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## Memorandum

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**To:** Members of the Visitation Data Committee  
**From:** Michael Beattie, PE, PTOE  
**Date:** August 8, 2024  
**Re:** Hudson Highlands Fjord Trail – Traffic and Transportation Analysis Summary  
**cc:** Amy Kacala, MJ Martin (HHFT, Inc.); Chelsea Anderson (About the Work)

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This memorandum provides a summary of the Hudson Highlands Fjord Trail traffic and transportation analysis. The analysis is based on visitation projections prepared for the project, which were translated into potential vehicle trips. The following sections provide an overview of the analysis, including methodology, potential impacts, and potential mitigation measures that could be implemented to address impacts.

### VISITATION

Based on projections developed by ORCA, the Fjord Trail is expected to generate an estimated 268,700 new annual visits and 1,710 new daily visitors during a design day<sup>1</sup> to the study area. The traffic and transportation analysis focuses on a peak hour when traffic volumes would typically be highest; therefore, modal split (i.e., mode of travel, such as personal vehicle, transit, pedestrian/bicycle) and vehicle occupancy factors were applied to the daily visitation number to develop peak hour vehicle trips. While the proposed Fjord Trail is anticipated to be complete by 2031, the visitation projection anticipates an initial surge of interest, with conditions normalizing by 2033. Therefore, the traffic and transportation analysis assesses a 2033 design year. A summary of the peak hour visitation projections is provided in **Table 1**.

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<sup>1</sup> “Design day” refers to a typical busy day, such as a weekend day, where visitation is generally higher. “Peak day” refers to a less frequent, outlier day, where visitation is exceptionally high, such as during a peak fall foliage weekend. While the design day visitation is projected to be 4,100 daily visitors, this includes visitors that would be arriving to the area without the Fjord Trail (identified as captured or shifted users in the ORCA projection). The 1,710 new design day visitors represent a net incremental increase of new visits to the area that that would occur with the Fjord Trail.

**Table 1**  
**2033 Net New Peak Hour Visitation by Travel Mode**

Travel Mode <sup>1</sup>		Visitors		Vehicle Trips	
		Design Day	Design Day Peak Hour <sup>2</sup>	Vehicle Occupancy <sup>3</sup>	Vehicle Trips (In and Out) <sup>4</sup>
Drive	75%	1,275	178	2.35	152
MNR	19%	325	153		
Walk/Bike	7%	110	16		
<b>TOTAL</b>		<b>1,710</b>	<b>347</b>		

**Notes:**

- Travel mode split based on ORCA visitation surveys
- Based on ORCA visitation surveys, 14% of the daily trips occur during a peak hour except for those arriving by train, which experiences 47% of daily traffic arriving during a peak hour
- Vehicle occupancy based on ORCA surveys; represents number of passengers per vehicle
- Applying a 2.35 people/vehicle occupancy rate and then doubling to account for inbound and outbound trips (178 visitors/2.35 visitors per vehicle \* 2 trips)

Please note that the projected visitation does not reflect any potential travel demand strategies that could reduce the project visitation during a peak hour, which are discussed in the last section of this memorandum.

## TRAFFIC ANALYSIS

### STUDY LOCATIONS

The traffic analysis network includes the following study intersections (see attached Study Area figure from DEIS):

1. Beekman Street and Beacon Train Station Road (Unsignalized) (*City of Beacon*)
2. Beekman Street and Red Flynn Drive (Unsignalized) (*City of Beacon*)
3. South Avenue and NYS Route 9D (Wolcott Avenue) (Signalized) (*City of Beacon*)
4. Fair Street and NYS Route 9D (Unsignalized) (*Village of Cold Spring*)
5. Main Street and NYS Route 9D (Chestnut Street/Morris Avenue) (Signalized) (*Village of Cold Spring*)
6. Main Street and Fair Street (Unsignalized) (*Village of Cold Spring*)

### ANALYSIS SCENARIOS

The traffic analysis assesses the peak hour operations during a Saturday and Sunday peak hour for the following scenarios:

- **Existing Conditions** – Traffic counts were initially conducted in October 2016 for Beacon and Cold Spring study intersections. As the analysis was delayed, these traffic volumes were grown by one percent per year to account for the passage in time and establish updated Existing Conditions. However, to address local concerns in Cold Spring, additional traffic counts were collected at the Village study intersections on a Saturday and Sunday from 9 AM to 1 PM in October 2022 and October 2023 to account for the peak fall foliage season. The highest intersection volumes for those two years were used to develop the Existing Conditions traffic volumes. The peak traffic hours identified for the Beacon and Cold Spring intersections were Saturday 12:00 PM to 1:00 PM and Sunday 11:45 AM to 12:45 PM.
- **2033 No Action Condition** – reflects growth of the Existing Condition traffic volumes by 2033 *without* the Fjord Trail based on a one percent per year background growth rate plus traffic added due to the planned 200-space parking lot at Dutchess Manor.
- **2033 With Action Condition** – reflects the peak hour trips generated by the Fjord Trail overlaid on the 2033 No Action traffic volumes. To determine potential future vehicle patterns, peak hour trips were assigned proportionally to the three proposed/expanded parking lots: Notch (75 parking spaces),

Wade’s Hill (90 parking spaces), and Washburn (expanded by 48 parking spaces with an additional egress). Majority of new vehicles trips would remain on NYS Route 9D to access the three parking lots.

**IMPACTED LOCATIONS AND MITIGATION**

Traffic operations are categorized by Level of Service (LOS), ranging from LOS A through F, with LOS A representing little or no congestion and delay, and LOS F describing extensive congestion and delay. Based on traffic impact criteria accepted by the New York State Department of Transportation (NYSDOT) in their review of traffic impact studies in the region, traffic impacts are identified as: (1) any change from LOS D or better to LOS E or F; (2) any change from LOS E to LOS F; or (3) any increase of 10 percent or greater in delay for LOS F.

**Table 2** presents the intersection LOS for the Existing, 2033 No Action, and 2033 With Action Conditions. As shown, under Existing Conditions, a majority of the study intersections operate at LOS D or better except for the Main Street and NYS Route 9D in the Village of Cold Spring. This intersection experiences approaches operating at worse than LOS D, which are further exacerbated in the No Build Condition.

**Table 2  
Level of Service Analysis**

Intersection	Saturday Peak Hour												Sunday Peak Hour											
	2023 Existing				2033 No Action				2033 With Action				2023 Existing				2033 No Action				2033 With Action			
	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS
<b>Signalized Intersections</b>																								
<b>South Avenue and NYS Route 9D (Wolcott Avenue)</b>																								
Eastbound	LTR	0.41	13.2	B	LTR	0.47	14.1	B	LTR	0.50	14.6	B	LTR	0.36	12.2	B	LTR	0.40	12.8	B	LTR	0.43	13.3	B
Westbound	LTR	0.44	13.4	B	LTR	0.50	14.2	B	LTR	0.53	14.9	B	LTR	0.42	13.0	B	LTR	0.46	13.6	B	LTR	0.50	14.3	B
Northbound	LTR	0.11	8.6	A	LTR	0.13	8.7	A	LTR	0.13	8.6	A	LTR	0.09	9.9	A	LTR	0.10	9.8	A	LTR	0.10	9.7	A
Southbound	LTR	0.08	12.1	B	LTR	0.08	12.3	B	LTR	0.09	12.4	B	LTR	0.11	11.5	B	LTR	0.12	11.7	B	LTR	0.13	11.8	B
	Intersection	12.8	B	Intersection	13.6	B	Intersection	14.1	B	Intersection	12.4	B	Intersection	12.9	B	Intersection	13.4	B						
<b>Main Street and NYS Route 9D (Chestnut Street/Morris Avenue)</b>																								
Eastbound	LTR	0.67	26.8	C	LTR	0.77	33.4	C	LTR	0.80	36.7	D	LTR	0.45	19.7	B	LTR	0.47	19.8	B	LTR	0.47	20.0	B
Westbound	LTR	1.34	197.1	F	LTR	1.54	283.0	F	LTR	1.62	315.0	F	LTR	0.87	47.2	D	LTR	0.91	51.2	D	LTR	0.92	53.6	D
Northbound	LTR	1.25	156.6	F	LTR	1.44	234.7	F	LTR	1.52	270.5	F	LTR	1.01	66.3	E	LTR	1.26	156.8	F	LTR	1.39	212.6	F
Southbound	LTR	0.74	32.9	C	LTR	0.87	45.0	D	LTR	1.02	76.3	E	LTR	0.59	20.8	C	LTR	0.74	29.9	C	LTR	0.89	44.0	D
	Intersection	119.8	F	Intersection	174.1	F	Intersection	200.6	F	Intersection	43.9	D	Intersection	81.3	F	Intersection	105.7	F						
<b>Unsignalized Intersections</b>																								
<b>Beekman Street and Beacon Train Station Road</b>																								
Eastbound	L	0.38	17.0	C	L	0.46	19.9	C	L	0.47	20.3	C	L	0.27	14.2	B	L	0.31	15.5	C	L	0.32	15.7	C
	R	0.14	11.1	B	R	0.16	11.6	B	R	0.17	11.7	B	R	0.05	10.0	A	R	0.06	10.3	B	R	0.06	10.3	B
Northbound	L	0.03	8.3	A	L	0.03	8.4	A	L	0.04	8.4	A	L	0.02	8.0	A	L	0.02	8.1	A	L	0.02	8.1	A
<b>Beekman Street and Red Flynn Drive</b>																								
Eastbound	LR	0.15	12.1	B	LR	0.18	12.8	B	LR	0.19	13.0	B	LR	0.28	11.8	B	LR	0.33	12.6	B	LR	0.34	12.9	B
Northbound	LT	0.04	7.9	A	LT	0.04	8.0	A	LT	0.05	8.0	A	LT	0.05	7.6	A	LT	0.05	7.6	A	LT	0.06	7.6	A
<b>Fair Street and NYS Route 9D (with Washburn Lot Entrance under With Action Condition (Cold Spring))</b>																								
Eastbound									LTR	0.01	8.7	A								LTR	0.01	8.4	A	
Westbound	LT	0.01	8.6	A	LT	0.01	8.8	A	LTR	0.01	9.0	A	LT	0.01	8.2	A	LT	0.02	8.4	A	LTR	0.02	8.6	A
Northbound	LR	0.45	25.0	D	LR	0.58	35.1	E	LTR	0.72	52.7	F	LR	0.30	17.3	C	LR	0.38	20.8	C	LTR	0.47	26.9	D
<b>Main Street and Fair Street</b>																								
Eastbound	LT	0.02	9.1	A	LT	0.02	9.4	A	LT	0.02	9.5	A	LT	0.02	15.5	C	LT	0.03	17.6	C	LT	0.03	17.7	C
Southbound	LR	0.68	36.9	E	LR	0.86	61.9	F	LR	0.89	68.4	F	LR*				LR*			LR*				

Notes: v/c = volume to capacity, LOS = Level of Service; L = Left Turn, T = Through, R = Right Turn  
 \*Fair Street operates as a one-way northbound roadway on Sundays.  
 Shading indicates traffic impact

In the 2033 With Action Condition (i.e., with the proposed Fjord Trail), the analysis identified the following potential impacts in Cold Spring (no impacts to Beacon study area intersections were identified):

- Main Street and NYS Route 9D in Cold Spring
  - **Potential Impact:** The westbound Main Street approach delay would deteriorate within LOS F, experiencing an increase in delay in excess of 10 percent during the Saturday peak hour (an increase of 32.0 seconds). The northbound NYS Route 9D approach delay would deteriorate within LOS F, experiencing an increase in delay in excess of 10 percent, during the Saturday and Sunday peak hours (an increase of 35.8 seconds and 55.8 seconds for the Saturday and Sunday peak hours, respectively). The southbound NYS Route 9D approach would deteriorate from LOS D to LOS E during the Saturday peak hour.

- **Potential Mitigation:** Restriping the eastbound Main Street approach to provide an exclusive left-turn lane and a shared through-right turn lane, which would require removal of parking on the eastbound and westbound Main Street approaches, and optimizing signal timing.
- Main Street and Fair Street in Cold Spring
  - **Potential Impact:** The southbound Fair Street approach would deteriorate within LOS F, experiencing an increase in delay in excess of 10 percent, during the Saturday peak hour (an increase of 6.5 seconds).
  - **Potential Mitigation:** The intersection volumes at the Main Street and Fair Street intersection do not warrant a signal. A potential mitigation strategy would be designating Fair Street as a one-way northbound street between Main Street and Northern Avenue on Saturdays, as is currently done on Sundays.
- Fair Street/Washburn Lot Entrance and NYS Route 9D in Cold Spring—the northbound Fair Street approach would decline from LOS E to LOS F during the Saturday peak hour.
  - **Potential Impact:** The northbound Fair Street approach would decline from LOS E to LOS F during the Saturday peak hour.
  - **Potential Mitigation:** Redesign of this intersection to provide a roundabout with yield control at each of the approaches.

The potential mitigations would require approval from NYSDOT, Putnam County, and the Village of Cold Spring, as applicable.

### SAFETY ASSESSMENT

**Table 3** provides a summary of documented crashes between 2017 and 2022 in the study area, which include eight crashes involving pedestrians on NYS Route 9D. The Fjord Trail would allow pedestrians and bicyclists to travel between Cold Spring and Little Stony Point, Washburn Trail, and Breakneck Ridge without having to traverse downtown Cold Spring roads or walk along Fair Street and NYS Route 9D. This is a critical benefit of the proposed Fjord Trail, as it would help address vehicular, bicycle, and pedestrian safety and congestion issues on these roadways.

**Table 3**  
**Study Area Crash Summary – Area Road Segments**

Road Segment	Number of Crashes (by Year)						Safety Trend		Crash Trend (Number of Crashes by Type)													
	2017	2018	2019	2020	2021	2022	# of Personal Injuries	# of Fatalities	Overtaking	Rear End	Right Angle	Left Turn (with other car)	Left Turn (against other)	Right Turn (with other car)	Right Turn (against other)	Side-swipe	Head On	Ped/Bike	Fixed Object	Animal	Other	Unknown
NYS Route 9D – between NYS Route 301 (Main Street in Cold Spring) to Beekman Street/West Church Street (in Beacon)	37	49	40	25	33	52	89	0	13	61	21	4	9	1	1	7	7	8	43	39	20	2
Beekman Street – between northern and southern intersections with NYS Route 9D	6	6	2	2	0	4	6	0	2	3	4	0	2	0	0	2	0	1	4	1	0	1
NYS Route 301 (Main Street) – between NYS Route 9D (Morris Avenue/Chestnut Street) and Fair Street	4	8	7	5	1	7	4	0	8	9	3	3	1	1	0	0	1	0	3	0	1	2
Fair Street – between NYS Route 9D and NYS Route 301	2	1	0	1	1	0	0	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0

**Source:** NYSDOT records for the period of January 1, 2017 through December 31, 2022

### PEDESTRIAN ASSESSMENT

While visitation is expected to increase with the Fjord Trail, there could be a reduction in pedestrian traffic on Main Street in Cold Spring due to:

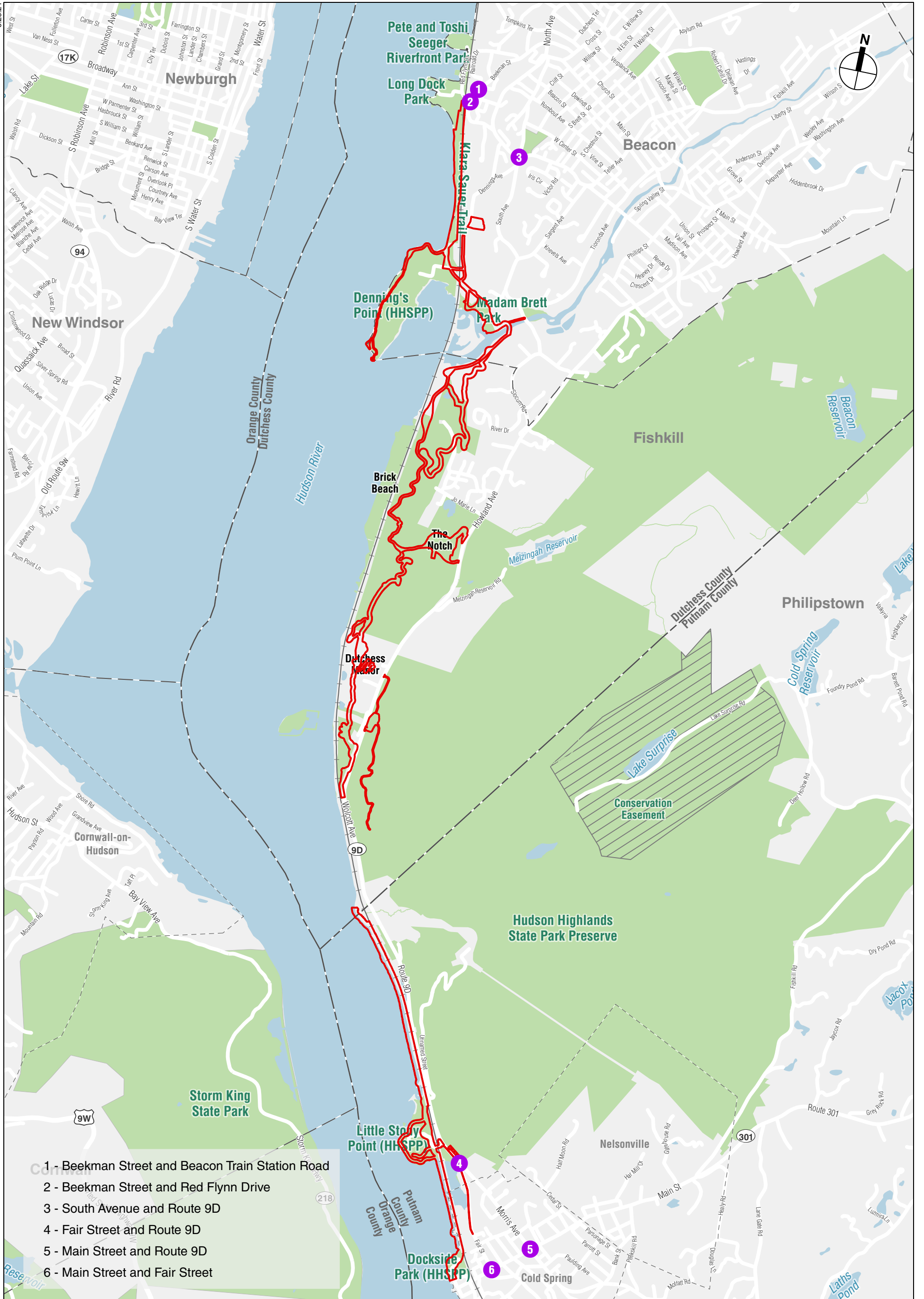
- New parking lots on NYS Route 9D that would provide parking outside of downtown Cold Spring.
- Trail access from Dockside Park, along with new amenities such as bathrooms, which would shift future and existing hikers from traversing Fair Street to the Fjord Trail trailhead.

### VISITOR DEMAND MANAGEMENT STRATEGIES

The traffic and transportation analysis focused on potential peak hour visitation levels. However, there are management demand strategies that could be deployed to potentially reduce or better manage peak hour visitation. Strategies under consideration include:

- Wayfinding improvements
- Advanced communication on where to park/planning your trip
- Parking app that indicates which lots have capacity
- Incentives/packages for visitors arriving by Metro-North Railroad
- Early/late day reduced parking fee incentives to try to shift visitors off the peak hour

While these visitor demand management strategies could result in potential reductions in peak hour visitation, they were not applied to the traffic and transportation analysis in order to provide a conservative assessment.



- 1 - Beekman Street and Beacon Train Station Road
- 2 - Beekman Street and Red Flynn Drive
- 3 - South Avenue and Route 9D
- 4 - Fair Street and Route 9D
- 5 - Main Street and Route 9D
- 6 - Main Street and Fair Street

- Limits of Disturbance
- Study Area Intersections

**HUDSON HIGHLANDS FJORD TRAIL**

Study Area Intersections  
**Figure III.L-2**