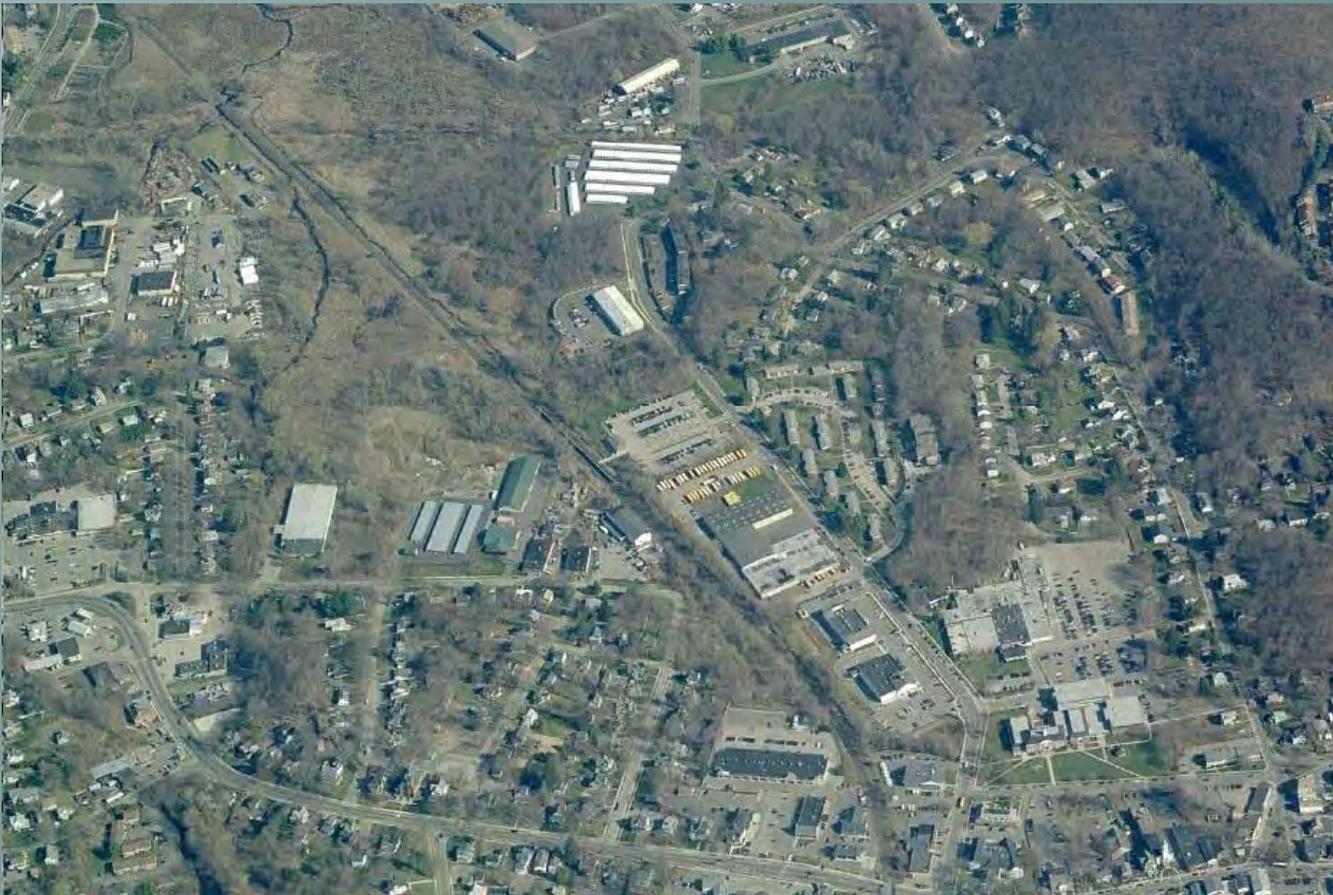


Bethel Rail Station Transit Oriented Development Feasibility Study

Prepared For: Housatonic Valley Council of Elected Officials



Prepared By:

**Harrall-Michalowski Associates
a Milone & MacBroom, Inc. company
Branford, Connecticut**

March 2010

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Transit Oriented Development
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MARCH 2010

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I. INTRODUCTION

What is a Transit Oriented Development (TOD)

A transit-oriented development (TOD) is a mixed-use residential or commercial area designed to maximize access to public transport, and often incorporates features to encourage transit ridership.

A TOD neighborhood typically has a center with a train station, metro station, tram stop, or bus station, surrounded by relatively high-density development with progressively lower-density development spreading outwards from the center. TODs generally are located within a radius of one-quarter to one-half mile from a transit stop, as this is considered to be an appropriate scale for pedestrians.

Transit oriented development as defined by Connecticut law adheres closely to this definition. According to Public Act 07-6 of 2007:

Transit-oriented development means the development of residential, commercial and employment centers within one-half mile or walking distance of public transportation facilities, including rail and rapid transit and services that meet transit supportive standards for land uses, built environment densities and walkable environments, in order to facilitate and encourage the use of those services.

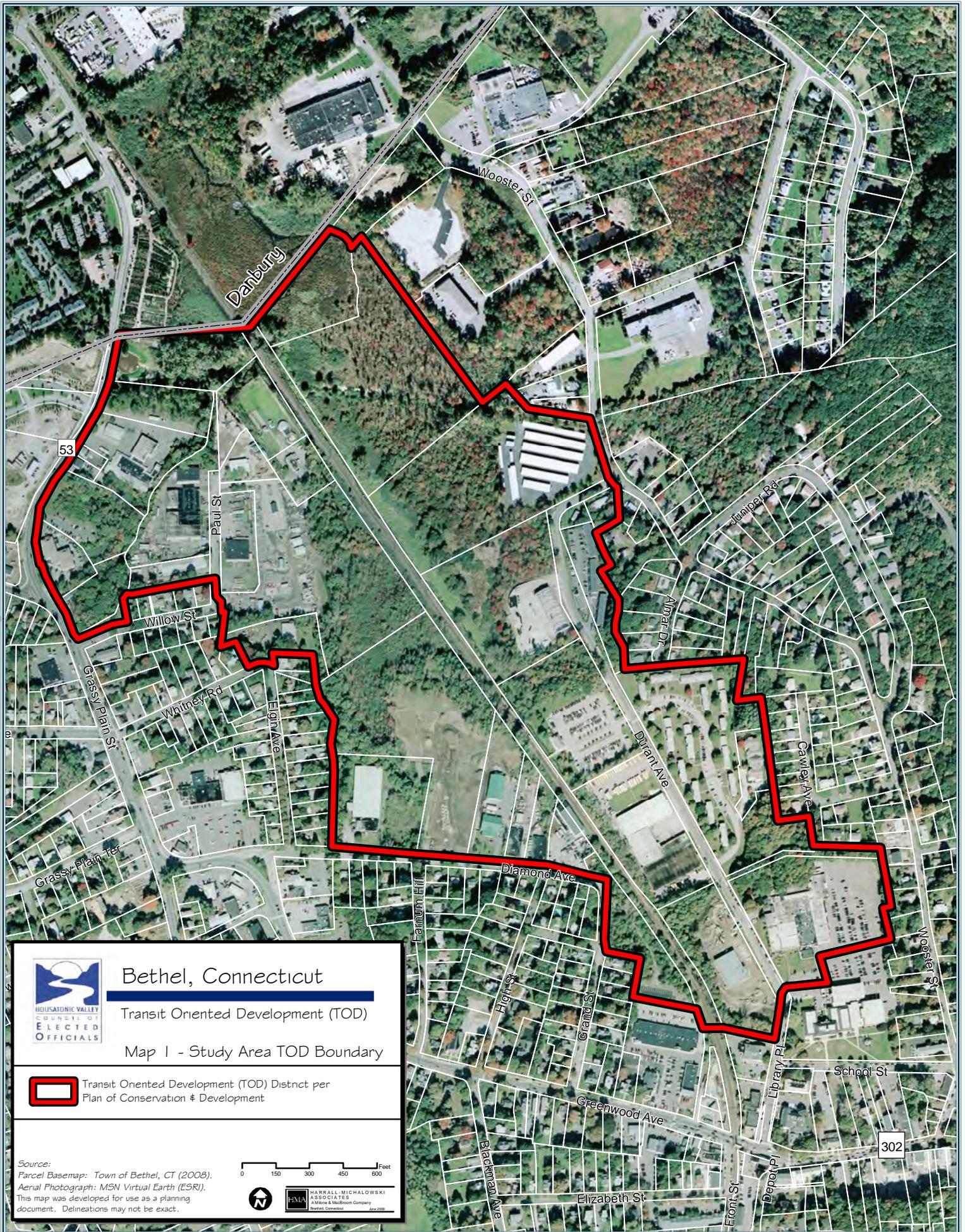
The Bethel Plan of Conservation and Development adopted in 2007 recommends support for transit-oriented development focused on the area surrounding the Metro North Rail Station. The Plan designates an approximately 133 acre area surrounding the station as a proposed Transit Oriented Development Area.

Development in the area is envisioned as transit accessible, pedestrian oriented and mixed-use. The Plan further recommends that the Planning and Zoning Commission and staff coordinate with the Housatonic Valley Council of Elected Officials (HVCEO), Bethel's regional planning

agency, in the advancement of the transit-oriented development concept through specific actions including:

- Identify appropriate locations for transit-oriented development.
- Work with property owners to educate them about the benefits of TOD.
- Rezone the areas around the Connecticut DOT Rail Station to support TOD.
- Encourage Connecticut DOT to build a west side platform at the train station.
- Consider similar regulations for transit-supportive development with lower densities than allowed in a TOD.

In response to these recommended actions and having obtained approval from its member town Bethel, HVCEO contracted with Harrall-Michalowski Associates, a Milone & MacBroom company to prepare this study. While the study focuses on Bethel, it is anticipated that many aspects used in the analysis approach as well as recommended implementation actions will be applicable to other TOD initiatives throughout the region.



Bethel, Connecticut

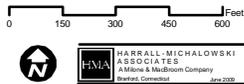
Transit Oriented Development (TOD)

Map 1 - Study Area TOD Boundary

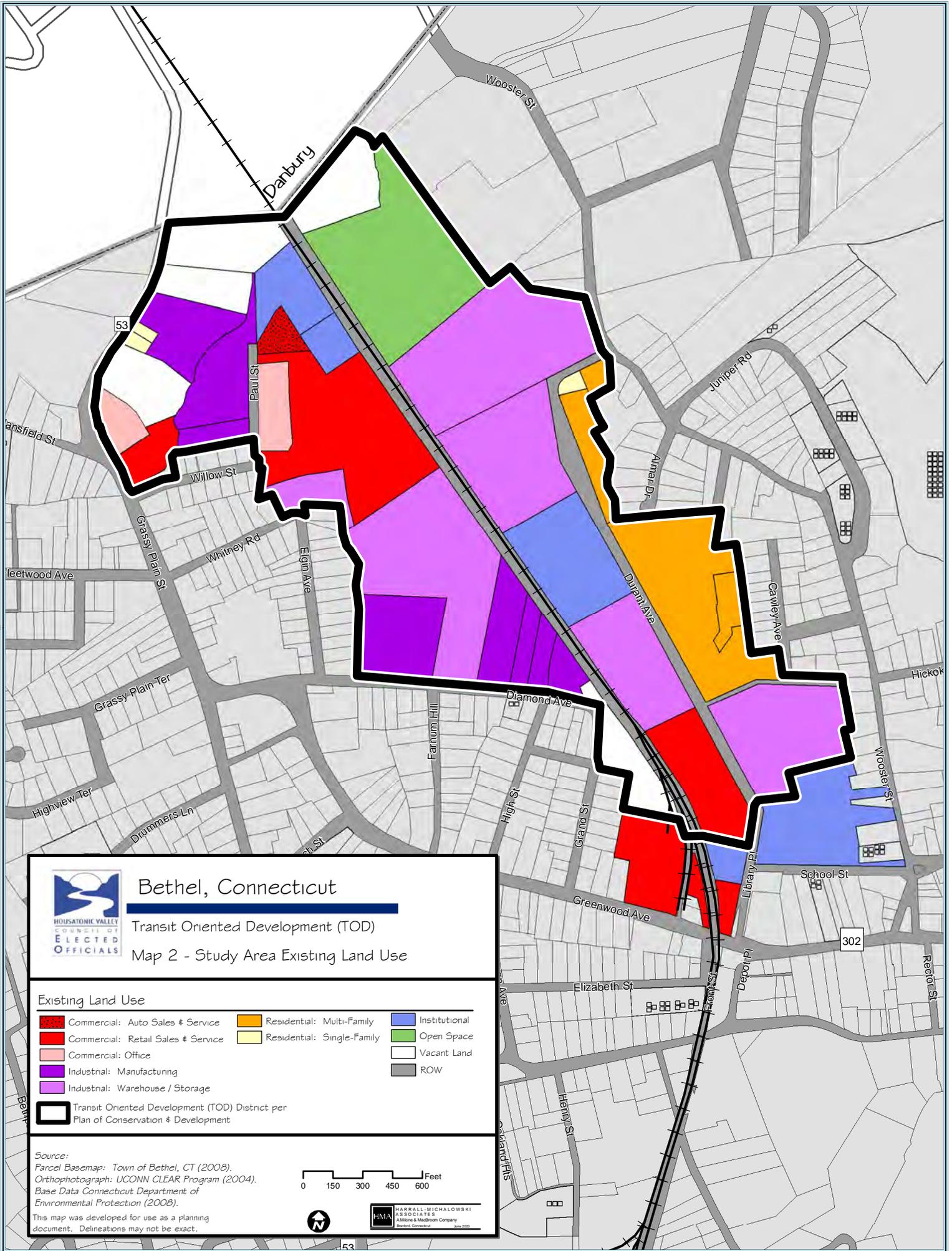


Transit Oriented Development (TOD) District per Plan of Conservation & Development

Source:
 Parcel Basemap: Town of Bethel, CT (2008).
 Aerial Photograph: MSN Virtual Earth (ESRI).
 This map was developed for use as a planning document. Delineations may not be exact.



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Bethel, Connecticut

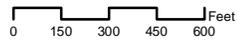
Transit Oriented Development (TOD)

Map 2 - Study Area Existing Land Use

Existing Land Use

- | | | | | | |
|--|--|--|----------------------------|--|---------------|
| | Commercial: Auto Sales & Service | | Residential: Multi-Family | | Institutional |
| | Commercial: Retail Sales & Service | | Residential: Single-Family | | Open Space |
| | Commercial: Office | | | | Vacant Land |
| | Industrial: Manufacturing | | | | ROW |
| | Industrial: Warehouse / Storage | | | | |
| | Transit Oriented Development (TOD) District per Plan of Conservation & Development | | | | |

Source:
 Parcel Basemap: Town of Bethel, CT (2008).
 Orthophotograph: UCONN CLEAR Program (2004).
 Base Data Connecticut Department of Environmental Protection (2008).



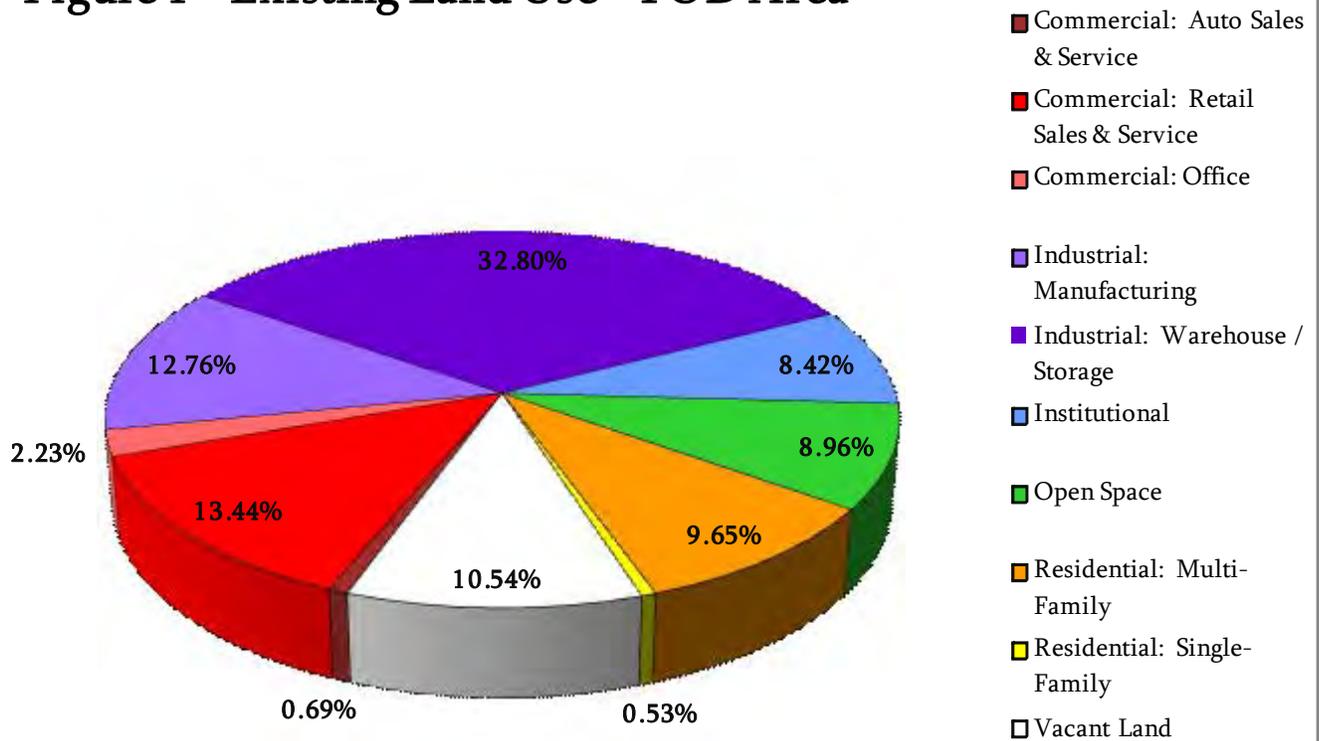
HARRALL-MICHALOWSKI ASSOCIATES
 A Liberty & Madison Company
 Bethel, Connecticut June 2009

II. SITE INVENTORY AND EXISTING CONDITIONS

Existing Land Use

The 133 acre area proposed for TOD in the Plan of Conservation and Development is shown on *Map 1*. Within the 133 acres, approximately 121 acres are distributed over 36 parcels with the balance within right-of-ways. *Map 2* shows the existing land use on a parcel basis and *Figure 1* breaks out the land use by category on a percentage basis.

Figure 1 - Existing Land Use - TOD Area



It is interesting that the area proposed for TOD and adjacent areas including the downtown already contain the mix of uses which often define a TOD. These include: the train station and related parking, multi-family residential on Durant Ave., municipal destination uses in the Library Place/School St. area, and retail and service uses in the lower Durant Ave. / Greenwood Ave. area.

At the same time, there are several uses which are not transit dependent or supported including the school bus garage on Durant Ave; self-storage facilities on upper Durant Ave and Diamond Ave; heavy commercial and outdoor storage on Diamond Ave. and to the north on Paul St; and industrial uses scattered throughout the area.



Aerial View of the TOD Area

The photo collage on the following page displays a sampling of uses in the area.

Paul Street Area



Durant Avenue Area



Diamond Avenue Area

Environmental Features

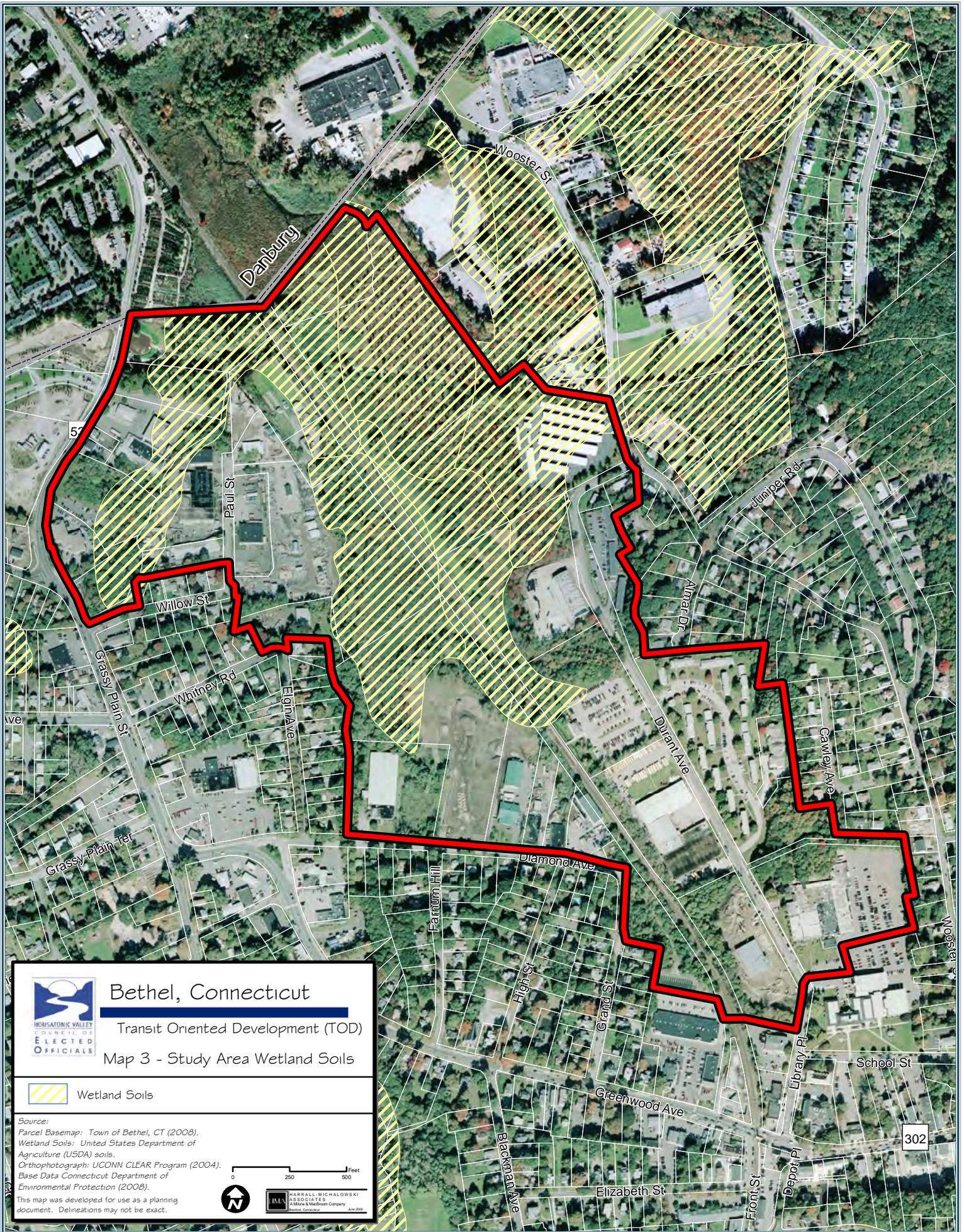
The dominant environmental feature within the study area is the considerable amount of wetlands. *Map 3* shows the location of wetland areas. The portion of the study area to the west of the railroad right-of-way is significantly impacted by wetlands. The impact of the wetlands to the east of the railroad right-of-way is limited to an area adjacent to the track embankment.

The second natural feature which impacts potential development is topography and man-made features. *Map 4* shows the topography in the study area. The change in grade is most significant as one moves north of the train station site on Durant Ave. and to the east of Durant Avenue. The area to the west of the rail right-of-way is generally flat. The railroad embankment creates a raised barrier through the middle of the TOD area running NW to SE.

Infrastructure

A key component as to the feasibility of transit-oriented development is the availability of public water and sewer to support appropriate densities. In this regard, the study area is within an existing Town public water and sanitary sewer service area.

Bethel does not have its own sewage treatment plant. Sewage is treated at the Danbury Sewage Treatment Plant. Although there is excess capacity in the agreement with Danbury for 2 million gallons of sewage per day to be treated, the Downtown Sewer Service area which includes the study area is near capacity for its portion of this flow. The Plan of Conservation and Development includes a recommendation that consideration be given to revising the agreement to reallocate some sewage capacity from the northern area of the Town to the Downtown area. Such a reallocation would facilitate the density and mix of uses appropriate in a TOD district.



Bethel, Connecticut

Transit Oriented Development (TOD)

Map 3 - Study Area Wetland Soils

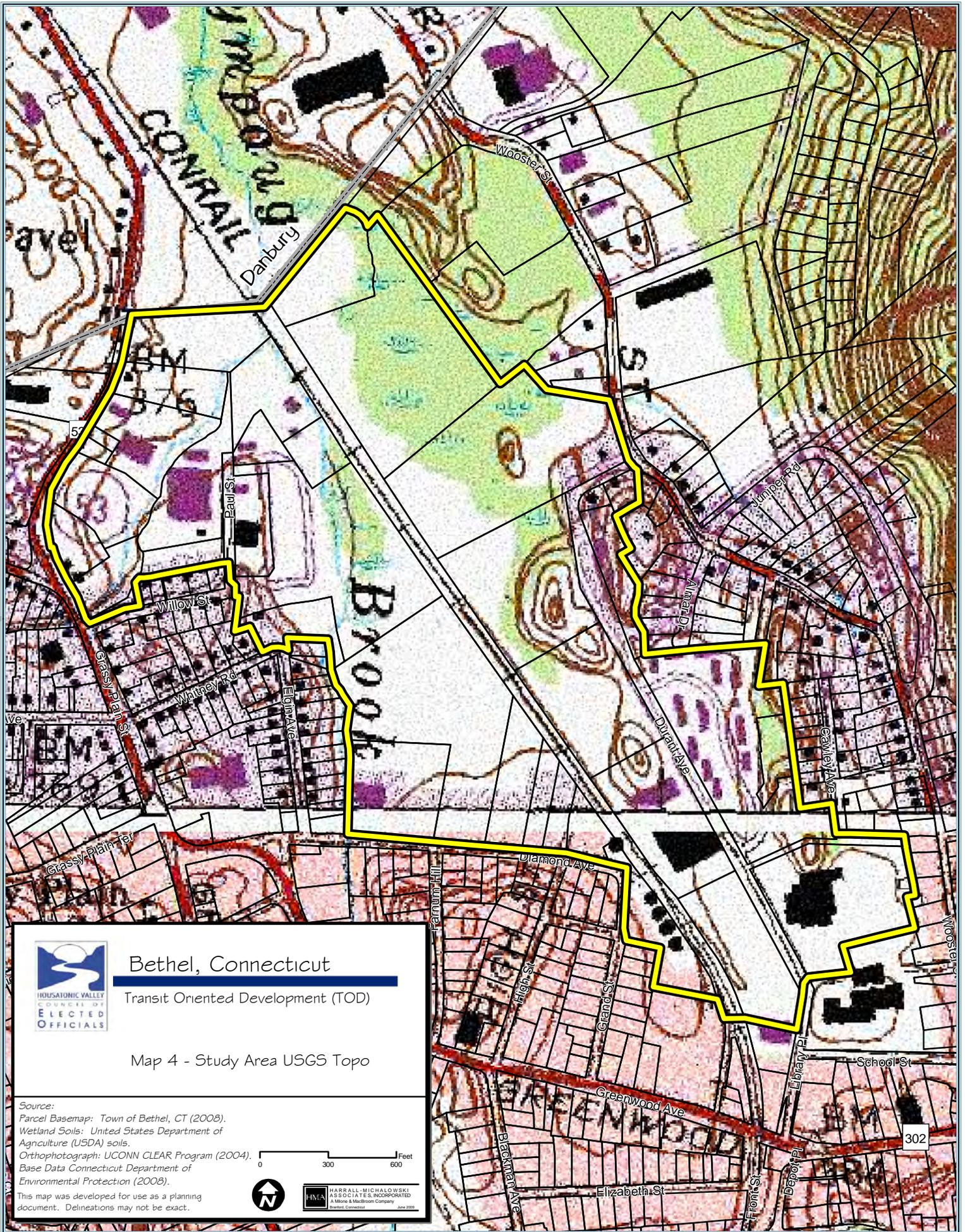
 Wetland Soils

Source:
 Parcel Basemap: Town of Bethel, CT (2008).
 Wetland Soils: United States Department of
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 Orthophotograph: UCONN CLEAR Program (2004).
 Base Data Connecticut Department of
 Environmental Protection (2008).

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 Bethel, Connecticut June 2009



Bethel, Connecticut

Transit Oriented Development (TOD)

Map 4 - Study Area USGS Topo

Source:
 Parcel Basemap: Town of Bethel, CT (2008).
 Wetland Soils: United States Department of
 Agriculture (USDA) soils.
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III. POSITIVES SUPPORTING TOD

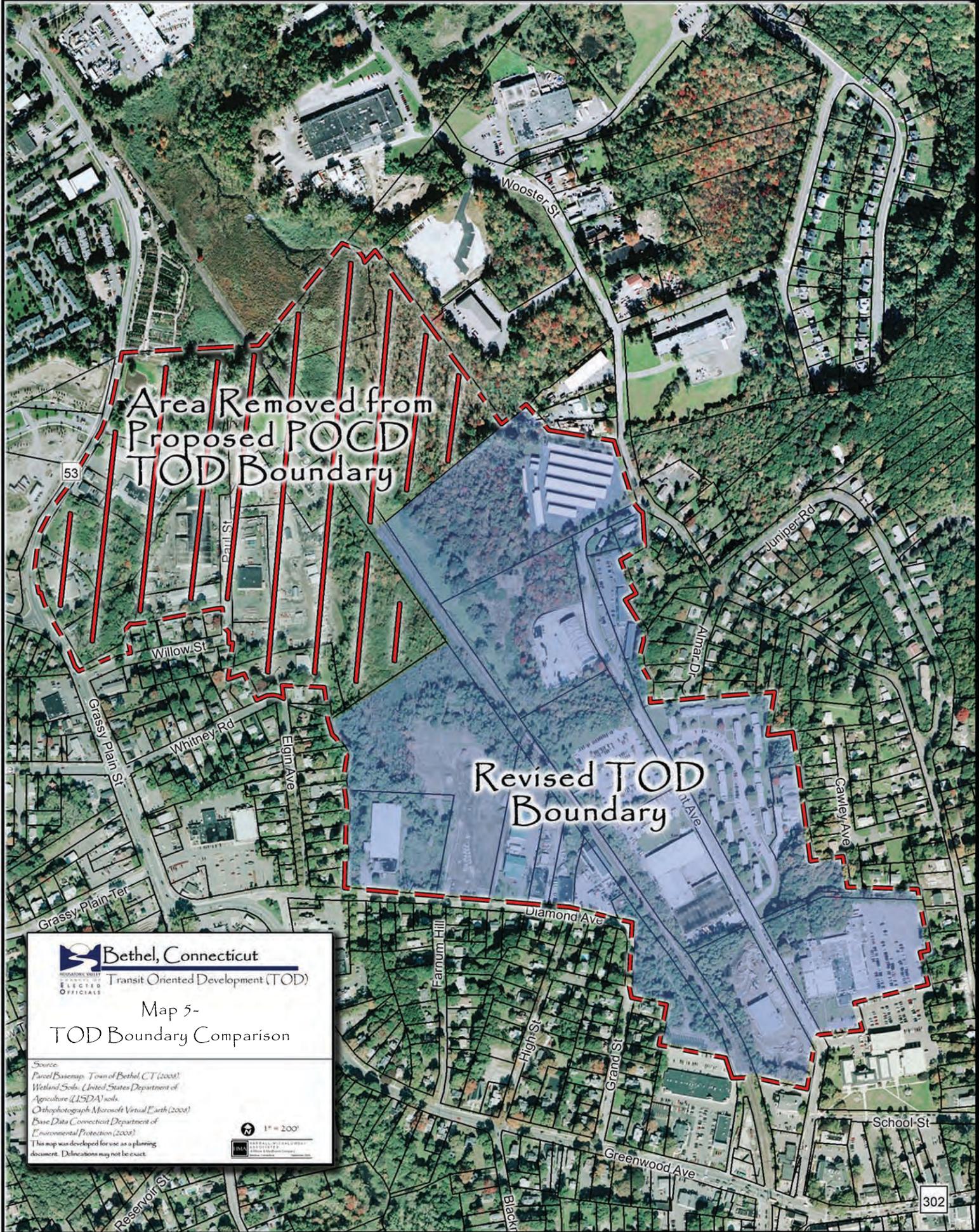
Based upon an analysis of existing conditions in the study area, several positives have been identified which support the TOD concept. These positives include:

- The study area contains a mix of uses which supports TOD.
- The proximity to the goods and services in the downtown creates a market attractive environment.
- Parcels of significant size and somewhat low intensity development provide opportunities for new investment without displacement of major revenue and activity producing uses.
- A multi-family residential pattern is already established in the area.
- Mixed residential/commercial development has existed in the adjacent downtown for many years.
- Significant traffic volumes on Route 53 and Route 302 are evidence of a vibrant center of activity.
- A mixing of uses provides the opportunity for shared parking based on different peak usage periods.

IV. DELINEATION OF TOD DISTRICT

The Bethel Plan of Conservation and Development (POCD) recommends advancement of the concept of both transit-oriented and transit-supportive development. Transit-oriented development is recommended for a 133 acre area both east and west of the rail line primarily between the town line and Greenwood Avenue. The transit-supportive development area is a smaller area fronting portions of Grassy Plain Street and Greenwood Avenue west of the downtown.

Based upon the more detailed analysis provided by this study and not available during POCD preparation, it is recommended that the POCD delineation be adjusted. Map 5 shows these recommended adjustments.



Area Removed from
Proposed POCD
TOD Boundary

Revised TOD
Boundary

Bethel, Connecticut
 TRANSIT ORIENTED DEVELOPMENT (TOD)
 ELECTED OFFICIALS

Map 5-
 TOD Boundary Comparison

Source:
 Parcel Base Maps: Town of Bethel, CT (2008)
 Wetland Soils: United States Department of
 Agriculture (USDA) soils
 Orthophotograph: Microsoft Virtual Earth (2008)
 Base Data: Connecticut Department of
 Environmental Protection (2008)

This map was developed for use as a planning
 document. Deliberations may not be exact.

1" = 200'

These adjustments relate primarily to the northwest portion of the area. The area surrounding Paul Street is now designated as transit-supported rather than transit-oriented due to the distance from the train station, the extent of wetlands and existing land uses.

Similar to the areas designated as transit-supported in the POCD, this area relates to the Route 53/Grassy Plain Street corridor more than the rail line. The distance from these areas to the rail station is generally beyond pedestrian limits. Connection between this area and the station will be provided by the HART bus system.

A second aspect of the revised delineation is the fact that the Bethel downtown has historically functioned as a transit-oriented area. Prior to its relocation, the train station was in the heart of the downtown. The relocation of the station to its current site addressed negative parking and traffic impacts related to the previous location while keeping the station close enough to the downtown to retain the transit advantages. The mixed-use development pattern as well as the higher-densities in the downtown create a vibrant pedestrian scale which transit-oriented development advocates hope to achieve. Bethel has a transit-oriented foundation to build upon. While it is not necessary to include the downtown within a new transit-oriented district, a focus on the southern portion of the transit-oriented development area identified in the POCD as the TOD District is a logical course of action.

The appropriateness of a TOD District in Bethel is supported by several statements included in a recent Conn DOT TOD study for the Danbury Branch. These statements include the following:

“Regarding market potential for TOD, the population in Bethel has many of the characteristics that lend itself to TOD development. The population is projected to increase faster than the State. It is also younger, wealthier and more accustomed to living in much greater densities than the State population in general. Bethel also has a large percentage of renters; 23%, but not as many as the State with 31.2%.”

“The ¼ mile area around the existing station contains many of the components of Transit Oriented Development including a mix of different types of commercial and residential uses.”

“The existing zoning does provide for a variety of uses and densities in the vicinity of the existing station; however, the regulations would have to be amended to provide for true TOD development.”

V. DEVELOPMENT OPPORTUNITY AREAS AND CONCEPTUAL PLANS

The conceptual plans described on the following pages present a long-term vision for development in the proposed TOD area. It is understood that market conditions will dictate the timing and mix of development. As discussed above, the plans recognize the proximity of the TOD area to the existing downtown containing a vibrant mix of retail, service, governmental and institutional uses. The conceptual plans focus on residential and office use with limited retail and service uses. The belief is that such a mix in the TOD area will both provide consumers for goods and services in the downtown and the presence of such goods and services will provide positive market support for development within the TOD area.

The residential development component is targeted at small households comprised primarily of singles, young couples and empty nesters. The housing would be a mix of studios, one bedroom and two bedroom units. These households place high value on transit accessibility as well as being within walking distance of the goods and services in the downtown. It is recognized that the office market is currently experiencing high vacancy rates throughout the region. It is reasonable to expect that demand for office development in the TOD area will have a more distant horizon than the residential component. However, as part of a long-term regional smart growth strategy, employment centers inclusive of office should be a component of TOD. In this regard, all of the conceptual plans include a substantial non-residential component. The amount of non-residential development should not be the focus. The intent is to establish the importance of a mix of uses as a basic principle of TOD development.

For planning purposes, four areas of development opportunity have been delineated. The areas labeled A-D are shown on *Map 6 Development Opportunities*. The acreage of the portion of each of these areas depicted with new development is listed below:

Area A	4.0 acres
Area B	9.6 acres
Area C	4.6 acres
Area D	1.75 acres

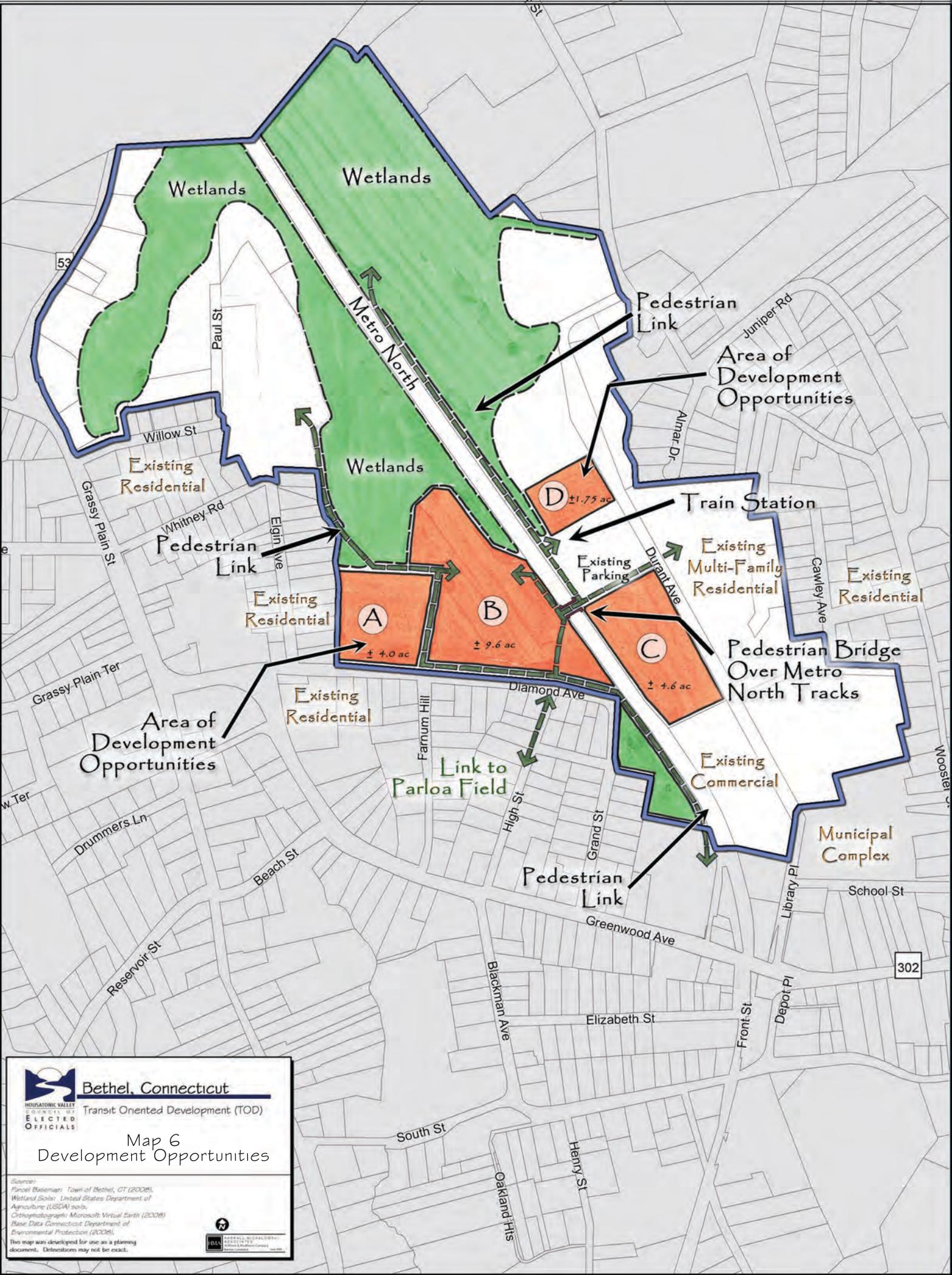
It should be noted that for purposes of development calculation under zoning, some of the areas contain more acreage than included in the development portion. For example, Area D is listed at 1.75 acres. This is a portion of the total DOT parcel containing 5 acres. The calculation of development would be determined based upon the delineation of the total parcel area.

While each of the areas is being considered as a development opportunity, it should be noted that A and B to the west of the tracks are comprised of multiple parcels under multiple ownership. Areas C and D are single parcels under single ownership with Area D under ownership by the CT Department of Transportation. Also, Areas C and D have direct access to the train station without need to cross the tracks. For this reason, it is logical to target the areas east of the tracks for first phase development.

A fifth area has been designated Transit Supported Development Area with access from Route 53. However, this area was not included as part of this study.

Utilizing the four areas as building blocks, a series of alternative conceptual plans for the TOD District have been prepared. While the plans provide a range of development potential within different site configurations, there are several basic components contained in all the plans. These basic components include:

- Each plan contains a mix of residential and non-residential uses.




Bethel, Connecticut
 HOUSATONIC VALLEY
 TOWN OF BETHEL
 ELECTED OFFICIALS
 Transit Oriented Development (TOD)

Map 6
 Development Opportunities

Source:
 Parcel Base Map: Town of Bethel, CT (2008).
 Wetland Soils: United States Department of
 Agriculture (USDA) soils.
 Orthophotography: Microsoft Virtual Earth (2008)
 Base Data: Connecticut Department of
 Environmental Protection (2008).
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 document. Delinators may not be exact.



- The highest density development is closest to the train station.
- The wetland areas are non-impacted with the exception of a trail system (*see samples in images 1 and 2*).



Image 1

Typical Trail Design Adjacent To Wetland



Image 2

Typical Wetland Boardwalk

- Development from the west side of the tracks will require an “up and over” pedestrian connection to the existing platform or the construction of a new platform on the west side of the tracks (*see a sample in image 3*).



Image 3

Guilford “Up and Over” Rail Station Connection

- Each plan provides parking in excess of the needs of proposed development in order to serve train passengers.
- Retail space as part of a mixed use development is proposed on Durant Avenue on the parcel currently used for bus storage and continues the retail recently developed as part of the CVS/bank development.
- The frontage on the north side of Diamond Avenue is proposed for lower-density residential compatible with the neighborhood to the south.
- The area surrounding Paul Street and adjacent to Route 53 is proposed as a transit-supported area.
- Each plan proposes pedestrian links connecting development areas, surrounding commercial and industrial areas, open space areas, the train station and downtown area.



Image 4

Farmington Canal Greenway - Hamden



Image 5

Farmington Canal Greenway – New Haven

The three conceptual plans have been created utilizing the following development principles:

- New development uses should be compatible with existing adjacent land use whenever possible.
- Architectural style, setbacks, height, scale and materials should be compatible and coordinated with adjacent buildings.

- New development should respect existing wetland soil limitations, streams, existing unique site features and restrictive topography.
- Use architectural, landscape or open space transitions between different uses to mitigate adverse visual or environmental impacts.
- Buildings should be oriented to the street and other development to establish a desirable pattern of development.
- Establish a standardized streetscape treatment throughout the development area accessible to all. Provide direct routes and convenient connections between destinations including residences, institutions, retail, commercial, open space and transit.

Areas A and B are the same in each Conceptual Plan. Two alternative development scenarios have been prepared for Areas C and D. These scenarios are interchangeable resulting in the potential for 2 more conceptual plan variations. The development mix and level of development for each conceptual plan is as follows:

Conceptual Plan 1

Areas A and B

The new residential development adjacent to the existing residential areas along Diamond Avenue is architecturally compatible through style, scale and setbacks from the street. Parking has been provided behind the residential buildings to lessen the visual impact on the neighborhood.

Larger non-residential buildings are placed away from the residential neighborhood and adjacent to existing mature woods to help mitigate building scale. A parking garage for the non-residential use provides transition between the uses.

A pedestrian network connects the two new use areas together as well as providing links via an over-track pedestrian bridge to the train station as well as a pathway connection to the downtown area via a new parking area.

Area C

The non-residential building relates to adjacent commercial uses and scale of existing structures to the southeast along Durant Avenue through architectural scale and style.

Access to new development areas, the train station to the north and downtown commercial areas are provided via walkways. An over-track pedestrian bridge and a new walkway system provide access to the other mix-uses west of the tracks.

Area D

This mixed-use structure with an internal parking garage relates to the scale of the existing building to the north. Residential use is compatible with the area to the east of Durant Avenue and the non-residential use relates to the building use directly northwest. Additional parking is provided for train station users. A walkway system provides connection to the other mixed-use areas as well as the adjacent existing uses and the downtown. Direct pedestrian access to the existing wetland open space area is provided via pathway and boardwalk system as necessary.

The following summarizes the quantities and types of uses in Conceptual Plan 1:

Area A	20,000 sq. ft. office/flex space
	16 dwelling units
	89 parking spaces
Area B	94,800 sq. ft. office
	30 dwelling units
	399 parking spaces

Area C 42,000 sq. ft. office/retail/service
 40 dwelling units
 194 parking spaces

Area D 46,000 sq. ft. office/retail/service
 44 dwelling units
 440 parking spaces

Conceptual Plan 2

This plan is the same as Conceptual Plan 1 with the exception of Area D. Under this plan, the mixed-use development in Area D increases the number of dwelling units by 44 to a total of 88 units.

Areas A, B and C

The uses in these areas are the same as in Conceptual Plan 1 and 3 and have the same site attributes.

Area D

The mixed-use structure utilizes the same building footprint as Plan 1 yet doubles the number of dwelling units. Site attributes remain the same; however, the extra parking provided for the train station is reduced from 227 to 152 spaces.

The following summarizes the quantities and types of uses in Conceptual Plan 2:

46,000 sq. ft. office/retail/service
88 dwelling units
440 parking spaces

Conceptual Plan 3

This plan is the same as Conceptual Plan 1 with the exception of Area C. Under this plan, the mixed-use development in Area C increases the amount of office/retail/service space by 14,000 sq. ft. and the number of dwelling units by 68 to 108.

Areas A, B and D

The uses in these areas remain the same as in Conceptual Plans 1 and 2. Attributes also remain the same.

Area C

The mixed-use structure is enlarged to expand both non-residential square footage as well as residential dwelling units. Parking for both uses has increased; however, extra parking for the train station has been decreased. Easy access to new development areas and the train station are provided via walkways and an over-track pedestrian bridge.

The following summarizes the quantities and types of uses in Conceptual Plan 3:

54,000 sq. ft. office/retail/service
108 dwelling units
387 parking spaces

The three conceptual plans are summarized as follows:

	<u>Conceptual Plan 1</u>	<u>Conceptual Plan 2</u>	<u>Conceptual Plan 3</u>
Dwelling Units	130	174	198
Non Residential	202,800 sq. ft.	202,800 sq. ft.	214,800 sq. ft.
Parking Spaces	1,122	1,122	1,315

It should be noted that the plans provide more parking than required to serve the proposed new development. The provision of this additional parking is intended to support the increased use of the Danbury line.

This will increase patronage by commuters of products and services in the new development as well as existing development in the downtown. This would increase economic activity in the downtown without the need to provide additional parking. Also, the single vehicle trip would serve multiple purposes with a positive impact on traffic volumes.

VI. TAX BASE IMPACTS

In order to establish the baseline to estimate the impact of development in the TODD, an analysis of assessed value and resulting tax in the 133 acre transit-oriented development area identified in the POCD was undertaken. The highlights of this analysis are as follows:

- Area has assessed value of approximately \$34 million.
- 6 properties have an assessment of over \$2 million.
- These higher assessed properties reflect mixed use character of the area with industrial, commercial, and residential included in this group of properties.
- Real property tax revenue approximately \$685,000 on an annual basis.
- The average per acre tax revenue is \$5,600.

For comparison purposes, a preliminary analysis has been prepared as to the potential tax revenue impacts of the three conceptual plans. It should be noted that the analysis has been limited to Development Areas A-D.

Given the conceptual nature of the plans and the absence of a specific development timeframe, the estimate of the potential tax revenues must be considered an order of magnitude analysis rather than projections. In order to establish some basis for value, two approaches were taken. One approach was to consult the *RS Means Quick Cost Estimator* which provides construction costs on a square foot basis for various types of structures.

These costs are as follows:

Residential Units	\$150 per sq. ft.	} Average \$125 per sq. ft.
Office (Multi-Story)	\$150 per sq. ft.	
Office/Retail/Service	\$125 per sq. ft.	
Office/Flex Space	\$100 per sq. ft.	

These cost estimates tend to be on the low side since they relate to construction rather than value.

A second approach was to review the Assessor’s field cards for selected properties within or in the vicinity of the TOD area. Values for Class A office and newly constructed residential were found to be in the \$200 per square foot range. Retail development was somewhat lower at \$175 per square foot.

In consideration of the results of these two approaches, a per square foot value of \$175 has been selected and applied to both residential and non-residential uses. An average size of 1,000 square feet has been used for the dwelling units in order to convert the number of units to total square footage.

Based upon these costs, the value of each Conceptual Plan would be as follows:

<u>Conceptual Plan 1</u>	
Residential Units (130)	\$22,750,000
Non-Residential (202,800 sq. ft.)	<u>\$35,490,000</u>
	\$58,240,000
 <u>Conceptual Plan 2</u>	
Residential Units (174)	\$30,450,000
Non-Residential (202,800 sq. ft.)	<u>\$35,490,000</u>
	\$65,940,000

<u>Conceptual Plan 3</u>	
Residential Units (198)	\$34,650,000
Non-Residential (214,800 sq. ft.)	<u>\$37,590,000</u>
	\$72,240,000

In order to establish an assessment value for property tax purposes, these costs were multiplied by .70. This resulted in assessments as follows:

Conceptual Plan 1	\$40,768,000
Conceptual Plan 2	\$46,158,000
Conceptual Plan 3	\$50,568,000

When the current mill rate of \$21.64 per \$1,000 assessed value is applied, the following real property tax revenue estimates result.

Conceptual Plan 1	\$882,220
Conceptual Plan 2	\$998,859
Conceptual Plan 3	\$1,094,292

By way of comparison, Development Areas A-D proposed for development in the conceptual plans currently have a total assessed value of \$7,325,822 with \$1,202,312 of the value attributed to the train station parcel which is tax exempt. Therefore, the net assessment is \$5,912,510. Application of the tax rate of \$21.64 results in real property tax revenue of \$127,936. The tax yield for the three concept plans is between 6.9 and 8.6 times the current tax yield.

It should be noted that the increased tax revenues should not be considered entirely a net increase. For example, Development Areas A-D do not currently contain any residential units. Therefore, the costs of providing Town services are limited to general costs and do not include educational costs.

It is anticipated that the number of school age children who would reside in residential units in the TOD area would be very low. Studies have shown that housing developed within such areas

are generally occupied by young singles and couples as well as older empty nesters. Residential units in multi-family developments generally have a limited number of school age children per unit. The number of school age children in the range of 1 per 5 dwelling units in multi-family developments has been estimated in studies by the Rutgers Center for Urban Policy Research. Based on the nature of the occupants of the units within the TOD area, we would expect the number of school age children to be less than this.

VII. SANITARY SEWER IMPACTS

As noted earlier, Bethel currently has an agreement in place under which sanitary sewer effluent is treated at the Danbury Sewage Treatment Plan. There are sewer service districts in Bethel with specific gallons per day allocations established. The area within which the proposed TODD is located is approaching the maximum amount of permitted effluent. Therefore, the amount of effluent produced within the TODD is a significant factor in the use mix and amount of development.

The level of effluent in each Conceptual Plan increases as the number of dwelling units increases. This can be explained by a comparison between the amount of effluent generated by residential use as compared to non-residential use. If one assumes that a 2 bedroom unit contains 1,000 sq. ft. on a gross basis, the 150 gpd of effluent generated is approximately 2 times the 80 gpd per 1,000 sq. ft. for the office/retail/service use. If restaurant uses are included in the non-residential mix, the amount of effluent will increase. The amount of effluent generated by a restaurant is calculated on a per seat basis. To compute the number of seats for each 1,000 gross sq. ft., approximately 50% is allocated to the dining area. Within that area, the industry average used is 15 sq. ft. per seat for an estimated 166 seats in the 2,500 sq. ft. allocated to the dining area. The amount of effluent generated is 30 gpd per seat. Therefore, a 5,000 sq. ft. restaurant would generate approximately 5,000 gpd.

It is beyond the scope of this study to calculate the specific amount of effluent to be generated within the TOD District since the plans presented herein are conceptual. It is recommended that as part of the consideration of the adoption of a TOD District, the Planning and Zoning Commission consult with the Public Utilities Commission to establish a sewer allocation for the district.

VIII. TRAFFIC IMPACTS

While the traffic impact of the proposed TOD zone will vary depending on the specific mix and types of developments in the zone, some initial estimates of anticipated traffic volumes have been made. We have made a number of assumptions relative to the expected development patterns in the proposed zone. Based on current and projected market conditions we assume that the proposed zone will be comprised of a mix of residential and office land uses.

While we expect some retail development in the area, we expect that it will be ancillary or convenience retail such as newsstands serving people already in the area, such as residents or commuters utilizing the train station. There is significant retail development located in downtown Bethel which should be supported by development in the TOD.

We estimated the site generated traffic for the three conceptual plans. Estimates were made for the weekday morning peak hour, the weekday afternoon peak hour, and the Saturday midday peak hour. Site traffic projections were made based on the Institute of Transportation Engineers' publication, *Trip Generation*¹. We then reduced the estimated site trips associated with the residential land uses based on current research on the effect so of Transit Oriented Development on travel behavior².

The research suggested that trip generation rates for residential land uses at Transit Oriented Developments are approximately 50 percent less than rates observed at conventional residential developments. While it is expected that the office land uses in the proposed zone would likewise

¹ *Trip Generation*. Institute of Transportation Engineers, 8th Edition, 2008.

² *TCRP Report 128, Effects of TOD on Housing, Parking, and Travel*, Transportation Research Board, 2008.

experience significant reductions in site generated traffic, we took a conservative trip reduction of 10 percent due to a lack of data regarding the exact effects of TOD on office development. This is largely because there is a lack of research on the effects of Transit Oriented Developments on trips associated with commercial development. The tables below show the anticipated site traffic for each of the three conceptual plans. For each plan we show the anticipated site traffic with and without the expected TOD trip reductions.

Table 1A
Anticipated Site Traffic – Conceptual Plan 1
Conventional Trip Generation Rates

Land Use	Unit	No. of Units	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Office	k.s.f.	202.80	290	40	330	52	253	305	35	30	65
Residential	DU	130	11	54	65	50	25	75	43	37	80
TOTAL			301	94	395	102	278	380	78	67	145

k.s.f. = 1,000 square feet
DU = Dwelling Unit

Table 1B
Anticipated Site Traffic – Conceptual Plan 1
TOD Trip Generation Rates

Land Use	Unit	No. of Units	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Office	k.s.f.	202.80	261	36	297	47	228	275	32	27	59
Residential	DU	130	6	27	33	25	13	38	22	18	40
TOTAL			267	63	330	72	240	312	54	45	99

Table 2A
Anticipated Site Traffic – Conceptual Plan 2
Conventional Trip Generation Rates

Land Use	Unit	No. of Units	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Office	k.s.f.	202.80	290	40	330	52	253	305	35	30	65
Residential	DU	174	14	66	80	64	31	95	51	44	95
TOTAL			304	106	410	116	284	400	86	74	160

Table 2B
Anticipated Site Traffic – Conceptual Plan 2
TOD Trip Generation Rates

Land Use	Unit	No. of Units	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Office	k.s.f.	202.80	261	36	297	47	228	275	32	27	59
Residential	DU	174	7	33	40	32	16	48	26	22	48
TOTAL			268	69	337	79	243	322	58	48	106

Table 3A
Anticipated Site Traffic – Conceptual Plan 3
Conventional Trip Generation Rates

Land Use	Unit	No. of Units	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Office	k.s.f.	214.80	304	41	345	54	266	320	38	32	70
Residential	DU	198	15	75	90	70	35	105	54	46	100
TOTAL			319	116	435	124	301	425	92	78	170

Table 3B
Anticipated Site Traffic – Conceptual Plan 3
TOD Trip Generation Rates

Land Use	Unit	No. of Units	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Office	k.s.f.	214.80	273	38	311	49	239	288	34	29	63
Residential	DU	198	8	37	45	35	18	53	27	23	50
TOTAL			281	75	356	84	257	341	61	52	113

As shown each of the conceptual plans is anticipated to generate a similar number of automobile trips. During the weekday morning peak hour, the proposed development is anticipated to generate between 330 and 356 automobile trips. During the weekday afternoon peak hour, we anticipate between 312 and 341 automobile trips, and during the Saturday midday peak hour, we anticipate between 99 and 113 automobile trips. Based on our analysis, we expect that the proposed development will, depending on time of day, generate approximately fifteen percent to thirty five percent fewer automobile trips than a conventional development.

Because the TOD zone is bisected by the railroad tracks and abuts numerous public streets, the anticipated site traffic is expected to be dispersed among the surrounding roadway network, rather than concentrated at a few key intersections. The precise impact of the proposed development would have to be more thoroughly evaluated in terms of a specific development program, and would include traffic counts at nearby intersections as well as a detailed analysis of likely routings to and from each component of the development.

However, for purposes of this study, the trips were distributed onto area roadways based on an analysis of journey to work data obtained from the U.S. Census Bureau. The site traffic distribution was broken into four components based on location and land use. These are:

- Office uses west of the railroad tracks;
- Residential uses west of the railroad tracks;

- Office uses east of the railroad tracks;
- Residential uses east of the railroad tracks;

For office uses located west of the railroad tracks it is anticipated that approximately 50 percent of the anticipated site traffic would access the site from the north, travelling south on Route 53 to Diamond Avenue. Ten percent of the site traffic would access the site from the south, travelling north on Route 53. The remaining 40 percent of trips would access the site from the east, travelling west on Route 302.

Residential uses located west of the railroad tracks would follow a similar distribution. Fifty percent of the site traffic would travel to the site via Route 53 heading south to Diamond Avenue. Twenty percent of the site traffic would access the site from the south, travelling north on Route 53 to Route 302. The remaining 30 percent of trips would access the site from the east, travelling west on Route 302.

For office uses located east of the railroad tracks it is anticipated that approximately 40 percent of the anticipated site traffic would access the site from the north via Shelter Rock Lane and Great Pasture Road. Ten percent of the anticipated site traffic would access the site from the north, travelling south on Route 53 to Route 302. Another ten percent of the site traffic would originate south of the site and travel north on Route 53 to Route 302. The remaining 40 percent of trips would access the site from the east, travelling west on Route 302.

For residential uses located east of the railroad tracks it is anticipated that approximately 40 percent of the anticipated site traffic would access the site from the north via Shelter Rock Lane and Great Pasture Road. Five percent would access the site from the north, travelling south on Route 53 to Route 302. Another twenty percent of the site traffic would originate south of the site and travel north on Route 53 to Route 302. The remaining 40 percent of trips would access the site from the east, travelling west on Route 302.

Based on distributions described above, the most significant traffic impact would occur at the intersection of Route 53 at Route 302, Route 53 between Mansfield Street and Route 302, and Route 302 between Route 53 and Diamond Avenue. In order to estimate the potential traffic impact of the proposed TOD zone on existing traffic volumes at these locations, the anticipated site traffic from Conceptual Plan 3 was distributed onto area roadways. Conceptual Plan 3 was selected because it would generate the highest volume of site traffic of the three scenarios discussed in this study. Existing traffic volumes at the three locations described above were obtained from turning counts taken by Milone & MacBroom Inc. at the intersection of Route 53 at Route 302 in February of 2007.

Based on the site traffic distribution, the proposed TOD zone would result in approximately 145 additional automobile trips at the intersection of Route 53 at Route 302 during the weekday morning peak hour and approximately 140 additional trips at that location during the weekday afternoon peak hour. This corresponds to a 9% and a 7% increase, respectively. Traffic volumes along Route 302 would likewise increase by 145 weekday morning peak hour trips and 140 weekday afternoon peak hour trips, resulting in a 19% increase in traffic volumes along that stretch of roadway during the weekday morning peak hour and a 15% increase during the weekday afternoon peak hour. Traffic

volumes on Route 53 between Mansfield Street and Route 302 would increase by approximately 105 trips during the weekday morning peak hour and 100 trips during the weekday afternoon peak hour, corresponding to a 7% and 6% increase, respectively. Table 7 summarizes the anticipated increase in the number of vehicles at three locations during the weekday morning and afternoon peak hour.

Table 7
Anticipated Traffic Impact - Conceptual Plan 3

Time Period Traffic Volumes	Weekday Morning Peak Hour	Weekday Afternoon Peak Hour
<i>Route 53 at Route 302</i>		
Existing	1635	1865
New	145	140
Percent Increase	9%	7%
<i>On Route 53 - Between Route 302 and Mansfield St</i>		
Existing	1535	1715
New	105	100
Percent Increase	7%	6%
<i>On Route 302 - Between Route 53 and Diamond Ave</i>		
Existing	750	920
New	145	140
Percent Increase	19%	15%

IX. PROPOSED TOD REGULATION

In order to implement transit-oriented development in the study area, an amendment to the Bethel Zoning Regulations is proposed.

TRANSIT ORIENTED DEVELOPMENT DISTRICT (TODD)

- A. Purpose: The Transit Oriented Development District is intended to encourage pedestrian friendly, moderate to high density, mixed use development within walking distance of the Bethel Train Station. This will create opportunities for a decreased reliance on the automobile and increased walking, bicycling and transit use. This development will increase tax revenues for the Town and economic support for the adjacent downtown area.
- B. Nature of District: The TODD is an overlay district. The requirements and provisions of the TODD shall supplement the requirements and provisions of the underlying zone.
- C. Location: The TODD may be applied to land within the area designated for transit oriented development as shown on the Bethel Zoning District Map.
- D. Size of District: The TODD may be applied only to parcels of land consisting of at least two acres.
- E. Permitted Uses: Subject to the design standards in this section, the following uses are permitted by Special Permit in the TODD:
 - (1) Retail Sales and Service Establishments of less than 10,000 square feet.
 - (2) Office, including general business and medical offices above ground floor.
 - (3) Residential use provided the dwelling units meet the minimum floor area requirements of Section 5.6.E in above ground floor where the ground floor contains other permitted uses with a density up to thirty (30) units per acre.
 - (4) Day Care Center and Adult Day Care Center.
 - (5) Park, playground or recreation areas including trails operated by a governmental unit or recognized non-profit organization with a mission of open space preservation.
 - (6) Railway right-of-way and related terminals.
 - (7) Parking of vehicles – need not be enclosed provided that any part of such use conducted outside an enclosed structure shall comply with all specifications for maintenance hereinafter required for off-street parking space.

- (8) More than one structure on a lot shall be permitted when the applicant demonstrates it would be advisable for one of the following considerations:
 - (a) Shape of the lot
 - (b) Topography
 - (c) Location of wetlands
 - (d) Traffic flow
 - (e) Aesthetic consistency with surrounding development
 - (f) Other factors considered supportive of transit oriented development

F. Density, Area, Height and Yard Requirements

(1) Density, area, height and yard requirements in the TODD shall be as follows:

(a) Minimum lot area (sq. ft.)	40,000
(b) Minimum lot width (ft)	140
(c) Maximum building coverage of lot without structured parking	50%
(d) Maximum building coverage of lot with structured parking	75%
(e) Minimum front yard (ft)	0
(f) Minimum side yard (ft)	20 ³
(g) Minimum rear yard (ft)	30 ¹
(h) Maximum building height	
Without structured parking	3 stories or 40 ft.
With structured parking	5 stories or 60 ft. ⁴

G. Parking: In order to encourage the use of modes of transportation other than the automobile and increased use of centralized parking for multiple purposes, the TODD shall limit the number of parking spaces rather than establish a minimum number of spaces. The following shall be the maximum number of parking spaces permitted.

- (1) A maximum of 1.5 parking spaces per dwelling unit, plus 1 guest space per 5 units is permitted.

³ When a parcel abuts a residential district.

⁴ When a parcel abuts a residential district, the side and rear yards shall be an additional 1.5 feet for every foot of height over 40 ft.

- (2) Parking for non-residential uses shall be provided at not more than 3 per 1,000 square feet (gross) and not less than 1 per 500 square feet (gross) for uses containing less than 1,000 square feet (gross).
 - (3) Further reduction in the number of required parking spaces may be permitted by Special Permit after a finding by the Planning and Zoning Commission that the development will be adequately served by users of public transportation.
 - (4) The number of parking spaces required may be reduced by Special Permit after a finding by the Planning and Zoning Commission that the peak parking demand of uses does not coincide and that adequate parking is being provided.
- H. Traffic Study: A request for a Special Permit shall be supported by an independent study prepared by a traffic/parking engineer using industry recognized standards.
- I. Design Guidelines: The design guidelines are intended to create a pedestrian friendly environment; provide connectivity within the district and to adjacent areas; provide for a scale of development which is compatible with existing development within and adjacent to the district. The following guidelines shall be addressed in development proposals within the TODD.
- (1) All buildings facing a public or private street must provide at least one street entrance to encourage pedestrian connection to the train station.
 - (2) The portion of the ground floor of buildings facing the street or pedestrian connections to the train station must contain a minimum of 50 percent glass.
 - (3) The architectural style and materials of buildings shall be compatible with the surrounding area.
 - (4) The portion of parking structures at ground level facing either streets or pedestrian connections to the train station shall be designed so that the only openings are those to accommodate vehicle and pedestrian ingress and egress.
 - (5) All public rights-of-way as well as pedestrian walkways and open spaces internal to the development shall contain appropriate landscaping including trees and shrubs.
 - (6) Pedestrian amenities including benches, planters, trash receptacles and similar features shall be provided within public rights-of-way, pedestrian walkways and open spaces.
 - (7) All new utilities shall be placed underground.