

Memorandum

TO: Yevgeniy Galinski and Gerry Bogacz, NYMTC

FROM: Christopher Lamm and Ben Eskin, Cambridge Systematics

DATE: June 15, 2022 (revised June 22, 2022)

RE: Task 4: Freight Land Use Typology

INTRODUCTION

NYMTC has initiated a Regional Freight Land Use Study to assess the current mix of land uses related to goods movement in the region, assess recent and projected future trends that affect the region's supply and use of land to support freight-generating economic activity, and develop a "typology" that categorizes freight land uses in the region and describes key features and trends affecting each category. This study will fulfill a recommendation of the Regional Freight Plan element of Plan 2045, NYMTC's current Regional Transportation Plan.

The study is reviewing the impacts of:

- Changing business models in response to technological development, logistics trends, and customer demands; and
- Local, regional, and national development pressures; on freight-related and industrial land uses in the multi-state region.

The region under study includes the planning areas of the ten metropolitan planning organizations and councils of government in New York, New Jersey, Connecticut, and Pennsylvania which comprise the Metropolitan Area Planning (MAP) Forum as shown in Figure 1.

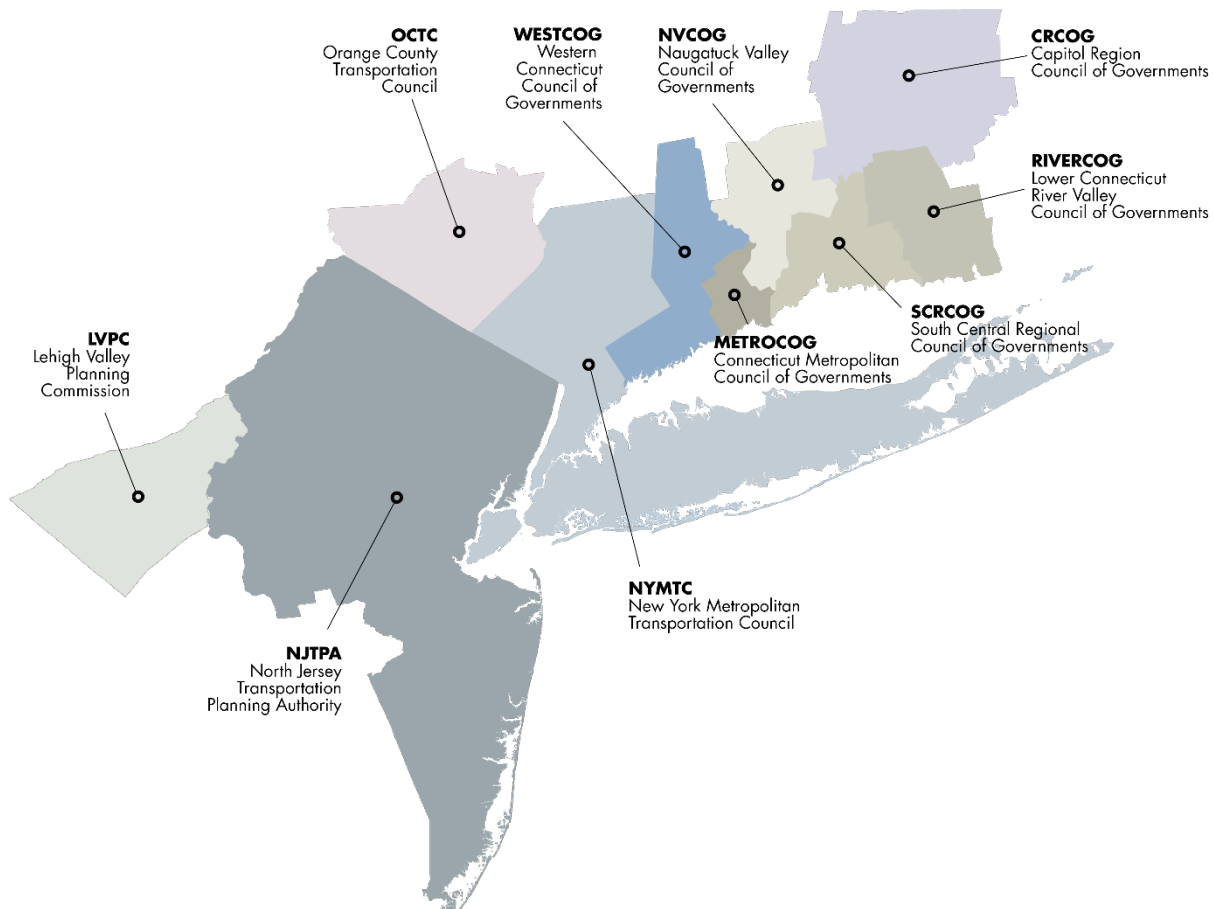
This technical memorandum describes a typology or classification scheme that describes freight land uses in the Study Area. The typology was developed using the findings of work completed in Tasks 2 and 3 of the Regional Freight Land Use Study, along with input gathered from technical advisors via a month-long virtual focus group. The technical advisors included municipal planners who manage land use and zoning at the local level, industrial and commercial real estate professionals, freight industry representatives, and transportation planners. A summary of the input received from the focus group is provided in Appendix A.

Land use classification is important as a standard for land use description and management. Having a consistent typology will help facilitate discussions and decision-making related to freight land use. Building on the materials gathered as part of Task 2, the trend and scenario development produced under Task 3, and feedback received from technical

advisors, this memorandum describes a Freight Land Use Typology, which includes categories that represent freight-related land uses that share common characteristics, including:

- Category of use
- Building types (manufacturing, warehousing, fulfillment, etc.)
- Vintage (age of buildings) and size
- Context (urban, suburban, exurban, rural)
- Development or redevelopment trend (Is the area newly-developing or mature? Is there new development or redevelopment occurring, etc.)

Figure 1 Multi-State Metropolitan Region



Source: NYMTC.org

A typology of three distinct categories has emerged that describe the ways that land is used for the movement of freight, and/or for the production or receipt of freight shipments:

- **Freight handling** - Includes transportation land uses that facilitate the movement of freight on the transportation network

- **Freight-generating** - Includes industrial and agricultural land uses. These typically produce a larger share of outbound shipments.
- **Freight-receiving** - Includes residential, commercial, institutional, and similar land uses. These are typically the final destinations of freight shipments. It is however important to note that some commercial spaces also generate outbound shipments.

Within the freight-generating land use category, there are multiple subtypes.

Table 1 provides brief descriptions of each freight land use category and subtype, including the typical uses, or categories of uses, used in municipal zoning codes where their subtypes exist. Each of the categories and subtypes is described in greater detail throughout the remainder of this memorandum.

Figure 2 presents the three categories of freight land uses and the freight-generating land use subtypes, and where they are most often found on the rural-to-urban transect. The transect is a conceptual model commonly used in the urban planning discipline to categorize the transition from undisturbed natural areas to urban core areas and the spectrum of uses in between. The transect does not include “exurban” uses in transitional areas between suburban and rural zones on the periphery of metropolitan areas, where suburban development is expanding into formerly-rural areas. However, exurban areas are mentioned in the descriptions of each of the freight land use categories and subtypes, as applicable.¹

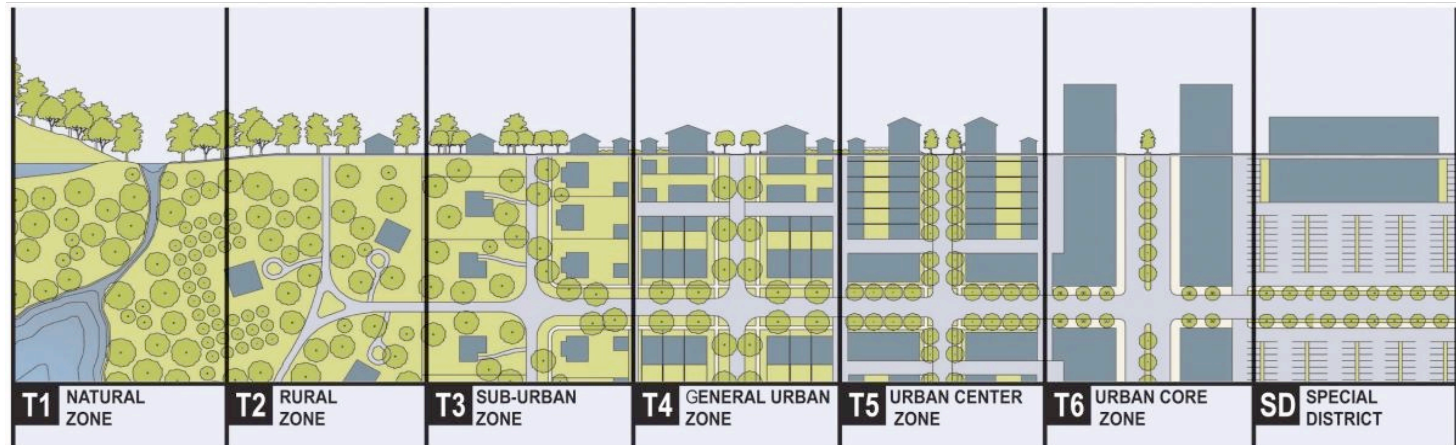
Agricultural areas, for example, are most often found in the rural zone. Large, greenfield distribution centers are also often built in rural areas, but also in suburban areas, and in some cases they are encroaching upon natural, undeveloped land (thus changing the character of the area from natural to developed). In urban areas, legacy industrial/manufacturing clusters, modernizing distribution clusters, endangered freight land use areas, and vacant storefronts converted to e-commerce fulfillment centers may be found. Some of these urban subtypes may also be found in suburban areas or special districts, as Figure 2 shows.

¹ More information about the transect is available from the Center for New Urbanism: <https://www.cnu.org/resources/tools>.

Table 1 Freight Land Use Typology Descriptions

Freight Land Use Types	Descriptions	Typical Use(s) in Municipal Zoning
Freight-Handling Centers	Seaports, cargo airports, carload and intermodal freight rail yards, tandem yards, container storage, and other facilities where freight is handled for import, export, transfer/transload, etc.	Transportation and Utilities
Agricultural Areas	Areas where agriculture generates shipments of freight (inbound fertilizers and equipment; outbound crops, livestock, and/or other agricultural products)	Agricultural
Large, Greenfield Distribution Centers	Concentrations of new, state-of-the-art distribution centers developed on previously unoccupied and relatively inexpensive land. Located in suburban areas with proximity to major highway corridors for access to the urban core and major freight hubs (e.g., ports, and intermodal facilities).	Industrial, warehousing, manufacturing
Modernizing and/or Redeveloping Distribution Clusters	Concentrations of legacy warehouses and industrial facilities in urban areas where there is a significant effort of repurposing, reconstruction, or upgrading to serve a new local market, typically for e-commerce. Modernized facilities may include multi-story buildings, advanced technology, efficient loading/unloading bays, multimodal connectivity, and other features. This subtype also includes the redevelopment of brownfields (former industrial sites that require environmental remediation) for these purposes.	Industrial, warehousing, manufacturing
Legacy Industrial/Manufacturing Clusters	Concentrations of older, smaller warehouses and industrial facilities. Limited loading space and expansion potential. Located in urban or urban-adjacent areas. These areas may include brownfields in need of remediation and redevelopment.	Industrial, commercial/retail/office
Endangered Freight Land Use Areas	Historic or legacy industrial neighborhoods in urban areas that are experiencing rent increases, higher operating costs, and conflicts with adjacent uses due to increasing demand for residential, commercial, or other non-industrial uses.	Industrial, transitioning to residential, mixed-use, etc.
Vacant Storefronts Converted to E-Commerce Fulfillment Centers	Vacant storefronts (or "dark stores"), "dead malls," and other vacant retail facilities which are being converted to "micro" e-commerce fulfillment or distribution center use. This is an emerging trend and there are not very many examples in the region to date. These may require zoning or master plan amendments to accommodate the use change.	Commercial (retail)
Freight-Receiving Land Uses	Residential communities, institutions (schools, hospitals, etc.), commercial (retail, office, etc.), and mixed-use districts are land uses that receive shipments of freight. Some commercial properties are being repurposed to generate freight shipments (e.g., vacant retail stores that are being repurposed as e-commerce distribution centers).	Residential, commercial (office, retail, etc.), institutional, mixed-use

Figure 2 Freight Land Use Typology Overview with Rural-to-Urban Planning Transect



Freight Land Use Categories	Freight Land Use Sub-Types				
Freight-Handling	Freight-Handling Centers				
Freight-Generating	Agricultural Areas				
	Large, Greenfield Distribution Centers				
			Modernizing Distribution Clusters		
			Legacy Industrial/Manufacturing Clusters		
			Endangered Freight Land Use Areas		
Freight-Receiving			Vacant Storefronts Converted to E-Commerce Fulfillment Centers		
			Freight-Receiving Land Uses		

FREIGHT-HANDLING LAND USES

Freight-handling land uses include land used to facilitate the movement of freight on the transportation network. Examples of freight-handling land use include seaports, cargo airports, carload and intermodal freight rail yards, tandem yards, container storage, and other facilities where freight is handled for import, export, transfer/transload, etc. Freight-handling land uses may accommodate any single mode (e.g., rail freight handled in a rail classification yard), or a combination of modes (e.g., freight transferred from ocean vessel to rail or truck at a marine terminal).

Freight-handling land uses may exist anywhere in the rural-to-urban transect, as transportation facilities and terminals are present in urban, suburban, exurban, rural, and natural environments.

Within the Study Area, there is a large number of freight-handling facilities that serve various transportation modes. Facility-level examples include:

- Marine Terminals, including Port Newark/Port Elizabeth, New York Container Terminal (NYCT), Global Container Terminal (GCT) Bayonne, South Brooklyn Marine Terminal, Port of Bridgeport, Port of New Haven, etc.
- Air cargo airports, including major air cargo hubs at John F. Kennedy International Airport and Newark Liberty International Airport, and airports that handle smaller volumes of cargo, such as LaGuardia International Airport, Lehigh Valley International Airport, Stewart International Airport, Bradley International Airport, and other airports throughout the Study Area.
- Intermodal Rail Terminals, including South Kearny Yard, Croxton Yard, and North Bergen Yard, all in Hudson County, NJ; Little Ferry Yard in Bergen County, NJ; Port Authority of New York and New Jersey's Intermodal Container Transfer Facilities (ICTF) at the major marine terminals, and Bethlehem Intermodal in the Lehigh Valley.
- Rail Classification/Sorting Yards, including Oak Island Yard in Essex County, NJ; Fresh Pond Yard in Queens, among others in the Study Area.
- Rail Transload Yards, including Greenville Yard in Hudson County, NJ; Blissville Yard in Queens, Oak Point Yard and Harlem River Yard in the Bronx, etc.

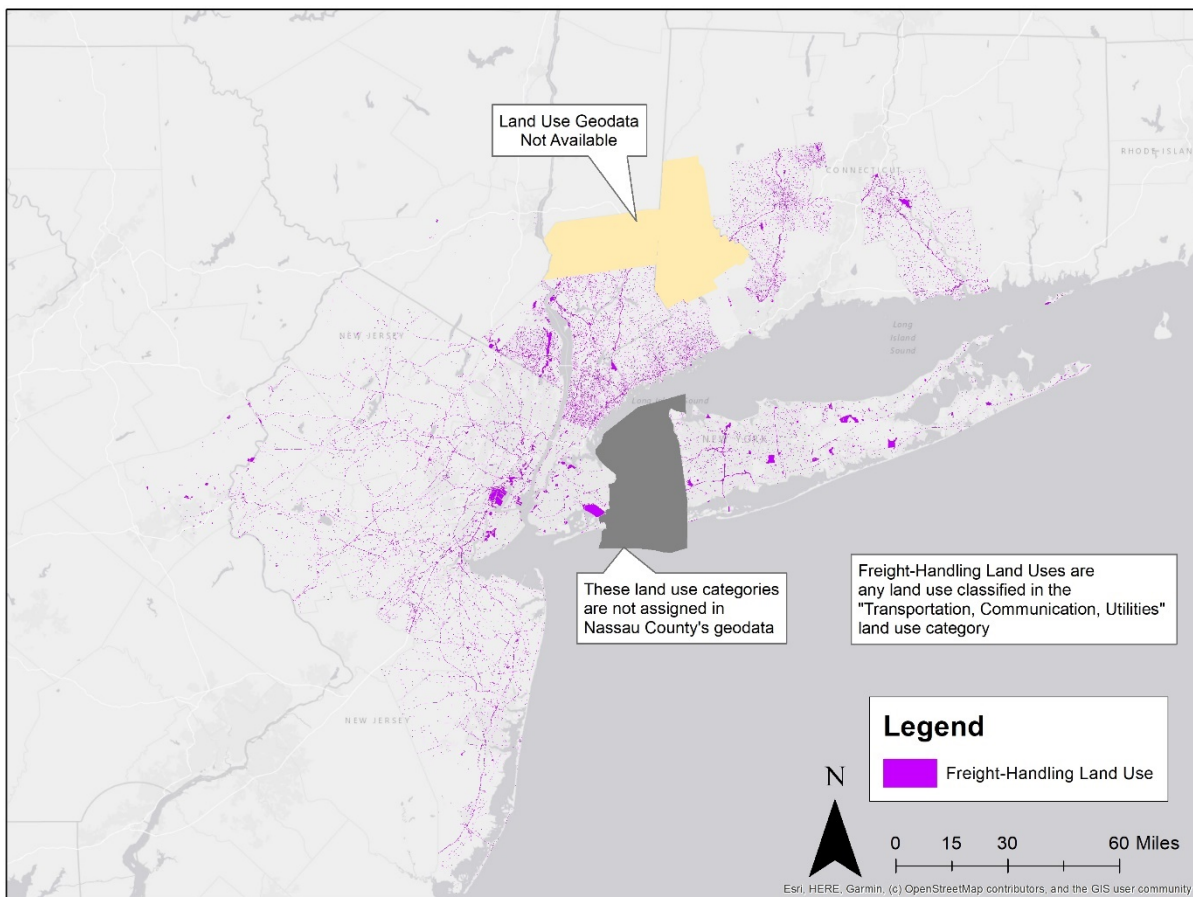
Freight-handling facilities are mostly mature, meaning there is little development of new rail or highway rights-of-way, marine terminals, or airports anticipated. However, existing facilities may be upgraded, expanded, modernized, or otherwise improved through planned or programmed public projects and/or private investments over the next three decades. These investments could provide the capacity to handle greater volumes of freight to keep up with regional and national population and economic growth.

Figure 3 Fresh Pond Yard in Queens (Left) and Port Newark/Elizabeth (Right), Examples of Freight-Handling Land Uses



Figure 4 shows the locations of freight-handling land uses throughout the Study Area.

Figure 4 Freight-Handling Land Uses in the Study Area



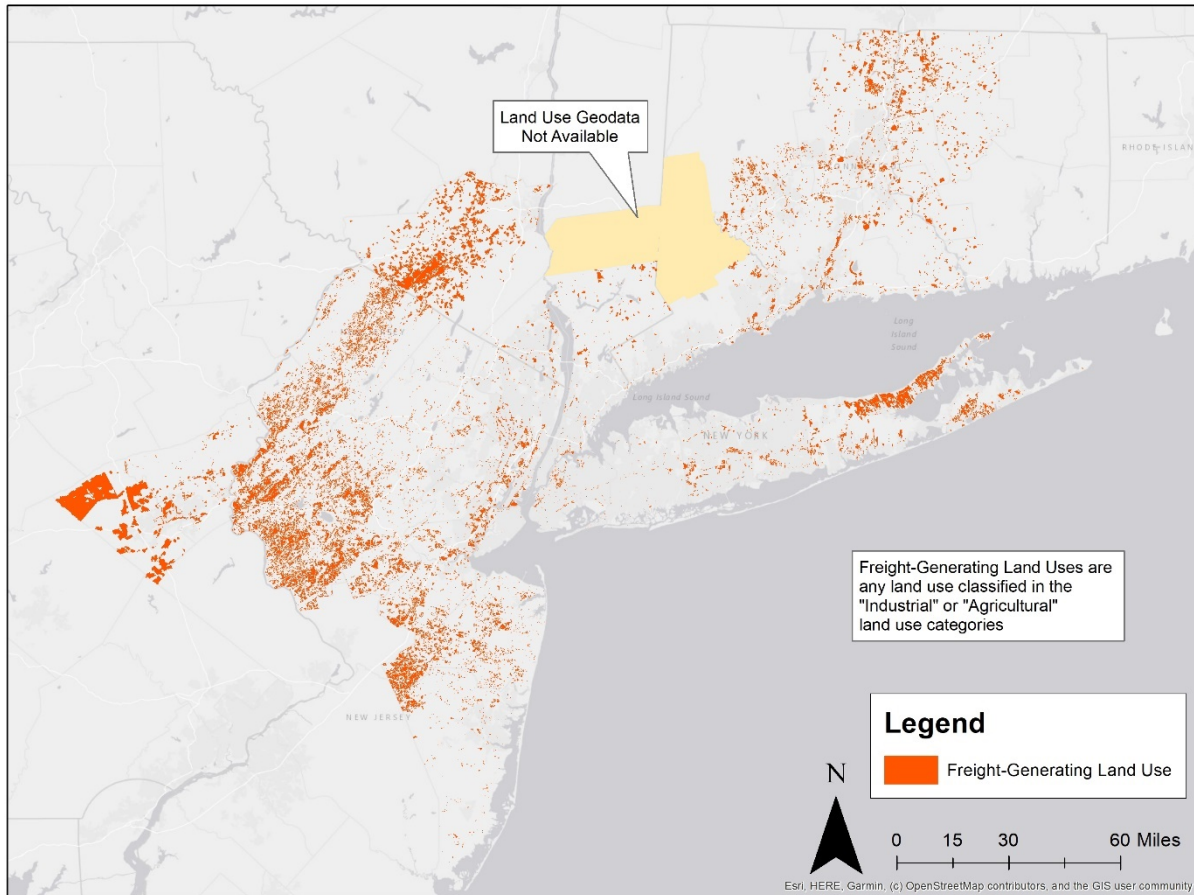
FREIGHT-GENERATING LAND USES

Freight-generating land uses consist of industrial (including manufacturing and warehousing/distribution) and agricultural uses that are the points of origin for outbound shipments of freight. Due to the diversity of freight-generating land use types, and how the trends under consideration in the study have affected their development and distribution over time, several subtypes of freight-generating land uses are identified and described in this study. The subtypes, described in greater detail below, include:

- Agricultural areas, which generate outbound shipments of agricultural goods, but are also potential sites of future warehousing, distribution, and other industrial development in many parts of the region;
- Large, greenfield distribution centers;
- Modernizing and/or redeveloping distribution clusters;
- Legacy Industrial/manufacturing clusters; and
- Endangered freight land use areas.

The distribution of freight-generating land uses throughout the Study Area is shown in

Figure 5.

Figure 5 Freight-Generating Land Uses in the Study Area

AGRICULTURAL AREAS

Agricultural areas are typically zoned for agricultural, farming, or similar uses. These areas may receive inbound shipments of fertilizers, equipment, and other supplies, and generate larger volumes of outbound shipments of agricultural products. Such products include fresh produce, grains, dairy, livestock, meats, and other products of agriculture.

Agricultural areas are primarily served by truck, though some have rail access. Agricultural areas are located in many parts of the region, including eastern Suffolk County, rural portions of the Lower Hudson Valley, Connecticut, Central and Northwestern New Jersey, and the Lehigh Valley.

Figure 6 Agricultural Land Use in Suffolk County, NY

Source: Google Maps

In many parts of the Study Area, land zoned for agriculture could also accommodate other freight-generating uses, such as warehousing and distribution or other “light industrial” uses, most likely in the Large, Greenfield Distribution Center subtype described below.

Agricultural areas that are located near growing distribution clusters, such as Lehigh and Northampton counties in Pennsylvania and Orange County in New York, among other areas, may be developed for warehousing and distribution uses in the future.

LARGE, GREENFIELD DISTRIBUTION CENTERS

Large, greenfield distribution centers include areas where new, state-of-the-art distribution centers are being developed on previously undeveloped and relatively inexpensive land. These facilities are described as “large” because many of the buildings exceed 500,000 or one million square feet.

These clusters are typically located in suburban, exurban, and rural areas, though some have been encroaching upon areas in the natural zone. Desirable sites for development have proximity to major highway corridors for access to urban core areas, port facilities, airports, and/or other freight-handling nodes. A short driving distance to intermodal rail terminals is also considered a positive attribute, and some shippers may want direct rail carload access via a siding or spur to ship or receive carload freight.

Some large distribution centers serve very large geographic areas that span multiple states, therefore access to highway, air cargo, and/or access to rail networks that connect to those markets is also important for many of these facility owners. The land where these facilities are developed is usually zoned for industrial, warehousing, manufacturing, or other similar use types.

Most facilities in this subtype receive inbound and generate outbound shipments that move by truck, with some also having rail access. Examples of large, greenfield distribution center clusters in the Study Area include the “Exit 8A” area of Middlesex County, NJ; Breinigsville/Trexlerstown/Lower Macungie area of Lehigh County, PA; and smaller clusters

throughout the region (including Montgomery, NY; South Windsor, CT; Bloomfield, CT; and others). The Bridge Point 78 industrial park in Phillipsburg, NJ; the PA Route 33 corridor near Easton and Nazareth, PA; and the area surrounding Kutztown, PA are examples of newly-emerging greenfield distribution clusters.

Figure 7 Large, Greenfield Distribution Center in Middlesex County, NJ



MODERNIZING AND/OR REDEVELOPING DISTRIBUTION CLUSTERS

Modernizing and/or redeveloping distribution clusters includes concentrations of legacy warehouses and industrial facilities in urban areas that are being redesigned to serve a large local market, typically for e-commerce. Modernized facilities may include multi-story buildings, advanced technology, efficient loading/unloading bays, multimodal connectivity, and other features. In some cases, brownfield sites, which are former industrial sites that require (often substantial) environmental remediation, are being remediated and redeveloped.

Typical zoning in these areas is industrial, warehousing, manufacturing, or other similar designations. Most facilities are served by truck, though some have rail access.

Examples of mature or aging distribution clusters that are witnessing some modernization and/or redevelopment include:

- Maspeth, Queens, NY
- Hunts Point, Bronx, NY
- Secaucus, NJ
- Red Hook, Brooklyn, NY

Figure 8 shows a modernizing distribution cluster in the Red Hook area of Brooklyn. The figure shows older warehousing and other industrial buildings on the left side of the street, and a recently-built modern e-commerce fulfillment center on the right side of the street.

Figure 8 Modernizing Distribution Cluster in Red Hook, Brooklyn

Source: Google Maps

LEGACY INDUSTRIAL/MANUFACTURING CLUSTERS

Legacy industrial and manufacturing clusters are areas that contain concentrations of older, smaller warehouses and other industrial facilities. Unlike the modernizing and/or redeveloping distribution clusters described above, these clusters are relatively stable and are not experiencing substantial rehabilitation, redevelopment, or modernization.

Buildings in this subtype typically exceed 40 years of age, have limited loading dock space, relatively low floor-to-ceiling heights, and may lack expansion potential without demolition and redevelopment. Most buildings in this subtype are truck-served, though some may have rail access.

Parcels in this subtype are typically zoned for industrial use, though some commercial uses may be found in these areas as well. This subtype is most commonly found in urban areas or inner-ring suburban areas that were developed by the middle of the 20th century.

Examples of clusters in the legacy industrial/manufacturing subtype in the Study Area include:

- South Kearny, NJ
- Mount Vernon, NY
- Carlstadt/Moonachie/Little Ferry, NJ
- Stratford, CT
- Wallingford, CT

Figure 9 Legacy Industrial Buildings in Bergen County, NJ



ENDANGERED FREIGHT LAND USE AREAS

Endangered freight land use areas include historic or “legacy” industrial clusters, primarily in urban areas, that are experiencing pressures associated with population growth and demand for housing development. In these areas, rents and other operating costs may be increasing, and conflicts with adjacent residential, commercial or other land uses may be complicating the continued operation of freight activity.

Some of the businesses in these areas may be relocating to other areas within (or outside) the region where the costs and pressures are more manageable. This relocation fuels a phenomenon sometimes called “freight sprawl,” in which manufacturing, distribution, and other freight-generating activities move from urban areas to exurban or rural areas.

In some cases, the industrial uses may be transitioning to residential or mixed-use. Examples of endangered freight land use areas in the Study Area include Bushwick, Brooklyn, and Long Island City, Queens. Emerging examples include the Lafayette/Communipaw area of Jersey City and the northern Ironbound/Down Neck area of Newark.

Figure 10 Freight-Generating Facility Located Close to Newly-Developed Residential and Mixed-Use Buildings in Queens County, NY



VACANT STOREFRONTS CONVERTED TO E-COMMERCE FULFILLMENT CENTERS

Vacant retail spaces often referred to as “dark stores,” and shopping malls that have closed or have high rates of vacancy, are sometimes candidates for e-commerce fulfillment (or “micro-fulfillment”) use. This is a relatively recent phenomenon, which appears to be gaining some momentum nationally, although the top markets for such conversions have been in the Midwest to date.²

These conversions appear to solve problems for retail property managers and e-commerce retailers alike. Retail property managers are witnessing increasing numbers of store closings and reduced foot traffic at malls, and e-commerce retailers need fulfillment center space close to consumers that receive those online orders. From the e-commerce retailer’s perspective, the local shopping center or big box retail store is a good staging point for last-mile deliveries to those customers.³ First-and-last-mile logistics account for as much as 30% of the cost of transporting goods and having a distribution node close to customers’ residences can reduce the cost of last-mile delivery by as much as 60% according to one study in the Chicago area.⁴

Figure 11 Vacant Big-Box Storefront in Hudson County, NJ



While retail-to-fulfillment conversions appear to be a win-win for retail property managers and e-commerce retailers, there are several issues for local municipalities and the public at large to consider.

Converting retail space for warehousing and distribution (including order fulfillment) use, especially if shipping is a component, may constitute a change of the use, even if the tenant is still operating a retail store on the site. Even if the stockroom and/or other warehouse and distribution were considered an accessory use to the retail store, dedicating more floor area to the warehouse and distribution use could lead to a determination that it is a separate

² <https://realtynewsreport.com/stores-becoming-warehouses/>

³ <https://www.goulstonstorrs.com/publications/just-dont-call-it-a-warehouse-repurposing-unused-retail-spaces-to-support-e-commerce/>

⁴ https://www.scmr.com/article/turning_your_retail_space_into_distribution_space

principal use, which may not be a permitted principal use in the zone where the store is located.⁵

Dark store conversions appear to straddle a gray area in land use and zoning codes. The activity happening on site is the storage, fulfillment, and shipment of goods, which tends to align with industrial and warehousing land use codes. However, arguments could be made that these facilities are the next generation of retail and ought to be grouped with commercial land use codes instead. While most municipalities do not have a land use code that captures dark stores converted to micro-fulfillment centers, amendments to either the industrial/warehousing or commercial/retail codes could be made to accommodate and/or address public concerns and priorities. In cases where the retail store is/was part of master-planned development (such as a large retail mall), a revision of the master plan may be warranted. Such amendments to zoning codes or master plans could address or specify:

- Maximum floor area to be used for fulfillment/warehousing/distribution;
- Parking and loading area requirements for trucks, delivery vehicles, and employee parking;
- Windows and other features that promote an “active” frontage;
- Minimum thresholds for in-person retail sales (to retain some foot traffic)⁶

Other public considerations include:

- The potential change in tax revenue (lost sales tax from the retail use versus other potential revenue streams associated with fulfillment center employment and/or sales tax revenues from employee expenditures at neighboring businesses);
- Potential net effects of the loss of trips associated with traditional retail use (truck deliveries to supply the store, employee trips, and shoppers’ personal auto/walking/transit trips) and those associated with the distribution activity (truck deliveries to supply the fulfillment center, outbound trips of delivery vehicles, and employee trips); and
- Potential effects that the conversion from retail to fulfillment center may have on foot traffic and the viability of neighboring retail uses.⁷

⁵ <https://www.sillscummis.com/going-dark-land-use-implications-of-converting-retail-space-to-dark-stores-for-fulfilling-online-orders/>

⁶ <https://www.clarionassociates.com/whats-new/store-or-warehouse-zoning-for-micro-fulfillment-centers/>; <https://www.hinckleyallen.com/publications/land-use-considerations-for-converting-vacant-retail-space-for-distribution-spaces/>

⁷ Ibid.

FREIGHT-RECEIVING LAND USES

Freight-receiving land uses include lands used for a variety of primary purposes, but that tend to receive more shipments of freight than they generate. Land in this category may be zoned for uses that include residential, commercial (retail and/or office), institutional (schools, hospitals, government, etc.), or mixed-use developments that include a combination of these uses. Freight-receiving land uses exist in urban, suburban, exurban, and rural contexts.

Residential land uses may receive shipments of parcels that contain e-commerce delivery orders, and deliveries of home furnishings or lawn and garden equipment or supplies. Many residential parcels receive deliveries of groceries and/or prepared meals from restaurants. During the COVID-19 pandemic, the increase in e-commerce shopping (discussed in Task 3 Technical Memorandum) resulted in more deliveries being made in residential areas. Although the proportion of e-commerce sales as a percent of retail sales has diminished since its 2020 high, as retail stores reopened late that year and into 2021, a long-term trajectory of growth in demand and delivery activity is expected. Residential areas produce outbound freight shipments as well, including household waste that is picked up for recycling and/or disposal.

Retail stores receive truckloads of retail products and/or multiple less-than-truckload deliveries of products from several vendors. Most of the products sold in stores leave the store with the customer, either as the customer shops for items in the store or as part of an increasing “order online for in-store pickup” retail channel. Some retail stores ship purchased items to the customer’s home or fulfill online orders for shipment and delivery from the store’s stockroom. Retail stores, therefore, receive inbound shipments of products that are sold to consumers and generate a small but increasing volume of outbound shipments that are delivered to customers, as well as waste that is picked up for recycling and/or disposal. E-commerce is also enabling the repurposing of some retail storefronts into e-commerce fulfillment centers. In some vacant former big-box storefronts, especially, e-commerce retail giants such as Amazon, among others, have developed fulfillment and/or delivery sorting centers to facilitate the movement of online orders to customers.⁸

Institutional land uses include schools, universities, hospitals, libraries, and government buildings. These facilities may receive inbound shipments of food to stock cafeterias, supplies and equipment to support operations, and/or construction materials used to construct, renovate, or rehabilitate the buildings themselves. These facilities are also likely to generate outbound shipments of waste that are picked up for recycling and/or disposal.

Mixed-use land uses includes buildings that contain two or more uses. Most often, the combination of uses is residential and commercial retail, but office and institutional uses could also be included in addition to, or lieu of, one of the other uses. Mixed-use buildings

⁸ <https://www.nbcnews.com/business/business-news/amazon-snapping-disused-shopping-malls-turning-them-fulfillment-centers-n1262914>.

exist in traditional urban or commercial center areas and are included in some newer developments. The freight delivery and generation characteristics of the component uses (residential, retail, etc.) described above would be observed in mixed-use settings.

Figure 12 shows the distribution of freight-receiving land uses across the Study Area.

Figure 12 Freight-Receiving Land Uses in the Study Area

