



State of Vermont
Division of Policy, Planning and
Intermodal Development
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Agency of Transportation

January 15, 2023

Senate and House Committees on Transportation
Vermont State House
115 State Street
Montpelier, VT 05633-5301

Re: Statewide Level 3 EVSE (EV Fast Charging) Map

Members of the Committees,

The Vermont Agency of Transportation (AOT) respectfully submits the attached maps of Vermont's public electric vehicle fast-charging network and progress towards State legislative goals. First is the 2023 map for the Electric Vehicle Supply Equipment Grant Program managed by the Department of Housing and Community Development in partnership with the EVSE interagency workgroup which includes AOT, Department of Environmental Conservation, and Department of Public Service.

As you may recall, Sec. 4 of Act 184 (last year's transportation bill) amended Sec. 30(b) of Act 55 (2021 Transportation Bill) requiring the following:

Sec. 30. EVSE NETWORK IN VERMONT; REPORT OF ANNUAL MAP

(a) It shall be the goal of the State to have, as practicable, a level 3 EVSE charging port available to the public within: (1) ~~five miles~~ **one driving mile** of every exit of the Dwight D. Eisenhower National System of Interstate and Defense Highways within the State; and (2) ~~50~~ **25 miles** of another level 3 EVSE charging port available to the public along a State highway, as defined in 19 V.S.A. § 1(20).

(b) Notwithstanding 2 V.S.A. § 20(d), the Agency of Transportation shall file an up-to-date map showing the locations of all level 3 EVSE available to the public within the State with the House and Senate Committees on Transportation not later than January 15 each year until the goal identified in subsection (a) of this section is met.

The second map—"State of Vermont DC Fast Charging Location Gap Analysis"—shows the gaps in meeting the state's goal to have a fast charger within twenty-five (25) miles of the next fast charger. These gaps appear as white spaces on the map. With the expected investment of federal funds, AOT believes that we can significantly shorten these distances while also building greater redundancy into the network. It has excluded proprietary fast chargers accessible to only certain vehicles or at certain times, such as Tesla or dealership chargers.

Vermont continues to be a national leader in transportation electrification, with more public charging ports per capita than any other state in the U.S.¹ Through recent funding rounds, Vermont has worked with Blink Charging and a local company, Norwich Technologies, to install multiple stations in seventeen (17) locations. Although these projects remain in progress because of a variety of setbacks, AOT expect these to be completed in 2023 and is currently exploring the further upgrades of seven (7) locations. The National Electric Vehicle Infrastructure (NEVI) Formula Fund Program, last year's appropriation of \$2 million in ARPA funds, the Carbon Reduction Formula Fund Program, and multiple federal competitive grant programs all provide a rare opportunity to significantly invest in the fast charging infrastructure necessary to create a convenient and reliable network and increase electric vehicle adoption in the State.

With the support of Drive Electric Vermont, AOT submitted a NEVI plan in July 2022 which was then approved by October 2022. Plan approval allowed AOT access to this federal funding for FFY2022. However, the final rules for the NEVI plan and Buy America waiver provisions have yet to be issued by the Federal Highway Administration (FHWA). Despite this delay, the Agency continues to work towards as rapid a buildout as possible, consistent with the requirements and ensuing targets of the Global Warming Solutions Act and Initial Climate Action Plan. Attached is an excerpt from the initial NEVI plan which offers a series of maps and discussion of the mapping analyses underpinning the first set of sites likely to receive federal investments.

AOT staff will be presenting on State plans this legislative session. In the meantime, please feel free to reach out to the Agency with any questions.

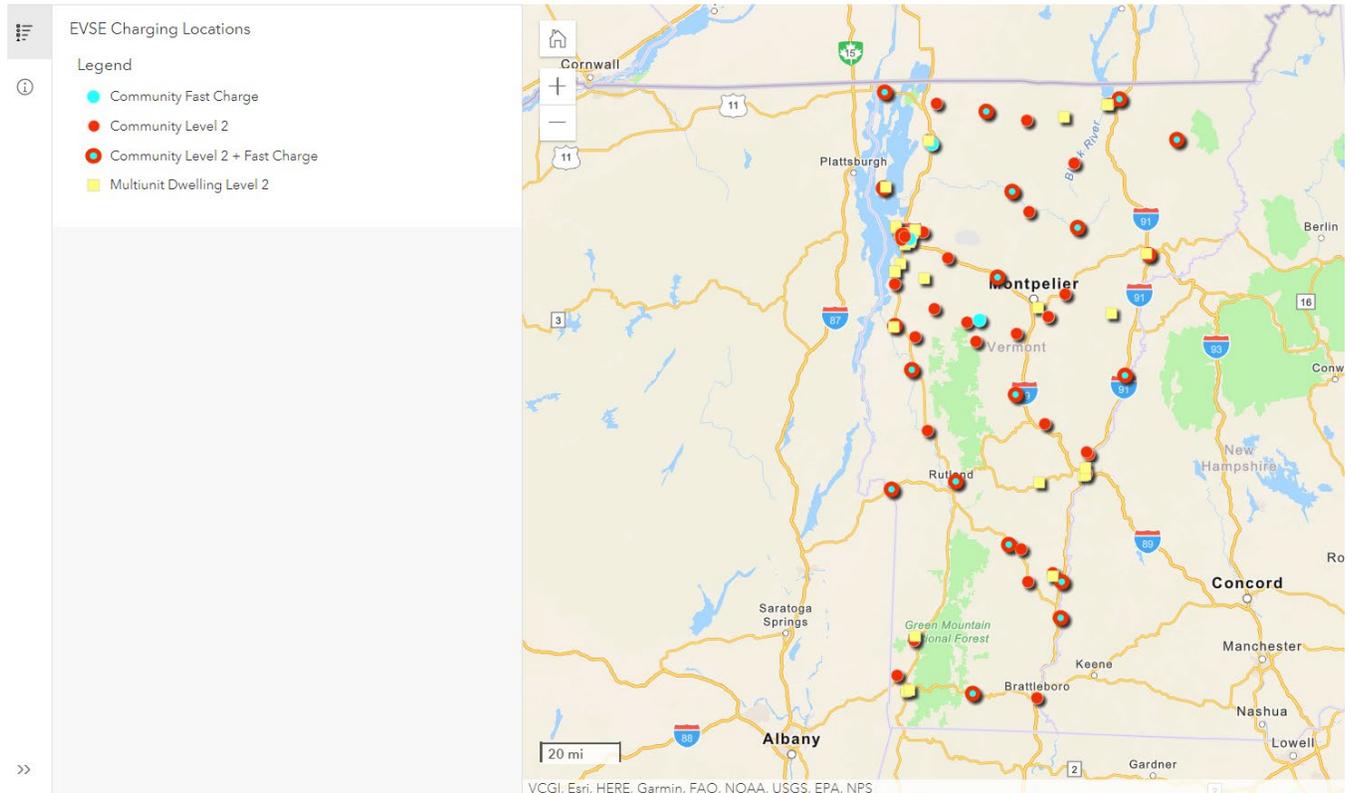
Yours sincerely,

Patrick Murphy
Sustainability and Innovations Project Manager
Patrick.murphy@vermont.gov

[State of Vermont Investments in Electric Vehicle Supply Equipment \(arcgis.com\)](https://arcgis.com)

¹ [US: Vermont Has The Most Charging Points Per Capita \(insideevs.com\)](https://insideevs.com)

State of Vermont Investments in Electric Vehicle Supply Equipment



VCGI, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

Developed by Agency of Commerce and Community Development

State of Vermont DC Fast Charging Location Gap Analysis



DC Fast Charge Locations

- Project In-Progress
- Unit Operational
- DC Fast Charging Station NY/NH

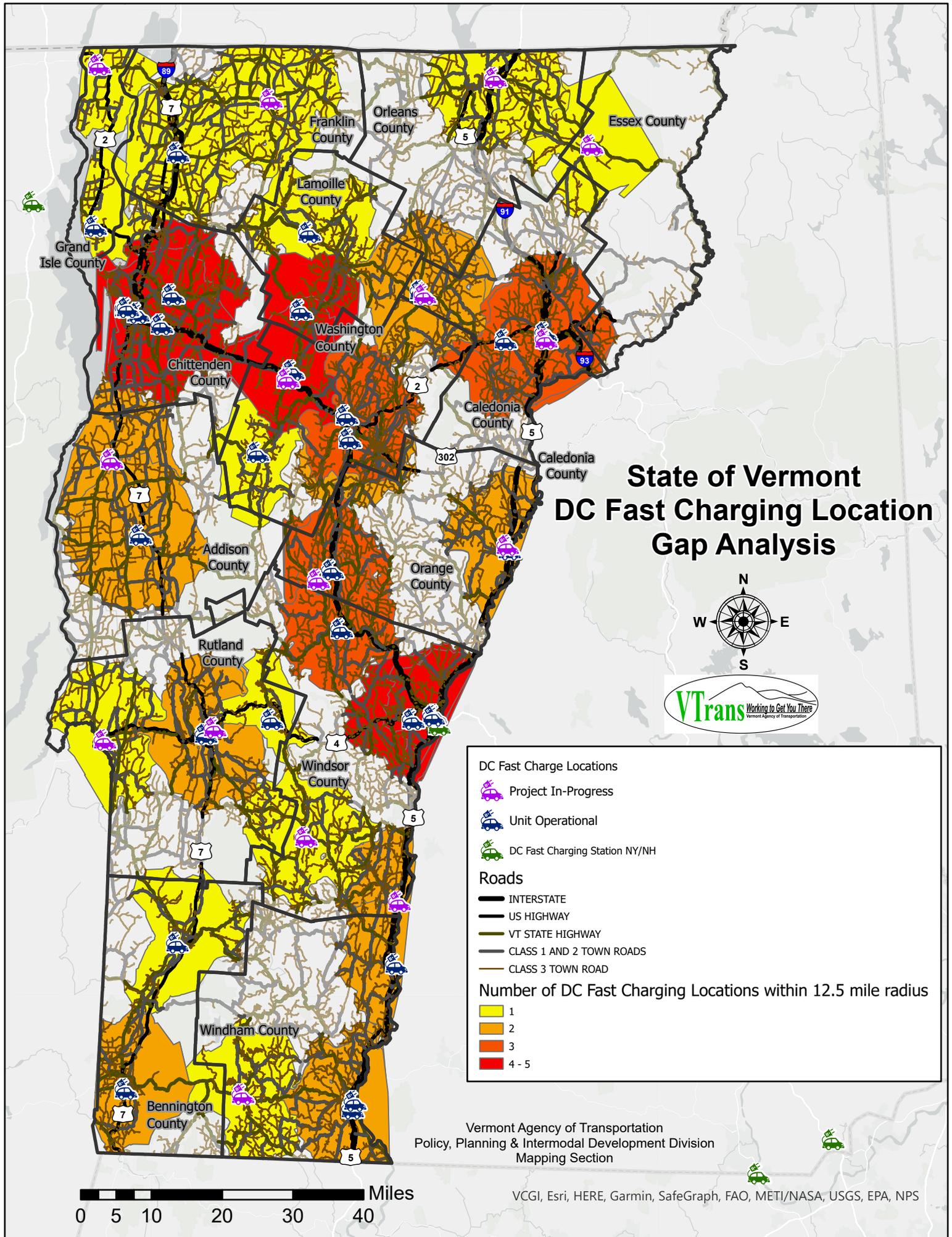
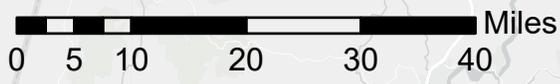
Roads

- INTERSTATE
- US HIGHWAY
- VT STATE HIGHWAY
- CLASS 1 AND 2 TOWN ROADS
- CLASS 3 TOWN ROAD

Number of DC Fast Charging Locations within 12.5 mile radius

- 1
- 2
- 3
- 4 - 5

Vermont Agency of Transportation
Policy, Planning & Intermodal Development Division
Mapping Section



State of Vermont National Electric Vehicle Infrastructure Plan



Vermont Agency of Transportation

August 1, 2022



EVSE Location Planning

Equity Issues

Identification and Outreach to Disadvantaged Communities (DACs) in the State

Figure 14 displays disadvantaged communities (DACs) in Vermont as defined in NEVI guidance as part of the Justice40 initiative. The Initiative, established under Executive Order 14008, sets a goal of directing at least 40 percent of overall benefits from certain federal investments toward DACs. DOT and DOE combined definitions of DACs to produce data relevant to NEVI funding to highlight energy and transportation-burdened communities, those facing high rates of pollution or are highly dependent of fossil energy sources, and those with high rates of social vulnerability. FHWA dictates that 40 percent of all charging infrastructure funded by NEVI does not have to be distributed to DACs, rather states must ensure a magnitude of benefits flow into these communities. This may take place through access to resources, reduced energy burden, increased penetration of renewable energy resources, or reduced vulnerability through jobs or transportation security.

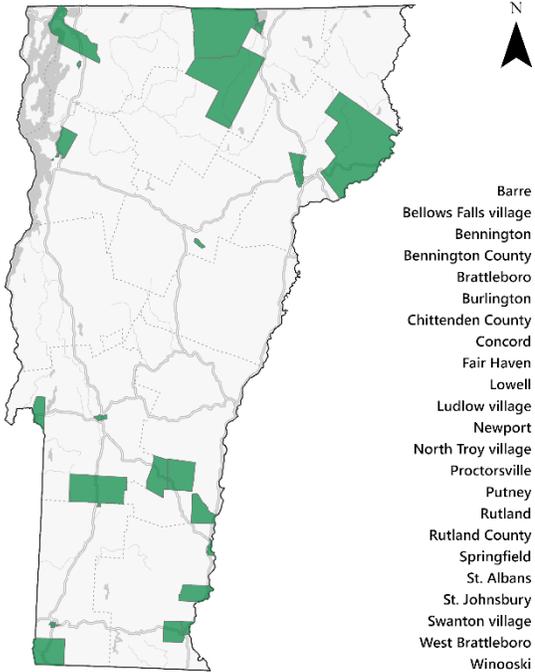


Figure 14. Disadvantaged communities in Vermont.

Process to Identify, Quantify, and Measure Benefits to DACs

Pollution resulting from the transportation and energy sectors have been disproportionately borne by disadvantaged, low-income, and otherwise underserved communities¹⁰⁵. Further, these populations have historically been excluded from the benefits of clean market transitions. Considerations for developing the EVSE network must be made regarding siting, distribution, access, and affordability across all demographics. It is important to note that, as many EV drivers charge at home, those that will be utilizing the public network the most are those that do not have access to private charging infrastructure. Given the cheaper relative cost of at home charging, particularly when taking advantage of time-of-use rates offered by utilities, public chargers will be more expensive to construct, own, and operate. These costs will be passed

¹⁰⁵ Huether, Peter. 2021. Siting Electric Vehicle Supply Equipment (EVSE) with Equity in Mind. www.aceee.org/white-paper/2021/03/siting-electric-vehiclesupply-equipment-evse-equity-mind.

down to consumers to ensure station viability in turn harming those most susceptible to economic hardship.

Lower income and multifamily households are at a disadvantage due to this higher cost of public charging. Level 2 and DCFC stations in Vermont operated by Electrify America cost \$0.43 per kWh with an additional \$0.40 per minute idle fee after charging stops. Where available, Level 2 chargers cost \$0.03 per minute. Comparatively, home charging under Burlington Electric Department's Residential EV Rate cost just \$0.08 per kWh. This means those reliant on the public charging network must pay five times more to refuel an electric vehicle than those that have access to home charging. Multifamily households are disproportionately burdened by this and must contend with parking availability and inability to connect the vehicle to their metered electric service. Without this, and without a strongly built-out EVSE network, multifamily households are barred from the benefits EVs can provide.

Rural stations present a competing challenge of lower utilization with higher vehicle miles traveled per capita¹⁰⁶. These stations may also see a greater ebb and flow of utilization in areas with high tourism traffic, impacting demand charges levied on station owner-operators. Moreover, many areas in rural Vermont do not yet have the electrical infrastructure capacity to support DCFC, adding to upfront project costs. Without these populations included in the market transition however, Vermont will be unable to achieve carbon reduction goals.

Benefits to DACs through this Plan

Some of these challenges may be addressed through policy and program design. Presently, the State of Vermont ACCD is issuing grants that prioritize EVSE projects located in affordable multifamily building complexes. The state should continue to design equity considerations into grant funding to uplift those that can benefit most from accessible and affordable charging. As upfront costs are offset, fewer costs must be passed down to the consumer. The state can design consumer protections into grants that are subsidizing costs to projects designed to benefit low-income and otherwise disadvantaged families. This will in turn expand access to electric vehicles for these populations to benefit from clean technologies. Additionally, the inclusion of EV make-ready infrastructure as part of new multifamily building codes will be a driver of lower costs and a means to reduce state funding for charging stations.

Engagement with rural residents will be critical to best understand needs and determine desirable locations for stations to be sited. While rural stations will be more dependent on public funding sources, the state can help encourage investments in rural and underserved areas through policy measures such as working with utility stakeholders, businesses and other organizations to further encourage investments. Additionally, the U.S. Department of

¹⁰⁶ U.S. DOT. 2022. Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure. <https://www.transportation.gov/rural/ev/toolkit>

Transportation has developed a Rural EV Funding Matrix¹⁰⁷ to help support states grow EVSE networks in rural areas.

The State of Vermont passed Act 154 in 2022 establishing a new state policy to advance environmental justice in disadvantaged communities, including development of mapping tools and engagement strategies to support this work.¹⁰⁸ Future iterations of this plan will consider new resources to identify DACs and consider associated EV charging needs and investments.

¹⁰⁷ U.S. Dot. 2022. Rural EV Funding Matrix. <https://www.transportation.gov/rural/ev/toolkit/ev-infrastructure-funding-and-financing/funding-matrix>

¹⁰⁸ Vermont General Assembly. Act 154 – An act relating to environmental justice in Vermont. May 2022. <https://legislature.vermont.gov/bill/status/2022/S.148>

EV Charging Geographic Analysis

There are many considerations in identifying the ideal locations for EV charging infrastructure. For NEVI funding, there are requirements to be within a certain distance of corridors. Availability of grid infrastructure, traffic volumes, and the location of disadvantaged populations are all considered in the map series below, starting with Figure 15 showing the federally designated EV corridors in Vermont and neighboring states that are the focus of this plan. Additional analysis will be performed as the State solicits stakeholder feedback on prioritizing future charging investments and makes progress in building out the designated corridors to the federal requirements.

Figure 15. Federally Designated EV Corridors

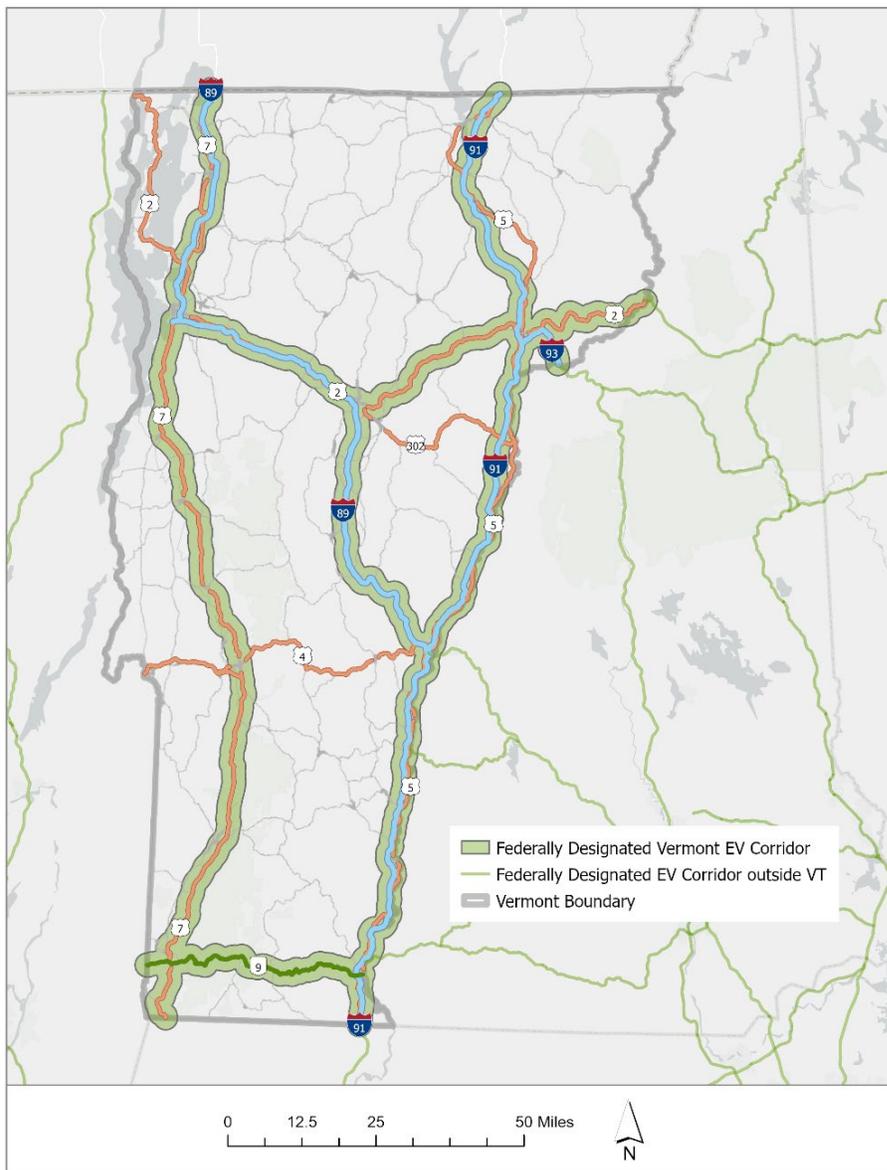


Figure below overlays current EV charging availability on the corridor locations, with distinctions made between Tesla-specific infrastructure and other non-Tesla charging locations.

Figure 16. EV Corridors with Existing EVSE Locations

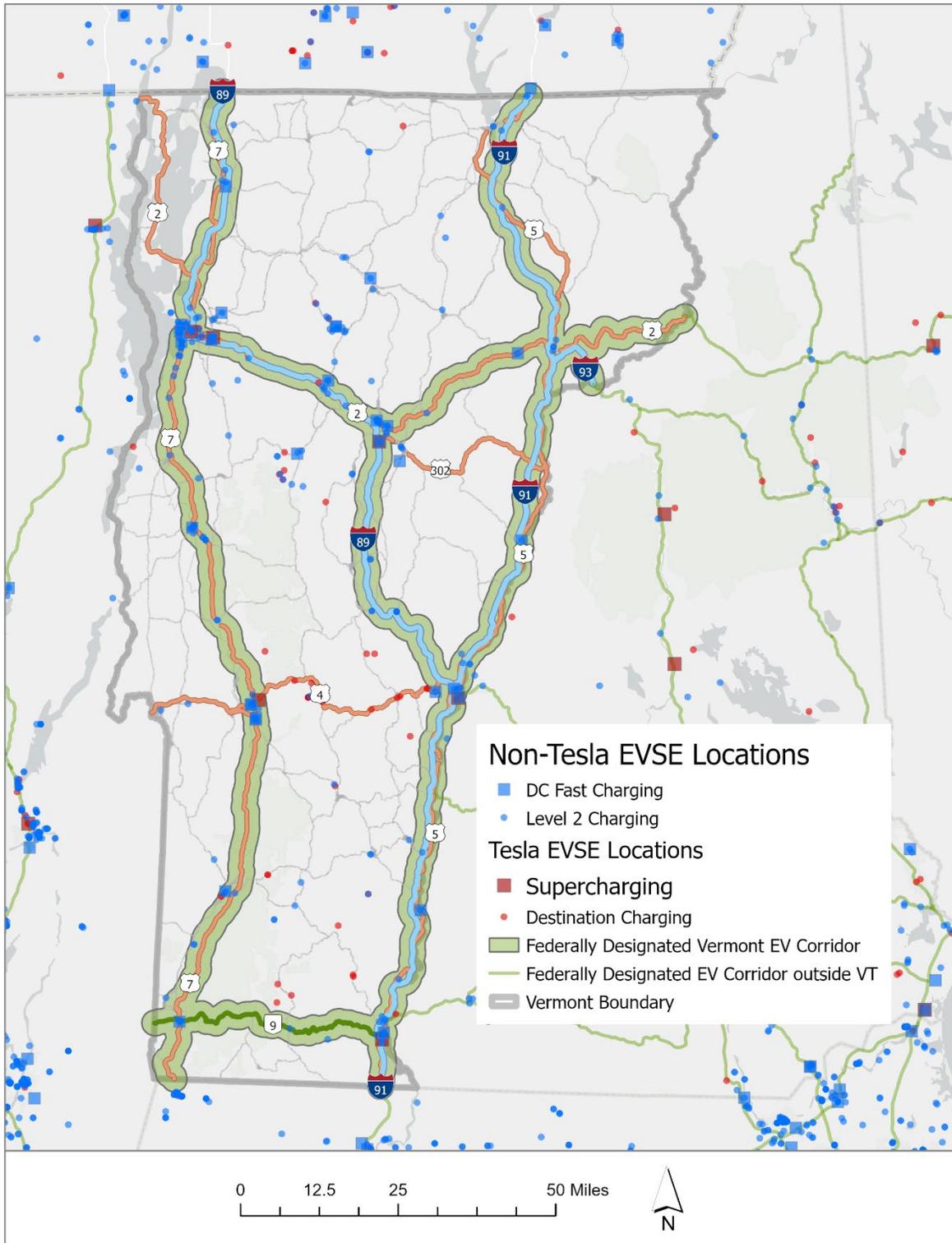


Figure 17 below summarizes general availability of 3-phase power across the State by dividing Vermont into 800-meter radius hexagonal grid cells. This unit of analysis was selected to offer localized analysis at a manageable scale as it was not feasible to perform site visits or grid assessments for thousands of potential individual locations. The presence of 3-phase power is generally regarded as a baseline requirement for installing four 150kW DCFC. The State will work with electric utilities, contractors, potential site hosts and other stakeholders as specific locations are identified and supported through NEVI funding.

Figure 17. 3-Phase Power Availability along Corridors

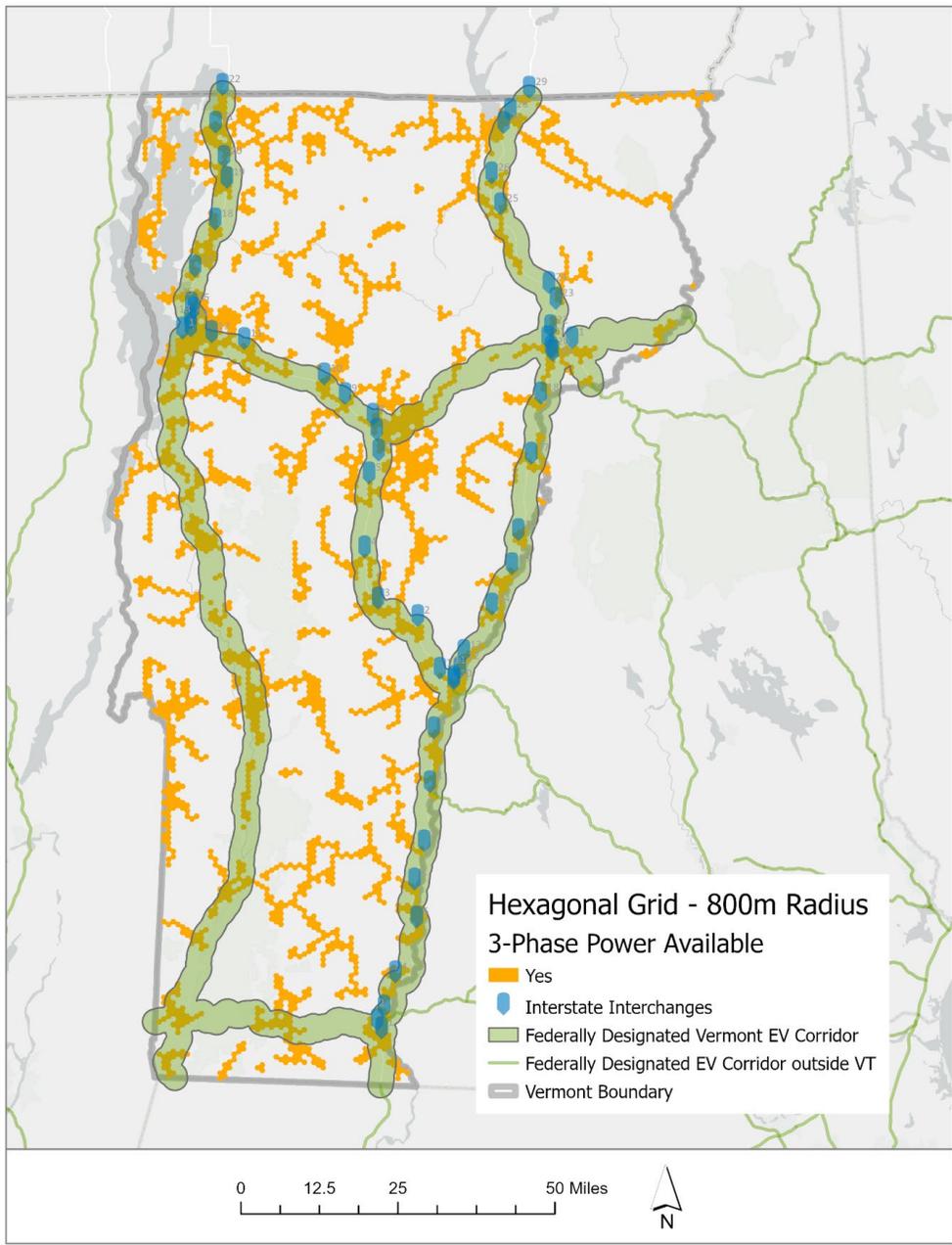
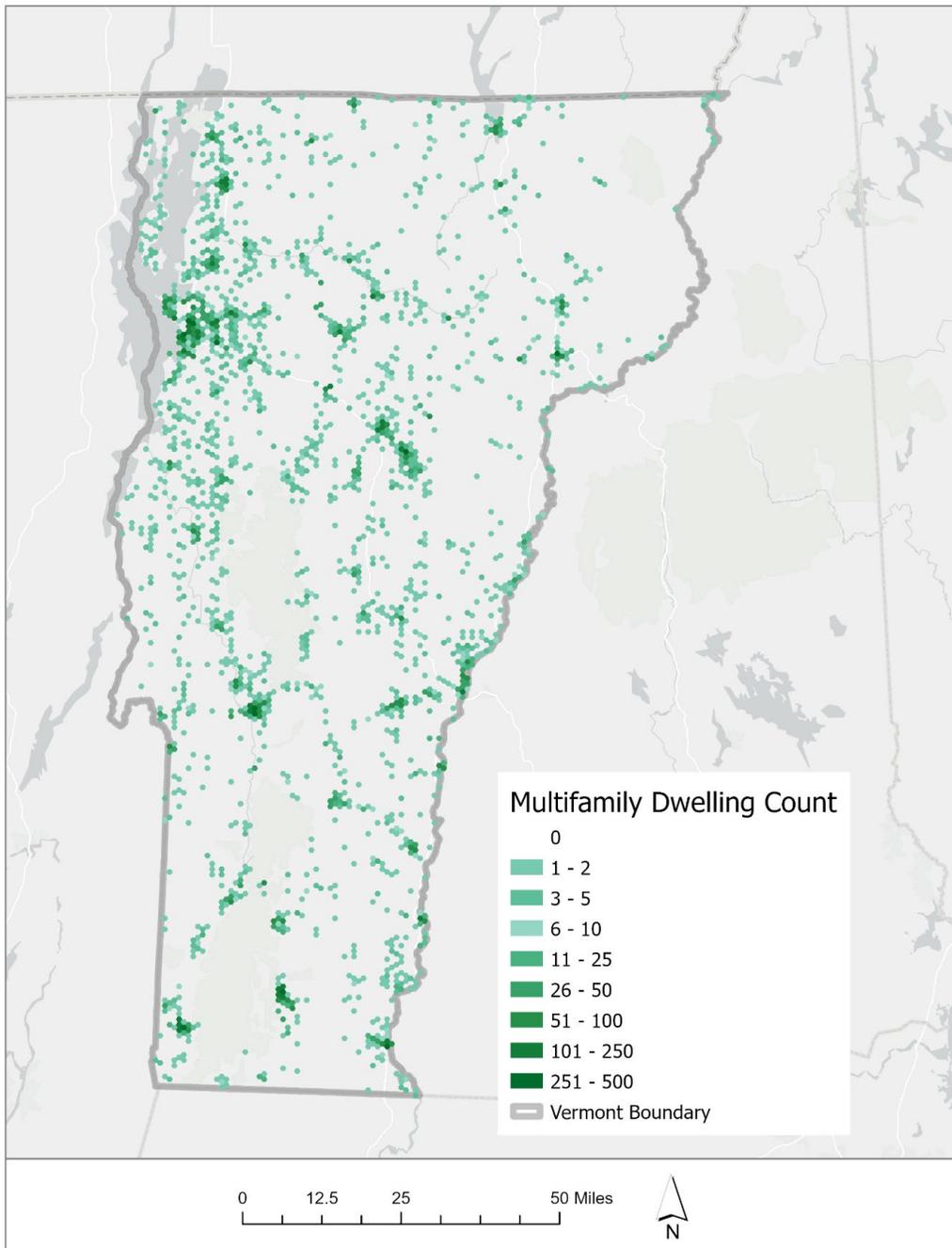


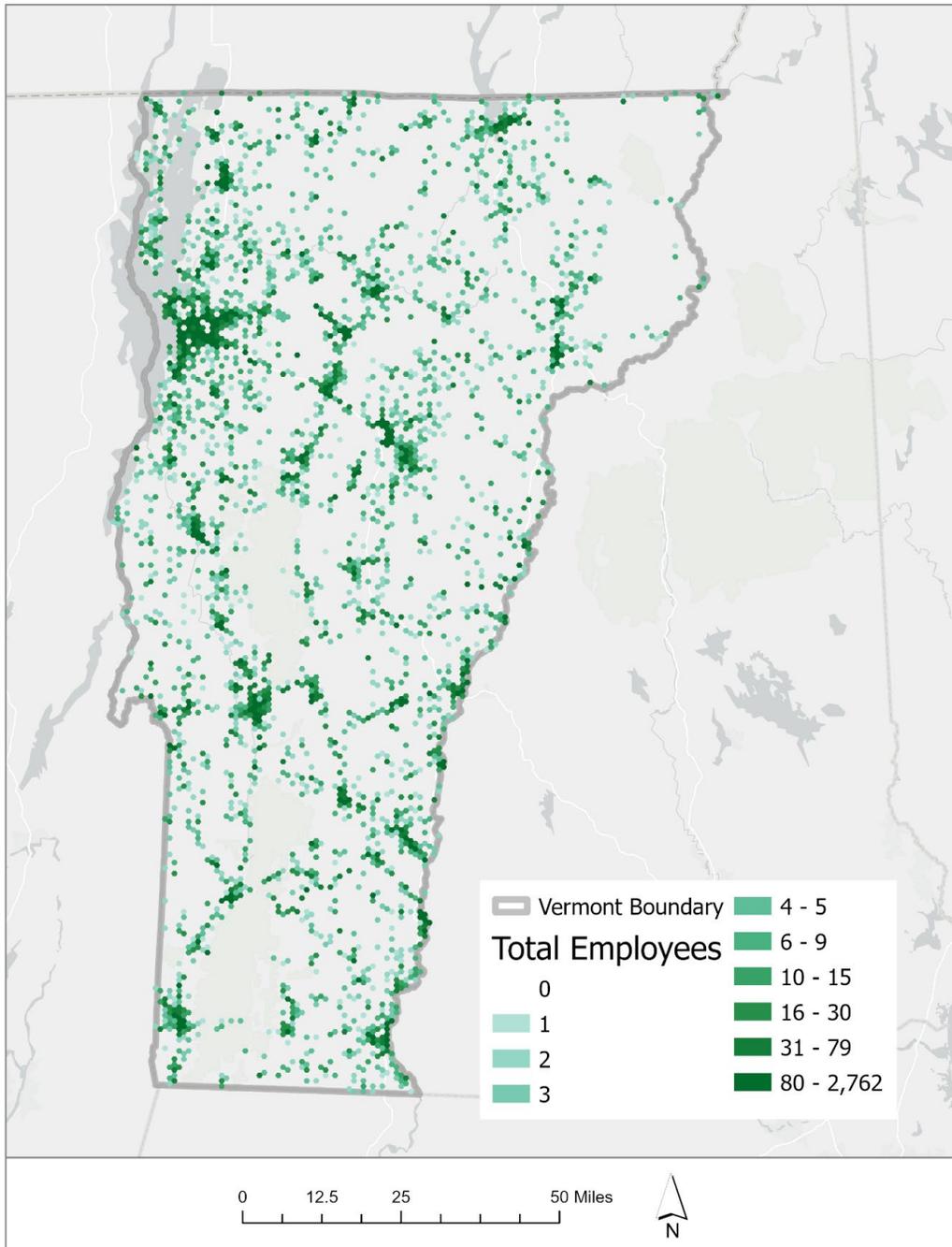
Figure 18 below assigned multifamily housing dwelling counts identified in the State of Vermont's enhanced 911 structures database to the same 800 meter hexagonal grid cells. Multifamily housing residents frequently have greater barriers to installing EV charging at home, particularly if they are renting as is often the case with multifamily housing. The statewide prioritization shown in Figure 24 took this into account by assigning a higher score to areas with higher concentrations of multifamily housing.

Figure 18. Multifamily Dwelling Locations



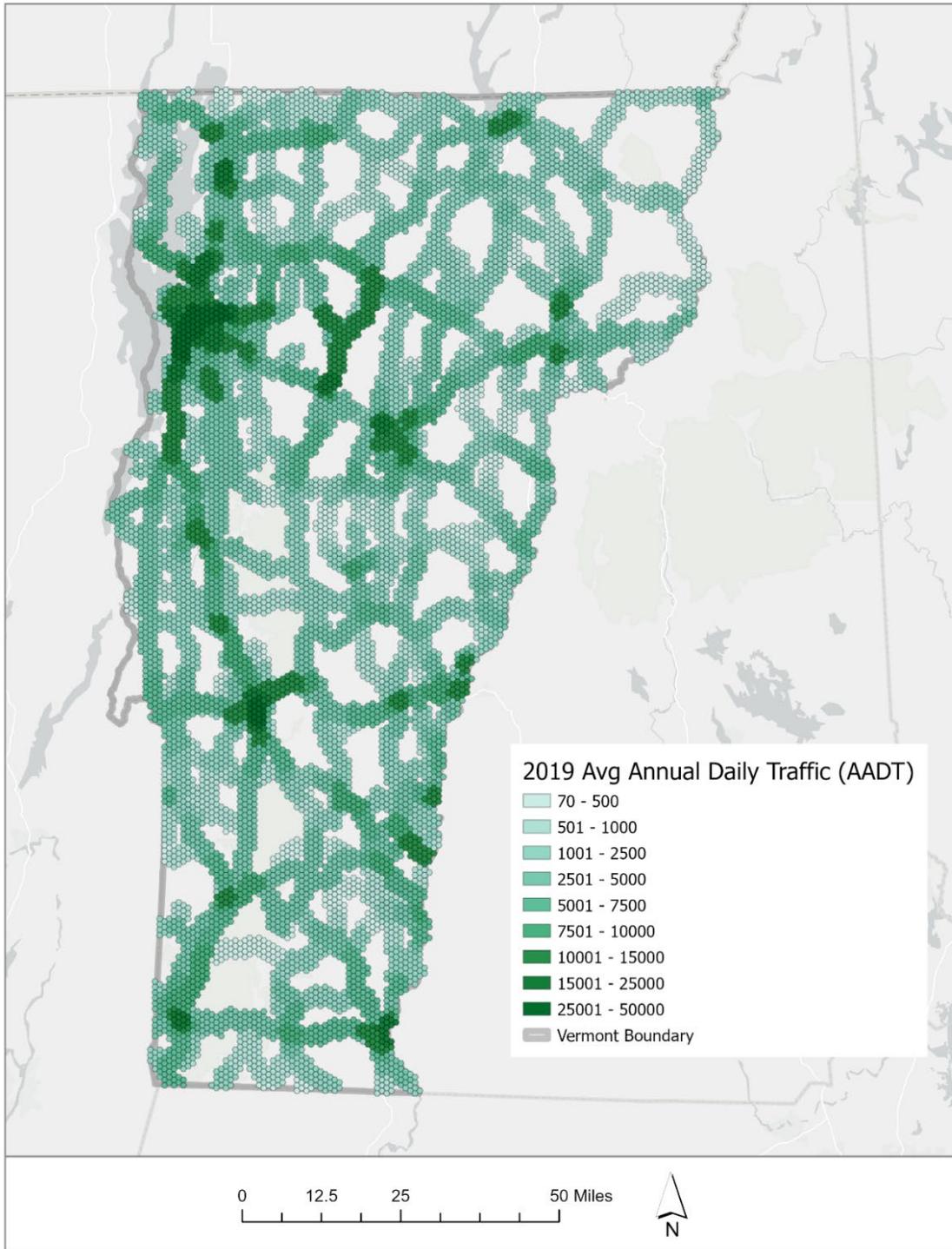
Local employment is also an important consideration siting charging infrastructure, both to serve employee and customer transportation needs. Figure 19 below shows total employment estimates by 800 m grid cell. Additional weight was given to locations with retail employment, including convenience stores, as they are more likely to offer goods and services desired by travelers.

Figure 19. Employment Locations



Traffic flows are also an important consideration in identifying areas more likely to have drivers in need of charging infrastructure. Figure 20 below includes the maximum estimated average annual daily traffic for 2019 by grid cell within 1 mile of non-limited access highways.

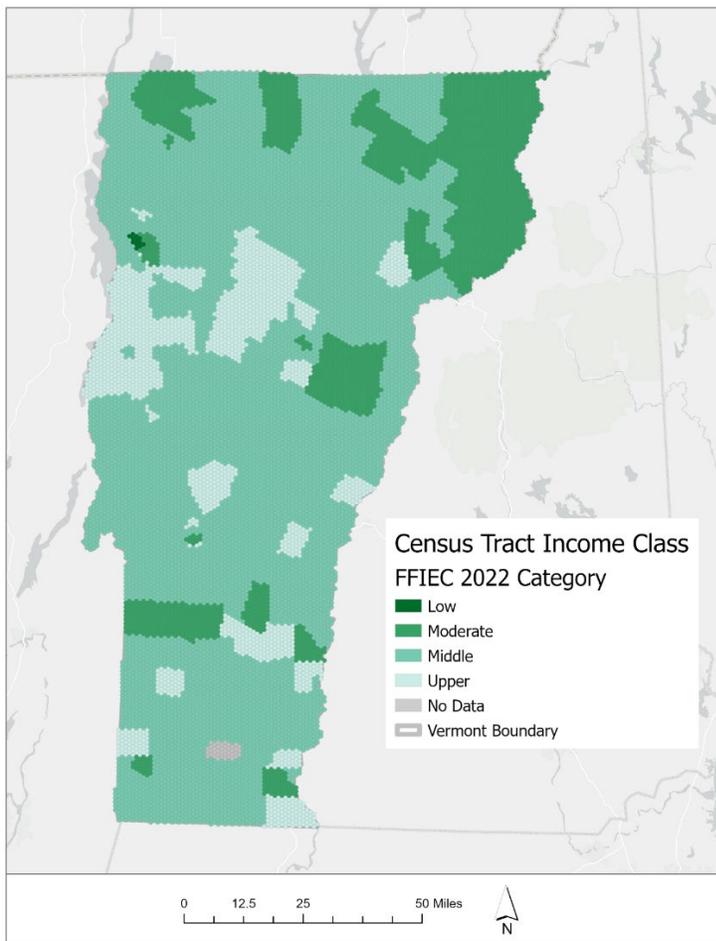
Figure 20. Traffic Volumes



Income and race are closely tied to disadvantaged and underserved areas that may require additional support to ensure equitable access to charging infrastructure. Figure 21 below assigns Federal Financial Institutions Examination Council (FFIEC) 2020 income categories by Census Tract to grid cells. Additional information on the FFIEC methodology and classifications is available at the reference footnote below.¹⁰⁹ Low income cells were assigned a score of 1, moderate income 0.5, and middle income 0.25. Upper income cells were excluded from scoring for this factor.

Figure 22 following presents a composite score for the number of non-white residents in each grid cell by apportioning 2020 US Census data at the block level to grid cells (which were generally smaller). The apportionment was weighted by the count of dwelling units in each grid cell. The BIPOC score was based on the square root of the estimated number of non-white residents in the grid cell divided by the square root of the maximum number across all cells in the state to better isolate areas with higher shares of non-white population.

Figure 21. Census Tract Income Categories



¹⁰⁹ FFIEC. FFIEC Census Flat Files. April 2022. <https://www.ffiec.gov/censusapp.htm>

Figure 22. Black, Indigenous and People of Color Population Score

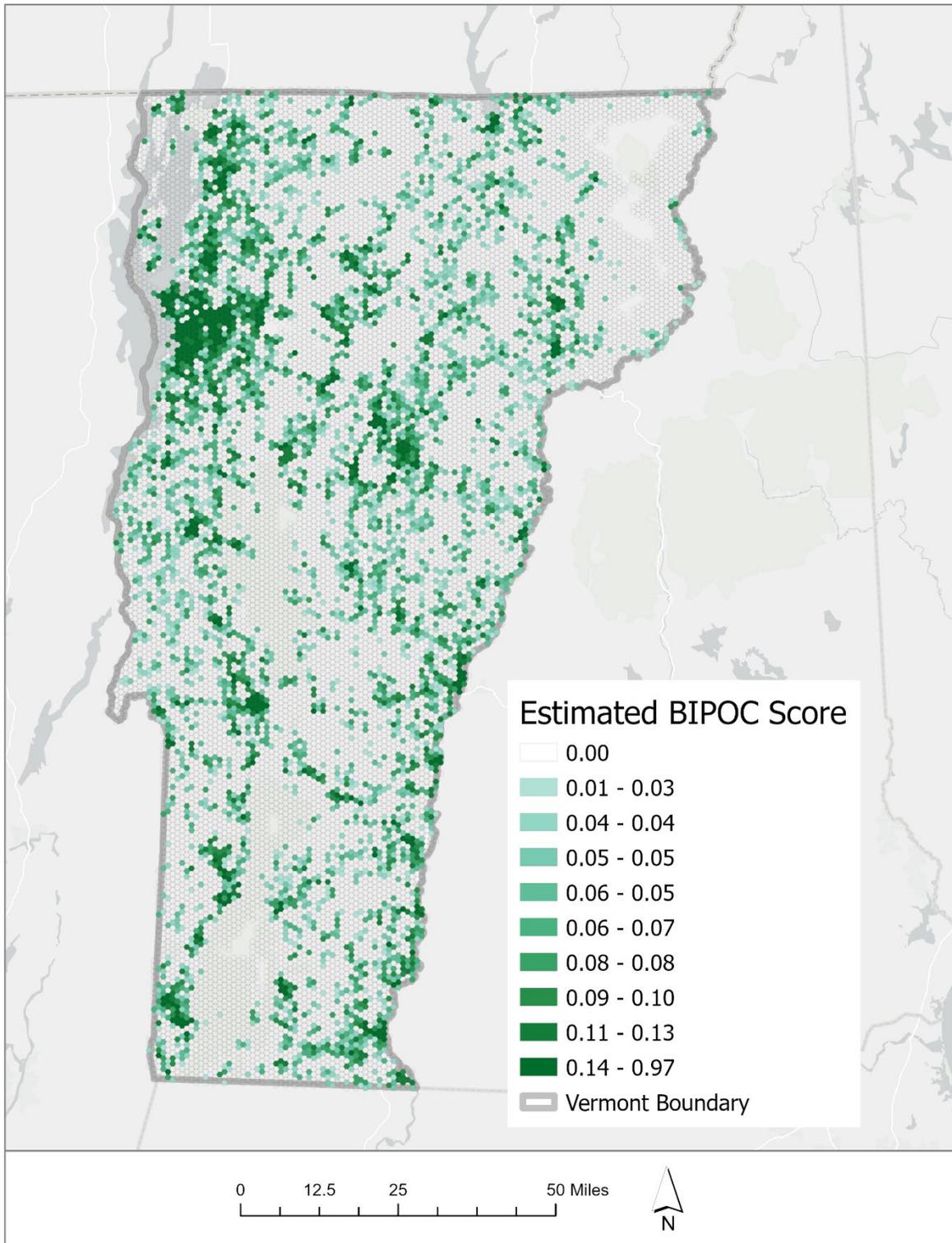


Figure 23 below identifies grid cells along roadways within 1 mile of a federally designated EV corridor, either within 1 mile of an interstate interchange, or 1 mile of a non-limited access highway.

Figure 23. Proximity to Federally Designated EV Corridor

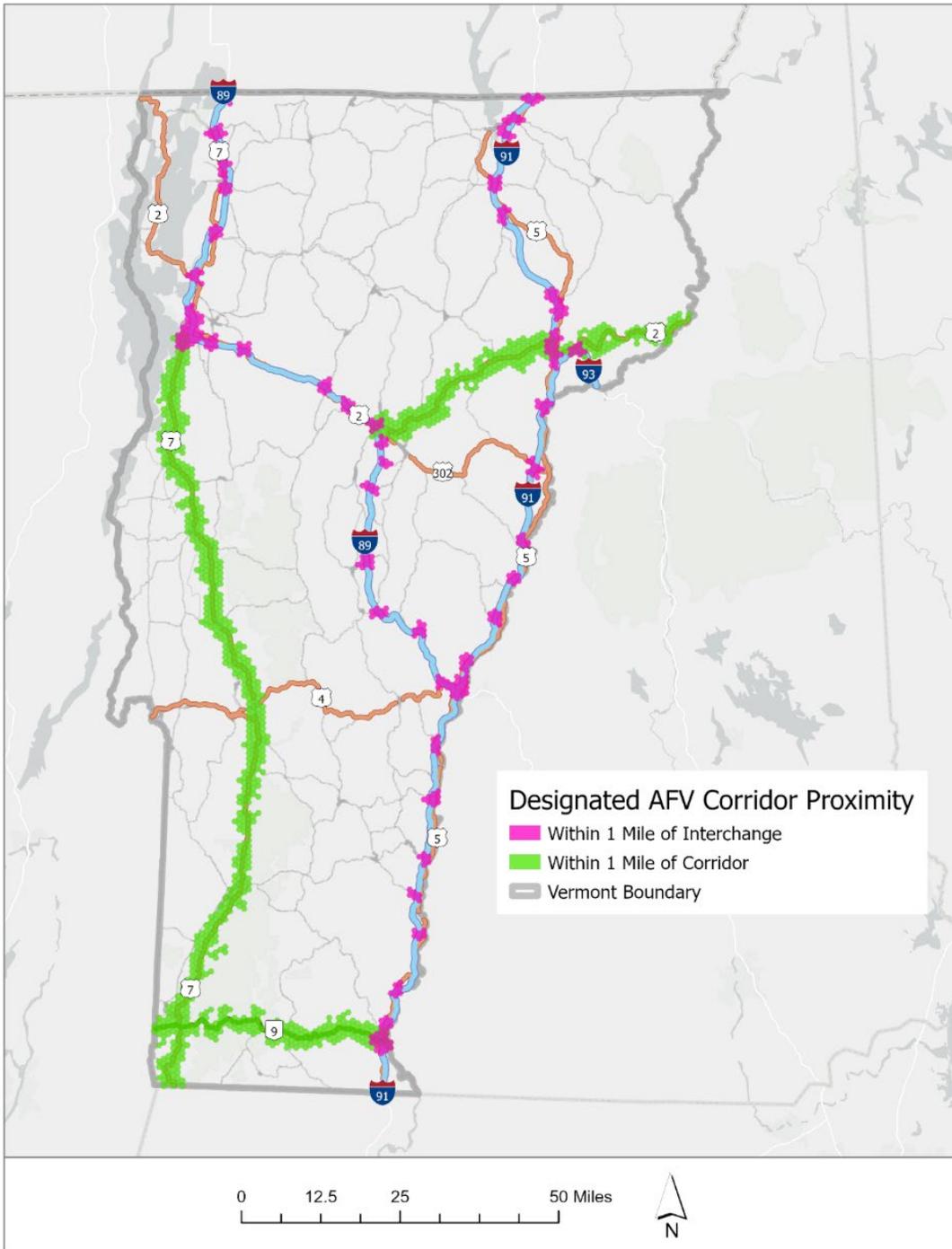
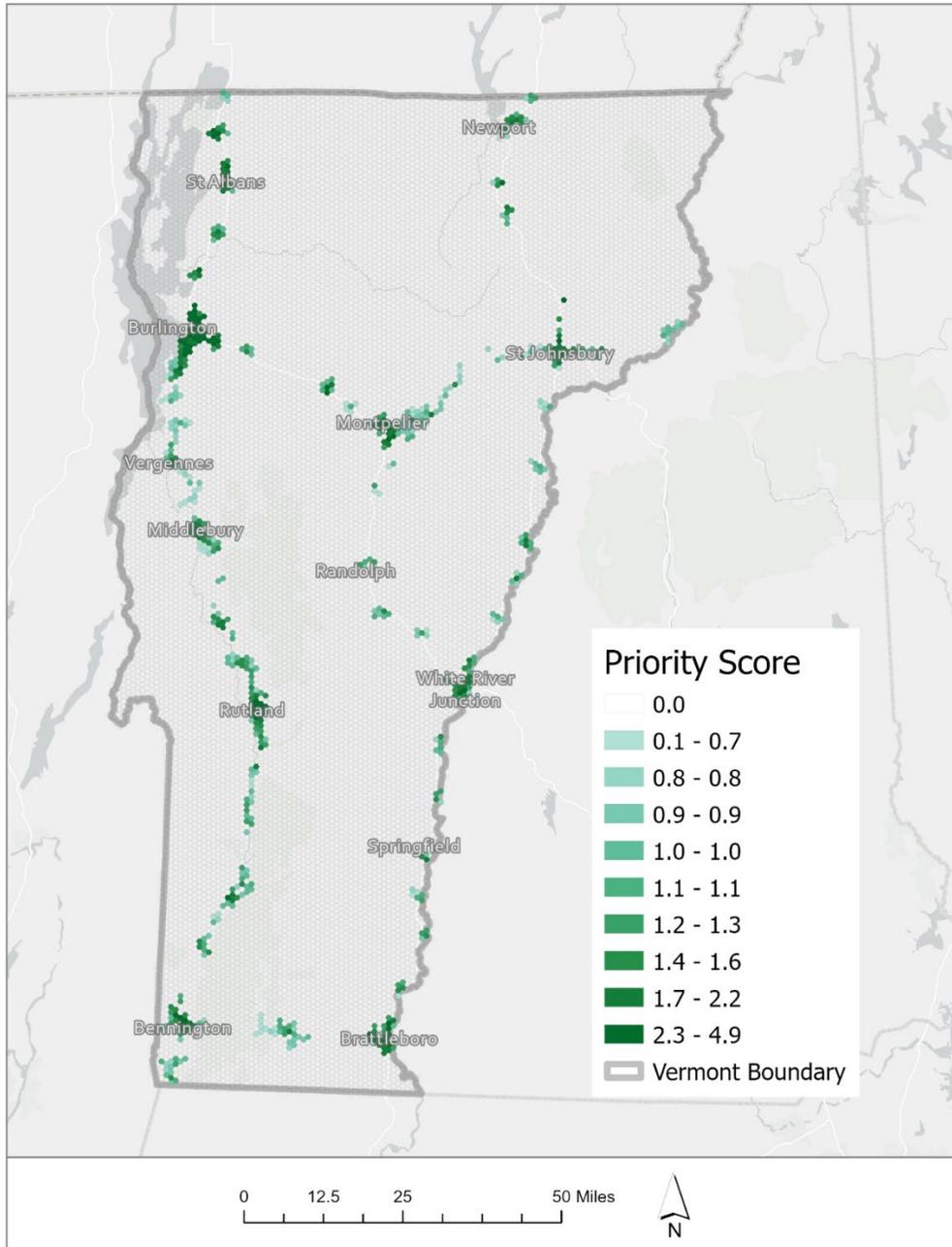


Figure 24 below summarizes the prioritization results for this initial EV charging deployment plan. The prioritization was limited to grid cells within 1 mile of corridors and offering 3-phase power as shown in Figure 23 and Figure 17. Additional prioritization factors were then normalized and combined to arrive at a single composite score. This prioritization was used to inform the plan recommendations in the following section and will be refined in future EV planning efforts as Vermont’s corridors are built-out to the federally-required standards and the State gains greater flexibility on charging investments.

Figure 24. Initial EV Charging Location Prioritization Score



NEVI Location Recommendations

Figure 25 on the following page shows 15 areas prioritized for NEVI investments in FY2022 where a minimum of 4 ports of 150kW fast charging are proposed to be sited. Once complete, charging should be available within 50 miles along all of Vermont’s designated corridors. These areas were selected based on the potential to serve a corridor by upgrading an existing location or one under State contract for construction. Additional areas were selected based on the geographic analysis factors described above.

Identifying willing site hosts in these areas may present challenges. As the state moves forward, minor changes in the location may be necessary. The State will strive to meet all NEVI minimum requirements, but if challenges exist serving a particular location or if more than one corridor may be served by a single location with a minor deviation from the minimum requirements then the State may seek exceptions to the NEVI requirements. The State of Vermont encourages FHWA to consider allowing more flexibility on this particular rule upfront.

Funding amounts will be refined as the State works with partners to identify appropriate funding packages, potentially leveraging additional state and private funding sources.

2022 Infrastructure Deployments/Upgrades

Table 9. FY2022 NEVI Priority Locations

State EV Charging Location Map ID	Route(s)	Location	Anticipated EV Network	Utility Territory	Status
1	I-89	St Albans	TBD	Green Mountain Power	To be constructed
2	I-89 / US 7	S Burlington	TBD	Green Mountain Power	To be constructed
3	I-89 / US 2	Berlin	TBD	Green Mountain Power	To be constructed
4	I-89	Randolph	Blink	Green Mountain Power	Potential exception for contracted installation
5	I-89 / I-91	White River Jct	TBD	Green Mountain Power	To be constructed
6	I-91	Derby	Blink	VT Electric Coop	Potential upgrade of current installation
7	I-91 / US 2	St Johnsbury	Blink	Green Mountain Power	Potential upgrade of current installation
8	I-91	Bradford	TBD	Green Mountain Power	To be constructed
9	I-91	Springfield	Blink	Green Mountain Power	Potential upgrade of current installation
10	I-91 / VT 9	Brattleboro	TBD	Green Mountain Power	To be constructed
11	US 7	Middlebury	TBD	Green Mountain Power	To be constructed
12	US 7	Rutland	Blink	Green Mountain Power	Potential upgrade of current installation
13	US 7	Manchester	TBD	Green Mountain Power	To be constructed
14	US 7 / VT 9	Bennington	TBD	Green Mountain Power	To be constructed
15	VT 9	Wilmington	TBD	Green Mountain Power	To be constructed

Figure 25. Vermont NEVI Priority Areas

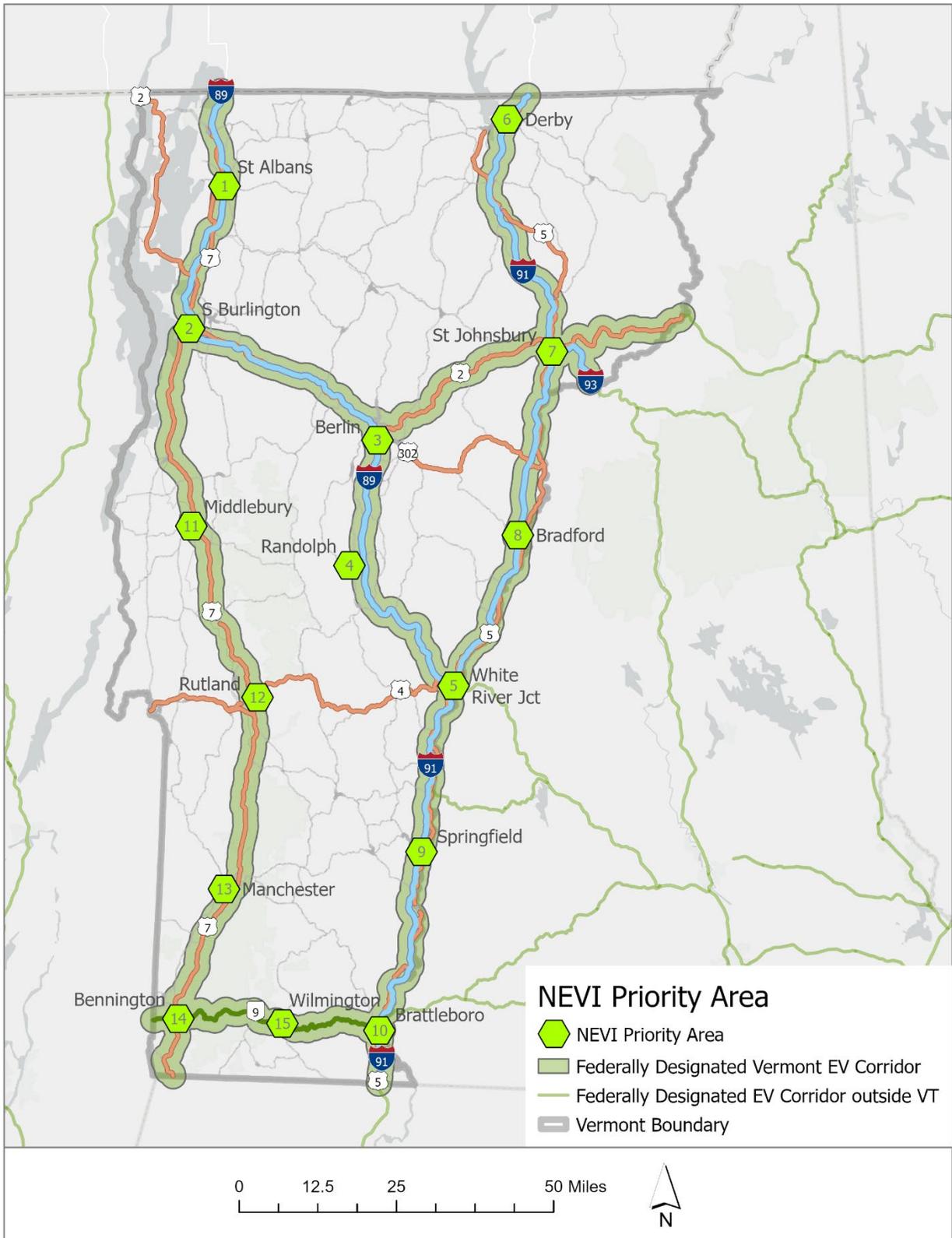


Table 10. Designated Corridor Distances

Corridor	Corridor Mile	Distance from Previous	Location ID	Location	Potential Location Distance to Corridor
I-89	0	0		<i>Vermont – Quebec Border</i>	
	17	17	1	St Albans	< 1 Mile
	42	25	2	S Burlington	< 1 Mile
	80	38	3	Berlin	< 1 Mile
	100	20	4	Randolph	3 Miles
	130	30	5	White River Jct	< 1 Mile
	131	1		<i>Vermont – NH Border</i>	
I-91	0	0		<i>Vermont – Quebec Border</i>	
	5	5	6	Derby	< 1 Mile
	49	44	7	St Johnsbury	< 1 Mile
	80	31	8	Bradford	< 1 Mile
	107	27	5	White River Jct	< 1 Mile
	136	29	9	Springfield	< 1 Mile
	169	33	10	Brattleboro	< 1 Mile
	178	9		<i>Vermont – MA Border</i>	
I-93	0	0		<i>Starting junction with I-91</i>	
	0	0	7	St Johnsbury	< 3 Miles
	11	11		<i>Vermont – NH Border</i>	
US 2	0	0		<i>Vermont – NH Border</i>	
	24	24	7	St Johnsbury	< 1 Mile
	62	38	3	Berlin / Montpelier <i>Corridor End</i>	5 Miles
US 7	0	0		<i>1-189 Ramp</i>	
	0	0	2	South Burlington	4 Miles
	33	33	11	Middlebury	< 1 Mile
	65	32	12	Rutland	1 Mile
	97	32	13	Manchester	1 Mile
	120	23	14	Bennington	< 1 Mile
	131	11		<i>Vermont – MA Border</i>	
VT 9	0	0		<i>I-91 Interchange</i>	
	0	0	10	Brattleboro	< 1 Mile
	18	18	15	Wilmington	< 1 Mile
	39	21	14	Bennington	< 1 Mile
	43	4		<i>Vermont – NY Border</i>	

FY23-26 Infrastructure Deployments

Vermont’s ability to obtain “fully built-out” status for its corridor network within the first year of implementation is now less certain than at the start of the state’s NEVI planning, given that initial state cost estimates were based on prior rounds of funding for DCFC, did not fully account for rising inflation, increased demand amid a limited supply of equipment and workers to install it, and the likely need for operating and maintenance assistance for many of the locations with more challenging business cases. These uncertainties around price make it difficult to project when the initial list of site locations will be built, and how far the remaining NEVI funding might be stretched to meet state goals beyond NEVI requirements.

Moreover, all states are still awaiting guidance on when corridors will be certified as “built-out”—with possibilities ranging from the point at which contracts are signed to the point at which the NEVI-compliant DCFC stations are energized and listed with the Alternative Fuels Data Center. Nor is it clear yet from federal guidance what sort of flexibility—around power levels, minimum ports per location, various use cases, etc.—will follow the certification of built-out corridors, if indeed that were to happen before the end of the NEVI program. As discussed earlier in the plan’s sections on Public Engagement and Equity, while public comments and feedback have informed all aspects of this plan, it is expected that greatest opportunity for public input to shape Vermont’s EV charging landscape is through a deeper engagement over the next year and beyond to determine collective priorities post-certification of Vermont’s fast-charging corridors. Through its most recent transportation bill, Vermont has set even more aggressive goals for its fast-charging (Level 3) corridors: at least one DCFC station within one mile of every exit along the interstates (89, 91, 93), as well as a DCFC station within 25 miles of the next throughout the state highway system. Future NEVI engagements (in FFY23-26) may help to identify additional locations to fund within this framework, or they may point to a wholly new or different set of priorities and goals by which to evaluate potential site locations and configurations.

In any case, Vermont’s prioritization analyses will need to be updated continually, based upon state Environmental Justice rules and tools currently under development, and as other factors such as EV adoption rates change. Deployment in future years will be guided by NEVI program requirements, public input and legislative goals, funding availability through overlapping state or federal sources (state transportation fund or the Carbon Reduction Program, for example), but also by evaluating the effectiveness of NEVI and similar investments to help achieve the greenhouse gas emissions reductions targets set by the Biden administration and required by Vermont’s Global Warming Solutions Act.