demand along the New Haven Line and waiting lists for parking passes at several stations on the Metro-North Line. Mean daily ridership is greater than 90,000 passengers, and several commuter lots along the New Haven line are typically close to or at capacity. Data gathered quarterly from January 2016 to January 2017 by the South Central Regional Council of Governments (SCROG) shows that the commuter parking lot at Union Station has ranged from 85-100% capacity, the lot at the Milford Railroad Station has consistently been at 100% capacity and the recently constructed lot at the West Haven Railroad Station has ranged from 64-92% capacity[1].

Although recent construction of parking facilities at West Haven and planned parking at New Haven's Union Station will address some of the demand for commuter parking, new parking has the potential to encourage additional ridership, and enable potentially waitlisted riders at other stations to obtain newly available passes. The construction of a new railroad station and parking garage in Orange would address this need by providing 566 additional commuter parking spaces.

Roadway congestion along the Interstate 95 corridor is severe and expected to continue to increase. As documented in the *I-95 Corridor Congestion Relief Study* (CTDOT, 2014), capacity on Interstate 95 has not significantly increased since its construction in the late 1950s, despite weekday travel volumes that exceed 135,000 vehicle trips per day in Orange. Peak hour directional traffic volumes typically range

[1] http://scrcog.org/reports-and-data/data-collection/

from 4,000 to 5,000 vehicles per hour (vph), and volume to capacity (v/c) ratios are >1.0 in the vicinity of Orange during peak hours[2], indicating that Interstate 95 is currently operating at capacity. The CT Congestion Study[3] found that traffic congestion along the I-95 Corridor in the Bridgeport/Stamford and New Haven Metro Areas increased 19 percent from 2001 to 2011. Level of Service, which characterizes the delay experienced by motorists, is impacted in the vicinity of the Marsh Hill Road Exit (Exit 41) of Interstate 95 during peak morning and evening travel times.[4] Aside from the air quality impacts associated with traffic congestion, it's been estimated that the impact of this congestion includes a total of approximately 41 million hours wasted due to people delayed in traffic and approximately $860 million dollars wasted due to delays caused by traffic congestion.

In its current configuration, I-95 in the peak direction of travel is operating at capacity for approximately 4 hours during both the morning and afternoon peak periods. Regional build-out analyses (SCRCOG, 2010) indicated potential population growth of an additional 53,000 by 2040.[5] With I-95 at its physical capacity, alternative means of transportation are needed to offset roadway congestion. In the absence of alternatives such as increased opportunity for rail ridership, the periods of commuting congestion will lengthen and traffic congestion will spread to alternative routes. Increasing rail ridership will contribute to alleviating this congestion.

The New Haven Line is the busiest commuter rail corridor in the country with over 40 million trips per year.[6] Currently, the 6-mile segment between the Milford and West Haven stations is the longest gap on the New Haven Line. This segment, which passes through a heavily-developed area, has been a location identified for additional commuter rail access for decades. At the local level, approval of a Transit Oriented Development District adjacent to the Metro-North right-of-way in Orange signaled local support for the development of commuter rail access in the community.

Construction of a new station in Orange would provide additional local access to commuter rail service on the New Haven Line, facilitating access via carpool and public transportation options and reducing the travel distance to the nearest stations. The proposed rail station would provide additional transportation options, with approximately 60-70 percent of Orange residents commuting from Orange to neighboring communities along the New Haven Line, and a similar number of out-of-town commuters traveling to jobs in Orange.

Transit projects, such as the Proposed Action, not only reduce energy usage and fuel consumption, but also aid in reducing overall vehicle emissions and the pollutants that create smog, which contributes to environmental and public health issues. Projects that promote public transportation as an alternative to single occupancy vehicle (SOV) trips have the benefit of replacing many separate emissions-producing vehicles with fewer transit vehicles that generally emit less pollution on a per person basis. For example, most rail transit vehicles, including those on the New Haven Line, emit little or no pollution, since they

[2] http://scrcog.org/wp-content/uploads/upwp/studies/2014_Congestion_Management_Process.pdf

[3] http://www.ct-congestion-relief.com/documents/Effects%20of%20Traffic%20Congestion%20I-95_DRAFT%2001%2020%2014v2-2.pdf

[4] http://www.ct-congestion-relief.com/documents/final/FULL%20PDF%20OF%20FINAL%20REPORT.pdf

[5] http://scrcog.org/wp-content/uploads/reports/2010_Regional_Build_Out_Analysis.pdf

[6] http://www.letsgoct.com/img/documents/Lets%20Go%20CT-%20Fact%20Sheets%2020150313.pdf

are powered by electricity. Transit projects also have the potential to reduce greenhouse gas emissions (GHGs), with rail systems producing approximately 60-70% less GHG emissions per passenger mile that an average SOV.
Transit projects can also facilitate higher density land development, which can have multiple environmental and socioeconomic benefits and is consistent with State level planning efforts to reduce sprawl and support the viability of transportation options in the State.[7]

The South Central Region Council of Governments' recently completed report (SCRCOG, 2016) on Transit Oriented Development (TOD)[8] opportunities identified TOD as supportive of an efficient and functional multi-modal transportation system in the south central region of Connecticut, which includes Orange and the surrounding area. Projects that support TOD and encourage transit use are also consistent with the State's transportation vision plan*, Let's Go CT!* CTDOT has identified a commitment to transit in the State as essential for economic growth and also important to transportation planning for the I-95 corridor.[9]

The segment of the New Haven Line where the Orange rail station is proposed also provides potential for expanded public transit use since while nearly 65% of Orange residents commute out of town to work, 80% of workers that live within 3 miles of the potential project site drive alone to work. In addition, Orange is one of the few locations along the New Haven Line that provides opportunity for both new TOD and TOD as an option for infill and/or redevelopment (SCRCOG, 2016).

On October 28, 2016, the Federal Transit Administration informed CTDOT that a Categorical Exclusion (CE) was the appropriate class of action for the the Orange Railroad Station project (the Proposed Action) to be reviewed under the National Environmental Policy Act (NEPA) in accordance with 23 CFR §771.115 and 23 CFR §771.118.

Alternatives

Under the No Action Alternative, the proposed Orange Railroad Station would not be constructed and no additional State- or Federally-funded capital improvement projects would be undertaken to specifically meet the project Purpose and Need, with the exception of those projects along the Interstate 95 and New Haven Line corridors that are already included in the Statewide Transportation Improvement Program (STIP), the SCRCOG 25-year *Long Range Transportation Plan* (LRTP), or the *Let's Go CT! Transportation Ramp-Up Plan*.

Alternative sites for the Proposed Action would include similar actions at alternative locations to meet the project purpose and need. Thirteen sites have been examined as part of previous studies for potential construction of a new railroad station to meet the project purpose and need. A 2000 study by SCRCOG evaluated these sites using seven criteria, including accessibility, parking arrangements, constructability, environmental constraints, land requirements (zoning) and takings, construction costs, and site design factors.

[7] http://www.ct.gov/opm/lib/opm/igp/org/cdupdate/2013-2018_cd_plan.pdf
[8] http://scrcog.org/wp-content/uploads/upwp/studies/2015_SCRCOG_Regional_TOD_Study.pdf
[9] http://www.ct-congestion-relief.com/documents/CTDOT%20I-95%20presentaion_LOW.pdf

The majority of these sites were eliminated from further consideration based on their attributes relative to these criteria. Of the two locations recommended for further analysis, a rail station has been constructed at one (West Haven) and Orange is the remaining site.

The Proposed Action considered in this document is the construction of a new passenger railroad station on the New Haven Line in Orange. A plan view of this option is shown in *Figure ES-2*. The station would be constructed by CTDOT using State funds. Federal funds are being used for planning purposes only.

Assessment of Impacts and Mitigation

This EIE includes a description of the Proposed Action; the purpose and need for the action; an evaluation of the direct, indirect, and cumulative effects of the Proposed Action; identification of unavoidable adverse environmental effects; evaluation of alternatives; and a description of proposed mitigation measures. These are summarized in *Table ES-1* below:

Table ES-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Land Use, Zoning, and Local and Regional Development Plans	• Proposed Action is consistent with land use, zoning and local/regional development plans	• None required
Consistency with State and Regional Plans	• Proposed Action is consistent with State and regional plans	• None required
Traffic and Parking	• Drop in LOS to below C during morning or afternoon peak at Marsh Hill Road at SCG and Salemme Lane and Woodmont Road at Benham Hill Road	• TOD reviewed by Office of State Traffic Administration (OSTA) – Station traffic included in analysis • Signalization at the Marsh Hill Road/Salemme Lane/SCG intersection to operate at LOS C or better (Signalization not required by OSTA, but proposed by developer.) • Possible restriping of approaches to unsignalized intersection of Oxford Road and Merwin Avenue
Considerations Relating to Pedestrians and Bicyclists	• Lack of connection of bicycle and pedestrian facilities to site of Proposed Action	• Construction of sidewalk along Marsh Hill Road to connect existing pedestrian facilities to site • Improved bicycle facilities to connect residential areas to site
Rail Operations and Transit	• Rail travel time to increase by approximately just over one minute per train during the morning peak period	• None required.

Table ES-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Air Quality	• No adverse impacts	• None required
Noise	• No potential for moderate or severe noise impact from rail operations at the new station and horn blowing during daytime and night-time hours.	• None required
Socioeconomic Resources	• No adverse impacts	• None required
Water Quality	• Increases in pollutant loading due to stormwater generated from creation of 6 acres of new impervious area (TOD and Station)	• Stormwater management measures consistent with the *2004 Connecticut Stormwater Quality Manual*, as amended, and Low Impact Development approaches will be considered in the project design and operation • Measures will include pollutant reduction, groundwater recharge, where feasible, and maintenance of peak flow rates
Hydrology and Floodplains	• Only construction of high level platforms may be within floodplain – will be confirmed during platform design • Increase in stormwater runoff due to increase in impervious area	• Fill or obstruction in 100-year floodplain from platforms to be mitigated, as appropriate • Stormwater management measures consistent with the *2004 Connecticut Stormwater Quality Manual*, as amended, and Low Impact Development approaches will be considered in the project design and operation
Wetlands	• Potential for a total (TOD and Station) impact of 35,940 square feet to inland wetlands	• Minimization of direct wetland impacts, to the extent practicable, given project Purpose and Need • Avoidance of wetlands that offer substantive primary functions and values • Wetland restoration or replacement • Compliance with mitigation measures specified in local permit (TOD) and CTDEEP Inland Wetlands and Watercourses Permit, Clean Water Act Section 404 Permit, Clean Water Act Section 401 Water Quality Certification (Station) • TOD subject to local wetlands permitting (approved)

Table ES-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Coastal Resources	• Project located outside of Coastal Boundary • No impacts to coastal resources or future water water-development opportunities and activities	• None required
Flora, Fauna, Threatened and Endangered Species	• Potential for minor habitat loss along Oyster River riparian corridor • Increased competition for suitable habitat among species with small home ranges and high populations • No listed species identified on site of Proposed Action	• None required
Soils and Geology	• Conversion of approximately 10.8 acres of Prime Farmland Soils or Soils of Statewide Importance • Located in census-designated Urbanized Area and not subject to Federal Farmland Protection Policy Act • Not identified in State, regional, or local planning documents as an area for conservation or restoration of farmland uses	• None required
Cultural Resources	• No adverse impacts • SHPO has issued finding of no effect	• None required

Table ES-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Solid Waste, Toxics, Pesticides, and Hazardous Materials	• No significant generation of hazardous or toxic materials during operation • Potential for minor pesticide/herbicide application associated with station operation • Generation of solid and universal waste from station operation	• Any pesticide/herbicide application to be conducted according to Connecticut Pesticide Control Act • Disposal of solid and universal waste in compliance with applicable regulations
Aesthetics/Visual Effects	• Remaining residential areas adjacent to site would have full or partial view of the connector road • New construction screened from view of adjacent properties due to existing mature trees and depressed topography	• None required
Energy Use and Conservation	• Increased energy consumption for operation of new buildings • Anticipated reduction in fossil fuel consumption associated with shorter vehicle commutes	• Energy efficient elements will be incorporated into the construction and operation of the Proposed Action where feasible to reduce energy consumption, dependency on fossil fuels, and greenhouse gas emissions
Public Utilities and Services	• Adequate capacity anticipated for all utilities based on conservative estimates of use and coordination with utility personnel • Wastewater generation may necessitate mitigation based on refined wastewater flow estimates in the design phase	• None required
Public Health and Safety	• No impacts	• None required

Table ES-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
	Construction Period	
Traffic	• Minor, temporary disruptions to traffic in the immediate project area	• Use of appropriate traffic management including appropriate construction phasing to minimize disruptions to traffic and access, establishing haul routes and staging areas, permissible hours of work, uniformed officers, and other traffic controls to direct traffic and assist with pedestrian crossings as needed.
Rail Operations and Transit	• Disruption of service for construction of platforms and pedestrian bridge.	• Scheduling construction activities during appropriate off-peak periods, coordinating with passengers, and careful coordination with the railroads that use the railway corridor, including Metro-North Railroad, Amtrak, CSX, and the Providence and Worcester Railroad as operated by the Genesee & Wyoming Railroad.
Air Quality	• Emissions from construction equipment • Increased vehicle exhaust emissions resulting from increased congestion during construction • Fugitive dust emissions during construction activities	• Ensure proper operation and maintenance of construction equipment • Prohibit excessive idling of construction equipment • Consider requiring use of clean alternative fuels or retrofit emission control devices for heavy machinery with engines of greater than 60 horsepower that will be assigned to the project for greater than 30 consecutive days • Implement traffic management measures during construction • Implement appropriate controls to prevent the generation and mobilization of dust
Noise	• Generation of noise by construction equipment and activities	• Contract specifications to ensure that noise levels at adjacent residences remain at less than 90 dBA • Restriction of work to 7:00 AM to 9:00 PM local time • Properly maintain construction equipment • Provide advance notification to sensitive receptors regarding anticipated excessive noise levels
Community Resources	• Potential for minor disruptions to traffic flow and increased dust and noise in vicinity	• See Traffic, Air Quality, and Noise above

Table ES-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Stormwater and Water Quality	• Exposure of soil increases potential for erosion and sedimentation	• Prepare Stormwater Pollution Control Plan that complies with the *General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities,* compliance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* • Local approvals for TOD
Solid Waste, Toxics, Pesticides, and Hazardous Materials	• Potential to encounter hazardous materials and/or petroleum products during excavation (TOD) • Generation of solid waste consisting of construction debris	• Development of Soil Management Plan to address potentially contaminated soil encountered during construction • Construction and excavation activities performed in accordance with CTDEEP General Permit for Contaminated Soil and/or Sediment Management
Safety	• Potential for impacts to workers	• Measures will be undertaken by CTDOT and the project contractor to avoid safety impacts during the construction period.
Utilities	• Temporary outages may be necessary to accommodate connections • Utilities could be damaged accidentally	• Coordinate planned outages with the appropriate utility to minimize disruptions • Inform the public of anticipated outages • Relocate, maintain, or protect utilities from disturbance or damage • Adjust street hardware, if necessary, to meet finished grades

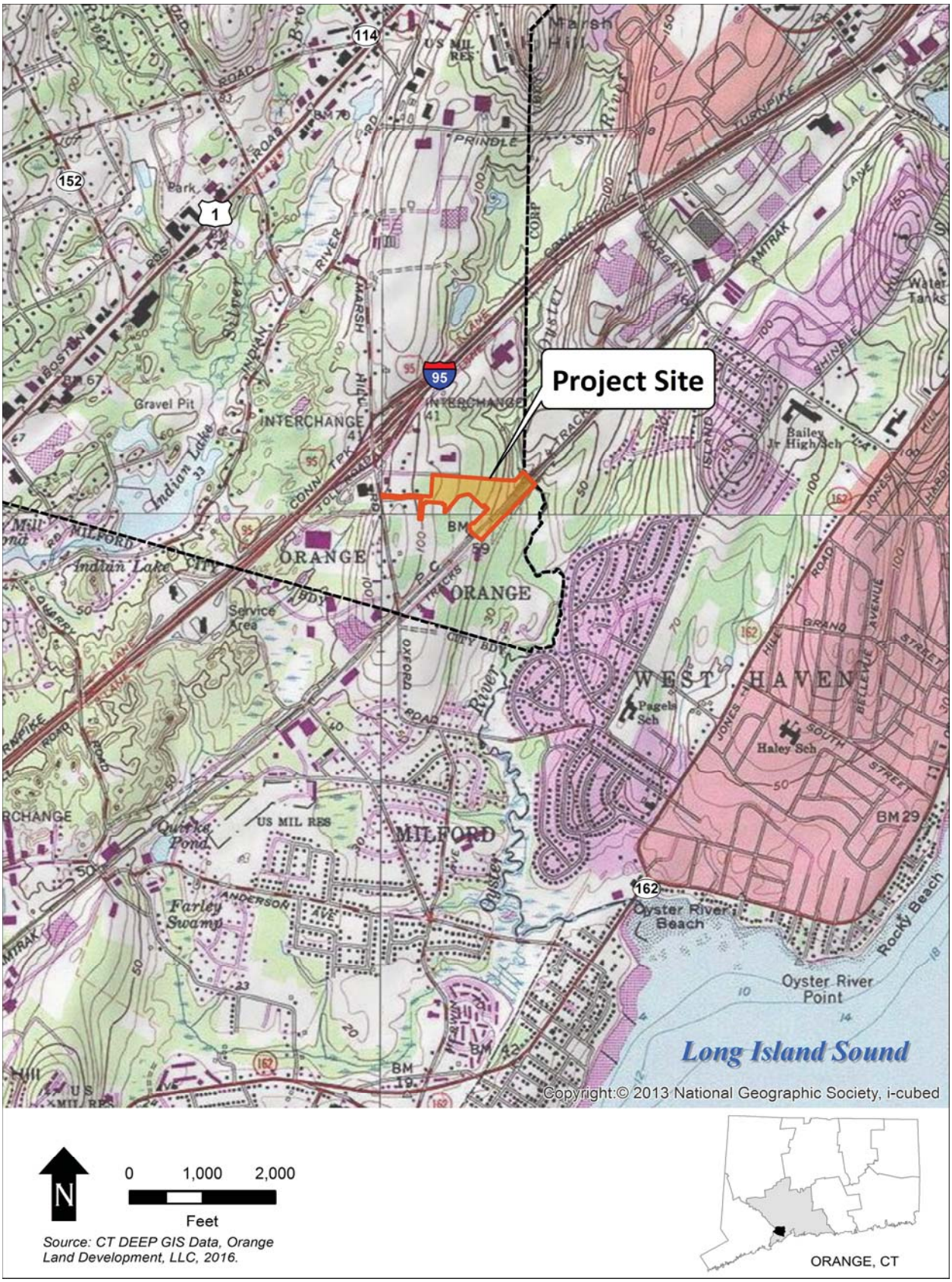

Figure ES-1. Site Location

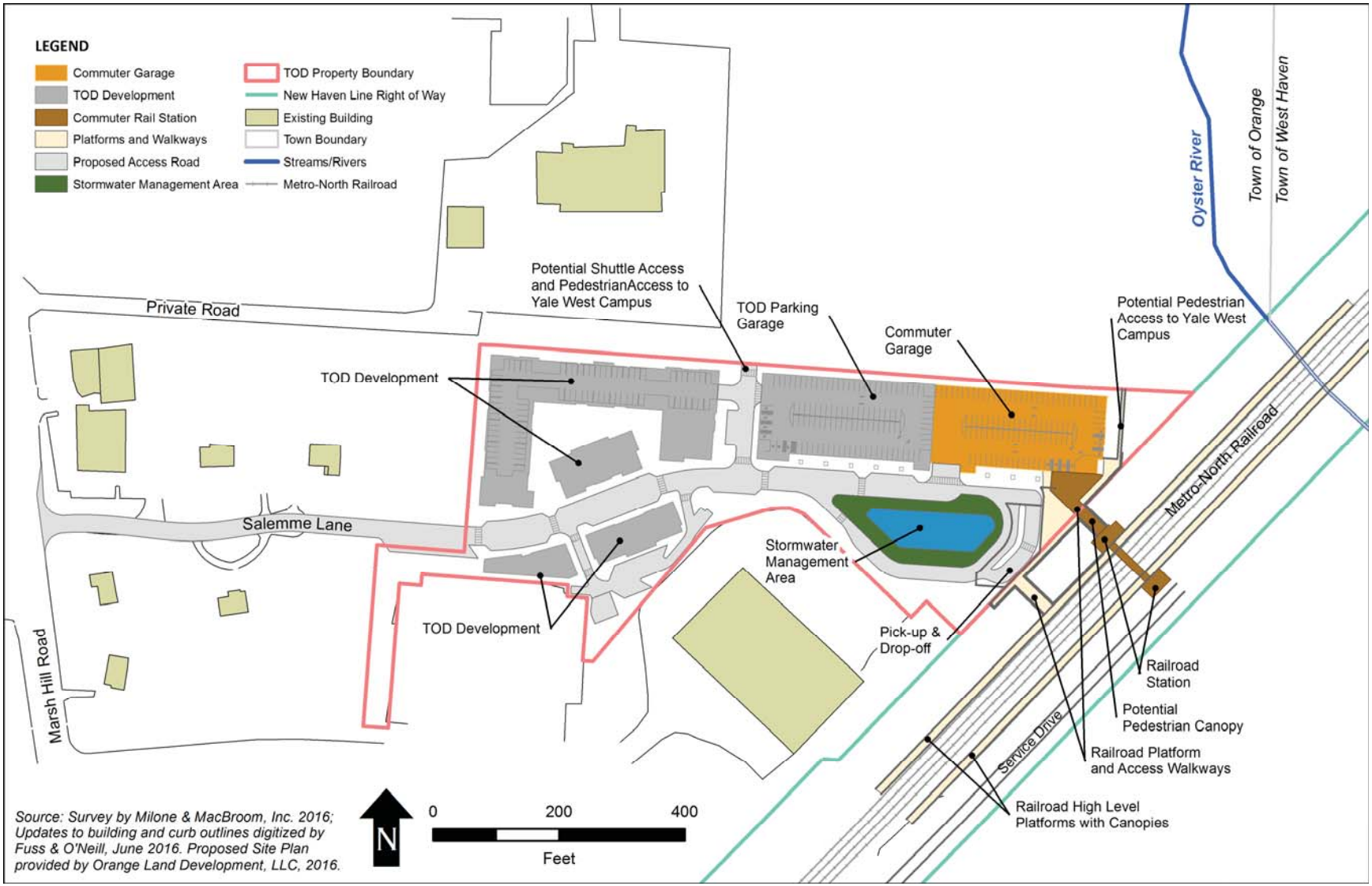

Figure ES-2. Proposed Action

EIE Distribution List

The following Federal, State, and local agencies and offices will receive a copy of this EIE for review and for availability to the public:

- State Representatives and Senators
- Governor, State of Connecticut
- U.S. Fish and Wildlife Service, New England Field Office
- U.S. Army Corps of Engineers, New England District
- U.S. Environmental Protection Agency, Region 1
- Selectmen, Town of Orange
- Plan & Zoning Department, Town of Orange
- Town Clerk, Town of Orange
- Department of Public Works, Town of Orange
- Orange Economic Development Corporation
- Connecticut Department of Energy and Environmental Protection
- Connecticut Department of Public Health
- Council on Environmental Quality
- Connecticut Department of Administrative Services/Construction Services
- Connecticut Office of Policy and Management
- Connecticut State Historic Preservation Office
- Connecticut Office of State Traffic Administration
- Connecticut Commuter Rail Council
- Connecticut Department of Housing
- Connecticut Department of Economic and Community Development
- Connecticut State Library
- Connecticut Department of Transportation, Office of Communications
- Orange Public Library (Case Memorial Library)
- South Central Regional Council of Governments
- South Central Regional Water Authority
- Orange Land Development LLC

1 Introduction

The Connecticut Department of Transportation (CTDOT) is evaluating the feasibility of constructing a new railroad station on the New Haven Line in the Town of Orange. The station would be owned by the State and located between the West Haven station and Milford station. The Connecticut portion of the New Haven Line is owned by the State and operated by the Metro-North Railroad. In recent years, annual ridership on the New Haven Line has been approximately 40 million passengers a year. The line serves stations in Connecticut along the main line and stations along the New Canaan, Danbury, and Waterbury branches as shown in *Figure 1-1*.

In 2001, CTDOT began investigating the feasibility, and studying the potential impacts of, constructing a new station or stations along the segment of the New Haven Line in West Haven or Orange. CTDOT determined that construction of a new station was warranted, and that fewer environmental impacts and a lower project cost would be incurred with the construction of a new station at the West Haven location. These results were released in *Environmental Impact Evaluation*[10] *for a New Railroad Station at City of West Haven or Town of Orange* in June of 2007 (herein referred to as the 2007 EIE).

Design and construction of the West Haven Railroad Station was completed in 2013 and now an approximately 6-mile segment remains between the West Haven and Milford stations. CTDOT has been evaluating the feasibility of constructing a new station at the Orange location since 2010 because it would provide additional access to the New Haven Line commuter rail service and relieve traffic congestion on the over-capacity Interstate 95 corridor. In 2016, the Town of Orange approved a zoning change to a Transit Oriented Development District for the area adjacent to the State owned right of way. Orange Land Development LLC (OLD) has proposed a Transit Oriented Development (TOD) on currently undeveloped land located off of Salemme Lane and directly adjacent to the railroad right-of-way.

The Proposed Action is the potential construction of a new railroad station at Orange, known as the "Orange Railroad Station – New Haven Line" hereafter also referred to as the Orange Railroad Station, would potentially be financed with Federal and State funds. Federal funds have been obtained for the planning and environmental review of the Proposed Action through the Federal Transit Administration (FTA); therefore, the project is subject to the National Environmental Policy Act (NEPA) of 1969 (as amended). The FTA informed CTDOT in an October 28, 2016 email that the Proposed Action may be evaluated as a Categorical Exclusion (CE) based on findings of prior and recent assessments of potential effects of the Proposed Action. A CE has been prepared in accordance with NEPA as well as 40 CFR Parts 1500 through 1508, the Federal Highway Administration (FHWA) regulations for Environmental Impact and Related Procedures (23 CFR Part 771) which are utilized by FTA, and Section 106 of the National Historic Preservation Act.

[10] The June 2007 Environmental Impact Evaluation was originally prepared as a combined Draft Federal Environmental Assessment (EA) and Draft State Environmental Impact Evaluation (EIE), but was subsequently issued in its final form as a State EIE as a result of a change in funding strategy, which resulted in no Federal funds being sought for the project.

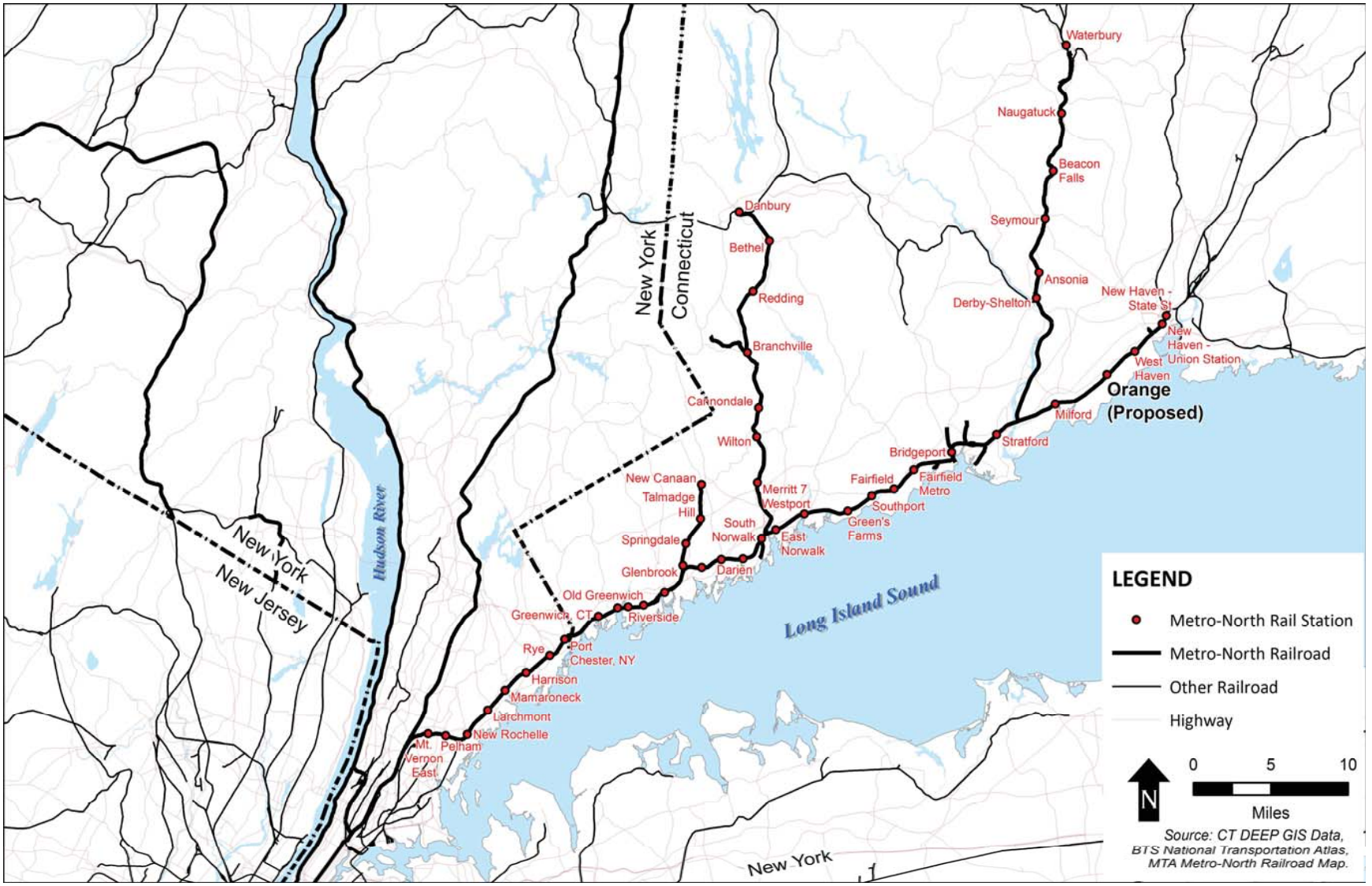

Figure 1-1. Metro-North Railroad System

The Proposed Action is also subject to the Connecticut Environmental Policy Act (CEPA) (Connecticut General Statutes [CGS] Sections 22a-1 through 22a-1h, inclusive, and, where applicable, CEPA regulations Sections 22a-1a-1 through 22a-1a-12, inclusive, of the Regulations of Connecticut State Agencies [RCSA]). The construction of a new rail facility is identified in the CTDOT Environmental Classification Document (ECD) as an action for which an Environmental Impact Evaluation (EIE) is always required.

This EIE includes a description of the Proposed Action; the purpose and need for the action; an evaluation of the direct, indirect, and cumulative effects of the Proposed Action; identification of unavoidable adverse environmental effects; evaluation of alternatives; and a description of proposed mitigation measures. CTDOT is the lead agency responsible for the EIE under CEPA. The NEPA documentation for the Proposed Action is a separate CE document (Fuss & O'Neill, 2017) and the Federal Transit Administration (FTA) is the lead Federal agency for NEPA documentation.

1.1 Description of Proposed Action

As described above, CTDOT is proposing to construct a commuter rail station in Orange, Connecticut through a public-private partnership agreement that will include a TOD developed by OLD. The Proposed Action refers to the actions specifically funded by State and Federal funds. State funds are proposed for the construction of the commuter train station, which includes station platforms, canopies, pedestrian overpass, and service access road within the existing railroad right-of-way. Federal funds are proposed for project planning. Elements of the project also considered part of the Proposed Action in this EIE include a commuter parking garage, commuter drop-off/pick-up, taxi stand and bus stop, and infrastructure improvements. The specifics of roles and responsibilities for these elements will be determined in negotiations between CTDOT and OLD. The TOD, which is proposed adjacent to the Orange Railroad Station, is wholly privately-owned and not considered part of the Proposed Action. The roadway to the TOD and the rail station will be owned by the Town of Orange. However, where relevant, the TOD is considered in the evaluation of indirect and cumulative effects.

1.1.1 Existing Site Conditions

The existing project site consists of one parcel owned by OLD and a portion of the State owned railroad right-of-way totaling approximately 14 acres between Marsh Hill Road to the west, the Oyster River to the east, the New Haven Line to the southeast, several residential properties and a commercial building to the north, the Yale University West Campus to the north/northeast, and by a commercial property to the south. This total consists of approximately 8.1 acres of TOD and Salemme Lane provides access to the project site from Marsh Hill Road. The site location is shown in *Figure 1-2*. *Figure 1-3* depicts the existing site parcels, and *Figure 1-4* shows basic site features. The undeveloped areas of the site are a mix of cleared and wooded areas, and the site slopes downward from Marsh Hill Road to the Oyster River. The boundary between Orange and West Haven is located at the eastern limit of the site.

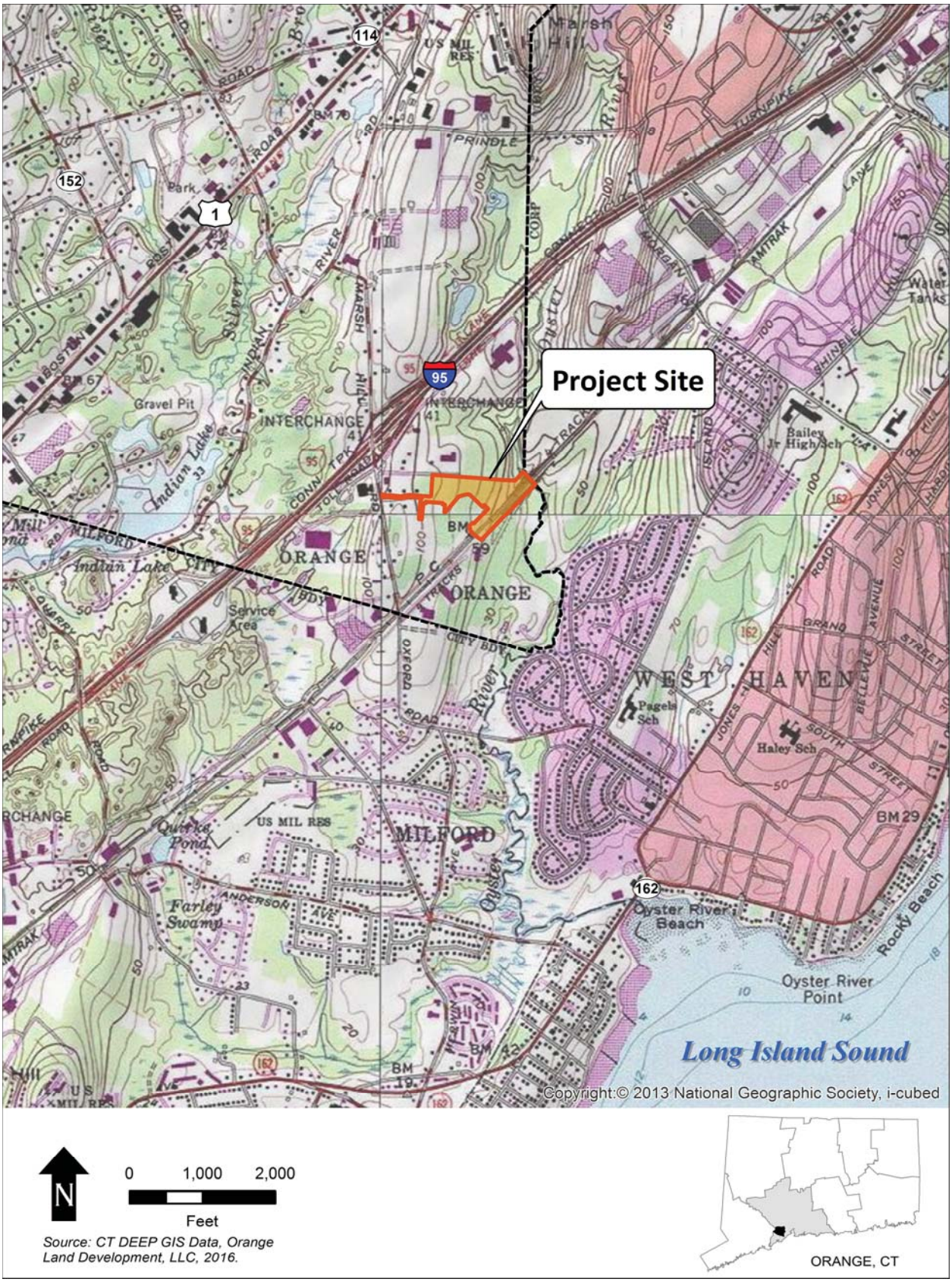

Figure 1-2. Site Location

Figure 1-3. Existing Site Parcels

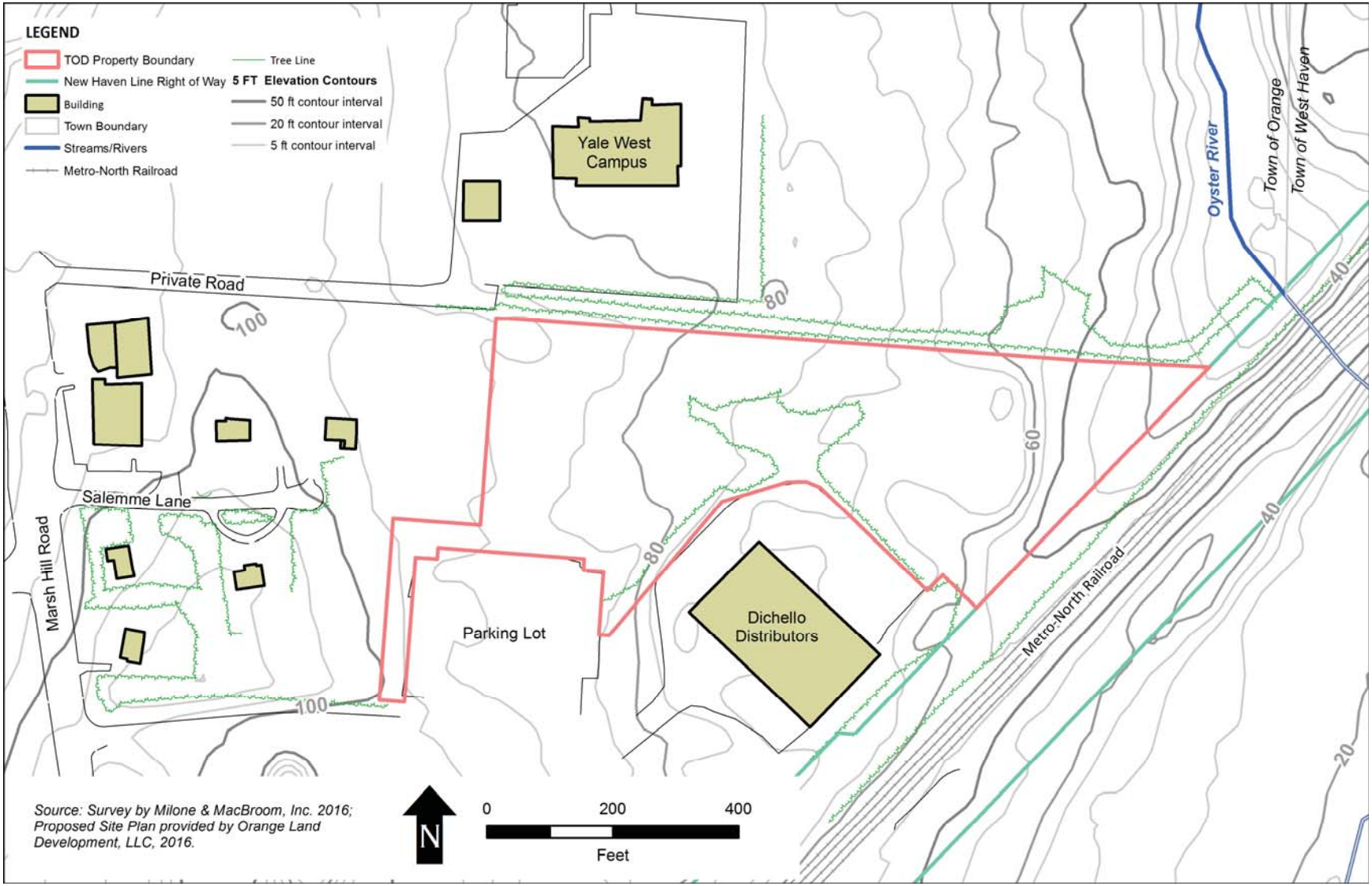

Figure 1-4. Existing Site Features

1.1.2 Proposed Action

Since the release of the 2007 EIE, the design concept for a potential commuter rail station in Orange has undergone several iterations, the latest of which is informed by the co-location with the proposed TOD. That alternative, shown in *Figure 1-5*, is the Preferred Alternative and has been carried forward in this EIE as the Proposed Action.

The Proposed Action includes the following elements:

- Two new approximately 1,020-foot long and approximately 10-foot wide canopied station platforms, one on the eastbound side and one on the westbound side.
- A covered pedestrian bridge connecting the platforms via stairtowers and elevators
- A gated emergency access driveway which may connect to Connair Road, a private way that parallels the railway corridor on the south side. Final location of the access drive will be determined during design.

In addition, the following elements are anticipated to be shared with the adjacent TOD and are considered part of the Proposed Action:

- Commuter drop-off/pick-up, taxi stand and bus stop areas
- 6-level, 566-space commuter parking structure that will serve the rail station
- Stormwater management system
- Utility infrastructure
- Improvements/extension of the existing Salemme Lane and cul-de-sac terminating at the new station.

The following elements are considered actions associated with the TOD, which is subject to local review and approval, and are not part of the Proposed Action, but are considered in the assessment of indirect and cumulative impacts, as appropriate:

- 4 new buildings (200 residential units and 21,500 square feet of retail/office space)
- 3-level, 233-space garage that will be dedicated parking for the TOD
- Approximately 123 surface parking spaces
- Site improvements, including the potential opportunity for future vehicular and pedestrian connection with Yale West Campus to the north and Dichello Distributors Inc. to the south.

The public cost of the Orange Railroad Station is anticipated to be in the range of $40 million to $60 million. It is currently anticipated that, pending availability of funding, construction would begin in FY2020 (Spring 2021), with a two year construction period for the Orange Railroad Station.

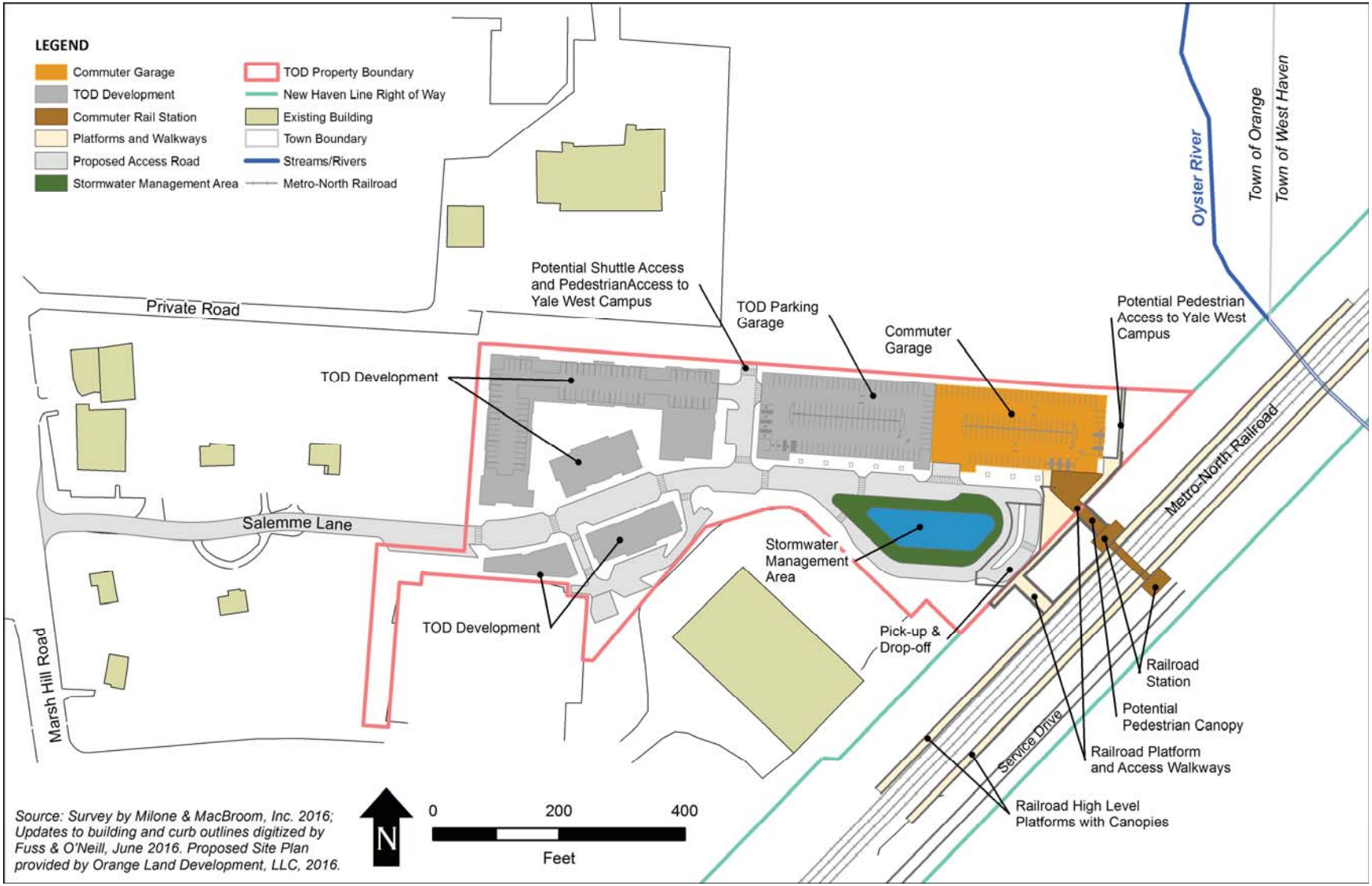

Figure 1-5. Proposed Action

1.2 Purpose and Need

The purpose of the Proposed Action is to accommodate current and future ridership and parking demand, and support statewide land use and transportation planning goals through construction of a new railroad station on the New Haven Line between the West Haven station and the existing Milford station. This action is anticipated to:

- Improve access to commuter rail for area residents
- Reduce roadway congestion
- Reduce emissions and fuel consumption associated with Single Occupant Vehicle (SOV) trips
- Meet State and regional transportation planning objectives as outlined in *Section 3.2*
- Improve land use/transportation synergies
- Support State policy goals for improved environmental and energy sustainability
- Improve New Haven Line parking supply to accommodate existing and future riders.

As described below, the Proposed Action will address the need for increased commuter parking, reduced roadway congestion, and improved commuter access.

1.2.1 Parking Demand

Currently, there is high ridership demand along the New Haven Line and waiting lists for parking passes at several stations on the New Haven Line. Mean daily ridership is greater than 90,000 passengers, and several commuter lots along the New Haven line are typically close to or at capacity. Data gathered quarterly from January 2016 to January 2017 by the South Central Regional Council of Governments (SCROG) shows that the commuter parking lot at Union Station has ranged from 85-100% capacity, the lot at the Milford Railroad Station has consistently been at 100% capacity and the recently constructed lot at the West Haven Railroad Station has ranged from 64-92% capacity[11].

Although recent construction of parking facilities at West Haven and planned parking at New Haven's Union Station will address some of the demand for commuter parking, new parking has the potential to encourage additional ridership, and enable potentially waitlisted riders at other stations to obtain newly available passes. The construction of a new railroad station and parking garage in Orange would address this need by providing 566 additional commuter parking spaces.

1.2.2 Roadway Congestion

Roadway congestion along the Interstate 95 corridor is severe and expected to continue to increase. As documented in the *I-95 Corridor Congestion Relief Study* (CTDOT, 2014), capacity on Interstate 95 has not significantly increased since its construction in the late 1950s, despite weekday travel volumes that exceed 135,000 vehicle trips per day in Orange. Peak hour directional traffic volumes typically range

[11] http://scrcog.org/reports-and-data/data-collection/

from 4,000 to 5,000 vehicles per hour (vph), and volume to capacity (v/c) ratios are >1.0 in the vicinity of Orange during peak hours[12], indicating that Interstate 95 is currently operating at capacity.

The CT Congestion Study[13] found that traffic congestion along the I-95 Corridor in the Bridgeport/Stamford and New Haven Metro Areas increased 19 percent from 2001 to 2011. Level of Service, which characterizes the delay experienced by motorists, is impacted in the vicinity of the Marsh Hill Road Exit (Exit 41) of Interstate 95 during peak morning and evening travel times.[14] Aside from the air quality impacts associated with traffic congestion, it's estimated that the impact of this congestion includes a total of approximately 41 million hours wasted due to people delayed in traffic and approximately $860 million dollars wasted due to delays caused by traffic congestion.

In its current configuration, I-95 in the peak direction of travel is operating at capacity for approximately 4 hours during both the morning and afternoon peak periods. Regional build-out analyses (SCROG, 2010) indicated potential population growth of an additional 53,000 by 2040.[15] With I-95 at its physical capacity, alternative means of transportation are needed to offset roadway congestion. In the absence of alternatives such as increased opportunity for rail ridership, the periods of commuting congestion will lengthen and traffic congestion will spread to alternative routes. Increasing rail ridership will contribute to alleviating this congestion.

1.2.3 Commuter Rail Access

The New Haven Line is the busiest commuter rail corridor in the country with over 40 million trips per year.[16] Currently, the 6-mile segment between the Milford and West Haven stations is the longest gap on the New Haven Line. This segment, which passes through a heavily-developed area, has been a location identified for additional commuter rail access for decades. At the local level, approval of a Transit Oriented Development District adjacent to the State owned railroad right-of-way in Orange signaled local support for the development of commuter rail access in the community.

Construction of the Orange Railroad Station would provide additional local access to commuter rail service on the New Haven Line, facilitating access via carpool and public transportation options and reducing the travel distance to the nearest stations. The proposed rail station would provide additional transportation options, with approximately 60-70 percent of Orange residents commuting from Orange to neighboring communities along the New Haven Line, and a similar number of out-of-town commuters traveling to jobs in Orange.

[12] http://scrcog.org/wp-content/uploads/upwp/studies/2014_Congestion_Management_Process.pdf

[13] http://www.ct-congestion-relief.com/documents/Effects%20of%20Traffic%20Congestion%20I-95_DRAFT%2001%2020%2014v2-2.pdf

[14] http://www.ct-congestion-relief.com/documents/final/FULL%20PDF%20OF%20FINAL%20REPORT.pdf

[15] http://scrcog.org/wp-content/uploads/reports/2010_Regional_Build_Out_Analysis.pdf

[16] http://www.letsgoct.com/img/documents/Lets%20Go%20CT-%20Fact%20Sheets%2020150313.pdf

1.2.4 Energy and Environmental Sustainability

Transit projects not only reduce energy usage and fuel consumption, but also aid in reducing overall vehicle emissions and the pollutants that create smog, which contributes to environmental and public health issues. Projects that promote public transportation as an alternative to single occupancy vehicle (SOV) trips have the benefit of replacing many separate emissions-producing vehicles with fewer transit vehicles that generally emit less pollution on a per person basis. For example, most rail transit vehicles, including those on the New Haven Line, emit little or no pollution, since they are powered by electricity. Transit projects also have the potential to reduce greenhouse gas emissions (GHGs), with rail systems producing approximately 60-70% less GHG emissions per passenger mile that an average SOV.

Transit projects can also facilitate higher density land development, which can have multiple environmental and socioeconomic benefits and is consistent with State level planning efforts to reduce sprawl and support the viability of transportation options in the State.[17]

1.2.5 Land Use/Transportation Synergies

The South Central Region Council of Governments' recently completed report (SCRCOG, 2016) on transit oriented development (TOD)[18] opportunities identified TOD as supportive of an efficient and functional multi-modal transportation system in the south central region of Connecticut, which includes Orange and the surrounding area. Projects that support TOD and encourage transit use are also consistent with the State's transportation vision plan*, Let's Go CT!* CTDOT has identified a commitment to transit in the State as essential for economic growth and also important to transportation planning for the I-95 corridor.[19]

The segment of the New Haven Line where the Orange Railroad Station is proposed also provides potential for expanded public transit use since while nearly 65% of Orange residents commute out of town to work, 80% of workers that live within 3 miles of the potential project site drive alone to work. In addition, Orange is one of the few locations along the New Haven Line that provides opportunity for both new TOD and TOD as an option for infill and/or redevelopment (SCROG, 2016).

1.3 Public Participation and Agency Coordination

A Notice of Scoping for the Proposed Action was published in the Council of Environmental Quality (CEQ) Environmental Monitor on August 16 and September 6, 2016. During the public scoping period, which ended on October 7, 2016, comment letters were received from the Connecticut Department of Energy and Environmental Protection (CTDEEP) on October 6, 2016, the Connecticut Department of Public Health (CTDPH) Drinking Water Section on September 23, 2016, and the Connecticut Office of Policy and Management on October 7, 2016. The scoping notice and comment letters are provided in

[17] http://www.ct.gov/opm/lib/opm/igp/org/cdupdate/2013-2018_cd_plan.pdf

[18] http://scrcog.org/wp-content/uploads/upwp/studies/2015_SCRCOG_Regional_TOD_Study.pdf

[19] http://www.ct-congestion-relief.com/documents/CTDOT%20I-95%20presentaion_LOW.pdf

Appendix A. A public scoping meeting was held on September 8, 2016 and copies of the scoping presentation, handout, and attendance sheet are included in *Appendix A*.

During data collection efforts for the preparation of the EIE and supporting studies, Federal and State resource agencies were contacted for information, as were municipal officials and the regional planning agency.

2 Alternatives Considered

The purpose of the Proposed Action is to accommodate current and future ridership and parking demand, and support statewide land use and transportation planning goals through construction of a new railroad station on the New Haven Line of the Metro-North Railroad between the existing West Haven and Milford stations. As described in *Section 2.1*, CTDOT and SCRCOG have considered many alternatives for meeting this purpose, several of which have already been evaluated under CEPA and NEPA. Passenger access needs, parking demand, and roadway capacity deficits are great enough that implementation of many projects is necessary to meet current and future needs. In addition to the No Action Alternative, which serves as a baseline for assessing potential impacts, several alternatives that potentially achieve the project purpose are considered in this EIE. These alternatives include:

- Alternative Sites (sites that are controlled or reasonably available)
- Alternative Designs
- Preferred Alternative.

2.1 No Action Alternative

Under the No Action Alternative, the proposed Orange Railroad Station would not be constructed and no additional State- or Federally-funded capital improvement projects would be undertaken to specifically meet the project Purpose and Need, with the exception of those projects along the Interstate 95 and New Haven Line corridors that are already included in the Statewide Transportation Improvement Program (STIP), the SCRCOG 25-year *Long Range Transportation Plan* (LRTP), or the *Let's Go CT! Transportation Ramp-Up Plan*. These include:

- **Union Station Garage.** Parking at Union Station is inadequate, with a parking pass waiting list of approximately 150-200 names. The *Long Range Transportation Plan* includes construction of a new garage at this location as an important major transit improvement since Union Station is a key hub for passengers travelling to and from the region. An Environmental Impact Evaluation for the garage was completed in April 2016. Design is currently underway and construction is anticipated to begin in 2018.

- **New Haven Line Service Study.** In response to concerns expressed by commuters, CTDOT is completing a rail study to detail the costs, benefits, and impacts of implementing more frequent local and express commuter rail service on the New Haven Line. The study is anticipated to start in 2017 using Transportation Ramp-Up Plan Funds.

- **New Haven Line Track Infrastructure Improvements.** Improvements identified in the LRTP include replacement of the catenary system for New Haven Line from Greenwich to New Haven, replacement of the New Haven Line tracks, and replacement of the New Haven Line Positive Train Control System.

- **Milford Station Parking Expansion.** In 2006, SCRCOG completed a study assessing the feasibility of constructing parking structures at or near the Milford Rail Station. The study recommended construction of a garage containing 650 to 675 new spaces for a net increase of

approximately 525 spaces. In 2015, the City acquired parcels in the vicinity of the train station for the development of parking. In June 2016, 112 new paved, lined parking spaces were added alongside the Milford train station in downtown Milford. Another 200 or more spaces are planned to be added by the City over the next three years.

- **I-95 Improvements.** Widening of I-95 between Stamford and Bridgeport. This project includes constructing an additional operational lane in each direction and reconfiguring access points to address traffic congestion and improve safety. The eastbound and westbound sections of I-95 between Stamford and Bridgeport are the most congested segments along the corridor and the highest priority for expanded capacity. Design is anticipated to begin in 2017. No funding for design or right-of-way acquisition has been identified.

2.2 Alternative Sites

Alternative sites for the Proposed Action would include similar actions at alternative locations to meet the project purpose and need. Thirteen sites have been examined as part of previous studies for potential construction of a new railroad station to meet the project purpose and need. A 2000 study by SCRCOG evaluated these sites using seven criteria, including accessibility, parking arrangements, constructability, environmental constraints, land requirements (zoning) and takings, construction costs, and site design factors.

The majority of these sites were eliminated from further consideration based on their attributes relative to these criteria. Two of the locations were recommended for further analysis, including the Sawmill Road Site in West Haven and the Dichello Distributors site in Orange.

The Orange and West Haven sites have both been examined in significant detail, through an engineering study (CTDOT, 2001) and a series of transportation, transit, economic, and environmental studies, resulting in the 2007 EIE that examined and compared both sites. The West Haven site was found to be the preferred alternative in the 2007 EIE based on cost considerations, benefits in promoting associated transit-oriented development and redevelopment, and environmental impacts. The West Haven site was therefore selected for detailed design and construction of a new rail station; which has been constructed and is being used. Therefore, the Orange site remains the only feasible location for a second new rail station. No other locations are carried forward for further analysis in this EIE.

2.3 Alternative Designs

Alternative designs to the Proposed Action consider alternative site configurations at the Orange site to meet the project purpose and need. Conceptual designs for the project were developed in 2001 and refined in 2004. Of the concepts developed, the preferred concept was evaluated in the 2007 EIE. The concepts were each developed to follow a consistent design program, which includes the following elements as identified in a 2005 Conceptual Design Report (CTDOT, 2005):

- New or revised site access
- Commuter parking and drop-off areas

- A fully accessible station facility that complies with the Americans with Disabilities Act (ADA) guidelines.

The following design criteria were selected by CTDOT, which served as the basis for developing alternative site configurations as described in the 2007 EIE:

- Two 12-car, high-level platforms.
- A station building that may be freestanding or integrated into a larger parking structure.
- Canopies to cover the platforms.
- Platforms to include amenities such as guardrails, benches, litter cans, commuter shelter areas, signage, lighting, tactile warning strips, and provisions for future public address systems and audio visual information systems (AVIS). Platforms will be handicap accessible.
- Commuter drop-off/pick-up area to be provided on at least one side of the tracks. This drop-off/pick-up area shall include handicap accessible parking, curb ramp, and handicap van parking.
- A minimum of 1,000 parking spaces to be provided at each station with at-grade or structured parking alternatives to be explored.
- An accessible pedestrian crossing to be provided between the two platforms. The access will be fully ADA compliant, meet code for egress, and will be achieved by either a pedestrian tunnel or an overpass incorporating an elevator and stairs at each platform.

Four conceptual designs were developed using these design criteria and are examined in the 2005 Conceptual Design report and described in the 2007 EIE. The concepts vary in the location and type of parking, the location of parking and the station building relative to the station platforms, and the location of the station platforms.

In 2016, the zoning of a Transit Oriented Development District (TODD) in Orange and the planning for a proposed TOD by OLD adjacent to the Metro-North Railroad right-of-way introduced the possibility of a public-private partnership for the development of a commuter rail station and associated parking and site development. Since a commuter parking garage was identified as a component of the TOD, CTDOT considered another alternative which focused solely on the development of a scaled-back station that meets many of the criteria identified in the 2005 Conceptual Design Report and 2007 EIE. The scaled-back station concept adjacent to the TOD emerged as the Preferred Alternative. The synergistic relationship between the commuter rail station and the TOD is a benefit to both. Consequently, this concept was selected as the preferred alternative for analysis in the EIE.

2.4 Preferred Alternative

The Proposed Action considered in this document is the construction of a new passenger railroad station on the New Haven Line in Orange. A plan view of this option is shown in *Figure 1-5*. The Orange Railroad Station would be constructed by CTDOT using State funds. Federal funds are being used for planning purposes only.

The following has been identified as the Preferred Alternative for the Proposed Action and includes the following elements:

- Two new approximately 1,020-foot long and approximately 10-foot wide canopied station platforms, one on the eastbound side and one on the westbound side
- A covered pedestrian bridge connecting the platforms via stairtowers and elevators
- A gated emergency access driveway which may connect to Connair Road, a private way that parallels the railway corridor on the south side. Final location of the access drive will be determined during design.

In addition, the following elements, which are anticipated to be shared with the adjacent TOD, are also considered part of the Proposed Action:

- Commuter drop-off/pick-up, taxi stand and bus stop areas
- 6-level, 566-space commuter parking structure that will serve the rail station.
- Stormwater management system
- Utility infrastructure.

The following elements are considered actions associated with the TOD, which is subject to local review and approval, and are not part of the Proposed Action, but are considered in the assessment of indirect and cumulative impacts, as appropriate:

- Improvements/extension of the existing Salemme Lane and cul-de-sac terminating at the new station
- 4 new buildings (200 residential units and 21,500 square feet of retail/office space)
- 3-level, 233-space garage that will be dedicated parking for the TOD
- Approximately 123 surface parking spaces
- Site improvements, including the potential opportunity for future vehicular and pedestrian connection with Yale West Campus to the north and Dichello Distributors Inc. to the south.

The specifics of roles and responsibilities for these elements will be determined in negotiations between CTDOT and OLD. The TOD, which is proposed adjacent to the commuter parking garage and rail station, is wholly privately-owned and not considered part of the Proposed Action. The roadway to the TOD and to the Orange Railroad Station will be owned by the Town of Orange. However, where relevant, the TOD is considered in the evaluation of indirect and cumulative effects within this document.

3 Existing Environment and Analysis of Impact

3.1 Land Use, Zoning, and Local Development Plans

3.1.1 Existing Conditions

3.1.1.1 Land Use

The project site is located on the easterly end of Salemme Lane and is bounded on the west by residential properties, on the east by the New Haven Line, on the north by property owned by Yale University and several residential properties, and on the south by commercial property. The site consists of approximately 14 acres of land and is proposed to include the Orange Railroad Station, structured parking, housing, and commercial uses.

The areas adjacent to the project site consist of residential, commercial, and open space land uses. To the south of the site, there is a large office building and a beverage distribution and bottle recycling facility (Dichello Distributors). There are four single family homes on smaller lots adjacent to the Dichello Distributors' property. These residential homes do not conform to the current zoning regulations and are more than a quarter mile from other residential neighborhoods. The site itself is currently wooded.

A Southern Connecticut Gas (SCG) operations center and a small office complex are located on Marsh Hill Road across from Salemme Lane. Adjacent to the site is the land formerly owned by Bayer which was purchased by Yale University in 2007. The site now houses Yale University West Campus, which has extensive laboratory space dedicated to studying science, art conservation, health, energy, and the environment and is also the headquarters for the Yale School of Nursing. The Hope Academy, a private special education school is located on the westerly end of Salemme Lane and has frontage on Marsh Hill Road. South of Salemme Lane, the Marsh Hill Road roadway width narrows, and property uses are primarily residential.

3.1.1.2 Zoning

The project site lies within an area zoned as a Transit Oriented Development District (TODD), while the surrounding parcels are within the Light Industrial District #2 (LI-2) and Light Industrial District #4 (LI-4), as shown on *Figure 3-1*. The LI-2 area immediately adjacent to the site also contains a TODD overlay. For LI-2, allowed uses include manufacturing, laboratories, office buildings, warehouses, freight and materials trucking, local and State owned buildings, railroad rights-of-way, and others. The minimum lot size in this district is two-acres, with a required minimum frontage of 50-feet and maximum ground coverage of 40%. Therefore, redevelopment of vacant parcels of less than one-acre would require assemblage into a two-acre lot. Dwellings, such as the residences along Salemme Drive which were presumably pre-existing to the designation of an LI-2 zone, are not allowed as new construction in the LI-2 zone. Dwellings are allowed within the TODD under certain conditions. Within a TODD, multi-family residential units shall only be permitted in conjunction with the development of office, hotels or

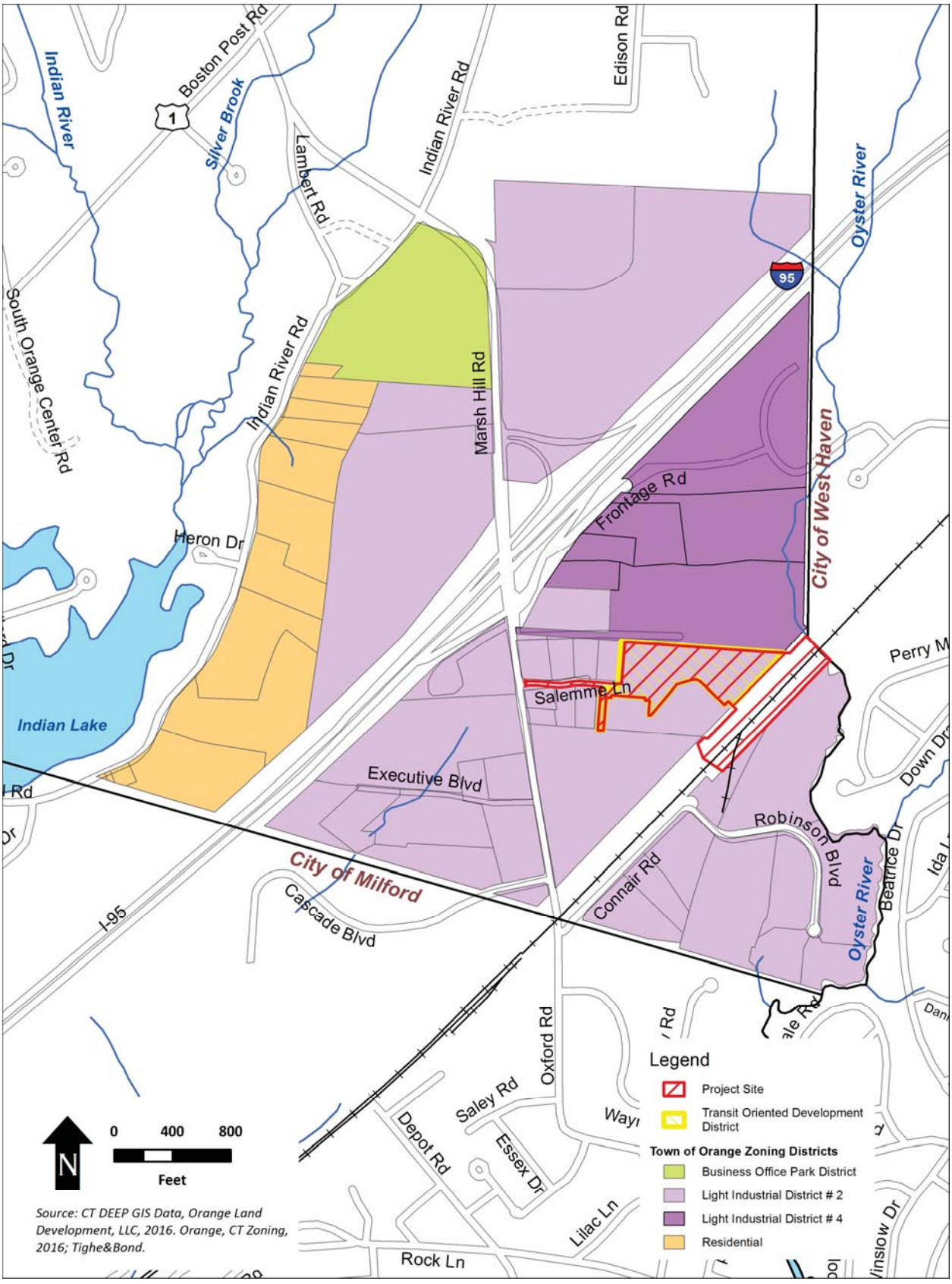

Figure 3-1. Town of Orange Zoning

other similar uses. There shall be a minimum of 1,000 square feet nonresidential use for each residential dwelling unit.

The LI-4 zone was added in 2008 as a result of a zone change for Yale University. Allowed uses include all of the uses allowed under LI-2, plus university or college, medical offices, and natural resource education areas. The minimum lot size requirements are also consistent with LI-2 requirements.

A TODD was established by the Town of Orange in December 2010 as an overlay to a section of LI-2, as shown on *Figure 3-1*. The purpose of the TODD is to create a high-density mixed-use, transit oriented development adjacent to a New Haven Line railroad station. It is further the intent to provide a range of housing, businesses and services specifically geared towards commuters and users of the railroad, designed in an aesthetically-pleasing, environmentally-conscious and pedestrian-scaled manner. Any parcels located within the "TODD Overlay" can apply to the Plan & Zoning Commission for a zone change from LI-2 to TODD.

3.1.1.3 Local Land Use Plan

The Town of Orange Plan of Conservation & Development (2015 POCD) goals include preserving rural areas, open space, quality residential areas, and existing vibrant commercial, retail, and industrial areas. The 2015 POCD incorporated the TODD, which designates the proposed Orange Railroad Station site as a preferred development site for the rail station.

A rail station in Orange would significantly benefit the residents and businesses in Orange and is supported by the 2015 POCD. The 2015 POCD states that Orange promotes transit-oriented development "provided it is 'firmly tied' to the construction of the railroad station."

3.1.2 Impact Analysis

3.1.2.1 Land Use

The proposed Orange Railroad Station is generally consistent with land uses on the proposed site and in the surrounding area.

3.1.2.2 Zoning

Although State projects are exempt from local zoning requirements, CTDOT attempts to avoid conflict with local zoning regulations. The Proposed Action and No Action Alternatives are both allowable uses by-right within the TODD and LI-2 zoning districts. Permitted uses include buildings and facilities of the State of Connecticut and Federal government; permitted uses may include off-street parking and loading spaces. The Proposed Action is consistent with local zoning requirements for minimum lot area, dimensions, and frontage.

3.1.2.3 Local Land Use Plan

The Proposed Action is identified in the Town of Orange Plan of Conservation & Development as a planned project to encourage the use of alternative transportation and to develop retail and commercial

businesses in the vicinity of the project site. The proposed Orange Railroad Station is consistent with local land use planning goals. The Proposed Action is anticipated to have a positive impact on the Town of Orange and surrounding area by benefitting retail and commercial development due to public transportation accessibility.

3.1.3 Mitigation

No mitigation is necessary or proposed since the Proposed Action is consistent with applicable land use, zoning, and planning initiatives.

3.2 Consistency with State and Regional Conservation and Development Plans

3.2.1 Existing Conditions

3.2.1.1 Conservation and Development Policies: The Plan for Connecticut 2013-2018

The Conservation and Development Policies: The Plan for Connecticut 2013-2018 (C&D Plan) was adopted in 2013 as an update to the previous C&D of 2005-2010. According to the Connecticut General Statutes, the State C&D Plan is "the official policy for the executive branch of government in matters pertaining to land and water resource conservation and development" and has grown over the years to include policies relating to transportation, energy and air. The C&D Plan outlines broad-based growth management principles designed to encourage sustainable development that balance human needs with conservation of environmental and socioeconomic resources.

The growth management principles in the C&D Plan reflect a desire to avoid land use trends that encourage sprawl and the subsequent disproportionate consumption of land and resources that results. These principles encourage the revitalization of areas with existing infrastructure and capacity to support growth and the development of currently undeveloped areas that is consistent with long-term sustainability of the State's resources.

According to the C&D Plan's Development Locational Guide Map (LGM), the Proposed Action and adjacent TOD are located primarily in a "Balance Priority Funding Area" with parts classified as "Priority Funding Area 3-4" (*Figure 3-2*). Priority Funding Areas are classified by Census Blocks that include:

- Designation as an Urban Area or Urban Cluster in the 2010 Census
- Boundaries that intersect a ½ mile buffer surrounding existing or planned mass-transit stations
- Existing or planned sewer service from an adopted Wastewater Facility Plan

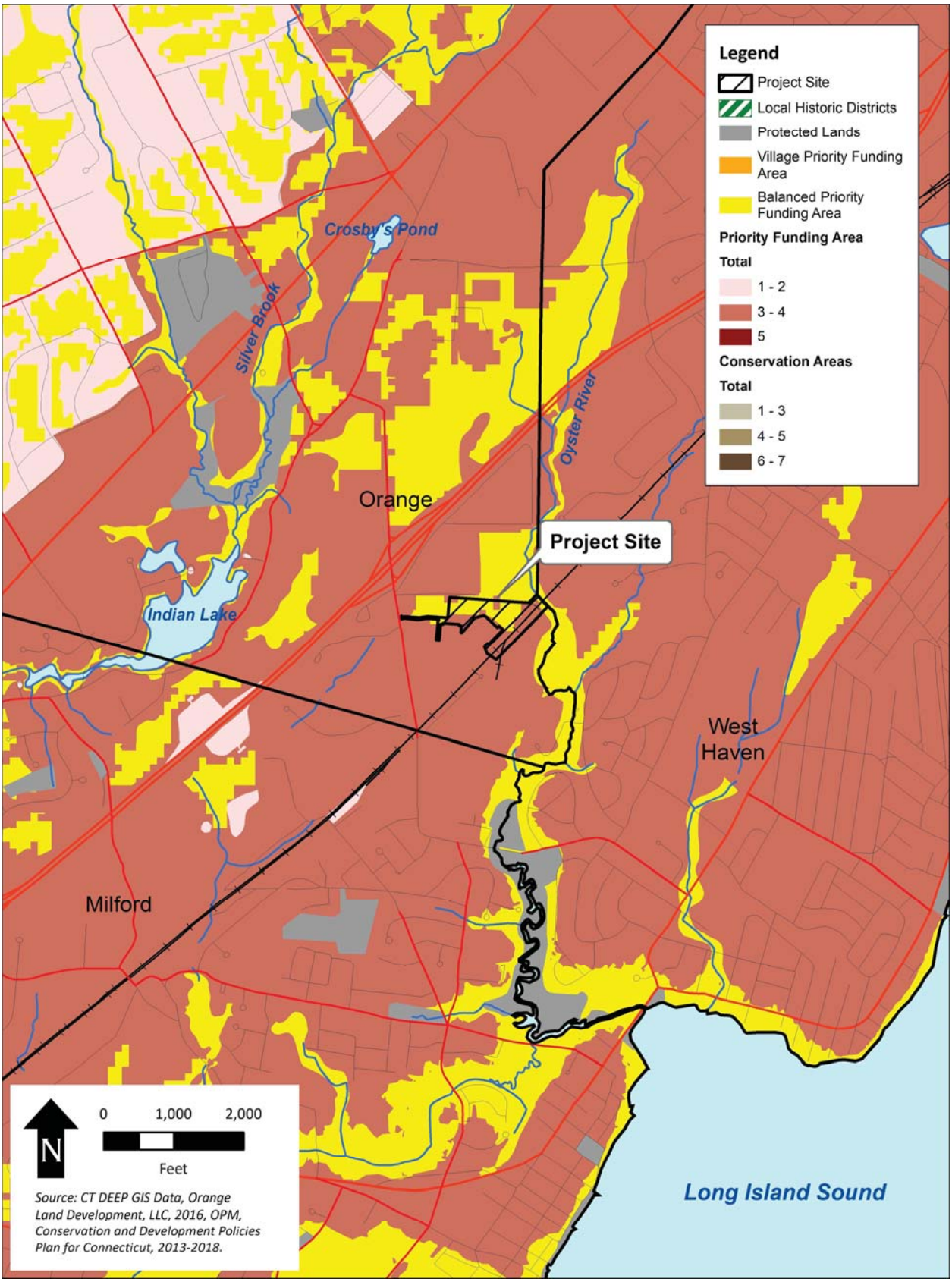

Figure 3-2. Project Area Development Policies

- Existing or planned water service from an adopted Public Drinking Water Supply Plan
- Local bus service provided 7 days a week.

Balanced Priority Funding Areas have characteristics consistent with Priority Funding Areas, and also with Conservation Areas, which have environmental or natural resource values. This means that there must be a balanced consideration of all factors in the area before actions in these areas can be proposed. The LGM classification is meant to aid State agencies in complying with administrative requirements associated with the Connecticut General Statutes. Any growth related projects will not receive funding unless the site is located within a Priority Funding Area on the LGM. A growth related project is defined as any project that includes acquisition of property, development of property, or acquisition of transportation equipment of facilities in excess of $100,000.

3.2.1.2 Plan of Conservation and Development, South Central Region

The South Central Regional Council of Governments (SCRCOG) is the regional planning agency representing 15 municipalities in the Greater New Haven area. These include Bethany, Branford, East Haven, Guilford, Hamden, Madison, Meriden, Milford, New Haven, North Branford, North Haven, Orange, Wallingford, West Haven, and Woodbridge.

The regional *Plan of Conservation and Development* (POCD) is an advisory document developed by the SCRCOG that is intended to be a regional long range land use planning document that evaluates existing conditions and identifies physical areas for growth and preservation.

The basic goals of the POCD include (SCRCOG, 2009):

- Guiding density to existing development corridors that have transportation, employment and utility infrastructure,
- Supporting the expansion of the area's rail service including the transit parking areas and station expansion along Metro-North,
- Coordinating work with CTDOT and the FHWA and any Congestion Management studies to reduce traffic congestion and subsequent air quality issues.

The POCD directly mentions a proposed train station in Orange. It states that there are opportunities for the creation of a transit-oriented development due to Yale University's purchase of the adjacent former Bayer site, surrounding parcels zoned for industrial uses, and the nearby densely developed single family residential neighborhoods (within ½ mile in West Haven and Milford). The POCD recommends additional pedestrian infrastructure to link the station to areas east of the Oyster River.

3.2.1.3 Transportation Planning

In addition to the broad State and regional planning document described above, there are several transportation-specific planning documents relevant to the proposed project.

Moving Forward: Connecticut's Transportation Strategy – Report and Recommendations of the Transportation Strategy Board The Transportation Strategy Board (TSB) recommended in the *Moving Forward: Connecticut's Transportation Strategy* report (January 2007) the evaluation and planning of a new New Haven Line rail station in the Town of Orange.

Connecticut on the Move: Strategic Long-Range Transportation Plan 2008 – 2035
The Connecticut on the Move: Strategic Long-Range Transportation Plan 2008 – 2035, prepared by the State of Connecticut Department of Transportation, identified transportation investment goals in determining their financial investment priorities as including: providing strategic capacity improvements and to support efforts to promote the benefits of transit oriented development. The plan specifically identifies the construction of a new commuter rail station between New Haven and Milford (i.e., West Haven or Orange) as an important effort.

Master Transportation Plan 2009-2016
The Master Transportation Plan 2009-2016, prepared by State of Connecticut Department of Transportation, identified the construction of a new rail station in Orange (Project No. 106-120) as a public transportation project in the planning stage.

Congestion Mitigation Systems Plan - "Vision 2020"
The Congestion Mitigation System Plan - also known as "Vision 2020" was released in February 2003 by the South Western Regional Planning Agency. The purpose of the study was to develop a strategic plan for reducing traffic congestion in Connecticut's southwest corridor, including Orange, and improving mobility and access within the southwest corridor and with adjacent regions in the New York Metropolitan Area. One of the overall strategies recommended by the study included optimizing the use of the region's rail system for passenger movement. A short term action of this plan was to provide additional parking at New Haven Line rail stations.

SCRCOG Congestion Management Process
In June 2010, the SCRCOG Congestion Management Process report was finalized. This report defines the majority of the Interstate 95 (I-95) corridor, including the section closest to the proposed station (exits 38 through 47), as congested. One of the goals to reduce this congestion is to promote enhancement and interconnection of alternative transportation modes to allow for multiple travel options in the region.

Passenger Rail Investment and Improvement Act of 2008 (PRIIA)
The PRIIA reauthorized Amtrak and tasked Amtrak, the U.S. Department of Transportation, States and other stakeholders with improving service, operations, and facilities.

3.2.2 Impact Analysis

The No Action Alternative fails to support both State and regional planning initiatives for land use conservation and development and transportation, which encourage development of areas with infrastructure suitable for long-term growth and improvement of existing transportation infrastructure to increase capacity and relieve traffic congestion.

The Proposed Action is consistent with the State and regional conservation and development plans and transportation plans described above. Specifically, it is consistent with regional and state-wide goals to maintain and improve transportation infrastructure and reduce traffic congestion and address related air quality and energy use issues.

3.2.3 Mitigation

No mitigation is necessary or proposed since the Proposed Action is consistent with State and regional planning initiatives.

3.3 Traffic and Parking

3.3.1 Existing Conditions

3.3.1.1 Adjacent Roadway Network

The roadway network adjacent to the proposed Orange Commuter Railroad Station includes the following roads (*Figure 3-3*):

- Interstate 95
- U.S. Route 1 (Boston Post Road)
- Lambert Road
- Marsh Hill Road
- Indian River Road
- Frontage Road
- Oxford Road
- Merwin Avenue
- Anderson Avenue
- Depot Road
- Woodmont Road
- Benham Hill Road
- Route 162 (Jones Hill Road)

Interstate 95 (I-95) is a limited access highway that traverses the study area along an east-west alignment just north of the project area for the Proposed Action. The highway provides access to Bridgeport to the southwest and New Haven to the northeast. Within the Town of Orange, I-95 provides three lanes in each direction with a posted speed limit of 55 miles per hour.

U.S. Route 1 (Boston Post Road) is classified by CTDOT as a principal arterial roadway which runs east to west through the study area north of the project site. This roadway serves as one of the primary corridors connecting Orange to West Haven, Milford and other cities and towns along the Connecticut coast. The roadway is generally two lanes in each direction with a two-way left turn lane in the center and a speed limit of 40 miles per hour within the study area.

Lambert Road and Marsh Hill Road are minor arterial roadways in Orange connecting Orange Center Road to the north with U.S. Route 1, I-95 Interchange 41 and the City of Milford to the south. Lambert

Road begins at Orange Center Road and terminates at Indian River Road, where it becomes Marsh Hill Road. Marsh Hill Road then ends at the Milford City Line where it becomes Oxford Road. Lambert Road provides one lane in each direction to the north of U.S. Route 1 and widens to two lanes in each direction south of U.S. Route 1. Marsh Hill Road continues south from Indian River Road with two lanes in each direction until 0.15 miles south of the I-95 northbound ramps. The speed limit on both roadways is 30 miles per hour.

Indian River Road, located in Orange, is classified as a local roadway from the Milford City Line to the intersection with Marsh Hill Road where it becomes a minor arterial leading to U.S. Route 1 to the northeast. The roadway provides one lane in each direction with an alternating turn lane serving businesses between Marsh Hill Road and U.S. Route 1. The speed limit is 30 miles per hour along its entire length.

Frontage Road is a local roadway in Orange. The roadway intersects Marsh Hill Road adjacent to the I-95 Northbound Interchange 41 exit ramp. Frontage Road serves as the beginning of the I-95 Northbound entrance ramp and also allows direct access to the Yale University West Campus. At the Marsh Hill Road intersection, the roadway has two lanes in each direction with a speed limit of 25 miles per hour.

Oxford Road is a two-lane bi-directional roadway in Milford connecting Marsh Hill Road in Orange to the north and Woodmont Road in West Haven to the east. It is classified by CTDOT as a minor arterial from the Milford City Line to the intersection with Merwin Avenue where it becomes a collector roadway. The speed limit is 30 miles per hour.

Merwin Avenue and Anderson Avenue are minor arterial roadways in Milford running north to south and east to west, respectively. Merwin Avenue connects to Oxford Road to the north and becomes Route 736 to the south after it intersects Anderson Avenue. Anderson Avenue connects to U.S. Route 1 via Woodmont Road to the northwest and Route 162 (New Haven Avenue) to the east. Both roadways are a single lane in each direction with a speed limit of 25 miles per hour.

Depot Road is a local roadway in Milford. The roadway is a single lane in each direction with a speed limit of 25 miles per hour. It begins at the intersection with Merwin Avenue and Anderson Avenue and runs northwest, terminating at the railroad tracks.

Woodmont Road and Benham Hill Road are collector roadways serving residential neighborhoods in West Haven. Woodmont Road runs east to west connecting Oxford Road in Milford to Route 162 (Jones Hill Road) in West Haven. Benham Hill Road begins at Woodmont Road and continues northeast to the intersection with Morgan Lane. Both roadways are a single lane in each direction, with a speed limit of 30 miles per hour on Woodmont Road and 25 miles per hour on Benham Hill Road.

Route 162 (Jones Hill Road) is a minor arterial roadway serving residential neighborhoods in West Haven. The roadway connects to New Haven Avenue in Milford to the south and Route 705 (Platt Avenue) to the northeast. Jones Hill Road is a single lane in each direction with a speed limit of 25 miles per hour.

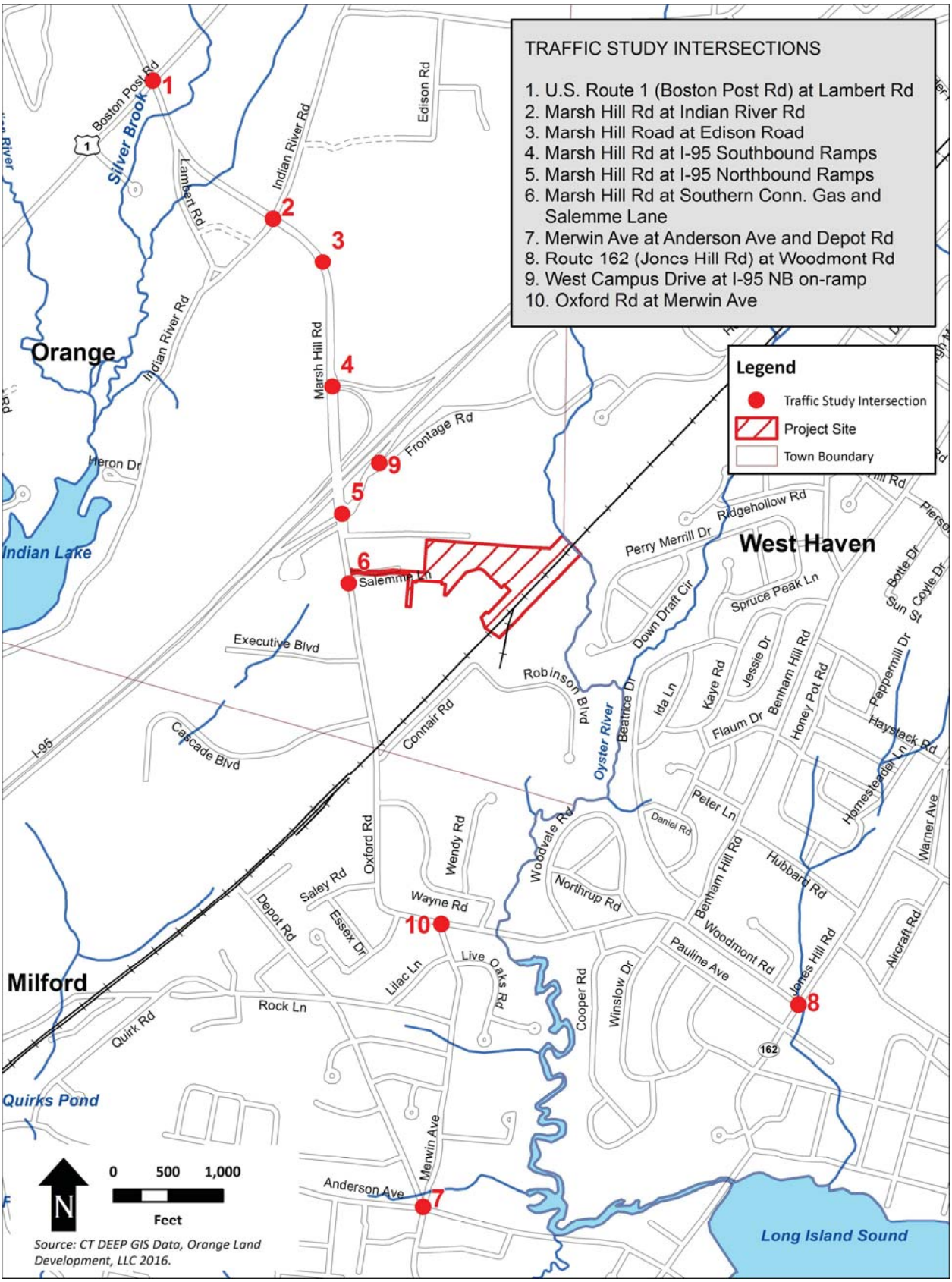

Figure 3-3. Traffic Study Intersections

3.3.1.2 Study Area Intersections

The adjacent roadway network includes the following intersections controlled by traffic signals:

- U.S. Route 1 (Boston Post Road) at Lambert Road
- Marsh Hill Road at Indian River Road
- Marsh Hill Road at Edison Road
- Marsh Hill Road at I-95 Southbound Ramps
- Marsh Hill Road at I-95 Northbound Ramps
- Marsh Hill Road at Southern Connecticut Gas (SCG) Driveway
- Merwin Avenue at Anderson Avenue
- Route 162 (Jones Hill Road) at Woodmont Road

The study area also includes the following unsignalized intersections controlled by stop signs:

- West Campus Drive at I-95 Northbound On-Ramp
- Marsh Hill Road at Salemme Lane
- Oxford Road at Merwin Avenue

3.3.1.3 Traffic Volumes

Existing 2013 and 2015 traffic volumes for each of the study area intersections were provided by a traffic study prepared by Milone & MacBroom for the Orange Railroad Station and TOD, which was submitted to the Office of the State Traffic Administration (OSTA) in June 2016. Traffic volumes were prepared for the morning and afternoon peak hours of adjacent street traffic. These traffic volumes are depicted in *Figures 3-4 and 3-5*.

The Milone & MacBroom study subsequently received OSTA Administrative Decision No. 441 on April 25, 2017, which indicated that the development will not substantially affect State highway traffic operations in the area and, therefore, formal action by OSTA under Section 14-311 of the General Statutes of Connecticut is not required.

3.3.1.4 Capacity Analysis

Capacity analyses for both signalized and unsignalized intersections were conducted using Synchro Professional Software, version 9.0.

In discussing intersection capacity analyses results, the term level of service (LOS) is used to describe the operating condition of the road or intersection. LOS is a measure of the delay experienced by stopped vehicles at an intersection. LOS is rated on a scale from A to F, with A describing a condition of very low delay (less than 10 seconds per vehicle), and F describing a condition where delays will exceed 50 seconds per vehicle for unsignalized intersections and 80 seconds per vehicle for signalized intersections. Delay is described as a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Therefore, intersections with longer delay times are less acceptable to most drivers. In both signalized and all-way stop controlled intersections, LOS provides a description of the average delay for each vehicle traversing the intersection.

The definition of LOS, as well as the methodology for conducting signalized and unsignalized intersection capacity analysis, is taken from the 2000 Highway Capacity Manual published by the Transportation Research Board.

Under existing conditions, the study area intersections operate at an acceptable LOS D or better with one exception (*Table 3-1*). The intersection of Oxford Road at Merwin Avenue operates poorly at an overall LOS E during the morning peak hour and LOS F during the afternoon peak hour.

The intersection of Marsh Hill Road and the SCG Driveway, which will provide access to the proposed rail station in the future, operates efficiently at LOS A during both the morning and afternoon peak hours.

Table 3-1. 2016 Existing Conditions Levels of Service

Intersection	AM Peak Hour	PM Peak Hour
Signalized Intersections		
U.S. Route 1 (Boston Post Road) at Lambert Road	C	C
Marsh Hill Road at Indian River Road	B	C
Marsh Hill Road at Edison Road	A	B
Marsh Hill Road at I-95 SB Ramps	C	C
Marsh Hill Road at I-95 NB Ramps	C	C
Marsh Hill Road at SCG	A	A
Merwin Avenue at Anderson Avenue and Depot Road	B	B
Route 162 (Jones Hill Road) at Woodmont Road	B	C
All-Way Stop Controlled Intersections		
West Campus Drive at I-95 NB on-ramp	B	B
Oxford Road at Merwin Avenue	E	F
Woodmont Road at Benham Hill Road	C	C

For analysis purposes, the intersection of Woodmont Road and Benham Hill Road was analyzed as an all-way stop controlled intersection. Although the intersection only has stop control on the northbound and westbound legs, the close proximity of a southbound stop sign at the intersection of Woodmont Road and Winslow Drive, 140 feet to the south of Benham Hill Road, results in the configuration effectively functioning as an all-way stop intersection.

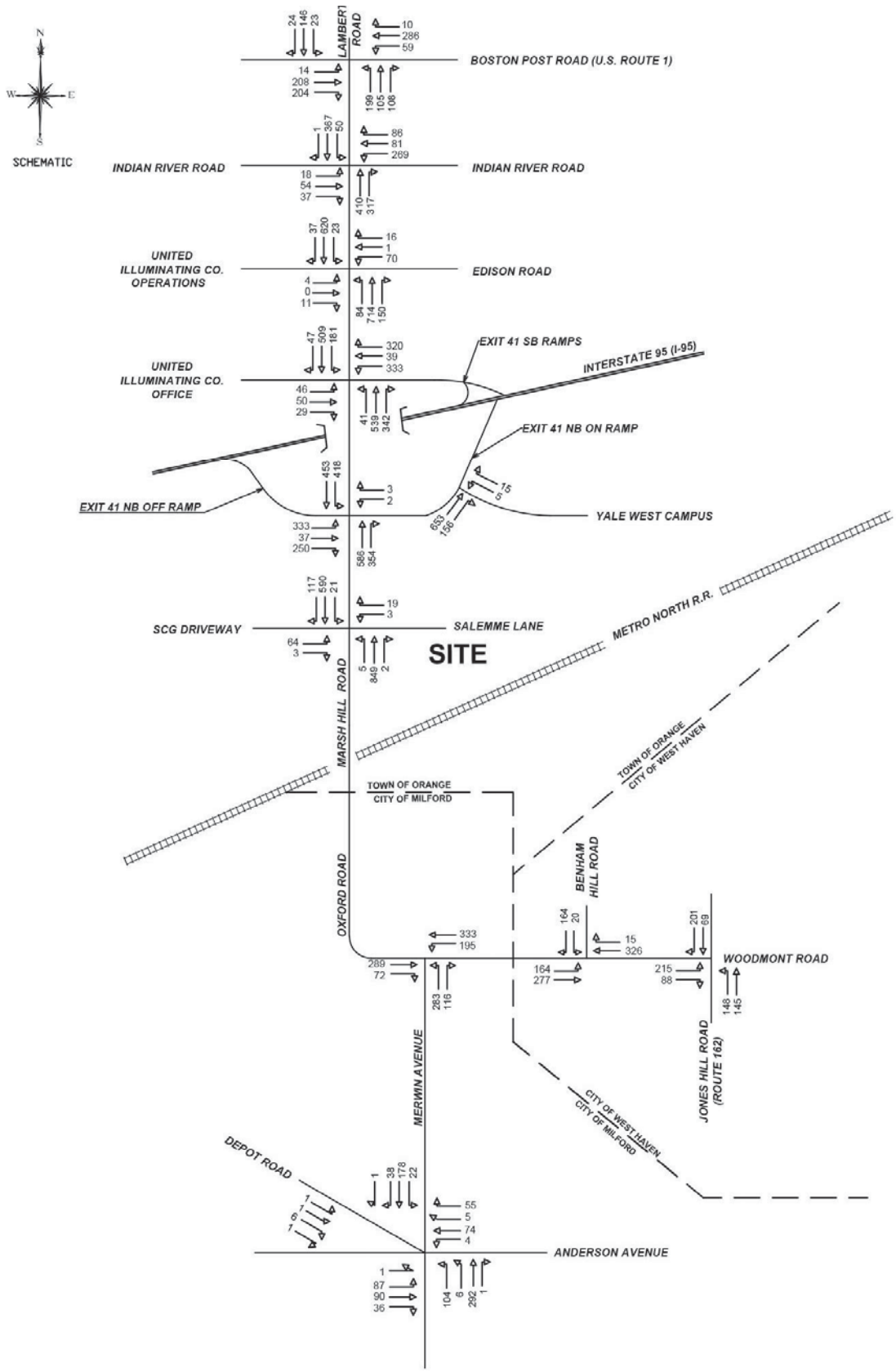

Figure 3-4. Existing Traffic Volumes Weekday Morning Peak

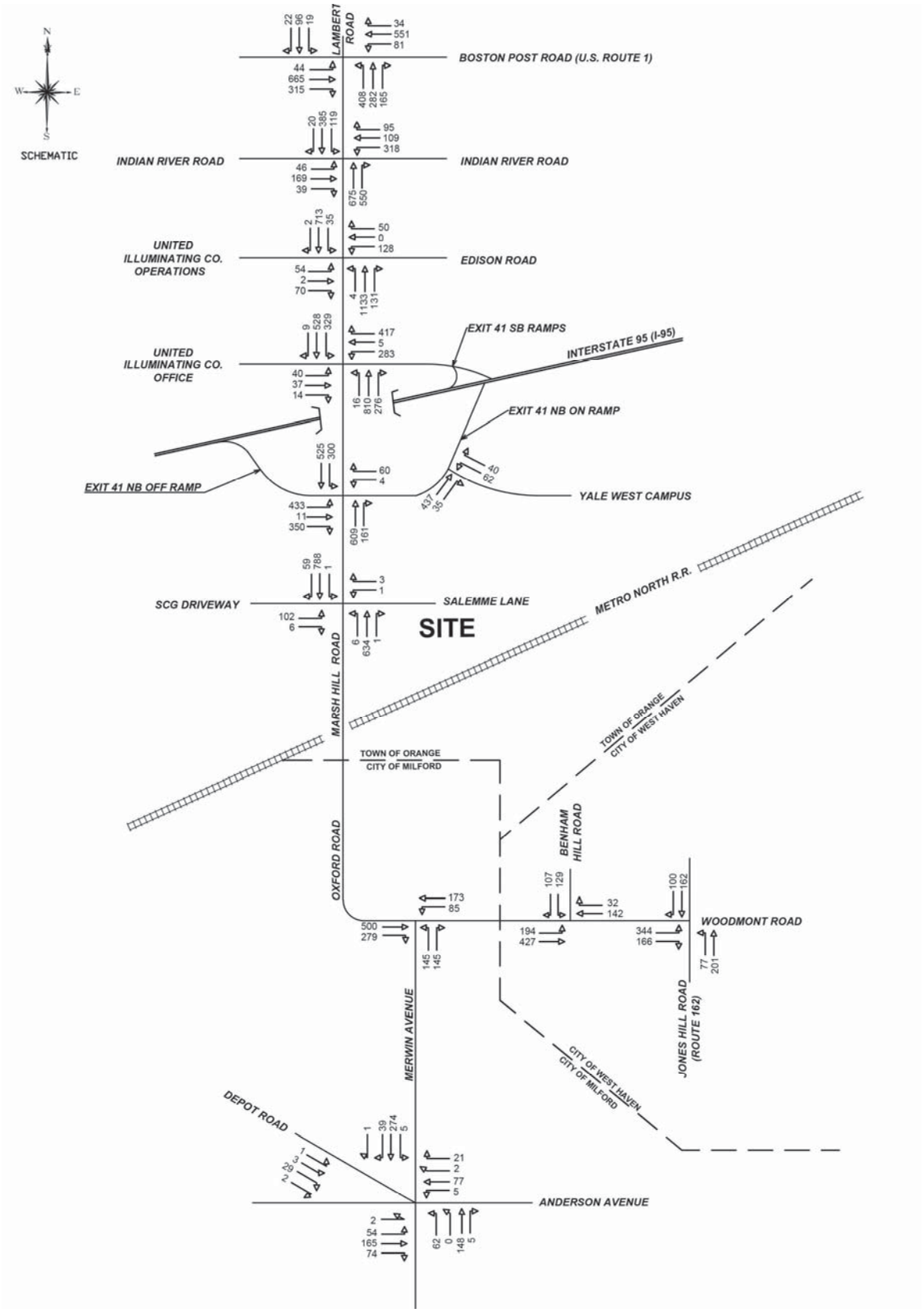

Figure 3-5. Existing Traffic Volumes Weekday Afternoon Peak Hour

3.3.2 Impact Analysis

Because the traffic analysis (and subsequent assessment in *Section 3.7 - Noise* and *Section 3.6 – Air Quality*) combine the TOD and Orange Railroad Station traffic generation, the conservative approach used in this evaluation was to assess impacts of the entire project (TOD and station) at the earliest possible date impacts could be seen – at the start of the TOD development in 2017. In addition, the future year (2037) assesses impacts well beyond the timeframe in which the entire development and station would be constructed, providing a "worst case" assessment of impacts of full build both now as the TOD development gets underway and in the future condition at full build out of TOD and station. Consequently, the impact of the Proposed Action was evaluated for 2017 and for the future design year of 2037, which reflects an approximately 20-year planning window. These years were also evaluated for background traffic conditions that account for background traffic growth and traffic impacts resulting from other developments occurring in the project area, while assuming that existing parking and trip generation at the site remain in their current condition (i.e., No Action Alternative). The traffic impact of the proposed railroad station was then determined by comparing the No Action analysis to the Proposed Action analysis. Supporting documentation for the traffic impact evaluation is included in *Appendix B*.

No Action Traffic Volumes
Background traffic volumes for 2017 were provided by the traffic study prepared by Milone & MacBroom and these volumes were grown to 2037 with data provided by the CTDOT Bureau of Policy and Planning. The volumes were developed using CTDOT's regional model to forecast growth within the study area.

The 2017 No Action traffic volumes are depicted in *Figures 3-6 and 3-7*, while the 2037 No Action traffic volumes are depicted in *Figures 3-8 and 3-9*.

3.3.2.1 Trip Generation

The anticipated site-generated traffic volumes for 2017[20] were obtained from the traffic study prepared by Milone & MacBroom. The commuter rail station volumes utilized in the study were derived from *Analysis of Passenger and Parking Demand at a New Metro-North Station in Orange*, which was written by Warner Transportation Consulting, Inc. in 2014. The all-day boarding data from that report was adjusted to peak hour levels from data in CTDOT's T*echnical Memorandum – West Haven/Orange Commuter Railroad Station – Traffic Impact and Access Study for Commuter Rail Station Site Selection* from July 2005. Ridership was then translated into vehicle trips using an assumed average car occupancy rate per vehicle.

[20] Because the traffic analysis and rail operations analyses combine the TOD and Orange Railroad Station traffic generation, the conservative approach used in this evaluation was to assess impacts of the entire project (TOD and station) at the earliest possible date impacts could be seen – at the start of the TOD development in 2017. In addition, the future year (2037) assesses impacts well beyond the timeframe in which the entire development and station would be constructed, providing a "worst case" assessment of impacts of full build both now as the TOD development gets underway and in the future condition at full build out of TOD and station. Consequently, the impact of the Proposed Action was evaluated for 2017 and for the future design year of 2037, which reflects an approximately 20-year planning window.

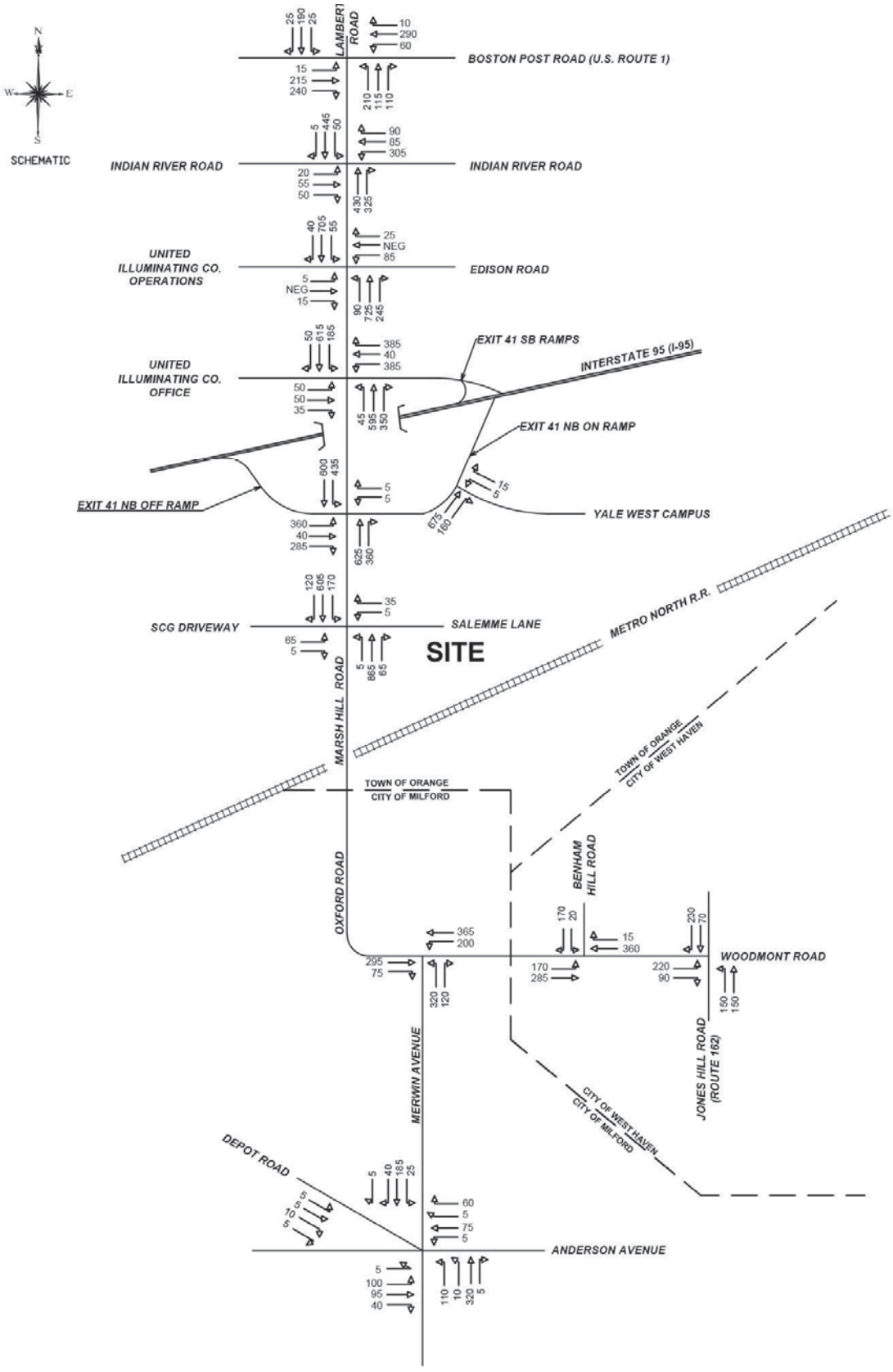

Figure 3-6. Background Traffic Volumes Weekday Morning Peak Hour

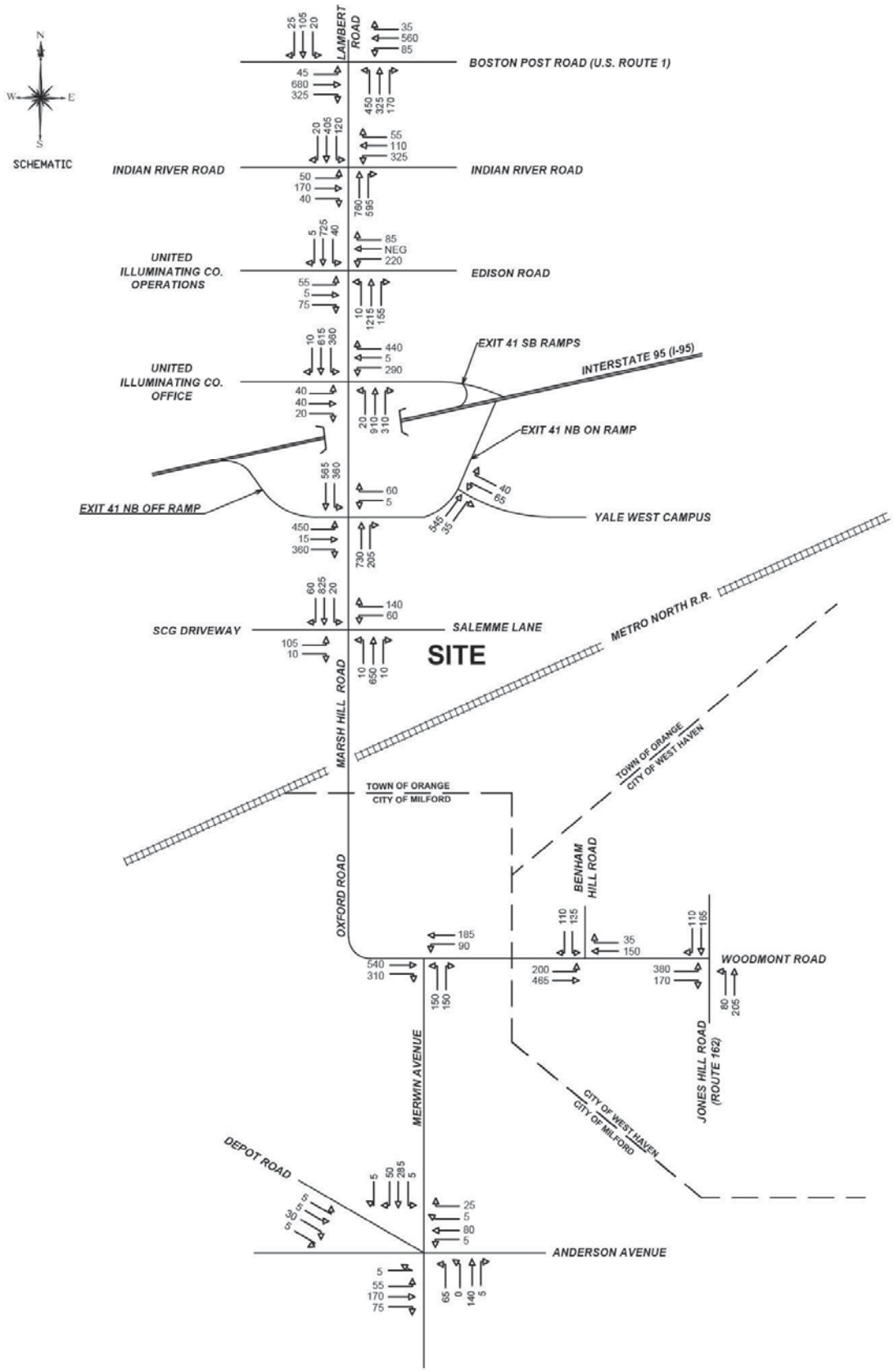

Figure 3-7. Background Traffic Volumes Weekday Afternoon Peak Hour

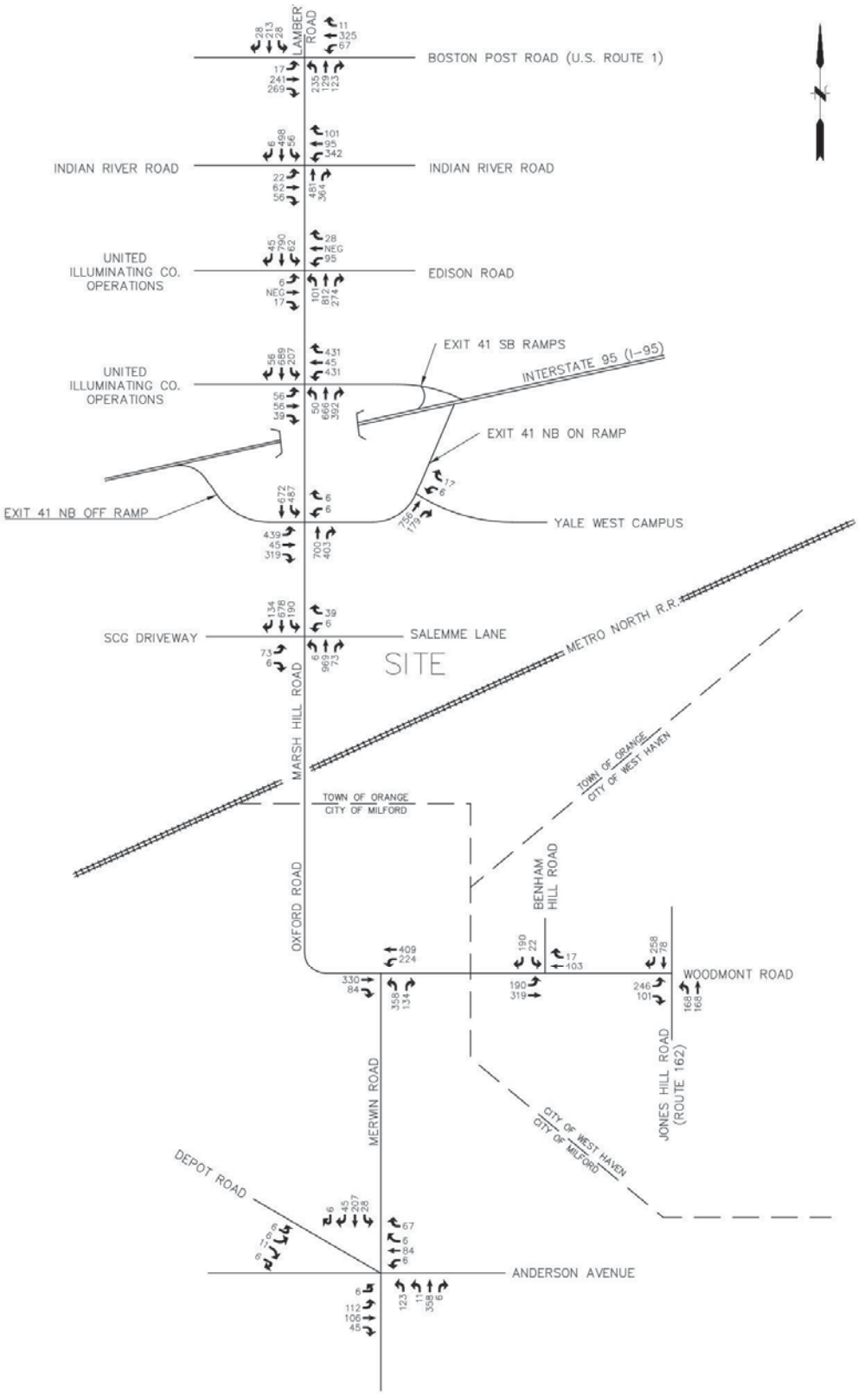

Figure 3-8. 2037 Background Traffic Volumes Weekday Morning Peak Hour

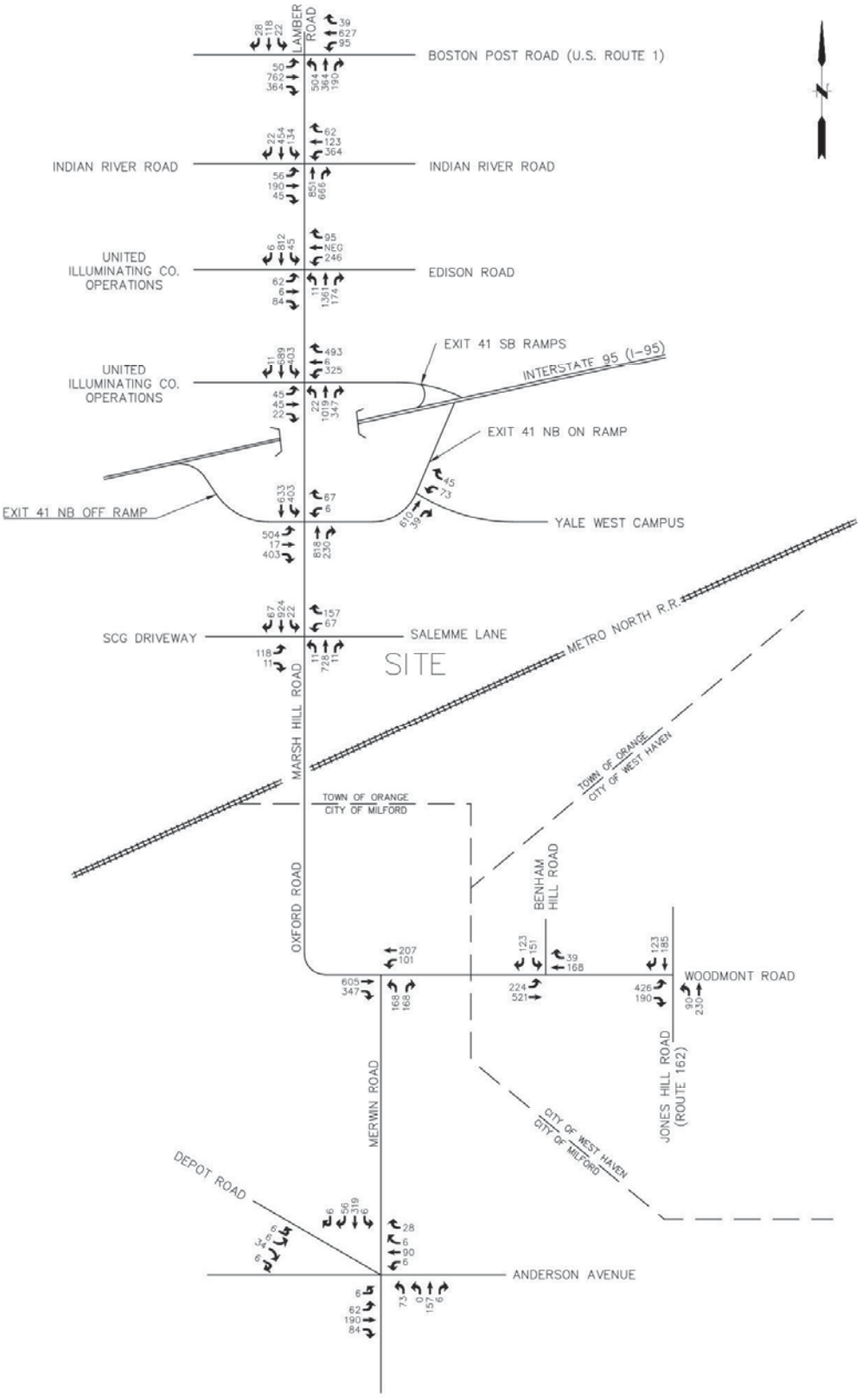

Figure 3-9. 2037 Background Traffic Volumes Weekday Afternoon Peak Hour

Upon opening, the proposed Orange Railroad Station is expected to generate approximately 235 trips (215 entering, 20 exiting) in the morning peak hour and approximately 210 trips (20 entering, 190 exiting) in the afternoon peak hour.

The expected site generated traffic volumes for the TOD (200 apartments and 21,500 square feet of general commercial space) were calculated using existing empirical data from the Institute of Transportation Engineers (ITE) publication *Trip Generation*, 9th edition, 2012. This publication is an industry-accepted resource for determining trip generation. The ITE manual indicates that the residential units will generate 100 vehicle trips (20 entering, 80 exiting) during the morning peak hour and 125 vehicle trips (80 entering, 45 exiting) during the afternoon peak hour, and commercial uses will generate 20 vehicle trips (10 entering, 10 exiting) during the morning peak hour and 80 vehicle trips (40 entering, 40 exiting) during the afternoon peak hour. A summary of the projected trip generation is provided in *Table 3-2*.

The distribution of traffic entering and exiting the proposed site was applied to the road network based on the existing regional traffic distributions and the layout of the adjacent roadway network. Morning and afternoon peak hour site-generated traffic volumes are shown in *Figures 3-10 and 3-11*.

Table 3-2. Trip Generation

	Trips Generated Morning Peak Hour			Trips Generated Afternoon Peak Hour		
	Entering	**Exiting**	**Total**	**Entering**	**Exiting**	**Total**
RR Station	215	20	235	20	190	210
Residential Units	20	80	100	80	45	125
Commercial Uses	10	10	20	40	40	80
Total Trips	**245**	**110**	**355**	**140**	**275**	**415**

3.3.2.2 Proposed Traffic Volumes

The trip generation traffic volumes were added to the 2017and 2037 No Action traffic volumes to estimate the 2017and 2037 Proposed Action (Combined) traffic volumes, which are provided in *Figures 3-12 through 3-15*.

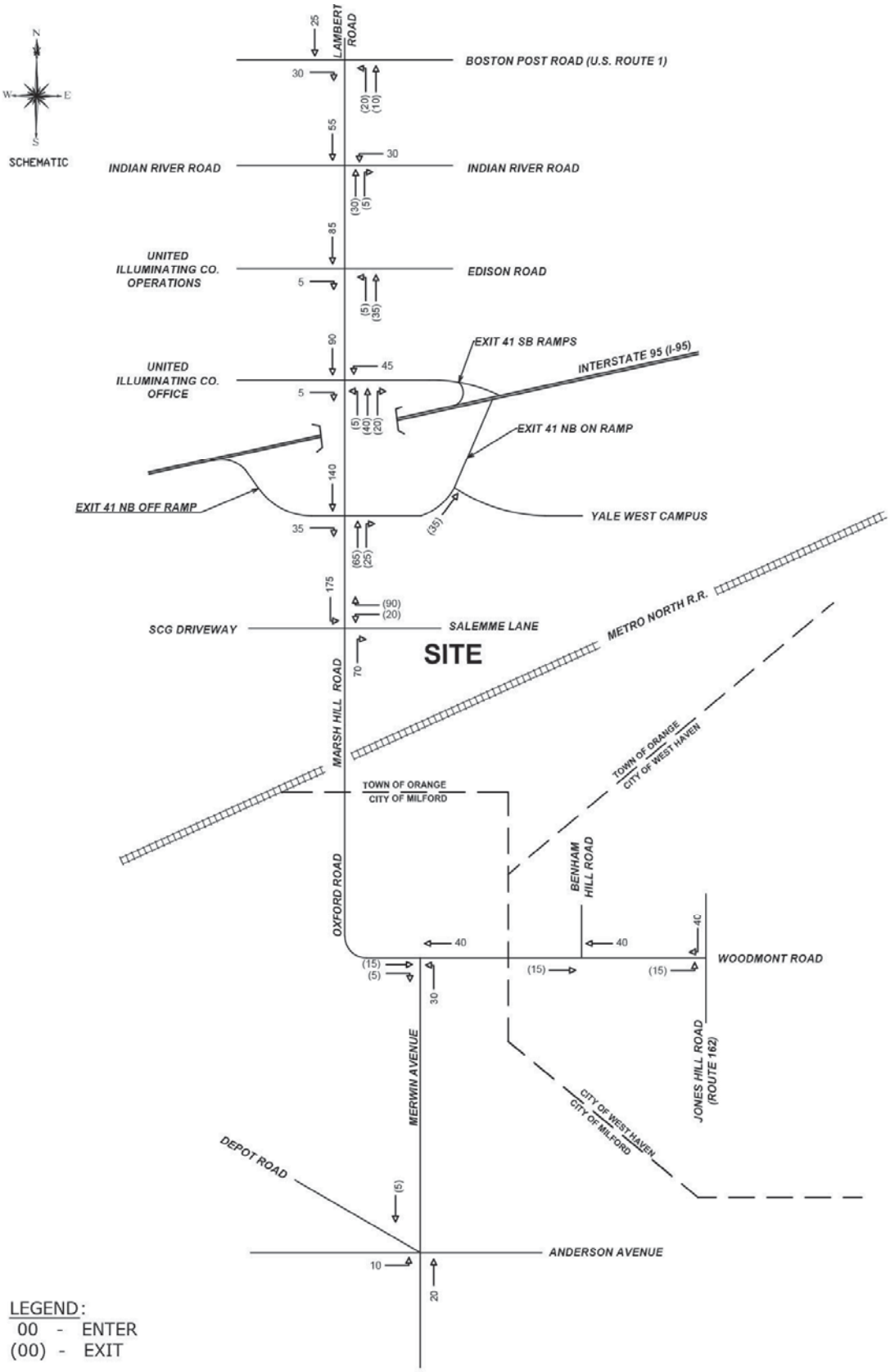

Figure 3-10. Total Site Traffic Volumes Weekday Morning Peak Hour

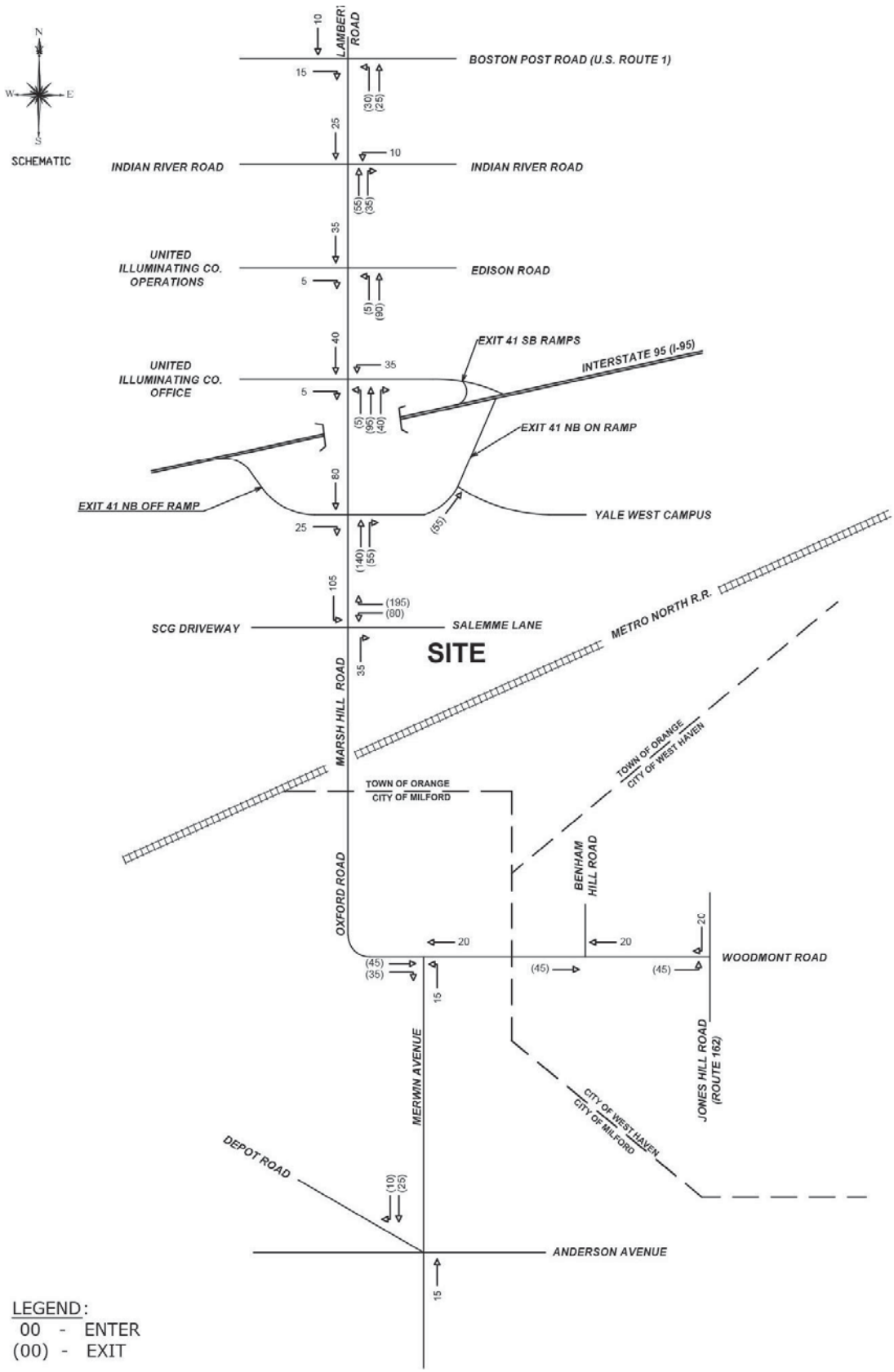

Figure 3-11. Total Site Traffic Volumes Weekday Afternoon Peak Hour

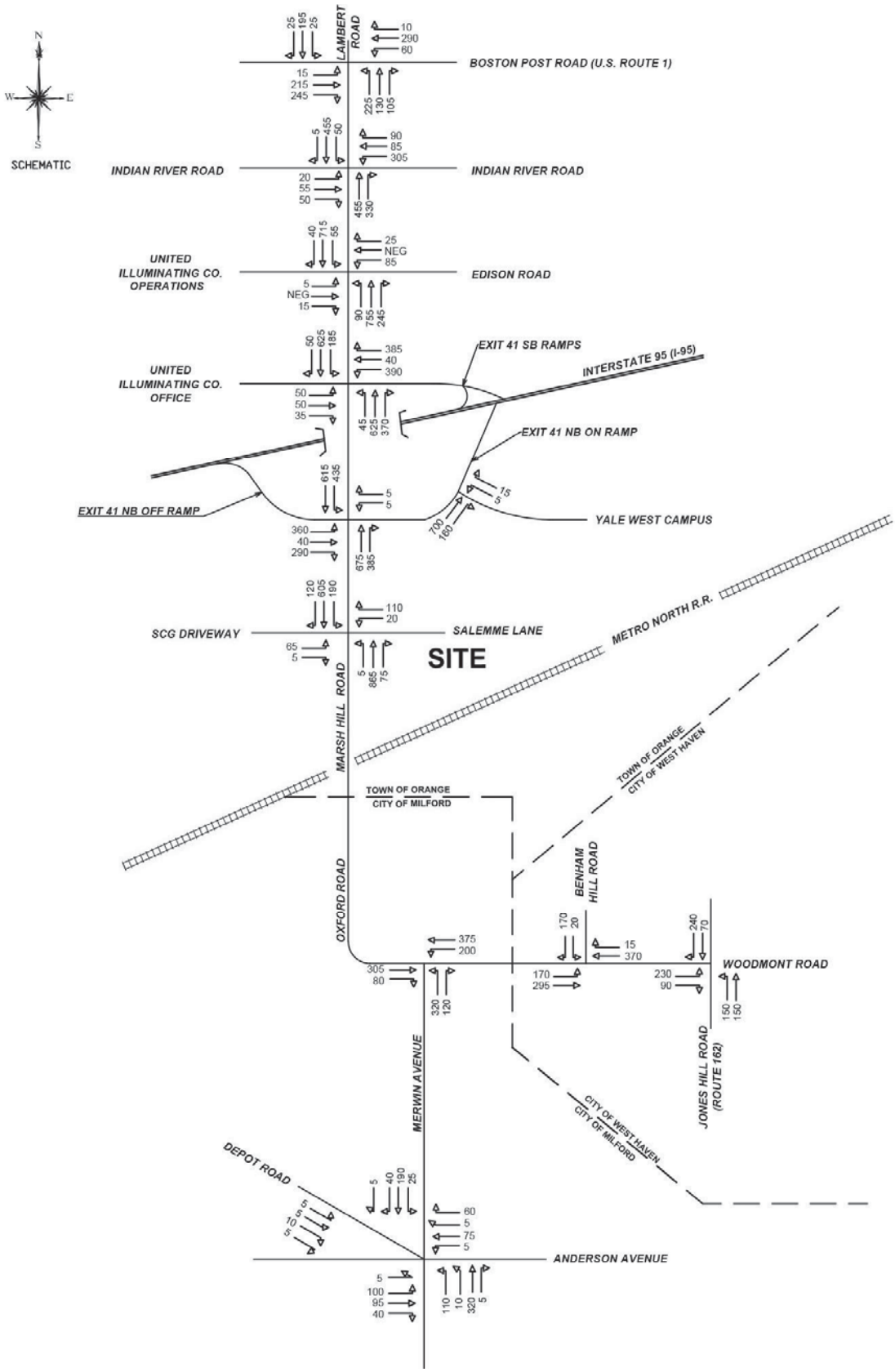

Figure 3-12. Combined Traffic Volumes Weekday Morning Peak Hour

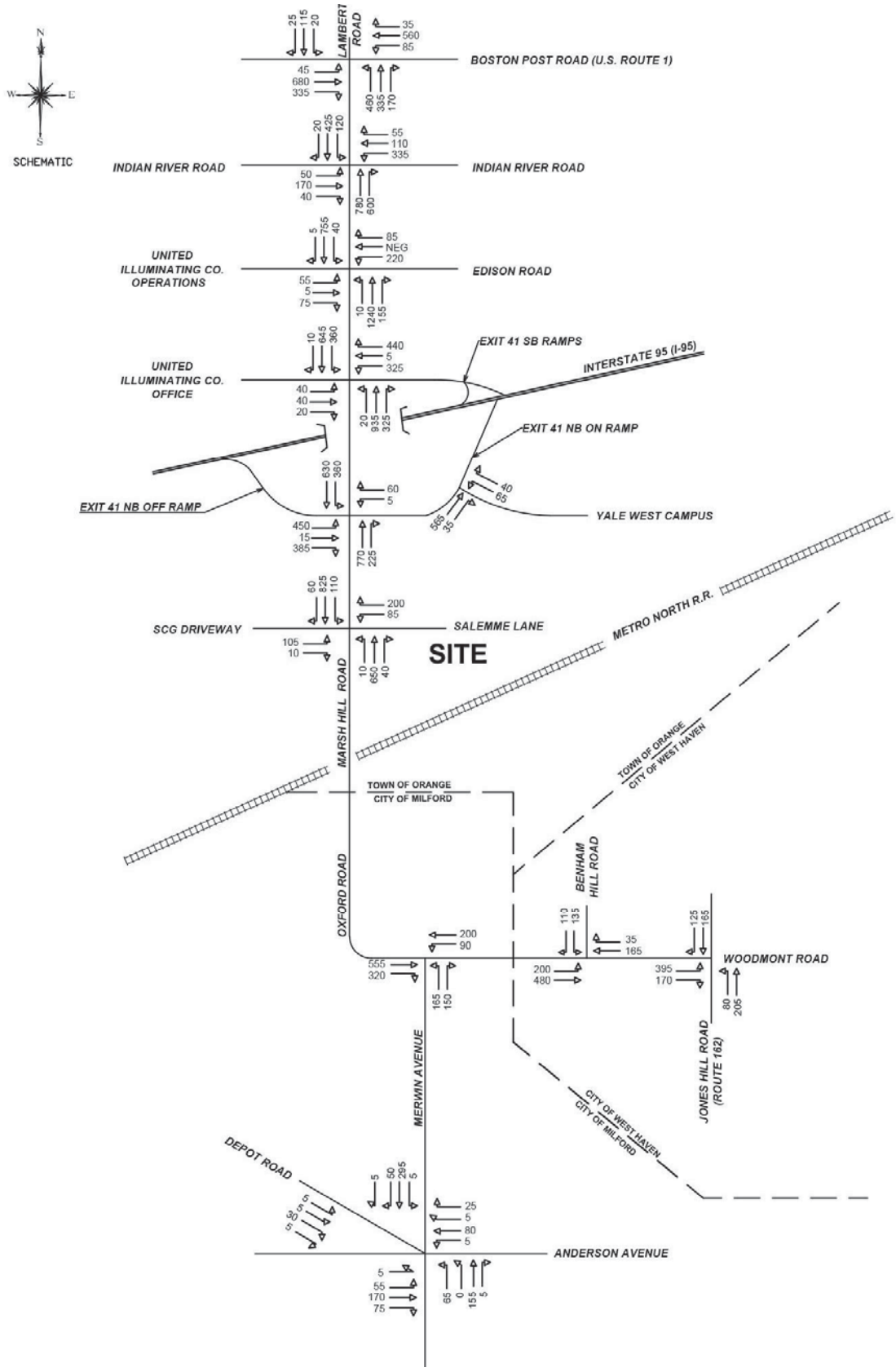

Figure 3-13. Combined Traffic Volumes Weekday Afternoon Peak Hour

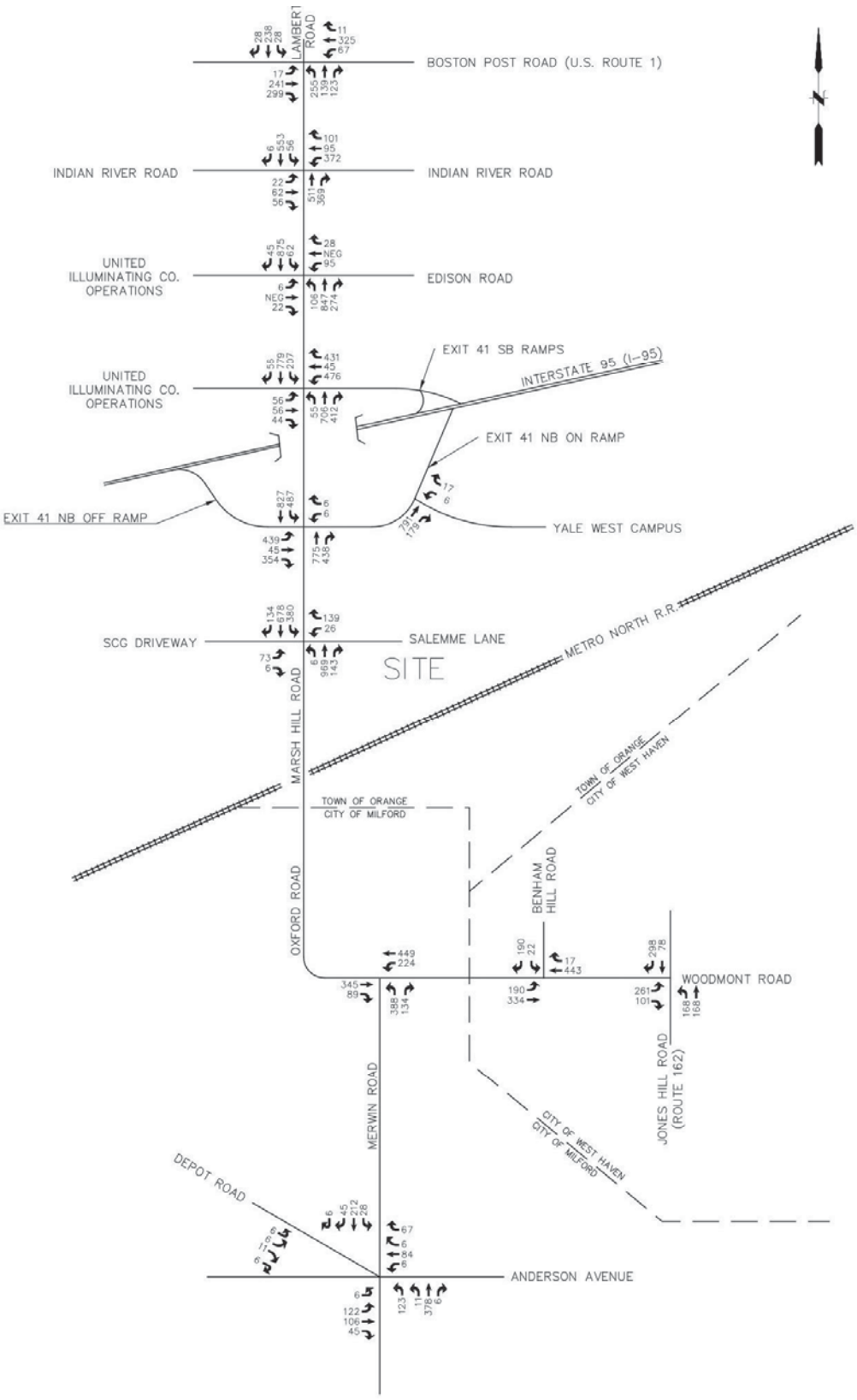

Figure 3-14. 2037 Combined Traffic Volumes Weekday Morning Peak Hour

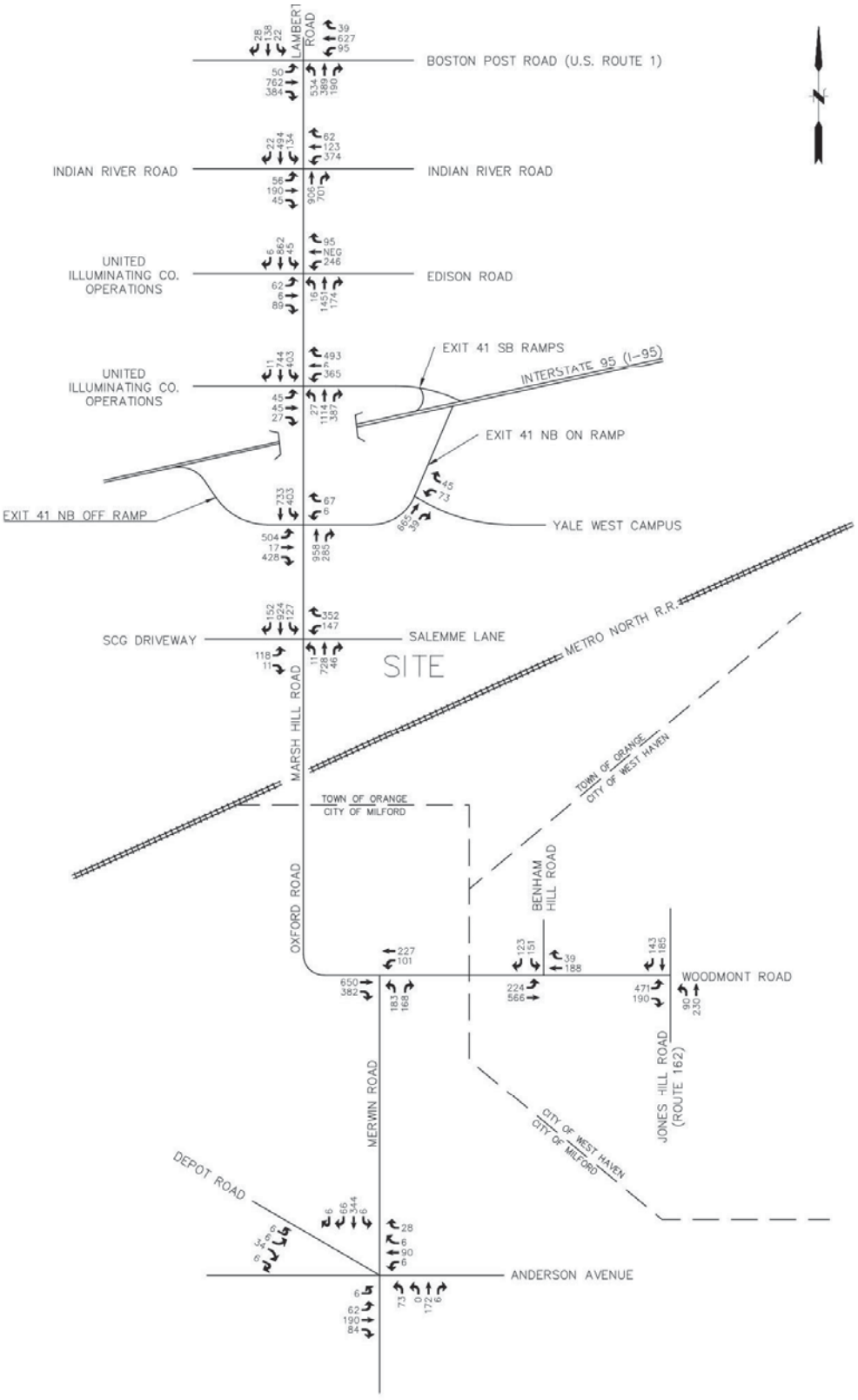

Figure 3-15. 2037 Combined Traffic Volumes Weekday Afternoon Peak Hour

3.3.2.3 Capacity Analysis

The results of the capacity analysis for the 2017 Proposed Action condition are provided in *Table 3-3*. The analysis indicates that the study area intersections would operate at acceptable levels of service with one exception. The Oxford Road at Merwin Avenue intersection is projected to experience significant levels of delay (LOS F) in both the No Action and Proposed Action conditions during the morning and afternoon peak hours. However, the additional traffic volumes that would be generated by the Proposed Action are not expected to cause a decrease in LOS or significant increase in delay at any of the study area intersections relative to the No Action condition.

Table 3-3. 2017 Levels of Service

Intersection	AM Peak Hour		PM Peak Hour	
	No Action	Proposed Action*	No Action	Proposed Action*
Signalized Intersections				
U.S. Route 1 (Boston Post Road) at Lambert Road	C	C	D	D
Marsh Hill Road at Indian River Road	B	B	C	C
Marsh Hill Road at Edison Road	A	B	B	B
Marsh Hill Road at I-95 SB Ramps	C	C	C	C
Marsh Hill Road at I-95 NB Ramps	C	C	C	C
Marsh Hill Road at SCG and Salemme Lane	--	B	--	B
Merwin Avenue at Anderson Avenue and Depot Road	B	B	B	B
Route 162 (Jones Hill Road) at Woodmont Road	B	B	C	C
Unsignalized Intersections (stop-controlled approach)				
West Campus Drive at I-95 Northbound On-Ramp	B	B	B	B
Oxford Road at Merwin Ave	F	F	F	F
Woodmont Road at Benham Hill Road	C	C	D	D

Under the Proposed Action, the signalized intersection of Marsh Hill Road and the SCG driveway would be revised to include signalization of Salemme Lane, and Salemme Lane would be widened to provide a two-lane egress. The traffic study prepared by Milone & MacBroom included a signal warrant analysis of the intersection of Marsh Hill Road and Salemme Lane, and the intersection met the minimum warrants for signalization based on volume as outlined in the Manual on Uniform Traffic Control Devices. The capacity analysis indicates that this reconfigured intersection is expected to operate efficiently at LOS B or better during both peak hours under the Proposed Action.

The capacity analysis results for the 2037 Proposed Action conditions are provided in *Table 3-4*. The results are similar for the 2037 and 2017 Proposed Action conditions. Ten of the eleven intersections are anticipated to operate acceptably at LOS D or better during both the morning and afternoon peak hours. The Oxford Road at Merwin Avenue intersection would experience significant delay (LOS F) in both the No Action and Proposed Action conditions during the morning and afternoon peak hours. The traffic generated by the proposed railroad station is not expected to significantly impact traffic operations at any of the study area intersections.

The signalized intersection of Marsh Hill Road, SCG driveway and Salemme Lane, which will provide access to the railroad station, is expected to operate efficiently at LOS C or better during both peak hours under the Proposed Action.

Table 3-4. 2037 Levels of Service

Intersection	AM Peak Hour		PM Peak Hour	
	No Action	Proposed Action*	No Action	Proposed Action*
Signalized Intersections				
U.S. Route 1 (Boston Post Road) at Lambert Road	D	D	D	D
Marsh Hill Road at Indian River Road	B	B	C	C
Marsh Hill Road at Edison Road	B	B	C	C
Marsh Hill Road at I-95 SB Ramps	D	D	E	F
Marsh Hill Road at I-95 NB Ramps	C	C	C	C
Marsh Hill Road at SCG and Salemme Lane	A	C	B	C
Merwin Avenue at Anderson Avenue and Depot Road	B	B	B	B
Route 162 (Jones Hill Road) at Woodmont Road	C	C	C	D
All-Way Stop Controlled Intersections				
West Campus Drive at I-95 Northbound On-Ramp	B	B	B	C
Oxford Road at Merwin Avenue	F	F	F	F
Woodmont Road at Benham Hill Road	C	D	F	F

3.3.2.4 Parking

The proposed railroad station site layout provides a total of 922 parking spaces. One surface lot for the TOD would be located on the west side of the site. There would also be a TOD parking garage and a commuter parking garage on the east side of the site. The proposed parking provides sufficient spaces to address the expected traffic generated by the proposed Orange Railroad Station.

Although the proposed development does not abut a State highway, it requires review by the Office of the State Traffic Administration (OSTA). The developer submitted an Administrative Decision Review request for this site to OSTA in June 2016 and subsequently received OSTA Administrative Decision (AD) No. 441 on April 25, 2017. The AD indicated that the development will not substantially affect State highway traffic operations in the area and, therefore, formal action by OSTA under Section 14-311 of the General Statutes of Connecticut is not required. Although the study prepared for the OSTA review indicates that the signalized intersection of Marsh Hill Road and the SCG driveway *should* be revised to include signalization of Salemme Lane in order to maintain adequate levels-of-service, it will not be a requirement by OSTA of OLD.

3.3.3 Mitigation

To accommodate additional traffic generated by the proposed Orange Railroad Station and TOD, the signalized intersection of Marsh Hill Road and the SCG driveway would be revised to include

signalization of Salemme Lane, which is off-set from the SCG driveway by approximately 100 feet, and widening of Salemme Lane to provide a two-lane egress. In order to accommodate the addition of Salemme Lane into the existing traffic signal, it would be necessary to replace the existing traffic signal equipment and revise the pavement markings on Marsh Hill Road. Due to the offset between Salemme Lane and the SCG driveway, the signal would have to operate under split phasing for the side streets. This type of phasing would be acceptable as the capacity analysis indicates that this reconfigured intersection is expected to operate efficiently at LOS C or better during both peak hours.

The unsignalized intersection of Oxford Road and Merwin Avenue is expected to operate inefficiently at LOS F under both No Action and the Proposed Action scenarios. To improve the capacity at this intersection, all approaches to the intersection would need to be restriped to provide turn lanes. This would increase the LOS to D during the morning peak hour and E during the afternoon peak hour. Minor widening on the southeast corner would be required. The traffic generated by the Proposed Action would not significantly impact any of the other study area intersections. No traffic mitigation is necessary or proposed at these intersections.

3.4 Considerations Relating to Pedestrian and Bicyclists

3.4.1 Existing Conditions

The existing pedestrian facilities in the study area do not offer direct connection to the proposed Orange Railroad Station site. Sidewalks exist north of the site along Marsh Hill Road between the I-95 Northbound and Southbound ramps and to the south of the site along Oxford Road from Connair Road to Wanda Road. The residential neighborhoods to the south of the project site in West Haven and Milford have well-connected pedestrian facilities.

Dedicated bicycle facilities do not exist on the surrounding roadway network. Shoulders along the roadways are narrow and do not promote the use of bicycles.

3.4.2 Impact Analysis

The lack of a direct connection of pedestrian and bicycle facilities to the proposed station poses a potential safety hazard under the Proposed Action. Pedestrians and bicyclists forced to travel on inadequate existing facilities would be exposed to automobile traffic traveling along Marsh Hill Road in the vicinity of the Orange Railroad Station.

3.4.3 Mitigation

The construction of sidewalks along Salemme Lane and along Marsh Hill Road between the I-95 Northbound Ramps and Connair Road is recommended to connect existing pedestrian facilities. Improved bicycle facilities, such as shared lane markings along low volume roads and restriping to provide wider shoulders on higher volume roads, are recommended to connect residential neighborhoods to the proposed station. Opportunities also exist for a mixed use trail within the railroad right-of-way from Marsh Hill Road at Connair Road to the proposed station and from the proposed

station east to the Yale West Campus through to Morgan Lane. Improved pedestrian and bicycle facilities on adjacent roadways and surrounding the project site would benefit the local area, allowing safer access to the station without the use of an automobile.

3.5 Rail Operations and Transit

3.5.1 Existing Conditions

Transit service in the area is provided by the Metro-North Railroad, New Haven Division of CT***transit*** and the Milford Transit District. The closest New Haven Line stations include New Haven Union Station (4.75 miles), the West Haven station (2.25 miles) to the northeast, and Milford Station (4.0 miles) to the southwest. The railroad tracks pass through the project site along the eastern boundary of the site. Existing occupancy of New Haven Line trains during the morning peak period, which includes trains arriving at Grand Central Terminal in New York City between 6:00 and 10:00 AM on weekdays, is 75% on average, ranging from 56% for Train 1503, which currently departs Union Station in New Haven at 4:05 am, and 99% for Train 1529, which departs Union Station at 6:48 am. Existing train capacities are presented in *Table 3-6*, and occupancy is presented in *Table 3-7*. Aside from the rail service, none of the other transit services in the local area provides direct access to the project site.

The CT***transit*** O2 bus line runs along U.S. Route 1 in the study area three times hourly from 5:00 AM to 10:00 PM and once during the 11:00 PM hour on weekdays. The O2 line runs three times hourly from 6:00 AM to 12:00 AM on Saturdays, and three times hourly on Sundays from 6:30 AM to 11:00 PM. In conjunction with the O2 line, CT***transit*** runs an express shuttle, CT Post Flyer, along I-95 connecting the Connecticut Post Mall in Milford to downtown New Haven once daily on weekdays, three times daily on Saturdays, and six times daily on Sundays.

Two other CT***transit*** bus lines, Line J7 and Line B5/6, travel to the south and east of the project site. The J7 line runs along Ocean Avenue and Route 162 (New Haven Avenue). The B 5/6 line runs along Jones Hill, with B5 continuing east to New Haven and B6 traveling north and east past the Yale University West Campus. Both lines have hourly service from 6:00 AM to 6:00 PM on weekdays and hourly service from 7 AM to 6:00 PM on weekends.

The Milford Transit District Route 4 bus runs along Merwin Avenue and turns onto Anderson Avenue south of the proposed site, connecting residential areas to the CT Post Mall, Downtown Milford and the Milford Metro-North Station. Route 4 runs once hourly on weekdays from 6:00 AM to 7:00 PM and Saturday from 8:00 AM to 6:00 pm.

Paratransit service in the area is provided by the Greater New Haven Transit District for all addresses. These services are open to eligible riders by appointment only.

3.5.2 Impact Analysis

The No Action Alternative would not affect local transit facilities in the study area. The Proposed Action may influence Metro-North transit operations along the New Haven Line. To quantify and analyze potential impacts, train loading analysis, ridership diversion analysis and rail travel time analysis

were conducted for Metro-North operations during the morning peak hour (See *Appendix B*.). The morning peak hour is assumed to have the greatest potential for impacts to rail operations based on existing data obtained from Metro-North and CTDOT.

3.5.2.1 Positive Train Control

Positive train control (PTC) is a safety and collision avoidance infrastructure for monitoring and controlling train movements. The United States Rail Safety Improvement Act of 2008 mandates States to have this technology on all train lines by 2015. PTC was not included in the transit analysis as it was assumed not to impact transit operations on a regular basis. Alteration to headway times and train speed as a result of PTC would only be needed in special cases where train traffic experiences an unusual delay or mechanical malfunction. The transit operations analysis in this EIE examines normal operating conditions with normal train headways and no major delays.

3.5.2.2 Ridership Diversion Analysis

Transit ridership diversion projections were generated based on the *Analysis of Passenger and Parking Demand at a New Metro-North Station in Orange*, prepared for Orange Land Development LLC and CTDOT by Warner Transportation Consulting, Inc. in March 2014. A majority of the trips at the proposed Orange Railroad Station are expected to be diverted from other local stations in the area. The Warner study utilized diversion projections developed from intercept survey results of riders from the neighboring New Haven Line stations at West Haven and Milford to determine how many existing riders would utilize a new station in Orange and how many new riders would be in place by build year 2017. The study went on further to examine population growth rates and anticipated growth of existing and planned businesses in the area to determine future users of the train station. The future users were determined to be in place within 20 years (2037). The distribution and volume of projected new and diverted trips for the 2017 and 2037 build years are provided in *Table 3-5*. The Orange Railroad Station is expected to generate 20 new boardings and 470 diverted boardings in 2017 and 718 new boardings and 794 diverted boardings in 2037.

Table 3-5. Trip Diversion Analysis

Orange Railroad Station	2017	2037
Existing Boardings	0	490
New Boardings	20	718*
Diverted Boardings	470	794
Total Boardings	**490**	**2002**

* The new boardings were calculated based on growth in population, TOD, area employment and on the Yale West campus. Yale growth was given as a range by Yale's Director of Finance and Administration. An average of the range was used for analysis purposes.

3.5.2.3 Train Loading Analysis

The No Action Alternative peak load passenger volumes were projected based on the peak load point ridership data obtained from Metro-North and an annual average growth rate acquired from the *2015 Ridership Report – Metro North Railroad – Executive Summary*. Based on this ridership report, over the long term a range of 1-2% growth rate is a reasonable assumption. For this report, three growth rates, 1.0%, 1.5% and 2.0%, were applied in order to show a complete picture of what this range of growth rates look like. Each growth rate was applied to the most recent passenger on-off counts from CTDOT (recorded in 2016) to the 2017 and 2037 analysis years.

According to the Warner study, approximately 70% of the daily boardings are estimated to occur during the morning commuter period before 9:00 a.m., which results in 14 new boardings in 2017 and 503 new boardings in 2037. These volumes were distributed based on existing boarding patterns and added to each of the No Action Alternative volumes to yield the projected 2017 and 2037 peak load passenger volumes for each growth factor. The projected 2017 and 2037 No Action and Proposed Action peak load passenger volumes were then compared to seating capacities (*Table 3-6*) to determine the percentage of occupancy. The results of the peak load analysis are provided in *Table 3-7a-c*.

Under existing 2016 conditions, only one of the trains (No. 1529) analyzed almost reaches capacity. With a 1.0% growth rate, in 2017, under the No Action Alternative one train reaches capacity, while the others still remain well below. By 2037, as shown in Table 3-7a, a total of five additional cars would be needed for the trains analyzed. With a 1.5% growth rate, the 2017 No Action Alternative results are the same, and the 2037 No Action Alternative results in 12 additional cars needed. With a 2.0% growth rate, the 2017 No Action Alternative results in one additional car needed, while the 2037 No Action Alternative results in 24 additional cars needed.

The impact of the proposed Orange Railroad Station was evaluated by comparing the projected peak loads under the three scenarios of No Action and Proposed Action conditions. In 2017, the low projected number of new rail trips at the Orange Railroad Station would result in only one of the trains requiring an additional car when compared to the No Action Alternative. However, in 2037, an additional three cars are needed for the 1.0% growth rate, four are needed with 1.5% growth rate, and 27 are needed with the 2.0% growth rate.

Table 3-6. Morning Inbound Peak Train Capacity and Schedule

Train No.	1503	1507	1509	1511	1513	1517	1523	1525	1529	1531	1533	1535	1537	1539
Number of Cars	7	7	10	9	9	7	9	10	7	8	8	9	7	6
Existing Capacity	700	700	1000	900	900	700	900	1000	700	800	800	900	700	600
Union Station Departure (2016)	4:05 am	4:37 am	5:01 am	5:27 am	5:46 am	6:02 am	6:27 am	6:20 am	6:48 am	6:42 am	7:26 am	7:19 am	7:47 am	7:57 am

Table 3-7a. Morning Inbound Peak Train Loading Analysis – 1.0% per year ridership increase

Train Information		2016		No Action 2017			No Action 2037			Proposed Action 2017			Proposed Action 2037		
No.	Cars	Max Load	Percent Occupied	Max Load	Percent Occupied	Add'l Cars	Max Load	Percent Occupied	Add'l Cars	Net Increase	Percent Occupied	Net Add'l Cars	Net Increase	Percent Occupied	Net Add'l Cars
1503	7	394	56%	398	57%	0	486	69%	0	1	57%	0	23	73%	0
1507	7	556	79%	562	80%	0	685	98%	0	1	80%	0	33	103%	1
1509	10	680	68%	687	69%	0	838	84%	0	1	69%	0	40	88%	0
1511	9	582	65%	588	65%	0	717	80%	0	1	65%	0	34	83%	0
1513	9	682	76%	689	77%	0	840	93%	0	1	77%	0	40	98%	0
1517	7	481	69%	486	69%	0	593	85%	0	1	70%	0	28	89%	0
1523	9	688	76%	695	77%	0	848	94%	0	1	77%	0	41	99%	0
1525	10	828	83%	836	84%	0	1020	102%	1	1	84%	0	49	107%	0
1529	7	690	83%	697	100%	0	850	121%	2	1	100%	0	41	127%	0
1531	8	703	88%	710	89%	0	866	108%	1	1	89%	0	42	113%	1
1533	8	571	71%	577	72%	0	704	88%	0	1	72%	0	34	92%	0
1535	9	802	89%	810	90%	0	988	110%	1	1	90%	0	47	115%	1
1537	7	491	70%	496	71%	0	605	86%	0	1	71%	0	29	91%	0
1539	6	347	58%	350	58%	0	428	71%	0	1	58%	0	21	75%	0
Totals	**113**	**8495**	**75%**	**8581**	**76%**	**0**	**10468**	**93%**	**5**	**14**	**76%**	**0**	**503**	**97%**	**3**

Table 3-7b. Morning Inbound Peak Train Loading Analysis – 1.5% per year ridership increase

Train Information		2016		No Action 2017			No Action 2037			Proposed Action 2017			Proposed Action 2037		
No.	Cars	Max Load	Percent Occupied	Max Load	Percent Occupied	Add'l Cars	Max Load	Percent Occupied	Add'l Cars	Net Increase	Percent Occupied	Net Add'l Cars	Net Increase	Percent Occupied	Net Add'l Cars
1503	7	394	56%	400	57%	0	539	77%	0	1	57%	0	23	80%	0
1507	7	556	79%	564	81%	0	760	109%	1	1	81%	0	33	113%	1
1509	10	680	68%	690	69%	0	930	93%	0	1	69%	0	40	97%	0
1511	9	582	65%	591	66%	0	796	88%	0	1	66%	0	34	92%	0
1513	9	682	76%	692	77%	0	932	104%	1	1	77%	0	40	108%	0
1517	7	481	69%	488	70%	0	658	94%	0	1	70%	0	28	98%	0
1523	9	688	76%	698	78%	0	941	105%	1	1	78%	0	41	109%	0
1525	10	828	83%	840	84%	0	1132	113%	2	1	84%	0	49	118%	0
1529	7	690	83%	700	100%	0	943	135%	3	1	100%	1	41	141%	0
1531	8	703	88%	714	89%	0	961	120%	2	1	89%	0	42	125%	1
1533	8	571	71%	580	73%	0	781	98%	0	1	73%	0	34	102%	1
1535	9	802	89%	814	90%	0	1096	122%	2	1	91%	0	47	127%	1
1537	7	491	70%	498	71%	0	671	96%	0	1	71%	0	29	100%	0
1539	6	347	58%	352	59%	0	474	79%	0	1	59%	0	21	82%	0
Totals	**113**	**8495**	**75%**	**8621**	**76%**	**0**	**11614**	**103%**	**12**	**14**	**76%**	**1**	**503**	**107%**	**4**

Table 3-7c. Morning Inbound Peak Train Loading Analysis – 2.0% per year ridership increase

Train Information		2016		No Action 2017			No Action 2037			Proposed Action 2017			Proposed Action 2037		
No.	Cars	Max Load	Percent Occupied	Max Load	Percent Occupied	Add'l Cars	Max Load	Percent Occupied	Add'l Cars	Net Increase	Percent Occupied	Net Add'l Cars	Net Increase	Percent Occupied	Net Add'l Cars
1503	7	394	56%	402	57%	0	597	85%	0	1	58%	0	23	89%	0
1507	7	556	79%	567	81%	0	843	120%	2	1	81%	0	33	125%	2
1509	10	680	68%	694	69%	0	1031	103%	1	1	70%	0	40	107%	1
1511	9	582	65%	594	66%	0	882	98%	0	1	66%	0	34	102%	1
1513	9	682	76%	696	77%	0	1034	115%	2	1	77%	0	40	119%	2
1517	7	481	69%	491	70%	0	729	104%	1	1	70%	0	28	108%	1
1523	9	688	76%	702	78%	0	1043	116%	2	1	78%	0	41	120%	2
1525	10	828	83%	845	85%	0	1255	126%	3	1	85%	0	49	130%	4
1529	7	690	83%	704	101%	1	1046	149%	4	1	101%	1	41	155%	4
1531	8	703	88%	717	90%	0	1066	133%	3	1	90%	0	42	138%	4
1533	8	571	71%	582	73%	0	865	108%	1	1	73%	0	34	112%	1
1535	9	802	89%	818	91%	0	1216	135%	4	1	91%	0	47	140%	4
1537	7	491	70%	501	72%	0	744	106%	1	1	72%	0	29	110%	1
1539	6	347	58%	354	59%	0	526	88%	0	1	59%	0	21	91%	0
Totals	**113**	**8495**	**75%**	**8667**	**77%**	**1**	**12877**	**114%**	**24**	**14**	**77%**	**1**	**503**	**118%**	**27**

3.5.2.4 Rail Travel Time Analysis

The rail travel time analysis presented in Section 2.3 and 3.3 of the West Haven/Orange Railroad Station Environmental Study Operational Analysis (December 2005) was updated for this EIE. The updated analysis includes the West Haven station which is now open.

Under the Proposed Action, inbound trains would utilize the Orange Railroad Station via Track 3. Inbound trains traveling from New Haven are assumed to begin on Track 1. Similar to the proposed station, the West Haven station requires a crossover to Track 3. This crossover is located just east of milepost (MP) 71. The travel time analysis assumes that trains platforming at the West Haven and Orange stations would travel along Track 3 between these stations. After leaving the Orange station, trains would then crossover back to Track 1 just east of MP 66. The distance between crossover points is approximately 5 miles or 26,400 feet. The total impacted distance, including deceleration prior to the first crossover and acceleration after the second crossover is 28,443 feet. Maximum allowable speeds on Track 1 and Track 3 in this area are 75 and 70 miles per hour, respectively. The maximum allowable speed on crossovers is 45 miles per hour.

The travel time impact of the proposed railroad station was assessed by comparing No Action with Proposed Action travel times along the 28,443-foot distance of potential impacts. The No Action travel time was calculated as the combined travel times associated with two operations. The first reflects the travel time for the West Haven station stop, which was obtained from the West Haven Station Operational Analysis. The travel time on the remaining distance after the West Haven station was calculated along Track 1. The Proposed Action travel time is a combination of acceleration and deceleration maneuvers required to perform the crossovers and station stops at both the West Haven and Orange stations. *Table 3-8* summarizes the No Action and Proposed Action travel time analyses.

Under the No Action Alternative, trains would traverse the impacted distance in approximately 5 minutes and 52 seconds. The travel time along this segment under the Proposed Action would be approximately 7 minutes and 4 seconds. The addition of the proposed Orange Railroad Station would result in an increase in travel time of just over one minute per train during the morning peak period.

3.5.2.5 Local Transit Access

The lack of direct access from local area transit poses an accessibility issue for the proposed Orange Railroad Station. With no existing bus lines connecting the local area to the proposed station, individuals without access to an automobile would be required to walk or bike and may have a difficult time accessing the proposed station.

Table 3-8. Rail Travel Time Analysis

No Action Travel Time		
Operation	**Distance**	**Time**
Deceleration to 45 miles per hour (on Track 1 for crossover to Track 3)	942 ft	10.7 s
Deceleration to Stop	530 ft	16.1 s
Dwell Time (at West Haven Station)	-	45 s
Acceleration to 70 miles per hour	1511 ft	29.3 s
Travel at 70 miles per hour (on Track 3)	23,599 ft	229.0 s
Deceleration to 45 miles per hour for crossover to Track 1	760 ft	9.0 s
Acceleration to 75 miles per hour (on Track 1)	1,101 ft	12.5 s
Total No Action Travel Time	**28,443 ft**	**351.6 s**
Proposed Action Travel Time		
Operation	**Distance**	**Time**
Deceleration to 45 miles per hour (on Track 1 for crossover to Track 3)	942 ft	10.7 s
Deceleration to Stop	530 ft	16.1 s
Dwell Time (at West Haven Station)	-	45 s
Acceleration to 70 miles per hour	1511 ft	29.3 s
Travel at 70 miles per hour (on Track 3)	7,966ft	77.3 s
Deceleration to Stop	1290 ft	25.1 s
Dwell Time (at Orange Station)	-	45 s
Acceleration to 70 miles per hour	1511 ft	29.3 s
Travel at 70 miles per hour (Between Orange Station and Final Crossover)	12,832 ft	124.6 s
Deceleration to 45 miles per hour for crossover to Track 1	760 ft	9.0 s
Acceleration to 75 miles per hour (on Track 1)	1,101 ft	12.5 s
Total Proposed Action Travel Time	**28,443 ft**	**423.9 s**

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3.5.3 Mitigation

3.5.3.1 Train Loading Analysis

The Proposed Action is not anticipated to result in significant adverse impacts to train capacity. The projected number of new rail boardings at the proposed Orange Railroad Station results in the need for three additional railway cars in addition to the five additional cars that would be needed under the No Action Alternative.

3.5.3.2 Rail Travel Time Analysis

The proposed Orange Railroad Station is anticipated to increase travel time by just over 1 minute per train during the morning peak period. These anticipated travel time impacts are comparable to travel time delays associated with other similar railroad stations along the New Haven Line, and no mitigation is necessary or proposed.

3.5.3.3 Local Transit Access

Local transit connections to the proposed Orange Railroad Station should be considered. CT ***transit*** and Milford Transit are likely to consider the modification of existing lines or the addition of transit line service to the proposed Orange Railroad Station. Coordination with these agencies to review transit services and potential new or modified routes is recommended during the planning of the railroad station. The proposed Orange Railroad Station layout is geometrically configured to accept bus arrivals and departures.

3.6 Air Quality

NEPA and CEPA require consideration of whether the Proposed Action will have an adverse effect on air quality in the study area. In order to assess the potential for the Proposed Action to affect air quality, quantitative carbon monoxide (CO), qualitative particulate matter (PM2.5), and Mobile Source Air Toxics (MSATs) analyses have been prepared. Additionally, a qualitative analysis of greenhouse gas (GHG) emissions was also conducted.

3.6.1 Existing Conditions

Pursuant to the Federal Clean Air Act (CAA) of 1970, the EPA established National Ambient Air Quality Standards (NAAQS) for major pollutants known as "criteria pollutants." Currently, the EPA regulates six criteria pollutants: ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter, and lead (Pb). Particulate matter (PM) is divided into two particle size categories: particles with a diameter less than 10 micrometers (PM10) and those with a diameter of less than 2.5 micrometers (PM2.5). Connecticut adopted the national standards as shown in Table 3-9 which includes both the primary and secondary NAAQS for the criteria pollutants. The NAAQS are two-tiered: the first tier (primary) is intended to protect public health; the second tier (secondary) is intended to protect public welfare and prevent degradation of the environment.

Section 176(c) of the CAA requires Federal agencies to ensure that all of their actions conform to applicable implementation plans for achieving and maintaining the NAAQS. Federal actions must not cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation, or delay timely attainment of any standard.

3.6.1.1 Attainment

The NAAQS apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area is equal to, or is better than the national standard, the Environmental Protection Agency (EPA) will designate the region as an attainment area. Areas where air quality does not meet the national

standards are designated as non-attainment areas. Once the air quality in a non-attainment area improves to the point where it meets the standards and the additional redesignation requirements in the CAA [Section 107(d)(3)(E)], EPA may redesignate the area as an attainment/maintenance area, which are typically referred to as "maintenance areas."

The CAA requires EPA to designate the status of all areas as being in or out of compliance with the NAAQS. The CAA further defines non-attainment areas for ozone based on the severity of the violation as marginal, moderate, serious, severe, and extreme. The State has developed a State Implementation Plan (SIP) to attain and maintain the standards in the NAAQS. The EPA Green Book21, which lists non-attainment, maintenance, and attainment areas, was reviewed to determine the designations for New Haven County in which the Project is located. The EPA Green Book shows that New Haven County is designated by the EPA as a moderate non-attainment area for the 2008 8-hour ozone standard and a maintenance area for CO and PM2.5 (1997 and 2006 standards). The area is designated as attainment for all other NAAQS. On August 24, 2016, EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012." (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, the region is no longer designated as maintenance with the 1997 standard for PM2.5 but is still designated as maintenance with the 2006 standard.

[21] EPA Green Book: https://www.epa.gov/green-book/green-book-frequent-questions

Table 3-9. National Ambient Air Quality Standards[22]

Pollutant	Averaging Time	Primary Standards [1,2]	Secondary Standards [3]
CO	8- hour	9 ppm (10 mg/m^3)	None
	1-hour	35 ppm	
Lead	Rolling 3-Month Average[5]	0.15 µg/m^3	Same as Primary
NO_2	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Same as Primary
	1-hour	0.100 ppm[6]	None
0_3	8-hour (2015 standard)[9]	0.070 ppm	Same as Primary
	8-hour (2008 standard)	0.075 ppm	Same as Primary
	8-hour (1997 standard)	0.08 ppm	Same as Primary
$PM_{2.5}$	Annual Arithmetic Mean	12 µg/m^3 [4,8]	15 µg/m^3 [10]
	24-hour	35 µg/m^3	Same as Primary
PM_{10}	24-hour	150 µg/m^3 [4]	Same as Primary
SO_2	1-hour	75 ppb[7]	None
	3-hour	None	0.5 ppm

Notes:

1. National standards (other than ozone, particulate matter, and those based on annual averages) are not to be exceeded more than once per year.
2. Primary Standards: Levels necessary to protect public health with an adequate margin of safety.
3. Secondary Standards: Levels necessary to protect the public from any known or anticipated adverse effects.
4. For PM_{10}, the 24-hour standard not to be exceeded more than once per year on average over 3 years. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over three years, are equal to or are less than the standard.
5. National lead standard, rolling three-month average: final rule signed October 15, 2008.
6. To attain this NO2 standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
7. Final rule signed June 2, 2010. To attain this standard for SO_2, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
8. EPA updated the NAAQS for PM2.5 to strengthen the primary annual standard to 12ug/m^3.
9. EPA updated the NAAQS for Ozone to strengthen the primary 8-hour standard to 0.07 ppm on October 1, 2015. An area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over three years is equal to or less than 70 ppb.
10. On August 24, 2016, EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012."
See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf

3.6.1.2 Mobile Source Air Toxics

The EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer drivers from their 1999 National Air Toxics Assessment. The nine compounds identified were: acetaldehyde, acrolein; benzene; 1, 3-butadiene; diesel particulate matter plus diesel exhaust organic gases; ethylbenzene, formaldehyde; naphthalene; and polycyclic

[22] https://www.epa.gov/criteria-air-pollutants/naaqs-table (accessed on October 7, 2016).

organic matter (POM). While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The Federal Highway Administration (FHWA) October 18, 2016 guidance presents a tiered approach for assessing MSATs in NEPA documents. This approach is also applicable to projects funded by the Federal Transit Authority (FTA). The three levels are for projects with 1) no meaningful MSAT effects, 2) low potential MSAT effects, and 3) high potential MSAT effects, respectively. The FHWA guidance defines the levels of analysis for each type of MSAT effect:

- No analysis for projects with no potential for meaningful MSAT effects;
- A qualitative analysis for projects with low potential MSAT effects; and
- A quantitative analysis for projects with high potential MSAT effects.

The No Action and Proposed Action were evaluated against each threshold criteria in order to determine the type of MSAT analysis required.

3.6.1.3 Carbon Monoxide

CO is a toxic colorless and odorless gas that results from the incomplete combustion of gasoline and other fossil fuels. Because CO disperses quickly, the concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO may occur near congested intersections, along heavily used roadways conveying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions.

Certain transit projects[23] located in carbon monoxide (CO) nonattainment or maintenance areas would require a quantitative CO hot-spot analysis during the environmental review process and generally include projects that affect congested intersections (e.g. fixed guideway transit projects that take an existing traffic lane from a congested highway or projects that include major park-and-ride lots). EPA recently released a new mobile source emission factor model, the motor vehicle emission simulator (MOVES) along with guidance for using MOVES in project level CO analyses. EPA approved air dispersion models are used to determine CO concentrations at receptor locations as part of the hot spot analysis. For this analysis, the CAL3QHC software modeling program was used to estimate CO concentrations in the hot spot analysis. Furthermore, the FHWA provides additional information pertaining to project related carbon monoxide (CO) analyses. Two types of analyses are discussed by FHWA: mesoscale and microscale. The mesoscale analysis is a regional analysis consisting of nitrogen oxide (NOx), ozone (O3) and hydrocarbons. Where these pollutants are an issue, a mesoscale analysis may be undertaken to evaluate the regional impacts of the project. A microscale analysis is a localized study where air quality dispersion modeling may be required to demonstrate that project related CO impacts are below the National Ambient Air Quality Standards (NAAQS).

3.6.1.4 Particulate Matter

PM is a broad class of air pollutants that exists as liquid droplets or solids, with a wide range of size and chemical composition. It is emitted by a variety of sources, both natural and man-made. Major man-

[23] Projects are defined in40 CFR 93.1.3 https://www.law.cornell.edu/cfr/text/40/93.123

made sources of PM include the combustion of fossil fuels in vehicles, power plants and homes, construction activities, agricultural activities, and wood-burning fireplaces. Smaller particulates less than or equal to 10 and 2.5 microns in size (PM10 and PM2.5) are of particular health concern because they can get deeper into the lungs and affect respiratory and heart function.

The Proposed Action is located in an area which is designated as maintenance for fine particulate matter (PM2.5) NAAQS; therefore, transportation conformity requirements pertaining to particulate matter apply for this Project. Connecticut has prepared a SIP[24] that outlines the control measures implemented to achieve compliance and maintain the ozone and PM2.5 NAAQS, respectively. As noted earlier, on August 24, 2016, EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated in part "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012. (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, the region is no longer designated as maintenance with the 1997 standard for PM2.5 but still designated as maintenance with the 2006 standard.

3.6.2 Impact Assessment

3.6.2.1 Methodology

The air quality analysis consisted of evaluating air emission of carbon monoxide (CO), particulate matter (PM), Mobile Source Air Toxics (MSATs) and greenhouse gases. The methodologies and assumptions applied to the analysis for each pollutant are discussed below, and are consistent with Federal Highway Administration (FHWA), Federal Transit Administration (FTA), EPA and Connecticut Department of Energy & Environmental Protection (CTDEEP) guidance.

3.6.2.2 Carbon Monoxide (CO) Analysis

A CO hot-spot analysis was conducted for traffic-related impacts at nearby intersections along with dispersion modeling of vehicle exhaust related to the proposed parking garage. Traffic forecasts for the Study Alternatives were developed for the Existing Conditions (2016), Construction Year (2017) and Design Year (2037) conditions, using traffic forecasts were performed for Build and No-Build Conditions (see *Section 3.3*), with Build Conditions assuming construction and operation of the TOD described in *Section 1* of this document[25].

CO Hot Spot Methodology

The CO hot-spot analysis included a review of the traffic conditions at eight signalized intersections in the area of the Proposed Action for the No Build and Build Alternative to identify the worst-case locations for assessment. Both morning and afternoon peak conditions were assessed.

[24] http://www.ct.gov/deep/cwp/view.asp?a=2684&q=322164&deepNav_GID=1619#CTPMISIP2012

[25] Because the traffic analysis on which the air quality analysis is based combines the TOD and station traffic generation, the conservative approach used in this evaluation was to assess impacts of the entire project (TOD and station) at the earliest possible date impacts could be seen – at the start of the TOD development in 2017. In addition, the future year (2037) assesses impacts well beyond the timeframe in which the entire development and station would be constructed, providing a "worst case" assessment of impacts of full build both now as the TOD development gets underway and in the future condition at full build out of TOD and station. Consequently, the impact of the Proposed Action was evaluated for 2017 and for the future design year of 2037, which reflects an approximately 20-year planning window.

For intersections where project-specific modeling was determined to be required, modeling methodologies and assumptions were applied following EPA and CTDEEP guidance. The microscale analyses were conducted using the latest version of the EPA emission model (MOVES2014a) and dispersion model (CAL3QHC) to estimate worst-case CO concentrations at individual receptor (i.e., receiver) locations. Peak CO concentrations modeled for each location were then added to the appropriate CO background concentrations (as specified in the CTDEEP CO design values for 2015) to determine the worst-case CO impacts at each location. These values were then compared to the 1-hour and 8-hour CO NAAQS to show compliance.

Intersections Studied

An analysis of the LOS and peak hourly volumes was evaluated for the Proposed Action Build and No Action (or No Build) Alternative to confirm the worst-case intersection for study. The intersection locations studied for each Build and No Build alternative are shown in *Figure 3-16*. Per EPA guidance, the intersections are typically ranked for each alternative using peak AM and PM volumes and LOS. *Table 3-10* shows a summary of the peak AM and PM traffic volumes along with LOS for each intersection. Traffic volumes used to summarize the signalized intersections are included in *Appendix C*.

As shown in *Table 3-10*, there are three intersections with a LOS of D or worse in 2037 for the Build and No Build conditions indicating the potential for higher delays and vehicle queuing and thereby potential microscale impacts. Since these intersections clearly represent the worst case locations of traffic volumes and LOS, a formal ranking of the intersections was not necessary. Therefore, the following three intersections were modeled for the air quality analysis consistent with EPA guidance:

1. US Route 1 at Lambert Road;
2. Marsh Hill Road at I-95 SB Ramps; and
3. Route 162 at Woodmont Road.

The traffic analysis, as described in Section 3.3 and summarized above, demonstrates that of the eight signalized intersections evaluated, only three were selected for evaluation in the CO hot-spot analysis since these locations are expected to have the highest traffic volumes and vehicle queuing and thereby the highest CO concentrations. It is assumed that if these intersections show peak ground level CO concentrations below the CO NAAQS, then all other locations in the study area would also be below the CO NAAQS.

The evaluation for the three intersections was conducted consistent with EPA and CTDEEP guidance using MOVES2014a and CAL3QHC (invoked via the latest version of the FHWA CAL3i interface software) to develop conservative estimates for CO concentrations. CAL3i provides a user-friendly interface for the EPA CAL3QHC model that serves to facilitate and streamline the modeling process, particularly for worst-case analyses. Details on the assumptions used for the modeling analyses are provided in the following sections.

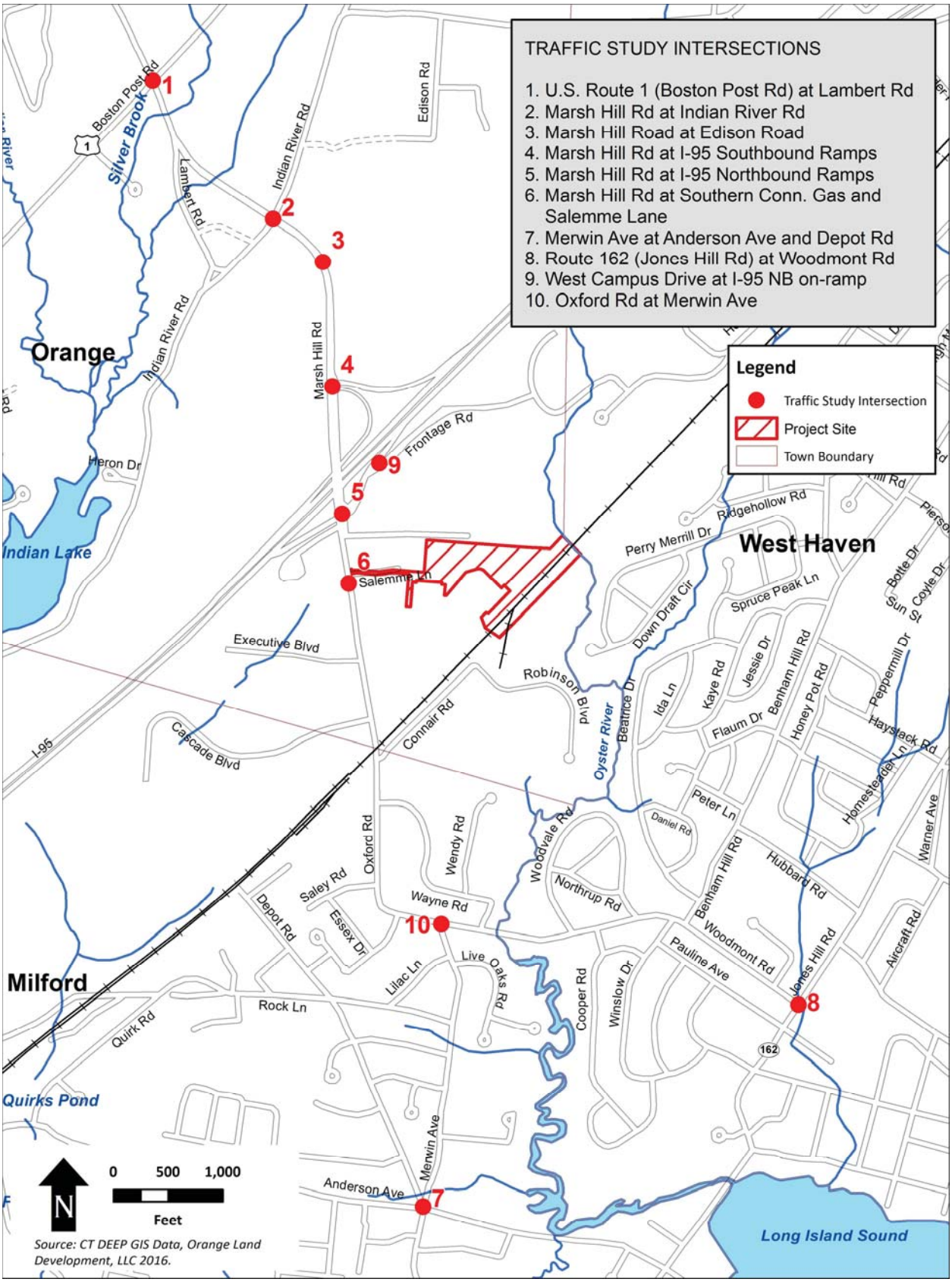


Figure 3-16. Intersection Locations Studied

As shown in *Table 3-10*, there are three intersections with a LOS of D or worse in 2037 for the Build and No Build conditions indicating the potential for higher delays and vehicle queuing and thereby potential microscale impacts. Since these intersections clearly represent the worst case locations of traffic volumes and LOS, a formal ranking of the intersections was not necessary. Therefore, the following three intersections were modeled for the air quality analysis consistent with EPA guidance:

4. US Route 1 at Lambert Road;
5. Marsh Hill Road at I-95 SB Ramps; and
6. Route 162 at Woodmont Road.

The traffic analysis, as described in Section 3.3 and summarized above, demonstrates that of the eight signalized intersections evaluated, only three were selected for evaluation in the CO hot-spot analysis since these locations are expected to have the highest traffic volumes and vehicle queuing and thereby the highest CO concentrations. It is assumed that if these intersections show peak ground level CO concentrations below the CO NAAQS, then all other locations in the study area would also be below the CO NAAQS.

The evaluation for the three intersections was conducted consistent with EPA and CTDEEP guidance using MOVES2014a and CAL3QHC (invoked via the latest version of the FHWA CAL3i interface software) to develop conservative estimates for CO concentrations. CAL3i provides a user-friendly interface for the EPA CAL3QHC model that serves to facilitate and streamline the modeling process, particularly for worst-case analyses. Details on the assumptions used for the modeling analyses are provided in the following sections.

MOVES Emissions Estimation

Vehicle emission rates for CO were estimated using the latest version of the EPA Motor Vehicle Emissions Simulator model (MOVES2014a). The methodologies and assumptions used for the MOVES modeling were consistent with FHWA and EPA guidance.[26] Specifically:

- Vehicle and fuels data required for input into the MOVES2014a model were provided by CTDEEP for 2016, 2017 and 2037 conditions, consistent with the latest planning assumptions for the area of the Proposed Action (i.e., New Haven County).
- Fuel data, vehicle population data, and age distribution data were provided by CTDEEP to populate the MOVES project data manager database (i.e., New Haven County).
- Source type hour fractions for each link were derived using project-specific data for car and truck volumes along with the source type population data for each source type.
- MOVES link files were developed for the intersections studied for each analysis year. The link file includes road type, peak-hour volumes, link lengths, roadway speed, and roadway grade.
- The roadway grades for the intersections were derived from GIS and Google Earth.
- Worst-case meteorological data (i.e., New Haven County) as provided by CTDEEP was used in the project data manager database.

A summary of the MOVES inputs are presented in *Table 3-11*.

[26] EPA, "Using MOVES2014 in Project Level Carbon Monoxide Analyses", March 2015.

Table 3-10. Signalized Intersection LOS and Peak AM and PM Volumes

					2017				2037			
			Existing		No Build		Build		No Build		Build	
Site Number	Intersection	Peak	Peak Volumes	LOS	Peak Volumes	LOS	Peak Volumes	LOS	Peak Volumes	LOS	Peak Volumes	LOS
1	U.S. Route 1 (Boston Road) at Lambert Road	AM	1386	C					1686	D	1771	D
		PM	2682	C					3163	D	3264	D
2	Marsh Hill Road at Indian River Road	AM	1690	B	1860	B	1900	B	2083	B	2203	B
		PM	2525	C	2650	C	2705	C	2967	C	3107	C
3	Marsh Hill Road at Edison Road	AM	1730	A	1990	A	2030	B	2230	B	2360	B
		PM	2322	B	2590	B	2645	B	2902	C	3052	C
4	Marsh Hill Road at I-95 SB Ramps	AM	2476	C	2785	C	2850	C	3118	D	3323	D
		PM	2764	C	3060	C	3165	C	3427	E	3667	F
5	Marsh Hill Road at I-95 NB Ramps	AM	2436	C	2715	C	2810	C	3077	C	3377	C
		PM	2453	C	2750	C	2900	C	3081	C	3401	C
6	Marsh Hill Road at SCG	AM	1673	A			2060	B	2174	A	2554	C
		PM	1601	A			2095	B	2116	B	2616	C
7	Merwin Avenue at Anderson Avenue and Depot Road	AM	1003	B	1110	B	1115	B	1245	B	1280	B
		PM	969	B	1020	B	1045	B	1147	B	1197	B
8	Route 162 (Jones Hill Road) at Woodmont Road	AM	866	B	910	B	930	B	1019	C	1074	C
		PM	1050	C	1110	C	1140	C	1244	C	1309	D

Table 3-11. Summary of MOVES Inputs

Parameter	Assumption
Domain/Scale	"Project"
Calculation Type	"Inventory"
Evaluation Month	January
Time Span	Year= (2016, 2017, 2037), AM Hour= 7AM to 8AM, Days=Weekdays
Geographic Bounds	New Haven County
Vehicles Equipment[3]	All Vehicle Types for diesel and gasoline
Link Files	Roadway Specific developed by HMMH
Roadway Grade/Link Speeds	Developed by HMMH using GIs/Google Earth and Posted Speed Limits
Fuel and Inspection/Maintenance (I/M) Inputs	Fuels and I/M Data Provided by CTDEEP
Vehicle Population and Age Distribution	Provided by CTDEEP
Pollutants and Process Panel	CO Running and CO Crankcase
Output Panel	Grams and Miles Selected as Units, Population and Distance traveled

MOVES Emission Factors

Mobile source emission factors are calculated based on the actual posted speeds at which vehicles travel through the intersection. The MOVES runs were used to generate CO emission rates for input into the CAL3QHC dispersion model for the base (2016), construction (2017), and design (2037) years. For estimating CO emission rates for the intersection analysis, the following assumptions were made:

- An average vehicle speed of 30 and 40 mph was assumed for the Route 1 at Lambert Road intersection; 30, 35, and 40 mph for Marsh Hill Road at I95 SB Ramps; and 25 and 35 mph was assumed for Route 162 at Woodmont Road;
- Project specific roadway grades (see below);
- Zero median width;
- At grade intersection; and
- Receptor locations on the edge of the right-of-way assuming EPA guidance.

Emission rates were developed for roadway links based on vehicle speed and roadway grades at each of the links entering and departing the intersections. Average road grades were taken from GIS and/or Google Earth maps and included in the MOVES roadway link files for each intersection.
As an example of the CO emission rates, *Table 3-12* summarizes the emission factors generated by MOVES for each year and vehicle speed and roadway grades using MOVES2014a. A sample MOVES input file is provided in *Appendix C*. A complete set of MOVES input/output files can be made available upon request.

Table 3-12. Summary of MOVES CO Emission Factors

Intersection	Approach	Vehicle Speed (mph)	Roadway Grade (%)	2016 (g/mile)	2017 (g/mile)	2037 (g/mile)
US Route 1 at Lambert Road	Lambert Road NB Approach/Depart	30/30	2.2/2.65	4.4/4.6	4.2/4.4	1.4/1.5
	Boston Road EB Approach/Depart	40/40	-0.4/-0.8	2.6/2.5	2.5/2.4	0.9/0.8
	Lambert Road SB Approach/Depart	30/30	-2.65/-2.2	2.3/2.4	2.2/2.3	0.7/0.7
	Boston Road WB Approach/Depart	40/40	0.8/0.4	3.3/3.1	3.1/2.9	1.1/1.0
	Idle[2]	0	n/a	15.6	13.8	3.4
Marsh Hill Road at I-95 SB Ramps	SB Ramp WB Approach/Depart	35/30	3.4/-3.1	4.9/2.1	4.8/2.0	1.7/0.6
	Marsh Hill SB Approach/Depart	40/40	-0.4/-1.9	2.5/2.0	2.4/1.9	0.9/0.7
	UILCO EB Approach/Depart	30/35	3.1/3.4	4.7/4.9	4.6/4.8	1.6/1.7
	Marsh Hill NB Approach/Depart	40/40	1.9/0.4	3.8/2.9	3.7/2.8	1.4/1.0
	Idle2	0	n/a	15.6	13.8	3.4
Route 162 at Woodmont Road	Woodmont RD EB Approach/Depart	25/25	-1.5/1.5	2.9/4.2	2.7/3.9	0.9/1.3
	Jones Hill Rd NB Approach/Depart	35/35	0.4/3.8	3.2/5.5	3.0/5.3	1.0/1.8
	Jones Hill Rd SB Approach/Depart	35/35	-3.8/-0.4	1.8/2.8	1.7/2.7	0.6/0.9
	Idle[2]	0	n/a	15.6	13.8	3.4

Notes:
1. MOVES generated CO emission rates utilize the New Haven County data in the MOVES file.
2. Idle emissions are denoted in grams per vehicle hour

CAL3QHC

The latest version of the CAL3QHC model (04244)[27] was used to predict worst-case 1-hour CO concentrations from free-flow links using the latest version of the FHWA CAL3i[28]. CAL3i is a software package that incorporates the EPA CAL3QHC dispersion model and various worst-case default parameters per EPA guidance. The peak 1-hour concentrations from CAL3QHC were scaled by a persistence factor of 0.7 (EPA default) to estimate 8-hour concentrations. This persistence factor accounts for the variability in meteorology over an eight-hour period relative to one-hour conditions. A summary of inputs used in the CAL3Interface model are shown in *Table 3-13*.

Worst-case modeled concentrations from CAL3QHC were added to appropriate background CO concentrations for comparison to the NAAQS. The background CO levels specified in the CT DEEP[29] Design Values for 2015 were used. As a conservative approach, the higher CO values for the more distant City of Bridgeport were used rather than the CO values for the nearby City of New Haven. Background CO concentrations of 2.4 ppm (one-hour CO concentration) and 1.8 ppm (eight-hour concentration) were used as input to CAL3QHC. CAL3QHC input and output files are provided in *Appendix C*.

Table 3-13. Summary of CAL3QHC Inputs

Description	Value
Surface Roughness Coefficient	175 Centimeters
CO Background Concentrations	2.4 ppm 1-hour, 1.8 ppm 8-hour (Bridgeport Roosevelt)
Persistence Factor	0.7 (EPA default)
Wind Speed	1.0 meter per second
Stability Class[1]	E
Mixing Height	1,000 meters
Wind Direction	5 degree increments (1 thru 36)
Receptor Height	5.9 feet

Note:
1. CAL3QHC was run for both Stability Class D and E for 2016. The highest concentrations consistently occurred for Stability E, therefore, Stability E was used for all existing and future conditions.

Receptors

Receptor locations are placed in the vicinity of the intersection at worst-case locations such as sidewalks, property lines, and parking lots where the public generally has access. For worst-case analyses for

[27] "User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections", EPA-454/R-92-006 (Revised), EPA, September 1995.

[28] See CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models", Michael Claggett, Ph.D., FHWA Resource Center, 2016.

[29] CTDEEP CO Design Values
http://www.ct.gov/deep/cwp/view.asp?a=2684&q=421150&deepNav_GID=1619

arterial streets (including intersections), the receptors are placed ten feet from the roadway edge (i.e., at the nearest possible location for the model, which assumes a ten-foot mixing zone next to the roadway).

Receptor locations for the worst-case intersection were generated in CAL3i consistent with EPA modeling guidelines[30] where the receptors were located a minimum of 3 meters from the edge of the roadway and positioned at a height of 1.8 meters above the ground (5.9 feet). Figures in *Appendix C* show the receptor locations at the worst-case intersection as displayed in the CAL3i interface for the No-Build and Build conditions. If the peak CO concentrations at the worst-case areas selected in the analysis are below the NAAQS for CO, it is assumed that all other locations in the corridor also would remain below the thresholds.

CAL3QHC Modeling Results

The results of the 1-hour and 8-hour CO hot-spot analysis for the three worst-case intersection locations are presented in *Table 3-14* for the existing, construction and design year Build and No-Build conditions. The table includes the overall worst-case modeled concentrations for the AM and PM peak periods, and includes the CAL3QHC modeled receptor number in parenthesis. The concentrations in *Table 3-14* also include the appropriate 1-hour and 8-hour background concentrations of 2.4 ppm and 1.8 ppm[31], respectively, for comparison to the CO NAAQS. The highest 1-hour predicted concentrations for the base, opening and design year Build and No-Build conditions were 3.6 ppm, 3.6 ppm and 2.8 ppm, respectively. The highest modeled 1-hour concentration for the existing, 2017 and 2037 conditions are expected at the Marsh Hill Road and I-95 SB Ramp intersection. All predicted peak 1-hour CO concentrations are well below the 1-hour CO NAAQS of 35 ppm.

The peak 1-hour values generated by CAL3QHC were scaled by a persistence factor of 0.7 to generate peak 8-hour CO concentrations, and these values were then added to the appropriate background concentration for comparison to the CO NAAQS. The highest 8-hour concentrations for the base, opening and design year Build and No-Build conditions were 2.6 ppm, 2.6 ppm and 2.1 ppm, respectively. Similar to the 1-hour concentrations, the highest modeled 8-hour concentrations for the existing, 2017 and 2037 conditions are expected at the Marsh Hill Road and I-95 SB Ramp intersection. All predicted peak 8-hour CO concentrations are also below the 8-hour CO NAAQS standard of 9 ppm.

These results demonstrate that the three worst-case intersections identified for existing, Build and No-Build alternatives would not cause or contribute to a violation of the CO NAAQS within the study corridor, and thereby satisfy all NEPA and CAA requirements pertaining to CO.

[30] "Guidelines for Modeling Carbon Monoxide from Roadway Intersections", EPA-454/R-92-005, US EPA, 1992.

[31] http://www.ct.gov/deep/cwp/view.asp?a=2684&q=421150&deepNav_GID=1619

Table 3-14. CAL3QHC CO Modeling Results for the Worst Case Intersections

Intersection	Averaging Period	2016[1,2]		2017[1,2]				2037[1,2]				NAAQS (ppm)
		Existing		No Build		Build		No Build		Build		
		Peak AM (PPM)	Peak PM (PPM)	Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	Peak AM (ppm)	Peak PM (ppm)	
Route 1 at Lambert Road	1-hour	3.4(9)	3.6(9)	3.3(28)	3.5(9)	3.3(28)	3.5(9)	2.6(17)	2.7(28)	2.6(17)	2.7(1)	35
	8-hour	2.5(9)	2.6(9)	2.4(28)	2.6(9)	2.4(28)	2.6(9)	1.9(17)	2.0(28)	1.9(17)	2.0(1)	9
Marsh Hill Road at I-95 SB Ramps	1-hour	3.5(1)	**3.6(1)**	3.5(1)	**3.6(1)**	3.5(1)	3.6(1)	2.7(5)	2.7(5)	**2.8(1)**	2.7(5)	35
	8-hour	2.6(1)	**2.6(1)**	2.6(1)	**2.6(1)**	2.6(1)	2.6(1)	2.0(5)	2.0(5)	**2.1(1)**	2.0(5)	9
Route 162 at Woodmont Road	1-hour	2.9(1)	2.8(1)	2.9(1)	3.3(1)	2.9(1)	2.9(1)	2.5(4)	2.5(4)	2.5(4)	2.5(4)	35
	8-hour	2.2(1)	2.1(1)	2.2(1)	2.4(1)	2.2(1)	2.2(1)	1.9(4)	1.9(4)	1.9(4)	1.9(4)	9

Notes:
1. Number in parenthesis is the receptor number as modeled in CAL3QHC.
2. Modeled concentrations include 1-hour CTDEEP Background value of 2.4 ppm and 8-hour background value of 1.8 ppm.

Parking Area Emissions

In addition to surface parking, there is an above grade parking garage planned as part of the Proposed Action consisting of shared parking to service both the TOD and the proposed Orange Railroad Station. The garage will consist of up to six levels and is not fully enclosed – it has open sides which provide ventilation of CO emissions from moving and idling vehicles into the ambient air. For modeling purposes, emissions are conservatively assumed to vent from the footprint of the entire garage area (including both TOD and Commuter Garage spaces). Although the garage dimensions are currently planned to be 532 feet in length by 148 feet in width, a larger approximately 210, 600 sf footprint was assumed to provide a conservative, worst case scenario. Emissions from the parking garage were calculated using MOVES2014a for 2016 to estimate the total CO emissions from the AM and PM peak hours which include both moving, startup and idle emissions. As a conservative assumption, the 2016 construction year was chosen since emissions are expected to decrease in the future due to EPA emissions standards and the removal of older less efficient vehicles. As a conservative approach, the MOVES run include both the shared parking structure spaces (799) and the surface street parking spaces (123) for a total of 922 spaces.

Vehicles Entering and Exiting the Garage

CO emissions from vehicles entering and exiting the parking garage were estimated based on the MOVES emission rate and the total miles traveled. The miles traveled within the garage was calculated by multiplying the average distance a car would travel in the garage by the number of cars entering and leaving the garage. It was estimated that each vehicle, on average, drives halfway into the garage and halfway out to park and leave.

For modeling assumptions, the footprint of the garage was ~210,600 sf. Assuming the cars entering and exiting the garage travel approximately 596 feet, a total trip of 104 miles is traveled in the garage (596 feet x 922 cars / 5,280 feet per mile) during the peak AM or PM hour. Assuming the vehicles travel at

an average speed of 15 mph within the garage, while entering and leaving, a CO emission rate of 4.7 grams per mile was obtained from MOVES.

Therefore, the emission rate from the vehicles entering and exiting the garage can be calculated as follows:

4.7 grams/mile x 104 miles/hour x 1 hour/3600 seconds = 0.14 grams/second.

Garage Vehicle Starts and Idling

Similarly, MOVES was run in the off network mode to estimate vehicle starting and idling activity within the garage. The resultant emission rate for starts and extended idling from MOVES was 1.22 grams per second.

Total Garage CO Emissions

The total CO emission rate from the parking garage assuming all the spaces were filled including starts and extended idling is 1.4 grams per second.

Garage Emission Dispersion Modeling

The EPA SCREEN3 model was run to determine ground level impacts from the total CO emissions associated with the garage. The following input parameters were used:

- The parking garage was modeled as a volume source with an average release height of 6.86 meters which is roughly half of the 45 foot building height above ground level;
- Urban dispersion coefficients were used;
- Flat terrain; and
- Full default meteorology.

Background CO Concentrations

Similar to the CO hot-spot analysis, background air quality levels were added to modeled concentrations for comparison to the NAAQS. Consistent with the CO intersection modeling analysis, background levels of future CO concentrations of 2.4 ppm (one-hour) and 1.8 ppm (eight-hour) were provided by CTDEEP.

Also consistent with the CO intersection modeling, peak eight-hour SCREEN3 concentrations were calculated using an eight-hour to one-hour ratio (or persistence factor) of 0.70 as recommended by EPA.

Mobile Source Modeling Results

The results of the one-hour build CO concentrations from CAL3QHC and SCREEN3 for the highest predicted receptor are provided in *Table 3-15*.

As a conservative approach, the results of the one-hour modeled CO ground-level concentrations from both models were added to CTDEEP supplied background levels for comparison to the NAAQS. The one-hour values were then scaled by 0.7 to generate eight-hour values. These values represent the highest potential concentrations independent of time and space (i.e. as they are predicted by each model

during the simultaneous occurrence of "defined" worst case meteorology and maximum modeled values).

The highest cumulative one-hour concentration predicted in the area of the project for the 2017 future build conditions plus background is 3.8 ppm. The total one-hour concentration includes the maximum predicted concentrations from SCREEN3 for the parking garage plus the maximum predicted concentrations from CAL3QHC. This value is well below the one-hour NAAQS standard of 35 ppm. The highest eight-hour concentration predicted in the area of the project for the 2017 future build conditions plus background is 2.8 ppm. The total eight-hour concentrations include maximum predicted concentrations from SCREEN3 and CAL3QHC modeled sources. This value is well below the eight-hour NAAQS standard of nine ppm.

Table 3-15. Summary of Mobile Source Modeling Results

Intersection	Average Period	2017 Peak Build Concentration (PPM)[1]	2017 Parking Garage Concentration (PPM)[2]	Total Concentration (PPM)[3]	NAAQS (PPM)
Route 1 at Lambert Road	1-Hour	3.5	0.2	3.7	35
	8-Hour	2.6	0.15	2.7	9
Marsh Hill Road at I-95 SB Ramps	1-Hour	3.6	0.2	3.8	35
	8-Hour	2.6	0.15	2.8	9
Route 162 at Woodmont Road	1-Hour	2.9	0.2	3.1	35
	8-Hour	2.2	0.15	2.3	9

Notes:
1. Denotes the maximum modeled concentrations from CAL3QHC in Table 3-14.
2. Denotes the maximum modeled concentrations from SCREEN3.
3. Denotes the cumulative maximum modeled concentrations from CAL3QHC and SCREEN3 independent of location, time or meteorological conditions.

Conclusions
Using a conservative approach, the CO concentrations at the nearest sensitive receptors from the three intersections and the parking garage plus monitored background values are well under the CO NAAQS thresholds.

3.6.2.3 Mesoscale Analysis

A mesoscale analysis was performed to assess the total VOCs and NOx (i.e., ozone precursors) associated with motor vehicle emissions for the Proposed Action, including the adjacent TOD, compared to the No Action Alternative, assuming that the TOD is not constructed. The mesoscale analysis typically evaluates the regional impact of VOC and NOx affiliated with the project.

Methodology
As mentioned above, the EPA Green Book shows that New Haven County is designated by the EPA as a moderate non-attainment area for the 2008 8-hour ozone standard and a maintenance area for CO, and $PM_{2.5}$ (1997 and 2006 standards). The area is designated as attainment for all other NAAQS.

Ozone, a common constituent of smog, is formed in the atmosphere rather than being directly emitted from pollutant sources. Ozone forms as a result of volatile organic compounds (VOCs) and oxides of nitrogen (NO_X) reacting in the presence of sunlight in the atmosphere. Ozone levels are highest in warm-weather months. VOCs and NO_X are termed "ozone precursors" and their emissions are regulated to control the creation of ozone.

The CTDOT conducts mesoscale analyses to determine ozone and $PM_{2.5}$ conformity with the SIP. The mesoscale analysis is prepared to document the emissions analysis that was completed to evaluate Transportation Conformity of the Metropolitan Regional Planning Organizations' Fiscal Year 2015-2018 Transportation Improvement Program (TIP), as Amended in September 2016 and the 2015 Regional Long Range Transportation Plans (LRTP) to the State Implementation Plan (SIP) for air quality. An analysis of NO_X and VOC was conducted for summer conditions for 2017 and 2040.

The mesoscale analysis uses the EPA MOVES2014a emission model. Emissions are calculated using emission factors which are dependent on meteorological conditions, vehicle fleet mixes, emission standards, fuel data, and road types along with vehicle characteristics including vehicle speed, vehicle hours traveled and vehicle miles traveled (VMT). VMT estimates were developed from CTDOT statewide network-based travel model for baseline and future conditions. A more detailed description of the modeling methodology and assumptions are found in the Ozone Air Quality Conformity Determination (amended September 2016)[32].

Existing Conditions

The CTDEEP operates ozone monitoring stations at locations throughout Connecticut. The stations closest to the proposed project area are located in New Haven (approximately 9 miles to the east) and Stratford (approximately 11 miles to the southwest). During 2015, both monitor locations reported a fourth high daily average above the EPA 2015 8-hour ozone standard of 0.070 ppm with the Stratford monitor reporting 15 days above the standard and the New Haven monitor reporting 7 days above the standard. The maximum 8-hour concentration reported at Stratford was 0.095 ppm with a fourth highest 8-hour concentration of 0.086 ppm. The maximum 8-hour concentration reported at New Haven was 0.093 ppm while the fourth highest 8-hour concentration was 0.081 ppm. It should be noted that while the 2015 ozone concentrations are above the EPA 2015 8-hour ozone NAAQS, ozone exceedances and concentrations in Connecticut have trended lower over the past 30 years as shown in *Figure 3-17* and *Figure 3-18* below.

[32] http://www.ct.gov/dot/lib/dot/documents/dplansprojectsstudies/plans/airqualityconformity/ozoneconformity_september_2016_amended.pdf

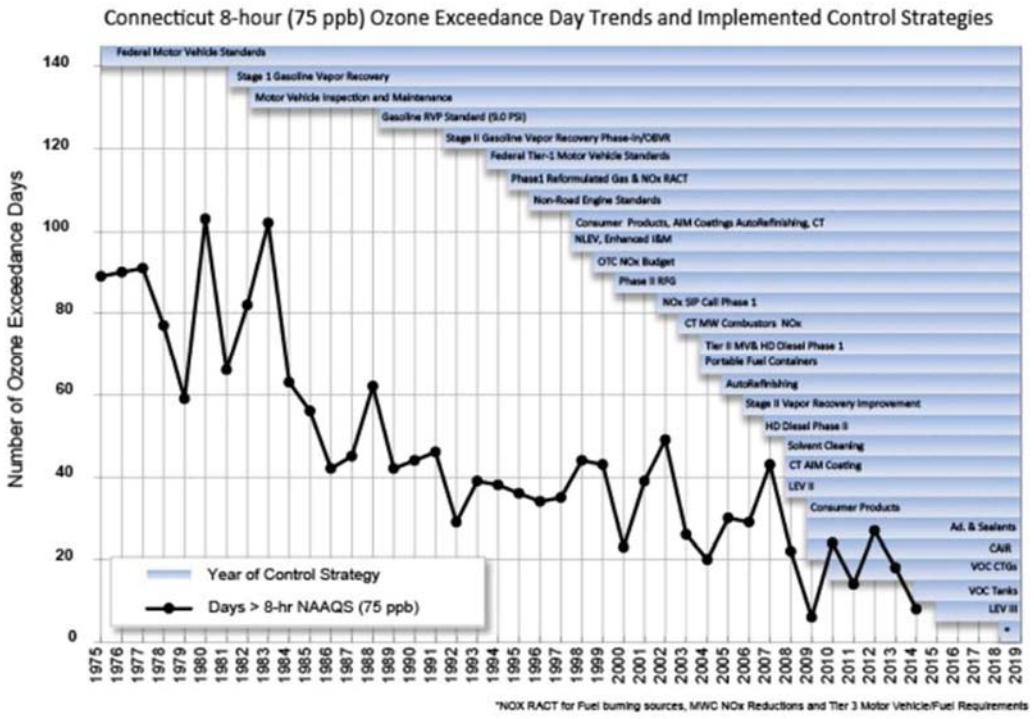


Figure 3-17. Connecticut 8-hour Ozone Exceedance Day Trends

Source: http://www.ct.gov/deep/cwp/view.asp?a=2684&q=322062&deepNav_GID=1744

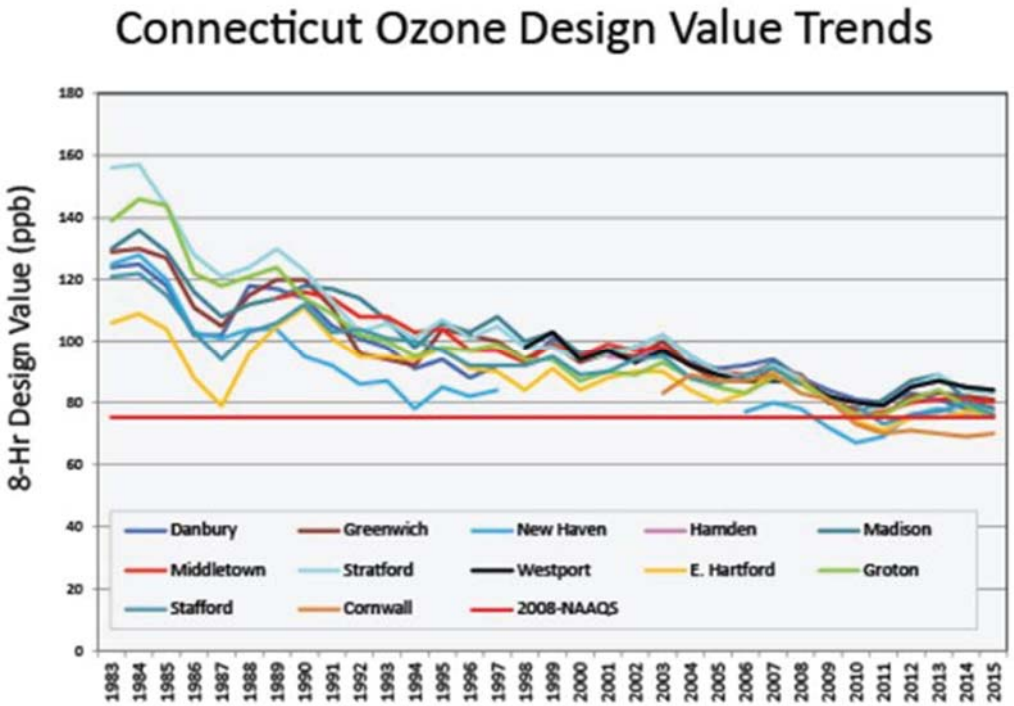


Figure 3-18. Connecticut Ozone Design Value Trends

Source: http://www.ct.gov/deep/cwp/view.asp?a=2684&q=322062&deepNav_GID=1744

Potential Mesoscale Impacts
Under the No Action alternative, vehicle trips would remain unchanged and similar to the existing conditions, and so no impacts are expected to the mesoscale air quality results.

The mesoscale analysis conducted by the CTDOT for 2017 estimates 8-hour summertime emissions in the greater Connecticut area air quality district as 15.99 tons per day of VOC and 21.99 tons per day of NOX and is well below the budgets of 26.3 tons per day of VOCs and 49.2 tons per day of NOX. For comparison, the 2040 final year modeled, VOC emissions are expected to decrease to 6.17 tons per day and NOX is expected to decrease to 6.49 tons per day. The expected reduction in emissions is primarily due to programs such as reformulated fuels, enhanced inspection and maintenance programs (I/M), stage two vapor recovery and the low emissions vehicle program.

The new Orange Railroad Station was included in the ozone SIP Conformity mesoscale analysis, however, the adjacent proposed residential/commercial portion of the TOD was not[33] Given the relatively small nature of the VMT associated with the residential/commercial portion of the proposed TOD relative to the total VMT's in the region, it is unlikely that this portion of the project would result in a substantial change in emissions or any subsequent direct or indirect impacts to the mesoscale analysis.

Mitigation
Since emissions of VOC and NOX are expected to decrease from 2018 to 2040 within the air district of the Proposed Action and projected emissions are well below the budgeted allowances required to maintain compliance with the SIP and the NAAQS, no specific mitigation measures are proposed.

Mobile Source Air Toxics Analysis Methodology
On October 18, 2016, the FHWA issued updated interim guidance regarding Mobile Source Air Toxics (MSATs) in a NEPA analysis to include the EPA's recent MOVES2014a emission model along with updated research on air toxic emissions from mobile sources. The guidance includes three categories and criteria for analyzing MSATs in a NEPA documents:

1. No meaningful MSAT effects,
2. Low potential MSAT effects, and
3. High potential MSAT effects.

A qualitative analysis is required for projects which meet the low potential MSAT effects criteria while a quantitative analysis is required for projects meeting the high potential MSAT effects criteria.
Projects with Low Potential MSAT Effects are described as:

- Those that serve to improve operations of highway, transit, freight without adding substantial new capacity or without creating a facility that is likely to significantly increase emissions. This category covers a broad range of project types including minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where

[33] It is assumed that mesoscale impacts associated with the proposed multi-family residential building will be addressed by the developer of this privately owned TOD. This analysis would be separate from the Environmental Impact Evaluation and is not included in this air quality study.

design year traffic is not projected to meet the 140,000 to 150,000 Annual Average Daily Traffic (AADT) criteria.

Projects with High Potential MSAT Effects must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location;
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 or greater by the design year; and
- Proposed to be located in proximity to populated areas.

In accordance with the latest MSAT guidance, the area of the Proposed Action is best characterized as a project with "low potential MSAT effects" since projected design year traffic is expected to be well below the 140,000 to 150,000 AADT criteria. Specifically, the Design Year Build Alternative is expected to have the highest Average Daily Traffic (ADT) volumes of 28,100 ADT from the United Illuminating Company driveway (UILCO) to Exit 41 southbound off-ramp segment. Table 3-16 summarizes the expected ADT and VMT along the mainline links throughout the project corridor

Table 3-16. Orange Rail Station ADT and Vehicle Miles Traveled

		2015 PM Peak Hour				2017 No Build PM				2017 Build PM					2037 No Build PM				2037 Build PM				
Link	Distance (miles)	Total	ADT	%Diesel	VMT	Total	ADT	%Diesel	VMT	Total	ADT	%Diesel	Diesel Build-No Build	VMT	Total	ADT	%Diesel	VMT	Total	ADT	%Diesel	Diesel Build-No Build	VMT
Old Tavern Road to Lambert Road	0.23	477.00	4,770	229	1,097	555	5,550	266	1,277	575	5,750	276	10	1,323	621	6,210	298	1,428	666	6,660	320	22	1,532
Lambert to Indian River	0.31	1,340.00	13,400	643	4,154	1,410	14,100	677	4,371	1,450	14,500	696	19	4,495	1,579	15,790	758	4,895	1,674	16,740	804	46	5,189
Indian River to UILCO	0.15	1,987.00	19,870	954	2,981	2,125	21,250	1,020	3,188	2,180	21,800	1,046	26	3,270	2,381	23,810	1,143	3,572	2,521	25,210	1,210	67	3,782
UILCO to Exit 41SB Off Ramp	0.18	2,133.00	21,330	1024	3,839	2,375	23,750	1,140	4,275	2,430	24,300	1,166	26	4,374	2,660	26,600	1,277	4,788	2,810	28,100	1,349	72	5,058
Exit 41 SB offramp to Exit 41 NB	0.22	1,927.00	19,270	925	4,239	2,165	21,650	1,039	4,763	2,270	22,700	1,090	50	4,994	2,425	24,250	1,164	5,335	2,665	26,650	1,279	115	5,863
Exit 41 NB Offramp to SCG Driveway	0.15	1,586.00	15,860	761	2,379	1,800	18,000	864	2,700	1,950	19,500	936	72	2,925	2,016	20,160	968	3,024	2,283	22,830	1,096	128	3,425
SCG Driveway to Merwin AVE	0.56	1,097.00	10,970	527	6,143	1,185	11,850	569	6,636	1,240	12,400	595	26	6,944	1,327	13,270	637	7,431	1,442	14,420	692	55	8,075
Merwin Ave to Anderson Ave	0.5	539.00	5,390	259	2,695	565	5,650	271	2,825	580	5,800	278	7	2,900	634	6,340	304	3,170	684	6,840	328	24	3,420
Merwin Ave to Benham Road	0.42	870.00	8,700	418	3,654	925	9,250	444	3,885	955	9,550	458	14	4,011	1,036	10,360	497	4,351	1,101	11,010	528	31	4,624
Benham Road to Jones Hill Road	0.24	687.00	6,870	330	1,649	740	7,400	355	1,776	770	7,700	370	14	1,848	829	8,290	398	1,990	894	8,940	429	31	2,146
Salame Lane	0.14	6	60	3	8	230	2,300	110	322	435	4,350	209	98	609	257	2,570	123	360	672	6,720	323	199	941
Total									36,017					37,693				40,344					44,054

Peak Hour represents 10 percent of the total ADT and scaled accordingly

Worst case percent diesel from AM and PM was 4.8% derived from Worst Case Traffic Counts performed by Reliable Traffic Counts, LLC.

The results in *Table 3-16* demonstrate that the expected ADT volumes would be much less than the 140,000 to 150,000 AADT MSAT criteria. As a result, a qualitative assessment of MSAT emissions projections was conducted for the affected network consistent with FHWA guidance.

Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants (HAPs). The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA's Integrated Risk Information System (IRIS) 2011 National Air Toxics Assessment (NATA)[34]. In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers, or contributors, and that are non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA)[35].. These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

Existing Conditions

At present, the State does not conduct continuous monitoring of MSATs in the proposed project study area. The CTDEEP did conduct a Toxic Air Study in Connecticut (TASC) from 1999-2003 to provide data on ambient levels of HAPs in Connecticut. This monitoring was conducted in the immediate vicinity of six stationary sources, and one background site. The study showed that while concentrations of formaldehyde and acetaldehyde increased during the summer months, most likely as a result of photochemistry, the increased concentrations of these chemicals also may have been influenced by mobile sources. In addition, concentrations of formaldehyde did show occasions of point source influence.

These two compounds were monitored at levels which may be of concern, as compared to proposed limits for annual exposure from the Connecticut Department of Public Health (CT DPH), although these levels were consistent with levels measured across the country. The study concluded that concentrations of formaldehyde and acetaldehyde are likely dominated by emissions from motor vehicles.

Motor Vehicle Emissions Simulator (MOVES)

According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 FR 60344), and

[34] https://www.epa.gov/iris

[35] https://www.epa.gov/national-air-toxics-assessment

the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR 60344). Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 MOVES2014a Questions and Answers Guide,[36], EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Using EPA's MOVES2014a model, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

MSAT Research

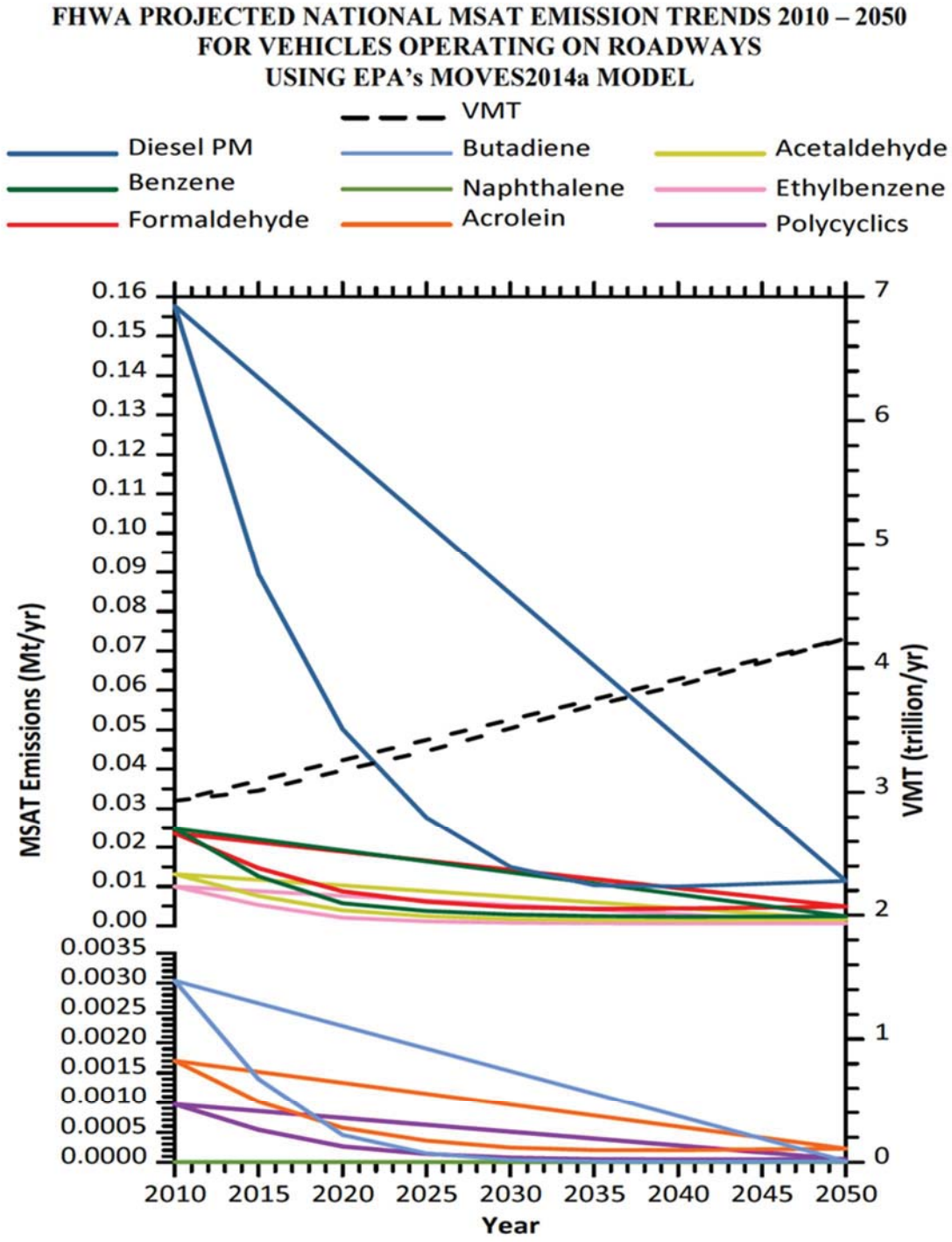
Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

Project MSAT Analysis

The amount of mobile source air toxics (MSAT) emitted would be proportional to the amount of vehicle miles traveled (VMT) and rail activity, assuming that other variables (such as travel not associated with the Orange Rail Station) are the same for each alternative. As shown in Table 4-8 above, the VMT estimated for the Proposed Action are higher than that for the No Action Alternative because of the additional activity associated with the Rail Station. This increase in VMT and rail activity associated with the Proposed Action would lead to higher MSAT emissions (particularly diesel particulate matter) in the vicinity of the Rail Station. The higher emissions could be offset somewhat by two factors: 1) the decrease in regional vehicle traffic due to increased use of rail and 2) increased speeds on area highways

[36] https://www3.epa.gov/otaq/models/moves/documents/420b15095.pdf



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.

Figure 3-19. National MSAT Emission Trends 2010-2050 for Vehicles Operating on Roadways Using EPA's MOVES 2014a Model

due to the decrease in vehicle traffic. The extent to which these emissions decreases will offset the Orange Railroad Station-related emissions increases is not known.

Because the estimated vehicle VMT and rail activity under the Proposed Action varies by less than 9 percent for the 2037 condition, it is expected there would be no appreciable difference in overall MSAT emissions among the No Action and Proposed Action alternatives in 2037. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of the Environmental Protection Agency's (EPA) national control programs that are projected to reduce annual MSAT emissions by over 90 percent from 2010 to 2050 (Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration, October 12, 2016). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the EPA-projected reductions are so significant (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future as well.

The additional activity contemplated as part of the project alternative will potentially have the effect of increasing diesel emissions in the vicinity of nearby homes, schools, and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSAT would be higher than under the No Action alternative. The localized differences in MSAT concentrations would likely be slightly higher under the Proposed Action. However, as discussed above, the magnitude and the duration of these potential differences cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific health impacts. Even though there may be differences among the alternatives, on a region-wide basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will cause substantial reductions over time that in almost all cases the MSAT levels in the future will be significantly lower than today.

In sum, the Proposed Action in the design year could be associated with higher levels of MSAT emissions in the study area, relative to the No Action Alternative, and yet may realize some benefit from improvements in speeds and reductions in region-wide vehicle traffic. There also could be slightly higher differences in MSAT levels among Alternatives in a few localized areas where rail activity occurs closer to homes, schools, and businesses. Under all alternatives, MSAT levels are likely to decrease over time due to nationally mandated cleaner vehicles and fuels.

MSAT Conclusions

What we know about mobile source air toxics is still evolving. Information is currently incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with each of the project Alternatives. Under the Proposed Action alternative, there may be slightly higher MSAT emissions in the design year relative to the No Action Alternative due to increased VMT. There could also be increases in MSAT levels in a few localized areas where VMT increases. However, EPA's vehicle and fuel regulations are expected to result in significantly lower MSAT levels in the future than exist today due to cleaner engine standards coupled with fleet turnover. The magnitude of the EPA-projected reductions is so great that, even after accounting for VMT growth, MSAT emissions in the study area would be significantly lower in the future than they are today, regardless of the preferred Alternative chosen.

3.6.2.4 Particulate Matter

The area of the Proposed Action is located in an EPA designated maintenance area for fine particulate matter (PM2.5); therefore, transportation conformity rule requirements apply for this project. It should be noted on August 24, 2016, EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012." Accordingly, the region is no longer designated as maintenance for the 1997 PM2.5 standards but still designated as maintenance for the 2006 standard, and the associated EPA regulatory requirements for conformity for PM2.5 still apply. A PM2.5 project criteria assessment was conducted consistent with EPA regulatory requirements (40 CFR 93.123(b)(1)) and guidance to determine if the project is one of potential air quality concern for PM2.5 as follows:

(i) New Highway Construction

This project does not involve new highway construction and does not meet the definition of a project of air quality concern for PM2.5 under (i).

(ii) Highway Capacity Expansion

This project does not involve highway capacity expansion and does not meet the definition of project of air quality concern for PM2.5 under (ii).

(iii) Intersections

The EPA criteria for a project of air quality concern is "Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project." This criteria is not met by this project. First, as shown in Table 3-16 above, truck percentages are low (4.8 percent[37]) and the increase in diesel traffic vehicles related to the project is less than significant (199 vehicles). Second, as shown in *Table 3-10* earlier, the project is expected to either improve the Level-of-Service or remain the same for all intersections expected to operate at a LOS D, E, or F. There are two intersections at Marsh Hill Road/I-95 SB Ramps and Route 62 at Woodmont Road for the 2037 PM Build Condition where the LOS is expected to go from a LOS E to F and C to D, respectively. However, as stated above, the changes are not due to an increase in traffic volumes from a significant number of diesel vehicles related to the project. The LOS for other intersections are expected to generally improve or remain the same for all Build conditions. Finally, truck percentages for the project will be low (4.8 percent) and the increase in diesel traffic volumes for the Build condition is much less than the highway capacity expansion significance threshold of 2,000 ADT for projects of air quality concern. Given all of these considerations, this project does not affect intersections with a significant number of diesel vehicles and does not meet the definition of project of air quality concern for PM2.5 under (iii).

[37] Worst case percent diesel from AM and PM was 4.8% derived from Worst Case Traffic Counts performed by Reliable Traffic Counts, LLC dated 10/3/2013.

(iv) New Intermodal or Transit Facility for Rail, Bus, or Truck

The project does involve a new intermodal or transit facility for rail, bus or truck. A project of air quality concern for new bus or rail terminals would include:

- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location; and
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

Examples of projects of air quality concern that would be covered by 40 CFR 93.123(b)(1)(iii) and (iv) and would require a PM2.5 hot spot include:

- A major new bus or intermodal terminal that is considered to be a "regionally significant project" under 40 CFR 93.101; and
- An existing bus or intermodal terminal that has a large vehicle fleet where the number of diesel buses increases by 50% or more, as measured by bus arrivals (e.g. a facility with 10 buses in the peak hour).

According to the CT***transit***-Connecticut Post Mall O2 bus schedule, approximately 3 buses per hour currently run within the vicinity of the location of the proposed Orange Railroad Station. In addition, the current Greater Bridgeport Transit (GBT) operates the Coastal Link bus line and currently stops once per hour at nearby Devon Center. With approximately 200 riders per day expected at the Orange Railroad Station, it is feasible that the bus routes could be augmented to provide bus service to the station. It's unlikely that either service would create additional routes or increase the frequency of scheduled stops due to the Orange Railroad Station. Therefore, a peak hour total of 4 buses could be expected to stop at the Orange Railroad Station based on the current bus schedule of 3 or 4 buses per hour in the vicinity of the proposed station. With this assumption, the proposed rail station would have significantly lower expected bus traffic than the "small terminal" threshold value of 10 buses in the peak hour in the example above.

Furthermore, based on the expected ADT associated with the Proposed Action, truck percentages are expected to be low (4.8 percent)[38] and the expected increase in diesel traffic vehicles related to the project is less than significant. As shown in (iii) above, the increase in diesel traffic volumes for the Proposed Action condition is much less than the highway capacity expansion significance threshold of 2,000 ADT for projects of air quality concern. Given all of these considerations, this project does not affect an intermodal facility with a significant number of diesel vehicles or bus service and does not meet the definition of project of air quality concern for PM2.5 under (iv).

(v) Expanded Intermodal or Transit Facility for Rail, Bus, or Truck

[38] Worst case percent diesel from AM and PM was 4.8% derived from Worst Case Traffic Counts performed by Reliable Traffic Counts, LLC.

This project does not involve an expanded intermodal or transit facility for rail, bus, or truck and does not meet the definition of a project of air quality concern for $PM_{2.5}$ under (v).

Trends in PM2.5 Background Concentration

A review of the latest PM2.5 monitoring data reported by the CTDEEP[39] for 2015 was conducted for monitoring locations available near the study area. A total of two nearby monitor locations were reviewed; Criscuolo Park (New Haven) and Roosevelt School (Bridgeport). The PM2.5 data are summarized in *Table 3-17*, which shows that the maximum 24-hour and annual PM2.5 background concentrations are 24 micrograms per cubic meter (μg/m3) and 9.4 μg/m3, respectively; both of which are well below the respective PM2.5 NAAQS of 35 μg/m3 and 12 μg/m3.

Given the general downward trend in ambient PM2.5 concentrations in Connecticut, it is unlikely the current annual NAAQS for PM2.5 of 12 μg/m3 within the study area would be exceeded based on expected ADT and diesel truck volumes associated with the Project.

Table 3-17. CTDEEP 2015 PM2.5 Air Monitoring Values Near the Orange Station Project

Site ID	City	$PM_{2.5}$ 24-Hour, 98th Percentile Values (μg/m^3)	Annual Arithmetic Mean 3-Year Average (μg/m^3)
Criscuolo Park	New Haven	22	8.3
Roosevelt School	Bridgeport	24	9.4
Maximum		24	9.4

PM2.5 Conclusions

Based on the criteria specified in the Transportation Conformity rule and associated guidance, the Project is not considered to be one of "air quality concern" for fine particulate matter. Therefore, the CAA and 40 CFR 93.116 requirements for PM2.5 are met without a detailed quantitative hot-spot analysis, since such projects have been found not to be of air quality concern under 40 CFR 3.123(b)(1).

3.6.3 Greenhouse Gas Emissions

Existing Conditions

Climate change is a critical national and global concern. Human activity is changing the earth's climate by causing the buildup of heat-trapping greenhouse gas (GHG) emissions through the burning of fossil fuels and other human activities. Carbon dioxide (CO2) is the largest component of human produced emissions; other prominent emissions include methane (CH4), nitrous oxide (N2O) and hydrofluorocarbons (HFCs). These emissions are different from criteria air pollutants since their effects in the atmosphere are global rather than localized, and also since they remain in the atmosphere for decades to centuries, depending on the species.

Greenhouse gas emissions have accumulated rapidly as the world has industrialized, with concentration of atmospheric CO2 increasing from roughly 300 parts per million in 1900 to over 400 parts per million today. Over this timeframe, global average temperatures have increased by roughly 1.5 degrees

[39] CTDEEP Air Monitoring Design Values:
http://www.ct.gov/deep/cwp/view.asp?a=2684&q=421150&deepNav_GID=1619

Fahrenheit (1 degree Celsius), and the most rapid increases have occurred over the past 50 years. Scientists have warned that significant and potentially dangerous shifts in climate and weather are possible without substantial reductions in greenhouse gas emissions. They commonly have cited 2 degrees Celsius (1 degree Celsius beyond warming that has already occurred) as the total amount of warming the earth can tolerate without serious and potentially irreversible climate effects. For warming to be limited to this level, atmospheric concentrations of CO2 would need to stabilize at a maximum of 450 ppm, requiring annual global emissions to be reduced 40-70% below 2010 levels by 2050[40]. State and national governments in many developed countries have set GHG emissions reduction targets of 80 percent below current levels by 2050, recognizing that post-industrial economies are primarily responsible for GHGs already in the atmosphere. As part of a 2014 bilateral agreement with China, the U.S. pledged to reduce GHG emissions 26 to 28 percent below 2005 levels by 2025; this emissions reduction pathway is intended to support economy-wide reductions of 80 percent or more by 2050[41].

In 2008, the Connecticut legislature enacted legislation (Connecticut General Statute's 22a-200) that sets a statewide GHG emissions target of 10 percent below 1990 levels by 2020 and 80 percent below 2001 levels by 2050. The State is in position to achieve the 2020 target ahead of schedule. According to the latest Connecticut Greenhouse Gas Emissions Inventory 2012[42], GHG emissions fell to 39.5 million metric tons (MMT) which represents an overall decline of 10.5 percent from 1990 emissions. The bulk of Connecticut's GHG emissions are from Transportation (40 percent) followed by Electric Power Generation (18 percent) and Residential use (17 percent). The remaining 25 percent is comprised of waste and wastewater, commercial, industrial and agriculture.

To meet the ambitious 2050 reductions, the Governor created the Governor's Council on Climate Change (GCCC) under Executive Order 46 in April of 2015, to examine the existing policies and regulations designed to reduce GHG emissions and identify new strategies to meet the 2050 target.

Potential Impact

On August 2, 2016 the Council on Environmental Quality (CEQ) released guidance on Climate Change in NEPA; Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. As stated in the FHWA Transmittal of CEQ Guidance (August 2016), the CEQ guidance applies to EAs and EISs and calls for analysis of direct and indirect GHG emissions from proposed Federal Agency actions. The guidance establishes that the level of analysis should be commensurate with the quantity of projected GHG emissions. It also calls for consideration of the impacts of a changing climate on the Proposed Action and on the affected environment.

Under the No Action Alternative, the Orange Rail Station would not be built and no vehicle trips would be diverted or generated although other development on the adjacent privately-owned parcel could occur.

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[40]IPCC, 2014: Climate Change 2014: Synthesis Report Summary for Policymakers. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

[41] "U.S.-China Joint Announcement on Climate Change," White House, Office of the Press Secretary, November 11, 2014, on the White House website, https://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change, accessed June 5, 2015.

[42]http://www.ct.gov/deep/lib/deep/climatechange/2012_ghg_inventory_2015/2012_ct_ghg_inventory_final.pdf

The proposed Orange Rail Station could result in a minor increase in the use of gasoline and diesel powered vehicles and associated GHG emissions compared to the overall traffic in the vicinity of the project. GHG emissions from vehicles using roadways are a function of distance traveled (expressed as vehicle miles traveled, or VMT), vehicle speed, and road grade. GHG emissions are also generated during roadway construction and maintenance activities. VMT derived from the MSAT Affected Network for each Alternative was used to characterize the VMT changes for the GHG discussion (See *Table 3-16* above).

Under the No Action Alternative, VMT is expected to gradually increase in the vicinity of the Proposed Action between 2017 and 2037 as employment and population in the area increases. Furthermore, under the Preferred Alternative, increased capacity and improved transit access with the Orange Rail Station will lead to a slight increase in VMT in the immediate vicinity of the project area relative to the No Action Alternative.

Under the No Action Alternative, VMT is expected to increases approximately 12 percent between 2017 and 2037 while under the Preferred Alternative, VMT is expected to increase on average approximately 17 percent compared to 2017 levels. Nationally, the Energy Information Administration (EIA) estimates that VMT will increase by approximately 38 percent between 2012 and 2040, so the VMT increase under the No Action and Preferred Alternatives is still at or well below the projected national rate.

Mitigation

A major factor in mitigating this increase in VMT is more stringent national fuel economy standards. EIA projects that vehicle energy efficiency (and thus, GHG emissions) on a per-mile basis will improve by 28 percent between 2012 and 2040. This improvement in vehicle emissions rates will help mitigate the increase in VMT for both the No Action and Preferred Alternatives. Other factors related to the project would also help reduce GHG emissions relative to the No Action Alternative. The project would improve rail access across the area and thereby remove vehicle trips from roadway networks in the southwestern Connecticut region.

3.6.3.1 Tip and Conformity Determination

EPA promulgated the transportation conformity rule (40 CFR Parts 51 and 93) pursuant to requirements of the CAA. The rule only applies in EPA designated non-attainment or maintenance areas (40 CFR 93.102(b)). The area of the Proposed Action is designated by the EPA as a moderate non-attainment area for the 2008 8-hour ozone standard and a maintenance area for CO, and PM2.5 (1997 and 2006 standards). The area is designated as attainment for all other NAAQS. Based on these EPA designations for the study area, transportation conformity requirements apply for this project for PM2.5. On August 24, 2016, EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in *2012.*"[43] Accordingly the region is no longer designated as maintenance for the 1997 PM2.5 standards. The area is still designated as maintenance with the 2006 PM2.5 standards. Air quality

[43] See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf

conformity is a process intended to ensure that FTA funding goes to transit activities that are consistent with the air quality goals set forth in the Clean Air Act.

3.6.3.2 Project Level Conformity Determination

The EPA promulgated the Transportation Conformity Rule (40 CFR Parts 51 and 93) concerning applicability, procedures, and criteria that transportation agencies must use in analyzing and determining conformity of transportation projects. The Transportation Conformity Rule applies to federal funded transportation projects in certain areas that have violated one or more of the NAAQS in EPA designated non-attainment or maintenance areas (40 CFR 93.102(b). In March of 2006, EPA issued joint guidance for conducting a hot-spot analysis for particulate matter. The guidance applies to projects within a maintenance or non-attainment area for PM2.5 and outlines the criteria for determining whether a project is considered to be one of "air quality concern". The guidance has been updated since 2006 and in November 2015, EPA issued the most recent updated modeling guidance for performing quantitative analyses of PM2.5 and PM10 emissions to demonstrate conformity with the PM2.5 NAAQS. This guidance pertains to federal-funded or approved transportation projects that are deemed to be projects of air quality concern that are located in PM2.5 non-attainment and maintenance areas. As the project is located in an area subject to the federal transportation conformity rule, inter-agency consultation is required under the federal rule and the Connecticut Regulation for Transportation Conformity. Air quality conformity inter-agency consultation was conducted on the models, methods and assumptions for transportation conformity in June of 2010[44].

Based on the criteria specified in the Transportation Conformity rule and associated guidance, the Project is not considered to be one of "air quality concern" for fine particulate matter (See Section 4.7.5). Therefore, the CAA and 40 CFR 93.116 requirements for PM2.5 were met without a hot-spot analysis, since such projects have been found not to be of air quality concern under 40 CFR 3.123(b)(1).

The conformity rule requires that a conforming transportation plan and program be in place at the time of the project approval (40 CFR 93.114), and for the project to be included in the conforming plan and program (40 CFR 93.115). The CTDOT performed a PM2.5 Air Quality Determination and an Ozone Air Quality Determination for projects included in the Transportation Conformity of the Metropolitan Regional Planning Organizations' Fiscal Year 2015–2018 Transportation Improvement Programs (TIP) as Amended, and the 2015 Regional Long Range Transportation Plans (LRTP) to the State Implementation Plan (SIP) for air quality. The submittal also incorporates the FY 2015–2018 TIPs, as Amended and 2015 LRTPs from Connecticut's Regional Planning Organizations (RPOs), and Mobile Vehicle Emission Budgets (MVEBs). The Orange Railroad Station construction was included in both the STIP and LRTP of both the PM2.5 and ozone Conformity Determination which showed that construction and operation of the Orange Railroad Station would not interfere with the SIP and that the current STIP and LRTP were found to be in conformance.[45].

[44] http://www.ct.gov/dot/lib/dot/documents/dplansprojectsstudies/plans/airqualityconformity/interagencyconsulationprocess_7-6-2010.pdf

[45] It is assumed that impacts associated with the proposed residential and commercial buildings will be addressed by the developer of this privately-owned TOD. This analysis would be separate from the Environmental Impact Evaluation and is not included in this air quality study. The TOD was not included in the latest CTDOT Transportation Conformity Determinations.

3.7 Noise

Noise from a rail transit system is analyzed in terms of a "source-path-receiver" framework. The "source" generates noise levels which depend on the type of source, such as rolling noise from the interaction of steel wheels and rails, and its operating characteristics. The "receiver" is the noise-sensitive land use (e.g., residence) exposed to noise from the source. In between the source and the receiver is the "path" where the noise is reduced by distance, intervening buildings and topography. Environmental noise impacts are assessed at the receiver.

Noise is typically defined as unwanted or undesirable sound, where sound is characterized by small air pressure fluctuations above and below the atmospheric pressure. The basic parameters of environmental noise that affect human subjective response are (1) intensity or level, (2) frequency content and (3) variation with time. The first parameter is determined by the magnitude of the sound pressure fluctuation above and below the atmospheric pressure, and is expressed on a compressed scale in units of decibels. The frequency content of noise is related to the tone or pitch of the sound. Frequency is based on the rate of the air pressure fluctuation in terms of cycles per second and expressed in Hertz (Hz). Because the sensitivity of human hearing varies with frequency, the "A-weighting system" is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response. Sound levels measured using this weighting system is expressed in A-weighted decibels (dBA).

It is common practice to condense all of this information into a single number, called the "equivalent" sound level (Leq). Leq can be thought of as the steady sound level that represents the same sound energy as the varying sound levels over a specified time period (typically one hour or 24 hours). Often the Leq values over a 24-hour period are used to calculate cumulative noise exposure in terms of the Day-Night Sound Level (Ldn). Ldn, is expressed in dBA and represents an average noise level evaluated over 24 hours in which a 10 dBA "penalty" is added to the hourly equivalent noise level for each of the nine nighttime hours (10 PM to 7 AM) to account for both increased human sensitivity to nighttime noise during quiet activities (such as sleeping) and the reduction in ambient noise levels during the nighttime hours.

Potential noise impacts for the project were assessed based on the methodology described in the U.S. Federal Transit Administration (FTA) guidance manual "Transit Noise and Vibration Impact Assessment" (FTA-VA-90-1003-06, May 2006). The noise study area is defined by the FTA unobstructed noise screening distance for commuter rail station (with horn blowing) of 1,600 feet from the center of noise-generating activity.

3.7.1 Methodology

Noise Impact Criteria

The FTA noise impact criteria group noise-sensitive land uses into the following three categories:

- Category 1: Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.

- Category 2: Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity is assumed to be of utmost importance.

- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses, such as museums and schools (Categories 1 and 3), the maximum 1-hour Leq during the facility's operating period is used. There are two levels of impact included in the FTA criteria, as summarized below:

- Severe Impact: Project-generated noise in the severe impact range can be expected to cause a significant percentage of people to be highly annoyed by the new noise and represents the most compelling need for mitigation. Noise mitigation will normally be specified for severe impact areas unless there are truly extenuating circumstances that prevent it.

- Moderate Impact: In this range of noise impact, the change in the cumulative noise level is noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation.

The FTA noise impact criteria are shown in graphical form in *Figure 3-22*. Along the horizontal axis of the graph is the existing noise exposure and the vertical axis shows the additional noise exposure from the project that would cause either moderate or severe impact. The future noise exposure would be the combination of the existing noise exposure and the additional noise exposure caused by the project.

Figure 3-23 shows the noise impact criteria for Category 1 and 2 land uses in terms of the allowable increase in the cumulative noise exposure. Along the horizontal axis of the graph is the existing noise exposure and the vertical axis shows the noise exposure increase due to the project that would cause either moderate or severe impact. The noise exposure increase is the difference between the future noise exposure and the existing noise exposure. Therefore, the future noise exposure increase would include modifications to the existing conditions such as shifting the existing rail track, or introducing warning horns as trains enter a new station.

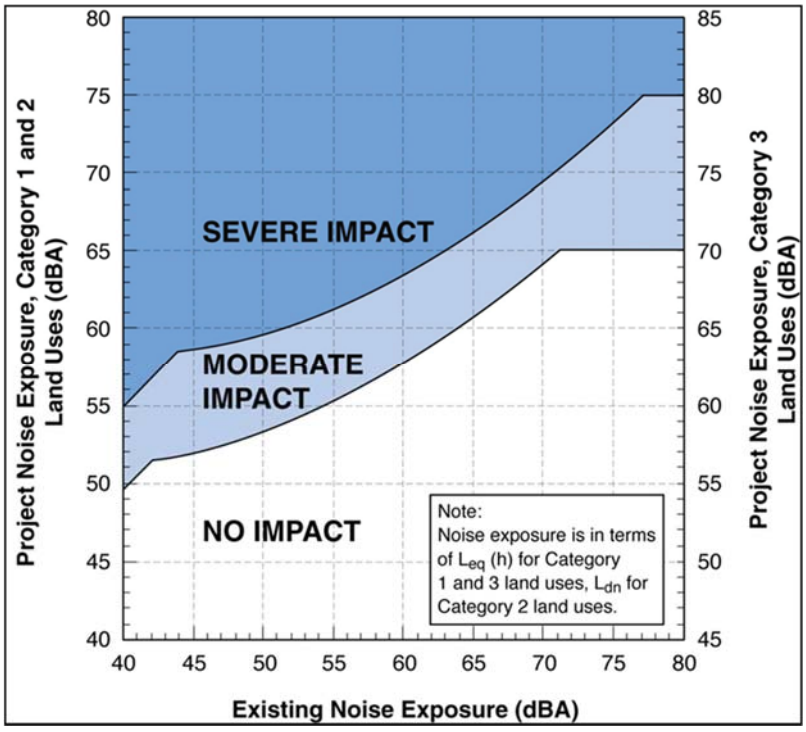


Figure 3-20. FTA Project Noise Impact Criteria

Source: Federal Transit Administration, 2006

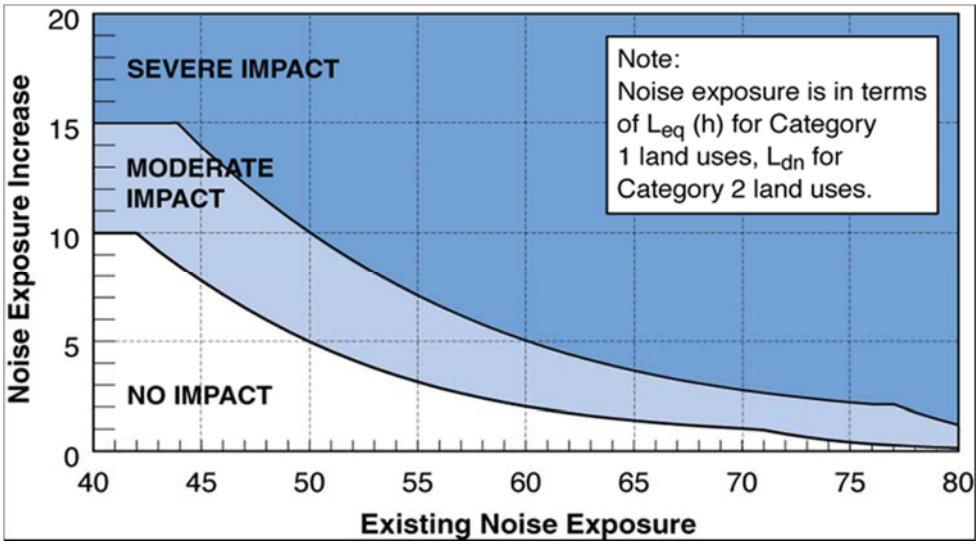


Figure 3-21. Increase in Cumulative Noise Exposure Allowed by FTA Criteria

Source: Federal Transit Administration, 2006

Noise Measurement Procedures

The noise measurement equipment included Bruel & Kjaer model 2250 and Larson Davis model 820 noise monitors. The equipment conforms to American National Standards Institute (ANSI) Standard S1.4 for Type 1 (Precision) sound level meters. Calibrations, traceable to the U.S. National Institute of Standards and Technology (NIST) were carried out in the field before and after each set of

measurements using acoustical calibrators. At each site, the measurement microphone was protected by a windscreen, supported on a tripod at a height of four to six feet above the ground, and positioned to characterize the exposure of the site to the dominant noise sources in the area.

3.7.2 Existing Conditions

Areas proximal (within 1,600 feet[46]) to the proposed Orang Railroad Station and TOD include commercial and industrial uses adjacent to the southwest, south, and northeast; single-family residences to the west, east, and northeast; medical facilities to the south; and institutional land uses to the north. The existing noise-sensitive land uses in the study area are described below from west of the proposed Orange Railroad Station to east of the proposed Orange Railroad Station:

- Yale West Campus (including the Bright Horizon Child Care and Yale School of Nursing which are the closest noise-sensitive facilities to the proposed station area – both considered Category 3) in the vicinity of West Campus Drive and next to the I-95 interchange, and behind commercial and industrial buildings adjacent to the proposed station area (Orange).
- Hope Academy (Category 3) in the vicinity of the Marsh Hill Road and Salemme Lane intersection (Orange).
- Mixed one- and two-story single-family residences (Category 2) in the vicinity of the Marsh Hill Road and Salemme Lane intersection (Orange).
- Medical facilities (Category 3) in the vicinity of the Oxford Road and Connair Road intersection, and behind commercial and industrial buildings adjacent to the proposed station area (Milford).
- Primarily two-story single-family residences (Category 2) in the vicinity of the Oxford Road and Wayne Road intersection, and behind commercial and industrial buildings adjacent to the proposed station area (Milford).
- Primarily two-story single-family residences (Category 2) in the vicinity of the Perry Merrill Drive and Chin Clift Trail intersection (West Haven).
- Mixed one- and two-story single-family residences (Category 2) in the vicinity of the Island Lane and Ridgehollow Road intersection, and partially behind commercial and industrial buildings adjacent to the proposed station area (West Haven).

The existing ambient noise measurement program included long-term (24-hour) monitoring of sound levels at representative noise-sensitive locations. Four sites were selected for monitoring. Noise measurements were performed primarily at residential properties, but represented multiple noise-sensitive sites previously described in the existing noise-sensitive land uses. Measurement Site M1 was selected to represent single-family residences in the vicinity of the Perry Merrill Drive and Chin Clift Trail intersection. Residences at this subdivision are closest to the proposed Orange Railroad Station area on the east side. Measurement Site M2 was selected to represent single-family residences in the vicinity of the Island Lane and Ridgehollow Road intersection. Residences at this location are partially shielded by commercial and industrial buildings; however, they are adjacent to residences represented by M1 and those that are not shielded are relatively equidistant to the proposed station area. Measurement Site M3 was selected to represent single-family residences and the Hope Academy in the vicinity of the Marsh Hill Road and Salemme Lane intersection. These noise-sensitive sites are closest to the proposed

[46] The FTA unobstructed noise screening distance (from the center of noise-generating activity) for commuter rail station with horn blowing.

station area on the west side. Measurement Site M4 was selected to represent single-family residences and medical facilities in the vicinity of the Oxford Road intersections with Connair Road and Wayne Road. These noise-sensitive sites are located south of the proposed station area and are behind commercial and industrial buildings (that are adjacent to the proposed station area). The project and locations of the noise measurement sites are shown in *Figure 3.22*.

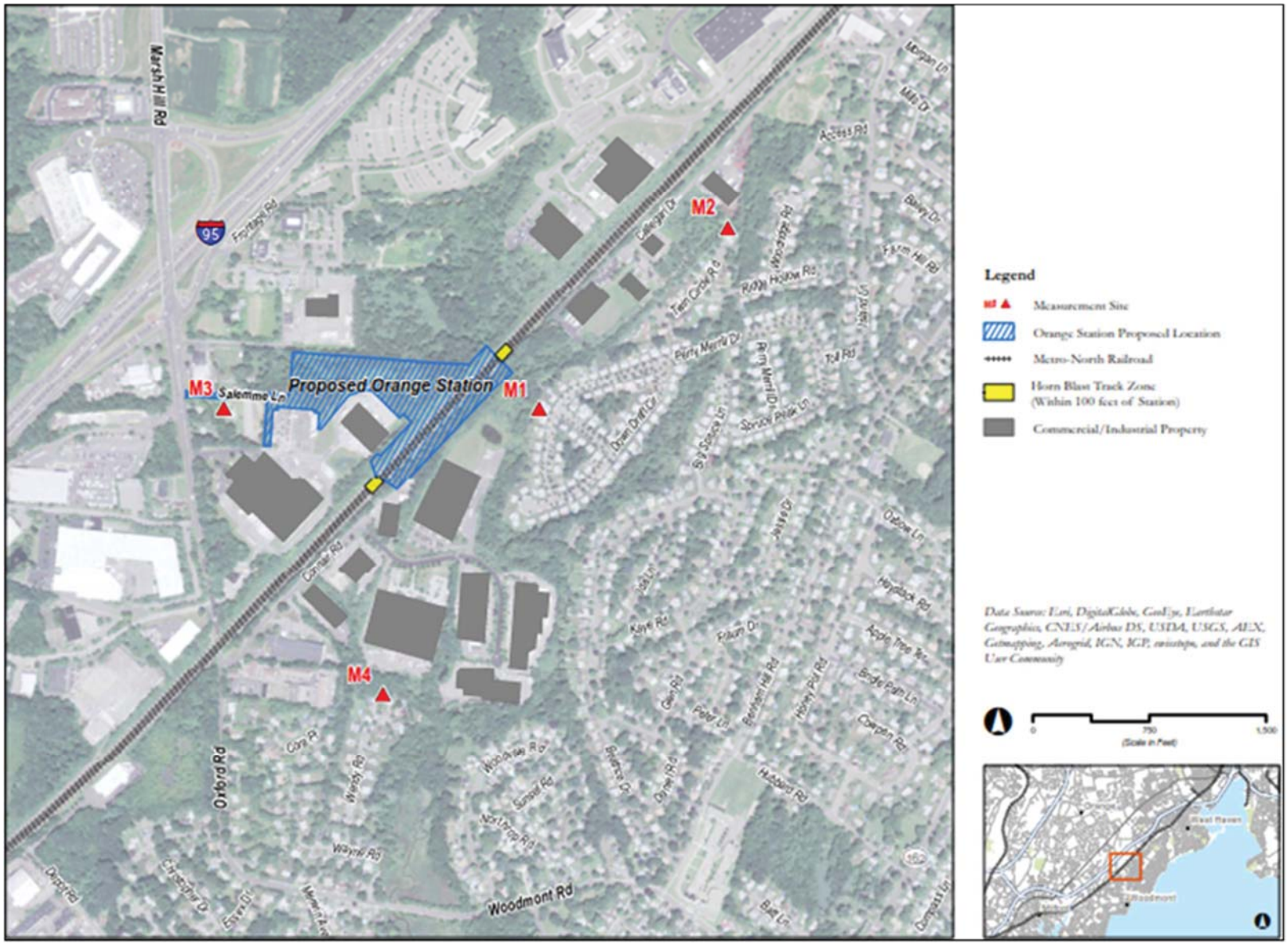


Figure 3-22. Location Map for Noise Measurement Sites

Noise Measurement Results

Existing ambient noise measurements were conducted November 1 through 2, 2016. The results of the existing ambient noise measurements are summarized in Table 3-18. These results serve as the basis for determining the existing noise conditions at all noise-sensitive receivers in the study area. Existing noise levels at noise-sensitive receivers were calculated from measurement results with consideration of the relative distance from the dominant noise source to the noise-sensitive receiver. For noise-sensitive receivers near noise measurement locations (and relatively the same distance from the dominant noise source), the noise level determined from the noise measurement was used. Noise measurement field sheets, site and noise measurement equipment photographs, and sound level meter calibration certificates are included in *Appendix D*.

Table 3-18. Summary of Existing Ambient Noise Measurement Results

Site No.	Measurement Location Description	Start of Measurement		Meas. Duration (hours)	Ambient Noise Exposure (dBA)	
		Date	Time		Ldn	Leq
M-1	Two-story single-family residence at 109 Perry Merrill Drive, West Haven	11/1/2016	12:00 PM	24	51.8	51.5
M-2	Two-story single-family residence at 30 Twin Circle Road, West Haven	11/1/2016	2:00 PM	24	61.8	59.5
M-3	One-story single-family residence at 15 Salemme Lane, Orange	11/1/2016	3:00 PM	24	62.3	56.2
M-4	Two-story single-family residence at 96 Wendy Road, Milford	11/1/2016	4:00 PM	24	55.6	52.9

3.7.3 Impact Analysis

No Build Alternative

Under the No Action Alternative, the proposed Orange Railroad Station will not be constructed. Noise from a commuter rail station with horn blowing will not occur within the project area.

Build Alternative Noise

The Proposed Action includes:

- Orange Railroad Station access road (proposed reconstruction and extension of Salemme Lane that connects to existing Marsh Hill Road)
- Orange Railroad Station with high-level platforms, canopies, commuter parking garage, and pedestrian overpass

Because of the relationship between the Proposed Action and the adjacent privately-owned TOD (as described in *Section 1.1.2*), proposed conditions associated with the TOD were also assessed including: commercial buildings[47], multi-family residential buildings[48], and commercial/residential parking garage)

The FTA recommended screening distances for parking facilities and access roads are 125 feet and 100 feet from the centerline of the noise generating activity or roadway, respectively. There is no existing noise-sensitive land uses located within the parking garage screening distance.

Several residential properties (a single-family home at 10 Salemme Lane, a single-family home at 15 Salemme Lane, and a vacant parcel at the east end of Salemme Lane) are adjacent and within 100 feet of the proposed access road. As indicated in the FTA noise manual[49], exceeding the operational criteria for access roads to a station with 1,000 vehicles or more (with speeds of 35 mph) utilizing the access road on an hourly basis would require a detailed highway noise study. The future (2037) traffic volume for the proposed Salemme Lane extension is 688 vehicles per hour[50]. This is lower than the FTA operational criteria; hence, it is anticipated that a detailed highway noise study will not be required.

Under the Proposed Action, rail operations at the new Orange Railroad Station will involve horn blowing during daytime hours for trains approaching the platforms, including trains that are stopping and trains that are passing through (in accordance with Metro-North Railroad operating rules), and horn blowing during night-time for trains approaching the station only when people are present on the platforms. The following assumptions about the Metro-North Railroad's operating plan for the proposed Orange Railroad Station were used in the noise model development:

- The train warning sound will be one long horn signal within 100 feet of the end of the station platforms.
- Sixty-six trains during the day and six trains at night will be Metro-North Multiple Unit Electric trains running on the outer tracks and stopping at the platforms. Each Metro-North train are expected to include nine cars and have front-mounted horns located near the bottom of the lead unit.
- Eighteen trains during the day and two trains at night will be intercity electric trains (Amtrak) passing by the proposed station. Each intercity train will include eight cars with center-mounted horns on the top of the locomotive.

[47] Commercial buildings are not considered noise-sensitive land uses and were only included as part of shielding in this FTA noise study.

[48] This future residential development is within the FTA's unobstructed noise screening distance of 1,600 feet (from the center of noise-generating activity) for commuter rail station with horn blowing, and its proximity to the new railroad station may result in potential noise impacts. The noise analysis and potential noise impacts associated with the proposed multi-family residential building should be addressed by the developer of this privately owned TOD. This analysis would be separate from the Environmental Impact Evaluation and is not included in this FTA noise study.

[49] The FTA guidance manual "Transit Noise and Vibration Impact Assessment" (FTA-VA-90-1003-06, May 2006).

[50] Based on Figure 3: 2037 Combined Traffic Volumes Weekday Morning Peak Hour of the Traffic and Parking section of the Environmental Impact Evaluation, which indicates the worst peak hour traffic on Salemme Lane.

- Four diesel powered freight trains will pass by the proposed Orange Railroad Station at night. Each freight train will typically include two diesel locomotives and up to 25 boxcars/hoppers. However, the use of train warning sound by freight trains as they pass by the Orange Railroad Station at night is not anticipated. The train warning sound for freight trains will not be evaluated in this noise analysis.
- Trains stopping at the platforms (Metro-North) will sound their horns as they slow, travelling at an average speed of 10 mph. Trains continuing through the Orange Railroad Station on the outer tracks (intercity and freight) will be travelling at 45 mph.
- A total of 84 trains (combined Metro-North and intercity trains) will be required to sound their horns during the day, and a total of six trains (Metro-North) will be required to sound their horns at night. The train warning sound for Metro-North and intercity trains will be evaluated in the noise analysis.
- The reference train horn level is a sound exposure level (SEL) of 110 dBA at 50 feet[51].
- Shielding is typical for a dense-suburban environment.

The results of the noise analysis indicate that there would not be any potential for moderate or severe noise impact from rail operations at the new Orange Railroad Station and horn blowing during daytime and night-time hours.

Table 3.19 provides a summary of the projected noise levels for the Build Alternative, which includes the commuter rail station and the TOD. The table provides a breakdown by general location and FTA noise-sensitive land use category. The data provide a range of minimum to maximum predicted noise levels in each section of the study area and includes the distance to the near track horn zone, maximum speed, existing and predicted noise levels, impact criteria, total future noise level, and the projected noise level increase.

The locations of noise-sensitive land uses and the impact status of receptors are shown in *Figure 3.23*.

Build Alternative Construction Noise
Temporary noise and vibration impacts could result from activities associated with the construction of the new Orange Railroad Station and TOD, utility relocation, grading, excavation, track work, and installation of systems components. Such impacts may occur in residential areas and at other noise-sensitive land uses located within several hundred feet of the alignment. The potential for noise impact would be greatest at locations near pavement breaking, and at locations close to any nighttime construction work.

3.7.4 Mitigation

In conclusion, potential direct noise impacts from a commuter rail station with horn blowing will not occur within the project area for either the No Action Alternative or the Proposed Action. Although temporary noise and vibration impacts are possible during the construction phase of the project, these

[51] The reference train horn level was determined in accordance with the guideline provided in the FTA guidance manual "Transit Noise and Vibration Impact Assessment" (FTA-VA-90-1003-06, May 2006).

are not anticipated to be significant and can be minimized by the use of construction best management practices including:

- Avoiding nighttime construction in areas adjacent to residential neighborhoods (east of the proposed station).
- Locating stationary construction equipment as far as possible from noise-sensitive sites (adjacent noise-sensitive sites to the west and east of the proposed station).
- Constructing noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive sites.
- Routing construction-related truck traffic to roadways that will cause the least disturbance to noise-sensitive sites.
- Using alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile-drivers and compactors).

Table 3-19. Noise Impact Summary

Receptor No.	Land Use Category	Distance to Northbound Horn Zone (ft)	Distance to Southbound Horn Zone (ft)	Existing Noise Level	Project Noise Level			Impact Status
					Predicted	Impact Criteria		
						Moderate	Severe	
Primarily Two-Story Single-Family Residences in the Vicinity of the Perry Merrill Drive And Chin Clift Trail Intersection and Measurement Site M1								
R1	Cat 2	844	1034	58	54.7	56.6	62.3	No Impact
R2	Cat 2	843	905	58	55.0	56.6	62.3	No Impact
R3	Cat 2	882	877	58	54.9	56.6	62.3	No Impact
R4	Cat 2	1000	915	58	54.0	56.6	62.3	No Impact
R5	Cat 2	973	828	58	54.3	56.6	62.3	No Impact
R6	Cat 2	976	743	58	54.9	56.6	62.3	No Impact
R7	Cat 2	995	671	58	54.9	56.6	62.3	No Impact
R8	Cat 2	1017	613	58	55.1	56.6	62.3	No Impact
R9	Cat 2	1051	545	58	55.4	56.6	62.3	No Impact
R10	Cat 2	1102	486	58	55.8	56.6	62.3	No Impact
R11	Cat 2	1155	447	58	56.0	56.6	62.3	No Impact
R12	Cat 2	1220	440	58	55.7	56.6	62.3	No Impact
R13	Cat 2	1273	430	58	55.4	56.6	62.3	No Impact
R14	Cat 2	1345	449	58	54.7	56.6	62.3	No Impact
R15	Cat 2	1427	498	58	53.8	56.6	62.3	No Impact
R16	Cat 2	1497	556	58	52.8	56.6	62.3	No Impact
R17	Cat 2	1564	611	58	52.4	56.6	62.3	No Impact
R18	Cat 2	1633	669	58	51.2	56.6	62.3	No Impact
R19	Cat 2	1707	735	58	50.4	56.6	62.3	No Impact
R20	Cat 2	1774	798	58	49.9	56.6	62.3	No Impact

Receptor No.	Land Use Category	Distance to Northbound Horn Zone (ft)	Distance to Southbound Horn Zone (ft)	Existing Noise Level	Project Noise Level			Impact Status
					Predicted	Impact Criteria		
						Moderate	Severe	
Primarily Two-Story Single-Family Residences in the Vicinity of the Perry Merrill Drive And Chin Clift Trail Intersection and Measurement Site M1								
R21	Cat 2	1848	864	58	49.6	56.6	62.3	No Impact
R22	Cat 2	1908	910	58	49.5	56.6	62.3	No Impact
R23	Cat 2	1981	986	58	49.6	56.6	62.3	No Impact
R24	Cat 2	2057	1057	58	49.7	56.6	62.3	No Impact
R25	Cat 2	2110	1109	58	49.7	56.6	62.3	No Impact
R26	Cat 2	1133	942	58	52.5	56.6	62.3	No Impact
R27	Cat 2	1107	795	58	53.4	56.6	62.3	No Impact
R28	Cat 2	1125	737	58	53.5	56.6	62.3	No Impact
R29	Cat 2	1147	678	58	53.5	56.6	62.3	No Impact
R30	Cat 2	1204	611	58	53.5	56.6	62.3	No Impact
R31	Cat 2	1223	685	58	52.3	56.6	62.3	No Impact
R32	Cat 2	1308	572	58	52.6	56.6	62.3	No Impact
R33	Cat 2	1352	642	58	51.7	56.6	62.3	No Impact
R34	Cat 2	1394	586	58	53.2	56.6	62.3	No Impact
R35	Cat 2	1470	639	58	51.3	56.6	62.3	No Impact
R36	Cat 2	1538	682	58	51.2	56.6	62.3	No Impact
R37	Cat 2	1613	741	58	50.5	56.6	62.3	No Impact
R38	Cat 2	1678	794	58	50.1	56.6	62.3	No Impact
R39	Cat 2	1746	849	58	49.9	56.6	62.3	No Impact
R40	Cat 2	1820	910	58	49.9	56.6	62.3	No Impact

Receptor No.	Land Use Category	Distance to Northbound Horn Zone (ft)	Distance to Southbound Horn Zone (ft)	Existing Noise Level	Project Noise Level			Impact Status
					Predicted	Impact Criteria		
						Moderate	Severe	
Mixed One- and Two-Story Single-Family Residences in the Vicinity of the Island Lane And Ridgehollow Road Intersection and Measurement Site M2								
R41	Cat 2	2353	1299	62	49.8	58.8	64.3	No Impact
Mixed One- and Two-Story Single-Family Residences and Institutions in the Vicinity of the Island Lane And Ridgehollow Road Intersection and Measurement Site M2								
R42	Cat 2	2284	1213	62	49.9	58.8	64.3	No Impact
R43	Cat 2	2208	1148	62	50.0	58.8	64.3	No Impact
R44	Cat 2	2127	1071	58	50.1	56.6	62.3	No Impact
R45	Cat 2	2012	962	58	50.0	56.6	62.3	No Impact
R46	Cat 2	1903	859	58	50.2	56.6	62.3	No Impact
R47	Cat 2	2148	1050	62	49.9	58.8	64.3	No Impact
R48	Cat 2	2232	1127	62	49.7	58.8	64.3	No Impact
R49	Cat 2	2306	1191	62	49.3	58.8	64.3	No Impact
R50	Cat 2	2388	1268	62	49.0	58.8	64.3	No Impact
R51	Cat 2	2457	1331	62	48.7	58.8	64.3	No Impact
R52	Cat 2	2464	1372	62	49.1	58.8	64.3	No Impact
R53	Cat 2	2526	1425	62	48.7	58.8	64.3	No Impact
R54	Cat 2	2688	1546	62	47.3	58.8	64.3	No Impact
Hope Academy	Cat 3	1255	1856	62	51.7	60.8	66.6	No Impact
Bright Horizons	Cat 3	1354	1410	62	50.3	60.8	66.6	No Impact
Mixed One- and Two-Story Single-Family Residences in the Vicinity of the Marsh Hill Road and Salemme Lane Intersection and Measurement Site M3								
R55	Cat 2	978	1720	62	51.2	59.1	64.6	No Impact
R56	Cat 2	1174	1916	62	53.4	59.1	64.6	No Impact
R57	Cat 2	1118	1913	62	54.2	59.1	64.6	No Impact

Receptor No.	Land Use Category	Distance to Northbound Horn Zone (ft)	Distance to Southbound Horn Zone (ft)	Existing Noise Level	Project Noise Level			Impact Status
					Predicted	Impact Criteria		
						Moderate	Severe	
Primarily Two-Story Single-Family Residences and Medical Facilities in the Vicinity of the Oxford Road And Wayne Road Intersection and Measurement Site M4								
R58	Cat 2	1336	2356	56	48.9	55.5	61.4	No Impact
Intuitive Surgical, Inc.	Cat 3	1201	2349	56	47.8	59.4	65.4	No Impact

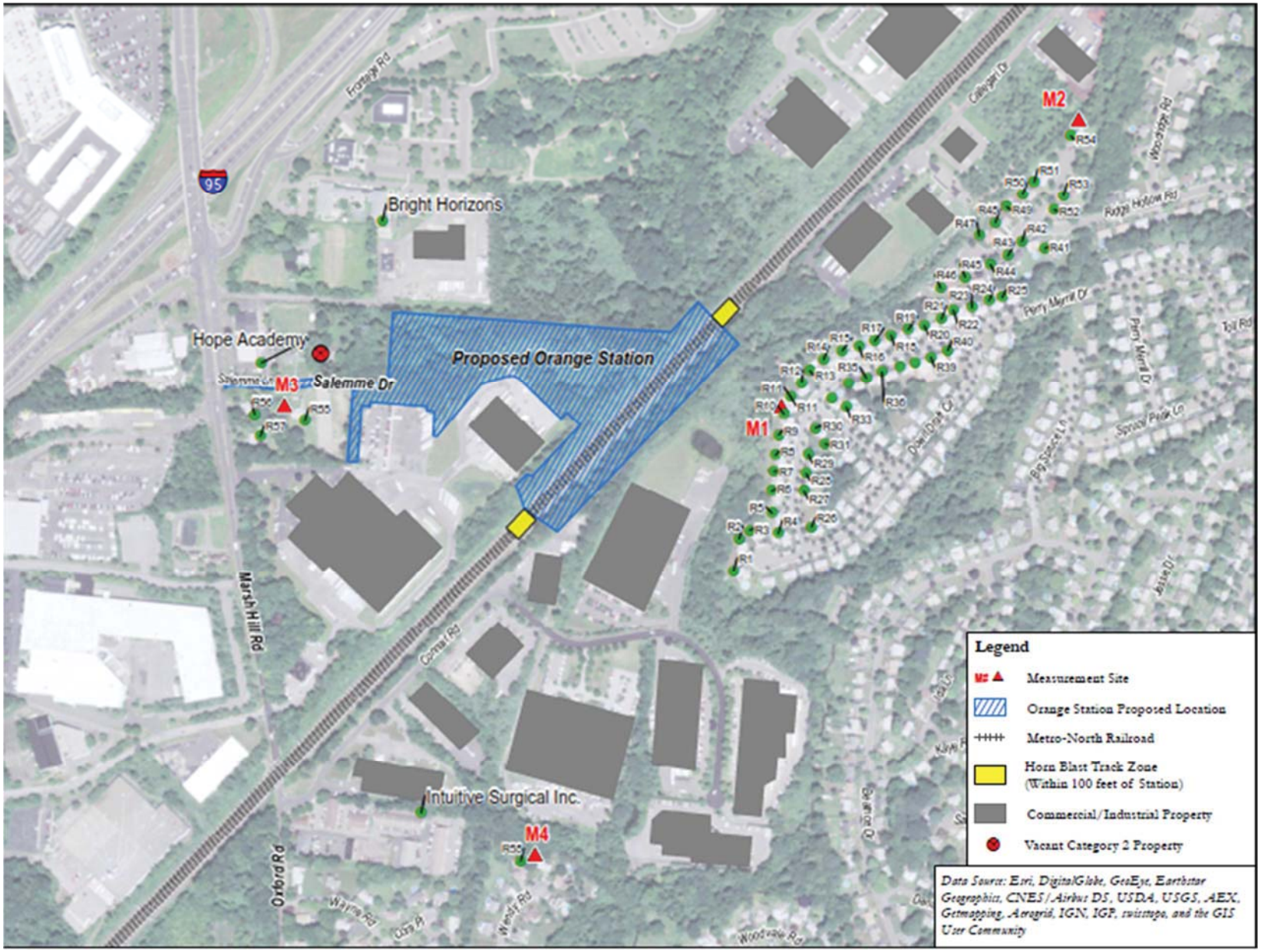


Figure 3-23. Impact Status for Category 2 Receptors

3.8 Socioeconomic Effects/Neighborhoods/Housing

This section summarizes the existing demographic, economic and real estate conditions around the site of the Proposed Action in Orange, Connecticut, and evaluates potential socioeconomic impacts of the Proposed Action. In addition, an update of the financial analysis from the 2007 EIE was prepared and further details of the analysis are provided in a separate report in *Appendix E*.

3.8.1 Existing Conditions

The Proposed Action study area is contained in an area of approximately ½-mile radius about the site, representing those parcels which may be impacted for future development or redevelopment. The study area is a mixed suburban setting with single family neighborhoods, low density light industrial development and highway-oriented commercial activity. The property is zoned for and includes a mix of light industrial, warehouse/distribution and service businesses.

Socioeconomics

Since 2000, there has been little population change in the Orange study area. This is in contrast to the town which realized growth during the decade and, after a slight decline in population, is projected to realize growth from 2015 to 2020. Note that if all of the 200 residential units at the proposed TOD are occupied, and assuming the town-wide average household size, this equates to an estimated population increase of 545 persons, representing a near four percent increase over the 2015 population.

Although the overall population in the Orange study area is nominal, there has been a decline among those aged 35 to 54 years, typically considered to be in their peak earning and spending years. This loss is projected to continue through 2020. This pattern is similar for the town, county and State. In contrast, all areas have, and are projected to continue, to realize growth in the 65 and older population.

The number of housing units in the Orange study area has grown since 2000, primarily among renter-occupied units, and is projected to continue to do so. The 2015 to 2020 projected town-wide housing growth is 180± units, with about twice as many owner- occupied units as compared to renter-occupied units. Note that the proposed TOD includes 200 renter units, representing a four percent increase to town-wide housing (over the 2015 level) and specifically a 34% increase over 2015 enter-occupied units. The proposed TOD residential development exceeds the town-wide projected housing growth, without the development.

Households earning $100,000 or more are projected to increase for the Orange study area, the town, county and State. The number of households earning less is projected to decline for all areas. In 2015, the average household income for the Orange study area was $99,700, similar to the State and above the county ($85,100) but well below the town ($142,400). These relationships are projected to hold for 2020, with the town average household income at nearly $152,200. Of the population aged 25 and over, approximately 43 percent in the Orange study area have college degrees, similar to the State and more than county (39 percent) but well below the town at 61 percent.

In 2015, approximately 60 percent of the population aged 16 and over in the Orange study area was employed. This is projected to remain constant through 2020. The town, county and State all also exhibit employment rates at around 60 percent of the 16 and over population. Since 2009, the town, county and State have all experienced employment growth across nearly all industrial sectors, with the universal exception of the manufacturing sector. The town also realized an employment decline among finance and insurance, as well as the retail trade sectors. However, since August 2014, the unemployment rate for the Town of Orange has consistently been less than that for the county and for the State. The unemployment rate for September 2015 was four percent for the town compared with 5.2 percent (State) and 5.6 percent (New Haven County).

Between 2010 and 2014 there was a 7.6 percent growth in the number of businesses in the town, compared to a 3.3 percent and three percent growth in the number of businesses in the county and the State, respectively. However, the number of businesses utilizing industrial type space (such as wholesalers or warehousing) increased by nearly 27 percent in the town compared to declines in the county and State. The town, similar to the State, experienced a decline in retail businesses.

In terms of a location quotient there are several industry sectors where the town outperforms the State, including wholesale trade, real estate, retail (despite some employment declines) arts/entertainment and accommodations. The town significantly under-performs the State in the education, health care, professional/technical and information services sectors.

In 2010, approximately 86 percent of the employment in the Town of Orange was from commuters residing outside of the town. In a similar comparison, approximately 83 percent of the Town of Orange workforce commuted out of town to their place of employment, with top commuting destinations being New Haven, Milford, West Haven, Stratford and Bridgeport.

Environmental Justice

In accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Population and Low Income Populations, and subsequent procedures developed by the U.S. Department of Transportation (US DOT), activities that have potential to generate an effect on human health or the environment must include explicit consideration of their effects on minority and low-income populations (i.e., "Environmental Justice" effects or impacts). These regulations aim to prevent minority and low-income populations from exposure to disproportionately high adverse human health or environmental effects as a result of US DOT programs, policies, and activities.

Selected sociodemographics for the study area were compared to the Town of Orange, New Haven County and Connecticut (refer to Table 3-20). The total population of the study area has remained stable since 2010 compared to a modest decline town-wide and modest increase at the county and the State levels. Similarly the non-white population has increases since 2010 for all areas.

According to the 2010-2014 American Community Survey data, the project census tract does not contain a significant population having limited English proficiency, with significant being 5% of the population or 1000 individuals, whichever is smaller.

Also noted in *Table 3-20*, despite the study area exhibiting a per capita income less than that for the Town of Orange, it was greater than the per capita income for either New Haven County or the State. The study area saw no change in the number of persons aged 25 or older who do not have a high school diploma. This compares to an increase town-wide and a decline in this statistic for both the county and the State.

The number of households in the study area without a vehicle held constant between 2010 and 2015, dissimilar to the Town of Orange, the county and the State where the number of households without vehicles all increased.

Table 3-20. Selected Sociodemographics

Selected Sociodemographics	Orange Study Area	Town of Orange	New Haven County	Connecticut State
Total Population				
2010	159	13,956	862,478	3,574,098
2015	159	13,931	862,236	3,605,635
% change	0.0%	-0.2%	0.0%	0.9%
Nonwhite Population				
2010	18	1,538	217,733	801,688
2015	18	1,659	229,355	864,271
% change	9.7%	7.9%	5.3%	7.8%
Per Capita Income				
2010	$35,333	$51,486	$33,200	$37,597
2015	$35,864	$52,364	$33,489	$38,722
% change	1.5%	1.7%	0.9%	3.0%
Population Aged 25+ no High School Diploma				
2010	7	481	69,815	276,964
2015	7	487	69,374	275,320
% change	0.0%	3.3%	-0.6%	-0.6%
Households with no Vehicle Available				
2010	4	182	37,690	123,944
2015	4	190	37,981	126,343
% change	0.0%	4.4%	0.8%	1.9%

Source: US Census, Alteryx, and RKG Associates, Inc.

Real Estate Indicators

There are nearly 46.8 million square feet (SF) of industrial space in the county. According to the Orange Economic Development Corporation (OEDC), as of September 30, 2015, there was slightly more than 6.1 million SF of commercial space in Orange, with a vacancy rate of 4.1 percent (195,700 SF). This is down from a peak of 11.2 percent (613,500 SF) in March of 2011. Summaries of commercial sectors are presented next.

Office
The office space in the town represents less than 2% of the office space throughout the county, the town vacancy rate was nearly 22 percent in 2009 and has declined to no measured vacancy as of the 3rd quarter 2015. Office vacancy countywide held steady at 14 to 15 percent. In both time periods the town realized positive absorption of office space while the county did not. Asking lease rates in the town lag those of the county. A sampling of existing office properties for lease in the Town of Orange indicates a little more than 178,200 SF available with an average asking lease rate of $12.64/SF and/or an asking price $123/SF.

According to the OEDC, as of September 30, 2015, there was nearly 584,900 SF of office space in Orange, with a vacancy rate of 3.1 percent (18,400 SF). This is down from a peak of 18.1 percent (105,700 SF) in June of 2013.

Retail
A sample of offered retail space indicates a nominal availability of 25,725 SF with an average asking lease of $12.51/SF and/or asking price of $54/SF. According to information on shopping centers, compiled by the National Research Bureau, there is more than 1.2 million SF of shopping center space in the town, much of it proximate to the development site.

According to the OEDC, as of September 30, 2015, there was slightly more than 3.0 million SF of retail space in Orange, with a vacancy rate of 4.1 percent (123,400 SF). This is down from a peak of 10.9 percent (329,300 SF) in June of 2009.

Residential
Between 2000 and 2009 there were approximately 1,535 single-family residential sales in the Town of Orange, averaging 153 annually and sales of condominium units was less, averaging seven annually or less than five percent of single-family activity. The average selling price for a single-family home was $353,800, more than $90,000 greater than for a condominium. Over the 2010 to 2014 period, single-family sales have averaged 110-units annually with a price of $336,700, less than the previous decade. The average price for a condominium unit rose to $354,500 surpassing that for a single-family unit and now averaging about ten percent of the annual sales volume and a selling price greater than that for single-family units.

Since 2000, the town has averaged 15 single-family residential permits, annually. Single-family residential construction was robust prior to 2004, but since that time, there has been only a handful of single-family permits issued annually. The estimated construction value of these permits peaked at $306,000 in 2009, but that is from a small sample of permits. Over the entire time period (2000 through July 2010), the average estimated construction value was $247,000.

3.8.2 Impact Analysis

Environmental Justice
Impacts to environmental justice populations are assessed based on anticipated changes to community cohesion, access to transportation options, access to community resources and institutions, safety, and economic opportunity. There are three residential properties near the project site. According to tax

assessment records from the Town of Orange, all of these properties have been acquired by Sixty Five Marsh Hill Road, LLC, and the owner's address differs from the actual property address. As such, it is assumed that the prior homeowners have already sold these properties and that, if currently occupied, the occupants are renters rather than owners. These properties are also within the TODD overlay area, but are not part of either the Proposed Action or the TOD. Should development of these parcels for new or different uses occur with a TODD zone change, they would be subject to the TODD regulations and guidance, but is not assumed to adversely impact low income or minority populations. Construction of the 200 residential units in the TOD adjacent to the proposed commuter rail station includes 40-units of affordable housing, which coupled with the overall proximity and convenience of the proposed Orange Railroad Station to the study area population may improve access to public transportation, and hence employment opportunities, for the population (households) not having access to a private passenger vehicle, irrespective of whether these households are of low income or minority populations.

The No Action Alternative is not anticipated to result in adverse impacts to environmental justice communities. However, construction of the station would result in a benefit to these communities since vehicle ownership is declining. Consequently, the No Action Alternative will result in these benefits not being realized.

Real Estate Impacts
Considering the existing and planned development activity around the proposed Orange Railroad Station site, coupled with the recently adopted TODD by the Town of Orange, the appropriateness of a rail station at this location is an entirely compatible use. The No Action alternative is inconsistent with these local planning efforts since they depend on the anticipated construction of the station.

Whether any of these properties would convert to other uses, given the development and auto traffic to the Orange Railroad Station is questionable. Many of the surrounding parcels of land, particularly with visibility and access to the interstate, via a diamond interchange, are currently developed. Retail and other consumer uses are abundant to the north of the site along Route 1 and to the south of the site the roadway and land uses quickly turn residential. However, possible future uses, such as convenience stores, coffee shops and those attracted to high consumer/commuter traffic counts may have an interest in acquiring and assembling these parcels, providing visibility and access could be improved and are developed in accordance with the recently adopted/amended TODD.

Considering the existing and possible development activity around the proposed Orange Railroad Station site, coupled with the recently adopted TODD by the Town of Orange, a railroad station at this location is an entirely compatible use.

3.8.3 Mitigation

No adverse impacts are anticipated to result to environmental justice populations or properties from the Proposed Action, and the use is consistent with local economic plans for the area. Therefore, no economic mitigation measures are proposed.

3.9 Water Quality

3.9.1 Existing Conditions

Surface Water

The project site is located in the watershed of the Oyster River, which is a tributary to Long Island Sound, a designated national estuary. The Oyster River flows in a southerly direction and crosses under the New Haven Line near the eastern limit of the project area. Inland wetland areas, as described in Section 3.11, are located on the project site. Runoff from the undeveloped portions of the project site either flow to the Oyster River or the on-site drainage ditch (existing swale), which flows east to west along the northern side of the railroad tracks and eventually discharges to the Oyster River. Surface runoff from the western portion of Salemme Lane drains overland to a catch basin at its intersection with Marsh Hill Road, while the eastern portion drains east into the wooded, undeveloped areas of the site.

Existing stormwater quality from the undeveloped portions of the site is anticipated to be typical of either wooded or vegetated areas. Stormwater quality from developed portions of the site is anticipated to be typical of suburban residential and commercial land use.

Inland and coastal waters in Connecticut are assigned a Water Quality Classification based on Connecticut's Water Quality Standards (CTDEEP, 2014a). These classifications define designated uses that a waterbody can support. Classifications in the area surrounding the project site are shown in Figure 3-22. The Oyster River is designated as a Class A waterbody, with designated uses that include existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture. The tidal portion of the Oyster River is designated as SA (Figure 3.22), indicating its designated uses include habitat for marine fish, shellfish and wildlife habitat, shellfish harvesting for transfer to approved areas for purification prior to human consumption, recreation, industrial water supply and navigation. Downstream of the Oyster River, Long Island Sound is designated as SB, with designated uses that include habitat for marine fish, other aquatic life and wildlife; commercial shellfish harvesting; recreation; industrial water supply; and navigation. The Oyster River Estuary (CT-C1-017) in Milford, Connecticut is identified as impaired for habitat for marine fish, other aquatic life and wildlife with low dissolved oxygen, eutrophication, and polychlorinated biphenyls identified as the cause of the impairments. (CTDEEP, 2014b).

Groundwater

Groundwater beneath the proposed project site is assumed to flow east toward the Oyster River. Similar to surface waters, groundwater in Connecticut is also classified following the Connecticut Water Quality Classifications (CTDEEP, 2014a). Groundwater below the project site is designated by CTDEEP as primarily Class GA, with the area of the State owned railroad right-of-way in West Haven underlain by Class GB groundwater (shown in *Figure 3-24*).

Designated uses for Class GA groundwater include existing private and potential public or private drinking water supplies without treatment. In 2011, municipal records indicated that no private drinking water supply wells were present on the project area (Kelly Kearney, Orange Health Department, February 3, 2011, pers. comm.). Given that no development has occurred on the site since that time, no

drinking water supply wells are suspected to be present. GA groundwater may also be baseflow for hydraulically connected surface water bodies. Discharges to Class GA groundwater are limited to septage treatment facilities subject to stringent treatment and discharge requirements, and other easily biodegradable wastes of natural origin that present no threat to groundwater.

Designated uses for Class GB groundwater include industrial process water and cooling waters and baseflow for hydraulically connected surface water bodies. Class GB groundwater is not suitable for human consumption without treatment and is typically associated with historically urbanized communities where waste discharges, spills or chemical releases, and land use impacts have degraded groundwater quality. Discharges to Class GB groundwater are the same as Class GA groundwater, which are limited to septage treatment facilities subject to stringent treatment and discharge requirements, and other easily biodegradable wastes of natural origin that present no threat to groundwater, as well as certain other biodegradable wastewaters subject to soil attenuation.

3.9.2 Impact Analysis

Under the No Action Alternative, there would be no change in land use and no direct or indirect impacts to surface water or groundwater quality. However, the privately-owned parcel could still be developed.

Surface Water Quality

The Proposed Action and adjacent TOD would create approximately 6 acres of additional impervious surface including roadways, surface parking, buildings, and walkways. Stormwater runoff from the site would be collected and managed in accordance with the requirements of the 2004 Connecticut Stormwater Quality Manual, as amended, which outlines requirements for pollutant reduction, attenuation of peak runoff rates, and groundwater recharge to minimize potential impacts associated with stormwater runoff. Although the stormwater management system described below has been designed to provide capacity for both the TOD and the Orange Railroad Station, as the design of the Orange Railroad Station progresses, stormwater from the State-owned elements of the project may be managed independently from the system described below, in accordance with applicable State guidelines and regulations.

Stormwater runoff will be collected and conveyed via a new storm drainage system to a proposed detention/water quality basin. The proposed stormwater basin incorporates design elements that will attenuate peak flow rates and treat stormwater runoff. A stormwater treatment plan is proposed, including catch basins with deep sumps, water quality treatment devices such as hydrodynamic separators, outfalls with protective riprap aprons, and retention volume within the proposed basin. Stormwater runoff from building roof areas will be directed to a proposed detention/water quality basin.

Discharge from the detention basin will be routed through a rip rap bed to dissipate energy and lower the velocity of the stormwater to nonerosive flows prior to discharge to the existing swale that runs parallel to OLD's eastern property line and the State owned railroad right-of-way. Stormwater that enters the swale ultimately discharges to the Oyster River located 140 feet to the northeast of the property corner (Milone & MacBroom, 2015). The proposed storm drainage system is designed to provide adequate pipe capacity to convey the 25-year storm event. In addition, the outlet pipe from the

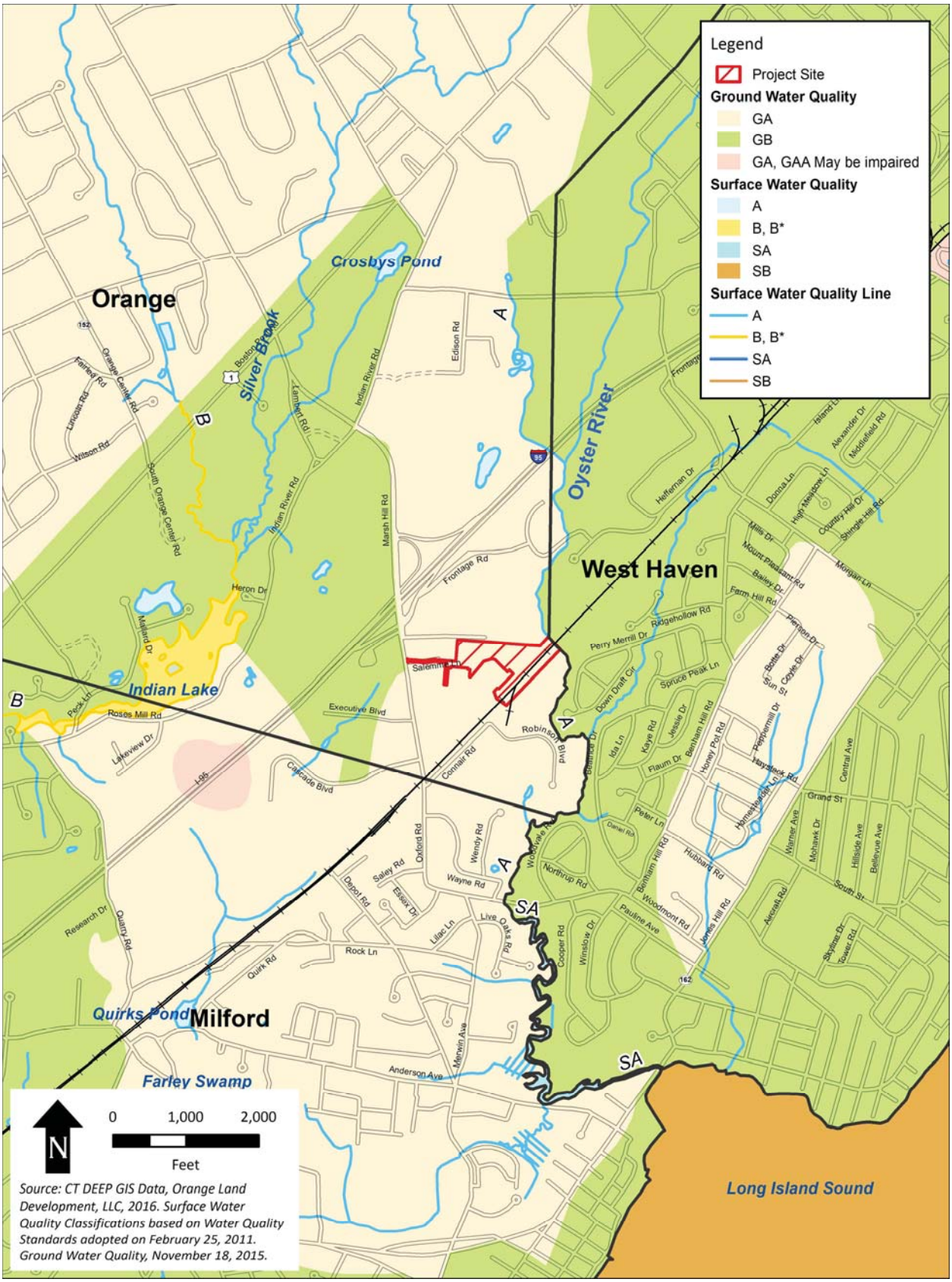


Figure 3-24. Surface and Groundwater Quality Classifications

detention basin's outlet control structure is sized with adequate capacity to convey the 100-year storm discharge from the basin (Milone & MacBroom, 2016).

The stormwater management system is designed to provide water quality treatment of runoff associated with the first inch of rainfall in accordance with the requirements of the 2004 Connecticut Stormwater Quality Manual, as amended. In addition, the design of the system includes provisions to collect runoff from the adjacent property in its current undeveloped state (Orange Land Development, 2016). Stormwater discharges from the site are not expected to contribute to the water quality impairments within the Oyster River or Long Island Sound.

Stormwater from the parking garage will be managed following CTDEEP's parking structure drainage policy. Under the policy, runoff from the top deck, which receives a high quantity of direct precipitation, is required to be treated for sediment and oil and grease using a gross particle separator prior to discharge to the storm drainage system. This discharge must also meet the requirements of the 2004 Connecticut Stormwater Quality Manual, as amended.

Drainage from lower decks must be collected and treated in an oil-water separator with a capacity of at least 1,000 gallons, and then discharged to the sanitary sewer system. The oil-water separator must be cleaned by a licensed waste oil hauler at least once per year. Additionally, washing the floors of the lower levels is eligible for coverage under the General Permit for Miscellaneous Discharges of Sewer Compatible Wastewater as building maintenance wastewater, although registration is required if greater than 5,000 gallons per day of washwater are generated.

During construction, soil will be exposed on the site, increasing the potential for soil erosion and discharge of sediment to receiving waters. Additionally, vehicle fluid spills or leaks from construction equipment could also potentially impact surface water quality. Erosion and sediment control measures and other construction-phase best management practices will be implemented during construction, as described in Section 3.21.

Groundwater Quality
The Proposed Action and adjacent TOD are not anticipated to result in adverse direct or indirect impacts to groundwater quality. Stormwater runoff from TOD building roof areas will be directed to a proposed detention/water quality basin equipped with an outlet control structures to restrict the outflow discharge and retain the required water quality volume. Water quality treatment devices will be placed upstream from the detention basin to capture any sediment and debris in the roof water.

3.9.3 Mitigation

Erosion and sediment control measures and other construction-phase best management practices will be implemented as described in *Section 3.21*. Following construction, an operation and maintenance plan for the site stormwater management system will be implemented. Overall site design concepts have been developed in accordance with the 2004 Connecticut Stormwater Quality Manual, as amended, as well as other applicable permit or approval requirements (see *Section 3.10*). Consequently, no other mitigation beyond the management measures described above is required or proposed as part of the Proposed Action.

3.10 Hydrology and Floodplains

3.10.1 Existing Conditions

The project site is located in the Oyster River watershed (Local Basin ID is 5000-53), within the South Central Shoreline subregional basin (Drainage Basin ID 5000), which discharges to Long Island Sound. As the majority of the project site is currently undeveloped, precipitation that falls on the site generally infiltrates into the ground or runs-off as overland flow. Runoff from the western portion of Salemme Lane drains overland to a catch basin at its intersection with Marsh Hill Road, while the eastern portion drains east into the wooded, undeveloped areas of the site. The project site is within the Coastal Area as discussed in *Section 3.12* but is not subject to coastal flooding. Floodplain and hydrologic features near the site are presented in *Figure 3-25*.

The Oyster River flows through the State owned railroad right-of-way and is anticipated to flow beneath the proposed station's high level platforms in the vicinity of the town boundary between Orange and West Haven, Connecticut. Only a small portion of the project site, which includes the northern limits of the State owned railroad right-of-way but none of the TOD area, is mapped by the Federal Emergency Management Agency (FEMA) as a 100-year flood zone (Zone A) (FEMA, 2010). Base flood elevations have not been determined by FEMA for this zone. Base flood elevations for this portion of the Oyster River were estimated by the Contour Interpolation Simplified Method as presented in the June 2007 New Railroad Station at City of West Haven or Town of Orange EIE ([CTDOT], 2007). The updated FEMA mapping (December, 2010) and the previous version of the FEMA mapping for the 100-year flood zone appear to be identical in the vicinity of the project site, indicating that there has been no change in the predicted base flood elevation or area affected by the 100-year flood zone.

Flood elevations for the portion of the Oyster River near the project site range from approximately 28 feet to 33 feet ([CTDOT], 2007). As the lowest existing elevation associated with the TOD area is approximately 36 feet (located in the northeast corner of the property) (Milone & MacBroom, 2016), the proposed TOD area is above the 100-year flood elevation, and no activities are proposed in Zone A areas. As indicated in the FEMA Flood Insurance Rate Map (FIRM) Number 09009C0438H dated December 17, 2010, no Special Flood Hazard Areas (SFHA) extend onto the TOD property at any location (Milone & MacBroom, 2016). The TOD is designated as an Area of Minimal Flood Hazard (Zone X). The proposed station's high level platforms are located within the mapped 100-year flood zone (i.e., Zone A).

No portion of the project site is within a mapped FEMA floodway or 500-year flood zone.

3.10.2 Impact Analysis

Under the No Action Alternative, no impacts to hydrology or floodplains would occur in the area of the proposed commuter railroad station and platforms. Independent development of the privately-owned parcels to the east may still occur.

Development activities associated with the Proposed Action and adjacent TOD are located outside of the FEMA 500-year flood zone and floodway. No impacts to floodplains are anticipated from the TOD

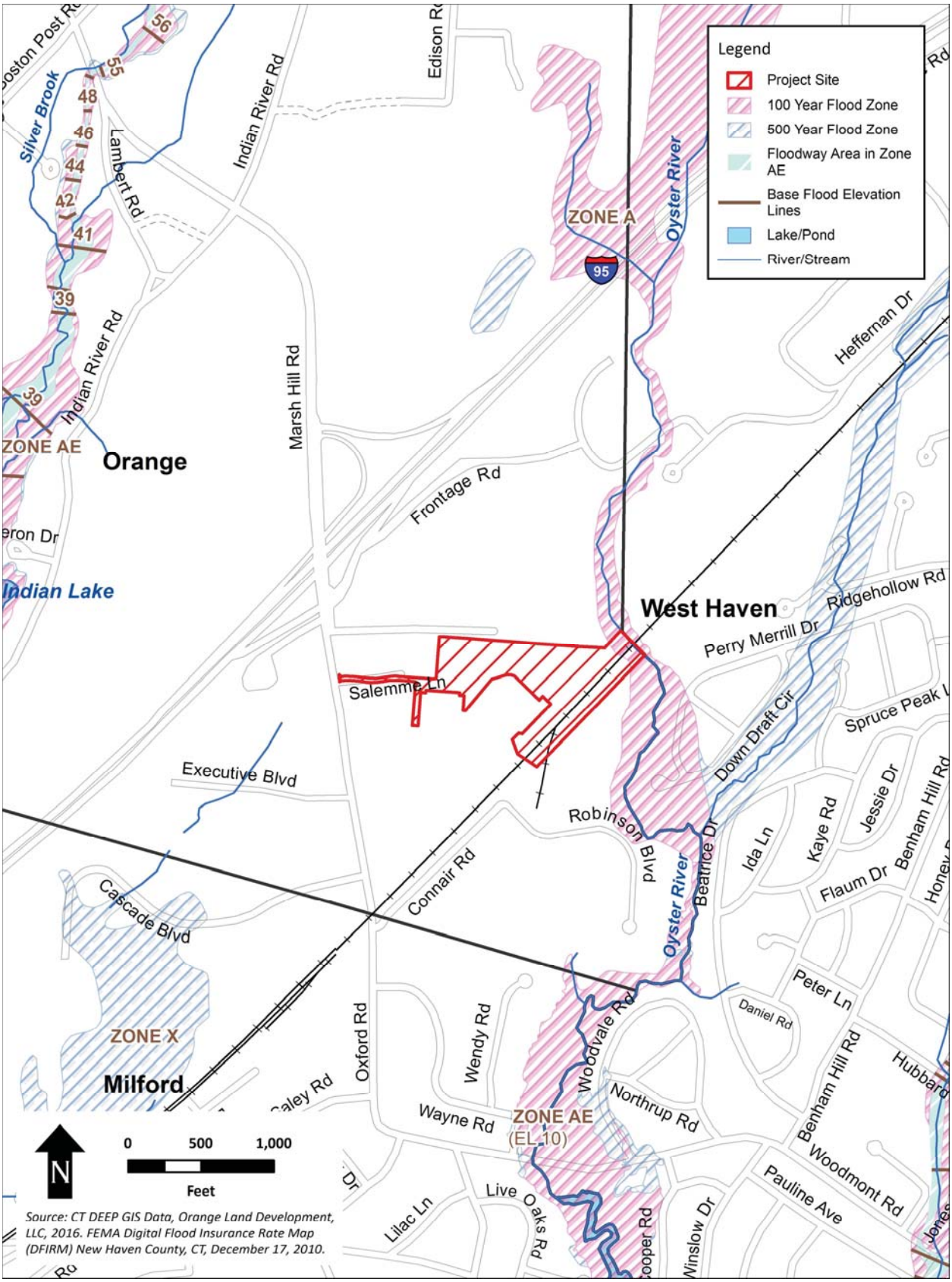


Figure 3-25. Floodplain and Hydrologic Features

area. A portion of the State owned railroad right-of-way is within the 100-year flood zone; any fill or obstructions encroaching below the 100-year base flood elevation could have potential adverse impacts. Construction of the high level platforms is the only activity proposed in the 100-year flood zone.

The Proposed Action and adjacent TOD will convert primarily undeveloped land into approximately 6 acres of new impervious cover (approximately 75% of the 8.09-acre site) and therefore has the potential to alter site hydrology. The proposed Orange Railroad Station design minimizes impervious surfaces to meet the project objectives, while balancing site constraints and project costs. The site design and drainage design will address potential increases in stormwater runoff volumes and peak discharge rates to maintain existing site hydrology. Specifically, runoff from the road and site improvements will be collected in a series of pipes eventually discharged to the existing swale on the easterly edge of the property. Prior to discharge, the stormwater will flow through a series of underground galleries as well as through a stormwater basin located within the loop of the new Salemme Lane road extension. The stormwater management system will be designed to provide water quality treatment of the first inch of rainfall in accordance with the requirements of the 2004 Connecticut Stormwater Quality Manual, as amended (MacBroom, 2016).

3.10.3 Mitigation

The proposed Orange Railroad Station platforms will be designed to avoid or minimize floodplain encroachments. Potential impacts to site hydrology will be mitigated by project design, construction, and operation following the guidelines of the *2004 Connecticut Stormwater Quality Manual*, as amended, and related permit approval requirements, as discussed in *Section 3.10* (Water Quality) and *Section 3.20* (Utilities).

3.11 Wetlands

An initial field investigation for the presence of wetland resources in the area of both the Proposed Action and the adjacent TOD was conducted in 2001 and reported in the 2007 EIE. At that time, a Certified Soil Scientist identified wetland boundaries in the field in 2001(*Site Study New Train Station, Orange or West Haven, Connecticut*, Frederic R. Harris, Inc., September 2001). Wetlands were delineated in accordance with applicable Connecticut General Statues (CGS § 22a-28 and/or 22a-38) inland wetlands and watercourse boundaries were surveyed. Wetland limits in the area of the proposed TOD were determined and field located by Milone & McBroom, Inc. in November 2012. As part of the development of this environmental document, a Professional Wetland Scientist and Certified Soil Scientist with Fuss & O'Neill, Inc. reviewed the previously delineated wetland boundaries and determined that the boundaries delineated in 2001 and 2012 are still valid and represent current jurisdictional boundaries as determined by the U.S. Army Corps of Engineers *Wetlands Delineation Manual* (January 1987) in conjunction with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (January 2012)[52]. Wetland resources previously identified both in

[52] Recent U.S. Supreme Court decisions have resulted in changes to the jurisdictional determination of Federal wetlands by the U.S. Army Corps of Engineers. Until an official jurisdictional determination has been made by the Corps for the site, it is assumed that all the State jurisdictional wetlands and watercourses on the project site are also Federal jurisdictional wetlands and/or relatively permanent water.

the area of the Proposed Action and in the adjacent TOD are shown in *Figure 3-26*. Note that wetland resources in the State-owned ROW will be reflagged as the project design moves forward.

In a letter dated April 4, 2016, the United States Army Corps of Engineers (USACE) provided an Approved Jurisdictional Determination for Wetlands Resource Areas (WRA) 1 through 4 shown in *Figure 3-24*. This determination was the result of a field inspection conducted by members of the USACE on October 22, 2015, after which it was determined that these four WRA are not considered waters of the United States, and are therefore not regulated by USACE. The investigation was completed for property associated with the TOD and owned by OLD, and therefore did not include inspection of WRA-5 and WRA-7 which are on the State owned railroad right-of-way.

Wetlands and watercourses provide a number of hydrologic and ecological functions, as well as corresponding societal values. The U.S. Army Corps of Engineers define eight functions and five values:

- Groundwater recharge/discharge
- Floodflow alteration
- Fish and shellfish habitat
- Sediment/toxicant/pathogen retention
- Nutrient removal/retention/transformation
- Product export
- Wildlife habitat
- Recreation
- Educational/scientific value
- Uniqueness/heritage
- Visual quality/aesthetics
- Threatened or endangered

Ecological functions and societal values vary with each wetland. Factors affecting wetland function include size, location in the watershed, number and interspersion of plant cover types, and the degree of disturbance. In this section, the potential functions and values of the resource areas are discussed to describe existing conditions and provide a basis for assessing impacts. The assessment is based on the ACOE Highway Methodology Workbook Supplement. (USACE, 1999).

3.11.1 Existing Conditions

Figure 3-26 shows the boundaries of wetlands and watercourses present on the site. Seven wetlands and watercourses ("water resource areas" or "WRAs") are present and are identified as WRA-1 through WRA-7. Note that WRA-6, as depicted on *Figure 3-24*, is not within the project limits, and therefore not included in the discussion.

Water Resource Area 1
Water Resource Area 1 is a 0.3± acre isolated wetland[2] located in the southwest portion of the site. WRA-1 has formed as a result of human disturbance and appears to have been a road bed or drainage ditch. The compacted soils in this area have created a seasonally-perched water table that has intercepted

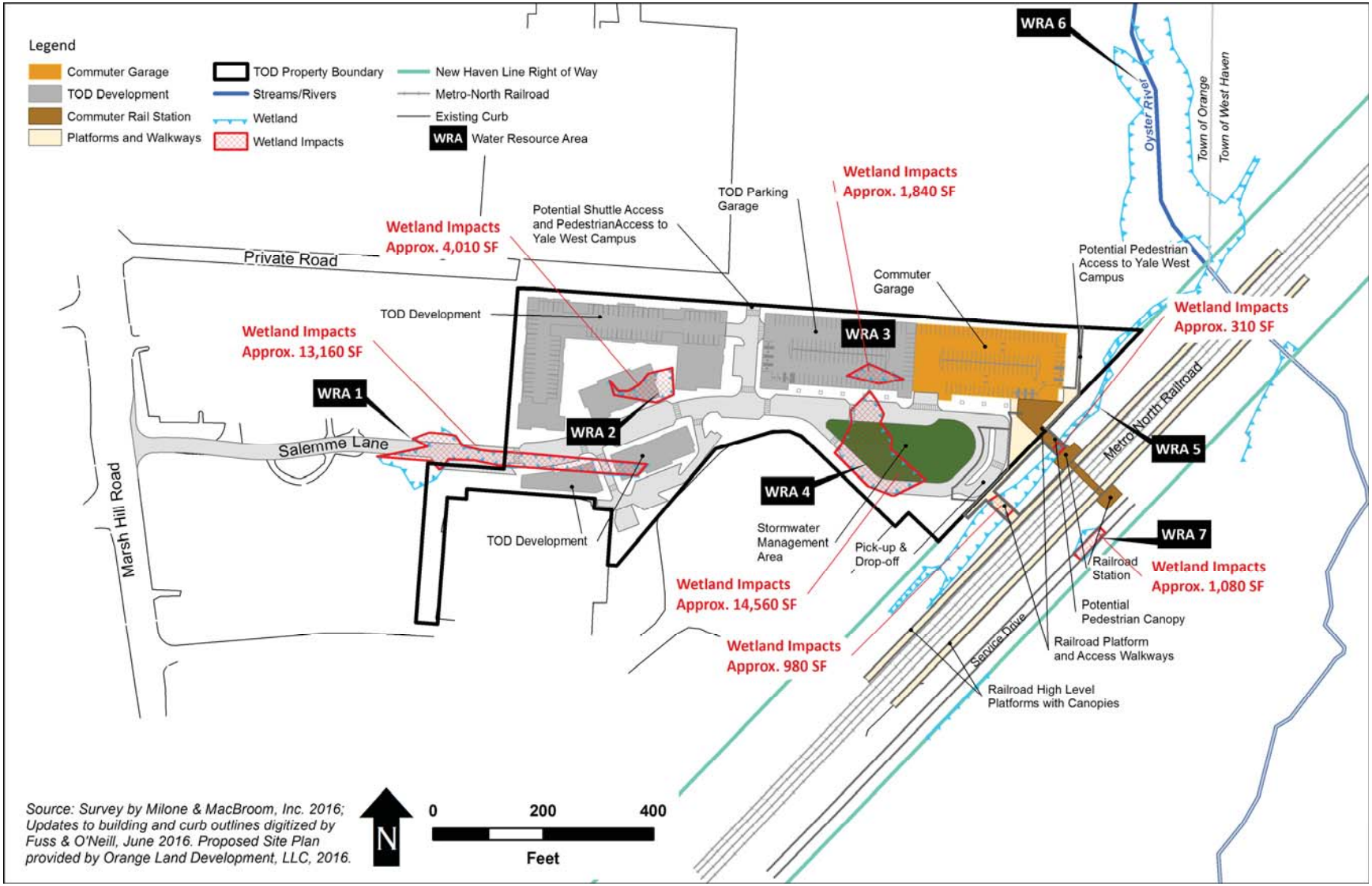


Figure 3-26. Wetlands and Watercourses

the local groundwater table. Consequently, the soils in this area are classified as poorly drained Aquents. The dominant vegetation in WRA-1 includes red maple (*Acer rubrum*), ironwood (*Carpinus caroliniana*), honeysuckle (*Lonicera tatarica*)*, multiflora rose (*Rosa multiflora*)*, winterberry (*Ilex verticillata*), and oriental bittersweet (*Celastrus orbiculatus*)*. (Species noted with an * in this section are invasive.) There is no readily apparent hydrologic connection between WRA-1 and other water resource areas on the site. Given the relatively small size, developed surroundings, isolated position in the landscape and disturbed nature of this water resource area, WRA-1 offers no principal functions or values and limited secondary functions or values[53]. Secondary functions or values include groundwater recharge /discharge and wildlife habitat (*Table 3-21*).

Water Resource Area 2, 3, and 7

Water Resource Areas 2, 3 and 7 are three very small, isolated wetlands (0.09± acre, 0.04± acre and 0.02± acre, respectively) formed from human disturbance and isolated from other wetlands and watercourses on site. WRA-2 is located in the central portion of the site. WRA-3 is located east of WRA-2. WRA-7 is located on the southeast side of the railroad right-of-way. WRA-2 and WRA-3 are similarly vegetated with black birch (*Betula lenta*) and red maple saplings, pussy willow (*Salix discolor*), catalpa (*Catalpa speciosa*), multiflora rose*, common reed (*Phragmites australis*)*, grape (*Vitis* sp.), and oriental bittersweet*. WRA-7 is predominantly vegetated by red maple trees and saplings. With no defined inlets or outlets, there are no readily apparent hydrologic connections between WRA-2, WRA-3, WRA-7 and other water resource areas on the site. Given the relatively small size, developed surroundings, and disturbed nature of these water resource areas, WRA-2, WRA-3 and WRA-7 offer minimal principal or secondary functions or values. Secondary functions or values include groundwater recharge /discharge and wildlife habitat (*Table 3-21*).

Water Resource Area 4

Water Resource Area 4 is a 0.33± acre forested wetland in the southeast portion of the site. WRA-4 has formed as a result of human disturbance, specifically excavation and grading activities. As a result, WRA-4 has seasonal standing water in the western portion of the wetland fed by shallow groundwater discharge from the eastern portion of the wetland. In addition, this wetland is bordered along the southwest by industrial development and receives stormwater runoff from the associated impervious surfaces. The dominant vegetation in WRA-4 includes red maple, American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), spicebush (*Lindera benzoin*), multiflora rose*, northern arrowwood (*Viburnum recognitum*), silky dogwood (*Cornus amomum*), poison ivy (*Toxicodendron radicans*), sensitive fern (*Onoclea sensibilis*), and skunk cabbage (*Symplocarpus foetidus*).

Previous investigations of the site (CTDOT 2007) identified potential vernal pool habitat. An inspection of WRA-4 in April 2004 for direct or indirect evidence (e.g., chorusing adult frogs, egg masses, etc.) of obligate vernal pool species was conducted. No evidence of obligate vernal pool species was observed. In addition, observations of the wetland in late spring and early summer indicated that the depth and duration of inundation is insufficient to support the life cycle of a breeding amphibian population (CTDOT 2007, confirmed by Fuss & O'Neill in 2010). Thus, WRA-4 is not considered a viable vernal pool habitat. With no defined inlets or outlets, there are no readily apparent hydrologic connections between WRA-4 and other water resource areas. Furthermore, given the relatively small size, developed

[53] Secondary functions or values are those functions or values that are present but are not considered principal.

surroundings and disturbed nature of this wetland, WRA-4 offers no principal functions or values. Secondary functions and values of this wetland include groundwater recharge/discharge, sediment/toxicant/pathogen retention, and nutrient removal/retention/transformation (*Table 3-21*).

Water Resource Area 5

Water Resource Area 5 is a 0.37± acre degraded intermittent stream/drainage ditch located in the southeast portion of the site and adjacent to the railroad right-of-way. Only a portion of this wetland is located on the project site. WRA-5 flows in a northeasterly direction and discharges to the Oyster River before it flows beneath the State owned railroad right-of-way. WRA-5 has formed as a result of human disturbance and, based on the extent of scour and placed armament, primarily conveys stormwater runoff from the surrounding vegetated and developed upland areas as well as a stormwater basin located further to the south and west The drainage area conveyed by this watercourse is approximately 35 acres. Not vegetated within its banks, the dominant vegetation immediately adjacent to WRA-5 includes Norway maple (*Acer platanoides*)*, pignut hickory (*Carya glabra*), black cherry (*Prunus serotina*), autumn olive (*Elaegnus umbellata*)*, red oak (*Quercus rubra*), multiflora rose*, poison ivy, and oriental bittersweet*.

Connecticut General Statues (CGS) Section 22a-38(16) defines an intermittent watercourse as "...a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation." Although not confirmed by site observations, the drainage ditch may intercept the seasonal high groundwater table and convey some groundwater discharge as base flow during periods of high groundwater conditions. Assuming this is the case, the drainage ditch would be regulated as an intermittent watercourse under the Connecticut Inland Wetlands and Watercourses Act. WRA-5 may not be subject to Federal wetland jurisdiction if the duration of groundwater discharge that provides base flow is absent or not sufficiently long (generally at least three months), although confirming the Federal status would require additional study.

For planning purposes, we have assumed that WRA-5 is subject to both State and Federal jurisdiction. However, the degraded and disturbed nature of WRA-5 does not make it an intermittent stream of notable function or value. The limited duration of flow is insufficient to support finfish or shellfish and the unvegetated channel is not capable of supporting viable vegetation or wildlife communities. Given the relatively small size, developed surroundings, lack of adjacent wetlands and disturbed nature of this water resource area, WRA-5 offers no principal functions or values. Limited groundwater discharge is a secondary function of this intermittent stream *Table 3-21*).

Table 3-21. Summary of Functions & Values of Water Resource Areas

Water Resource Area	Area (acres)	Wetland Functions & Values												
		GWR	FFA	FSH	STPR	NRRT	PE	SS	WLH	REC	EDS	UH	VQA	ES
1	0.37	S							S					
2	0.09	S							S					
3	0.04	S							S					
4	0.32	S			S	S								
5	0.37	S												
7	0.04	S							S					

Abbreviations

GWR = Groundwater Recharge/Discharge
FFA = Floodflow Alteration
FSH = Fish and Shellfish Habitat
STPR = Sediment/Toxicant/Pathogen Retention
NRRT = Nutrient Retention/Retention/Transformation
PE = Production Export
SS = Sediment /Shoreline Stabilization
WLH = Wildlife Habitat
REC = Recreational Value
EDS = Educational/Scientific Value
UH = Uniqueness/Heritage
VQA = Visual Quality/Aesthetics
ES = Endangered Species
P = Principal Function or Value
S = Secondary Function or Value; Present in a Limited Capacity

3.11.2 Impact Analysis

The No Action Alternative would result in no direct or indirect impacts to wetlands or watercourses at the site of the Proposed Action. However, under the No Action Alternative, development may still occur on the privately-owned parcels, and wetland resources in the area of the TOD may occur.

The potential for impacts to wetlands and watercourses is assessed in terms of impacts associated with the Proposed Action and project elements anticipated to be shared with the adjacent TOD (*Table 3-21.1*) and impacts associated solely with the TOD (*Table 3-21.2*). It is anticipated that the location of wetland resources in the State owned railroad right-of-way will be confirmed through field assessment/delineation during the design process.

Table 3-21.1. Direct Wetland Impacts Associated with Proposed Action or Anticipated Shared Project Elements

Wetland Location	Impact (square feet)	Construction Impact Activities
WRA-1	13,160	Extension of Salemme Lane, TOD Buildings E & F and driveway
WRA-4	14,560	Commuter parking garage, access drive, stormwater retention basin
WRA-5	1,290	Pedestrian access to railroad platforms
WRA-7	1,080	Railroad emergency service drive
Total Impact	30,090	

Table 3-21.2. Direct Wetland Impacts Associated with Adjacent Proposed TOD Project

Wetland Location	Impact (square feet)	Construction Impact Activities
WRA-1	13,160	Extension of Salemme Lane, TOD Buildings E & F and driveway
WRA-2	4,010	TOD Buildings C & D
WRA-3	1,840	TOD Parking Garage
Total Impact	19,010	

Water Resource Area 1

The construction of the extension of Salemme Lane will provide the main vehicle entrance and egress for both the TOD and the proposed Orange Railroad Station. This extension will result in the filling of the portion of WRA-1 located within the project boundary. Additional filling of WRA-1 will occur as the result of construction of TOD Buildings E and F and the associated driveway between them. A total area of approximately 13,160 square feet of WRA-1 will be filled.

Based on field observations, the existence of WRA-1 is a likely result of the historical disturbance of the land around it. For the sole purpose of preserving WRA-1, avoidance of direct disturbance could be achieved by either shifting the road to the east and south of the wetland area or moving the entrance to the proposed Orange Railroad Station access road approximately 500 feet to the north. However, the former alternative would require obtaining significantly more property and result in the demolition of a large, active warehouse, increasing project costs and impacts. The latter would require a new signalized intersection near the I-95 interchange, causing potential operational issues with the interstate. Given the lack of principal functions or values and limited secondary functions or values, the proposed crossing will not result in a substantive loss of functions or values at WRA-1.

Water Resource Area 2

Building ABC, and Building D will be constructed as part of the TOD to the north of the access drive/Salemme Lane in the northwestern portion of the site. This construction will result in the complete loss of WRA-2, an area of approximately 4,010 square feet. Given the relatively small size,

developed surroundings, and disturbed nature, WRA-2 offers minimal principal or secondary functions or values.

Water Resource Area 3
The TOD parking garage will be constructed in the north-central portion of the site and will result in complete filling of WRA-3, an area of approximately 1,840 square feet. Given the relatively small size, developed surroundings, and disturbed nature, WRA-3 offers minimal principal or secondary functions or values.

Water Resource Area 4
The construction of the parking garage, access drive/Salemme Lane, and stormwater management basin, will result in the complete loss of WRA-4, an area of approximately 14,560 square feet. WRA-4 is an isolated forested wetland that offers no principal functions or values. Secondary functions of this wetland are groundwater recharge and discharge, and sediment/nutrient/ toxicant retention. Given the limited values of this area, these secondary functions will not be significantly diminished by the Proposed Action.

Water Resource Area 5
WRA-5 is an intermittent stream and primarily serves as a stormwater drainage ditch from the State owned railroad right-of-way and an upgradient, off-site detention basin. Therefore, the primary hydrologic function of WRA-5 is stormwater conveyance as is evident from the steep banks, deep scour, lack of in-stream vegetation and habitat. WRA-5 offers no principal ecological functions or values. The secondary function of this wetland is groundwater discharge from the adjacent State owned railroad right-of-way and forested upland. This secondary function will be altered but not be diminished by the installation of a culvert or bridge crossing. Construction of pedestrian bridges for access to rail station platforms will impact approximately 1,290 square feet.

Water Resource Area 7
The possible construction of the service road to access the southeastern railroad platform will result in approximately 1,080 square feet of fill in WRA-7, a small, forested wetland that offers minimal principal or secondary functions or values.

3.11.3 Mitigation

Various alternative station designs were reviewed in an attempt to avoid direct wetland impacts. However, due to the locations of wetlands relative to the State owned railroad right-of-way it is not possible to satisfy the station and platform needs and entirely avoid wetland impacts. The design of the proposed station avoided direct impacts to the Oyster River, an adjacent wetland resource area that offers substantive principal functions and values. One of the objectives of the development plan is to avoid direct and indirect impacts to the Oyster River wetland corridor and maintain a vegetated riparian buffer since this wetland system has the greatest range of functions and values of the wetland resources on the project site. Wetland impacts are therefore isolated to existing altered and disturbed water resource areas, mostly in areas associated with the TOD or elements shared with the Orange Railroad Station. Due to the existing disturbances to these aquatic resources and their relatively small size, they do not provide significant principal functions or values, and only provide limited secondary function as

groundwater discharge and/or wildlife habitat. Furthermore, the primary hydrologic function of WRA-5 is to convey stormwater and surface water runoff. It is anticipated that this function will be maintained through the use of an appropriately-sized culvert.

In a letter dated April 4, 2016, an Approved Jurisdictional Determination was provided by the U.S. Army Corps of Engineers to Orange Land Development LLC for WRA-1, 2, 3, and 4. These four wetland resource areas are not considered waters of the United States, and therefore, do not fall under Federal jurisdiction. In a letter dated July 11, 2013, the Town of Orange Inland Wetlands and Watercourses Commission (IWWC) approved plans to fill a portion of WRA-1 and WRA-5. In a letter dated June 16, 2016, the IWWC approved modifications of the plans, which include wetland impacts discussed above.

A Stormwater Maintenance Plan and Invasive Species Control Plan were both required conditions of the IWWC application approval. Structural and non-structural stormwater best management practices are recommended to reduce flow velocities and enhance pollutant removal (e.g., bank stabilization, water quality swale, protected outfall, etc.). Improved stormwater management practices at the site would provide functions and values such as floodflow alteration, sediment/toxicant/pathogen retention, and nutrient removal/retention/transformation, which are currently not provided by the wetlands that would impacted by the proposed activity. The Invasive Species Control Plan identifies several commonly found invasive plant species located in the vicinity of the project site and provides both short and long-term management strategies for each species.

Specific mitigation measures would be developed during subsequent project design and permitting in coordination with the Army Corps of Engineers and the CTDEEP. Potential Federal and State wetlands and watercourses permits that may be required include:

- An ACOE In Lieu Fee Payment and the Department's Invasive Species Removal Specification will be included in the ACOE Permit Applications. A Clean Water Act Section 401 Individual Clean Water Certification administered by CTDEEP because of the placement of an Storm Water detention Basin in an existing wetland.
- Inland Wetlands and Watercourses Permit as administered by CTDEEP in accordance with the Connecticut Inland Wetlands and Watercourses Act.

3.12 Coastal Resources

3.12.1 Existing Conditions

The project site is located within the Connecticut Coastal Area; however it is outside of the Connecticut Coastal Boundary as shown in *Figure 3-27* Additionally, there are no coastal resources on or near the site since the adjacent watercourse, the Oyster River, is not tidal in this area.

3.12.2 Impact Analysis

The No Action Alternative would involve no construction and no direct or indirect impacts on coastal resources.

Since the site of both the Proposed Action and the proposed TOD are located outside the limits of the Connecticut Coastal Boundary, neither the Proposed Action nor the TOD are not subject to the Connecticut Coastal Management Act (CCMA) pursuant to Connecticut General Statutes (CGS) Section 22a-90 through 22a-113.

The Proposed Action is consistent with the goals of Connecticut's coastal management policies regarding improving existing transportation resources as a primary means for meeting the transportation needs of the coastal area and not resulting in a loss of public access to the shorefront, impacting significant habitat or species, or altering cultural sites. In addition, no direct or indirect impacts to coastal resources or future water-dependent development opportunities and activities are anticipated to result from the Proposed Action.

3.12.3 Mitigation

No direct or indirect impacts to coastal resources are anticipated by the Proposed Action; therefore, no mitigation is required.

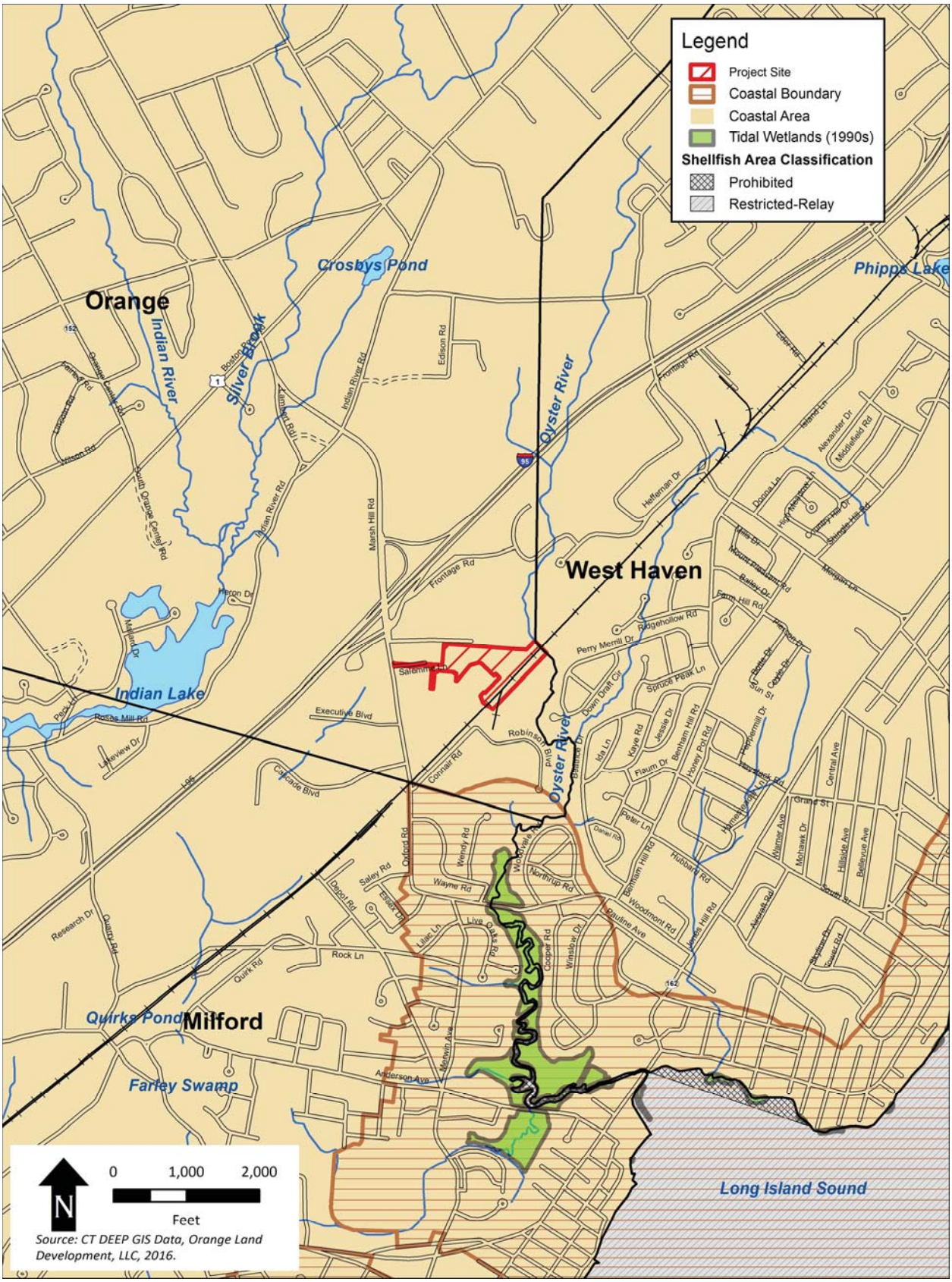


Figure 3-27. Coastal Resources

3.13 Flora/Fauna/Threatened and Endangered Species

3.13.1 Existing Conditions

Vegetation and Wildlife Habitats
The site of the Proposed Action and the proposed TOD has been extensively altered over the last century and has become fragmented by residential, commercial, and industrial development in recent decades.

The majority of the site is dominated by early successional forest and shrubland. Primarily located throughout the central portion of the site the vegetation community is dominated by quaking aspen (*Populus tremuloides*), grey birch (*Betula populifolia*), autumn olive*, multiflora rose*, greenbriar (*Smilax* spp.) and raspberry/blackberry (*Rubus* spp.). (Species noted with an * in this section are invasive.) In areas where vegetative succession has progressed to more mature forest, dominant species include red oak, white oak, hickory (*Carya* spp.), black cherry, multiflora rose* and oriental bittersweet*. The western third of the site consists of more mature forest, the middle of the site is dominated by shrubland, and the eastern third consists primarily of early successional forest. Several small isolated wetland pockets were observed throughout the site. The dominant vegetation in wetland areas includes red maple, white oak, yellow birch, pussy willow, spicebush, skunk cabbage, multiflora rose*, and poison ivy. The dominant vegetation in the upland area includes red oak, white oak, hickory, black cherry, multiflora rose*, and oriental bittersweet*. *Figure 3-28* shows the general location of these dominant vegetation and ecological communities.

The habitat on the site is largely fragmented, relatively small in size and isolated from similar habitats in the landscape by railroad right-of-way, roads, development, and a 12-foot chain link fence along the northern property boundary. Given these conditions, wildlife migration, as well as cover, feeding and breeding habitat is limited. Furthermore, the existing vegetative cover combined with on-site and surrounding land uses perpetuate the presence and proliferation of nuisance and invasive species at the site.

Commonly observed wildlife in urbanized areas (e.g., gray squirrel, chipmunk, American crow, and sparrows) were noted on-site. Query on the US Fish and Wildlife Service Information for Planning and Conservation (IPaC)[54] website provided a species list of identified threatened species that may occur within the boundary of the proposed project or be affected by the proposed project. The list identified the Red Knot (*Calidris canutus rufa*), a bird species with Threatened status. Red Knot are found primarily in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. Habitat for the Red Knot does not exist within the limits for this project. The list also included the Northern Long-Eared Bat (NLEB) (*Myotis septentrionalis*), a Threatened mammal (*Appendix F*). This project is not located within one-quarter mileany known NLEB hibernacula or within 150 feet of any known maternity roost trees. In addition, neither of these species were identified in a review of the CTDEEP Natural Diversity Database (NDDB). The most recent NDDB map of Orange (December 2016) revealed there are no records of extant populations of Federally listed endangered or threatened species or species listed by

[54] https://ecos.fws.gov/ipac/

the State, pursuant to section 26-306 of the Connecticut General Statutes, as endangered, threatened or special concern in the project area.

Some wildlife migration may occur along the Oyster River corridor. However, migration is severely limited by the presence of the 12-foot chain link fence that crosses the river immediately upstream of the State owned railroad right-of-way. In addition, the Oyster River as a wildlife corridor and linear habitat is substantially degraded by road, interstate and railroad crossings along its length both upstream and downstream of the site.

The most recent NDDB map of Orange (December 2016) indicated no records of extant populations of Federally-listed endangered or threatened species or species listed by the State, pursuant to section 26-306 of the Connecticut General Statutes, in the project area. However, as a Federal agency, the FTA may wish to utilize the streamlined consultation framework for the northern long-eared bat (NLEB) to document compliance with Section 7 of the Endangered Species Act.

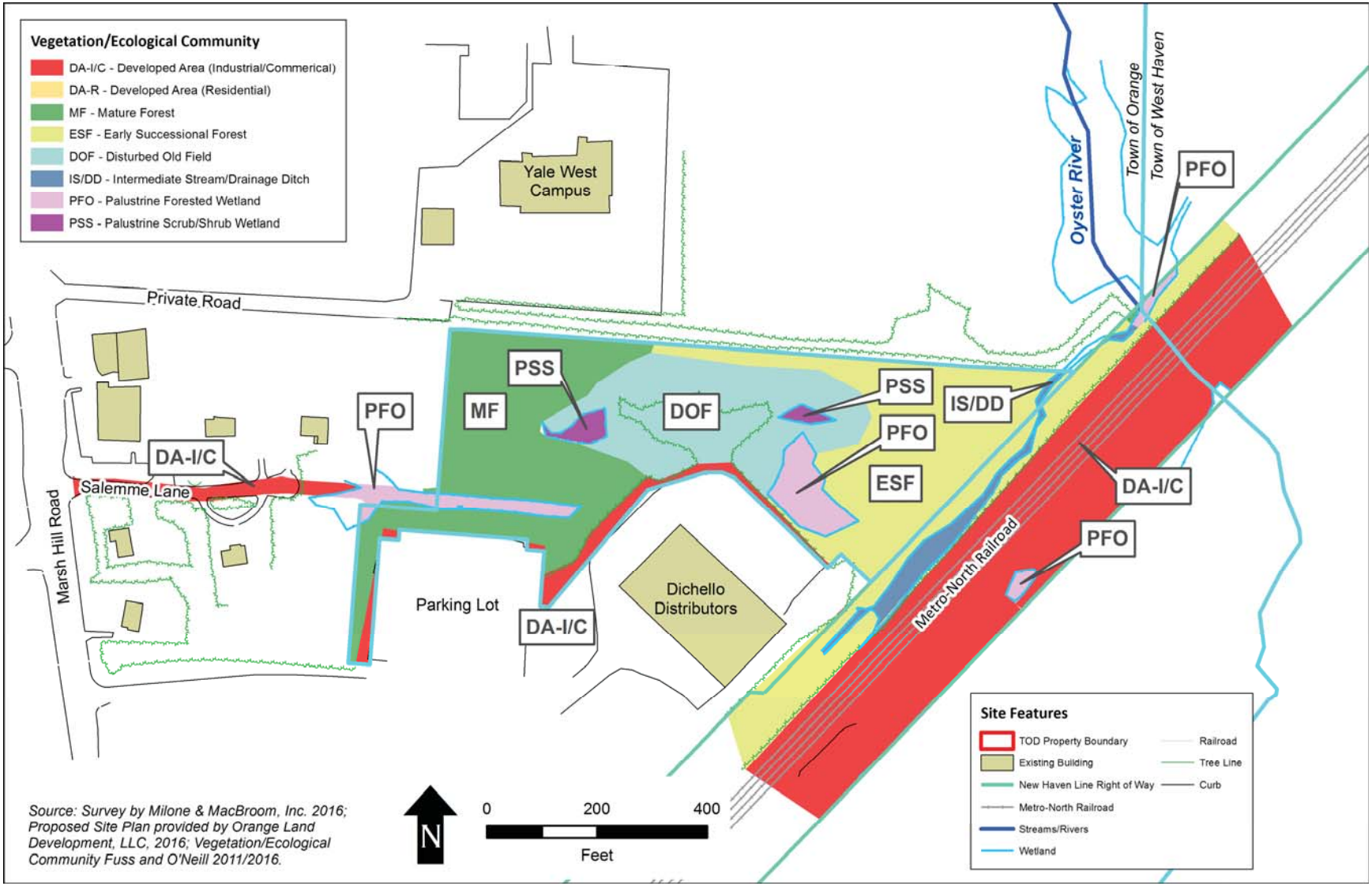


Figure 3-28. Dominant Vegetation and Ecological Communities

3.13.2 Impact Analysis

The No Action Alternative would not result in any direct or indirect impacts because no site disturbance or construction would occur.

Under existing conditions, the project site and adjacent parcels have been extensively developed and wildlife habitats are fragmented. Therefore, loss and fragmentation of wildlife habitat would not result in significant impacts under the Proposed Action.

The proposed development avoids direct impact to the Oyster River corridor. Although this is not considered a significant riparian corridor due to the surrounding development and fragmentation, it is the only water resource area on or adjacent to the site that provides substantive functions and values. Direct effects would include minor habitat loss, primarily affecting species tolerant of human disturbance. Design of the station platforms will consider measures to avoid or minimize impacts to such resources and will be subject to the Connecticut Inland Wetlands and Watercourses Act (See *Section 3.12*).

As the Orange Railroad Station would be constructed adjacent to an existing railroad, industrial development and nearby roadway, indirect effects are expected to be minimal since development may already deter many wildlife species from the area. The most likely indirect effect would be to increase competition for suitable habitat among species with small home ranges and high population levels that would be displaced as a result of site development. Because wildlife tend to avoid roadways and adjacent areas, it is possible that the station will displace some individuals of wildlife populations, causing increased competition for nearby suitable habitat.

3.13.3 Mitigation

Since no significant direct or indirect impacts to wildlife and vegetation are anticipated to result from the Proposed Action, no specific mitigation measures are proposed.

3.14 Soils and Geology

3.14.1 Existing Conditions

The area of the Proposed Action and the adjacent proposed TOD is underlain by surficial deposits consisting of glacial till of varying thickness, the majority of which has been disturbed through urbanization. The bedrock geology in the area is primarily medium- to fine-grained schist and garanofels (CTDEP, 2000). Soils in the project area are designated by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) as a combination of Urban Land (including urban land complex), fine sandy loam soils (including Agawam and Paxton and Montauk), and silt loam (including Saco) (*Figure 3-29*). Urban Land is defined by NRCS as land mostly covered by streets, parking lots, buildings, and other structures of urban areas (USDA, 1993).

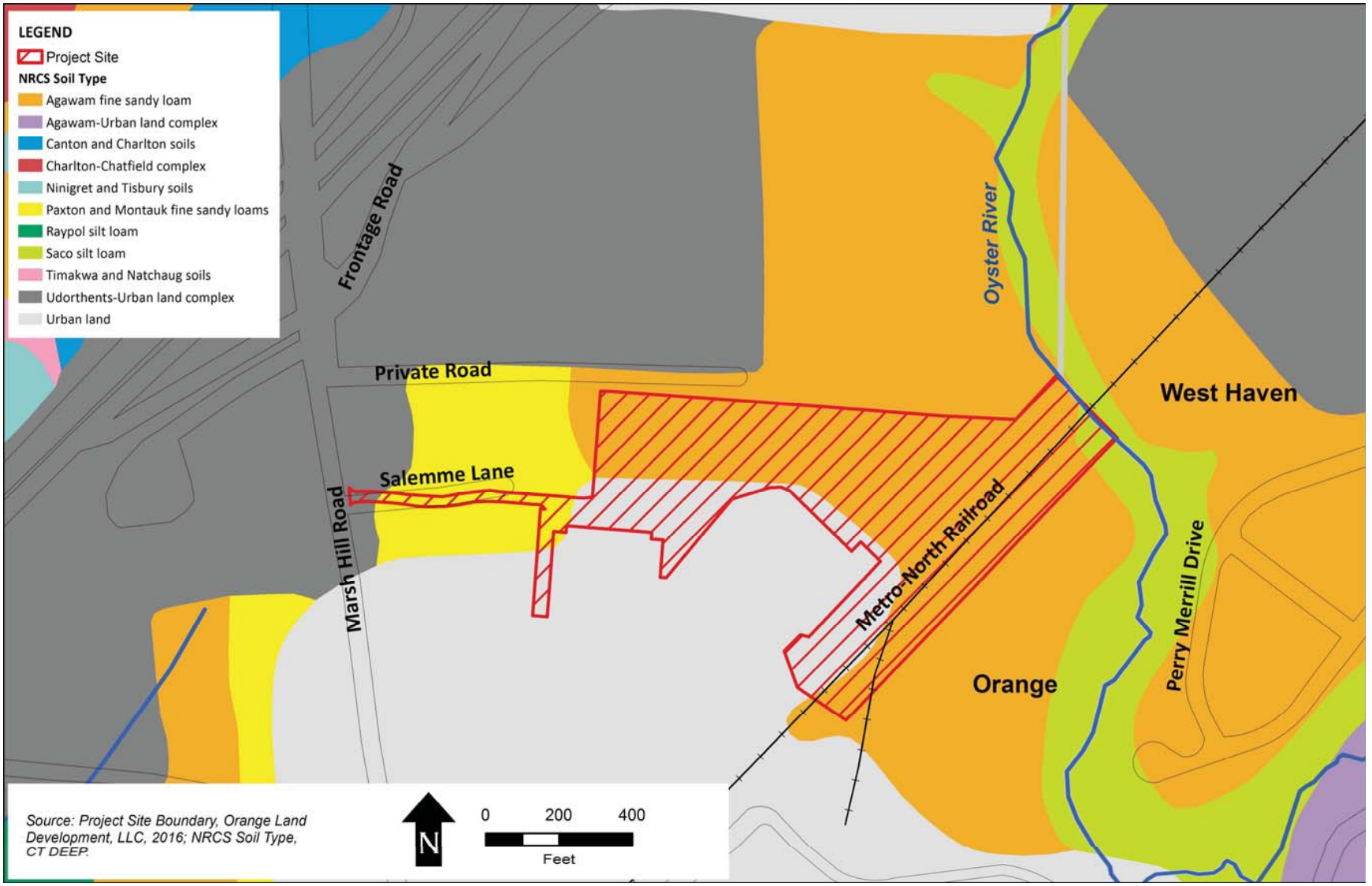


Figure 3-29. Soils

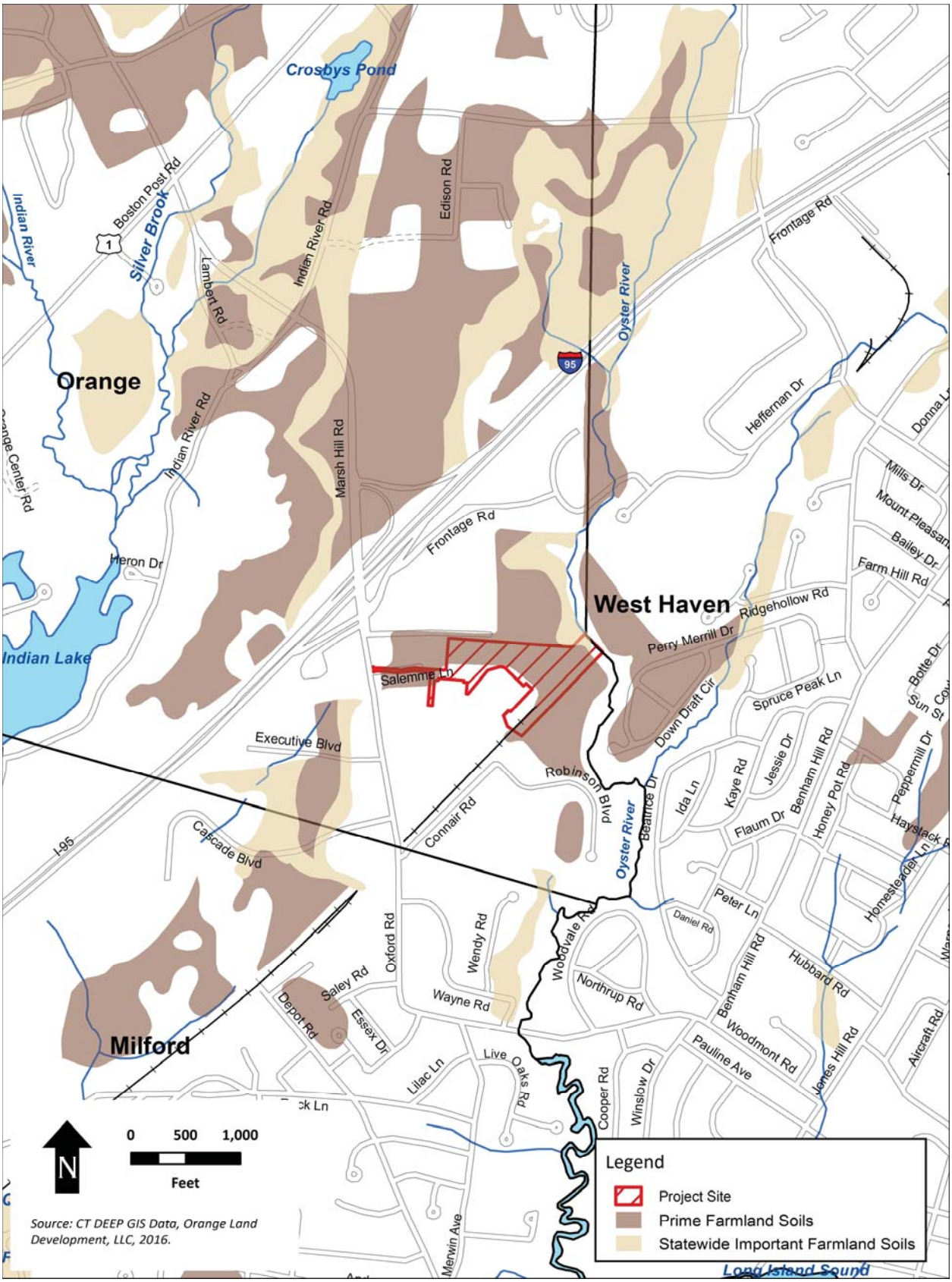


Figure 3-30. Farmland Soils

Current farmland soils mapping for the site including Salmme Lane, the TOD, commuter garage, and the Orange Railroad Station, indicates that there are approximately 10.5 Prime Farmland Soils and 0.3 acres of Farmland Soils of Statewide Importance on the combined area of the Proposed Action and the TOD (*Figure 3-30*). The majority of this area is currently wooded, and none are cultivated. Farmland soils are delineated by NRCS based on a combination of physical and chemical characteristics for areas most suitable for producing food, feed, fiber, forage, and oilseed crops (USDA, 1993).

The Federal Farmland Protection Policy Act (FPPA) (Public Law 97-98, 7 U.S.C. 420) and implementing regulations (7 CFR 658) apply to projects undertaken by a Federal agency or that receive assistance from a Federal agency and that may irreversibly directly or indirectly convert farmland to nonagricultural use. Normally, this requires completion of a Farmland Conversion Impact Rating form and consultation with NRCS. However, the prime farmland soils on this site are not considered "farmland" according to 7 CFR § 658.2(a) since the site is located in an Urbanized Area as defined by the U.S Census (Census 2010)[55]. In addition, the most recent South Central Regional Council of Governments Plan of Conservation and Development (SCROG, 2008) includes a railroad station at the Orange site as an anticipated Transit Oriented Development and Smart Growth project, and does not indicate that the parcel is a priority for conservation or restoration of farmland uses.

Under Title 22 Chapter 466 of the Connecticut General Statutes, Section 22-6, the Commissioner of the Connecticut Department of Agriculture is responsible for the review of any proposed State-funded project that would result in the conversion of 25 or more acres of prime farmland to non-agricultural use. The Proposed Action and the adjacent TOD will result in conversion of less than 25 acres of prime farmland and, therefore, does not require review by the Connecticut Department of Agriculture.

3.14.2 Impact Analysis

The No Action Alternative includes no soil disturbance at the site of the Proposed Action, so no direct impacts to soils or geology will occur. Under the No Action Alternative, development may still occur on the privately-owned TOD site, in which case, farmland impacts may still occur.

Approximately 10.8 acres of the site consists of Prime Farmland Soils or Soils of Statewide Importance that will be developed for non-farming uses as a result of the Proposed Action or adjacent TOD. However, since the Proposed Action will result in significantly less than 25 acres of development of prime farmland soils, it will not require approval from the Connecticut Department of Agriculture. Furthermore, the 2010 U.S. Census Bureau (2011) designates the project site as "urbanized area," which, according to 7 CFR § 658, indicates that the site is not considered "farmland." Therefore, since the project is in a census-designated Urbanized Area, the project is not subject to the FPPA. Additionally, the site has been identified in the South Central Regional Council of Governments Plan of Conservation and Development (2008) as the location of a proposed train station, indicating that there are no plans to conserve the parcels or restore active farming on them.

[55] http://www.ct.gov/dot/lib/dot/documents/dpolicy/policymaps/ref/2010cturbanizedareas.pdf

3.14.3 Mitigation

The mapped farmland soils associated with the Proposed Action and adjacent TOD encompass an area less than 25 acres (i.e., exempt from Connecticut Department of Agriculture approval), and are not considered high priority for conservation or active farming by the Connecticut Department of Agriculture or in the regional Plan of Conservation and Development. The mapped farmland soils at the project site are located in a census-designated Urbanized Area (i.e., exempt from the FPPA) and are not considered high priority for conservation or active farming by the Connecticut Department of Agriculture. Therefore, no mitigation is required.

3.15 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 requires Federal agency actions to consider the effect of a project on a historic property. Coordination with the Connecticut State Historic Preservation Office (SHPO) was initiated during preparation of the 2007 *New Railroad Station at City of West Haven or Town of Orange EIE* and has continued during the development of this EIE (*Appendix G*).

3.15.1 Existing Conditions

The site of the Proposed Action is located within an area of moderate to high sensitivity for prehistoric and historic archaeological resources, as assessed by the SHPO. As noted in the 2007 EIE, this assessment was based on the proximity of the site to the Oyster River, a known environmental draw for prehistoric peoples; and the historic-period sensitivity was derived from historic maps and the presence of fieldstone walls typically associated with 18th and 19th-century farmsteads.

A Phase I Archaeological Reconnaissance Survey of the proposed railroad station area was performed by Archaeological and Historical Services, Inc. during 2010 to support CTDOT's planning for a commuter railroad station at Orange, which at the time included consideration of the area that included essentially all the land from Marsh Hill Road to the State owned railroad right-of-way, as well as property to the north and south of the current project area. This Phase I survey (included in *Appendix G*) indicated that the potential for intact archaeological sites was reduced by disturbance related to suburban house development along Salemme Lane, and earthmoving and large-scale refuse dumping in the adjacent Yale and Dichello-owned lots. Historical background research indicated that the project area was historically agricultural in nature, with a single house depicted on historic maps on the southeast corner of Marsh Hill Road and Salemme Lane. This house was originally owned by Daniel Merwin, and first appears on an 1837 map. Later it was owned by the Munson and Beach families. The house was no longer present in maps dating from 1889, and no visible evidence of the structure appears to have survived. Associated archaeological remains were identified in the project area, however.

Archaeological testing identified two loci of 19th-century artifacts through which the proposed access will pass; the loci are designated State Site No. 107-14, Locus 1 and Locus 2 (*Figure 3-30*). The artifact density within the loci is very light, and cultural material was found in mixed plowzone and disturbed contexts. Domestic (i.e., household-related) in nature, the artifacts/loci are probably "field scatter" associated with the Merwin-Munson-Beach House.

In the eastern portion of the project area, two prehistoric sites were identified. Site 107-15, located at the site of the proposed commuter parking garage, dates to the Late Archaic period (6000-2700 years ago), based on the recovery of a Lamoka projectile point and a quartz bifacial retouch flake, from two test pits 15 meters apart. Fifty meters north of Site 107-15, outside of the project area and on property owned by Yale University, Site 107-16 produced a prehistoric drill and charred botanical fragment from two test pits two meters apart. A Phase II Intensive Archaeological Survey was recommended for Sites 107-15 and 107-16 to refine the site definitions.

A Phase II Intensive Archaeological Survey was conducted for Sites 107-15 and 107-16 in accordance with the SHPO's *Environmental Review Primer for Connecticut's Archaeological Resources* (hereafter the Primer) in 2012. Although both sites produced produced lithics indicative of occupation during the Late Archaic period, specifically associated with the Narrow-stemmed tradition (c. 4500-4000 years ago), only a small number were identified and no features were identified. During the survey, pervasive prior soil disturbance was noted. Based on the findings of the Phase II, no further archaeological survey was recommended since both Sites 107-15 and 107-16 were determined to be unlikely to yield information important to prehistory and were not eligible to be listed on the National Register of Historic Places. After reviewing the Phase II Survey findings, the SHPO agreed that prehistoric archaeological Sites 107-15 and 107-16 were not eligible for the National Register of Historic Places and concurred that no historic properties will be affected by the construction on the site that includes both the proposed Orange Railroad Station and the adjacent TOD (see *Appendix G*).

3.15.2 Impact Analysis

Since the Phase I and II surveys determined that no historical resources would be affected by development on the project area including the area of the proposed Orange Railroad Station, commuter parking garage and adjacent privately-developed TOD, no direct or indirect impact will occur under either the No Action of Proposed Action Alternatives.

3.15.3 Mitigation

Since the SHPO has determined that no historic properties will be affected by development on the proposed site, no mitigation is needed.

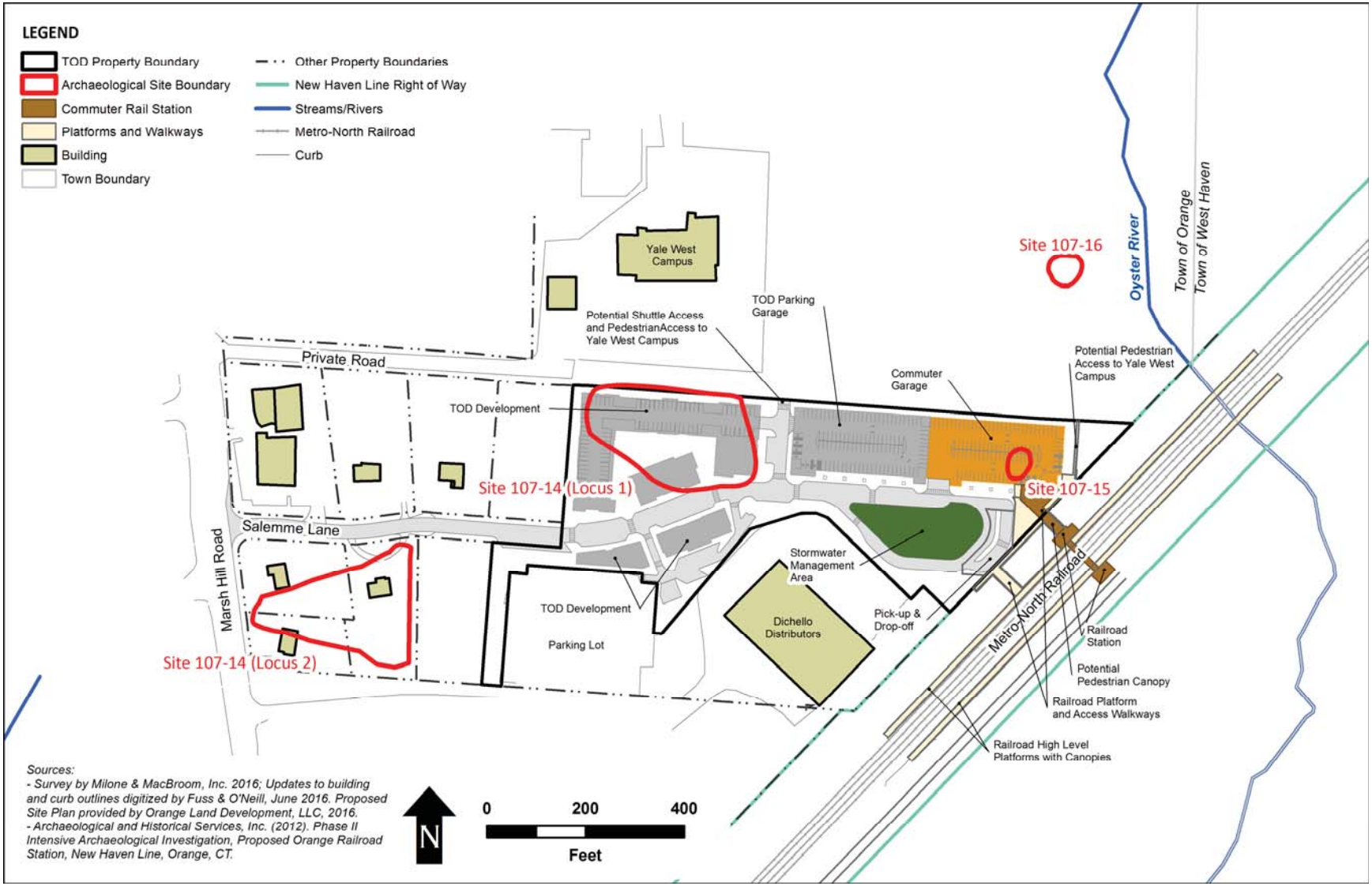


Figure 3-31. Historical and Archaeological Resources

3.16 Solid Waste, Toxics, Pesticides, and Hazardous Materials

A preliminary assessment was conducted to assess existing conditions at the site of the proposed Orange Railroad Station to identify potential environmental concerns and to evaluate the potential for hazardous materials and/or petroleum products to be encountered during future site construction and development activities. Because of the relationship between the Proposed Action and the adjacent privately-owned TOD parcel (as described in *Section 1.1.2*), conditions on the TOD parcel were also assessed. The assessment included:

- Review of the 2007 *Final State Environmental Impact Evaluation* for the New Railroad Station at City of West Haven or Town of Orange (CTDOT, 2007) to determine the existing condition of the project site to identify areas of concern, which may affect the environmental quality of the soil and/or groundwater at the project site.
- Review of additional existing documents, including environmental investigation reports, State aerial photographs, records present in State of Connecticut and Federal environmental databases (copies of relevant source documents are included in *Appendix H*) and building and land use permits available at the Orange Town Hall.
- Site visits performed in December 2010 and on October 12, 2016.
- A Task 110 Corridor Land Use Evaluation by Marley Environmental Inc., under subcontract to Consulting Environmental Engineers for CTDOT dated April 17, 2001.
- Three Task 120 Preliminary Site Evaluations for 55, 95, and 0 Marsh Hill Road, also prepared by Marley Environmental Inc., under subcontract to Consulting Environmental Engineers for CTDOT, each dated May 2, 2003.

3.16.1 Existing Conditions

The analysis of existing conditions for both the area of Proposed Action and the adjacent TOD parcel was compiled based primarily on the October 12, 2016 field inspection and the review of available historical documents for these properties or adjacent parcels. The information and documents listed above were reviewed for any evidence for potential sources of hazardous material and/or contamination which may have migrated onto either the site or onto the adjacent, privately owned TOD parcel. It is noted that due to dense vegetation overgrowth, these parcels were not accessible in their entirety during the October visit.

The anticipated risk of encountering contaminated soil and/or groundwater during proposed construction at the proposed Orange Railroad Station or on the adjacent TOD parcel is addressed in the sub-sections below and summarized on *Table 3-22*.

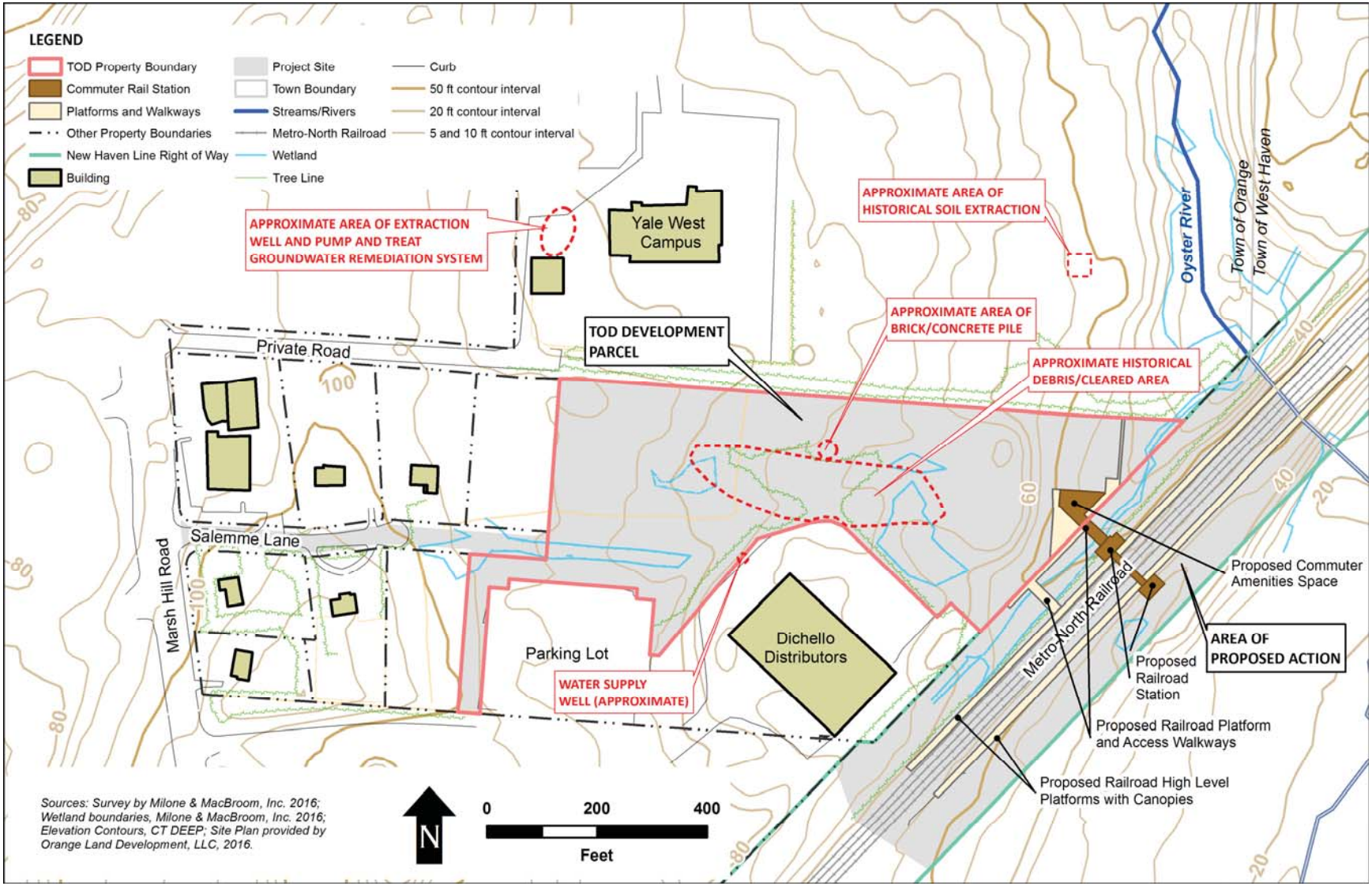


Figure 3-32. Hazardous Materials Locations

Proposed Action Area
The Proposed Action consists of the development of the Orange Railroad Station within the State owned railroad right-of-way located east of Salemme Lane, along the eastern property boundary of 0 Marsh Hill Road. The area of Proposed Action consists of approximately 5.6 acres of land within the right-of-way, which currently exists as vegetated land. The Oyster River is culverted under the railroad tracks along the northeastern portion of the Proposed Action area, and inland wetland areas associated with an existing drainage ditch and the Oyster River are located along the western side of the Proposed Action area. The wetland areas are discussed in more detail in *Section 3.12* and are indicated on *Figure 3-26*.

TOD Parcel
The privately-owned TOD parcel, is an approximately 8.09-acre parcel of undeveloped, wooded land located directly adjacent to the area of Proposed Action (to the west of the rail line right-of-way), east of Salemme Lane, off Marsh Hill Road in Orange, Connecticut. This parcel was formerly part of the 0 Marsh Hill Road parcel (which abuts the parcel to the south) until it was subdivided and sold to Orange Land Development LLC in August 2015.

The TOD parcel is bound by the area of Proposed Action and the State of Connecticut Metro-North railroad to the east, a chain link fence and the West Campus of Yale University (95 Marsh Hill Road) to the north, Dichello Distributors, Inc. facility (55 Marsh Hill Road) to the south and vacant residential lots along Salemme Lane to the west.

As discussed in *Section 3.12*, inland wetland areas are located throughout the TOD parcel, as indicated on *Figure 3-26*, associated with an existing drainage ditch and the Oyster River along the northeast corner of this parcel.

3.16.2 Hazardous Materials and Toxics

The observations of hazardous materials and toxics made on both the location of the proposed Orange Railroad Station and the adjacent TOD parcel during the visit and as a result of the review of available documents are summarized below.

Proposed Action Area
Although the area of the proposed Orange Railroad Station in its entirety was not accessible during the visit, based on the amount and type of debris observed at the adjacent TOD parcel during the October 2016 visit, it is likely that similar conditions are present within the Proposed Action area. Overall, the potential that the debris has negatively impacted the soil in the area, from contaminants leaching from the debris, is low.

Given the extensive history of the State owned railroad right-of-way, there is a high probability of the presence of contaminated soils or debris along the existing railroad track. Contaminants commonly found associated with railroad corridors include railroad ties (wood treating chemicals), spilled, or leaked fluids (oil, cleaning solvents), herbicides, transformer fluids [Polychlorinated biphenyl (PCBs)], fossil fuel combustion products [Polycyclic aromatic hydrocarbons (PAHs)], asbestos, and metals such as arsenic and mercury.

TOD Parcel

A small debris pile (consisting primarily of bricks and concrete) was observed in the north-central portion of the TOD parcel and small amounts of miscellaneous debris (primarily plastic and general refuse) were noted throughout various other locations of this parcel during the site inspection. Based on the amount and type of debris observed during the October 2016 visit, the potential that the debris has negatively impacted the soil at the TOD parcel or area of Proposed Action, as a result of contaminants leaching from the debris, is low.

Historical aerial photos from the 1960s and 1970s show patches of vegetation cleared out in the approximate central portion of the TOD parcel, while the 1990 aerial photograph shows a larger cleared area. Additionally, small structures or storage containers, likely associated with Dichello Distributors (owner of the site at the time) were present. The historical partial clearing of the wooded area on the TOD parcel could potentially be due to soil disturbance and/or debris dumping in this area.

Surrounding Area

Properties located directly adjacent to the TOD parcel and area of Proposed Action and the current and past uses of these parcels are summarized in *Table 3-22* below. Additional details pertaining to the environmental history of these parcels, as available, are provided in the following subsections.

Table 3-22. Parcels Adjacent to the Proposed Action and Proposed TOD

Address	Parcel ID	Location Relative to Site	Current Use	Former Use	Historical Use
0 Marsh Hill Road / 55 Marsh Hill Road	3-1-10	Southwest	DiChello Beer Distributors & parking area	Wooded/Vacant	Agricultural
95 Marsh Hill Road/ 11 Frontage Road	8-3-4	Northwest	Yale University vacant warehouse and facilities office	Bayer Corporation warehouse	Aviation Components Support Co.; Various trucking companies

0 Marsh Hill Road/55 Marsh Hill Road

These parcels, owned and operated by Dichello Distributors, Inc., are located south of the TOD parcel and southwest of the Proposed Action area. The 0 Marsh Hill Road bottling facility directly abuts the TOD parcel to the south and the Proposed Action area. The 55 Marsh Hill Road property is presently occupied by Dichello Distributors, Inc. and Valenti Leasing Company, and both companies are listed as generators of RCRA hazardous waste (primarily paint-related waste materials).

A parking lot and warehouse/storage building present at 0 Marsh Hill Road were constructed on the parcel between the early 1980s and 1987. During a 2011 property assessment, the paved

asphalt in the parking lot and loading dock area was noted to be in poor condition and slight staining (likely petroleum based) was evident.

According to a report filed with the CTDEEP Leaking Underground Storage Tank (LUST) program, as provided by the October 2016 Environmental Data Resources, Inc. (EDR) report (*Appendix H*), USTs (gasoline and diesel) removed from the 55 Marsh Hill Road property were allegedly dumped in the marsh (wetlands) behind the building; likely referring to the current TOD parcel. No documentation has been identified that confirms or refutes this allegation; nor were any tanks identified during the 2011 or 2016 site visits.

95 Marsh Hill Road / 11 Frontage Road

This parcel (also identified as 11 Frontage Road) is currently owned and operated by Yale University and is located immediately north of the TOD parcel and northwest of the Proposed Action area. A chain-link fence separates the eastern portion of this property from the TOD parcel.

Available information indicates that this property was entered into the Connecticut Property Transfer Program (REM ID #8718) prior to the Yale University purchase of the property from Bayer Corporation in 2007. Environmental assessments and investigations began at the property in 1998 and filings with the State indicates that there is known contamination on the property. The signing party intends to fully investigate and remediate the property in accordance with the "property transfer law" and remediation standard regulations (RSRs).

Historically, between 1968 through the 1990s, this parcel was occupied by a number of companies, which conducted machining, grinding, spray painting, paint stripping and parts maintenance on the property, including the manufacturing and restoration of helicopters. Past operations associated with the repair and refurbishing of helicopter parts and auxiliary equipment may have resulted in a release of hazardous material to the subsurface.

Previous environmental assessments identified at least eleven areas of concern (including loading docks, an outdoor solvent storage area, floor drains, maintenance pits, vapor degreaser, an outdoor hazardous waste storage area, former machine shop, and former waste oil drum storage area) on this parcel. Several environmental assessments and investigations have been conducted which included soil, groundwater, building surface and soil vapor investigations.

Several remediation activities have also been conducted at this property including soil excavation, Hydrogen Release Compound (HRC) injection, monitored natural attenuation and the installation and operation of a pump & treat groundwater remediation system (from approximately 1993 to 2000) to address a volatile organic compound (VOC) groundwater plume. Soil excavation was also conducted to address a small area (approximately 10x10x4 feet) of elevated lead concentrations identified in the fill/debris material located in the eastern, undeveloped portion of this property.

Currently, two buildings exist on this property (a warehouse and associated office building) which were constructed in approximately 1968. A previous investigation of this property

identified concrete fragments and soil piles in the eastern portion of this property. The origin of these piles was unknown, and it was unclear if dumping of soil and/or debris had occurred in the eastern, wooded portion of this parcel, northwest of the Proposed Action area. Historical topographic maps and aerial photographs of this area also show uneven terrain indicative of soil disturbance activities. Concrete fragments were also observed along the southern property line (adjacent to the TOD), suggesting that fill material with the potential to impact shallow soil, may still be present throughout this portion of the property.

From the documentation reviewed for this parcel, although investigation and remediation of the property has been completed, post-remediation groundwater monitoring requirements have not yet been met. A Licensed Environmental Professional (LEP) has not filed a verification with CTDEEP documenting that remediation has been performed to achieve compliance with the CT RSRs.

3.16.3 Pesticides

According to the CTDEEP, a pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant.

Prior to the development of adjacent parcels, the entire site area was formerly used for agricultural purposes. Development of the area began approximately in the 1950s with the residential structures along Marsh Hill Road and Salemme Lane. The 95 Marsh Hill Road parcel was developed in approximately 1968 and the Dichello Distributors warehouse (0 Marsh Hill Road) was constructed in approximately 1987.

Although there is no known use of pesticides or herbicides, the former use of the TOD parcel, area of Proposed Action and the surrounding area for agricultural cultivation suggests the possibility exists that pesticides may have historically been applied to the ground surface. In addition, herbicide application in the State owned railroad right-of-way may also have occurred. Therefore, residual concentrations of pesticides or herbicides, which prior to mid-century were primarily lead or arsenic-based and containing chlorinated VOCs, may remain in shallow soils.

3.16.4 Solid Waste

Solid waste disposal within the area surrounding the site is provided to individual properties by private solid waste haulers. The Town of Orange provides no municipal curbside solid waste pickup, although it does provide curbside recycling pickup and operates a transfer station for residents.

Universal waste, which may contain mercury, lead, Freon, and other hazardous constituents, could also be generated from building construction and daily operational activities on the adjacent TOD parcel or on the site. Such wastes potentially include:

- Batteries (e.g., for emergency lights and security systems)
- Sprinkler system contacts

- Fluorescent lamps including PCB ballasts
- Cathode ray tubes (e.g., computer monitors)
- Electronic equipment (e.g., circuit boards)
- Air conditioning equipment
- Gas regulators
- Thermostats

3.16.5 Impact Evaluation

Under the No Action alternative, the environmental risk associated with existing on-site conditions identified in *Sections 3.16.1* through *3.16.2* would remain unchanged. Potential impacts associated with the Proposed Action are discussed below.

Hazardous Materials and Toxics
The Proposed Action, which consists of the construction of the Orange Railroad Station, would not require significant soil disturbance. However, it is noted that fill material (brick, concrete, general refuse, etc.), conditions on adjacent parcels and potential historical pesticide/herbicide use may have negatively impacted soil and/or groundwater on the adjacent TOD parcel and surrounding parcels. Further investigation and sampling activities may be required on the TOD parcel to determine whether impacted materials are present and if a release had occurred from the existing debris to the subsurface; however this likely would not significantly impact the area of Proposed Action.

As previously mentioned, soil and groundwater remediation has occurred at the property located at 95 Marsh Hill Road to the northwest of the area of Proposed Action and conditions were identified which may have the potential to negatively impact the adjacent TOD. Specifically, a groundwater plume containing elevated concentrations of volatile organic compounds was identified in the western portion of this property. Since groundwater flows to the east/southeast towards the adjacent Oyster River, the potential exists that impacted groundwater may have migrated onto the TOD and/or the area of Proposed Action.

The location of the Proposed Action is southeast from the area of the groundwater contamination plume, but the literature reviewed identified no evidence that groundwater monitoring has occurred near the proposed development. As such, it is unknown at this time whether impacted groundwater has migrated beneath the site. Groundwater plumes containing volatile organic compounds migrating from off-site sources may represent a vapor intrusion risk to new structures constructed.

Based on the identification of elevated lead concentrations in the wooded portion of the 95 Marsh Hill Road parcel, north of the TOD parcel, the potential exists that similar lead-impacted fill material could be present in the area of Proposed Action or on the TOD parcel. Proposed construction activities have the potential to disturb fill materials that may be impacted with elevated concentrations of lead, and would require specific disposal methods more costly than disposal of unpolluted fill.

Following construction, the operation of the commuter rail station is not anticipated to result in any significant generation of hazardous or toxic materials and no subsequent direct or indirect impacts to

hazardous and toxic waste generation or disposal. All solid and universal wastes will be handled and disposed of in accordance with applicable regulations, as described below.

Pesticides
The area of Proposed Action currently exists as undeveloped woodland in the State owned railroad right-of-way; therefore it is unlikely that shallow soil has been disturbed in this area. Based on the extensive operation of the railroad and historical uses of the site as farmland, and historical vegetation management activities along the State owned railroad right-of-way, there is a potential for residual concentrations of pesticides to remain in shallow soil.

As part of the operation and maintenance of the Orange Railroad Station, there may be a need to apply pesticides within buildings or on adjacent external areas. Pesticides may also be necessary to control vegetation around the station, parking garage, and parking lots. In addition, Metro-North may use pesticides along the State owned railroad right-of-way to maintain safe access to the railroad tracks and adjacent areas. Pesticide application would be conducted using approved pesticides by a CTDEEP-certified pesticide applicator according to the "Connecticut Pesticide Control Act."

Solid Wastes
Since the area of Proposed Action is currently undeveloped, significant quantities of construction and demolition debris, other than the limited debris identified on the property, will not be generated during development and construction activities.

Solid and universal waste will be generated at the Orange Railroad Station during its operation and maintenance. The solid waste generated on the premises will be collected in receptacles in the Orange Railroad Station and inside the parking garage. The operation of the Orange Railroad Station is not anticipated to result in any significant generation of hazardous or toxic materials and no subsequent direct or indirect impacts to hazardous and toxic waste generation or disposal. Solid waste generated by operations at the new facility will be disposed of in accordance with applicable requirements. There will be minimal amounts of universal waste, including light bulbs and batteries generated on-site. Universal waste will be segregated from the general waste stream and recycled in accordance with Section 22a-449(c)-113 of the RCSA.

3.16.6 Mitigation

Plans, specifications, and cost estimates for contractor bidding for the Proposed Action area and the TOD should address anticipated environmental conditions. Design team members should meet with LEPs familiar with conditions at the site, the adjacent TOD parcel, and the surrounding area, to review project objectives and construction activities in relation to potential environmental contamination which may migrate onto the proposed development areas from adjacent parcels, investigate any concerns, if any, and ensure that project designs will avoid increased risk to human health and the environment. Procedures for contractor health and safety, temporary waste stockpiles, polluted soil management, and dewatering activities should be developed for both the Proposed Action Area and the TOD. Specifically, a Soil Management Plan should be developed for the project to address potentially contaminated soil or fill materials encountered during construction and development of the TOD. The plan will include provisions for the sampling, analysis, stockpiling, transportation, and disposal of

potentially-contaminated soil or fill materials. The plan will be consistent with the CTDEEP *Guidance for Utility Company Excavation*.

Groundwater sampling should be performed on the TOD site to determine groundwater quality in the area of the proposed TOD and adjacent to the area of Proposed Action.

Construction and excavation activities on the TOD site should be performed in accordance with the CTDEEP General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer). If de-watering is anticipated to occur during construction, a General Permit for the discharge of wastewater may be required. It is unknown whether groundwater at the site area has been impacted by upgradient, off-site sources of hazardous material and/or petroleum products.

Pesticides
Any potential pesticide application performed at the station and in the railroad right-of-way would be conducted using approved pesticides by a CTDEEP-certified pesticide applicator according to the "Connecticut Pesticide Control Act" and no additional mitigation is necessary.

Solid Waste
Solid and universal wastes generated during the on-going operation and maintenance of the proposed train station will be handled and disposed of in accordance with all applicable regulations, therefore no mitigation is necessary.

3.17 Aesthetics/Visual Effects

3.17.1 Existing Conditions

The site of the Proposed Action is located within an urban, primarily residential and commercial/industrial area along the Interstate 95 and New Haven Rail Line transportation corridor. The area identified or the construction of the rail station and platforms is currently undeveloped and mostly wooded. The location of the proposed adjacent TOD is primarily wooded with residential development to the west and commercial and industrial development to the north and south, respectively. Photographs in *Figure 3-32* illustrate the existing visual conditions.

3.17.2 Impact Analysis

The No Action Alternative would not affect the visual environment as there would be no changes to the existing landscape.

Potential visual and aesthetic effects of the Proposed Action were examined from the perspective of how the design will appear and be incorporated into the surrounding area. Given the currently undeveloped status of the proposed area, the construction of the Proposed Action will result in a change in the overall visual and aesthetic character, but one that is anticipated to be both consistent with the adjacent proposed TOD and also with the commercial and industrial development in the surrounding parcels. Although the design of the station façade has not been determined at this time, it is anticipated

that it will be similar in nature to recently constructed stations of a similar size and function (see *Figure 3-34* as an example).

The construction of the improvements on the adjacent TOD and shared parking structure will also alter the visual setting of the currently undeveloped and mostly, wooded site. The TOD plans call for the construction of 3- to 6-story buildings, as well as surface parking areas. *Figures 3-35 and 3-36* provide a sense of the visual appearance of the site near the proposed shared parking structure based on the current level of design and *Figure 3-37* provides an example of the anticipated façade for the parking structure and adjacent TOD. The landscaping plan for the site, in addition to the screening provided by the wooded area to remain undeveloped between the TOD and the existing residences on Salemme Lane, will provide some screening between the existing structures and the new development, including the Proposed Action.

Although the Proposed Action and adjacent TOD will result in a significant change to the overall visual and aesthetic character of the primarily undeveloped site, the resulting visual and aesthetic character will be generally consistent with the underlying zoning and development in the surrounding area. As a result, no significant direct, indirect or cumulative visual impacts are expected.

3.17.3 Mitigation

The Proposed Action is not anticipated to have a significant impact on the aesthetics and the visual setting of the project area or surrounding properties. Therefore, no mitigation is necessary or proposed.

Brick & concrete debris pile on TOD Development Parcel

Wooded Area Looking East Toward Railroad

View from Salemme Lane Looking toward Dichello Distributors

Figure 3-33. Site Photos

(Sources: Fuss & O'Neill, Oct 2016; Google Streetview, Jan 2016)

Figure 3-34. Example of Similar Station Design

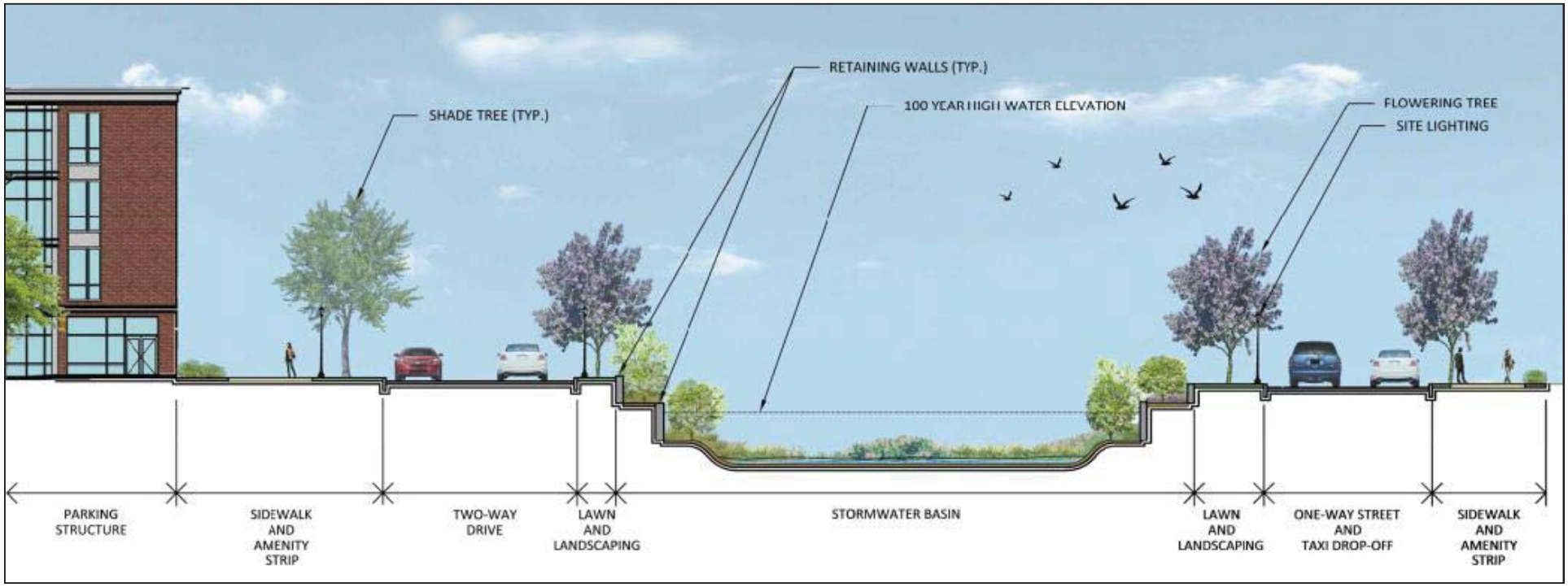


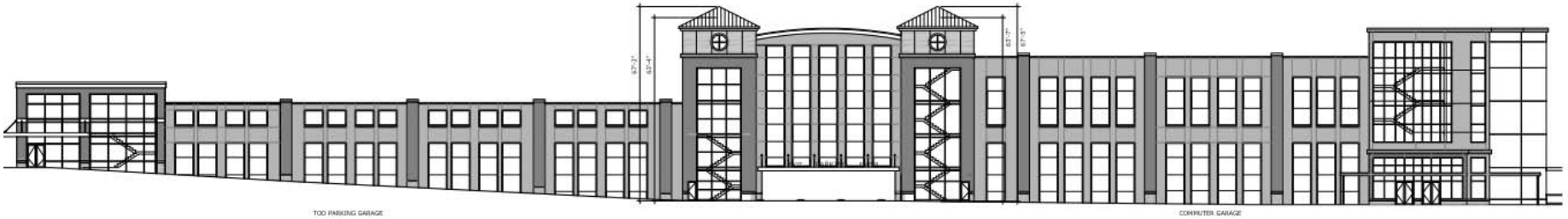
Figure 3-35. Streetscape Cross Section of Proposed TOD

(Source: Petition for Zone Change, Orange Land Development, LLC, 2016)

Figure 3-36. Typical Streetscape View Looking East

(Source: Petition for Zone Change, Orange Land Development, LLC, 2016)

PROPOSED WEST ELEVATION



PROPOSED SOUTH ELEVATION

Figure 3-37. Proposed Parking Garage Facades

(Source: Orange Land Development, LLC, May 2017)

3.18 Energy Use and Conservation

3.18.1 Existing Conditions

The site of the Proposed Action, as well as the area of the adjacent proposed TOD, is currently undeveloped, so there is no existing energy use. As described in *Section 3.20*, energy-related utilities to the area are proposed by United Illuminating and Southern Connecticut Natural Gas.

3.18.2 Impact Analysis

Under the No Action Alternative, no energy demand associated with the rail station would be generated. However, development on the privately-owned parcel proposed for the TOD may still occur regardless of the construction of the commuter rail station.

The Proposed Action will result in an increased energy demand on the site associated with the Orange Railroad Station and parking garage. However, the demand will be limited given the proposed design of the station and will be primarily associated with lighting for the station building, pedestrian bridge, platforms, commuter parking garage and outdoor fixtures.

The construction of the proposed Orange Railroad Station is expected to be subject to High Performance Building Construction Standards for State-Funded Buildings (CGS Sections 16a-38k-1 through 16a-38k-9)[56] since project involves the construction of a State facility that is projected to cost five million dollars or more, and for which all budgeted project bond funds are allocated by the State Bond Commission. CTDOT will incorporate energy efficiency to minimize the energy demand associated with the project, where feasible.

The adjacent proposed TOD will include energy consumption associated with the residential and commercial activities; however, the details of energy use and potential conservation features are not known at this time. It is assumed that energy conservation measures will be implemented by OLD where found to be feasible and advantageous.

On a regional level, the Proposed Action is anticipated result in an indirect benefit to energy use, reducing energy consumption and promoting conservation by improving access to and encouraging the use of mass transit. In general, use of mass transit such as commuter rail reduces the consumption of fossil fuel by reducing vehicle miles traveled on regional roadways.

[56] The High Performance Building Construction Statndards were adopted primarily to require State-funded buildings to be built using high performance building standards equivalent to that of the United States Green Buildings Council (USGBC) Leadership in Energy and Environment Design (LEED) Green Building Rating System™-Silver. This rating system focuses on five areas of concern: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

3.18.3 Mitigation

Although no significant direct or indirect impacts to energy use and conservation are anticipated to result from the Proposed Action, CTDOT will incorporate energy efficient elements for construction and operation of the Proposed Action where feasible to reduce energy consumption, dependency on fossil fuels, and greenhouse gas emissions.

3.19

3.19 Public Utilities and Services

3.19.1 Existing Conditions

Descriptions of the public utilities in proximity to the project site (*Figure 3-38*) were obtained from information provided by CTDOT and plans for the Orange TOD Project (Milone and MacBroom, 2016).

Electricity
The United Illuminating Company is the electric service provider for the Town of Orange and the area including the project site. The utility company has existing three-phase electrical service along Marsh Hill Road. Various residential and commercial properties along Marsh Hill Road and residential properties along Salemme Lane currently receive electric service.

Gas
Natural gas service to the project area is provided by the Southern Connecticut Gas Company. There is currently a high-pressure natural gas line along Marsh Hill Road that is owned and maintained by the Southern Connecticut Gas Company.

Water
Water service to the area including the project site is currently provided by the South Central Connecticut Regional Water Authority (SCCRWA). The existing 16-inch water main in Marsh Hill Road provides potable water to the site.

Wastewater
A 6-inch force main carries wastewater north along Marsh Hill Road and then turns east, following the private road north of Salemme Lane that serves as the driveway to 95 Marsh Hill Road. The force main then discharges into an 8-inch gravity sewer flowing from west to east along the private road and then continues along an off-road easement towards the railroad tracks. The 8-inch gravity sewer then turns northeast, crosses the town line into West Haven, and connects to a 21-inch sewer pipe on the other side of the Oyster River. The 21-inch sewer flows generally from north to south toward the Oyster River Pump Station, which is located in a residential area on Beatrice Drive, and eventually to a treatment facility in West Haven.

Stormwater
Marsh Hill Road is served by a curb and gutter drainage system that receives discharges from a localized area extending from the driveway to 95 Marsh Hill Road south to 65 Marsh Hill Road. Stormwater is carried through reinforced concrete pipes (RCP) below the road to a 24-inch collector on the west side of Marsh Hill Road opposite Salemme Lane, which carries flows to the southwest, toward the Southern Connecticut Gas work center.

No catch basins have been observed on Salemme Lane except at the intersection with Marsh Hill Road, nor are any known to exist along the private drive to 95 Marsh Hill Road. Site survey plans provided by CTDOT, which are the basis for the information shown in *Figure 3-38,* do not show catch basins or drainage pipes in these areas. Thus, stormwater from Salemme Lane and the associated residences west of a high point in the road drains to the west as overland flow toward Marsh Hill Road before entering the catch basins at the intersection. Runoff generated east of the high point flows east and discharges to the adjacent wooded areas, where it eventually infiltrates or discharges to the Oyster River. Based on topography, the stormwater drainage from the undeveloped areas of the project site generally infiltrates or migrates toward the existing wetland areas on the site and eventually discharge to the Oyster River. Stormwater runoff from the warehouses and parking areas owned by Dichello Distributors, Inc. south of the site is discharged to on-site detention basins prior to entering the drainage ditch along the west side of the State owned railroad right-of-way (Water Resource Area 5 as discussed in *Section 3.11*).

3.19.2 Impact Analysis

The No Action Alternative would result in no changes to existing conditions for electric, natural gas, water, wastewater, or stormwater utilities, although future development on the privately-owned location of the proposed TOD may still occur. The impact evaluation presented in the remainder of this section focuses on the Proposed Action.

Electricity
Given the small size of the proposed Orange Railroad Station, lighting will comprise the major electric demand for the Proposed Action. Additional electric demands will be associated with the commercial and residential development of the TOD. The existing three-phase electrical service on Marsh Hill Road is likely to be adequate to meet the project demand since the estimated loads are not large and are generally consistent with surrounding industrial uses. Therefore, no direct or indirect impacts to electrical utilities are anticipated as a result of the Proposed Action.

Gas
Should the final design of the proposed Orange Railroad Station necessitate the use of natural gas, the existing high-pressure natural gas main on Marsh Hill Road will be adequate to provide natural gas service for heating, hot water, and other incidental uses in the train station. Additional natural gas usage will be associated with the TOD, but no anticipated direct or indirect impacts to natural gas utilities are anticipated. The natural gas line would be extended from the gas main on Marsh Hill Road to the structures along an easement or through the property acquired as a part of the proposed site development.

Wastewater

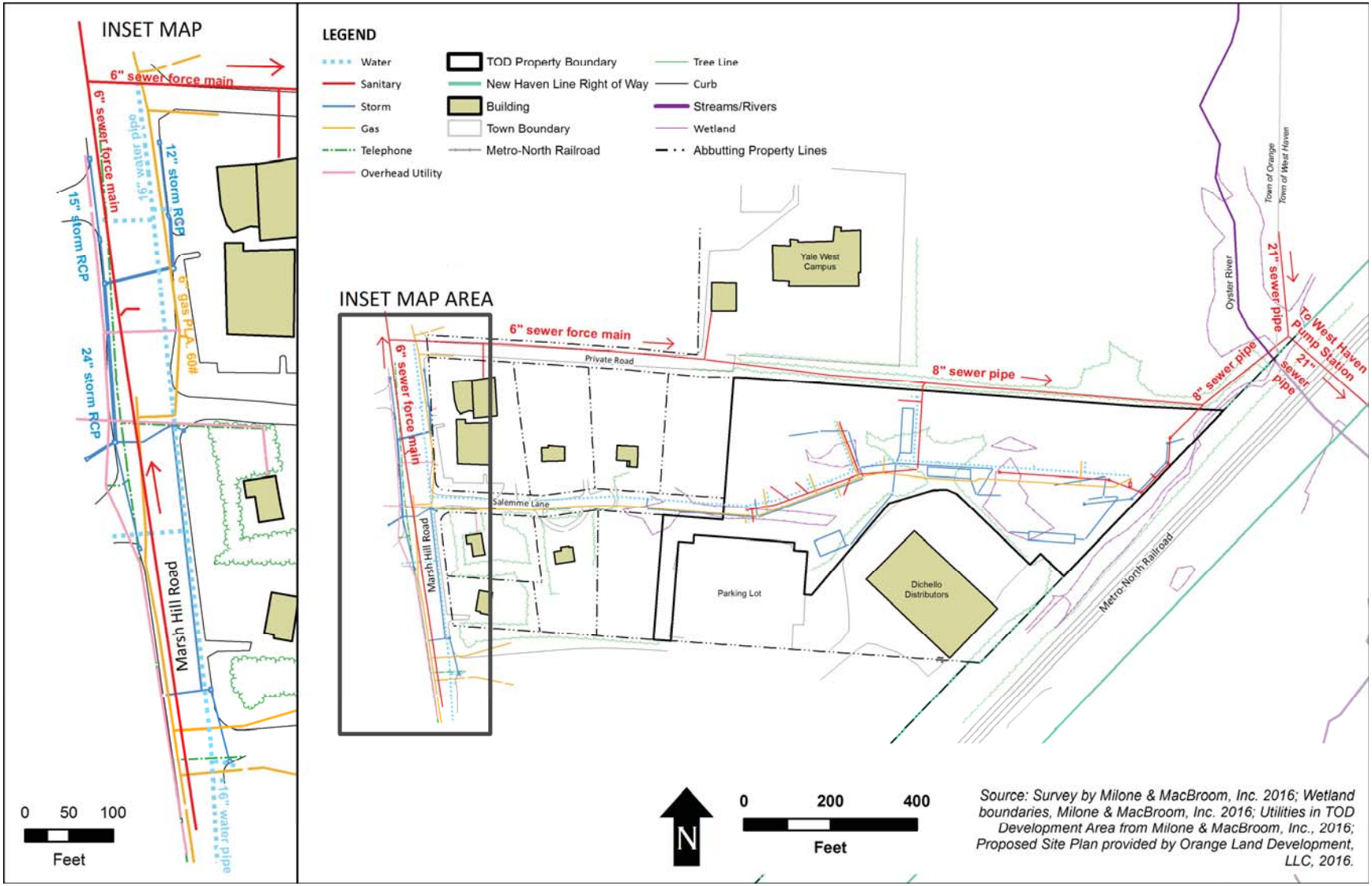


Figure 3-38. Utilities

A new sanitary sewer line will be installed to serve the TOD and will be connected to the existing 8-inch main located to the north of the property. Total anticipated wastewater quantities generated by the TOD and Orange Railroad Station are 25,648 gpd, with a peak flow estimate of 71 gpm[57] (Daly, personal communication, November 4, 2016). The proposed parking garage is anticipated to have floor drains connected to a proposed oil/water separator before discharging to the sanitary sewer system, consistent with the CTDEEP requirements for parking structure drainage (floor drains from the top level would be treated and then discharged as stormwater since this water would tend to be larger in quantity and more dilute in quality). Estimated wastewater flow for the parking garage is 2,880 gpd, with a peak flow of 8 gpm.

The Orange Water Pollution Control Authority (WPCA) has approved the connection for the TOD and the Orange Railroad Station (Kleffman, 2015). In addition, provisions will be made to relocate the existing sewer lateral serving the bottle recycling facility on the Dichello Distributors, Inc. property (Milone & MacBroom, 2016). The capacity of the existing 8-inch gravity sewer pipe will be confirmed during subsequent design.

Water

A new water line to serve the TOD will be extended from Marsh Hill Road and will have the capacity to provide domestic water service and fire protection to the property. This new water line will also permit future development of the properties along Salemme Lane (Milone & MacBroom, 2016). Anticipated water demands for the project were estimated based on the projected wastewater flows, using a conservative estimate of 115% of wastewater flows described above (Daly, personal communication, November 4, 2016). Using this method, estimated water demand associated with the TOD, including parking, is 29,495 gpd, with a peak demand of 82 gpm. Available fire flows at the hydrants will be 1,000 gpm (Daly, personal communication, November 4, 2016).

The minimal water usage associated with the Proposed Action is not anticipated to have any direct or indirect impacts on water supply utilities. Current design for the TOD includes the extension of water from the existing 16-inch water main on the east side of Marsh Hill Road.

Stormwater

The Proposed Action will convert primarily undeveloped land, resulting in the creation of approximately 6.0 acres of new impervious surfaces. The proposed impervious surfaces include the access roadway and potential shuttle access and pedestrian access to Yale West Campus, buildings associated with the TOD, parking garage (TOD and commuter), Orange Railroad Station and access walkways. Without the use of structural stormwater controls, the increase in impervious surfaces would result in changes to the existing stormwater drainage patterns and increase peak runoff rate and increase stormwater volumes discharging from the site. Stormwater management practices will be used at the site to mitigate increases

[57] For local permitting purposes, OLD calculated an estimated 30 gpd for the station, assuming restrooms are located in the station, with a peak flow of 0.06 gpm. Since restrooms are not anticipated to be included in the final design, negligible wastewater will be generated by the proposed station. Overall daily and peak flows from the residential and commercial development at the TOD will be reduced to 25,618 gpd, with a peak flow of 65 gpm.

in impervious surfaces and potential impacts to hydrology and water quality (See *Sections 3.10 and 3.20* for more detailed discussion).

3.19.3 Mitigation

Electricity
No mitigation is necessary since there is adequate electric service capacity in the vicinity of the project site along Marsh Hill Road to serve the proposed Orange Railroad Station.

Gas
No mitigation is necessary since there is adequate natural gas service capacity in the vicinity of the project site along Marsh Hill Road to serve the proposed Orange Railroad Station.

Water
Adequate water supply and infrastructure is available in the vicinity of the project site that can be extended to the proposed Orange Railroad Station, should water service be required. Therefore, no mitigation is necessary.

Wastewater
Approval by the Town of Orange WPCA of connection of the project, which would include the Orange Railroad Station and parking garage, indicates that there is adequate sanitary sewer infrastructure and capacity to serve the proposed Orange Railroad Station. The adequacy of the existing sanitary sewer infrastructure will be confirmed through subsequent design phases given the current configuration of sewer service in the area and preliminary estimates of projected peak wastewater flows associated with the TOD. The proposed Orange Railroad Station is anticipated to generate negligible wastewater flows.

Wastewater generated from the parking garage (i.e., incidental runoff, snowmelt water, or floor washwater from interior decks of the garages) is eligible for coverage under the CTDEEP *General Permit for Miscellaneous Discharges of Sewer Compatible Wastewater* as building maintenance wastewater, although registration is required if greater than 5,000 gallons per day are generated. The total projected parking garage water discharge is approximately 2,880 gpd, which is below the threshold requiring permit registration.

Stormwater
Stormwater runoff from the project site will be managed consistent with the water quantity and quality requirements of the *2004 Connecticut Stormwater Quality Manual*, as amended, for new development projects. The drainage systems will be designed to meet the CTDOT drainage and stormwater management requirements. The stormwater management systems will address water quality, peak runoff rates, and groundwater recharge requirements and will consider Low Impact Development approaches. In addition, the proposed drainage for the parking garage structure will be consistent with current CTDEEP requirements for multi-level parking structures.

Runoff from Salemme Lane and site improvements will be collected in a series of pipes that eventually discharge to the watercourse on the easterly edge of the property. Before being discharged, the

stormwater will flow through a series of underground detention galleries as well as through the stormwater basin at the loop of the new road extension. The stormwater basin on the project site will be designed with sufficient volume to maintain predevelopment peak flow rates of runoff to receiving waters.

3.20 Public Health and Safety

3.20.1 Existing Conditions

Emergency Preparedness

The safety and security of Connecticut's rail system and its users is a high priority for CTDOT, the State, and nation as described in the Connecticut State Rail Plan (CTDOT, 2012). Emergency preparedness planning for the State consists of systems for responding in an appropriate, timely response to natural hazards, emergencies, and homeland security threat events. The State of Connecticut's Strategic Long-Range Transportation Plan (CTDOT, 2009) identifies rail-related strategies and actions for emergency preparedness, including developing a Security Planning program at CTDOT, collaborating with the Department of Emergency Services and Public Protection, along with Federal partners (Department of Emergency Management and Homeland Security) to ensure adequate, stable funding and staffing levels, implementing the National Response Framework (NRF), and continuing to implement the National Incident Management System (NIMS). These emergency preparedness systems in Connecticut ensure the safety and security of rail passengers throughout the State rail system, including the Metro-North Railroad.

Emergency preparedness guidelines recommend that transit station design and construction provide for rapid patron evacuation and rapid emergency response personnel access for potential emergency scenarios. Transit station design should take into consideration the system safety concept in the station planning phase to identify and resolve potential safety hazards associated with a transit system's emergency response capabilities. In addition, critical station egress and access paths should be identified in the planning phase, and thereafter remain unobstructed.

Public Safety and Emergency Services

The Metropolitan Transportation Authority Police Department (MTA PD) is the primary law enforcement agency for the Metro-North Railroad. The primary mission of the MTA PD is to ensure a safe environment within the transit system, reduce fear, and promote confidence of the riding public through station based policy. The MTA PD polices rail stations that Metro-North Railroad services and patrols the State owned railroad right-of-way in Connecticut from Greenwich to New Haven. The MTA PD provides the primary response to all incidents on the New Haven Line and coordinates response efforts with the Connecticut State Police and local police agencies in Connecticut. The MTA PD has facilities in Stamford, Bridgeport, and New Haven (CTDOT, 2012).

In addition to the MTA PD, State and local governments, passenger rail operators, and private industry are important in rail security efforts. The responsibility for responding to emergencies involving the passenger rail infrastructure often falls to State and local governments since the rails run through their jurisdictions. State and local police participate in the Visible Intermodal Prevention Response (VIPR) initiatives in coordination with the Transportation Safety Administration (TSA), MTA PD, and Amtrak

Police Department (PD) to respond to incidents along the rail line. The TSA utilizes VIPR teams to leverage resources quickly and to increase visible security in all modes of transportation throughout the country (CTDOT, 2012).

Starting in 2011, the Connecticut State Police's newly created five member Mass Transit Security Team (MTST) has conducted proactive explosive detection sweeps with canines at passenger rail and bus stations/terminals and other critical locations within the mass transit system in Connecticut. The MTST coordinates with the CTDOT, MTA PD, Amtrak PD, various mass transit officials, Federal agencies and local police agencies to develop effective terrorism prevention strategies for Connecticut's mass transit operations (CTDOT, 2012).

The operators of parking lots vary between stations. The Orange Railroad Station will be State owned, as will the commuter portion of the parking garage. Therefore, the commuter portion of the parking garage and Orange Railroad Station may fall under the jurisdiction of various police/security agencies.

The Town of Orange emergency services will have a primary role in emergency response at the proposed rail station. The Town of Orange Department of Police Services serves the entire town and consists of a patrol division and investigative services. The Orange Police Department currently has an authorized strength of 43 sworn personnel and 12 civilian employees. The Town also has an Emergency Communications Center (commonly referred to as 9-1-1), which services all of the police, fire, and emergency medical calls for the Town (Town of Orange, 2016b).

The Orange Volunteer Fire Department is one of the few remaining all-volunteer incorporated fire departments in the State of Connecticut. Active members are on-call to serve the community on a 24-hour and seven-day basis, dispatching from two stations: Station 1 at Orange Center Road (3.2 miles north of the project site) and Station 2 at Boston Post Road (1.7 miles northeast of the project site). During 2009, the Orange Volunteer Fire Department firefighters responded to 460 alarms with an average arrival time of less than five minutes (Town of Orange, 2016c).

The Town of Orange has a Community Emergency Response Team (CERT) program to train people to be better prepared to respond to emergency situations in their communities. When emergencies happen, CERT members can give critical support to first responders, provide immediate assistance to victims, and organize spontaneous volunteers at a disaster site. CERT members can also help with non-emergency projects that help improve the safety of the community (Town of Orange, 2016d).

Health Services

Milford Hospital is located approximately 4.1 miles from the proposed Orange Railroad Station at 300 Seaside Avenue in Milford, which is the closest emergency medical provider. The hospital is a full-service health care facility providing emergency and urgent care services, clinical services, and patient support services (Milford Hospital, 2016). The Yale-New Haven Hospital is located at 20 York Street in New Haven, approximately 5.1 miles from the proposed project site. The hospital provides full-service emergency services and many specialty services (Yale-New Haven Hospital, 2016).

The Town of Orange Health Department has responsibility for public and environmental health issues in the Town, including inspection of restaurants, schools, sewer and septic systems, investigation of disease outbreaks, and education on health related issues (Town of Orange, 2016).

3.20.2 Impact Analysis

The No Action Alternative would not impact the demand for or provision of public health and safety services in the Town of Orange, although development at the adjacent privately-owned parcels may still occur.

Emergency Preparedness
Under the Proposed Action, emergency preparedness will be ensured through the implementation of the existing systems described in the State of Connecticut's *Strategic Long-Range Transportation Plan* and the *Connecticut State Rail Plan*. The proposed Orange rail station will be designed to provide for rapid patron evacuation and rapid emergency response personnel access for potential emergency scenarios.

Public Safety and Emergency Services
Under the Proposed Action, the Orange Railroad Station, parking garage and on-street as well as off-street parking will require security services and police or security patrolling. The MTA PD is anticipated to have the primary role for policing the Orange Railroad Station and the State owned railroad right-of-way. Security inside the train cars is the sole responsibility of the MTA PD.

Secondary security and patrolling agencies at the rail station and parking garages and on-street and off-street parking may include the Orange Police Department or a private parking management company. The MTA PD may provide security personnel stationed inside the train station during operating hours. In addition, the other police/security departments and security personnel may incorporate the station into their routine patrols.

It is expected that the Orange police and fire departments will respond to emergency (9-1-1) calls at the proposed Orange Railroad Station site. There is believed to be adequate personnel and equipment to respond to routine and emergency calls at the proposed Orange Railroad Station

Health Services
There will be a minor increase in vehicular traffic in the vicinity of the project site and rail passengers at the proposed Orange Railroad Station. The increase in traffic and activity at the Orange Railroad Station are not anticipated to adversely affect the public safety at or in the vicinity of the proposed Orange Railroad Station nor result in adverse indirect impacts by placing a significantly greater demand on hospitals of public health services in Orange.

3.20.3 Mitigation

No significant impacts to public health and safety services are anticipated. Therefore, no mitigation is necessary or proposed.

3.21 Demolition and Construction Period Impacts

The Proposed Action will require clearing wooded areas, grading, construction of the Orange Railroad Station, pedestrian bridge and access roadway to the eastern side of the State owned railroad right-of-way, as well as construction of project elements shared with the adjacent proposed TOD, including construction of utility infrastructure and stormwater management system, commuter drop-off/pick-up area and the commuter parking structure. Additional building, parking structure, utility, and roadway construction associated with the development of the TOD will occur. An evaluation of the associated construction-phase impacts and mitigation measures are described in this section. The existing conditions at the site are not applicable to this section. Additionally, the No Action Alternative includes no construction and is therefore not discussed.

3.21.1 Impact Analysis

Traffic
Since the majority of the project consists of new construction in an undeveloped area, only minor impacts are anticipated to traffic flow in and around the Proposed Action during construction. Impacts to through traffic along Marsh Hill Road would be limited to the period when work will be performed to revise the traffic signal at Marsh Hill Road and the SCG driveway to include the Salemme Lane approach. Access to Salemme Lane and the SCG driveway could be disrupted for a short period during the signal equipment installation.

Parking
There are currently no regularly used parking areas at the site therefore no significant impacts to local parking are anticipated during the construction period.

Considerations Relating to Pedestrians and Bicyclists
There are currently no pedestrian or bicycle facilities along Marsh Hill Road that would be disrupted during construction. Any pedestrians and bicyclists that do use the road would be able to continue past the work area during construction with minimal disruption.

Considerations Relating to Local Transit
The project will require construction of new platforms along existing active rail lines, requiring special care to ensure continued train operation. The largest potential disruption to rail traffic is likely to result from the construction of the pedestrian bridge above the rail lines. Potential requirements could include staging of some construction activities from an active rail and suspending materials by crane over active tracks. The elevated nature of the tracks relative to adjacent ground and the overhead electrical transmission and catenary wires would require special consideration during any crane operation. Minor signal, communication, and catenary upgrades may still be required.

Air Quality
Potential construction air quality impacts can occur due to the use of diesel-powered construction vehicles. Diesel air emissions include carbon monoxide, hydrocarbons, nitrogen oxides, and particulate matter (PM10 and PM2.5). Emissions from construction equipment are anticipated to be significantly less than the total emissions from other industrial and transportation sources in the region, and

therefore, are expected to be insignificant with respect to compliance with the NAAQS. However, potentially localized air quality impacts could occur as a result of diesel exhausts from construction equipment in the vicinity of the project site.

Roadway traffic disruption due to lane closures, detours, and construction vehicles accessing the site can cause congestion which can increase motor vehicle exhaust emissions. Significant disruptions are not currently anticipated, but if they were to occur they will be mitigated by implementing appropriate traffic management.

Fugitive dust emissions can occur during ground excavation, material handling and storage, movement of equipment at the site, and transport of material to and from the site. Fugitive dust is most likely to be a problem during periods of intense activity and would be accentuated by windy and/or dry weather conditions.

Noise

Construction activities are a potential source of short-term noise impacts, which can include both continuous and intermittent noise being received by nearby receptors. It is difficult to reliably predict the sound levels that may occur at a particular receptor or group of receptors as a result of construction activity. Heavy construction equipment is the principal source of noise during construction activity, and the pattern of heavy equipment use is constantly changing as a construction project progresses. *Table 3-23* presents noise levels generated from selected construction equipment that may be present as part of the proposed project (FTA, 2006).

Table 3-23. Typical Noise Levels From Construction Equipment

Equipment	Typical Noise Level (dBA) 50 Feet From Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Mobile	83
Dozer	85
Generator	81
Jack Hammer	88
Loader	85
Rock Drill	98
Saw	76
Shovel	82
Spike Driver	77
Truck	88

In general, sources of noise grouped close together constitute a point source, which have been shown to attenuate by approximately 6 dBA for each doubling of distance (FTA, 2006).

The residences on Salemme Lane and at 65 Marsh Hill Road and Hope Academy at the intersection of Marsh Hill Road and Salemme Lane are the nearest noise-sensitive land uses to the proposed activity. The residential development located southeast of the railway corridor is partially shielded from noise generated in the construction area by the railway embankment.

The residences on Salemme Lane are approximately 300 feet from the edge of proposed pavement associated with the west side of the TOD. This distance is three doublings of the 50-foot noise measurement distance presented in the table, or equivalent to an 18 dBA reduction in noise level. Since only roadway construction is included in this area, the loudest anticipated noise is from a jackhammer or truck (a rock hammer is not anticipated to be required in this area). At the 50 foot distance, the noise level is reduced to 70 dB, which is elevated compared to existing sound levels.

Additionally, when workers are present on or near the tracks, trains are required to sound their horns at least twice to warn of their approach. The reference noise level for a train horn 50 feet from the source is 110 dBa (FTA 2006). The residential neighborhood that includes Perry Merrill Drive is the closest noise-sensitive land use to the railway tracks where the horns would sound. The distance between the rail embankment and the nearest residence is approximately 375 feet, which is greater than three doublings of distance, corresponding to a noise reduction of 18 dBa and a resultant 94 dBa blast. Dense trees separate the railway embankment from the neighborhood, which is likely to provide some noise shielding. In addition, construction noise is exempt under Section 22a-69-1.8(g) of the Connecticut Regulations for Control of Noise due to the temporary nature of construction-related noise.

Community Resources

Community resources include services that exist to improve the health and well-being of the public, including schools, health care facilities, emergency response services, public safety, libraries, daycare, and other community organizations. No community resources are located on the site of the Proposed Action or the adjacent TOD. As such, no direct impacts to community resources are anticipated during the construction period. One community resource is located near the affected parcels; Hope Academy is located at 89 Marsh Hill Road and has a driveway that connects to Salemme Lane. This school could experience minor indirect impacts during construction. Traffic flow from this school could be affected during construction, and the building could be affected by noise or dust. These impacts are addressed above. The school should be able to remain open during construction if appropriate traffic mitigation measures are provided. Additionally, Bright Horizons daycare is located at 117 Frontage Road, and the building is located approximately 500 feet from the site of construction activities. This facility could experience minor indirect impacts from construction through noise and dust, although it is relatively far from the proposed work. These impacts are addressed above.

Stormwater and Water Quality

Activities that result in the disturbance of stabilizing groundcover, including pavement, buildings, landscaping, and natural vegetation, can leave soil exposed and subject to erosion. Eroded soil that is carried by stormwater can discharge to surface waters, resulting in sediment deposition adverse impacts to water quality and aquatic habitat.

Soils may be exposed to precipitation during the majority of the construction period, from clearing and grubbing through stabilization of the site. The project will comply with the *2002 Connecticut Soil Erosion and Sediment Control Manual* and associated errata to reduce the potential for soil erosion and sedimentation.

Solid Waste, Toxics, Pesticides, and Hazardous Materials
As discussed in Section 3.17, hazardous materials and/or petroleum products may be encountered during the construction of the proposed Proposed Action and the adjacent TOD. Construction machinery, fuels, maintenance fluids, paints, solvents, and other hazardous or toxic construction materials may be present at the site during construction period, with potential for exposure to workers and the public.

Safety
The Proposed Action includes construction activities in a dense urban area near roadways, railroad tracks, and parking areas that will remain partially or completely open during construction. Construction activities will require heavy equipment operation for construction and material handling, resulting in potential safety impacts to traffic and pedestrians in the surrounding area. Uneven surfaces, falling objects, trenching, inadequate construction barriers, inadequately rerouting traffic and pedestrians during construction, inadequate signage, inadequate precautions around railroad operations, and other activities can pose a hazard to the public if not properly managed.

Utilities
Adequate utility service is available in the project area to facilitate construction activities. Planned, temporary electrical outages may be required to connect new construction to existing services. It is not currently anticipated that sewer, water, or gas service lines would need to be relocated to accommodate construction, although temporary disruptions could occur if relocation is required or if expanded utility service is required.

3.21.2 Mitigation

Traffic
Traffic management around the Proposed Action during construction will be necessary for short periods to maintain efficient traffic circulation on Marsh Hill Road and to ensure access to the residences on Salemme Lane. This mitigation would include appropriate construction phasing to minimize disruptions to traffic and access, establishing haul routes and staging areas, permissible hours of work, uniformed officers, and other traffic controls to direct traffic and assist with pedestrian crossings as needed.

Parking
No significant construction-period impacts are anticipated. Therefore, no mitigation is necessary or proposed.

Considerations Relating to Pedestrians and Bicyclists
No significant construction-period impacts are anticipated. Therefore, no mitigation is necessary or proposed.

Considerations Relating to Local Transit
The impact of construction on rail operations can be mitigated by scheduling construction activities during appropriate off-peak periods, coordinating with passengers, and careful coordination with the railroads that use the railway corridor, including Metro-North Railroad, Amtrak, CSX, and the Providence and Worcester Railroad operated by the Genesee & Wyoming Railroad.

Air Quality
Potential air quality impacts from diesel exhausts will be addressed through the proper operation and maintenance of construction equipment, and prohibition of excessive idling of engines. Section 22a-174-18(b)(3)(C) of the RCSA limits the idling of mobile sources to 3 minutes.

Additionally, CTDOT will consider requiring diesel powered non-road construction equipment to include retrofit emission control devices or to use clean alternative fuels to reduce diesel emissions, or both. In general, these requirements would apply to diesel powered non-road construction equipment with engine horsepower ratings of 60 that will be used on the project or assigned to the contract for a period in excess of 30 consecutive days.

Potential air quality impacts from fugitive dust will be addressed through the following mitigation measures:

- Reducing exposed erodible earth area to the extent possible through appropriate construction phasing.
- Stabilization of exposed earth with grass, pavement, or other cover as early as possible.
- Application of stabilizing agent (i.e., calcium chloride, water) to the work areas and haul roads.
- Covering, shielding, or stabilizing stockpiled material as necessary.
- Use of covered haul trucks.
- Limiting dust-producing construction activities during high wind conditions.
- Rinsing of construction equipment with water or any other equivalent method to minimize drag-out of sediment by construction equipment onto the adjacent roads.
- Street sweeping of roads within construction areas.

Noise
Potential noise impacts during construction will be addressed through the following mitigation measures, which will be incorporated into the contract specifications for the project:

- Restriction of work to 7:00 a.m. to 9:00 p.m. local time. Although construction noise is exempt under the Connecticut Noise Regulations (Sections 22a-69-1 through 22a-69-7.4), those hours of work which are specified for lawn maintenance equipment provide a reasonable estimate of acceptable work hours.
- Proper maintenance of equipment, and advance notification of nearby sensitive receptors of activities that may produce excessive sound levels.
- The Connecticut Department of Transportation standard specification for noise pollution (Form 814A, Section 1.10.05), which states that the maximum allowable level of noise at the

residence or occupied building nearest to a project site shall be 90 decibels on the "A" weighted scale (dBA).

Community Resources

No direct construction-period impacts to community resources are anticipated. Mitigation of indirect impacts will occur when appropriate mitigation for traffic, noise, and dust impacts is implemented. Therefore, no additional mitigation is necessary.

Stormwater and Water Quality

Development and redevelopment projects which disturb one or more total acres of land are required to obtain a permit from the CTDEEP under the *General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities*. This permit requires that the applicant develop a Stormwater Pollution Control Plan. The plan requires the implementation of measures to prevent pollution in discharged stormwater to be consistent with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*. Appropriate implementation of controls in accordance with this general permit and the guidelines will prevent construction-period impacts to stormwater and water quality.

Solid Waste, Toxics, Pesticides, and Hazardous Materials

Plans, specifications, and cost estimates for contractor bidding for the Proposed Action area and the TOD parcel should address anticipated environmental conditions. Design team members should meet with LEPs familiar with conditions at the site of the Proposed Action, the adjacent TOD parcel, and the surrounding area, to review project objectives and construction activities in relation to potential environmental concerns which may migrate onto the proposed development areas from adjacent parcels, investigate any concerns, if any, and ensure that project designs will avoid increased risk to human health and the environment. Procedures for contractor health and safety, temporary waste stockpiles, polluted soil management, and dewatering activities should be developed for both the Proposed Action area and the TOD.

Soil Management Plans should be developed to address potentially-contaminated soil or fill materials encountered during construction and development of the Proposed Action and TOD. The plans will include provisions for the sampling, analysis, stockpiling, transportation, and disposal of potentially-contaminated soil or fill materials and be consistent with the CTDEEP *Guidance for Utility Company Excavation*.

Construction and excavation activities on the TOD parcel should be performed in accordance with the CTDEEP *General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer)*. If de-watering is anticipated to occur during construction, a General Permit for the discharge of wastewater may be required. It is unknown whether groundwater at the site area has been impacted by upgradient, off-site sources of hazardous material and/or petroleum products.

Construction machinery, fuels, maintenance fluids, paints, solvents, and other hazardous or toxic construction materials may be present at the site during construction periods. These materials will be managed following appropriate best management practices, regulatory programs, and manufacturer recommendations to prevent significant impacts.

Safety

Measures will be undertaken by CTDOT and the project contractor to avoid safety impacts during the construction period. Potential measures, adopted from FHWA (2001), may include:

- Using backup alarms on construction equipment
- Providing police details for directing traffic around construction equipment
- Providing safety cones and barrels indicating temporary roadway hazards
- Providing alternative routes for traffic and pedestrians
- Providing a continuous, accessible path of travel around or through construction
- Placement of effective barriers
- Ensuring that workers are property trained on railroad safety requirements and that required procedures are followed.

Utilities

If planned electrical outages are required, the contractor will coordinate with the electrical utility and affected customers to minimize disruptions. If necessary, existing utilities will be relocated, maintained, and/or protected from disturbance or damage during construction in accordance with the requirements of each utility company.

3.22 Secondary and Cumulative Impacts

CEPA regulations require that the sponsoring agency consider the secondary and cumulative impacts of its actions, in addition to direct impacts. Secondary or indirect impacts are effects of an action that are removed in time or distance from the action itself. Cumulative impacts are those that result from the incremental impact of a project when added to other past, present, or reasonably foreseeable future actions.

3.22.1 Secondary Impacts

Under the No Action Alternative, other ongoing projects that are included in local and regional planning efforts would occur regardless of whether a new station is constructed at the project site. The success of the proposed TOD, and the viability of the newly zoned TODD, is inherently dependent on the construction of the Orange Railroad Station. The No Action Alternative (not constructing the station) would limit the viability of transit-oriented development in Orange, by eliminating a key transit component.

The Proposed Action may induce development that could result in changes in land use in the vicinity of the site. The remaining residential parcels along Salemme Lane, which do not currently conform to local zoning, may be redeveloped into uses that would primarily serve the rail commuter consumer as discussed in *Section 3.8*. These uses could include convenience stores, coffee shops, and other uses attracted to higher commuter and consumer traffic counts.

Beyond these parcels, many of the parcels in the area surrounding the project site are developed, under development, or planned for development. Their location is already close to the Interstate 95 interchange, such that they are already easily accessible to the transportation network. Although a new station may marginally increase their attractiveness for development, it is not reasonably foreseeable that the Proposed Action would spur their development.

Other secondary impacts may be associated with the potential induced development of the non-conforming residential parcels to commercial use. Businesses could attract additional traffic beyond that accessing the station for commuting, resulting in minor increases in delay at roadway intersections. These customers are expected to be a minor proportion of users of the businesses, considering the proximity of retail establishments along Route 1.

Other secondary impacts could result from this induced development. The new development would require additional vehicle parking and larger building footprints than the existing residences, resulting in potential for erosion and sedimentation during construction as well as post-development increases in peak runoff rates and volumes that could impact hydrology and floodplains as well as potential increases in pollutant levels in stormwater runoff that could impact receiving water quality. Mitigation measures to offset these potential impacts would be reviewed and approved during local permitting processes and would conform to the requirements of the *2004 Connecticut Stormwater Quality Manual, as amended,* and the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*, as applicable.

Minor indirect impacts to wildlife habitat may result from increased competition for suitable habitat among species with small home ranges and high population levels that may be displaced by the Proposed Action.

Short-term secondary economic benefits are anticipated during the construction period as a result of construction-related employment, and associated expenditures.

Other potential construction-phase secondary impacts include planned, temporary disruption of utility service (electric, telecommunications, etc.) to areas around the project site during the construction period. These potential impacts will be addressed through coordination between CTDOT and its contractors and the public utility providers. Indirect impacts to nearby buildings from construction-related noise, dust, and temporary traffic disruption may also occur. Such impacts would be offset through the mitigation measures described in *Section 3.21*.

3.22.2 Cumulative Impacts

The potential cumulative impacts of the Proposed Action are documented in the following sections, including identification of the resource categories, geographic area, and timeframe for which the cumulative impacts can reasonably be expected to occur.

Cumulative Impact Analysis Topics
Potential cumulative impacts can occur to those resources for which direct or indirect impacts are also anticipated. Therefore, the following resources were considered in the cumulative impacts analysis based on the direct and indirect impacts identified in previous sections of this EIE. None of these direct and indirect impacts are anticipated to be significant and several are reduced or offset by mitigation.

- Water Quality – potential direct impacts to water quality associated with increased pollutant loads in stormwater runoff from the proposed project site, and indirect impacts from stormwater associated with the conversion of the remaining non-conforming residential parcels along Salemme Lane to commercial uses.

- Hydrology – potential direct impacts to hydrology associated with increased stormwater peak flow rates and volumes and reduced groundwater recharge resulting from increased impervious cover at the project site, and indirect/induced impacts from stormwater associated with the potential conversion of the remaining residential parcels along Salemme Lane to commercial uses.

- Wetlands – loss of State-jurisdictional wetlands and watercourses including the filling of up to approximately 35,940 square feet .

- Demolition and Construction Period Impacts
    - Air and Noise – potential air quality impacts associated with emissions from construction equipment and fugitive dust, and potential construction-related noise impacts.

Cumulative Impacts Analysis Area

The cumulative impacts analysis considers the geographic area within which previous or reasonably foreseeable future (i.e., planned and programmed) projects would be reasonably expected to have a cumulative effect in combination with the Proposed Action. Geographic boundaries of the resources that may be affected by direct or indirect impacts of the Proposed Action were reviewed to select an appropriate boundary for each resource category in the cumulative impacts analysis. These boundaries are presented in *Table 3-24*.

Table 3-24. Cumulative Impacts Analysis Area

Resource	Geographic Area
Water Quality	Oyster River and wetlands immediately surrounding project area
Hydrology	Oyster River downstream from the site
Wetlands	Oyster River Watershed
Demolition and Construction Period Impacts o Air and Noise	Area immediately adjacent to or downwind of the project area

Cumulative Impacts Analysis Timeframe

The timeframe for analysis of cumulative impacts for water quality, hydrology, and wetlands begins with existing conditions as of 2016 when the majority of field investigation and data collection for this document was performed, implicitly incorporating prior activities that may have contributed to cumulative impacts, and ends in 2030, which is the selected horizon year for the proposed project. The analysis timeframe for construction period impacts is limited to the construction period, which is anticipated to begin as early as 2017 for the TOD and in FY2020 (Spring 2021) for the Orange Railroad Station, pending availability of funding. Construction for the Orange Railroad Station is anticipated to be completed in two years, with the station opening in 2023.

Reasonably Foreseeable Future Actions

The project site is located within a heavily-developed context, with relatively few nearby parcels available for development. The companion financial report to this EIE (*Appendix E*) assessed a study area in Orange that encompasses approximately ½ mile, extending north along Marsh Hill Road north of I-95 to Indian River Road, west to the corporate boundary with the City of Milford, and east to the corporate boundary with West Haven. Only several remaining developable parcels are known to exist within this geographic area. The following public and private development projects were considered in the cumulative impacts analysis. These projects are generally within or have the potential to affect resources located within the cumulative effects impact area.

- The full build out of the TOD is the most reasonably foreseeable development, but it has already been considered in the analysis in this EIE because of the connected nature of the actions.

- Yale University has acquired the former Bayer facility of approximately 136 acres (adjacent to the project site) and has begun to re-tenant the existing buildings as a research park. Over the next several years, it is believed that these uses may bring an additional 3,000 jobs to Orange at this location. The Bayer facility existed prior to the start of the cumulative impacts analysis period and is anticipated to provide adequate space for the proposed uses for the foreseeable future. These two developments are ongoing and are known to CTDOT. The background growth traffic projections for 2016 and 2030 and traffic impact analysis presented in *Section 3.3* include these projects. Therefore, potential cumulative traffic impacts have been considered in the traffic analysis, and the results of the analysis indicate that the roadway network provides adequate capacity for the Proposed Action.

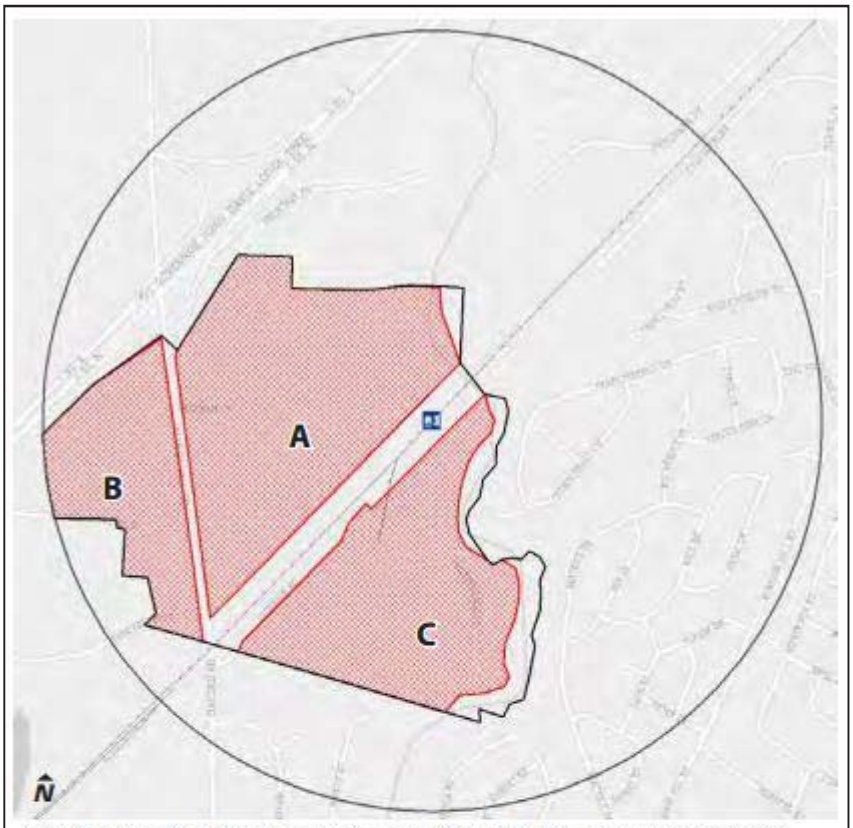
- The recent SCRCOG TOD Study (SCRCOG, 2015) identified 3 parcels in the vicinity of the TODD, including the site of the Proposed Action and TOD, that have potential development potential (*Figure 3-39*). No specific development plans are known for these parcels, but they represent potential future actions because of their current zoning and proximity to the proposed rail station.

In addition to these projects that have the potential to contribute to potential cumulative adverse impacts, many projects are currently proposed or ongoing in the region that are intended to collectively relieve traffic congestion and improve air quality in the region. These projects, summarized in *Section 2.1*, are intended to increase access to the New Haven Line by increasing parking, improving rail infrastructure, improving access to commuter rail services, and improving highway capacity and traffic circulation. The Orange Railroad Station is intended to fulfill similar objectives as these other projects, which together will provide significant cumulative benefits to transportation in the region.

Potential Cumulative Impacts

Water Quality
Section 3.9 describes how development of the project site could increase pollutant levels in stormwater runoff and impact receiving water quality and outlines stormwater management design measures to reduce potential water quality impacts. These measures include managing parking garage runoff in accordance with the CTDEEP parking structure drainage policy, consideration of Low Impact Development approaches for reducing impacts to site hydrology, and capturing and treating runoff from developed areas of the site to reduce pollutant levels in accordance with the *2004 Connecticut Stormwater Quality Manual*, as amended. The Town of Orange drainage requirements in the municipal subdivision regulations, which would apply to ongoing and future private development, require that post-development peak runoff rates not exceed pre-development peak runoff rates, but do not specify water quality goals for stormwater management.

Hydrology
Development of the project site has the potential to cause impacts to hydrology through reduced groundwater infiltration and increased peak discharge rates and volumes resulting from the addition of impervious cover. These impacts will be mitigated by meeting the groundwater recharge and peak discharge control requirements of the *2004 Connecticut Stormwater Quality Manual*. The Town of Orange drainage requirements, which would apply to ongoing or future private development, stipulate that no



Area A: This area includes the proposed station site which is currently occupied by distribution warehouses, commercial office buildings, vacant land, and a small number of residences. There is considerable potential for infill development within this area.

Area B: This area also includes commercial office and warehouse space. Properties would require redevelopment to support TOD land uses.

Area C: Located on the south side of the rail corridor, this area is comprised of business and industrial parks which would require redevelopment to accommodate TOD. A rail overpass at the proposed station will be critical in linking development on this site to the rail station.

Opportunity Area	Area* (acres)	Primary Land Use	Zoning	Constraints
A	60.4	Warehouse, office, undeveloped land, residential	Light Industrial	
B	26.2	Office, warehouse	Light Industrial	
C	44.4	Office and industrial	Light Industrial	

**Inclusive of municipal right-of-way within each opportunity area*

Figure 3-39. Potential Development Site

(Source: *Transit Oriented Development Opportunities for the South Central Region*, SCRCOG, June 2015)

increase in runoff rate may occur from development sites. Together, municipal and State stormwater management requirements will reduce the potential for cumulative impacts resulting from development in the Oyster River watershed.

Wetlands

The Proposed Action will result in impacts to inland wetlands and an intermittent watercourse, each of which were formed by human disturbance and provided limited functions and values. Mitigation for these impacts will be developed through the State and Federal wetlands permitting process. Significant construction is not anticipated at the Yale West Campus in the foreseeable since the current facility buildings and infrastructure are anticipated to meet foreseeable future uses. Future impacts to wetlands from other private development projects, such as the United Illuminating project, will be subject to local inland wetlands and watercourses permitting and potentially subject to State and Federal wetland permitting. In general, these wetland permitting requirements and mitigation, considered collectively with the wetland mitigation required for the Proposed Action, are adequate to prevent cumulative impacts to wetland resources.

Demolition and Construction Period Impacts

Demolition and construction period cumulative impacts to traffic, noise, and air quality are only likely to occur if other construction projects are occurring simultaneously with the construction of the Proposed Action. Construction-related cumulative impacts to traffic associated with the conversion/redevelopment of the residential parcels on Salemme Lane are unlikely since that development is speculative and would be anticipated after the Orange Railroad Station construction is completed.

4 Summary of Impacts and Mitigation

4.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts from the Proposed Action are anticipated to include:

- Minor increases in traffic on the adjacent roadway network in the vicinity of the site.
- Minor increased travel time for trains as they stop at the proposed Orange Railroad Station.
- Increased ambient noise levels due to increased traffic, building HVAC equipment, and train horns.
- Fill of wetland resources to accommodate the proposed station and associated access road and parking.
- Loss of a small area of prime farmland soils.
- Minor increased energy and utility use, although the result will be better access to public transportation to reduce energy use.
- Increased generation of solid waste
- Temporary construction-related inconveniences.

The Proposed Action consists of in-fill development of an isolated undeveloped area in an existing developed context, and will serve to provide additional public transportation opportunities in an urbanized context. The Proposed Action will incorporate appropriate mitigation measures as summarized in *Section 4.3* to offset these adverse impacts.

4.2 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable commitment of resources associated with the Proposed Action consist of resources that remain committed to a project through its lifespan (i.e., irreversible commitment) or those that are consumed or permanently impacted during project construction and operation as a result of the proposed project (i.e., irretrievable commitment).

Irreversible and irretrievable resources that would be committed to the Proposed Action include:

- Energy – Energy will be used for project construction and operation of the Proposed Action.
- Construction materials – Natural, synthetic, and processes materials will be used for construction of the Proposed Action.
- Land – The site will continue to be converted from a primarily undeveloped area to a transportation use as a result of the Proposed Action.
- Human labor – The dedication of human labor to the construction phase of the project represents an irretrievable expenditure of time and production that will be unavailable for other uses.
- Financial – The expenditures required represent funds that, once committed, are no longer available for other purposes and once spent, cannot be regained.

4.3 Summary of Mitigation Measures

Mitigation measures that will reduce or offset potential adverse impacts associated with the Proposed Action are summarized in *Table 4-1*.

Table 4-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Land Use, Zoning, and Local and Regional Development Plans	• Proposed Action is consistent with land use, zoning and local/regional development plans	• None required
Consistency with State and Regional Plans	• Proposed Action is consistent with State and regional plans	• None required
Traffic and Parking	• Drop in LOS to below C during morning or afternoon peak at Marsh Hill Road at SCG and Salemme Lane and Woodmont Road at Benham Hill Road	• TOD reviewed by OSTA – Station traffic included in analysis • Signalization at the Marsh Hill Road/Salemme Lane/SCG intersection to operate at LOS C or better (Signalization not required by OSTA, but proposed by developer.) • Possible restriping of approaches to unsignalized intersection of Oxford Road and Merwin Avenue
Considerations Relating to Pedestrians and Bicyclists	• Lack of connection of bicycle and pedestrian facilities to site of Proposed Action	• Construction of sidewalk along Marsh Hill Road to connect existing pedestrian facilities to site • Improved bicycle facilities to connect residential areas to site
Rail Operations and Transit	• Rail travel time to increase by approximately just over one minute per train during the morning peak period	• None required.
Air Quality	• No adverse impacts	• None required
Noise	• No potential for moderate or severe noise impact from rail operations at the new station and horn blowing during daytime and night-time hours.	• None required
Socioeconomic Resources	• No adverse impacts	• None required

Table 4-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Water Quality	• Increases in pollutant loading due to stormwater generated from creation of 6 acres of new impervious area (TOD and Station)	• Stormwater management measures consistent with the *2004 Connecticut Stormwater Quality Manual*, as amended, and Low Impact Development approaches will be considered in the project design and operation • Measures will include pollutant reduction, groundwater recharge where feasible and maintenance of peak flow rates
Hydrology and Floodplains	• Only construction of high level platforms may be within floodplain – will be confirmed during platform design • Increase in stormwater runoff due to increase in impervious area	• Fill or obstruction in 100-year floodplain from platforms to be mitigated as appropriate • Stormwater management measures consistent with the *2004 Connecticut Stormwater Quality Manual*, as amended, and Low Impact Development approaches will be considered in the project design and operation •
Wetlands	• Potential for a total (TOD and Station) impact of 35,940 square feet to inland wetlands	• Minimization of direct wetland impacts to extent practicable given project Purpose and Need • Avoidance of wetlands that offer substantive primary functions and values • Wetland restoration or replacement • Compliance with mitigation measures specified in local permit (TOD) and CTDEEP Inland Wetlands and Watercourses Permit, Clean Water Act Section 404 Permit, Clean Water Act Section 401 Water Quality Certification (Station) • TOD subject to local wetlands permitting (approved)
Coastal Resources	• Project located outside of Coastal Boundary • No impacts to coastal resources or future water water-development opportunities and activities	• None required

Table 4-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Flora, Fauna, Threatened and Endangered Species	• Potential for minor habitat loss along Oyster River riparian corridor • Increased competition for suitable habitat among species with small home ranges and high populations • No listed species identified on site of Proposed Action	• None required
Soils and Geology	• Conversion of approximately 10.8 acres of Prime Farmland Soils or Soils of Statewide Importance • Located in census-designated Urbanized Area and not subject to Federal Farmland Protection Policy Act • Not identified in State, regional, or local planning documents as an area for conservation or restoration of farmland uses	• None required
Cultural Resources	• No adverse impacts • SHPO has issued finding of no effect	• None required
Solid Waste, Toxics, Pesticides, and Hazardous Materials	• No significant generation of hazardous or toxic materials during operation • Potential for minor pesticide/herbicide application associated with station operation • Generation of solid and universal waste from station operation	• Any pesticide/herbicide application to be conducted according to Connecticut Pesticide Control Act • Disposal of solid and universal waste in compliance with applicable regulations

Table 4-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Aesthetics/Visual Effects	• Remaining residential areas adjacent to site would have full or partial view of the connector road • New construction screened from view of adjacent properties due to existing mature trees and depressed topography	• None required
Energy Use and Conservation	• Increased energy consumption for operation of new buildings • Anticipated reduction in fossil fuel consumption associated with shorter vehicle commutes	• Energy efficient elements will be incorporated into the construction and operation of the Proposed Action where feasible to reduce energy consumption, dependency on fossil fuels, and greenhouse gas emissions
Public Utilities and Services	• Adequate capacity anticipated for all utilities based on conservative estimates of use and coordination with utility personnel • Wastewater generation may necessitate mitigation based on refined wastewater flow estimates in the design phase	• None required
Public Health and Safety	• No impacts	• None required
Construction Period		
Traffic	• Minor, temporary disruptions to traffic in the immediate project area	• Use of appropriate traffic management including appropriate construction phasing to minimize disruptions to traffic and access, establishing haul routes and staging areas, permissible hours of work, uniformed officers, and other traffic controls to direct traffic and assist with pedestrian crossings as needed.

Table 4-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Rail Operations and Transit	• Disruption of service for construction of platforms and pedestrian bridge.	• Scheduling construction activities during appropriate off-peak periods, coordinating with passengers, and careful coordination with the railroads that use the railway corridor, including Metro-North Railroad, Amtrak, CSX, and the Providence and Worcester Railroad.
Air Quality	• Emissions from construction equipment • Increased vehicle exhaust emissions resulting from increased congestion during construction • Fugitive dust emissions during construction activities	• Ensure proper operation and maintenance of construction equipment • Prohibit excessive idling of construction equipment • Consider requiring use of clean alternative fuels or retrofit emission control devices for heavy machinery with engines of greater than 60 horsepower that will be assigned to the project for greater than 30 consecutive days • Implement traffic management measures during construction • Implement appropriate controls to prevent the generation and mobilization of dust
Noise	• Generation of noise by construction equipment and activities	• Contract specifications to ensure that noise levels at adjacent residences remain at less than 90 dBA • Restriction of work to 7:00 AM to 9:00 PM local time • Properly maintain construction equipment • Provide advance notification to sensitive receptors regarding anticipated excessive noise levels
Community Resources	• Potential for minor disruptions to traffic flow and increased dust and noise in vicinity	• See Traffic, Air Quality, and Noise above
Stormwater and Water Quality	• Exposure of soil increases potential for erosion and sedimentation	• Prepare Stormwater Pollution Control Plan that complies with the *General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities,* compliance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* • Local approvals for TOD
Solid Waste, Toxics, Pesticides, and Hazardous Materials	• Potential to encounter hazardous materials and/or petroleum products during excavation (TOD) • Generation of solid waste consisting of construction debris	• Development of Soil Management Plan to address potentially contaminated soil encountered during construction • Construction and excavation activities performed in accordance with CTDEEP General Permit for Contaminated Soil and/or Sediment Management

Table 4-1. Summary of Impacts and Proposed Mitigation

Resource Category	Impacts	Proposed Mitigation
Safety	• Potential for impacts to workers	• Measures will be undertaken by CTDOT and the project contractor to avoid safety impacts during the construction period.
Utilities	• Temporary outages may be necessary to accommodate connections • Utilities could be damaged accidentally	• Coordinate planned outages with the appropriate utility to minimize disruptions • Inform the public of anticipated outages • Relocate, maintain, or protect utilities from disturbance or damage • Adjust street hardware if necessary to meet finished grades

5 Project Costs and Benefits

Costs and benefits associated with a project are both quantifiable (tangible) and non-quantifiable (intangible).

Tangible Costs and Benefits
Costs associated with the commuter rail station elements of the Proposed Action include improvements to the New Haven Line railroad corridor and associated infrastructure to accommodate the proposed Orange Railroad Station, construction of the station platforms, and pedestrian bridge. Costs that may be shared, if any, with the adjacent TOD may include construction of on-street parking, drainage, utilities, and off-site improvements. Other costs include project design, construction contingencies for unforeseen conditions, and incidentals (including construction inspection and quality control testing). Federal Funds will only be used for project planning. State Funds for construction for the Orange Railroad Station are estimated to be $40 million to $60 million. These estimates are preliminary and are subject to change as the Orange Railroad Station design progresses. It should also be noted that construction of the commuter garage will result in tangible short-term benefit to the local or regional construction industry.

Operation and maintenance (O&M) costs are associated with operation and maintenance of the station building and the commuter parking garage, which may be partially or wholly borne by CTDOT. Actual O&M costs are uncertain at this time because they will depend on the range of services provided by a facility management company selected to operate the station through a competitive selection process. These O&M costs also represent a minor benefit to employment in the area since the Proposed Action will require new jobs to staff the parking garage. Details of O&M responsibilities may be determined through negotiations with OLD.

Revenue generated by the Proposed Action is expected to be relatively small and include ticket sales and parking fees. Ticket revenues may be affected by riders that are diverted from other stations, which would result in no net revenue gain.

Life cycle cost analyses for the elements of the Proposed Action may be conducted at a later time, when there is more certainty in the allocation of roles and responsibilities between CTDOT and OLD.[58]

Intangible Costs and Benefits
The project is expected to result in intangible benefits. These benefits include expanding public transportation into a localized area where personal vehicle ownership has declined, increasing the efficiency with which a limited subset of commuters can access the New Haven Line, promoting infill development of a heavily disturbed area, and serving as the centerpiece of the local TODD.

[58] Although the State Plan of Conservation and Development places an expectation of life cycle cost analyses for projects involving the expansion of infrastructure beyond the current limits of the existing or planned service area for the particular form(s) of infrastructure, this project which is on the existing New Haven Line, does not represent an expansion beyond current infrastructure limits.

6 List of Potential Certificates, Permits, and Approvals

The following certificates, permits, and approvals are anticipated to be required for the construction and operational phases of the Orange Railroad Station. Permits and approvals specific to the TOD and outside the control of CTDOT are not included in *Table 6-1*. This list will be refined during the project design phase.

Table 6-1. Certificates, Permits, and Approvals

Certificate/Permit/ Approval	Category	Reviewing Agency	Comments
Federal			
Clean Water Act Section 404 Permit	Wetlands	US Army Corps of Engineers	Required for discharge of dredge or fill material within Federal jurisdictional wetlands
Clean Air Act Conformity Determination	Air	US EPA	Required to demonstrate conformity with Clean Air Act in non-attainment and maintenance areas
State			
Clean Water Act Section 401 Water Quality Certification	Wetlands	CTDEEP	Required for State-review of Federal actions in wetlands, such is issuance of a permit.
State Historic Preservation Office Determination	Cultural	SHPO	Required for impacts to cultural resources; Determination of no effect has been made.
General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities	Stormwater	CTDEEP	Required if total site disturbance exceeds 5 acres
General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer)	Hazardous Materials	CTDEEP	If storing greater than 1,000 cubic yards of contaminated soils
Inland Wetlands and Watercourses Act Permit	Wetlands	CTDEEP	Regulates activities undertaken by State agencies in or affecting inland wetlands or watercourses
Flood Management Certification	Hydrology, Utilities, Water Quality	CTDEEP	Required for all State actions in or affecting floodplains or natural or man-made storm drainage facilities

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