

Brookfield Town Plan

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I. Introduction

A. Authorization and Purpose

The Town of Brookfield is authorized to develop a town plan by 24 V.S.A. Chapter 117. The purpose of this plan is to encourage the appropriate development of the land in Brookfield in a manner that will promote the health, safety, prosperity, comfort, convenience and general welfare of all residents in the town. As conditions change, this plan will be modified to meet new needs. The Planning Commission is responsible for revising the Plan a minimum of every eight years. Once revised and required public hearings are held, the new Plan is adopted by majority vote of the Selectboard.

The plan attempts to express the intent and desires of the town's residents and is designed to serve as a guide for future growth and development in the town. The plan contains general and philosophical statements on the desired future development and growth of the town and specific policies and directives. This Plan should guide the interpretation of the town's bylaws and ordinances. Although the plan may serve as a guide for future public activities or investments, any significant expenditure of town funds will continue to be determined by the voters of the town.

B. General Philosophy and Objectives

The basic philosophy underlying this plan is that the attainment of the town's planning objectives should be achieved with a minimum of regulation. Any necessary regulation should balance public needs and desires with the rights of property owners and reflect purposes that are clearly in the public interest. It is also a basic premise underlying this plan that the future growth and development of the town should be guided so that it does not impose undue financial burdens on the taxpayers.

Among the primary objectives of this plan are the following:

1. To promote a safe, healthy, and pleasant environment. In doing so, the plan considers the following:
 - a. Allow for housing that meets the needs of the diversity of residents, with a focus on affordable housing.
 - b. Public health, safety, and environmental issues, including water resources, sewage and solid waste disposal.
 - c. Maintenance of a sustainable, high quality school system.
 - d. Transportation needs.
 - e. Development of public recreational facilities.

- f. Promote an economic environment conducive to the conduct of home occupations and clean small-scale businesses.
 - g. Conservation of significant natural areas and water resources.
2. To preserve the town's rural character and conserve the town's natural, historic, scenic and cultural resources. In doing so, the plan considers the following:
- a. Agricultural and forest lands, wetlands, wildlife habitat and other sensitive natural areas, large forest blocks, wildlife connectivity zones, rare and uncommon natural communities, and rare, threatened and endangered species.
 - b. The effective management of forests and woodlots.
 - c. Historic sites and areas.
 - d. Scenic roads, ridgelines and vistas.

In addition to these broad objectives, the plan enumerates specific goals in some of the succeeding sections.

C. Description of Town

Brookfield was chartered in 1791. It is a predominantly rural and agricultural community of 24,472 acres located on the central west border of Orange County. Over 1,000 acres are publicly owned conservation and recreation lands including: state forests and parks – 825 acres; state fish and wildlife areas – 57 acres; and town forest and town-owned wetlands – 168 acres. The town's topography is quite typical of the area east of the Green Mountains. It ranges from hills up to about 1800 feet elevation on the easterly border of the town through brook valleys slightly below 700 feet elevation, to Bear Hill, the town's highest point, on the west at just over 2100 feet. Brookfield is located at the top of the watershed for a portion of the White River watershed and a portion of the Winooski River watershed. Ayers Brook and its tributaries and upper Sunny Brook are the major streams in the western part of the town. The Second Branch of the White River drains the eastern valley. Five ponds are designated as state waters because they are over 25 acres in size: Sunset Lake and Baker, Lamson, North and Rood Ponds. In addition to approximately 6 miles of I-89, Brookfield has 17.42 miles of state highway (Routes 12, 14, and 65) and 75.3 miles of town roads: Class II – 19.18 miles, Class III – 38.96 miles, and Class IV – 17.17 miles. A portion of Pond Village is designated a state historic district with smaller historic districts located around the churches in East and West Brookfield.

D. Historic Development

Settled in 1779, Brookfield has four relatively intact 19th century villages: Pond Village, Brookfield Center, East Brookfield, and West Brookfield. Although some of the early structures are gone, few new buildings have been constructed in these villages during the past one hundred years. In addition to the residences and churches that currently exist, at one time these villages were the site of many businesses and industries, including sawmills, grist mills, stores, blacksmiths, creameries, cheese factories and other manufacturers. The stonework from several

of the old mill sites remains intact. The Vermont Division of Historic Preservation has listed Pond Village, East Brookfield Village, and West Brookfield Village as state-significant historic districts. Pond Village is also listed on the National Register of Historic Places.

Many historic structures and buildings survive in Brookfield, including three churches, several former one-room schoolhouses, homes, barns, and silos. The Vermont Division of Historic Preservation's Historic Sites and Structures Survey includes 98 sites in Brookfield. Noteworthy historic structures include the following:

- The Floating Bridge, Brookfield's chief tourist attraction, was first built in 1820 across Sunset Lake (then Colt's Pond). The bridge was completely rebuilt in 2015 and is one of the only remaining pontoon bridges in the East.
- The Marvin Newton House, located in Brookfield Center, is owned and operated as a museum by Brookfield Historical Society. The house was built in 1835 and is an example of federal style architecture. It is listed on the National Register of Historic Places.
- The Ebenezer Stratton Tavern, a private home on East Street built in the 1780s, is listed on the National Register.
- The Old Town Hall in Pond Village, now owned by the Brookfield Community Partnership, was built in 1850, and added to in 1902; it is considered historically significant by the state.
- The Fork Shop in Pond Village, now a private residence, was erected in 1866, and was once the finishing plant and shipping office of the Peck and Clark Company's fork factory, which manufactured farm implements. On its south side is the dam on Sunset Lake which provided water power for this and other early industries.
- The First Congregational Church in Pond Village was built in 1846 and is still used regularly for services.
- The West Brookfield Community Church was built in 1840 and has changed little. It has no central heating, plumbing, or electricity and still has a horse and carriage shed next to the church.
- The East Brookfield Church was built in the late 1800s and is still used regularly for services.

Brookfield has five cemeteries with gravestones dating from the early 1800s. Cemeteries are located in Brookfield Center (two locations), East Brookfield, East Hill, and West Brookfield.

Potential sites for archaeological research in Brookfield include areas of old cellar holes and foundations, particularly those in the vicinity of Brookfield Center and Sunset Lake. Scuba divers have found many artifacts from Brookfield's early settlement in the thick layers of mud on the lake bottom. A student project overseen by an archaeologist found some artifacts at the site of the Old Town Hall from its use as a Masonic Hall.

Goal

1. To protect the historic character of Brookfield.
2. To preserve important and irreplaceable historic structures, sites, and districts, and the important archaeological sites and archaeologically sensitive areas.

Policy

1. Protect the historic character of Brookfield's landscape.

E. Status of Planning

Planning by an appointed commission began in 1969, and a temporary plan was adopted in 1970. The first comprehensive town plan was adopted by the Selectboard in 1974. The Plan has been revised as required, with the last Plan update being adopted in 2016.

1. Subdivision Regulations were adopted in 1970, and have been amended five times in 1977, 1980, 1999, 2003 and 2005.
2. Interim Zoning was in effect in 1978-80.
3. Flood Hazard Area Zoning was adopted in 1978 and substantially amended in 2006 to allow participation in the national flood insurance program.
4. Shorelands Zoning was adopted in 1980.
5. A Sewage Ordinance was adopted in 1986 and amended in 1991. It is no longer in effect.
6. The Selectboard has adopted an ordinance regulating parking on town highways during the winter months.
7. In 1990 the town adopted the Brookfield Development Bylaw and amended it in 1999, 2003, 2005, and 2010.

II. Demographics

A. Population

Between 1970 and 1980 the town’s population grew from 606 to 969, by 1990 the population had risen to 1,089 and by 2000 the census recorded a population of 1,149. In 2010, when much of Vermont reflected a decline in population growth, Brookfield’s population continued to rise, reaching 1,292 residents. Over the last decade, the population has declined slightly. In 2020, there were 1,244 residents in Brookfield. Population projections assume that conditions that occurred in the past will continue into the future. As such, they can be influenced by externalities that are not predicted for, such as changing economic conditions that result in shifts in national (internal) migration. For instance, the nationwide recession which began in 2008 resulted in a slowing of population growth in Vermont that was counter to projections.

Table 1: Population of Brookfield and Surrounding Areas, 2010 -2020

	2010	2020	Percent Change
Braintree	1,246	1,207	-3.2%
Brookfield	1,292	1,244	-3.7%
Chelsea	1,238	1,233	-0.4%
Randolph	4,778	4,774	-0.1%
Williamstown	3,389	3,513	3.5%
Orange County	28,936	29,277	1.2%
Windsor County	59,634	57,753	-3.3%
Vermont	625,741	643,077	2.7%

Source: US Decennial Census DP1 “Profile of General Population and Housing Characteristics”, 2020

For more information on Brookfield’s population and demographics, go to:
<http://www.trorc.org/towns/brookfield/>

In 2013, the Vermont Agency of Commerce and Community Development released new population projections which included two scenarios, one based on a strong economy (Scenario A) and the other based on a weak economy (Scenario B). With the exception of the neighboring community of Williamstown, Brookfield is the only town among its neighbors that is projected to see continued population growth in both scenarios.

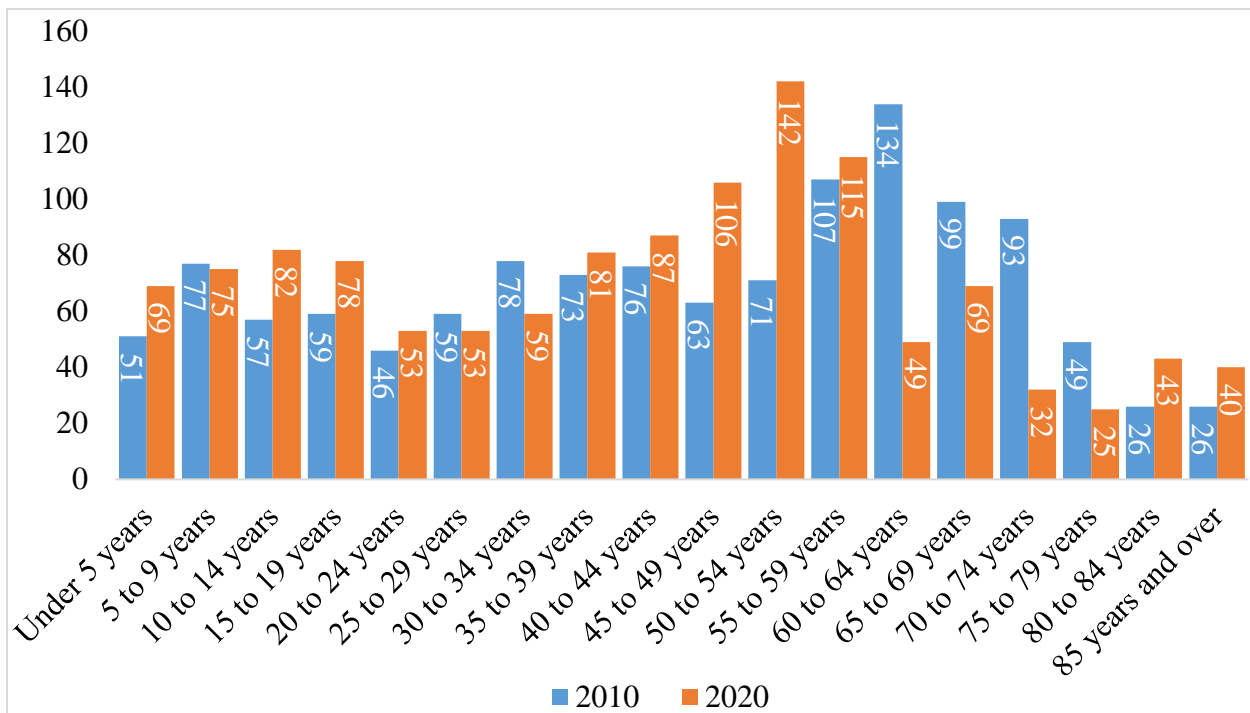
Table 2: Strong Economy and Weak Economy Comparison

2020 Population		Scenario A Strong Economy		Scenario B Weak Economy	
		2020	2030	2020	2030
Braintree	1,207	1,273	1,277	1,236	1,209
Brookfield	1,244	1,363	1,395	1,323	1,320
Chelsea	1,233	1,252	1,245	1,215	1,178
Randolph	4,774	4,745	4,666	4,606	4,413
Williamstown	3,513	3,575	3,658	3,472	3,463
Orange County	29,277	29,813	30,056	28,946	28,443
Windsor County	57,753	61,186	62,372	55,788	54,395
Vermont	643,077	653,575	670,073	628,688	620,480

Source: Vermont Agency of Commerce and Community Development
 “Vermont Population Projections 2010 – 2030”

Between 2010 and 2020, Brookfield saw a 4.3% decrease in the number of residents aged 45 and up. At the same time, Brookfield saw a 50% increase in the number of residents aged 50 to 54. This was the largest age cohort in Brookfield in 2020, and likely a result of in-migration. While there was an overall decrease in the percentage of residents aged 45 and up, Brookfield’s median age actually increased by 6.6% from 45.6 to 48.8 from 2010 to 2020.

Figure 1: Brookfield Population by Age Group, 2010 and 2020



Source(s): American Community Survey S0101 “Age and Sex”, 2010
 American Community Survey S0101 “Age and Sex”, 2020

III. Land Use

A. Introduction

In terms of planning, one of the most complex discussions is about how land will be used in the future. How a town uses its land and plans for future land development can affect a wide range of issues including the town's character and its ability to provide services adequately and at a reasonable price. In order to ensure that the impacts of future development in Brookfield does not have unintended consequences, the town's growth must be managed to reflect the vision of this plan.

This section discusses both current and future land use patterns and provides goals, policies and recommendations for future implementation. Vermont law requires a town's land use regulations, such as zoning, subdivision and site plan review, to conform with this plan and the statutory planning goals, stating:

A municipality that has adopted a plan through its bylaws may define and regulate land development in any manner that the municipality establishes in its bylaws, provided those bylaws are in conformance with the plan and are adopted for the purposes set forth in section 4302 of this title. [24 V.S.A. § 4410]

The Plan is designed to be used by Brookfield's decision makers to guide growth to the most appropriate locations. The citizens of Brookfield have both a need and a right to review and assess proposed development, and to regulate new building to ensure appropriate location and that too rapid expansion of Brookfield does not unreasonably and adversely affect the rural and scenic quality of the town or its ability to pay for the services that increased development requires.

It is the intent of this Plan to provide for the maintenance of the high quality of life in Brookfield by protecting the rural and scenic quality of the town through the appropriate use of land for residential, agricultural, forestry, recreational and small business use. Future development within Brookfield should be guided by and related to the existing settlement patterns and the citizens' desires to maintain the rural and scenic quality of the town, as well as by natural environmental constraints, and the ability of the taxpayers and the land to support the proposed growth.

B. General Goals, Policies and Recommendations

The overall land use goals for Brookfield are listed below:

- Promote the economic and cultural viability of Brookfield's Village Centers;
- Conserve the natural environment by protection, management and judicious use of natural resources;
- Protect the character of rural areas and their natural resources by avoiding incompatible land uses;

- Channel public investments into existing or planned settlement areas to avoid sprawl; and
- Protect wetlands, water resources and aquifers from development.

The following policies apply to all lands in Brookfield:

- Site and design development:
 - To maintain the current mix of lot sizes and building setbacks from the road.
 - To complement and be consistent with the town’s existing settlement pattern and historic and rural character.
 - Not to create a suburban aspect to the town.
- Use vegetation and existing topography to reduce the intrusiveness of large structures.
- Use screening to reduce the visual impacts of commercial uses and major subdivisions as seen from public roads and neighboring properties in accordance with the following:
 - Make the maximum use possible of preexisting vegetation, structures, and topographical features that screen the project.
 - Assure the continuity of this preexisting screening through site control or agreements with relevant property owners.
 - If preexisting screening is lost during the life of the project (e.g., cutting of vegetation that screens from a public road), review the ensuing visual impact and install new screening to mitigate that impact.
 - Install screening such as vegetation or topographic features to distract the viewer from the project and break up the view of the project.
 - Do not install “solid wall” screening such as a line of arborvitae.
 - Choose parcels whose size is sufficient for both the project and the installation of screening.
 - When installing vegetative screening, choose a diversity of native species and mix coniferous and deciduous plantings.
- Maintain or improve the agricultural and forestry base in the town.
- Site new housing on existing town roads that currently have electric utility service.
- Do not convert Class 4 roads to Class 3 roads unless there are significant advantages to the town.
- Limit the length of driveways to minimize forest fragmentation.
- Minimize the adverse effects of forest fragmentation by careful placement of structures and limiting forest clearing and driveway length, or establishing setbacks.
- Keep the best agricultural soils (prime land and land of statewide importance) available for long-term agriculture use.

- Design and review the extraction of earth resources to minimize impacts, assure restoration of the land following extraction, and ensure conformance with the policies of this plan.
- Maintain the small scale, “in-home” aspect of the town’s non-farm commercial base.
- Do not site commercial strip development in the town.
- Protect sensitive ecological areas such as steep slopes, wetlands, deer wintering areas, and rare species sites.

The following are general recommendations for town action related to land use:

- Maintain the highest quality water resources with a specific goal of not having to provide public infrastructure to provide clean water in the town.
- Encourage the maintenance and improvement of public and private lands in the town for recreational use, including the use of Class 4 roads as trails.
- Encourage the creation of appropriate greenbelts in the subdivision process or through other methods by reserving undeveloped portions of land that serve as corridors to connect larger and coherent blocks of undeveloped land.
- Encourage landowners voluntarily to conserve their farm and forest lands through donation and sale of development rights to qualified non-profit land trusts.
- Provide an environment where people can maintain domestic animals.
- Provide an environment where people can conduct home-based businesses and small commercial enterprises.
- Encourage the creation of public recreational land.
- Encourage and improve appropriate recreational fields and facilities at the school for public use.
- Consider the implementation of zoning districts or other bylaw amendments that would allow for continued growth but would encourage the clustering of homes in and around “town centers” and protect open space in outlying districts. These could permit smaller lot sizes in zones around “town centers” and larger lot sizes in outlying districts. Maintaining the rural aspect of the town should be encouraged.

C. Current Land Use

Land use in Brookfield is still largely rural, with a strong agricultural presence and a large proportion of the town currently in forested tracts. The town also has a strong residential component since Brookfield serves as a bedroom community for the nearby employment centers of Randolph, Bethel, Northfield, Montpelier, Barre and Waterbury. Another important use of land in Brookfield is either as nonresident second homes or nonresident land investment. Roughly 53% of the homes and land parcels in Brookfield are owned by nonresidents.

Land use regulations in Brookfield are an overlapping mix of various bylaws passed between 1970 and 2010. These regulations include:

- The Development Bylaw regulates land use in Brookfield.
- Subdivision regulations provide for the orderly review of subdivisions creating lots.
- Flood hazard regulations meet federal guidelines limiting construction of buildings in a flood hazard area. They affect about 730 acres in Brookfield.
- The shoreland regulations require a 75-foot setback from ponds and lakes over 20 acres in size in Brookfield.

Almost the entire town, with the exception of the areas within the villages and a conservation district, has a 5-acre minimum lot size. Wetlands on the National Wetlands Inventory map or otherwise deemed to be Class 1 or Class 2 by the state of Vermont (865 acres) and areas of steep slopes over 25% (3,227 acres) are deemed undevelopable with structures. There is also a 75-foot setback for buildings near any wetlands or stream. These regulations provide acres of green space in the town, mostly in the form of narrow corridors along watercourses and on high elevation land. Commercial uses are permitted throughout the town, but only after they have received a conditional use permit from the Board of Adjustment. Junkyards, including salvage yards, are prohibited in the town. The Bylaw allows the use of clustering to encourage the protection of additional open space in the town.

In 2019, Brookfield rejoined the Village Center Designation program for Pond Village. Pond Village was previously enrolled in the program. In addition, Brookfield will pursue a Village Center Designation for Brookfield Center. The program provides the Town of Brookfield and its businesses with tax credits and financial assistance that incentivizes new development, historic preservation, and code improvements within the designated village center. The program also gives the village center priority consideration for a number of state grants. For Brookfield, pursuing new Village Center Designations and maintaining its existing designations furthers the goals of this plan by encouraging growth and redevelopment within the town’s compact, mixed-use village areas. These village areas are most suitable for redevelopment and growth.

D. Future Land Use

Map 2 (see Appendix B) attached to this plan is the future land use map, showing the town’s land use areas. These areas are designed to meet the overall goals and policies of this plan stated in Section B, above. Each of these areas is subject to the specific policies identified in the immediately following section and in other sections.

Land Use Districts

Village Areas

There will be three Village Areas in Brookfield: Brookfield Center, Pond Village, and East Brookfield. The purpose of the Village Areas is to provide for a higher density of activity, including:

- residential and

- business uses, that serve
 - the immediate community within these centers
 - as a focal point for the social and economic life of surrounding rural areas and
 - to preserve the historic significance of existing landmarks.

Density should vary based on the existing scale of development in each village and on the proximity to the core of the village (density decreases as you move farther from the core). Pond Village’s core represents the highest density at roughly ½ acre lot size, decreasing to one acre as the overall density decreases. East Brookfield, which is less dense than Pond Village, maintains a density of roughly three acres per lot.

This plan encourages new development in Brookfield primarily within the village districts, particularly development that is commercial. This Plan recognizes the benefits of increased density in village areas, and/or add a new village district of Brookfield Center.

Goal

1. To provide a location for high density mixed use development of a character and scale that is compatible with Brookfield’s villages.

Policies

1. Single and multi-unit residential, appropriately scaled commercial (including primary retail) and civic or governmental uses are appropriate in Brookfield’s Village Areas.
2. New development and road construction or reconstruction in the village areas must preserve and provide pedestrian access.
3. Maintain and encourage small scale commercial use.
4. Locate any proposed commercial development adjacent to existing villages or hamlets.
5. No industrial uses are planned or encouraged.
6. Size, site, and screen new commercial uses so as to be compatible with the character and residential use found throughout the town.

Recommendation

1. Because of topographic, geographic, and infrastructure constraints in the area of Pond Village, Brookfield’s Zoning Bylaw should continue to include the extended village district along Stone Road which provides a location immediately adjacent to Pond Village into which the existing village area of higher density uses may be expanded in a reasonable manner.

Agricultural – Residential District

The purpose of the agricultural/residential area is:

- to promote, encourage, and protect farming of all kinds as an important part of the town’s economic base and social character;
- to maintain and conserve agricultural lands and lands with potential for agricultural use; and
- to provide areas for residence at a density consistent with the capacity of the soil and topography to furnish potable water supply and accommodate a private waste disposal system for such residences.

The area consists of all the land in the town that is not included in any one of the previously listed Areas (Village Area, Conservation Area, Scenic Protection Area, or Public Lands Area). Conformance with this plan requires that development be at a density of one unit per five or more acres, with the character, scale and density of any commercial uses consistent with the average residential use in the district. Uses in this area may include single-unit residential, home occupations, outdoor recreational facilities, small-scale commercial (not including primary retail), and appropriately managed forestry. In addition, small-scale light industrial may be included if compatible with the purpose and character of the area.

Goal

1. To maintain and conserve Brookfield’s working landscape and the rural character of the community.

Policies

1. Appropriate uses in this area include agriculture and appropriately managed forestry, single-unit residential, home occupations, outdoor recreation, small scale commercial and small –scale light industrial compatible with the purpose and character of the area.
2. Commercial or light industrial development may not have an adverse effect on roads or the character of the area in which it is located.
3. Primary retail development is not appropriate for this area.

Forest Block District

The purpose of the Forest Block District is to protect natural resources on lands that are mostly undeveloped or lack direct access to public highways, are important for forest blocks, wildlife habitat, and habitat connectors, or have a physical characteristic such as wetlands or slopes of 25% or greater. Development in this area will have a low density. Appropriate uses in this area include outdoor recreation, maple sugaring and forestry (with a plan approved by the Town Forester or County Forester and in conformance with the State’s accepted management practices for logging), single-unit dwellings, and camps.

Goal

1. To protect natural resources, wildlife habitat, forest blocks, and wildlife connectors in areas of Brookfield that are essentially undeveloped.

Policy

1. Appropriate uses for this area are outdoor recreational activities, appropriately managed forestry, single-unit homes, and camps. Commercial or industrial development is not appropriate in this area.

Public Lands Area

The purpose of this district is to permit appropriate public uses on the large tracts of publicly owned land in Brookfield. This district consists of Ainsworth State Park, Allis State Park, any state-owned forest land and the Town Forest. Conformance with this plan requires that development in this Area be limited to:

- a. Camping, picnicking, hiking, hunting, skiing, other outdoor recreational activities, maple sugaring, and forestry with a plan that is approved by the Town Forester or the County Forester and in conformance with the State's accepted management practices for logging; and
- b. Structures for public recreational use that are consistent with the objectives and policies of this plan.

Goal

1. To protect public lands and maintain recreational opportunities for Brookfield residents.

Policies

1. Appropriate uses in this area are limited to public recreation and appropriately managed forestry. Limit structural development in this area to those associated with the types of facilities common at State-owned public recreational facilities.
2. Development that has an adverse impact on public recreation is not appropriate in this area.

Overlay Districts

Scenic Protection Area

The purpose of this land use area is to protect the scenic beauty and unique undeveloped character of the areas designated, which presently include the Brookfield and Williamstown Gulfs. Both gulfs include winding roads through narrow, undeveloped areas with steep slopes on either side, no commercial uses, and only a few residential uses. The Brookfield Gulf includes Allis State Park along much of the east of Route 12 and the Williamstown Gulf includes the Ainsworth State Park along much of the east side of Route 14 as well as a tributary of the White River (second branch) on the west side.

Development in these districts that has a density greater than one dwelling unit per 25 acres or the equivalent does not conform to this plan. Appropriate uses in this area include outdoor recreation, maple sugaring and forestry (with a plan approved by the Town Forester or County Forester and in conformance with the State’s accepted management practices for logging), single-unit dwellings and camps not visible from a public road.

Goal

1. To protect the scenic beauty and unique character of the Brookfield and Williamstown Gulfs.

Policy

1. Appropriate uses for this area are limited to outdoor recreational activities, appropriately managed forestry, single-unit homes and camps. Commercial or industrial development is not appropriate in this area.

Shorelands Overlay Area

The purpose of the Shorelands Overlay Area is to:

- Further the goals and policies contained in the Natural Resources chapter of this Plan
- Protect the quality of water in designated ponds and lakes in Brookfield
- Prevent undue erosion of the shorelands of those ponds and lakes, and
- Control siltation, so that these water bodies may be safe and healthy for recreation, fish, wildlife, boating, and water sports.

The area presently includes Baker Pond, Lamson Pond, North Pond, Rood Pond, Sunset Lake, and any water body in Brookfield determined by the ANR to cover at least 20 acres. See the [ANR website](#) for more information about the State’s shoreland permitting.

Goal

1. To protect the quality of water in designated lakes and ponds by limiting the potential for erosion and other damage.

Policies

1. Development located within the Shorelands Overlay area shall be set back from the water body a minimum of 75 feet.
2. The Brookfield Development Bylaw shall continue to require setbacks from wetlands, rivers, streams, and ponds.

Flood Hazard Overlay Area

Some lands adjacent to the White River as well as its tributaries are subject to periodic flooding. Floodplains and River Corridors are unsuitable for development because of the high loss potential for life and property as well as the limited ability of septic systems to perform adequately during periods of high water.

It is the purpose of this land use area to:

- Avoid and minimize the loss of life and property, the disruption of commerce, the impairment of the tax base, and the extraordinary public expenditures and demands on public services that result from flooding related inundation and erosion;
- Ensure that the selection, design, creation, and use of development in hazard areas is safe and accomplished in a manner that is consistent with public wellbeing, does not impair stream equilibrium, flood plain services, or the stream corridor;
- Manage all designated flood hazard areas.
- Make the Town of Brookfield, its citizens, and businesses eligible for federal flood insurance, federal disaster recovery funds, and hazard mitigation funds as may be available.
- To protect the environmental and recreational value of Brookfield's rivers and streams.

As of the date this Plan was adopted, Brookfield's Flood Hazard Regulations have been designed to meet the minimum standards (for more information, see Chapter XI, Flood Resilience) set by the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP). Current Flood Hazard Bylaws do not allow new development within the floodway, but do allow some development within the 100-year floodplain on issuance of a conditional use permit. Uses currently allowed with a conditional use permit include single and multi-unit residences, commercial businesses, public buildings, quarries and home occupations to name a few.

Goal

1. To protect the citizens of Brookfield and the quality of our waterways as natural and recreational resources by using sound planning practices within designated Flood Hazard Areas.

Policies

1. Allow only agriculture, recreational and open space uses in floodplains.
2. Do not site new development within the 100-year floodplain except properly designed accessory structures and renovations that meet the requirements for flood hazard regulation as stipulated by the Federal Emergency Management Agency.

Recommendations

1. The Planning Commission should regularly review the flood hazard bylaw to ensure that it remains up-to-date with the requirements of FEMA and the NFIP.
2. The Planning Commission should examine additional protections for the Flood Hazard Area, and areas outside the FHA, such as river corridors, that are prone to flooding or flood damage. These should be incorporated into the Brookfield Flood Hazard bylaw.
3. The Planning Commission should revise the flood hazard bylaw to prohibit new development within the floodplain except properly designed outbuildings and renovations that meet the requirements for flood hazard regulation as stipulated by the Federal Emergency Management Agency.
4. The town should work with watershed organizations and river scientists to reduce flooding, for example by the addition of woody debris in appropriate stream reaches and ecological management of beaver habitat.

Wildlife Corridor Overlay Area

Forested lands in the northern part of Brookfield, abutting other forested lands in the neighboring town of Williamstown are considered by Vermont Fish and Wildlife Department biologists as an important east-west wildlife travel corridor. These lands should receive protection from overdevelopment that would serve to protect wide-ranging species, such as large mammals that utilize this area in order to travel to find food, habitat or mating. This wildlife corridor is located near the most viable crossing of the Interstate at the Northfield Road underpass.

Goal

1. To allow for connectivity between wildlife populations and promote animal health and genetic diversity.

Policies

1. Create a Wildlife Overlay Zone for the northern portion of Brookfield in the Zoning Bylaw.

Recommendations

1. Minimize the adverse effects from the fragmentation of wildlife corridors by limiting forest clearing and driveway length, or by establishing maximum setbacks.
2. Consider reducing development density within the Wildlife Overlay Zone to avoid fragmentation of wildlife corridors.

IV. Economic Development

A. Local Economy

Brookfield is no longer the self-sufficient agricultural community it was a hundred years ago. The advance of the automobiles, technological age of computers, telecommunications and other conveniences has brought Brookfield’s once independent community into the regional economy. A significant portion of Brookfield’s labor force is employed outside of the town, as far south as Lebanon, New Hampshire and to the north in Barre, Montpelier, and Waterbury. A growing portion of Brookfield’s labor force is working remotely.

Table 3: Residential Employment by Field, 2022

Residents’ Field of Employment	Total
Educational services, health care, and social assistance	209
Agriculture, forestry, fishing and hunting, and mining	136
Retail trade	104
Manufacturing	94
Professional, scientific, management, and administrative and waste management	62
Construction	60
Public administration	51
Arts, entertainment, recreation, and accommodation and food services	42
Finance and insurance, real estate and rental leasing	20
Wholesale trade	17
Information	17
Other services, except public administration	15
Transportation and warehousing, and utilities	14

Source: American Community Survey DP03 “Selected Economic Characteristics”, 2022

In 2022, a plurality of Brookfield’s employed residents (24.9%) worked in educational, health care and social assistance service industries. These types of occupations, by and large, are available outside of the community.

Table 4: Local Establishments & Employees

	Number of Local Establishments	Employed by Local Establishments
2022	37	201
2021	32	207
2020	31	185
2019	33	183
2018	30	194
2017	29	171
2016	28	159
2015	26	181
2014	26	177
2013	27	164
2012	26	151

Source(s): Vermont Department of Labor “Covered Employment & Wages”, 2012 - 2022

Brookfield contains several farms, local establishments and self-employed businesspersons. According to the Vermont Department of Labor, the number of local establishments in Brookfield has risen to a high of 37 in 2022. In 2021, the number of people employed by local establishments reached a high point (207). In 2022, that figure dipped slightly to 201.

Home occupations are an important component of the non-farm commercial base.

Pond Village is considered by many to be the “town center.” Though there is no town green or commercial focal point, this area has a higher population density and the Town Municipal Building, the “Old Town Hall,” Town Library, Pond Village Church, the Floating Bridge and the associated park, and Green Trails Inn are located there. The town also has three hamlets known as West Brookfield, East Brookfield, and Brookfield Center.

The manufacture and marketing of value-added agricultural or forestry products currently exists on a small scale in Brookfield, including craftspeople, farmers who sell products grown or made principally from crops grown or livestock raised on the farm.

B. Future Economic Development

It is a policy of this plan to maintain and encourage small-scale commercial use and to encourage any proposed commercial development to locate in areas adjacent to existing villages or hamlets. No industrial uses are planned or encouraged. All new commercial uses should be adequately sized, sited, and screened so as to be compatible with the residential and agricultural uses found throughout the town.

To encourage continued economic development within Brookfield’s villages, the town rejoined the Village Center Designation program for Pond Village in 2019. Pond Village was previously enrolled in the State’s program, which is designed to help revitalize existing villages by offering commercial businesses tax credits for historic preservation and code improvements. The town is also granted priority consideration for several state grant programs. In addition, Brookfield will pursue a Village Center Designation for Brookfield Center.

The rural character of Brookfield’s community depends greatly on the continued operation and growth of agriculture and forestry operations. Outside of Brookfield’s villages and hamlets, businesses that support the manufacture of value-added agricultural and forestry products are encouraged provided that they are at a scale that is consistent with the surrounding area. On-farm diversified agricultural enterprises are also supported by this plan. In addition, remote work is encouraged.

C. Goals, Policies and Recommendations

Goal

1. A vibrant rural economy that encourages appropriately scaled small-scale businesses that are compatible with the character and environment of the community.

Policies

1. Maintain and encourage small scale commercial use including home occupations and remote work.
2. Encourage any proposed commercial development to locate in areas adjacent to existing villages or hamlets.
3. Industrial uses with the exception of light industry are discouraged.
4. Size, site and screen new commercial uses so as to be compatible with the residential and agricultural uses found throughout the town.

Village Designation Benefits

The benefits of Village Designation include:

10% Historic Tax Credits - Available as an add-on to approved Federal Historic Tax Credit projects. Eligible costs include interior and exterior improvements, code compliance, plumbing and electrical upgrades.

25% Facade Improvement Tax Credits - Eligible facade work up to \$25,000.

50% Code Improvement Tax Credits - Available for up to \$50,000 each for elevators and sprinkler systems and \$12,000 for lifts. Eligible code work includes ADA modifications, electrical or plumbing up to \$25,000.

Priority Consideration for HUD, CDBG and Municipal Planning Grants

Priority consideration for Municipal Planning Grants, Transportation Funds and funding from Vermont’s Community Development Program.

Priority Consideration by State Building and General Services (BGS)

Priority site consideration by the State Building and General Services (BGS) when leasing or constructing buildings.

5. Continue the small-scale, “in-home” aspect of the town’s non-farm commercial base. Do not site commercial strip developments in the town.

Recommendation

1. Encourage the growth and development of diversified agricultural operations and forestry operations that are environmentally sound.

Find selected economic characteristics for Brookfield (US ACS):

<http://www.trorc.org/towns/brookfield/>

For more information on the Vermont Village Center Program:

http://accd.vermont.gov/strong_communities/opportunities/revitalization/village_center

V. Housing

A. Background

Table 5, below, reveals a shift in land use over the last two decades toward more residences. Since 2015, the number of year-round residences increased by 99 or by 23%, the number of farms increased by 1 or 6%, and 1 fewer lot was classified as woodland or other property, a 6% decrease. At the present time the town is not heavily subdivided. Many of the 390 lots of ten acres or less in town are undeveloped, so the potential for growth in new houses is clearly present. There has been in the past a demand for seasonal camp lots in the town, and recently some seasonal dwellings have been converted to year-round residences.

Table 5: Land Use Change in Brookfield, 1998 - 2022

Parcels	Total Units					Actual Change	Percent Change
	1998	2008	2010	2015	2022	2015 - 2022	
Year-Round Residential	354	397	400	426	525	99	23%
Mobile Homes	61	63	62	61	51	-10	-16%
Vacation Residences	159	171	171	150	71	-79	-53%
Commercial	12	11	9	8	9	1	13%
Farms	19	16	17	16	17	1	6%
Woodland/Misc.	262	202	200	203	190	-13	-6%

Source(s) Vermont Grand List, 1998, 2008, 2010, 2015, 2022

The housing data from the 2022 American Community Survey (ACS) 5-year Estimates reported that the majority of Brookfield’s 785 housing units (643 or 81.9%) are occupied residences, while a minority were vacant (142 or 18.1%). Of these vacant housing units, the majority (116 or 81.7%) are for seasonal, recreational, or occasional use. A further 18 housing units (12.7% of all vacant housing units) are available for rent. Of these occupied housing units, the majority (543 or 84.4%) were owner-occupied, while a minority were rented (100 or 15.6%).

Rental housing represents a small portion of Brookfield’s housing stock, 118 units or 15.0% of all housing units in Brookfield. Most of these rental units were rented in 2022. In 2022, only 18 rental units, 2.3% of the community’s total housing stock, were available to rent.

During the last decade, Brookfield has seen the construction of several large residential structures scattered around town. Because of their size, and in some cases height, these structures can be prominent and potentially inconsistent with the existing character of the areas in which they are located. A specific policy of the plan is that the siting of large residential structures use vegetation and existing topography to reduce the intrusiveness of the homes and that new development in town is not unduly inconsistent with the historic and rural character of the town.

The intent of this plan is to maintain the current mix of low-density housing and viable farms and woodland along existing Class 2 and 3 roads outside the town centers and higher density

development within the villages and their immediate periphery. Another intent is to maintain a mix of permanent and seasonal residences that provide a high-quality lifestyle for all residents and nonresidents, while minimizing the cost of services. The clustering of homes to protect open space and to mimic the natural hamlet development of the town is also encouraged.

B. Housing Affordability

Data from the ACS 5-Year Estimates shows that the median household income in Brookfield (\$87,563) is higher than in Orange County (\$74,534) and Vermont (\$74,014). Median monthly costs for homeowners with a mortgage were approximately \$1,711 or \$20,532 a year. This figure is over 23% of Brookfield's yearly household income, which would indicate that housing in Brookfield is generally affordable. However, not every resident of Brookfield is able to afford their housing.

The Vermont Housing Finance Agency (VFHA) compiles housing related data for the state and each town and county in Vermont. According to VFHA, in 2018, the median price of a home in Brookfield was \$150,000. This includes single-family homes, mobile homes, and condominiums. By 2023, the median price of a home in Brookfield had risen to \$379,000, a 152.7% increase over five years. In 2023, these figures were higher than the state (\$315,000) and county (\$315,000) average for median home prices. Using the Consumer Price Index Inflation Calculator, a \$150,000 median home price in 2018 equates to about \$171,000 in 2022 dollars, a 14% increase in median price from 2018. Clearly then, inflation alone cannot account for the significant increase in median home prices in Brookfield over the last few years.

According to data from the New England Real Estate Network, in 2022 the average listing price of a home in Brookfield was \$432,000, while the average sales price was \$438,000. This is a substantial increase from 2018. In 2018, the average listing price of a home was \$190,000, and the average sales price was \$183,000. This is a 127.4% increase in average listing price and a 139.3% increase in average sales price from 2018 to 2022. Using the Consumer Price Index Inflation Calculator, an average home listing price of \$190,000 equates to about \$219,000 in 2022 dollars, a 15.3% increase. Concurrently, an average sales price of \$183,000 equates to about \$211,000 in 2022 dollars, a 15.3% increase.

According to the ACS 5-Year Estimates, the median value of mortgages for housing units that have a mortgage was \$278,000 in 2022. In 2018, this figure was \$233,500. This represents a 19.1% increase from 2018.

In addition, monthly rent has also increased over the last few years in Brookfield. In 2022, the median gross rent in Brookfield was \$1,083. This is an increase from 2018 of \$157, or 17%.

C. Housing Needs

A household that spends more than 30% of their income for monthly housing expenses is considered "cost burdened," according to standards set by the US Department of Housing and Urban Development. For homeowners, housing costs include payments for principal and interest on mortgage, taxes, etc. For renters, housing costs include rent and utilities.

According to ACS 5-Year Estimates data, 128 individuals or 8.8% of Brookfield’s population lived below the poverty line in 2022. Furthermore, 35 individuals, or 2.4% of Brookfield’s population, earned incomes below 50% of the poverty line in 2022.

According to 2022 ACS 5-Year Estimates data, 25 renter households, or 25% of all renter households, were cost burdened in Brookfield. Of these renter households, 14, or 14%, were severely cost burdened (spending more than 50% of their income on housing). Of the 543 owner-occupied housing units in Brookfield, 111, or 20.4%, were cost burdened. Of these cost burdened owner-occupied housing units, 35, or 6.4%, are severely cost burdened. In total, 136 households (21.2% of all households) were cost burdened, while 49 households (7.6% of all households) were severely cost burdened in Brookfield in 2022.

With the cost of both rent and mortgages increasing over the last few years, more households in Brookfield could become cost burdened in the near future. Furthermore, many of the housing units in Brookfield are older. According to the ACS 5-Year Estimates data, 287 housing units (36.6%) were built before 1940. More than half of the homes in Brookfield were built before 1980. Accordingly, 1975 is the median year a home in Brookfield was built. Many of these older homes may need rehabilitation or renovation if they are to remain safe, sanitary, and livable. Since 2010, only 42 housing units (5.4%) have been built in Brookfield. This shows while the cost of housing is increasing in Brookfield, there has not been a significant increase in the supply of new housing.

In order to make more housing locally and regionally available, Brookfield applied for and received a 2023 Bylaw Modernization Grant with the intent to enhance its zoning bylaws to remove obstacles to developing more housing units, and create an educational platform for the community to learn about the benefits of allowing different types of housing in the community.

At this time, Brookfield needs more affordable housing units for its current residents. Zoning changes should allow for more development of housing units and other higher-density forms of housing including multi-unit housing and accessory dwellings in places suited for growth, such as Brookfield’s village areas. Furthermore, accessory dwelling within or attached to single-unit residences allow for close proximity to cost-effective care and supervision for relatives or disabled or elderly persons. Brookfield’s Zoning Bylaws should also support the development of manufactured homes, modular housing, or prefabricated housing to encourage the development of affordable housing in all districts where housing is permitted.

D. Goals, Policies and Recommendations

Goals

1. A mix of clustered denser housing in village areas with lower density outside of village areas that preserves viable farms and woodlands and maintains the community’s traditional rural character.
2. Promote the availability of affordable housing through zoning, by, including single/multi-unit housing, rental units, and higher densities in Village Districts.
3. Promotion of new housing in areas that are not prone to flooding.

Policies

1. Development of housing units must comply with all applicable rules and regulations pertaining to their impacts on water quality, municipal services, flood plains or the character of the area in which they are located. All developments require compliance with State regulations for water supply and wastewater disposal and need to be designed so as to enhance the historic character of the area.
2. The most appropriate location for higher density multi-unit housing is within or adjacent to Brookfield's village districts, including East Brookfield, Pond Village, and Brookfield Center surrounding the Elementary School.
3. In non-village areas of town multi-unit housing development should be encouraged only if the development employs clustering and follows policy number one above.
4. The town further encourages affordable housing through the recommended bylaw zoning districts that implement this plan, accessory dwelling units as defined in the development bylaw, Habitat for Humanity, and the various land trust mechanisms that are available to create lower cost single-unit homes.
5. Large residential structures should use vegetation and existing topography to reduce intrusiveness and ensure that new development in town is not unduly inconsistent with the historic and rural character of the town.

Recommendations

1. The creation of a new village in Brookfield Center.
2. The town should consider the implementation of zoning districts or other bylaw amendments that would allow for continued growth but would encourage the clustering of homes in and around "village centers" and protect open space in outlying districts. These could permit smaller lot sizes in zones around "village centers" and larger lot sizes in outlying districts.
3. The town should identify potential locations for multi-unit housing to encourage affordable housing and consider potential ways the community could support its development.
4. The town should encourage affordable housing in the bylaws, including allowing: (1) as conditional uses, multi-unit dwellings in the village districts and planned residential development in the agricultural/residential district; (2) as permitted uses in these districts, duplexes; and (3) as permitted uses in these districts, manufactured housing anywhere that residential dwellings are permitted.

VI. Education

A. Background

Children in grades Pre-K to 6th grade attend the Brookfield Elementary School, which is located on Ridge Road in Brookfield. Students in grades 7-12 are transported to the Randolph Union Middle and High School and the Area Vocational Center in Randolph. The 2024 student population of Brookfield Elementary School is 71.

Brookfield Elementary is part of the [Orange Southwest \(Unified\) Supervisory District \(OSSD\)](#). OSSD was created in 2018 following a vote taken by residents in the towns of Randolph, Braintree, and Brookfield to unify under a single school district.

Under the Unified District, each town is represented as follows:

- Braintree – two board representatives
- Brookfield – two board representatives
- Randolph – four board representatives

The two members of the OSSD Board are elected traditionally at the time of the March town meeting – at which time the voters act on the OSSD school budget for the next fiscal year.

B. Brookfield School

The Brookfield Elementary School for grades Pre-K to 6th was built in 1967 and enlarged in 1979. In recent years, the School has made various physical improvements, including paving the parking lot, adding a new foyer and doors, exterior and interior painting, new cafeteria tables and walls, playground, and several safety and energy efficiency improvements. The District provides curriculum by grade for the combined district.

The Brookfield Elementary has had an active School Club for decades that to provide a variety of enrichment programs for the students. After School Program: At Brookfield, our after school program includes a variety of activities, such as arts, sports, STEM and tutoring in order to foster the holistic development of our children. As of this plan, the school is in an adequate condition and there are no major investments in the building planned.

Table 6: Brookfield Elementary Enrollment, 2011 - 2023

School Year	Enrollment
2022-2023	72
2021-2022	71
2020-2021	68
2019-2020	76
2018-2019	72
2017-2018	64
2016-2017	73
2015-2016	59
2014-2015	64
2013-2014	58
2012-2013	76
2011-2012	78

Source(s): Vermont Agency of Education “Enrollment Dashboard” 2011 -2023

C. Enrollment

Brookfield students continue to perform well academically and receive a high-quality education. The OSSD provides an [annual report](#) that explains in detail the complex Vermont State funding and tax impacts for each town in the district. The OSSD provides an [annual report](#) that explains in detail the complex Vermont State funding and tax impacts for each town in the district.

In Fiscal Year 2024/25, the OSSD budget was:

OSSD 2024-25 BUDGET: BUDGET SUMMARY

	2022-23 Budget	2022-23 Actual	2023-24 Budget	2024-25 Proposed	Difference
REVENUE					
Local Revenue	1,071,912	1,229,985	1,165,277	1,217,650	52,373
			8.71%	-1.00%	
Special Programs	2,210,149	2,276,986	2,377,539	2,703,635	326,096
			12.14%	18.74%	
State Revenues	17,350,584	17,354,421	18,895,649	20,591,511	1,695,862
			8.90%	18.65%	
Federal Funds	876,478	0	1,182,660	1,182,660	0
Beginning Balance	746,171	746,171	1,096,503	1,033,333	-63,170
Total Revenue	22,164,294	21,607,562	24,717,628	26,728,789	2,011,161

Source: Orange Southwest(Unified) School District 2024 – 2025 Budget Summary

D. Childcare

An inventory of registered childcare facilities reveals that Brookfield has a very limited amount of childcare available to the community. The State of Vermont has two classifications of regulated childcare facilities:

- Registered Family Child Care Home: A child care program approved only in the provider's residence, which is limited to a small number of children based on specific criteria.

- Licensed Program: A child care program providing care to children in any approved location. The number and ages of children served are based on available approved space and staffing qualifications, as well as play and learning equipment. A Licensed program must be inspected by the Department of Labor and Industry's Fire Safety Inspectors and must obtain a Water and Wastewater Disposal Permit from the Agency of Environmental Conservation. A Licensed program is considered a public building under Vermont Law. Types of licensed programs include: early childhood programs, school-age care, family homes and non-recurring care programs.

Table 7: Nearby Registered & Licensed Childcare Providers, 2022

	Registered	Licensed
Brookfield	2	2
Braintree	3	2
Chelsea	1	4
Northfield	0	3
Randolph	1	5
Roxbury	0	1
Williamstown	5	1

Source(s): Vermont Department for Children & Families “Bright Futures Report” 2022

There are currently two registered and two licensed childcare services in Brookfield. Brookfield Elementary offers childcare for children ages 3 to 5 years of age. Most residents currently arrange for care with relatives, or take their children to childcare facilities beyond the borders of Brookfield to neighboring towns like Randolph or to areas near where they work, such as Montpelier or Lebanon, NH.

E. Adult Education

Brookfield has a fairly limited amount of adult education opportunities. Most adults take advantage of the opportunities that are available in Randolph as an alternative. These include:

- Vermont State University Randolph Campus – VSU is part of the Vermont State College system and offers full and part time educational opportunities that range from computer technology, to agriculture, to health services. Attendees may choose a two-year program that leads to an Associate's Degree, a four-year program that leads to a Bachelor's Degree, or the college's one-year program that leads to a Practical Nursing certificate.
- Randolph Technical Career Center (RTCC) – Located in Randolph village, the RTCC is part of Randolph Union High School. RTCC offers adult education courses that range from the traditional tech center focuses of mechanical and woodworking, to computer technology, small business management, bookkeeping, as well as arts, crafts, and languages. RTCC’s adult education classes are open to all for a fee.
- The Brookfield Free Public Library – The Library offers a number of free services to library card holders, including access to the Internet and online learning.

Other, more extensive, opportunities are available in Montpelier and the Upper Valley as well.

F. Goals, Policies and Recommendations

Goals

1. To provide a safe and secure learning environment where quality educational opportunities are provided to all students.
2. To enable the best opportunity to educate our students in a manner that is financially sustainable to the community.

Policy

1. To ensure a strong and vibrant school, access to adequate affordable housing for families with school age children is critical.
2. Include Brookfield Elementary School in the Brookfield Center Village to encourage higher density housing where students can walk to school and make greater use of school amenities during non-school hours.
3. Encourage the utilization of existing childcare facilities and encourage the development of new facilities in town and in neighboring towns.
4. Support broadened access to education and vocational training opportunities sufficient to realize the full potential of Brookfield's residents.

VII. Utilities, Facilities and Services

The provision of services and maintenance of facilities is one of the key roles of any municipal government. The cost of services and public facility maintenance can represent a substantial amount of a municipality’s yearly budget (not including transportation, which is generally the largest portion).

At present, the Town of Brookfield does not have a Capital Budget and Program (CB&P). However, this plan does include recommendations to develop a CB&P. Furthermore, The Planning Commission has the authority to make recommendations as part of its role under V.S.A. Title 24, §4430 to the Selectboard with regard to what capital investments should be considered annually. Below is a list of town future needs, with indications of priority of need, estimated costs, and possible methods of financing.

Project	Priority	Costs	Potential Funding Sources
Municipal Building – Weatherization and Energy Efficiency Projects	Ongoing	TBD	Grants or General Fund
Town Garage – Weatherization and Energy Efficiency Projects	Ongoing	\$133,500	Municipal Energy Resilience Program (MERP) Grants
Fire Station – Weatherization and Energy Efficiency Projects	Ongoing	\$42,200	Municipal Energy Resilience Program (MERP) Grants
Sunset Lake – Purchase or Conserve Land for Outdoor Recreation	Ongoing	TBD	Grants or General Fund
Hippo Park Beach – More Accessible Entrance	Long-Term	TBD	Grants or General Fund

A. Town Buildings

Municipal Building

The Brookfield Municipal Building is located in Pond Village. It houses the Office of the Town Clerk, vital records including the town vault and the Brookfield Free Public Library. The building is in good condition and is meeting the needs of the Town Clerk and the Library. Over the past five years, the town has focused much of the work done on the building toward recommendations provided as part of a comprehensive energy audit. Improvements include replacing the heating system, air sealing doors, window replacement, insulation, and addition of

a mini-split heat pump system serving both the Town Office and Library. The addition of an entry vestibule is being considered to improve efficiency throughout the Municipal Building.

Brookfield Town Garage

The Brookfield Town Garage is a two-bay garage facility located on Route 65. Built in 1975, the structure is reasonably modern. In 2014, energy efficiency improvements were made to the garage's lighting. Space in the building is a challenge. The interior includes a small office where records are kept and a bathroom, the remainder of available space is the garage area where the town keeps three road vehicles as well as the multitude of tools, fuel and other materials. OSHA requirements regarding the storage of materials are increasing the need for additional space. In 2024, Brookfield demolished the existing equipment shed and is building a new enclosed three-bay garage which will comply with Vermont's energy code.

The Town applied for and has received a grant to complete an energy audit on both the existing Town Garage building and the Fire Station in 2024. One of the items that the Town anticipates will be increasing the insulation in the attic space.

Brookfield Free Public Library

The Brookfield Free Public Library is the oldest continually operating library in Vermont. The collection of the library contains 4,035 volumes. The library circulates 2,270 items per year. In addition to paper and digital media, the library offers access to online genealogy research databases, online internet media archives and online classes. The library shares space with the Brookfield Town Office. The Library has been located there since the building was given to the community in 1938.

Brookfield Fire Station

The Brookfield Fire Station, which is owned by the fire district, is located on Firehouse Lane. The building is in generally good shape. Over the past several years it has had exterior renovations including vinyl siding and replacement doors. It is anticipated that in fiscal year 2025 that the heating system will be replaced.

B. Community Buildings Not Owned by Town

Old Town Hall

The Old Town Hall was built in 1852. Due to age and deterioration, the building sat unused for roughly 50 years until in 2004 the building was purchased by the non-profit Brookfield Community Partnership with the goal of rehabilitating it for use as a community center. Starting in 2005, major structural renovations were made to the building, including bathrooms, kitchen, etc. The Old Town Hall functions as a community center at which residents can informally gather. It currently offers community events and programs and is available to rent by community members.

West Brookfield Meeting House

The West Brookfield Meeting House was built in 1839. The building was purchased in 2011 by the nonprofit West Brookfield Village Trust. Since 2011, many renovations have been made including a new roof, restoring the balcony, stabilizing the carriage shed and painting. The Trust depends on grants and donations to continue renovating the property. The Meeting House is available to use for community events.

C. Services

Solid Waste

Solid waste in Brookfield is managed as part of the Mountain Alliance which includes the towns of Brookfield, Braintree, Northfield and Randolph under an Intermunicipal Agreement. The four communities utilize transfer stations in Northfield and Randolph for self-hauling of trash, recycling, special wastes and household hazardous wastes (the latter during planned semi-annual events). Additionally, all municipal solid waste and recyclables collected by private haulers conducting curbside pickups in each town are brought to the Northfield and Randolph transfer stations. Recycling is accepted at the Transfer Station for a small fee. Brookfield does not manage curb-side pickup of trash or recycling. Brookfield encourages all residents and businesses to reduce their waste through source reduction, reuse and recycling. Trash burning and dumping are banned under state law. The town seeks to enforce these laws and its local zoning ordinances to reduce unpermitted waste disposal.

Sewer and Water

Brookfield has no municipal water or sewage facilities. Given these constraints, Pond Village cannot realistically support additional infill development or density. East Brookfield experiences flooding which makes the development of sewer and water services unfeasible. In the event that Brookfield seeks to support higher density residential development within the Town, shared water and sewage systems might be necessary, whether privately or publicly owned. The development of Brookfield Center is a promising location for new development as it has septic capacity. Buildings outside of the hamlets are widely spaced and have private water and wastewater systems.

D. Recreation

There are over 1,030 acres of publicly-owned land in Brookfield, of which 862 acres is owned by the state – Allis State Park, Ainsworth State Park, Baker Pond, and the Rood Pond access area. The town maintains a 170-acre town forest on Halfway Brook Road, a small park next to the Floating Bridge on Sunset Lake, and the 7-acre Sunset Brook Natural Area, a wetland off Route 65. All of this land is accessible for recreational use such as hiking, snowshoeing, and cross-country skiing. Some of the land includes trails for horseback riding and snowmobiles, and the land is open to hunting in season. Camping is available in the summer in Allis State Park.

The town owns a very small park, colloquially known as “Hippo Park” for the Jim Sardonis sculpture there, for swimming on Sunset Lake, but the most intensive use of the lake for swimming and fishing results primarily from the Floating Bridge crossing the lake. This area receives the most intensive public use in the town from both residents and non-residents, and yet no formal steps have been taken to accommodate or support such use. If an opportunity to purchase suitable land on Sunset Lake arises, or there is an effort to enhance access to the lake at Hippo Park, the town should consider it to better accommodate the swimming, fishing, and kayaking that takes place at the lake subject to financing review and vote at a town meeting.

Most of the recreational use in Brookfield is on private land. Recreation activities in Brookfield include hiking, snowshoeing, cross-country skiing, and hunting on private land. The informal private network of trails for skiing, hiking, mountain biking and horseback riding estimated at over 50 miles. In addition, all town highways, particularly Class 3 and 4, totaling 60 miles, are used for horseback riding, biking, jogging, hiking, and hunting. So far, a substantial amount of land in Brookfield remains unposted but there has been an increase in recent years in the number of acres posted by private landowners. Several miles of trails in Brookfield are marked and maintained by the Vermont Association of Snow Travelers (VAST) and available for use in the winter by snowmobilers. The town should consider developing a policy concerning the use of all-terrain vehicles in town taking into consideration other non-motorized uses.

The most important recreation objective is to encourage the informal recreational use provided by private landowners. This use accommodates a large number of people and is an important component of the quality of life in Brookfield. In addition, the town should encourage the creation of public rights-of-way for trail use and make sure that Class 4 roads remain open to public access.

E. Goals, Policies and Recommendations

Goals

1. To plan for, finance, and provide an efficient system of municipal and recreational facilities and services to meet future needs of the citizens and visitors of Brookfield.
2. That Brookfield residents have access to public and private recreation throughout Brookfield.
3. To provide residents with safe, effective, responsive and affordable municipal infrastructure, facilities and services consistent with other town goals and whenever possible, to encourage and work with other public and private utility or service providers to do the same.
4. Consider the creation of water and sewer infrastructure for Brookfield Center.

Policies

1. Growth and development should not exceed the capacities of local facilities and services.
2. Infrastructure expansion should take place with a minimum impact on the aesthetic quality of the community. Utility lines should be buried wherever feasible.

3. Support continued access to public and private recreation throughout Brookfield.
4. Encourage patterns of land use that maintain and enhance the opportunity for outdoor recreation.
5. Plan for growth that does not significantly diminish the value and availability of outdoor recreational activities for residents and visitors.

Recommendations

1. The Selectboard should consider the development of a capital budget and program for building maintenance, highways, equipment and fire protection.
2. Continue to support the renovation of the historic Old Town Hall in Pond Village into a community facility that provides a mix of uses.
3. The town should consider developing a policy concerning the use of all-terrain vehicles in town.
4. The town should encourage the creation of public rights-of-way for trail use and make sure that Class 4 roads remain open to public access.
5. If an opportunity to purchase or conserve suitable land on Sunset Lake arises, the town should consider it to better accommodate the swimming, fishing, and kayaking that takes place at the lake.
6. Consider ways to make the water entry at Hippo Park Beach on Sunset Lake more accessible, for example, by grading, removal of boulders, and placement of sand.
7. The town should look for opportunities to use town forest and other lands to provide recreation and conservation values.

VIII. Communications

A. Introduction

This communications plan:

- identifies the current providers of telecommunications and television service to Brookfield;
- discusses the technologies available for telecommunications and constraints posed by Brookfield's topography;
- summarizes current telecommunications regulation; and
- presents goals, policies, and recommendations.

B. Service Provision

Wireline Voice and Data

Consolidated Communications is the incumbent provider of landline voice communication services in Brookfield. It has lines throughout the town. Residents may choose competing local and long distance providers.

Consolidated Communications offers digital subscriber line (DSL) service that provides internet access to many residents of Brookfield. However, DSL is not available to many Brookfield residents because of their distance from the switching station.

In contrast, Brookfield has little cable access. Comcast lines reach a limited number of residences in town.

ECFiber offers symmetrical internet access (same upload as download,) and a choice of five speeds that do not vary by time of day or according to the weather. It also offers telephone service. ECFiber achieved full build-out in 2022.

Wireless Voice and Data

Verizon Wireless and AT&T provide wireless voice and data communications that reach locations in Brookfield depending on the accessibility of the locations from existing telecommunications facilities built near I-89. In some locations in town, this coverage is good, in others moderate or weak, and in still others nonexistent. In some locations, coverage includes 4G LTE service.

Wireless voice and data is also available from T-Mobile in some locations. T-Mobile was the original permittee for the one existing telecommunications facility constructed in Brookfield, on Ridge Road, and that facility now attaches antennae for both T-Mobile and AT&T.

Satellite Internet providers currently serving Brookfield include Hughesnet, Starlink, and Viasat.

Television

Satellite television is available throughout Brookfield. Broadcast television service is available but limited. Cable television is available only to a small number of residents.

C. Topographic Issues

Brookfield's topography presents significant challenges for wireless communications. Because the town already hosts a widespread utility line network and associated rights-of-way, it may be better suited for deployment of wireline communications technology augmented by small cells. The vertical nature of Brookfield, with its ridges and valleys, limits the reach of wireless cell towers and encourages either proliferation of those towers or great height, which have a significant effect on the scenic character of this rural town that contains few structures above tree line.

D. Current Telecommunications Regulations

The Town of Brookfield currently regulates wireless telecommunication facilities through a bylaw adopted by the voters at town meeting in 1999. The bylaw states a purpose to protect the scenic qualities of Brookfield's natural environment and to guide development that may have adverse health, safety or visual impacts. It requires conditional use review of proposed facilities. Among other provisions, the bylaw requires that the height of the facility shall not exceed 10 feet above the average height of the tree line on land immediately adjoining the proposed site and removal of abandoned or unused towers.

Telecommunications facilities may also require a land use permit under Act 250 (10 V.S.A. chapter 151). Specifically, Act 250 requires a permit to build a support structure that is primarily for communication or broadcast purposes and that extends 50 feet, or more, in height above ground level or 20 feet, or more, above the highest point of an attached existing structure. In 2009, the Act 250 program approved the Ridge Road telecommunications facility, deciding that the Brookfield telecommunications bylaw, including its height restriction, constitutes a clear, written community standard intended to preserve aesthetics and scenic beauty.

A certificate of public good (CPG) must be obtained from the Public Utility Commission (PUC) prior to construction or installation of telecommunications facilities under Vermont law (30 V.S.A. § 248a or "Section 248a"). This process was created as an option. Telecommunications facilities approved under Section 248a option are exempt from Act 250 land use law and local bylaws. Under current law, the option expires July 1, 2017. Before issuing a CPG, the PUC must find that the facility will promote the general good of the state. The PUC is required to give "substantial deference" to the applicable local land use plan and the recommendations of the municipal legislative body and municipal and regional planning commissions, and "due consideration" to most, but not all, of the environmental and land use criteria found in Act 250.

E. Goals, Policies, and Recommendations

Goal

1. To secure for Brookfield high quality voice, broadband, and data communications through technologies appropriate to the town's scenic and rural character and encourage the deployment of these technologies in areas of the town that are not served.

Policies

1. Deliver communications services where available primarily through wireline rather than wireless technologies because of wireline's potential for higher data transmission, a topography that limits the reach of wireless towers, and the reduced impact of wireline installation on the scenic and rural character of the town in comparison to wireless towers.
2. Maintain support in Brookfield of fiber optic cable for communications services.
3. Encourage use of small cells on utility poles and existing structures to expand the reach of communications networks and provide mobile communications service.
4. Minimize the impact of wireless telecommunications facilities on the town's scenic and rural character. The following policies support the town's regulation of these facilities and, for purposes of Act 250 and Section 248a, constitute specific policies and recommendations of the Selectboard and the Planning Commission. Policies 4a through 4i are intended to conserve the scenic, rural, and natural qualities of Brookfield and as written community standards to preserve Brookfield's aesthetics and scenic beauty:
 - a. The height of a wireless telecommunication facility shall not exceed ten feet above the average height of the tree line on land immediately adjoining the proposed site. Exceptions may be considered when supported by an independent study.
 - b. Install telecommunications antennae on existing structures such as grain silos, church steeples, and barns, and on existing telecommunications facilities that comply with policy 5a, above.
 - c. To the extent practical with respect to height, color and size, the facility shall be compatible with the existing natural and human-made characteristics of the site.
 - d. Existing on-site vegetation shall be preserved to the extent possible or improved, and disturbance of the existing topography outside the physical facility shall be minimized, unless the disturbance would result in a lesser visual impact to the facility on the surrounding area.
 - e. No lighting shall be allowed on a tower except as required by FAA regulations. Lighting on the tower, if required, shall be shielded so as not to be visible by a person on ground level anywhere within a 300-foot radius of the tower.
 - f. Materials utilized for the exterior of any structures shall be of a kind and positioned on structures so as to minimize visibility of the structure in daylight.

- g. All aspects of the proposed facility, including access roads and utility lines, shall be located and designed to mitigate its visual and natural resource impacts.
- h. The owner of the facility shall post a bond adequate to cover dismantling and removal of the facility and associated improvements and site restoration.
- i. The facility shall comply with the policies found in other sections of this Plan that address visual, scenic, aesthetic, or rural qualities of Brookfield or the protection of natural resources.
- j. Construction of the facility shall be completed within two years of when approval is issued or, if additional time is needed to secure other necessary permissions to construct, of when construction commences. The purpose of this policy is to ensure that, if Brookfield is going to host a facility and experience its impact on the town's scenic character, Brookfield receives such benefits as the facility will provide at the earliest possible date.

Recommendations

1. Municipal officials should participate in the PUC's review of new and expanded telecommunications facilities in support of the goals and policies of this plan. If the PUC receives an application for a wireless telecommunications facility that does not comply with one or more of the specific policies stated above, the town should advocate for compliance with those policies, including compliance with the Brookfield Development Bylaws. If the application proposes a facility that does not comply with the town's policy on the height of telecommunications facilities, the town also should make the alternative recommendation that in no event should the PUC approve a telecommunications facility at a height that exceeds that policy without:
 - A transparent and clear weighing of the specific benefits to be gained by such a facility against its impact on the scenic beauty and rural character of Brookfield.
 - An investigation by the PUC into the long-term plans of all wireless communications providers for delivery of service from locations in Brookfield leading to an order that ensures the siting of the fewest possible facilities by those providers exceeding the height requirement.

IX. Health/Emergency Services

A. Health Care Facilities

Health care facilities are essential in the prevention, treatment, and management of illness, and in the preservation of mental and physical well-being through the services that they offer. Rural locations such as Brookfield are served by small facilities that can assist residents with general health care needs but are not suited for more complex acute care services that require specialized services and equipment.

There are no small-scale health clinics located in Brookfield, but residents may utilize services offered at Gifford Family Health Care in Randolph. Gifford Medical Center offers a wide range of services to serve most medical needs. There are also community hospitals in Berlin (CVMC), VA Medical Center in White River and Dartmouth Hitchcock Medical Center in Lebanon, NH. Gifford Medical Center developed an assisted living facility in nearby Randolph Center. Additional services are offered by the Clara Martin Center in Randolph, Washington County Mental Health Services, and the UVM Medical Center and its local affiliates.

B. Fire Protection Services

Primary fire protection is provided by the volunteer fire company based in East Brookfield and by the Randolph Fire Department for West Brookfield. The Brookfield Fire Department (BFD) shares communications with the Town of Randolph, but a new hi-band frequency has been acquired by the town for the purpose of enabling communication between the BFD and the Road Crew, an essential need in the event of a severe weather event. The Brookfield Fire Department is operated exclusively by volunteers. While coverage is adequate there is always a need for additional volunteers to serve as firefighters, to help raise money, and to help care for the equipment. It can be challenging to find volunteers because a majority of Brookfield's employed work outside of the community, and because of the added challenge of the many State and Federal requirements for training.

Brookfield Fire Station

The Brookfield Fire Station, which is owned by the fire district, is located on Firehouse Lane. The building is in generally good shape. Over the past several years it has had exterior renovations including vinyl siding and replacement doors. It is anticipated that in FY 25 the heating system will be replaced.

C. Police Protection Services

The Town of Brookfield does not have a full time police force. The Town of Brookfield relies upon the Vermont State Police for response to major crimes. For response to basic police services and enforcement of town ordinances, the Town of Brookfield contracts with nearby police agencies for additional coverage. In Fiscal Year 2025, the Town of Brookfield contracted with the Windsor County Sheriff's Department. In previous years, the Town of Brookfield had

contracted with the Orange County Sheriff's Department. In the future the town will continue to contract with nearby police agencies. The elected First and Second Constables provide limited animal control when needed.

In 2015, the Select Board formed the Brookfield Public Safety Advisory Committee to assist the Select Board in monitoring and making recommendations about public safety issues to include monitoring the law enforcement contract. The committee has and will continue to urge the replacement of damaged or missing traffic control signs, revise traffic ordinances, review overweight vehicle procedures, encourage reflective house number signs, increase pedestrian and bicyclist safety, monitor law enforcement contract monthly bills and periodic reports, and other appropriate issues such as public education. As an advisory public body, the committee encourages members of the public to attend and participate in their meetings.

D. Emergency Medical Services

Emergency medical services in Brookfield are provided by White River Valley Ambulance, Inc. (WRVA) and Barre Town Emergency Medical Service (BTEMS). Both services are paid for through taxes which are assessed on a per capita basis.

WRVA provides ambulance service for the western portion of Brookfield. WRVA is a not-for-profit emergency ambulance and rescue service composed of paid full-time, part-time and volunteer staff. Emergency medical service is provided to a geographical area encompassing 500 square miles and approximately 10,000 residents. In addition to Brookfield, WRVA covers Barnard, Bethel, Braintree, Granville, East Granville, Hancock, Pittsfield, Randolph, Rochester and Stockbridge.

BTEMS provides ambulance service for the eastern portion of Brookfield. BTEMS is a critical care ambulance service located in Washington County. BTEMS staffs three 24-hour paramedic level ambulances with 2 person crews every day. In addition, BTEMS provides a fourth ambulance from 9 AM to 5 PM on weekdays. The primary station location is 4 McLaughlin Road East Barre. The other two 24-hour stations are located in the Berlin fire station at 338 Paine Turnpike N. in Berlin, and the Williamstown Public Safety Building at 249 Meadow Street in Williamstown. A fourth station is located in the South Barre fire station at 528 South Barre Road.

E. Emergency Management Planning

The impact of expected, but unpredictable natural and human-caused events to the region can be reduced through proper emergency management. Emergency management is generally broken down into four areas: preparedness, response, recovery and mitigation.

- Preparedness includes emergency personnel acquiring suitable equipment, and conducting training and exercises. Preparedness is also a responsibility of residents, business and government. Simple preparedness measures, like having disaster supplies on hand, installing smoke detectors and generators, having emergency fuel for generators and vehicles and knowing basic first aid will all help to lessen the impact of a disaster. Preparing emergency plans is also a preparedness activity.

- Response is the initial emergency response to save life and property during and immediately after an incident, and is initiated by local emergency crews and then followed up by outside forces if necessary. Response operations are greatly enhanced by proper preparedness. Most emergencies of any scale will require towns to work together, and often to work with state or federal agencies. Practicing with all of these partners before an actual emergency is critical to smooth emergency operations.
- Recovery is the more long-term process of putting life back to normal, and includes many state and federal agencies, especially the Federal Emergency Management Agency (FEMA) in large disasters. As events like Tropical Storm Irene showed, recovery can take a long time and is hindered if a disaster is severe or widespread.
- Hazard mitigation means any sustained action that reduces or eliminates long-term risk to people and property from natural or human-caused hazards and their effects. Mitigation planning begins with an assessment of likely hazards, and then targets activities to reduce the effects of these hazards. Given that the largest threat in Vermont is flood related, good mitigation measures include proper road and drainage construction, as well as limiting development in flood-prone areas.

Local Emergency Operations and Hazard Mitigation Plans

Brookfield, like every town in Vermont, maintains a Local Emergency Operations Plan (LEOP). The LEOP covers the procedures for Brookfield's response to a disaster. In the event of a disaster, the Selectboard will formally declare a state of emergency if the Board feels it exceeds the town's emergency management capacity. This declaration will be faxed to Vermont Emergency Management and a local emergency operation center will be set up in the Town Office and/or Brookfield Fire Station. The Selectboard Chair acts as the town's Emergency Management Coordinator and would be assisted by several people who have been identified in the LEOP in coordinating the town's response to a disaster. The Selectboard should continue to keep the LEOP up-to-date and ensure that all parts of municipal government that are active during a hazard event are aware of what is in it. This includes the Selectboard, Fire and Rescue, Road Crew and Shelter coordinators.

The Brookfield School acts as a shelter, although it is not officially designated as a Red Cross shelter. There is a generator at Brookfield Elementary School. Vermont State University at Randolph is the designated Emergency Shelter for Brookfield.

The Selectboard worked with the Regional Planning Commission to update Brookfield's Hazard Mitigation Plan in January of 2022. Disaster mitigation covers actions done to reduce the effects of a disaster. For Brookfield, the primary hazards are fire hazards (structure, wildfire, and brushfires), invasive species infestation, and severe weather (heavy rain, high winds, snow, climate change, sleet, hail, thunderstorms, drought, tropical storms, hurricanes, extreme heat, and flooding), with a variety of other lesser hazards. All hazards are considered as part of the town's Mitigation Plan, but the most significant hazards in Brookfield include: Flooding (flash flooding, inundation and fluvial erosion), structure fire and winter weather (extreme cold, snow and ice storms) events. There are many ways that the town can reduce damages, and since a disaster does not always result in state or federal assistance, the town should take sensible steps that can reduce disaster costs, damage to property and loss of life (See Chapter X, Flood Resiliency).

F. Goals, Policies and Recommendations

Goal

1. To maintain effective fire and ambulance services.

Policies

1. Support efforts to provide residents with access to high quality physical and mental health care through local providers.
2. Decrease response times for emergency services.
3. Evaluate road and driveway access to proposed developments for fire trucks and other emergency vehicles as part of the permit review process.
4. Maintain Brookfield's relationship with White River Valley Ambulance and Barre Town EMS.
5. Maintain an up-to-date Emergency Operations Plan.
6. Work with the Two Rivers-Ottawaquechee Regional Commission to properly plan and update for hazard events.

Recommendations

1. The Selectboard should update the Local Emergency Operation Plan at least once a year or when key emergency management personnel change.
2. The Selectboard should maintain an up-to-date Hazard Mitigation Plan with assistance from the Two Rivers-Ottawaquechee Regional Commission.
3. Develop and update a methodology to document infrastructure damage after weather events.
4. Develop new and maintain existing water supplies year round throughout town for fire protection services.

X. Energy

A. Overview

Local land use planning affects how much energy is needed and used in a town. Dispersed and uncoordinated development can waste both land and energy resources and lead to costs, such as additional or upgraded roads, that could have been avoided. Siting and design of buildings and selection of building components and energy systems for energy efficiency can save money over the long run, combat climate change, and reduce exposure to volatile energy markets that are driven by state, national, and international forces.

Vermont strongly supports reducing its reliance on fossil fuels and securing energy independence for the state by improving the energy efficiency of residential, business, and government buildings, and utilizing in-state renewable energy resources. The 2022 Vermont Comprehensive Energy Plan (CEP) addresses the major factors to our energy use by addressing the state's energy future for electricity, thermal energy transportation and land use. To highlight the state's commitment to efficiency, the State set a long-term goal of obtaining 90% of Vermont's energy demand from renewable resources by 2050. To achieve this goal, Vermont's towns will need to be proactive in reducing local fossil fuel use and transitioning to both statewide and local production of renewable energy via solar, small-scale hydroelectric, small-scale wind, and emphasis on shifting our transportation sector to electric power.

“Energy” as used in this Plan and in the state's Comprehensive Energy Plan (CEP) is not the same as electricity. It includes all forms of energy used by people. This is commonly broken down into three sectors:

- commercial and industrial (C&I) which mainly involves using energy to operate machinery for manufacturing products and/or cooling, heating and lighting structures
- residential which mainly involves cooling, heating and lighting structures
- transportation which mainly involves the consumption of gasoline and diesel by vehicles

The overall goals of this energy plan are: (1) to promote the installation and use of energy efficiency measures that are cost-effective over their life and (2) to encourage the use of renewable energy to meet the remaining demand.

After reviewing energy use and sources in Brookfield, this plan discusses methods to encourage energy efficiency and the types of renewable energy resources, and follows with goals, policies, and recommendations related to energy.

B. Energy Needs

In referring to energy, this plan is not only talking about electricity; wood, gas, oil and other sources are all forms of energy. To compare energy across source types, this Plan will use the million British thermal units (MMBtu) and kilowatt hours (kWh). For reference, 1 MMBtu converts to 293 kWh.

The Vermont Department of Public Service's (PSD) has developed a model, the Low Emissions Analysis Platform (LEAP), for calculating heating and transportation energy in MMBtus within each municipality. At the same time, Efficiency Vermont (EVT) has compiled data on electric consumption in kWh by residential and C&I customers from service providers within each municipality. By converting electric consumption into MMBtus, one can determine the overall MMBtus of energy consumed in a municipality. Using this method, Brookfield consumed 189,918 MMBtus of energy across the transportation, heating, and electric sectors in 2022.

In breaking down this data, one can see that heating alone accounted for almost half (49.8% or 94,658 MMBtus) of the energy consumed in Brookfield. Almost three quarters (74.7%) of the MMBtus attributable to the heating sector were from residential structures, meaning that commercial structures only accounted for around a quarter (25.3%) of the heating sector's energy consumed. At the same time, transportation accounted for 39.8% or 75,581 MMBtus of the energy consumed in Brookfield in 2022. Accordingly, only 10.4% (19,679 /MMBtus) of the energy consumed in Brookfield in 2022 was attributed to the electric sector. Within the electric sector, residential customers accounted for 84.7% of the energy consumed, while C&I customers accounted for the remaining 15.3% of the energy consumed in Brookfield in 2022.

1. **Residential:** Brookfield's residential sector accounted for 84.7% of the electric demand in the town in 2022, according to data provided by Efficiency Vermont (EVT). Brookfield's residences also accounted for 74.7% of the heating demand in the town in 2022, according to the LEAP model's data.

Most of the residences in Brookfield use oil, propane (bottled gas), or wood to heat their home. Some homes use electricity as a primary or secondary heat source. In those residences where the domestic water supply is not heated by a central heating system (furnace) it is normally heated by propane or electricity. Some homes use passive solar radiation for a portion of their heating needs. Residential use of photovoltaic panels, active solar water heating, and small wind turbines has increased.

The table below displays the heating energy used by occupied residences in Brookfield based on data from the 2022 American Community Survey (ACS) 5-year Estimates for the fuel source and number of occupied households. The table also contains information about the heated square footage calculated using the LEAP model.

Table 8: Current Residential Heating Energy Use in Brookfield, 2022

Fuel Source	Number of Households	Percentage of Households	Square Footage Heated (MMBTUs)
Utility gas	0	0.0%	-
Bottled, tank, or Liquid Petroleum gas	124	19.3%	13,640
Electricity	79	12.3%	8,690
Fuel oil, kerosene, etc.	205	31.9%	22,550
Coal or coke	0	0.0%	-
Wood	216	33.6%	23,760
Solar energy	6	0.9%	660
Other fuel	12	1.9%	1,320
No fuel used	1	0.2%	110
Total	643	100.0%	70,730

Source: American Community Survey DP04 “Profile of General Population & Housing Characteristics”, 2022

2. **Commercial and Industrial:** Brookfield’s C&I sector accounted for a smaller portion (15.3%) of the town’s total electric use in 2022 than residential (84.7%) according to data from EVT. Brookfield’s commercial structures also accounted for 25.3% of the heating demand in the town in 2022, according to the LEAP model’s data.

The table below displays the heating energy used by commercial establishments in Brookfield based on 2022 data from the Vermont Department of Labor. The table also contains information about these commercial establishments’ thermal energy use calculated using the LEAP model.

Table 9 Current Commercial Heating Energy Use in Brookfield, 2022

	Number of Commercial Establishments	Thermal Energy by Commercial Establishments (in MMBTUs)	Average Thermal Energy per Commercial Establishment (in MMBTUs)
Commercial Thermal Energy Use	21	23,928	1,139

Source(s): Vermont Public Service Department LEAP Model
 Vermont Department of Labor “Covered Employment & Wages”, 2022

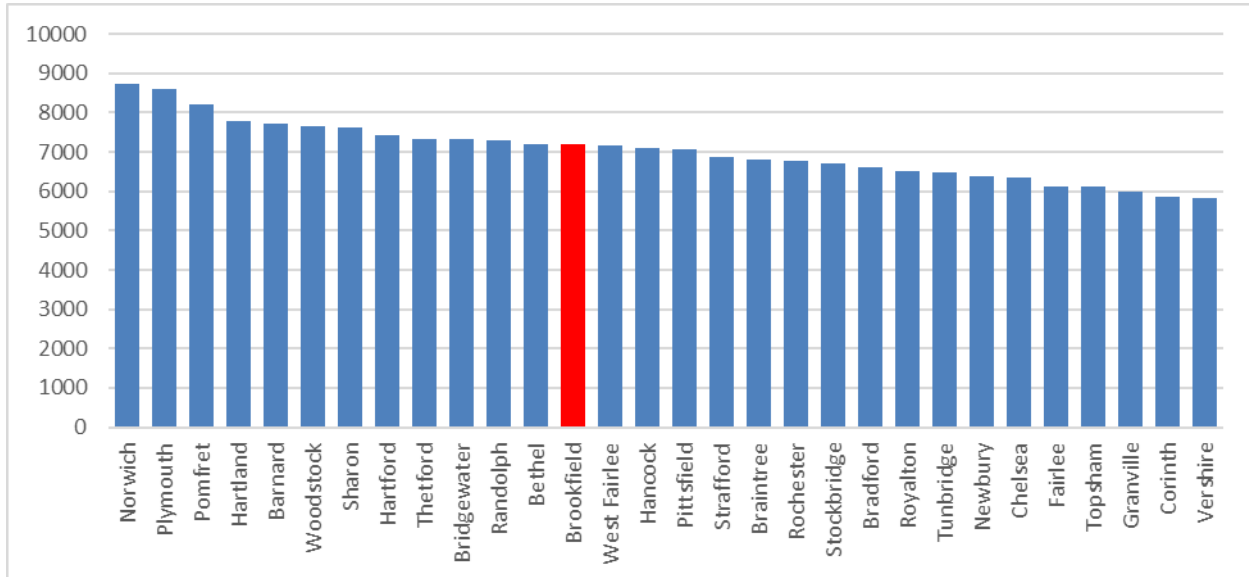
3. **Transportation:** Brookfield's transportation sector accounted for 39.8% of the energy used in 2022.

While the ACS 5-year estimates do not directly provide a count of the number of light duty vehicles (passenger cars and light duty trucks), one can estimate the number of light duty vehicles by counting the number of occupied residences that have one, two, or three or more vehicles. If one multiplies the number of occupied residences with three or more vehicles by three, and multiplies the number of occupied residences with two vehicles by two, and adds both of these figures to the number of occupied residences with one vehicle, then one can arrive at a rough estimate of the number of light duty vehicles in the area. Using this method will result in a slight undercount, but it is not possible to parse the ACS data further to determine how many occupied residences have three, four, five, or more vehicles. Given these limitations in calculating this data, one can estimate that there were about 1150 light duty vehicles in Brookfield in 2022. Of these, 17 (or about 1.5%) were electric vehicles (EV) according to data gathered by EVT for 2022. 10 of these EVs were all electric and 7 were plug-in hybrids.

4. **Agricultural:** Active farms are significant energy users, depending primarily upon electricity for barn lighting, milk cooling and other motor operated barn equipment. Field work is performed by tractors, which are predominantly diesel operated.
5. **Public Buildings:** the Brookfield Elementary School, the Town Office and Town Garage, and the library are heated with oil.

The town has obtained data on electricity use from EVT. For example, Figure 2 suggests that Brookfield is the middle of the average residential electricity use within the area of the Two Rivers-Ottawaquechee Regional Commission. This data was provided by EVT and includes the residential customers of both Green Mountain Power (GMP) and Washington Electric Cooperative (WEC).

Figure 2: Average Residential Electricity Use, 2022



Source: Efficiency Vermont, “Energy Usage & Savings Report” 2022

In addition, Table 10 shows that total electricity consumption in Brookfield’s residential and commercial and industrial sectors increased during the period from 2017 through 2022, with a notable 13.5 % spike in 2021 in the commercial and industrial sector and a 6.9% spike in 2020 in the residential sector. It is possible that these spikes in electric demand are attributable to the Covid-19 pandemic in 2020 and 2021.

Table 10: Energy Consumption by Sector in Brookfield, 2017 - 2022

Sector	2017	2018	2019	2020	2021	2022
Commercial & Industrial	755,967	754,228	772,805	764,920	868,384	879,956
Residential	4,228,336	4,301,705	4,239,784	4,533,563	4,724,228	4,887,572
Total	4,984,303	5,055,933	5,012,589	5,298,483	5,592,612	5,767,528

Source(s) Efficiency Vermont, “Energy Usage & Savings Report” 2017 - 2022

Based on recent figures from GMP and WEC, Brookfield’s peak demand on the system approximates 1.1 megawatts (MW). Peak demand represents the maximum amount of energy that Brookfield needs from the electric utilities during periods of high electricity use, meaning that the utilities need to be able procure enough power to meet this demand.

This town plan continues the policy established in the 2011 town plan of discouraging the installation of electric generation projects greater than 2.2 MW. The purpose of this policy is to

reduce the possibility that electric generation sited in the town would be out of scale with its character.

C. Current Energy Resources

1. **Electricity from utilities:** Electricity is provided within their franchise areas by Green Mountain Power (GMP) and the Washington Electric Cooperative (WEC). Most of the town is supplied only with single phase service. The majority of electric consumers in Brookfield are within GMP's territory.

Developments in applicable state law and utility resource plans focus on increasing the availability of this electricity from renewable resources. This is especially true for those in GMP's territory since all of WEC's energy sources are already from renewable sources.

GMP and WEC will be subject to Vermont's newly enacted Renewable Energy Standard (RES), which requires each utility to meet 100% of its demand through renewable energy by 2035.

[GMP's 2014 integrated resource plan](#) – created before adoption of the RES – projected that 52% of its 2017 power mix would be from plants that meet Vermont's definition of renewable energy. However, that plan also indicated that GMP would sell, to other utilities, the renewable energy credits (RECs) associated with some of that power. Power for which a utility does not own the “environmental attributes” embodied by the RECs will not count toward meeting the RES.

[WEC's 2014 integrated resource plan](#) – also created before adoption of the RES – stated that WEC's power mix is entirely from renewable resources and that WEC also sells RECs from some of these resources. The newly enacted RES contains provisions to encourage utilities like WEC to remain 100% renewable in the future, backed by ownership of RECs.

2. **On-site renewable energy:** Some residences and farms generate electricity and heat water or both through the use of renewable energy systems such as photovoltaic panels, solar thermal, windmills, biomass, geothermal, and micro-hydroelectric systems. According to 2022 ACS 5-year Estimate data, about 1% (6) of occupied residences in Brookfield used solar energy for heating. If the house or farm with a qualifying renewable energy system is connected to utility power, excess power and energy can be provided to the utility by the use of a “net metering system” that allows the owner to deduct the system's energy production from the owner's utility bill and obtain credits that can be applied to future bills.

Brookfield has approximately 70 net metering systems installed in town, based on review of logs available on the Public Utility Commission's (PUC) Net Metering Log website and copies of applications to the Board served on the Planning Commission. Most of these systems are solar electric generation of 15 kW or less, although one farm on Roxbury Line Road installed a 150 kW solar net metering installation in 2019, while

another farm on West Street installed a 30 kW solar net metering system in 2014. There are also two small wind electric generation systems of 15 kW or less.

3. **Oil:** Fuel oil (Number 2) is delivered by several local vendors to the users' storage tanks. In 2022, fuel oils, or **kerosene**, heated 31.9% (205) of Brookfield's occupied residences.
4. **Propane:** Propane, or liquefied petroleum gas, is delivered by local vendors to customers, either in the form of fully charged cylinders or by tank trucks which meter deliveries into storage tanks at the users' locations. In 2022, 18.8% (121) of Brookfield's occupied residences used this fuel source for heating.
5. **Wood:** Most of the fuel wood is harvested from small privately owned woodlots or purchased from nearby suppliers. In 2022, 33.6% (216) of Brookfield's residences used wood for heating. The census data does not distinguish between wood and wood pellets in reporting this figure.
6. **Electricity:** Electricity accounts for 12.3% (79) of the fuel source of occupied residences in Brookfield in 2022, according to the ACS 5-year Estimates. This data does not distinguish between heat pumps, heat pump water heaters, or electric resistance heaters.
7. **Motor fuels:** Residents, businesses, and farms typically obtain motor vehicle fuel from service stations located outside of Brookfield.

As over fifty percent of Brookfield's occupied residences used fuel oil, kerosene, propane, and liquified petroleum gas for heating in 2022 means that an opportunity exists to reduce costs and greenhouse gas emissions through implementation of energy efficiency measures and substitution of renewable fuels. One such substitution could be the installation of heat pumps that use renewable fuels. This technology has become more viable for use in Vermont's climate. For example, air source heat pumps are likely to become a net reducer of greenhouse gas emission as Vermont's electricity source mix becomes increasingly renewable. However, the use of heat pumps could significantly increase electric demand, and possibly the need for bigger or more poles and wires, if installed in homes that are not designed for energy efficiency. The RES itself contains provisions that link the installation of heat pumps with ensuring that the structure is energy efficient.

D. Energy Scarcity and Costs

There are few scarcities of energy foreseen in the 8-year life of this plan. Our electrical providers have plenty of power supply resources either under contract or available to purchase at this time. Total energy demand is likely to shrink modestly in the near term as population is not expected to grow much and efficiency is constantly improving. There should be ample amounts of heating and transportation fuels for the life of this plan, but we must encourage a shift away from fossil fuels to meet our goals. Wood is a plentiful local source of heating fuel, and many more cords could be sustainable harvested than are being cut now.

That is not to say that plentiful energy will be cheap. Fossil fuels have varied widely in price over the last several years, and the overall trend is for dwindling supplies. Also, whether it is

carbon pricing or other methods, fossil fuels will have to increase in cost to disincentivize their use. The cost of energy is not an issue for some families, but is still an issue for many, and will be less of an issue for all if targets for better insulating buildings, switching to EVs, and using heat pumps and advanced wood heat systems are met. An EV has much less maintenance costs, as they have no engine or exhaust system, and the cost of electricity to power a car comes out to the equivalent of about \$1.50 per gallon (in today's value), much less than current gasoline prices. For more information about heat pumps, electric/thermal efficiency, and EVs, please visit [Efficiency Vermont](#).

For many, the cost barriers are not the daily or monthly energy costs but implementing these changes to the buildings and vehicles we have now that use our energy. There are rebates and programs available that are income-based, and even for those that have too much income to qualify over time these investments will pay off, but they still require getting financing or having considerable savings on hand.

E. Energy Problems

The energy problems are historically not due to supply, as energy has historically been relatively abundant and cheap. Mainly, the energy problems stem from the environmental costs that have been externalized for a very long time. These problems are now becoming apparent in the form of greenhouse gasses and the heat they are trapping on Earth. It is clear that the window for rectifying this issue is extremely short, and that a shift to renewable sources of energy across all forms of energy use is imperative.

Consistency within the grid is also a problem in Brookfield for both WEC and GMP customers. Often the power will fluctuate, which is due to Brookfield being located far from the sources of electric energy. The condition of utility power lines is also an issue in Brookfield.

F. Residential & Commercial Energy Efficiency

There are a number of ways to encourage meeting Brookfield's energy needs by lowering demand.

Decreasing Energy Use by Implementing Energy Efficiency

Residents, businesses, farms, and town buildings can apply the principles of energy efficiency to use less energy to cost-effectively provide the same level and quality of service. Examples include:

- Conduct an energy audit to identify the greatest ways to save energy.
- Implement the air-sealing and insulation recommendations of the energy audit.
- Insulate with high R-value (or heat flow resistance) material.
- Use high efficiency windows.

- Install energy efficient appliances like refrigerators, freezers, front loading washing machines, gas heated clothes dryers and heating systems without blowers,
- Use high efficiency lighting,
- Site buildings to make use of existing wind blocks and natural cooling patterns derived from the landscape’s topography.
- Site buildings with southern exposure to capture passive solar energy.

Residential development in the State of Vermont is required to comply with Vermont Residential Building Energy Standards (RBES). Examples of development that these standards apply to include:

- Detached one- and two-unit dwellings;
- Multi-unit and other residential buildings three stories or fewer in height;
- Additions, alterations, renovations and repairs;
- Factory-built modular homes (not including mobile homes).

There is an exception to the RBES for residential construction by the owner, if various conditions are met. Among these conditions is that the owner must disclose the noncompliance in writing to a prospective buyer.

The Department of Public Service (PSD) has developed a residential “stretch” code that promotes energy efficiency measures in buildings that go beyond the minimum requirements. Projects subject to Act 250 (10 V.S.A. chapter 151) have to meet this stretch code and municipalities may choose to adopt the stretch code.

In order to comply with the RBES, a home, as built, must meet all of the Basic Requirements and the Performance Requirements for one of several possible compliance methods. If the home meets the technical requirements of the RBES, a Vermont Residential Building Energy Standards Certificate must be completed, filed with the Town Clerk and posted in the home. If a home required by law to meet the RBES does not comply, a homeowner may seek damages in court against the builder. See PSD’s [RBES webpage](#) for more information.

Commercial buildings and residential buildings 4 or more stories in height are subject to the Commercial Building Energy Standards (CBES). commercial building stretch code. See PSD’s [CBES webpage](#) for more information.

Decreasing Energy Use by Changing Behavior

Raising awareness to replace wasteful energy behaviors with energy saving ones can reduce the strain on existing energy resources, and help residents and businesses save money, making the town a more affordable place to live with a higher quality of life.

Examples include:

- Turn off lights when leaving a room.

- Use a programmable thermostat.
- Use a laundry line or indoor laundry rack in winter.
- Use a cold-water laundry wash.
- Consolidating car errands into single trips.

G. Municipal Role in Energy Efficiency

Municipalities can have an impact on energy use within their communities, including their own energy use.

Building Energy

State law requires a municipal administrative officer to provide a copy of the applicable building energy standard (RBES or CBES) when an application to issue a municipal land use permit for a structure is received, although the administrative officer may supply a copy of the PSD residential energy code handbook in lieu of the full residential standard.

In addition, because enforcement is limited at the state level, a municipality may encourage compliance with the building energy standards in its land use review processes to promote energy efficiency.

A municipality may use its general authority to adopt bylaws promoting energy conservation to condition land use permits for development on the submission of the certificate of compliance with the building standards (if applicable) and, in the case of the exception for construction by the owner, the disclosure of noncompliance. These actions would encourage energy efficiency by providing additional avenues to support compliance with the building energy standards and helping to assure that prospective buyers become aware of homes that are noncompliant.

In addition, a municipality may adopt a bylaw that requires compliance with the RBES stretch codes. This action would encourage energy efficiency in construction that exceeds the minimum requirements of the RBES. State law specifically allows towns voluntarily to adopt the RBES stretch code. In addition, a town's general authority to adopt bylaws promoting energy conservation would support a bylaw that requires compliance with the CBES stretch code.

Auditing Municipally Owned Buildings

Many towns in Vermont own buildings that are old and inefficient in many respects. For instance, older buildings often have insufficient insulation, wasteful heating and cooling systems, and out-of-date lighting. These kinds of infrastructure problems result in higher energy use with the resulting cost passed onto taxpayers. The Brookfield Town Office & Library has been audited and has led to cost-saving improvements. However, the audit's recommendations have not been fully implemented. In addition, the town could conduct audits on additional town buildings in order to determine what improvements are necessary, and which projects would have the highest cost-benefit ratio in terms of energy and financial savings.

Property Assessed Clean Energy (PACE)

Vermont enacted legislation in May 2009 (Act 45) that authorizes local governments to create town-wide districts known as Property Assessed Clean Energy (PACE). Once created, municipalities can offer financing to property owners for renewable energy and energy-efficiency projects. Eligible projects include the installation of solar water and space heating, photovoltaic panels (PV), and biomass heating, small wind, and micro-hydroelectric systems. PACE financing effectively allows property owners to borrow money to pay for energy improvements. The amount borrowed is typically repaid via a special assessment on the property over a period of up to 20 years; if the property owner wishes to sell the parcel before fully repaying the obligation, then the obligation is transferred to the new property owner at the time of sale. Brookfield is part of the PACE program. Brookfield's involvement with the PACE program has been minimal to date.

Capital Budget Planning

Given the potential expense of energy efficiency improvements, it is essential to wisely budget town funding to cover these costs. State statute enables communities to create a Capital Budget and Program for the purposes of planning and investing in long-range capital planning. Although most communities have some form of capital account where they save money, many do not have a true Capital Budget and Program. A capital budget outlines the capital projects that are to be undertaken in the coming fiscal years over a five-year period. It includes estimated costs and a proposed method of financing those costs. Also outlined in the Program is an indication of priority of need and the order in which these investments will be made. Any Capital Budget and Program must be consistent with this Plan and include an analysis of what effect capital investments might have on the operating costs of the community.

When planning for routine major facility investments, such as roof replacements, foundation repairs, etc., it is important to consider making energy efficiency improvements simultaneously. The cost to replace or renovate a community facility will only be slightly higher if energy efficiency improvements are done at the same time, rather than on their own.

At present, the town of Brookfield does not have an adopted Capital Budget and Program to help guide investments in community infrastructure and equipment.

Policy Making for Change

In addition to reducing the energy use related to facilities, Brookfield can implement policies that lower energy use by town staff or encourage greater energy efficiency. Examples include:

Energy Efficient Purchasing Policy – A policy of this nature would require energy efficiency to be considered when purchasing or planning for other town investments. For example, purchasing Energy Star rated equipment is a well-documented way to increase energy efficiency. Devices carrying the Energy Star logo, such as computer products and peripherals, kitchen appliances, buildings and other products, generally use 20 to 30 percent less energy than required by federal standards.

Staff Policies – Towns can also implement policies to guide its employees that are designed to reduce wasteful energy practices. Through policy making, local governments can set a clear example for townspeople and encourage sustainable behavior that will ultimately result in both energy and financial savings.

H. Renewable Energy Resources

The State of Vermont has adopted a statutory energy policy, codified at 30 V.S.A. § 202a, that encourages the “efficient use of energy resources” and the “wise use of renewable resources and environmentally sound energy supply.” It also has adopted various statutory goals that promote increased use of renewable energy to meet the energy needs of Vermonters. These include:

- By January 1, 2017, 55% of the State’s electricity consumption will be from renewable sources, rising to 100% by 2035.
- Reducing total fossil fuel consumption across all buildings by 0.5% each year, leading to a total reduction of 6% annually by 2017 and 10% annually by 2025. 10 V.S.A. § 581.
- By 2025, at least 25% of all energy consumed in Vermont will be from renewable sources. 10 V.S.A. § 580.
- By 2028, reducing greenhouse gas emissions by 50% from a 1990 baseline. 10 V.S.A. § 578.

In the 2011 Comprehensive Energy Plan (CEP), the PSD set out an ambitious goal that, by 2050, 90% of all energy consumed in the State be from renewable resources. The CEP sets an energy policy vision for Vermont and issuing the CEP is a statutorily required duty of the PSD.

Vermont law defines renewable energy generally as energy produced using a technology that relies on a resource that is being consumed at a harvest rate at or below its natural regeneration rate. It allows methane or other flammable gasses produced by landfills or anaerobic digestion of agricultural or food wastes to be considered renewable, but nuclear, coal, oil, propane, and natural gas may not be considered renewable.

Although initial set-up costs for renewable energy generation systems can be high, these systems can save users money over the long term and minimize their exposure to volatile fossil fuel prices. They reduce the consumption of carbon-based fuels, which helps to protect the environment and reduce reliance on centralized energy. In Vermont, some of these energy sources are more readily available than others and some are more cost effective for the individual energy producer.

While the benefits of renewable energy are clear, renewable energy may have negative environmental and land use impacts. All generation projects must follow state criteria outlined in Section 248. See section K of this chapter for more information.

- **Solar energy** can provide clean, reliable, safe electricity and water heating in Vermont.
 - The Vermont Energy Atlas (using GIS data) identified 647 viable locations in the town of Brookfield to develop rooftop solar energy production. One issue in siting

solar on roofs is whether the home is “solar-ready.” The concept of a “solar-ready” home is one constructed in such a way that installing and connecting a solar energy system (whether photovoltaic or solar thermal) does not require additional wiring, plumbing, or building modification.

- o Ground-mounted solar facilities do not rise above treeline and can be located in areas that are less rural, requiring fewer access roads and reducing adverse environmental impacts. However, if not properly sited, large solar facilities can impact soil and water resources, wildlife habitat and corridors, and scenic beauty, and disrupt historic settlement patterns of more densely developed areas surrounded by countryside. In addition, siting solar generation on agricultural land can have mixed impacts: On the one hand, solar generation may supply the farm with electricity or revenue or both, but on the other hand, solar generation can make land unavailable for agricultural production for the life of the facility.
- **Wind** generates electricity when a wind turbine is installed on top of a tall tower. Towers for home use are generally 80-100 feet in height, while commercial scale wind turbines can reach 500 feet tall or more, including rotor height. The amount of energy produced by a specific wind tower depends greatly on location, height of the tower and proximity to other obstructions. There are multiple levels of potential wind energy generation, ranging from Class 1 (10-11 mph) to Class 7 (19-25 mph). Most potential wind energy generation sites in Brookfield are Class 1, which is suitable for residential energy generation. In very limited areas, Brookfield does have the topography to generate wind energy at a commercial level, but only at a small scale (50 meter towers). However, the areas with the most potential are also some of Brookfield’s best wildlife habitat and siting 50 meter turbines in those areas would have negative effects on the town’s scenic and rural character because the towers would be significantly above tree line on prominent ridges.

Table 11: Potential Wind Energy Generation in Brookfield (in acres)

	Class 1 10-11 mph	Class 2 12-13 mph	Class 3 13-14 mph	Class 4 15-16 mph	Class 5 16-17 mph	Class 6 17-18 mph	Class 7 19-25 mph
Residential (30-meter)	9401	122	0	0	0	0	0
Small Commercial (50-meter)	754	16	0	0	0	0	0
Large Commercial (70-meter or more)	0	0	0	0	0	0	0

Source: Vermont Energy Atlas

- **“Biomass”** refers to organic non-fossil material of biological origin constituting a renewable energy source. Examples include agricultural and food wastes, grass, and wood. Biomass can be converted into an energy source to fuel vehicles (e.g. biodiesel), heat homes, or even generate electricity. Brookfield does not have any biomass electric generation facilities or community-scale biomass heating.
 - The most common biomass used in Vermont is wood for heating. Much of Brookfield is wooded, and therefore offers the opportunity for sustainably harvested woody biomass,
 - All use of wood for energy poses the risk of increased emissions of greenhouse gasses and other pollutants. Harvesting of wood for energy must be properly managed to ensure that the community’s natural resources are not negatively affected and that their consumption for energy reduces rather than increases pollutant emissions.
 - A biomass power plant would require a great deal of space to accommodate the various stages of collection and conversion of the mass into fuel before burning it to produce electricity. Water can also pose a problem as biomass facilities require large quantities to handle the recycling process of waste materials. Materials would have to be transported to and from the facility. Further, burning woody biomass solely to generate electricity is inefficient and expensive.
 - Farms can contribute agricultural wastes to the process of methane digestion (also known as ‘Cow Power’) to generate electricity or grow crops that can be used for transportation fuels. However, raising crops for transportation fuel takes land out of cultivation for food consumption and often can use more energy than it produces. Cow Power requires a significant upfront financial investment and is generally only effective when utilized by a large scale farm. Both the Sprague Farm and Meadowbrook Farm may have the capacity to utilize a methane digester.

- **Hydroelectric power** divides into two broad categories: (a) run-of-river, which uses the natural flow of water to generate power and (b) facilities that store water behind an impoundment. Run-of-river systems rely on seasonal rainfall and runoff to produce power, resulting in periods of low production. Impounding water behind a dam allows for control of the water flow, resulting in consistent electric production. Hydroelectric development necessitates balancing priorities. While the benefits of generating electricity from local renewable water resources are evident, they are not without associated costs. Streams and other waters are public trust resources. The power output from a given water must be moderated by environmental considerations. A minimum stream flow that is adequate to support aquatic life needs to be maintained and impoundments need to be designed with water quality, land use, and recreation considerations in mind. Brookfield currently has no active hydropower facilities but impoundments exist on Holden’s Pond, North Pond, and Sunset Lake that have the potential to generate electricity. Retrofitting existing sites is likely to have less environmental impact than opening new hydroelectric sites.

I. Energy and Land Use Policy

The Vermont Municipal and Regional Planning and Development Act (24 V.S.A. Chapter 117) does not allow communities to impose land use regulations that prohibit or has the effect of prohibiting the installation of solar collectors or other renewable energy devices. However, the statute does enable Vermont's municipalities to adopt regulatory bylaws (such as zoning and subdivision ordinances) to implement the energy provisions contained in their town plan.

Zoning Bylaws control the type and density of development. It is important to acknowledge the connection between land use, transportation and energy and seek to create zoning ordinances and subdivision regulations that encourage energy efficiency and conservation. Encouraging higher density and diverse uses in and around existing built-up areas can lead to more compact settlement patterns, thereby minimizing travel requirements. At the same time, Zoning Bylaws must be flexible enough to recognize and allow for the emergence of technological advancements which encourage decreased energy consumption, such as increased use of solar and wind power.

Subdivision regulations are one of the most effective tools for encouraging energy efficiency and conservation. Subdivision regulations involve town review in the design process. Because subdivision regulations govern the creation of new building lots, as well as the provision of access and other facilities and services to those lots, a community can impose requirements that a developer site their building to maximize solar gain. Likewise, subdivision can require that landscaping be utilized to reduce thermal loss.

J. Energy and Transportation Policy

It is important that communities recognize the clear connection between land use patterns, transportation and energy use. Most communities encourage the development of residences in rural areas, and these are in fact coveted locations to develop because of the aesthetics that make Vermont special. However, this rural development often means much of our population must drive to schools, work and services.

Because transportation is such a substantial portion of local energy use, it is in the interest of the community to encourage any new developments that are proposed in Brookfield to locate adjacent to existing roads. In particular, dense residential developments should be located within or adjacent to existing village centers. Commercial development that requires trucking and freight handling should only be located on roads which can effectively handle the size of vehicle needed.

K. Permitting and Siting Considerations

Energy generation in Vermont is subject to a number of different permitting requirements, most of which are limited to state level permitting. On the municipal level, state statute protects residential renewable energy generation systems from regulations that will completely prohibit their development.

Section 248

Distributed power generation facilities, such as hydropower dams, fossil fuel plants as well as wind power or solar systems that are part of the public power generation system, are subject to review and approval by the Vermont Utility Commission (30 VSA §248). Under this law, prior to the construction of a generation facility, the Board must issue a Certificate of Public Good. A Section 248 review addresses environmental, economic, and social impacts associated with a particular project, similar to Act 250. In making its determination, the Board must give due consideration to the recommendations of municipal and regional planning commissions and their respective plans. Accordingly, it is appropriate that this Plan address these land uses and provide guidance to town officials, regulators, and utilities.

For all commercial-scale energy generation facilities, the following policies shall be considered:

Preferred Locations: New generation and transmission facilities shall be sited in locations that reinforce

Brookfield's traditional patterns of growth, of compact village centers surrounded by a rural countryside, including farm and forest land. The town also supports renewable energy generation on top of existing buildings, on landfills, on brownfields outside of the village center, on reclaimed quarries or gravel pits, Superfund sites, or on sites that were previously covered by structures or impervious cover. The town, by joint letter of the Planning Commission and Selectboard, may designate a site as preferred if it is not visible in the growing season from town or state highways, is not actively agriculture, and is not part of a priority or high priority forest block or habitat connector.

1. **Prohibited Locations:** Because of their distinctive natural, historic or scenic value, energy facility development shall be excluded from the following areas:
 - Floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydro facilities)
 - Fluvial erosion hazard areas shown on Fluvial Erosion Hazard Area maps (except as required for hydro facilities)
 - Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis.
 - Rare, threatened or endangered species habitat or communities.

Section 248

Section 248 of Title 30 requires companies to obtain approval from the Board before beginning site preparation or construction of electric transmission facilities, electric generation facilities and certain gas pipelines within Vermont. Section 248 also requires Board approval for some long-term contracts for purchasing power from outside Vermont and for some investments in transmission and generation facilities outside Vermont.

Development under Section 248 is exempt from local zoning regulations.

2. Significant Areas: All new generation, transmission, and distribution facilities shall be sited and designed to avoid or, if no other reasonable alternative exists, to otherwise minimize and mitigate adverse impacts to the following:
 - Historic districts, landmarks, sites and structures listed, or eligible for listing, on state or national registers.
 - Public parks and recreation areas, including state and municipal parks, forests and trail networks.
 - Municipally designated scenic roads and viewsheds.
 - Special flood hazard areas identified by National Flood Insurance Program maps (except as required for hydro facilities)
 - Public and private drinking water supplies, including mapped source protection areas.
 - Primary agricultural soils mapped by the U.S. Natural Resources Conservation Service.
 - Necessary wildlife habitat identified by the state or through analysis, including core habitat areas, migration and travel corridors.
3. Natural Resource Protection: New generation and transmission facilities must be sited to avoid the fragmentation of, and undue adverse impacts to the town's working landscape, including large tracts of undeveloped forestland and core forest habitat areas, open farm land, and primary agricultural soils mapped by the U.S. Natural Resource Conservation Service.
4. Protection of Wildlife: Designers must gather information about natural and wildlife habitats that exist in the project area and take measures to avoid any undue adverse impact on the resource. Consideration shall be given to the effects of the project on: natural communities, wildlife residing in the area and their migratory routes; the impacts of human activities at or near habitat areas; and any loss of vegetative cover or food sources for critical habitats.
5. Site Selection: Site selection should not be limited to generation facilities alone; other elements of the facility need to be considered as well. These include access roads, site clearing, onsite power lines, substations, lighting, and off-site power lines. Development of these elements shall be done in such a way as to minimize any negative impacts. Unnecessary site clearing and highly visible roadways can have greater visual impacts than the energy generation facility itself. In planning for facilities, designers should take steps to mitigate their impact on natural, scenic and historic resources and improve the harmony with their surroundings.

New generation and transmission facilities should be sited in locations that reinforce Brookfield's traditional patterns of growth.

L. Equity Considerations

The Town of Brookfield is actively considering the potential equity impacts of the energy chapter's goals, policies, and recommendations. The Plan identifies that low-income households and individuals will be most burdened, and therefore the least likely to benefit from the energy-related goals, policies, and recommendations that the plan calls for individuals and households to undertake. Therefore, the Plan elaborates on programs and means that low-income households and individuals can utilize to implement these goals, policies, and recommendations. The Plan also considers equity concerns in siting renewable energy generation facilities.

While increased conservation and efficient use of energy benefits all residents, the benefit will be greatest for income-burdened residents. Regretfully, income-burdened residents may not be able to afford the upfront costs to renovate and weatherize their properties, install renewable energy facilities, or switch to energy-efficient appliances. The plan therefore supports income-based financial incentives, rebates, and programs for low- and moderate-income residents available from Efficiency Vermont, Capstone, and other organizations. Furthermore, the plan supports residents' participation in the Property Assessed Clean Energy (PACE) program, which provides access to financing for upfront commercial and residential energy efficiency, weatherization, and renewable energy generation improvements. The Plan also elaborates on how the costs of energy and energy scarcities are most burdensome to low-income households and individuals.

The Plan supports the minimization of energy use from transportation by promoting active transportation and multimodal transportation through developing more pedestrian and bicycle facilities, carpooling, clustering new development in village areas, and increasing access to public transportation options. The Plan also supports the Tri-Valley Transit Dial-A-Ride program wherein elderly residents or those with disabilities or low income can receive free rides for medical appointments, pick up groceries, or reach critical services. These goals, recommendations, and policies will help lower energy costs for all residents. However, this will benefit residents the most who do not own or lack access to a single-occupancy vehicle.

The Plan calls for patterns of land use that do not place inequitable, undue, or unfair burdens or costs on any segments of the Town's population. Lastly, given that renewable energy generation facilities (other than biomass facilities) do not pose a health risk or environmental threat, on nearby residents or any segments of the Town's population. In the case of siting biomass facilities, the Plan calls for a minimization of polluting emissions.

M. Goals, Policies and Recommendations

Goals

1. To promote the installation and use of energy efficiency measures that are cost-effective over their life and to encourage the use of renewable energy to meet the remaining demand.
2. To encourage a pattern of settlement and land use that is energy efficient.

3. To promote the construction of energy efficient residential and commercial buildings and increase awareness and use of energy conservation practices through educational outreach to the public.
4. To consider increasing public transportation opportunities throughout the community, including park-and-ride access, biking paths, and sidewalks.
5. To promote greater use of existing public transportation services by community members.
6. To promote electric grid and power line hardening for residences in Brookfield in order to increase reliability.

Policies

Overall

1. The town encourages the use of energy sources that are the most efficient and cost-effective and the use of the least environmentally damaging sources of energy. The efficiency, cost-effectiveness, and environmental impacts of energy use and conveyance shall be determined on a life-cycle basis, including all costs related to extraction, processing, refinement, transportation, transmission, reliability, and generation and disposition of waste and pollutants.

Energy Efficiency

2. Promote compliance with RBES and CBES and any RBES and CBES “stretch” codes adopted by the Department of Public Service.
3. Promote newly constructed or renovated residences that elect to use the “construction by owner” exception to file on the land records a disclosure of their noncompliance with the RBES.
4. Make PACE available to leverage installation of cost-effective residential energy efficiency measures in Brookfield.
5. Encourage construction of new buildings, additions, and renovations to utilize the maximum feasible passive solar heating, use high efficiency lighting and appliances, and achieve a U.S. Environmental Protection Agency Energy Star rating or the equivalent in energy use. The installation of on-peak resistance electric heat does not conform to this plan.
6. Encourage residents and owners of existing buildings, including the town, to obtain a competent energy audit of the buildings with a view toward identifying and making cost-effective improvements in energy efficiency. They should:
 - a. Be encouraged to retrofit those buildings to improve their insulation and efficiency.
 - b. Be encouraged to install highly efficient heating systems and to maintain and operate their existing heating systems to maximum efficiency possible.

7. Encourage residents and owners of existing buildings, including the town, to acquire and use high efficiency lighting equipment and appliances.
8. Promote energy-efficient travel by residents by encouraging carpooling, increased use of public transportation, telecommuting, home businesses, ebikes, and electric vehicles, and safe bike routes.

Energy Sources, Facilities, and Siting

9. Encourage use of renewable energy systems for self-generation in both off-grid and net metering scenarios. Encourage new construction to be solar-ready. Install group net metering systems only if the renewable energy credits from the systems are applied toward the Renewable Energy Standard or are retired by the group.
10. Encourage the use of heat pumps to replace fossil fuel heating when:
 - a. Installed in structures that comply or are renovated to comply with policies 2 and 5 of this energy plan.
 - b. The installation will result in a net decrease in greenhouse gas emissions, determined in accordance with policy 1 of this plan.
11. Site power generation projects in town, the purpose of which is primarily to sell power onto the electric grid, provided each of the following is true:
 - a. The total capacity of the generation project is no more than 2.2 MW.
 - b. The project is proposed to meet the needs of Vermont electric consumers.
 - c. The generation facilities involved in the project use renewable fuels, and the renewable energy credits from the facilities are applied toward the Renewable Energy Standard.
 - d. The project meets the other policies of this plan.

For purposes of these policies, the term “project” includes all energy facilities that are part of a larger undertaking (i.e., multiple wind turbines that are developed according to a common plan) and all access roads, site clearing, power lines, gas mains, substations, fencing, and lighting, and all other land development related to the energy facilities.
12. Site an electric transmission project in Brookfield only to ensure reliability and if the applicant demonstrates that electricity transmitted through the project is more cost-effective and has lower environmental costs than generation and demand-side alternatives, calculated in accordance with policy 1.
13. Site generation and transmission projects in locations that reinforce Brookfield’s traditional patterns of growth. The applicant shall take all feasible measures to minimize the visual impact of the project and its impact on the town’s rural character.
14. Exclude new energy generation, transmission, and distribution projects from the following areas because of their distinctive value:

- a. Floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydroelectric facilities)
 - b. River Corridors (except as required for hydroelectric facilities)
 - c. Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis.
 - d. Rare, threatened or endangered species habitat or communities.
 - e. The town's Conservation and Scenic Protection Districts, except for self-generation of 15 kW AC or less that uses a renewable fuel.
15. Site and design all new generation, transmission, and distribution projects to avoid or, if no other reasonable alternative exists, to minimize and mitigate adverse impacts to the following:
- a. Historic districts, landmarks, sites and structures listed, or eligible for listing, on state or national registers.
 - b. Public parks and recreation areas, including state and municipal parks, forests and trail networks.
 - c. Scenic roads, vistas, and viewsheds. Determine the existence of scenic roads and scenic vistas and viewsheds from those roads in accordance with policy 8 under Significant Natural and Scenic Areas.
 - d. Special flood hazard areas identified by National Flood Insurance Program maps (except as required for hydroelectric facilities)
 - e. Public and private drinking water supplies, including mapped source protection areas.
 - f. Primary agricultural soils mapped by the U.S. Natural Resources Conservation Service.
 - g. Forest land. For the purpose of this policy, fragmentation of forest land constitutes an adverse impact.
 - h. Necessary wildlife habitat, natural communities, and wildlife migration and travel corridors. For the purpose of this policy, fragmentation of these resources constitutes an adverse impact. Project designers must gather information and analyze the effects of the project on habitat and natural communities in the project area, and wildlife residing in the area and its migratory routes.
16. Use screening to reduce the visual impacts of energy generation, transmission, and distribution projects as seen from public roads and neighboring properties in accordance with the following:
- a. Without interfering with the project's function, make the maximum use possible of pre-existing vegetation, structures, and topographical features that screen the project.

- i. Assure the continuity of this pre-existing screening through site control or agreements with relevant property owners.
 - ii. If pre-existing screening is lost during the life of the project (e.g., cutting of vegetation that screens from a public road), review the ensuing visual impact and install new screening to mitigate that impact.
 - b. Install screening such as vegetation or topographic features to distract the viewer from the project and break up the view of the project.
 - i. Do not install “solid wall” screening such as a line of arborvitae.
 - ii. Do not install screening that interferes with the project’s function. For example, do not install screening that will place a shadow on solar electric generation.
 - iii. Choose parcels whose size is sufficient for both the project and the installation of screening.
 - c. When installing vegetative screening, choose a diversity of native species and mix coniferous and deciduous plantings.
 - d. This policy does not apply to solar installed on rooftops or self-generation of 15 kW AC or less that uses a renewable fuel.
- 17. Do not site wood biomass electric generation in Brookfield.
- 18. Develop small hydroelectric facilities in Brookfield only if the project meets the other policies of this plan and avoids or, if no other reasonable alternative exists, minimizes and mitigates adverse impacts to riverine ecosystems and water quality.
- 19. Locate new significant public investments (including schools, public recreational areas, municipal facilities, and major commercial or residential developments) within or in close proximity to the village areas and utilize existing roads whenever possible.
- 20. In proceedings before the PUC under 30 V.S.A. § 248 (“Section 248”), apply policies 1, 9, and 11 through 19 of this chapter and the other policies of this Plan as described under State Regulatory Proceedings in Chapter XVI, Town Plan Implementation. For the purpose of Section 248 proceedings:
 - a. These policies constitute recommendations of the Selectboard and Planning Commission.
 - b. Policies 14 through 19 are measures to conserve and protect the environment, natural resources, and the scenic, aesthetic, and rural character of Brookfield and policies 14 through 17 are intended as written community standards to preserve Brookfield’s aesthetics and scenic beauty.
- 21. Distribution line reconstructions and extensions subject to Act 250 jurisdiction do not conform to this plan unless the applicant demonstrates that:
 - a. Electricity delivered through the distribution line is more cost-effective and has lower environmental costs than on-site electricity generation from renewable sources or a combination of such generation with demand-side measures, calculated in accordance with policy 1.

- b. All feasible measures have been taken to minimize the visual impact and to avoid and, if not avoidable, minimize the natural resource impact of the reconstructed line or line extension.
 - c. With respect to a line reconstruction or extension outside a village district identified in the development bylaw, the reconstruction or extension will not cause or contribute to additional development.
22. Support income-based financial incentives, rebates, and programs for low- and moderate-income residents available from Efficiency Vermont, Capstone, and other organizations.

Recommendations

1. The town should amend the development bylaw to require the filing of RBES and CBES certificates as a condition of land use approval. For structures taking advantage of the owner-builder exception, this amendment should include filing a disclosure on the land records.
2. The town should adopt the residential or commercial “stretch codes” issued by the Department of Public Service.
3. The town should complete implementation of the energy audit conducted on the Town Office and Library and consider conducting audits on additional town buildings.
4. The town should foster awareness among town residents about incentives for energy efficiency and renewable energy.
5. The town should continue its support for PACE.
6. The town should include energy efficiency and use of renewable energy when planning for capital investments and consider adopting a Capital Budget and Program.
7. The town should consider instituting an energy efficiency purchasing policy and a policy to guide town officers and staff in reducing energy use.
8. The Brookfield Elementary School should continue its program that teaches the need for and methods of conserving energy.
9. Woodlot owners should be encouraged to manage their woodlots for multiple uses which would include sustained yield of timber and fuel wood in accordance with the policies of this plan.
10. The town should consider requiring new construction to be solar-ready and to include capacity for level 2 EV charging stations.
11. The town may consider whether to create incentives for renewable energy systems.
12. Municipal officials should participate in the PUC’s review of new and expanded generation and transmission facilities in Brookfield to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.
13. The Town should work with the electric service providers to create more resilient and hardened electric infrastructure.

XI. Natural, Scenic and Cultural Resources

A. Background

Brookfield’s forested, farmed, and open land resources as well as its water and wildlife resources are key elements in defining rural character. Brookfield residents value open, working lands that are hospitable to both recreation and outdoor work. The quality and quantity of Brookfield’s natural resources and the character of place they create are important ingredients in maintaining our health and economic welfare.

Vermont’s Planning Statutes were amended by Act 171 of 2016 to encourage towns to identify forest blocks and wildlife habitat connectors and to minimize fragmentation of those areas through land use planning.

It is the fundamental goal of this Plan to sustain and enhance the integrity and diversity of the natural resources within Brookfield. Therefore, it is the policy of the town to develop and implement practices that conserve natural resources and to ensure that future land use activities are not detrimental to the environment.

Goals

1. To protect the natural and scenic character of Brookfield.
2. To maintain the quality of the landscape for the future and to protect the natural world while allowing the land to be worked safely.
3. To enhance and maintain Brookfield’s outdoor environment for both active and passive recreational uses including hiking, fishing, boating, camping, hunting, horseback riding, music, and the arts.

Policies

1. To protect the natural and scenic character of Brookfield’s landscape.
2. Preserve the health of Brookfield’s ecosystems, natural communities, forest blocks, wildlife corridors, and the species that inhabit these ecosystems.

B. Water Resources

Brookfield has an abundance of high-quality water resources, including its surface waters – lakes, ponds, streams, springs, wetlands, and groundwater. Land use planning and regulation can play an important role in the maintenance of the quality of the town’s water resources. There are currently no community water supplies in Brookfield. Town residents are self-supplied through wells and springs. Sustainable yields of quality water are necessary for the lives and livelihood of citizens in Brookfield. Downstream residents in other communities depend upon clean water from Brookfield, being located at the top of the watershed. Thus it is Brookfield’s responsibility to maintain and enhance water quality as it leaves our town.

The health of Brookfield's surface waters is essential to maintaining quality groundwater, as well as an important element for outdoor recreation and natural beauty. Vermont law declares that the lakes and ponds of the state and the lands lying underneath them are held in trust by the state for the benefit of all Vermonters. The state, as trustee, cannot sell or give away these public resources to individuals or corporations for purely private purposes. A permitting program for large groundwater withdrawals was implemented by the state in 2011. Those seeking permits will have to show that their withdrawals will not have an adverse impact on water resources and will be consistent with local and regional plans.

The maintenance of high water quality is important for public health, wildlife and fisheries, ecosystem health, and water-based recreation. There are currently no permitted point discharges to surface waters in Brookfield. However, nonpoint pollution from inadequate septic systems, runoff from roads and construction projects, and improper agricultural practices are all problems. Other sources of nonpoint pollution are agricultural runoff, streambank erosion, removal of riparian vegetation, upstream impoundments, junkyards, and land development. Future land use decisions should evaluate the probable water quality impacts associated with each development proposal, and should be consistent with the water standards promulgated by the State of Vermont.

Stream instability can lead to excessive flooding and other types of damage due to increased flow velocity. Riparian buffers are strips of bankside vegetation along waterways that provide a transition zone between water and land use. Construction or development along shorelines, or removal or disruption of vegetation within these areas can create increased water pollution, higher water temperatures, destabilization of banks, higher soil erosion rates and loss of fish or wildlife habitats. There are a number of state and federal programs that help fund stream-management projects, such as the Conservation Reserve Enhancement Program (CREP). CREP provides funds to farmers for the purpose of preserving lands once used for agriculture, with the goal of introducing and encouraging plant life to prevent erosion and provide habitat. The White River Partnership, a nonprofit organization, has been planting trees and shrubs along tributaries to the White River in Brookfield and other watershed towns to improve water quality and fish habitat.

Replacing deficient culverts and bridges also helps protect water quality – installing appropriately scaled and designed structures that can handle flood events, stormwater runoff, promote fish passage, and minimize the discharge of road sediment.

Goals

1. To maintain or enhance the quality of drinking water resources.
2. To allow use of groundwater resources by new development in such a manner to protect the public right to adequate quality and quantity of the resource.
3. To consider surface water and groundwater impacts and effects related to proposed or existing uses of land.
4. To maintain or improve surface water quality.

5. To support the permanent protection of the land around some of these water bodies to protect their water quality and scenic character
6. Support the maintenance and improvement of water quality through the policies and implementation actions listed in the White River and Winooski River Tactical Basin Plans, where practicable.

Policies

1. Review and monitor land use activities which threaten groundwater to prevent undue loss of groundwater quality, with the cost of remediation and monitoring borne by the responsible party.
2. Preservation of the natural state of streams by:
 - Protection of adjacent wetlands;
 - Maintenance of buffer vegetation and existing streambanks.
 - Allow for the natural meandering of streams where possible.
3. At a minimum, comply with the setbacks and other activities required by the State for Class 1 and 2 wetlands, shorelands, streams, and river corridors.
4. Permit development (as defined in 24 V.S.A. §4302) only if it does not cause any significant environmental degradation and does not result in an adverse impact on ground or surface waters.
5. Permit commercial water withdrawals only if:
 - They will not have an adverse impact on the water sources in Brookfield.
 - Developers maintain a monitoring plan that is properly enforced by the state.
 - They provide some level of remuneration to the community in return for utilizing a public asset.
6. Support the continued restoration of natural riparian vegetation along stream banks and lakeshores.
7. Maintain appropriately scaled and designed structures, such as culverts, that can handle flood events, stormwater runoff, promote fish passage, and minimize erosion.

Recommendations

1. Maintain an up-to-date inventory of existing culverts and structures, coupled with a short- and long-range plan for replacement and upsizing.
2. The town should take advantage of state programs to control nonpoint pollution, and should provide input to the State when it is considering any applications for discharge permits in Brookfield.

C. Air Quality

Air quality is an important feature in our overall quality of life. Clean air contributes to our health and to clear skies and extended views. Brookfield is mostly forested with limited development, but air quality can be affected from vehicle emissions, heating sources, backyard burning, commercial activities, wildfires, and dust from construction projects.

Goals

1. Maintain healthy air quality.
2. Support state and federal programs directed at the reduction of air pollution.

Policies

1. Biomass generation facilities and outdoor wood burning heating units must utilize appropriate pollution control measures.

D. Wetlands and Vernal Pools

The State of Vermont defines wetlands as areas inundated by surface or groundwater with a frequency sufficient to support significant vegetation or aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands are ecologically fragile areas. How these lands are managed has a direct bearing on the quality and quantity of water resources. The Vermont Water Resources Board estimates that wetlands comprise less than 5 percent of the surface area of Vermont. In addition to being Vermont's most productive ecosystem, wetlands serve a wide variety of functions beneficial to the health, safety and welfare of the general public, including the following:

- Retaining storm water run-off, reducing flood peaks and thereby reducing flooding;
- Improving surface water quality through storage of organic materials, chemical decomposition and filtration of sediments and other matter from surface water;
- Providing spawning, feeding and general habitat for fish;
- Providing habitat for a wide diversity of wildlife and rare, threatened or endangered plants; and
- Contributing to the open space character and the overall beauty of the rural landscape.

In 1986, Vermont adopted legislation for the protection and management of wetlands [10 V.S.A., Chapter 37]. Determination of whether a wetland merits protection is based on an evaluation of the extent to which it serves the general functions outlined in the bulleted list above.

Under the Vermont's Wetland Rules, if land development can be expected to impact a protected wetland, such activity cannot commence unless the Vermont Agency of Natural Resources (ANR) first grants a Conditional Use Determination (CUD). A CUD will be granted when the proposed use will not have an undue adverse impact on the function of the wetland. In many

cases, such approvals are granted with conditions to mitigate impacts and to more readily protect wetlands.

For Brookfield, as well as the State, the most significant wetlands have been mapped. These wetlands have been delineated on USGS topographic maps, and by reference are made a part of this Plan (see Appendix B, Map 6, Natural Resources). Other smaller wetlands often do not show on these maps, so a field determination by a qualified biologist is needed for most activities that involve state permits. There are approximately 865 acres of mapped wetlands in Brookfield.

In those towns such as Brookfield, that have zoning or subdivision regulations, final approvals cannot be granted for projects involving wetlands unless the ANR has first had an opportunity to evaluate the effect of the project on the wetland [24 V.S.A., Section 4409].

Vernal pools (small woodland pools filled with water in the spring that support consistent amphibian breeding) should be identified and conserved. The recommended 200-foot buffer area around vernal pools is critical habitat for these amphibians and should be protected from adverse uses and development. Fens – rare wetland natural communities with numerous rare plants – are discussed below.

Goal

1. To identify and encourage land use development practices that avoid or mitigate adverse impacts on wetlands and vernal pools.

Policies

1. Locate structural development or intensive land uses consistent with town zoning setbacks and State and Federal wetland protection rules and regulations.
2. Permit development (as defined in 24 V.S.A. § 4302) outside the established buffer only if it does not cause any significant environmental degradation and does not result in an adverse impact on a wetland or its function.

Recommendation

1. The town should consider conducting a wetland and vernal pool inventory.

E. Flora, Fauna and Natural Communities

Brookfield hosts a broad range of natural communities that exist in the older forests, early successional forests, open fields and valley floors. Several priority forest blocks have been mapped by the Vermont Department of Fish and Wildlife. The breadth and diversity of wildlife and plant communities indicate a healthy, thriving ecosystem. Plants respond to soil structure and chemistry, hydrology, and climate. The effects of unmanaged development can have a negative impact on plant communities, which in turn will harm the overall ecosystem in the area affected. Good management practices, such as requiring developers to locate their projects in less

sensitive areas, maintain buffer areas and protect against silt runoff from excavating, are a few of the ways that these communities can be maintained.

Brookfield's fields, forests, marshes, wetlands, riverbanks, ponds, and streams provide habitat to a diversity of flora and fauna. Although nearly all undeveloped land in the town provides habitat for these plants and animals, there are some areas which provide critical habitat that should remain intact. These areas include wetlands, vernal pools, cliffs, ledges, fens, deer-wintering areas and ecotones (the edge transition zone between two cover types, such as field and forest). Development or logging in or adjacent to these areas should consider wildlife implications during the planning process. Wildlife is one of the primary attractions to the area and provides many citizens of Brookfield with direct and indirect livelihoods from sports, tourism and direct harvest of wildlife.

The Vermont Natural Heritage and Nongame Program of the Department of Fish and Wildlife has mapped 28 known occurrences of rare plant and animal species and 15 rare natural communities in Brookfield. Nine of these rare natural communities are fens, mineral-rich wetlands characterized by a sedge mat. Many of the rare plant species occur in fens; they tend to be small ecosystems, very sensitive to disturbance. Five of these rare natural communities are swamps. One of these ecologically significant swamp communities is Halfway Brook Swamp, a red maple-black ash seepage swamp. The fens, swamps, and the rare plants that grow there receive some degree of protection under the Vermont Wetlands Rules. Part of one fen has been acquired by The Nature Conservancy.

Brookfield is home to a wide variety of animals, insects, and plants. There are areas in Brookfield which provide critical habitats for certain animals, including white tailed deer, birds including forest-interior songbirds, black bear, and bobcat. Every new development in town results in an incremental loss or change to wildlife habitats. Sensitive land use planning can lessen or mitigate the impact on wildlife habitats. For example, housing development or excessive logging can have detrimental effects on deer wintering areas. If an area proposed for development encompasses a deeryard, utilizing certain planning strategies can lessen the impact on the area. Should the entire area be winter cover, clustering of homes within an area of the project site will still enable deer to retain most of their habitat. State biologists are available to work with landowners and developers interested in planning projects in ways that reduce the impact on critical wildlife habitats, rare and endangered species, and other critical natural communities.

Wintering areas are an important habitat requirement for deer during the critical winter months when snow depth and climate are limiting factors to survival. Typically, these areas consist of mature softwood stands, at low elevations or along stream beds, which provide cover and limit snow depths. Southerly facing slopes are also beneficial due to good sun exposure and may be utilized even in areas of limited softwood cover. More specific factors, such as percent canopy closure, species of softwoods, and stand age, also figure into the quality of the wintering area. Brookfield has approximately 9,907 acres (34% of Brookfield's total acreage) of mapped deer wintering yards. Deer wintering areas were once critical to maintaining deer populations, because winter kill was the limiting factor of deer populations. Today, with climate change affecting winter conditions, winter kill has been reduced, and the deer densities have increased to the point where increased crop damage and tree regeneration has been hampered somewhat. So,

deer wintering areas, while still important for survival in very cold winters, are of reduced concern, but they are often in steep slope areas, so development is not recommended there.

Wildlife management requires management of human activities around animals as much as management of animals around human activities. Managing for specific species is not as desirable as managing for the entire ecosystem supporting the species.

There comes a point where a species cannot use seemingly adequate habitat because of adjacent development. While certain strategies may lessen the impact on habitat, planners and developers should keep in mind that almost every development will affect the ecological balance. It should be noted, however, that high density or intensive land uses are more likely to have a negative impact on the quality of wildlife habitats.

Large tracts of forest land, rivers, riverbanks, floodplains, and cliffs are natural communities for many animals and should remain intact as much as possible. Forests provide habitat to a diverse population of wildlife, which are negatively impacted when forested land is fragmented through development. Forest fragmentation affects water quality and quantity, fish and wildlife populations, and the biological health and diversity of the forest itself. When many small habitat losses occur over time, the combined effect may be as dramatic as one large loss. Forest fragmentation can disrupt animal travel corridors, increase flooding, promote the invasion of exotic vegetation, expose forest interiors, and create conflicts between people and wildlife. Habitat loss reduces the number of individuals of many wildlife species and can totally eliminate some species.

To help mitigate the effects of human population growth and land consumption, many scientists and conservationists urge governments to establish protected corridors, which connect patches of important wildlife habitat. These corridors, if planned correctly, allow wildlife to move between habitats and allow individual animals to move between groups, helping to restore or maintain genetic diversity that is essential both to the long-term viability of populations and to the restoration of functional ecosystems. An important corridor in the northern part of town allows wildlife to travel from west to east. In this corridor is an underpass of I-89 that has been identified by a state wildlife biologist as a critical wildlife crossing of the highway. Because of its generally low density, Brookfield maintains a substantial amount of good quality wildlife habitat. In this regard, the habitat ratings shown on Map 6 of 9 (see Appendix B) are relative ratings that should be read in conjunction with the discussion in this chapter.

Goals

1. Sustain the natural diversity of flora and fauna found in Brookfield.
2. Maintain or improve the natural diversity, populations, and migratory routes of wildlife.
3. Maintain large forest blocks in Brookfield, particularly large forest blocks as defined by the Vermont Conservation Design, developed by the Vermont Department of Fish and Wildlife.
4. Encourage sport and subsistence hunting and fishing in accordance with seasons and bag limits determined by the State Department of Fish and Wildlife.

5. Preserve critical habitat areas for wildlife.
6. Preserve unique species and habitat.
7. Protect large tracts of forest land, rivers, riverbanks, floodplains, and cliffs which are natural communities and wildlife habitat.

Policies

1. Sustain and enhance native wildlife populations and natural diversity.
2. Protect critical habitats through conservation easements, land purchases, leases and other incentives.
3. Design development to protect Brookfield's significant role as an east-west wildlife corridor by:
 - Maintaining large tracts of land.
 - Avoiding fragmentation of habitat.
 - Maintain connecting links between habitat blocks, particularly the underpass beneath the Interstate.
4. Minimize development that has the potential to adversely impact wildlife corridors.
5. Give preference to development that utilizes existing roads and whenever possible preserves existing forest blocks and prime agricultural lands.
6. Encourage connecting large patches of habitat that will allow for the movement, migration, and dispersal of animals and plants.
7. Protect critical habitat and sensitive ecological areas such as steep slopes, wetlands, deer yards, vernal pools, fens, and endangered species sites.

Recommendations

1. Identify and maintain - large forest blocks, especially priority blocks, in Brookfield to promote forestland conservation.
2. The town should consider conducting a natural resources and biodiversity inventory.
3. Protect wildlife corridors identified by the VT Department of Fish and Wildlife including the east-west wildlife corridor in the north of Brookfield and improve wildlife Interstate crossing.

F. Invasive Species

Invasive non-native species are a growing problem throughout Vermont. Invasive plants are exotic species that typically spread from disturbed areas into natural communities, but many of these species also encroach on yards, agricultural fields, and working forests. In Brookfield the spread of invasive species negatively affects the rural character of the town, reducing native plant populations and consequently degrading wildlife populations; dominating economically productive plants in agricultural fields and inhibiting reproduction of trees in sugarbush areas

and other forests; destroying the scenic quality of roadsides; reducing property values; and potentially posing health risks.

The greatest threats to Brookfield are posed by wild chervil (fields, roadsides and recently logged areas), Japanese knotweed (streams, rivers, roadsides, yards), and Japanese barberry and buckthorns (forests), but there are increasing threats throughout the region from garlic mustard, giant hogweed, Asian bittersweet, wild parsnip, goutweed, purple loosestrife, hemlock woolly adelgid, Asian longhorned beetles, emerald ash borer, jumping worms, and other invasive species. Some of these invasive species, especially wild chervil and knotweed, proliferated to such an extent that eradication from many sites is impossible. Fortunately, portions of the town are not infested. Diligence is necessary from town residents and employees to prevent the further spread of these species, and the introduction of new species that could pose more serious threats. For example, giant hogweed has been identified in several towns in Central Vermont but so far is not widespread in Brookfield. It is important to prevent the spread of these and other invasive species.

One of the more common ways in which invasive species spread to new locations is when seeds or root segments are transported on vehicles, especially construction and logging machinery, and mowers, among other vehicles. Best management practices have been identified for reducing the accidental spread of invasive species including avoiding using fill from invaded sites, washing of equipment before leaving infected sites, stabilization of disturbed sites, and timing mowing to occur before the plants produce seeds. [Vermont Invasives](#) has more information available about ways that residents can help stop the spread of invasive species.

Goal

1. To reduce the impact of invasive species on agricultural and forest native ecosystems.

Policy

1. Control occurrences of invasive species to prevent further infestations.

Recommendations

1. Train town employees and contractors to identify and implement best management practices to prevent the spread of invasive species.
2. Time roadside mowing to minimize and reduce the spread of invasive species.
3. Promote public educational programs regarding identification and control of invasive species.

G. Mineral Resources

The use and management of Brookfield's earth and mineral resources are matters of public interest. Maintenance of quantities of gravel, sand, crushed rock, and other materials are essential for state and local highways. Having access to mineral resources is important to the community for the maintenance of roads, but needs to also balance the negative impacts to residents and the

environment. Issues related to mineral extraction include creation of excessive dust and noise, increased truck traffic through residential neighborhoods, surface and groundwater contamination, degradation of the site or wildlife habitat, loss of scenic character in the immediate area, and undue deterioration on state and town roads.

Goal

1. To permit extraction and processing of mineral resources only where such activities are appropriately sited (taking into account impacts on natural resources, scenic character and compatibility with this Plan), managed, and the public interest is clearly benefited. Any support shall be balanced against the need to maintain the rural character valued by the citizens of Brookfield.

Policies

1. Consider the potential impacts of pollution, noise and vehicle traffic as part of the decision making process when reviewing proposed gravel extraction projects.
2. Plan, construct and manage existing and proposed mineral extraction and processing facilities:
 - So as not to adversely impact existing or planned uses within the vicinity of the project site.
 - To not significantly interfere with the function and safety of existing road systems serving the project site.
 - To minimize any adverse effects on water quality and quantity, fish and wildlife habitats, viewsheds and adjacent land uses.
 - To reclaim and re-vegetate sites following extraction.
 - To minimize noise impacts on adjacent uses including residential areas.
 - To maintain the rural character of the town.

H. Significant Natural and Scenic Areas

All of Brookfield is significant for its beauty and its rural landscape. There are several areas that represent more significant places in town. These areas include:

- **Lakes and Ponds** – Brookfield has several good-sized lakes and ponds which can be seen from town roads and state highways: Sunset Lake, Lamson, Baker, Rood, South, Holdens, Pickles and Twin Ponds. Lamson Pond is also visible from Interstate 89. The Twin Ponds are especially scenic and distinctive as they are nestled in a depression and can be viewed from above.
- **Brooks and Streams** – The Second Branch of the White River, which runs through the Route 14 valley on the east side of town, fed by its tributaries, Sunset and Halfway Brooks are significant to the community. Also of importance is Ayers Brook which runs

through the Route 12 valley on the west side of town, fed by its tributary, Open Meadow Brook.

- **Significant Cascades** – Significant cascades have been identified along brooks at the following sites: on Sunset Brook between Sunset Lake and Rt 14, at two old mill sites in West Brookfield village and west of this village on Cram Hill Road, and at an old mill site on the outlet stream from Twin Pond.
- **Brookfield & Williamstown Gulf** - Brookfield Gulf, almost three miles long, is found in the western part of town and is traversed by Route 12. Williamstown Gulf, approximately 1 1/2 miles long, is found in the northeast part of town and is traversed by Route 14. Approximately 1/2 mile of the southern portion of Williamstown Gulf is located in Brookfield. These areas are highly scenic due to their natural beauty, their visibility from public roads, and the fact that they are largely undeveloped (except for a handful of structures), and contain no overhead power lines.

The Brookfield portion of the Williamstown Gulf receives a high degree of protection as it lies almost entirely within Ainsworth State Park. Approximately 1/3 of Brookfield Gulf lies within Allis State Park. The gulfs also receive a degree of protection by inclusion in the town's Conservation District, in which structures are prohibited, and a Scenic Protection District.

In addition to these specific areas, Brookfield has many roads that residents would consider scenic. Town roads are especially scenic where they afford views of the surrounding mountains and hills or of the major lakes and ponds in town, or are lined with stone walls or large sugar maples.

Goals

1. To identify and protect those natural, scenic, and historic resources that are unique to Brookfield and make it special.
2. To preserve and protect Brookfield's important cultural, scenic, and natural resources for future generations.

Policies

1. Allow for compatible development without sacrificing important scenic, cultural, and natural resources.
2. Review of all development projects carefully to minimize the impact on Brookfield's natural, scenic, and cultural resources.
3. Protect unique resources through careful planning.
4. Encourage the permanent protection of the remainder of Brookfield Gulf through fee acquisition or conservation easements by the State, town, or private land trusts.
5. Discourage the widening of town roads and the cutting of large trees (where it would adversely affect the scenic quality).

6. Minimize the adverse impacts development may have on scenic vista(s), by careful placement of buildings, clustering of buildings or other mechanisms.
7. Minimize the adverse effects of development of ridge tops by careful placement of structures and limiting forest clearing and driveway length, or establishing setbacks.
8. Preserve and minimize adverse impacts to views from town roads of the surrounding mountains, hills, and fields; of the lakes and ponds listed in the first bullet of this Section G; and of stone walls and large sugar maples that line or grow along the roads.

I. Land Protection Strategies

Methods of protecting lands are varied. In general, there are two ways to encourage the preservation of culturally and naturally significant areas: voluntary and regulatory. Voluntary methods allow landowners to:

- Preserve land by placing restrictions on its use, through such tools as conservation easements or mutual covenants.
- Transfer land to a conservation organization (such as the Vermont Land Trust) through donation.
- Sell or donate land with conditions attached, like deed restrictions or conditional transfers.

Brookfield could become an active participant in land conservation through replenishing Brookfield's existing Conservation and Recreation Fund through annual appropriations via the town budget. The town could use such funds to purchase land outright, or to assist a land conservation organization with the purchase of a conservation easement. Monies from this fund have been used in the recent past to assist a conservation organization to purchase an easement on land in Brookfield.

Regulatory methods use zoning and/or subdivision rules to regulate the location, density and design of development within selected areas to minimize harmful impacts while allowing for a reasonable level of development. Regulatory methods include:

- **Overlay Districts** - The creation of overlay districts is the most common method of regulating specific areas for the purpose of protecting wildlife and other natural resources. Overlay districts can be used to exclude development on or to impose resource protection or conservation standards within overlay areas. These districts can be used to protect many types of resources.
- **Resource Protection Districts** - protect wildlife resources and open space areas or resource-based uses such as farming, forestry, recreation from incompatible development.
- **Large Lot Zoning** - Large lot zoning refers to the designation of a very large minimum lot size within certain zoning districts to accommodate resource-based uses, such as

farming or forestry, or to require a pattern of very scattered, low-density development to limit, for example, impervious surfaces and protect surface and groundwater quality.

- **Fixed Area & Sliding Scale** - Fixed area and sliding scale zoning are two zoning techniques (typically applied in association with subdivision regulations) that are used to differentiate allowed densities of development from district lot size requirements.
- **Conservation (Open Space) Subdivision Design** - Conservation or open space subdivision design is a subdivision design process wherein subdivisions are intentionally designed to protect rural character and open space.

Each of these methods has its own set of benefits and pitfalls and all of them should be thoroughly evaluated before they are implemented. However, there are many examples of successful regulatory land protection strategies in Vermont. The key to success is to ensure that the community as whole is generally supportive of the strategies.

XII. Agriculture and Forestry

A. Background

The working landscape shapes the character of Brookfield and is valued by those inside and outside of the agricultural and forestry professions. Agriculture and forestry define the character of Vermont and in the past have been major industries in the region. Agriculture and forestry remain crucial to Vermont, but the reasons are changing. How one makes a living from the land is not the same as it was decades ago. Fewer, larger farms have become more common. At the same time, smaller farms that combine agriculture, forestry and tourism are on the rise. Artisan practices for adding value to farm products are resurging. How we maintain the working landscape and support the agriculture and forest industries will have a long-term impact on our landscape and our local economy.

B. Farm and Forest Land Issues

Land and Taxation

An economic restructuring or a shift away from agriculture to the service and tourism industries has placed economic pressure on farm owners. The higher cost of owning land makes it difficult to rationalize conventional farming. Owners of forestland most often are faced with a tax bill on land that exceeds its economic value for timber production. Current Use Taxation can alleviate this problem.

Current Use Taxation

For farmland and forestland conservation to be successful, the pressures posed by the market value approach to taxation must be solved for both the landowner and municipality. One means to address this issue has been the Use Value Appraisal Program administered by the State. Known as “Current Use,” this program sets the valuations on farm and forest land based on their productivity values rather than their development values. There are 12,773 acres of land in Brookfield enrolled in Current Use in 2023, amounting to nearly 48% of all lands in Brookfield.

C. Agricultural Trends

An analysis of the United States Census of Agriculture data between 2017 and 2022 (2022 being the most recent period of data collected) shows that small farms in Vermont are decreasing. Between 2017 and 2022, the number of farms in Vermont decreased by 4%. The average size of farms increased from 175 acres to 180 acres. One farm in Brookfield is a large farm by the Vermont Department of Agriculture’s standards. Thirty-two percent of Vermont’s farms in 2022 were considered “small-scale” farms that sell under \$2,500 in agricultural products per year. These small-scale farms only produce less than 1% of Vermont’s agricultural income.

However, over the past 10 years a growing movement in sustainable agriculture—involving increased local food production and consumption, value-added processing, and diversified

farms—has taken off. In 2009, the State of Vermont passed legislation that created the Farm to Plate Investment program, part of which included the creation of the Farm to Plate Strategic Plan (F2PSP). In 2022, USDA data indicated the estimated agricultural revenue in Vermont to be \$1 billion per year. That number increased to over \$4 billion when food product manufacturing is also included.

Many other businesses in Vermont depend on the “farm economy.” According to the F2PSP, Vermont has about 800 food processing establishments that employ about 7,000 people and is the second-largest manufacturing sector employer in the state, behind computer and electronic products. In addition, Vermont has about 300 wholesale distribution establishments that collectively employ about 2,000 people. The farm-related food industry is clearly connected to the farm economy.

In Brookfield, as in the rest of Vermont, the scale and style of farming has changed. The most recent Census of Agriculture (2022) reports that there are around 28 farm operations in Brookfield. About 42% of these operations utilize more than 50 acres of land. Products grown or produced on farms in Brookfield include vegetables, herbs, dairy, hay, corn, maple syrup, honey, fruit, Christmas trees, cattle, horses, chickens, pigs, goats and sheep.

For census purposes, a farm is defined as “a place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.”

The distinctiveness of the working landscape gives Vermont its beauty. Farms provide open space for certain wildlife habitat, scenic views and a connection to the land that is hard to find in other places. They also help our towns avoid sprawl and maintain small town and village settlement patterns. To continue to receive the benefits farming has to offer, a community must encourage farming.

D. Forestry Trends

Development pressures, taxes and erratic markets have affected the region’s forestland and its productivity. Forests and farms have been subdivided into small lots which threaten the economic viability of forestry. Development pressure in the region has relaxed since the early 1990s, but the economy is predicted to rebound and the trend of land moving out of forest use to other uses will continue, particularly in those areas where access and development conditions are suitable.

High taxes contribute to a low rate of return on timber sales, and may have prompted some conversion to non-forest uses. Federal and state estate and inheritance tax laws may place family landowners into financial predicaments where they need to subdivide or develop forest land in order to cover taxes. Current tax law bases estate values on the market value of land rather than at use value.

The Current Use Program alleviates some of the tax burden of forest management. By allowing land to be assessed on the basis of current use, family landowners are able to realize a more reasonable return on investment for long-term timber management. The Northern Forest Lands

Council has identified funding Current Use as vital to landowners maintaining their patience so as not to over-harvest forests or clear-cut large forest tracts.

Finally, markets for timber and wood are sensitive to changes in supply and demand. While the numbers of sawmills in the region have declined, new markets emerge, including timber exports, pulpwood production, and specialty wood products. Some of these markets make forest management more economically viable. For example, wood used for pulp is usually younger and of a lower quality which allows for thinning in stands that may ultimately produce quality sawtimber.

E. Sustaining Agriculture and Forestry

Planning, policy and implementation efforts should be directed at sustaining agriculture and forestry pursuits and not just conservation of the resource because sustaining those pursuits is the best way to keep the land open and because agriculture and forestry are critical to the town and region.

There are a variety of tools that can be used to conserve these resources. Some are directed primarily at sustaining agriculture, others forestry, some are regulatory in nature, others are compensatory, and others voluntary. It is in the public interest to encourage conservation groups, landowners, local officials, and policymakers to utilize all of these tools.

Voluntary Methods

Conservation easements are a common method used to ensure that the working landscape gets preserved. The Vermont Land Trust (VLT), Vermont's largest non-profit conservation organization, has conserved more than 590 parcels of land in agricultural use throughout the state, totaling 145,109 acres. Approximately 405 acres are conserved in Brookfield by the VLT. An additional 86 acres are conserved by The Nature Conservancy, while the Upper Valley Land Trust has conserved about 65 acres in Brookfield. Altogether, these three organizations have conserved approximately 556 acres of land in Brookfield. Most land purchased with the intent of applying a conservation easement to it is funded, at least in part, by some form of grant from either state or private sources.

Conservation easements are one potential solution to preserving the working landscape. Other strategies for preserving the working landscape are adding to the Town Forest or other conservation lands, Current Use, and individual efforts.

Forest Carbon offsets: compensation to forest owners for increases in forest carbon storage can be available to larger forest landholdings through the Family Forest carbon program.

Regulatory Methods

A Forest Conservation District that would serve to limit development within large forest blocks would reduce forest fragmentation and allow for continued forest management. As described above, this would be in keeping with Act 171 of 2016, passed by the Legislature.

F. Farming, Forestry and the Economy

In addition to preserving Brookfield's working landscape and maintaining the community's scenic beauty, farming and forestry can have an economic impact. Vermont is within easy reach of millions of people in cities like Boston and New York City. Additionally, Vermonters are increasingly seeking locally-sourced, sustainably-produced farm and forest products. Vermont is a national leader in innovative education programs based on local food, agriculture, and healthy eating. It is also widely recognized for its strong network of land trusts and other nonprofits that are models for conserving farm and forest lands.

There is already a growing mix of emerging agricultural and forestry entrepreneurs who are adapting to the economy to stay competitive. They are producing artisan cheese, caramel, honey, specialty wood products, produce, breads, and other value-added items. Brookfield encourages the continued development of these industries and seeks to foster local interest in these products. One way Brookfield works to keep these businesses prosperous is its support of the Floating Bridge Food and Farms Cooperative. This organization includes members that are located in the area surrounding Brookfield. Members offer locally produced farm products including locally raised meats, vegetables, farm tours, cooking classes, on-farm workshops, events, farm vacation packages, farm stays, and more. The cooperative gathers together with visitors as a community, hosting seasonal markets and special events.

G. Goals, Policies and Recommendations

Goals

1. To encourage the conservation, wise use, and management of the town's agricultural and forestry resources, to maintain its environmental integrity, and to protect its unique and fragile natural features.
2. To protect the town's rural agricultural character, scenic landscape, and recreational resources.
3. To encourage the economic growth of agricultural and forest operations at a scale that is appropriate for Brookfield.

Policies

1. Discourage the fragmentation of areas where farming or forestry exist, or have significant potential to exist.
2. Encourage the retention of the best agricultural soils (prime land and land of statewide importance) available for long-term agriculture use.
3. Contiguous forest and significant agricultural areas should remain largely in non-intensive uses unless no reasonable alternative exists to provide essential residential, commercial and industrial activities for the town's inhabitants.

4. The construction of utilities, roads or other physical modifications should skirt tracts of productive agricultural land and large forest blocks rather than divide them.
5. Farmers, loggers, and foresters must use state-sanctioned Required Management Practices (RMP) and are encouraged to implement Best Management Practices (BMP) in their operations and to minimize point and nonpoint source pollution.
6. Support the development of value-added, environmentally sound, farm and forest products.
7. Support the development and consumption of locally-grown food products.
8. Preserve recreational and scenic access by ensuring that at the completion of logging projects all roads are restored to their previous condition.

Recommendation

1. Encourage the use of conservation easements to preserve the working landscape.
2. Establish a Forest Conservation District to protect priority forest blocks.

XIII. Transportation

Land use, energy, and transportation are related. Land use, both within and outside Brookfield's borders, can drive the need for improvements to the transportation system. At the same time, transportation build-out without consideration of land use can drive sprawl that imposes costs on local governments and undermines a town's scenic and rural character.

There are no fixed-route transit, rail or air transport systems within the town. Instead, most of Brookfield's transportation system consists of private vehicles on public roads. However, bicyclists also use these roads and there are trails for motorized (snowmobiles and ATVs) and nonmotorized (cross country skiing, mountain biking, horseback riding and hiking) forms of transportation. Transportation by boat also occurs in Brookfield's ponds and lakes.

Local land use goals must be facilitated in part by providing the necessary transportation facilities to accommodate growth where growth is desired. In addition, a given land use can have very different impacts on the transportation system depending on how it is sited and designed. Land use and transportation are both linked to the town's economic well-being. Poorly planned land use patterns increase transportation costs and the tax rate, while well planned development can add to the tax base of the town, providing additional funds for the transportation system.

A. Public Highway System

Highway classifications determine the amount of state aid available to assist with repair and maintenance. The Vermont Agency of Transportation (VTrans) and the Selectboard determine road classes. Criteria include traffic volume, road condition and function. Class two highways are the major connectors linking villages with each other and with state highways, and they receive a higher rate of State aid than Class 3 highways.

Twenty-six percent of Brookfield's roads are Class 2, including Ridge Road, West Street, Crossover Road, Stone Road, Schoolhouse Road, and Northfield Road. The remaining roads in Brookfield are either Class 3 or 4.

Class 3 highways are other town roads, including most gravel roads, that are maintained in a manner enabling them to be driven under normal conditions in all seasons by a standard car. The majority (57%) of Brookfield's roads are Class 3.

Seventeen percent of Brookfield's highways are Class 4. Class 4 highways are generally in poor condition and are subject to light three season maintenance. No state aid is available for work on Class 4 highways. While not suited for regular traffic, Class 4 roads do represent a valuable

Table 12: Miles of Roads in Brookfield

Miles of Roads in Brookfield	
Class 1	0.00
Class 2	19.18
Class 3	41.83
Class 4	12.78
Total Town Roads	73.79

Source: VTrans "Brookfield Town Highway Map", 2021

asset for the town from a recreation standpoint. Such town-owned corridors will help ensure that there will continue to be a place to enjoy snowmobiling, cross-country skiing, walking, hunting, horseback riding and other outdoor recreation.

Apart from education costs, public roads have been and will continue to be Brookfield’s largest town asset requiring significant financial investments paid through municipal taxes. Transportation funding comes from numerous combinations of the local tax base, state and federal gas tax receipts, state and federal allocations and registration fees. The most significant funding comes from the federal transportation bill. This funding is distributed to towns by VTrans. The federal and state governments pay a percentage of project costs and the community pays the remainder. This funding applies only to Class 1-3 roads. Maintenance of Class 4 roads is funded exclusively by the community.

The Two Rivers-Ottawaquechee Regional Commission has compared programs throughout the region and recommends a program of early intervention using preventative maintenance, because such a program has proven to be 75 to 85 percent less costly than larger reconstruction work after significant deterioration has occurred. Such a program should be a part of an adopted Transportation Capital Budget and Transportation Program.

Proper and timely road and drainage systems maintenance can help protect these systems from most severe weather events. Maintaining a reliable and up-to-date inventory of existing culverts and structures, coupled with a short and long range plan for replacement and upsizing is essential. Replacing deficient culverts and bridges also helps protect water quality – installing appropriately scaled and designed structures that can handle flood events, stormwater runoff, promote fish passage, and minimize the discharge of road sediment. These upgraded culverts and bridges, operating in greater harmony with the natural environment, will also be less likely to fail during storm events.

B. State and Federal Highways

State highways in Brookfield include Route 12, Route 14 and Route 65. Interstate 89, a significant North-South travel corridor, passes through Brookfield with no direct access in the town except for emergencies. The most significant impact I-89 has on the community is for emergency services: Brookfield’s fire and rescue teams must respond to accidents on the Interstate.

Table 13: Miles of State & Federal Roads in Brookfield

State & Federal Roads in Brookfield	
State Highways	17.42
Interstate Highways	6.17
Total State & Federal Roads	23.59

Source: VTrans “Brookfield Town Highway Map”, 2021

C. Class 4 & Trails

Class 4 roads and trails primarily offer access to town and conservation resources and provide unique insights into an agrarian landscape long abandoned. Many Class 4 roads have been incorporated into the natural landscape, with very little development occurring along these roads. Class 4 roads are not maintained except for some culvert and bridge work to ensure access for emergency vehicles. The town also does not plow these roads during the winter. Public utility services or other municipal infrastructure that typically accompany roads are nearly nonexistent. Often these roads are scenic travel corridors for hikers and bicyclists and provide limited access to hunting and conservation lands.

Trails are used exclusively for recreational purposes and are not intended for vehicle access, and therefore they are not maintained. According to VTrans in 2015, Brookfield had 1.88 miles of publicly owned trails.

D. Development Review Road Standards

The town currently uses highway rules and regulations based on state standards that were adopted by the Selectboard in April of 2013. This policy details road construction standards and policies for road classifications, right-of-way, access, road acceptance, and numerous other construction and maintenance related activities. The responsibility of ordinance implementation rests with the Selectboard and the Brookfield Road crew.

The following planning considerations should continue or be expanded upon in future policy updates:

- Emergency management services will have guaranteed safe access to all development.
- Roads should be designed with multi-modal transportation safety (pedestrian, bicycle, etc.) in mind.
- Since local and state road construction follows State of Vermont design standards, private roads should be constructed to those standards, thereby minimizing changes if the road is accepted by the town at a later date.
- Road design and construction should adhere to the relevant town plan goals and objectives - land use, natural resources and transportation elements.
- All roads will reflect a context-sensitive design that preserves and enhances the adjacent land uses and transportation system.
- Private road and driveway standards should be adopted to ensure stormwater is not discharged onto public highways or drainage systems.
- The development of private roads and bridges should be approved by the Selectboard after review of the proposed road by the town road Foreman and a designated representative of the Fire Department that serves the town.

Major transportation projects often place a greater emphasis on contemporary engineering design standards. However, in some instances, the design and engineering of our roadways and bridges

fail to consider the town's unique historical and natural landscapes. While engineering sufficiency criteria are important factors for road and bridge improvements, compatibility with existing and future development patterns also are important considerations.

E. Access Management

Access management is an important process to provide reasonable accessibility to adjacent land uses while maintaining a safe and efficient flow of traffic. The town recognizes the value of access management and can implement access management strategies through its planning and public works related ordinances and policies. The following are strategies for all public and private transportation and development projects:

- Utilize State of Vermont design standards for all temporary and permanent access, to include emphasis on drainage, sight distance, and access for emergency services.
- Encourage use of shared driveways and/or permitting access that may result in a future shared driveway.
- Require the review of access for existing development whenever a change of use or other application process is brought before the town.
- Encourage commercial properties to use existing development nodes in order to preserve or create road segments with few accesses, unless additional replacement access better meets access management goals.
- When practical, approve subdivisions with private and public road designs that allow shared access with other adjacent subdivisions and/or have the private rights-of-way reserved so an access may be built to connect to existing and future development.
- Encourage permanent landscaping and roadside enhancements to visually define access points and contribute to the roadway's aesthetic character.
- Use sight-distance standards based on the actual travel speeds and not the posted speed limits. If no such data exists or is not current, then the town may work with the Regional Planning Commission to obtain the appropriate data.

F. Other Modes of Travel

Bicycles and Pedestrians

Many residents bike or walk on town roads in Brookfield. In the more rural areas of town, bicycle and pedestrian travel is reasonably safe. Routes 12 and 14 are a common location for bicycle travel, but in some areas, travel is less safe due to higher traffic volume and speed, lack of available shoulders and poor pavement quality.

Public Transportation

Brookfield has limited access to a small regional public transportation system, Tr-Valley Transit (TVT). TVT offers regular transportation to West Lebanon, NH and Montpelier, VT. Its southern

route to West Lebanon (the 89er) stops in nearby Randolph. In addition, a weekly “shopping route” to West Lebanon is offered that also stops in Randolph. TVT also offers limited public transportation in the form of special requests for individuals who need transportation for medical reasons or to access critical services. Brookfield residents can take advantage of TVT’s “Dial-A-Ride” Program which provides free or subsidized rides for senior citizens (60+), persons living with a disability, or those on Medicaid when there is not available transportation in the household or the person requesting the trips is unable to drive on the day of the trip. Dial-A-Ride is available for a broad array of destinations, such as medical services, shopping, errands, and social purposes. Between 2019 and 2023, 104 Brookfield riders on average annually used the Dial-A-Ride Program.

Given that Brookfield's senior population is growing, there is an important need for an affordable source of public transportation that can bring the seniors to major medical facilities like Dartmouth-Hitchcock and larger commercial centers for day-to-day shopping.

Air Facilities

For air travel, residents have access to the Lebanon Municipal Airport, which is approximately a 45 minute drive from Brookfield. The Burlington Airport is also nearby and is approximately one hour drive from Brookfield.

Rail Facilities

Brookfield has no rail service. The nearest railroad is the New England Central Railroad (NECR) line, which serves both freight and Amtrak passenger traffic. The nearest passenger station is in Randolph.

G. Goals, Policies and Recommendations

Goals

1. To provide and maintain a safe, energy-efficient and well-maintained transportation network in a cost-effective manner, integrating all modes of travel (auto, pedestrian, bicycle, and mass transit) and meeting the needs of the public in a manner consistent with the other goals, policies and recommendations of this Plan.
2. To maintain the rural and scenic character of the back roads and byways thereby protecting the rural scenic quality of the town whenever possible.

Policies

1. Maintain the existing road system, while discouraging the expansion or addition of new roads.
2. Consider public input prior to a decision to substantially change the maintenance level, surface treatment, or class of a town road.

3. Evaluate traffic volume and maintenance costs against other factors when deciding whether or not to pave a road, such as the up-front cost of paving and base improvements that may be necessary to support a paved surface and the potential quality-of-life impacts to residents.
4. Replace undersized culverts and bridges with appropriately sized infrastructure whenever financially feasible, when addressing improvements on roads that are Class 2 or 3.
5. Integrate land use and transportation planning by concentrating growth in areas served by an adequate highway system, utilizing land use regulations and appropriate highway access management techniques to control the impacts of development on the transportation system, and making transportation improvements in areas where growth is desired.
6. Limit the number of access points during new development along highways to reduce driver confusion and traffic congestion and to minimize conflicts between through and local (turning) traffic via provisions on further subdivision in new access permits.
7. Work with other communities in the region through the TRORC and its Transportation Advisory Committee to ensure that the region's transportation system is developed in a well-coordinated manner that recognizes and balances the needs and desires of each community.
8. Consider the relationship of a road to surrounding features of the landscape when planning improvements needed to safely accommodate increasing traffic.
9. Combine widening of roadways to accommodate safe use by bicyclists with traffic slowing measures and enforcement of speed limits to ensure that traffic speeds do not increase.
10. Retain Class 4 roads, trails, and other public rights-of-way as public resources.
11. Require development on private roads to adhere to town access standards and to provide safe year-round access for town services, particularly fire and rescue.
12. Any plan for changes to roads, including Routes 12, 14, and 65, must not unduly compromise the historic, scenic, rural and cultural characteristics of these areas. Economic development objectives or new growth that create increased demand for upgrading of routes must preserve and enhance Brookfield's Village Areas and planned expansion areas.
13. Maintain a reliable and up-to-date inventory of existing culverts and structures, coupled with a short and long range plan for replacement and upsizing.
14. Actively participate in any process or project which would result in significant changes to Routes 12, 14, or Route 65.
15. Support efforts to sustain, expand, or enhance existing public transportation.

Recommendations

1. The town should consider developing a town highway capital plan and schedule that will guide maintenance and road infrastructure investments in the future.

2. Continue participation in the Regional Transportation Advisory Commission as well as the TRORC Road Foreman's meeting program.
3. The Selectboard should actively explore the purchase and utilization of simple to use rural road maintenance software for maintaining roads and drainage systems.

XIV. Flood Resilience

A. Background

Following the impact of Tropical Storm Irene in 2011, the Vermont Legislature added a requirement that all communities address flood resilience as part of their municipal plans. Interpreted broadly, “resilience” means that an entity—a person, neighborhood, town, state, region or society— when faced with a particular situation or event, has the ability to effectively return to its previous state or adapt to change(s) resulting from the situation or event without undue strain. As such, “resilience” means an overall preparedness for a future event. For the purposes of this chapter, flood resilience will mean the ability of Brookfield to effectively understand, plan for, resist, manage and, in a timely manner, recover from flooding.

Types of Flooding

Generally speaking, there are two types of flooding that impact communities in the state of Vermont - inundation and fluvial erosion. Inundation flooding occurs when an extended period of rainfall occurs over an extended area of a river’s basin leading to flooding along the river, inundating previously dry areas. This type of flooding occurs slowly, but flood waters can cover a large area. Inundation flooding is slow and allows for emergency management planning if necessary. However, unlike during a flash flood, it may take days or weeks for inundation floodwaters to subside from low areas, which may severely damage property.

Flash flooding occurs when heavy precipitation falls on the land over a short period of time. Precipitation falls so quickly that the soil is unable to absorb it, leading to surface runoff. The quick-moving runoff collects in the lowest channel in an area - upland streams, small tributaries, and ditches - before moving further downstream. Flash flooding typically does not cover a large area, but the water moves at a very high velocity and the flooding manifests quickly, making flash floods particularly dangerous. Due to the velocity of the water, a flash flood can move large boulders, trees, cars, or even houses. Flash floods can also mobilize large amounts of debris, plugging culverts and leading to even greater damage.

The collecting of water in channels in steep areas also causes fluvial channel erosion, which can severely damage roads and public and private property. Fluvial erosion occurs when the power of a flood exceeds the natural resistance of the river's bed and banks. Rivers that have been overly straightened or deepened may become highly erosive during floods, especially when the banks lack woody vegetation, or when the coarser river bed sediments have been removed. In areas where rivers are confined due to human activity and development, they have become steeper, straighter, and disconnected from their floodplains. The more trapped the river is, the greater power it will gain, which eventually results in a greater degree of damage to critical public infrastructure such as roads and stream crossings, as well as homes, businesses, community buildings and other man-made structures built near rivers. Fluvial erosion is also increased downstream when all the eroded materials (i.e. sediment and debris) come to rest in a lower gradient reach, clog the channel, and cause the river to flow outside its banks. When severe enough, fluvial erosion can also be the cause of landslides. Fast moving water in the

stream channel may undermine roads and structures and change the river channel itself, predisposing other roads and structures to future flooding damage. In Vermont, most flood-related damage is caused by flash flooding and fluvial erosion. Due to its topography, Brookfield is vulnerable to flash flooding and fluvial erosion.

Causes of Flooding

Flooding is caused by a small number of distinctive types of weather, the cumulative impact of a weather event, and the conditions on the land at the time the flooding occurs, as well as the amount of impermeable surfaces on the landscape that do not allow the water to be absorbed by the soil or taken up by trees and other vegetation. By far the most common type of weather event to occur in the region is a severe storm. Severe storms may include thunder, lightning, hail, high winds, and precipitation with varying degrees of intensity. Severe storms with particularly heavy precipitation can create flash flood conditions. However, over an extended period, severe storms may cause inundation flooding due to the cumulative effects of continuous rain, saturated soils and high water table or aquifer levels.

Hurricanes and tropical storms occur during the summer and into the fall months. The main hazards associated with hurricanes and tropical storms are high winds and flooding. By the time most hurricanes reach Vermont, they have been downgraded to tropical storms. However, tropical storms are still dangerous. Due to the steep slopes and narrow valleys in the region, heavy precipitation from a hurricane or tropical storm tends to cause severe flash flooding and widespread destruction. The speed that the hurricane or tropical storm is moving across the area and the pockets of varying severity have an impact on the rainfall totals observed from town to town. Storm impacts can be greatly magnified by previous rains.

Ice jams and the combination of melting snow and rain leave the region vulnerable to the impacts of flooding in the winter and early spring. Ice jams typically occur during the spring when river ice begins to break up and move downstream, but may occur during a thaw period in the winter months. Sheets of ice become hung up on a narrow portion of the stream or river, such as under a bridge, culvert or another obstruction, creating a “dam” and additional ice and water begin to back up behind the ice dam. This creates inundation flooding immediately adjacent to the site of the dam, and additional inundation flooding upstream. Once the dam breaks free, flash flooding may occur downstream as well. Ice jams in the region typically cause minimal damage, but they can damage road infrastructure and flood homes and businesses.

The combination of melting snow and rain can lead to flooding in Brookfield. Flooding is worsened by land uses that create impervious surfaces that lead to faster runoff, and past stream modifications that have straightened or dredged channels, creating channel instability.

Historic Flood Events

The most significant event of recent years was the July 2023 storm. With the ground already saturated, the over 5-inches of rain that fell on July 10 resulted in significant damage to Brookfield roads as well as private properties and homes. There were over 100 sites of road damage from small washes to the complete loss of entire road sections. Cleanup and repair work

began immediately after the storm passed and continued for months thereafter. At present, the estimated damage stands at just over a half million dollars at 106 sites.

A previous flood event that devastated the region and the state was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, as well as hundreds of millions of dollars of home, road, and infrastructure damage. Due to the strong winds, 50,000 Vermont residents were initially without power, and many did not have electricity restored to their homes and businesses for over a week.

Tropical Storm Irene caused damage to property and infrastructure in the Town of Brookfield, but no lives were lost. It is estimated that Tropical Storm Irene dropped 5-7 inches of rain over the Town of Brookfield in a very short span of time, mirroring the average precipitation totals for Orange County.

A number of Brookfield's roads and bridges were damaged by the storm, including parts of: Route 65, Stone Road, and West Brookfield Road. Relatively few culverts, approximately 10, were damaged or blown-out during Tropical Storm Irene. The county-wide damage for Orange County totaled over \$5 million. Following the flood damage, the State of Vermont and FEMA have been coordinating on the home buy-out process across the state; however, there are no home buy-out properties in Brookfield.

Brookfield received less damage from Tropical Storm Irene than other towns in the Region. However, flood events that occurred between June and July 2013, identified as DR-4140¹ VT, caused more damage in Brookfield. Approximately 20 culverts were damaged, and significant erosion occurred on Bear Hill Road. Sections of East Hill Road, Taylor Hill Road, Rowley Road, Lower Twin Pond Road, Old Cross Road, Crossover Road, Chelsea Road, Ridge Road and Eagle Peak Road were also damaged.

One of the worst flood disasters to hit the Town of Brookfield, as well as the overarching region and the State of Vermont, occurred on November 3, 1927. This event was caused by up to 10 inches of heavy rain from the remnants of a tropical storm that fell on frozen ground. Eighty-four Vermonters, including the Lieutenant Governor, were killed. The flooding in the White River valley was particularly violent, with an estimated 120,000 to 140,000 cubic feet/second (cfs) flowing out of the White River at West Hartford, Vermont. Like many towns in the region, the Town of Brookfield received heavy precipitation, seeing roughly 7-9 inches of rainfall over the storm period.

Flooding events are increasing in frequency and severity causing an increased financial burden and risks to lives and livelihoods. The Town has been working with FEMA and the Vermont Agency of Transportation to right-size and upgrade a number of culverts in Town. Several have already been completed as of August 2024, with an additional eight identified for upgrade.

¹ FEMA disaster designation

B. Flood Hazard and River Corridor Areas in Town

Flood Hazard and River Corridor Areas

There are two sets of official maps that govern development in floodplains in Vermont. They are the FEMA's Flood Insurance Rate Maps (FIRMs) and VT Agency of Natural Resource's (ANR) river corridor area maps. The FIRMs show the floodplain that FEMA has calculated would be covered by water in a 1% chance annual inundation event, also referred to as the "100-year flood" or base flood. This area of inundation is called the Special Flood Hazard Area (SFHA). FIRMs may also show expected base flood elevations (BFEs) and floodways (smaller areas that carry more current). FIRMS are only prepared for larger streams and rivers. Brookfield has FEMA FIRM maps that are used in Flood Hazard Bylaw administration. They are out-of-date and do not contain elevation data.

Recent studies have shown that a significant portion of flood damage in Vermont occurs outside of the FEMA mapped areas along smaller upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. Since FEMA maps are only concerned with inundation, and these other areas are at risk from flash flooding and erosion, these areas are often not recognized as being flood-prone. It should be noted that although small, mountainous streams may not be mapped by FEMA in NFIP FIRM, flooding along these streams is possible, and should be expected and planned for. Property owners in such areas outside of SFHAs are not required to have flood insurance. Flash flooding in these areas can be extremely erosive, causing damage to road infrastructure and to topographic features, including stream beds and the sides of hills and mountains, thereby creating landslide risk. The presence of undersized or blocked culverts can lead to further erosion and streambank/mountainside undercutting. Change in these areas may be gradual or sudden. Furthermore, precipitation trend analyses suggest that intense, local storms are occurring more frequently.

Vermont ANR's river corridor maps show the areas that may be prone to flash flooding or erosion, which may be inside of FEMA-mapped areas, or extend outside of these areas. In these areas, the lateral movement of the river and the associated erosion is a greater threat than inundation by floodwaters. Elevation or floodproofing alone may not be sufficiently protective in these areas as erosion can undermine structures. In the Town of Brookfield, there are approximately 25 residences, 3 mobile homes, 1 firehouse, 1 post office, 2 farms, 1 commercial structure in the river corridor. The river corridor area is not subject to specific regulatory conditions in the Brookfield Zoning or Flood Hazard bylaws, but the Planning Commission may adopt new language that provides river corridor protection.

In Brookfield, there are 654 acres of mapped floodplain, with no mapped floodway (the deepest, fastest flowing area in a flood). Two percent of the town is in the floodplain. Less than 2% of the town (463 acres) may be in the developable portion of the floodplain (not including wetlands).

Flood Hazard Regulations

The Town of Brookfield has a standalone Flood Hazard Area Bylaw, and also a Shoreland Zoning Bylaw. These regulations were adopted in 2007 and 1980, respectively. The town's Flood Hazard Area Bylaw sets standards for development in the town's floodway and floodway fringe areas, prohibiting development in floodways unless it has been determined it will result in no increase in flood levels during the occurrence of the base flood through hydrologic and hydraulic analyses. The Flood Hazard Area Bylaw requires a permit for all proposed construction or other development, including the placement of manufactured homes, in areas of special flood hazard. In the areas regulated by that bylaw, conditional use approval by the Board of Adjustment is required for new buildings, substantial improvement of existing buildings, and development in a floodway. As of the date this Plan was adopted, Brookfield's Flood Hazard Regulations have been designed to meet the minimum standards set by the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP).

The Shoreland Bylaw, meanwhile, restricts development on bodies of water that cover no less than 20 acres, which applies to the Baker, Lamson, North, and Rood Ponds as well as Sunset Lake.

The severe damages and complete loss of homes caused by Tropical Storm Irene in 2011 highlighted the need for Brookfield to reevaluate the requirements of the Flood Hazard Area, both in terms of uses allowed and in terms of the area designated as Flood Hazard Area.

There are 16 residential and 3 commercial/industrial/public structures in the 100-year floodplain. In addition, the Brookfield Fire Station is located in the Special Flood Hazard Area. Disruption of the fire station within the 100-year floodplain could drastically hamper future response and relief efforts in the town and cause major disruption to continuity of operations. In an effort to help protect structures and road infrastructure, it is important to restore floodplains, improve areas and/or increase the number of areas for retention of floodwaters to reduce the risk to structures and road infrastructure wherever possible.

National Flood Insurance Program (NFIP)

Under the provisions of the National Flood Insurance Act (1968), the Federal Emergency Management Agency (FEMA) has conducted a series of evaluations and hydrologic engineering studies to determine the limits of flood hazard areas along streams, rivers, lakes, and ponds expected to be inundated during the 100-year base flood, meaning that the flood level has a 1% chance of being equaled or exceeded in any given year. The calculations do not take into account the impact of ice dams or debris, and may, therefore, actually underestimate the areas which are subject to flooding damage.

FEMA has prepared a Flood Hazard Boundary Map for the Town of Brookfield, which includes flood hazard areas for the White River and for major streams and ponds. This map is on file at the Town Office and at the Two Rivers-Ottawaquechee Regional Commission. The Flood Hazard Area is indicated in Map #2, Future Land Use (see Appendix B). Contact the Brookfield Administrative Officer to determine if a proposed development is in the Flood Hazard Area.

FEMA also administers the National Flood Insurance Program, which provides flood hazard insurance at subsidized rates for property owners in affected areas. In order to qualify for federal insurance, towns must adopt and retain a bylaw to control land development within these areas. Minimum standards must be included and approved by FEMA. Coverage is only available to landowners in town if a town elects to participate in the program. The Town of Brookfield incorporates Flood Hazard regulations as part of its Zoning Bylaws, and is recognized as a participating community in the National Flood Insurance Program.

C. Promoting Flood Resilience

Flood Hazard Regulation

The following changes to the Flood Hazard Bylaw would help protect the citizens of Brookfield from further damages from a severe flooding event:

1. Prohibit all new development in the 100-year floodplain.
2. The prohibition on new development would not apply to small out-buildings or similar structures provided they are properly flood-proofed and meet the thresholds required by the National Flood Insurance Program for flood hazard regulation. The prohibition would not apply to renovations to existing structures unless the proposed renovations expand the footprint of the existing building or exceed the substantial improvement thresholds required by the National Flood Insurance Program for flood hazard regulation.
3. The best and most appropriate uses within the Flood Hazard Area on the White River are those that are recreational and agricultural (using Required Management Practices). Minimizing development within these areas will help protect both public and private investments as well as the natural and scenic quality of Brookfield's waterways.
4. Prohibit new development within mapped river corridor areas.

Revisions to Brookfield's flood hazard bylaw will require input from the community regarding the level of regulation it believes is necessary to protect citizens and their buildings from severe flood hazard events. Provided that all parts of the flood hazard bylaw continue to meet the minimum requirements of the NFIP, communities have a broad range of flexibility in regulating the flood hazard area.

Non-regulatory approaches

Easements

Brookfield could pursue riparian easements as a way to protect the floodplain from development and preserve flood storage.

Culvert Maintenance

Brookfield maintains an up-to-date list of culverts and culvert condition, and has engaged in culvert upgrading since the 2010 Brookfield Annex was drafted. Approximately 30 culverts have been upgraded since Tropical Storm Irene occurred in 2011. During the summer of 2015, the town replaced a major culvert on Old Cross Road with FEMA funding. A hydrologic and hydraulic (H&H) analysis was completed on major structures to determine the appropriate size for an upgraded structure. The process of upgrading culverts is currently underway.

D. Goals, Policies and Recommendations

Goals

1. To enhance and maintain use of flood hazard areas as open space, greenways, non-commercial recreation and/or agricultural land.
2. To ensure no net loss of flood storage capacity in an effort to minimize potential negative impacts. These impacts include the loss of life and property, disruption of commerce, and demand for extraordinary public services and expenditures that result from flood damage.
3. To allow Brookfield to be resilient in the event of a severe flood.
4. To protect municipal infrastructure and buildings from the potential of flood damage.
5. To restore floodplains and upland forested areas that attenuate and moderate flooding and fluvial erosion.
6. Relocate the Brookfield Fire Station to a site less susceptible to flood damage.

Policies

1. Use sound planning practices to address flood risks so that Brookfield's citizens, property, economy, and the quality of the town's rivers as natural and recreational resources are protected.
2. Prohibit all new fill and construction of buildings in Brookfield's mapped floodways and special flood hazard areas (Mapped areas, unless corrected by FEMA).
3. Require new development in the identified river corridors to demonstrate through best practices that it will not increase the risk of flooding or fluvial erosion.
4. Encourage non-structural outdoor recreational and agricultural land uses within Brookfield's River Corridor Areas due to the dangerous erosive risk in these areas.
5. Limit commercial, industrial, and residential uses within ANR's mapped river corridor areas.
6. Move or abandon roads that often experience serious flood damage when there are other cost effective solutions.

7. Design culverts and bridges at minimum, to meet VTrans Hydraulics Manual and ANR Stream Alteration Standards and to respect the historic character and scenic nature of the community.
8. Do not build Brookfield's emergency services, power substations, and municipal buildings in the Special Flood Hazard or River Corridor Areas.
9. Maintain vegetated buffer strips in riparian zones bordering streams and rivers. Rock riprap and retaining walls should only be used to the minimum extent necessary and when bioengineering techniques may not be adequate to prevent significant loss of land or property.
10. Maintain Brookfield's upland forests and watersheds predominately in forest use to ensure high quality valley streams and to ensure that flood flows are reduced.
11. Maintain wetlands which provide flood storage functions shall remain undeveloped. In the long term, restoration and enhancement of additional wetlands should be pursued in order to improve Brookfield's flood resilience.
12. Maintain culverts to ensure that they are effective during severe weather events.
13. Manage post-event recovery and reconstruction within the river area according to the Vermont River Program's best practices in order to avoid negative impacts downstream.

Recommendations

1. Maintain Brookfield's Flood regulations to be consistent with State and Federal regulations.
2. Brookfield should work with VTrans and the Regional Planning Commission on advocating for and improving the flood capabilities of state or town-owned transportation infrastructure.
3. Brookfield should continue working to develop flood mitigation plans, and emergency preparedness and recovery procedures.
4. The Selectboard should continue to send a representative to regularly attend and participate in the region's Local Emergency Planning Committee (LEPC #12).
5. The town should continue to maintain and update town bridge and culvert inventories. This information should be used to develop a schedule to replace undersized culverts.
6. The town should identify and purchase a suitable piece of land for the future relocation of the Fire Station and Emergency Services that is not prone to flooding.

XV. Relationship to Other Plans

A. Relationship to Municipal Plans

The Municipal Plan focuses primarily on development and policy within the community's boundaries. However, it is important to recognize that how a community grows and changes can be affected by development that takes place outside the community. An example from the past is the many places that had large and vibrant villages that declined because the railroad tracks were laid elsewhere.

In order to analyze the potential for outside impacts on Brookfield, the Planning Commission worked with Two Rivers-Ottawaquechee Regional Commission to review the Municipal Plans and, if available, the land use regulations of surrounding towns for consistency with this Plan. These communities include:

- **Braintree** – The Town of Braintree has had an adopted plan since the 1990s, which has been revised regularly, as well as an adopted Unified Bylaw (zoning and subdivision). The pattern of development promoted by the Braintree Town Plan along Brookfield's border is very similar to the pattern outlined in the Land Use chapter of this plan. Uses encouraged in Braintree are likewise similar. There are no potential conflicts between these plans.
- **Chelsea** – The Town of Chelsea most recently updated their Town Plan in 2023, and adopted a zoning bylaw in 2017. The shared border between Chelsea and Brookfield represents similar patterns of land use, primarily focusing on rural residential, home occupation and appropriately scaled services. The only potential conflict between these two plans relates to density. Where the Rural Agricultural areas in this Plan limit density to five acres per development, Chelsea allows two acre lot sizes. It is possible, although unlikely, that a dense development could be permitted in Chelsea in an area immediately adjacent to Brookfield that might negatively impact the rural character of the community.
- **Northfield** – The area of shared border between Brookfield and Northfield is limited in scale. Northfield's Municipal Plan, which was updated in 2020, indicates that the area which borders Brookfield is rural residential in nature. Uses within the limited area of shared border between Northfield and Brookfield are similar and therefore compatible. No conflicts are foreseen.
- **Randolph** – Randolph has had a long history of land use planning including zoning and subdivision regulations. Randolph and Brookfield share two significant municipal north-south corridors, the Ridge Road and Route 14. Randolph's municipal plan calls for slightly greater density in areas immediately adjacent to these roads (three acres per unit), but these areas do not border Brookfield. Areas where the two communities meet are similar in density and use. Conflicts are unlikely.
- **Roxbury** - Roxbury enacted an updated town plan in 2021. Roxbury does not have zoning bylaws. Roxbury's future land use map establishes an agricultural-residential district or a forest reserve district along the border with Brookfield. Roxbury's town plan

does not establish specific density requirements for these districts, but it does recommend low density land uses in these districts. No conflicts are foreseen.

- **Williamstown** – Williamstown has no land use regulations beyond Flood Hazard regulations. The Williamstown Town Plan was last revised in 2016. It is likely that the patterns of development in their previous plan will continue forward in the next iteration of their Plan. Like Brookfield, Williamstown’s rural areas favor residential development with agricultural uses, open space and natural resource protection. Density is primarily low-density and uses are limited to some small businesses, home occupations and forestry and agricultural uses. Conflicts between these two plans are not anticipated.

B. Relationship to the Regional Plan

Brookfield is a member of the Two Rivers-Ottawaquechee Regional Commission (TRORC). It is one of thirty (30) municipalities that comprise the Region. The TRORC Region covers northern Windsor County, most of Orange County and the Towns of Pittsfield, Hancock and Granville. The Commission was chartered in 1970 by the acts of its constituent towns. All towns are members of the Commission, and town representatives govern its affairs. One of the Regional Commission’s primary purposes is to provide technical services to town officials and to undertake a regional planning program. As is the case in many areas of the State, the extent of local planning throughout the region is varied. Some municipalities are more active than others. Thus, the level of services to each of the towns changes with time.

The Regional Commission adopted its Regional Plan in August of 2020. It will remain in effect for a period of eight years. This Plan was developed to reflect the general planning goals and policies expressed in the local plans. It is an official policy statement on growth and development of the Region. The Regional Plan contains several hundred policies to guide future public and private development in the Region. Policies for land use settlement are identified. These areas are: Regional Centers, Town Centers, Village Settlements, Hamlet Areas, Industrial Areas, Mixed-Use Areas, Interchange Areas, Rural Area, and Forest-Based Resource Areas. Delineation of each land use area is mapped or charted.

C. Goals, Policies and Recommendations

Goal

1. To work with neighboring towns and the region to encourage good land use and environmental policy that benefits the citizens of Brookfield.

Policies

1. Encourage continued communication and cooperation between Brookfield and its neighboring towns.
2. Continue participation in the Two Rivers-Ottawaquechee Regional Commission.
3. Exchange planning information and development data with neighboring communities.

XVI. Town Plan Implementation

Vermont law requires a town plan to contain a “recommended program for the implementation of the objectives of the development plan.” [24 V.S.A. §4382(7).] While it is not required by law that communities implement any of the policies or recommendations in a municipal plan, it is important to recognize that in order to meet the vision of the Plan, it must be implemented wherever possible.

Implementation can be approached in multiple ways, some regulatory and some non-regulatory. They include (but are not limited to) the following:

<u>Regulatory</u>	<u>Non-Regulatory</u>
Zoning & Subdivision bylaws	Design a Capital Budget & Program
Strengthening Town Plan language to clearly influence state regulatory proceedings (use of direct language)	Advisory Committees (i.e. Conservation Commissions or Energy Committees)
Official Map	Education/Outreach on important issues
Access Permits - Town Highways Only (Selectboard)	Purchase or acceptance of development rights
Flood Regulations & National Flood Insurance Program	Follow-up on recommendations for action in Plan

A. Regulatory Implementation

Regulation of land use and development through rules adopted by the town is one possible method of Plan implementation. Well recognized and utilized means include, but are not limited to, zoning bylaws and subdivision regulations. Examples of potential implementation tools include:

Zoning Bylaws

Zoning bylaws are a commonly used method for guiding development at the local level. Zoning may regulate:

- Uses of land,
- The placement of buildings on lots,
- The relationship of buildings to open space, and
- The provision of parking, signs, landscaping and open space.

Brookfield has a zoning bylaw that establishes districts or zones that have a different set of uses, densities, and other standards for development. Zoning districts must be reasonably consistent with this Plan, and it is the responsibility of the Planning Commission to implement changes to the bylaw that are proposed in this Plan.

Subdivision Bylaws

Brookfield has had subdivision bylaws since the 1970s. Subdivision bylaws govern the division of parcels of land and the creation of roads and other public improvements. Furthermore, subdivision regulations can ensure that land development reflects land capability and that critical open spaces and resources are protected from poor design or layout. It is the responsibility of the Planning Commission to implement any changes to subdivision regulations that are proposed in this Plan.

Flood Hazard Bylaws

Under Vermont law, the Town of Brookfield adopted flood hazard bylaws to regulate the use of land in a defined flood hazard area adjacent to streams and ponds. These bylaws were established to ensure that design and construction activities within the limits of the 100-year floodplain are designed so as to minimize potential for flood damage and to maintain use of agricultural land in flood-prone areas. As noted in the Natural Resources section of this Plan, property owners are eligible for federal flood insurance on buildings and structures at relatively low federally subsidized premium rates. However, such insurance cannot be obtained for properties in Brookfield unless the town has in effect a flood hazard bylaw which, at present, Brookfield has. The current flood hazard bylaw is designed to meet the minimum standards required for a community to be part of the National Flood Insurance Program. The town should strengthen these regulations as recommended in Chapter XIV Flood Resilience.

State Regulatory Proceedings

This plan has a role in land use proceedings before state agencies and it is therefore important for this Plan to address implementation through those proceedings. Case law indicates that state agencies are most likely to apply provisions of a plan that are specific and clear.

For example, in proceedings under Act 250 (10 V.S.A. chapter 151) and before the Public Utility Commission (PUC) under 30 V.S.A. § 248 (siting of electric generation and transmission, natural gas facilities) and 248a (siting of telecommunications facilities), provisions of this plan may be treated as written community standards intended to preserve the aesthetics and scenic beauty of an area.

All of the policies of this plan that address the visual, aesthetic, scenic or rural qualities of Brookfield are meant to be written community standards intended to preserve the aesthetics and scenic beauty of Brookfield. These include, without limitation, the policies addressing these qualities in Chapters VII Communications, X Energy, XI Significant Natural, Scenic and Cultural Resources, and III Land Use. The Brookfield telecommunications bylaw specifically constitutes and is incorporated into this plan as such a written community standard.

Also, in Act 250 proceedings, a district commission will determine whether a proposed development or subdivision conforms to the specific policies of this plan. The goals and objectives of this plan that guide the location, siting, and design of land development in Brookfield are intended to constitute specific policies for the purpose of such determinations. These policies include, without limitation, the policies addressing location, siting, and design in

Chapters VII Communications, XI Significant Natural, Scenic and Cultural Resources, XII Agriculture and Forestry, and III Land Use. The telecommunications bylaw is incorporated into this plan as a specific policy.

Further, in the above-referenced PUC proceedings, the Board will give due consideration to the land conservation measures contained in this plan and the recommendations of the Brookfield Selectboard and Planning Commission. In the case of telecommunications facilities, the Board is required to give these measures and recommendations substantial deference.

For the purpose of applying the term “land conservation measures” to this plan, the Planning Commission intends that all policies of this plan that address the conservation, preservation, or protection of land that possesses natural, agricultural, forestry, historic, and scenic resources be treated as such measures. These policies include, without limitation, the policies addressing these resources in Chapters I, III, XI, XII, and XIV.

Moreover, all policies of this plan that guide the location, siting, and design of land development in Brookfield constitute recommendations of the Selectboard and Planning Commission to which the PUC should give due consideration or, in the case of telecommunications facilities, substantial deference. These policies include, without limitation, the policies set out in Chapters III and VIII and X. Additionally, the Selectboard or Planning Commission may make recommendations that are specific to a project at issue.

For the purposes of PUC proceedings on telecommunications facilities, the requirements of the telecommunications bylaw specifically are incorporated into this plan as measures to conserve the scenic qualities of land in Brookfield and as recommendations of the Selectboard and the Planning Commission.

Highway Ordinances

Brookfield has in effect a Highway Ordinance setting forth the standards and conditions for the maintenance, improvement, discontinuance, laying out and acceptance of town highways. In addition, the ordinance includes provisions related to the reclassification of town highways (Classes 2, 3 and 4).

Lastly, Brookfield does have, through its Selectboard, the ability to regulate private access to municipal roads through the issuance of “curb cut” access permits to landowners. “Curb cuts” are places where a private driveway or road connects to a town highway. In granting a cut onto town roads, the Selectboard can give consideration to safety issues such as adequacy of sight distance and proximity to intersections as well as conformance with this Plan.

B. Non-Regulatory Implementation

Capital Budget & Program

The creation of a capital budget and program has been discussed in several chapters of this Plan. A capital budget and program is a financing approach that benefits the town greatly in the selection, prioritization, timing and costing of capital projects. Under the capital budget, a project

is selected (e.g., bridge refurbishment), a funding source determined (e.g., general taxes, and general obligation bonds) and a priority year given for each activity. Collectively these capital projects make clear when public facilities will be placed to accommodate projected growth.

In addition, it is noted that under Vermont's Act 250 law, in granting a Land Use Permit for a major development or subdivision, the District Environmental Commission must first find that the project is in conformance with the town's capital budget. [See 10 V.S.A. § 6086(a)(10).] Accordingly, this mechanism gives the town an indirect method of implementing its policies and priorities as set forth in the Plan.

While Brookfield has an informal system of capital programming, the town should consider establishing a Capital Budget Committee to work with the Selectboard and Planning Commission in the development of a list of capital needs and expenditures, and to create a Capital Budget and Program for review.

Advisory Committees

State statute authorizes a community, by vote of the Selectboard, to create advisory committees. These committees can have differing roles, some provide advice to the Planning Commission or Development Review Board regarding development (for example, a historic review committee as part of a design review district), but more often advisory committees are created to focus on a specific topic in the Plan. The most common advisory committees are the Conservation Commission and the Energy Committee. These groups (outlined in the Natural Resources and Energy chapters respectively) can assist the Selectboard and/or Planning Commission with the creation of policy, but they can also act as the primary source of outreach and education relating to their primary focus point.

Coordination of Private Actions

Citizens and private enterprises have a vested interest in the well-being of Brookfield. The actions of the private sector, such as the construction of homes and businesses, land conservation, and the use of land for recreation and agriculture, should relate positively to the goals and policies as set forth in this Plan.

It is in the interest of Brookfield to develop a cooperative relationship with investment activities that may have a significant impact on the community values and policies set forth in the Plan. By working together in a cooperative venture early in the process of planning for a project, an adversarial relationship can be avoided. Examples of contacts that could be maintained include the following:

- State agencies such as the Vermont Housing and Conservation Board and the Agency of Natural Resources,
- Green Mountain Economic Development Corporation
- Vermont Land Trust and Upper Valley Land Trust
- Twin State Housing Trust

- Owners of significant properties of high resource or development value, and
- Major employers in Brookfield.

Conservation Activities

Conservation programs are an effective means of securing protection of valuable farm and forestland or significant natural resources. Techniques available involve voluntary direct work between non-profit conservation organizations and affected landowners such as donation of conservation easements, bargain sales of land, and limited development schemes.

The land trust movement has grown immensely during the past twenty years, particularly in Vermont. Land trusts offer viable means of bringing together the needs of property owners with the community interests. The Vermont Land Trust and the Nature Conservancy are particularly well-recognized organizations. Several organizations are also involved in water quality protection. It is the intent of this Plan to implement its policies through coordination and the involvement of these organizations and others dedicated to public purposes.

Vermont Community Development Program

Since the mid-1970's, the Vermont Community Development Program (VCDP) has made grant funds available to towns for community projects. Historically, the major focus of the program has been on housing rehabilitation and affordable housing projects benefiting low and moderate-income families, but the program also offers funding for municipal infrastructure investments.

Brookfield should investigate the Vermont Community Development Program and its potential to assist the community in addressing its housing and infrastructure needs. The Regional Commission and the Vermont Agency of Commerce and Community Development are resources available to assist.

Vermont Local Roads

The Vermont Local Roads program offers technical assistance to communities, which focuses on transportation infrastructure and maintenance.

C. Responsibility for Implementation

In order to ensure that the policies of this Plan are implemented, it is essential to identify what municipal panel, organization or citizen is most suited to act on them. Throughout this Plan, the Planning Commission has identified recommendations for action. Generally, responsibility for implementation of the Plan will rest with the Planning Commission in areas relating to land use such as implementing changes to land use bylaws and to the Selectboard in areas such as implementing municipal policy for town roads. However, advisory committees as well as other community organizations could also have responsibilities for implementation.

In addition to assigning responsibility, the Planning Commission should also keep track of progress made toward implementing the goals, policies and recommendations of this Plan. This

information will be useful to identify areas where additional effort needs to be applied to achieve implementation. It can also be used to describe how successful the community has been at implementation in the next iteration of this Plan, and to guide future policy.

In order to track the progress of implementation, the Planning Commission has included a chart that identifies the policy or recommendation, the responsible party and the progress. See Appendix A.