Water and Wastewater Infrastructure to Support Affordable Housing Development

Phase 2 Report

September 2024

Prepared for:

Addison County Regional Planning Commission

CORNWALL, VT. 1761

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Acknowledgements

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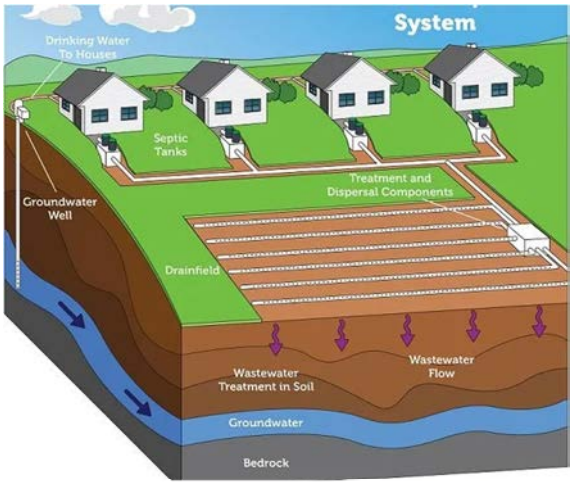
PROJECT OVERVIEW & KEY FINDINGS

This report examines opportunities and challenges related to water and wastewater infrastructure to support affordable housing development in the Town of Cornwall. Although this research was undertaken for the Town of Cornwall specifically, the findings may be relevant for other towns that lack public water and wastewater infrastructure and want to develop affordable housing. Included in this report are case study findings from several rural towns in Vermont that illustrate opportunities and constraints to developing centralized infrastructure systems, as well as the results of a housing preference survey of Cornwall residents conducted in July 2024.

Key findings for the Town of Cornwall are as follows:

- **Centralized water supply systems are feasible, but costly.** A centralized community-based water system could rely on groundwater to allow for additional development and reduce water costs on a per user basis in the long-term. However, to support this kind of financial investment, the Town would have to be committed to investing in a set of uses (e.g., affordable housing, public facilities, general store) and rely on a combination of grants and public and private development funds.
- **Centralized wastewater systems are constrained by soil conditions.** Existing development patterns and loamy and clay soil types in the designated Cornwall Village Center are less suitable for centralized cluster or community-based wastewater systems. The Town may want to undertake further engineering analysis to evaluate sites with more promising soil conditions.
- **Potential beyond Village Center boundaries.** Based on these soil conditions, a small project of fewer than 10 units may be the most feasible option for housing development in the Village. Just outside the designated Village Center, there are some areas with more suitable site conditions. The Town could consider extending the Village Center designation to evaluate sites that would allow for affordable housing development. Moreover, sites elsewhere in Cornwall could have soil conditions than are more suitable for development.



Cluster septic systems consolidate treatment and disposal in an efficient centralized system. However, sufficient land area, soil conditions, and funding are required. (Source: US Environmental Protection Agency)

Decentralized infrastructure (e.g., individual septics) are unlikely to support the density needed for an affordable housing community. However, duplexes and attached townhomes, could be feasible in certain locations and could be attainable for middle-income households. (Example: duplexes in South Burlington)

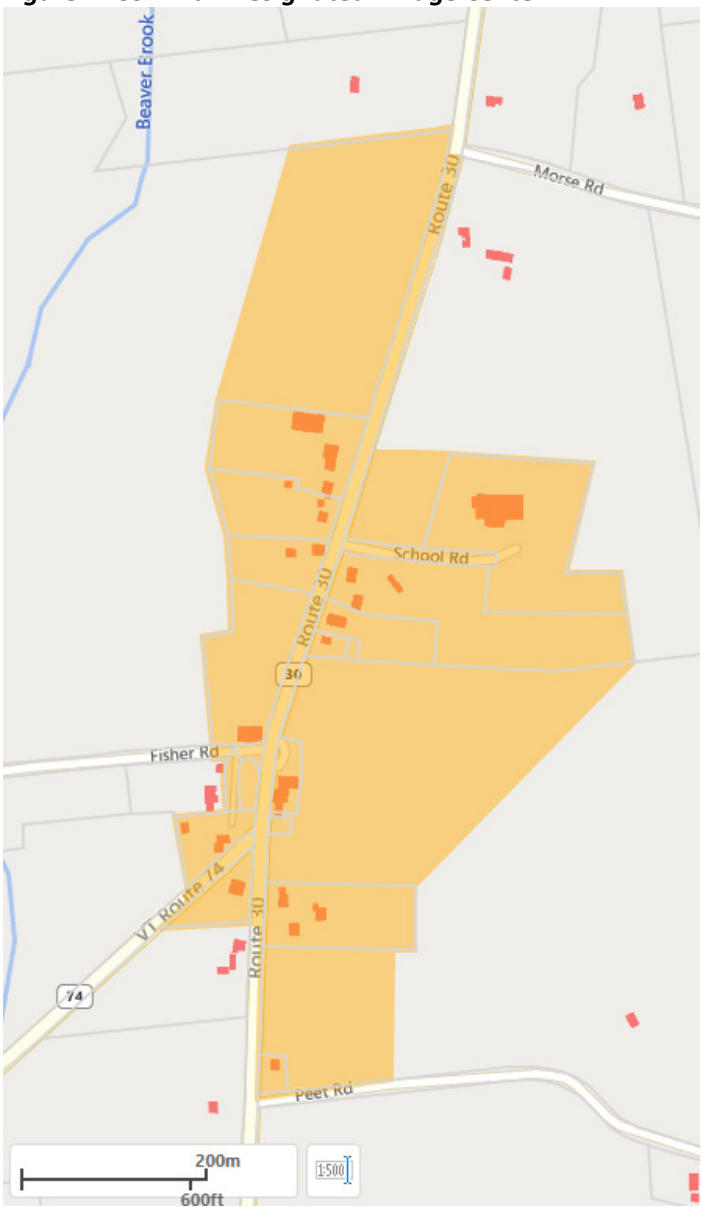
Following this summary, this report discusses opportunities and constraints related to water and wastewater infrastructure, available funding, case study findings, and next steps including further engineering analysis, coordination with the Town of Middlebury on potential off-site treatment and coordination with the Addison Central School District on the future of the Cornwall School site.

BACKGROUND

Statewide Context

Recent amendments to Act 250 in 2023 and 2024 provide increased flexibility for local jurisdictions to permit and develop affordable housing. However, this flexibility is generally limited to downtown and village centers that have existing or planned public water and wastewater systems with capacity to support development. The Town of Cornwall has a designated Village Center (see Figure 1), but it does not have public water or wastewater systems. This places the Town at a disadvantage when it comes to permitting multifamily housing projects and accessing State and federal funding for affordable housing. A centralized system could support both affordable housing development as well as other potential uses in the Village Center.

Figure 1: Cornwall Designated Village Center



Source: Vermont Department of Housing and Community Development (https://maps.vermont.gov/ACCD/PlanningAtlas/index.html?viewer=PlanningAtlas)

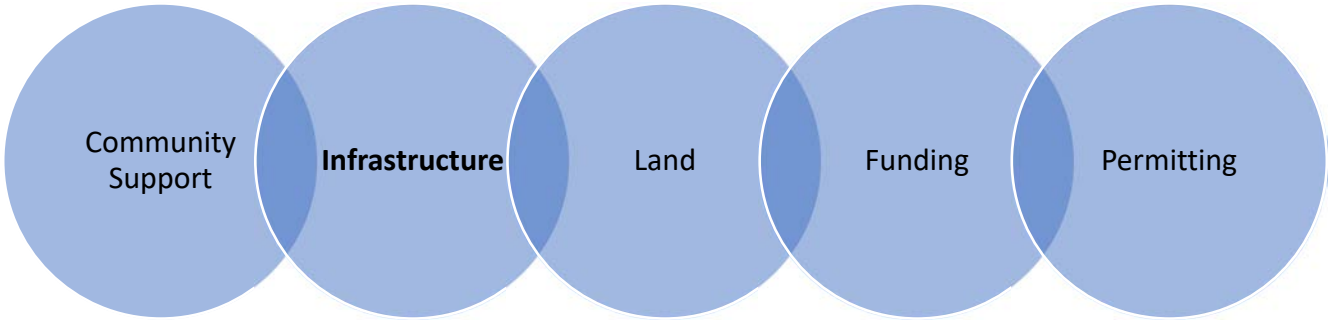
Local Context

The 2023 Cornwall Town Plan encourages greater diversity in the housing stock, including multi-family and affordable housing. Developing affordable housing is essential to meeting the needs of Cornwall residents, including young people, seniors, farmworkers, and low- and moderate-income households who cannot afford to live in the town. The Plan also acknowledges the need to supply sufficient water and wastewater systems to support these uses.

To pursue these goals, the Cornwall Planning Commission recently formed a Housing Committee to study opportunities and barriers to developing affordable housing in the town and initiated a community-wide survey to gauge interest in building affordable housing. (See Appendix B for survey results.)

The Cornwall Town Plan supports reestablishing businesses in the village like a general store or café, in addition to supporting affordable housing development. This desire for a general store and housing in the village is reinforced by the survey results shown in Appendix B. (Source: Cornwall Town Plan, Town Hall and the former Lavalley Store)

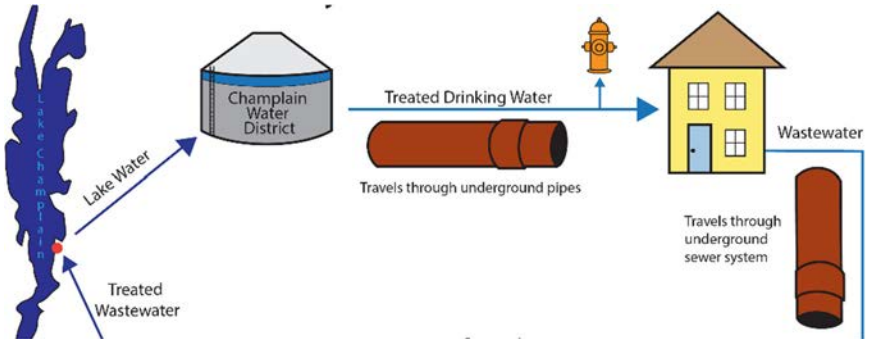
Currently, all households and uses in Cornwall rely on private water and septic systems. The Cornwall Town Plan recommends further investigations into potential wastewater infrastructure in the village to support a reasonable amount of development. Centralized wastewater systems can also support water quality in local and regional waterways and prevent contamination to local water supply sources. This analysis supports these objectives.



Identifying infrastructure opportunities and barriers to adding to the affordable housing supply in Cornwall is an important first step before engaging in other regulatory, financial, and political aspects of affordable housing development in Cornwall.

KEY FINDINGS: WATER INFRASTRUCTURE

Water supply infrastructure in Cornwall is limited to on-site water supplies, such as wells and springs. Table 1 explores options for water supply systems, depending on the type of housing (e.g., ADUs, single-family, apartments). It explores costs for the supply system (excluding connections and ongoing operations), both lump sum estimates and on a per gallon basis. Key findings are as follows:



This analysis explores a potential centralized water system, where a water source and treatment facility convey potable water through connected pipes to homes and businesses (Shelburne, VT example, above). This is distinct from Cornwall's existing decentralized system, generally composed of individual wells and springs.

- Water supply systems are generally achievable in Cornwall, but water supply construction, quality and quantity are dependent on site conditions, including geology and drainage patterns.
- Costs per gallon for on-site systems are highest for single-family homes and lowest for multi-family housing since they are spread among multiple uses. However, maintenance costs for small systems needed for multi-family housing are relatively expensive per user.
- A community system in Cornwall would need a water source, likely a well, and would have a substantial upfront cost ($1.5-$5 million for the system, depending on design flows, plus the cost of connecting pipes). A community system could allow for additional development, reducing costs on a per user basis in the long-term. Such a system could be appropriate in a place where more density is anticipated, such as the village. However, to support this kind of financial investment, the Town would have to be committed to a set of uses (e.g., affordable housing, public facilities, general store) and rely on a combination of grants and public and private development funds.
- In the absence of a community system, multi-family housing in Cornwall is limited to on-site water supply systems, typically individual wells drawing on groundwater. For example, a decentralized system could accommodate a housing project with fewer than 10 units.

Table 1: Water Supply Systems, by Housing Type

Size ↓

Housing Type	*Capacity*[1]	*Supply Options*	*Advantages*	*Disadvantages*	*Cost*	*Cost per Gallon ($/gpd)*
Accessory Dwelling Unit (ADU) [2]	150 GPD	- Modification of existing water supply	- Low-cost option for residents - Ease of construction	- Construction and yield depend on site conditions - Requires construction of water and wastewater system on the same lot	$10,000	$66.67
Single Family	450 GPD	- On-site water supply			$30,000	$66.67
Duplex	900 GPD				$50,000	$55.56

↑ Initial Cost

Size ↓

Housing Type	*Capacity*[1]	*Supply Options*	*Advantages*	*Disadvantages*	*Cost*	*Cost per Gallon ($/gpd)*
Multi Family[3]	Community system triggered at 10 service connections or at least 25 users.[4] Design Flow estimate of 3,240 GPD	- Individual on-site water supply - Small Public Community Water System or Non Transient Non-Community System.[5]	- Small public or NTNC[5] system allows for additional development in areas with limited water availability	- Construction and yield depend on site conditions - Cost of maintenance per user for a small water system can be expensive	$150,000	$46.30
Small Scale Community	Greater than 25 users and/or at least 10 service connections. Design Flow estimate of 20,000 GPD	- Public Community Water System	- Allows for additional development - Reduces cost of maintenance per user by increasing user base	- Water system supply construction and yield depend on site conditions - Systems can be expensive to build	$1,400,000	$70.00
Large-scale Community	Greater than 25 users and/or at least 10 service connections. Design Flow estimate of 40,000 GPD				$5,000,000	$125.00

Initial Cost ↓

Notes:

1. Following the Vermont Environmental Protection Rules (EPRs); Chapter 1:WWWSR Subchapter 8, § 1-803 Design Flows ; the design flow for individual components of a wastewater system and a potable water supply shall be calculated using one of the following methods for the total living units served: (1) The design flow of 70 gallons per day per person at the maximum residential occupancy proposed for each living unit, provided the resulting design flow is not less than the design flow calculated using the following minimum design standards: (A) a living unit contains at least 1 bedroom, except as provided in Subsection (c); (B) the first 3 bedrooms in a living unit contain a minimum occupancy of 2 persons per bedroom; and (C) each additional bedroom beyond 3 contains a minimum occupancy of 1 person per bedroom.
2. ADU capacity based on assumption of 1 bedroom with a minimum of 2 persons.
3. For the purposes of calculating design flows, multifamily is triggered at five or more units, following the Vermont EPRs; Chapter 1: WWWSR; Table 8-1. Design flows for projects with fewer than five units are calculated based on single-family rates.
4. The Water Supply Rule indicates serving at least 15 connections, but practically the Drinking Water and Groundwater Protection Division (DWGPD) has acted based on the assumption that only 10 single-family homes, with an average household size of 2.5 persons per household, will trigger the threshold for serving 25 persons. A smaller development (<10 units) would generally utilize an individual on-site water supply system.
5. Non-Transient Non-Community (NTNC) Water Systems: NTNC water systems are defined as a public water system that is not a public community water system and that regularly serves at least 25 of the same people daily for more than six months per year in a system.

Source: Otter Creek Engineering, 2024.

KEY FINDINGS: WASTEWATER INFRASTRUCTURE

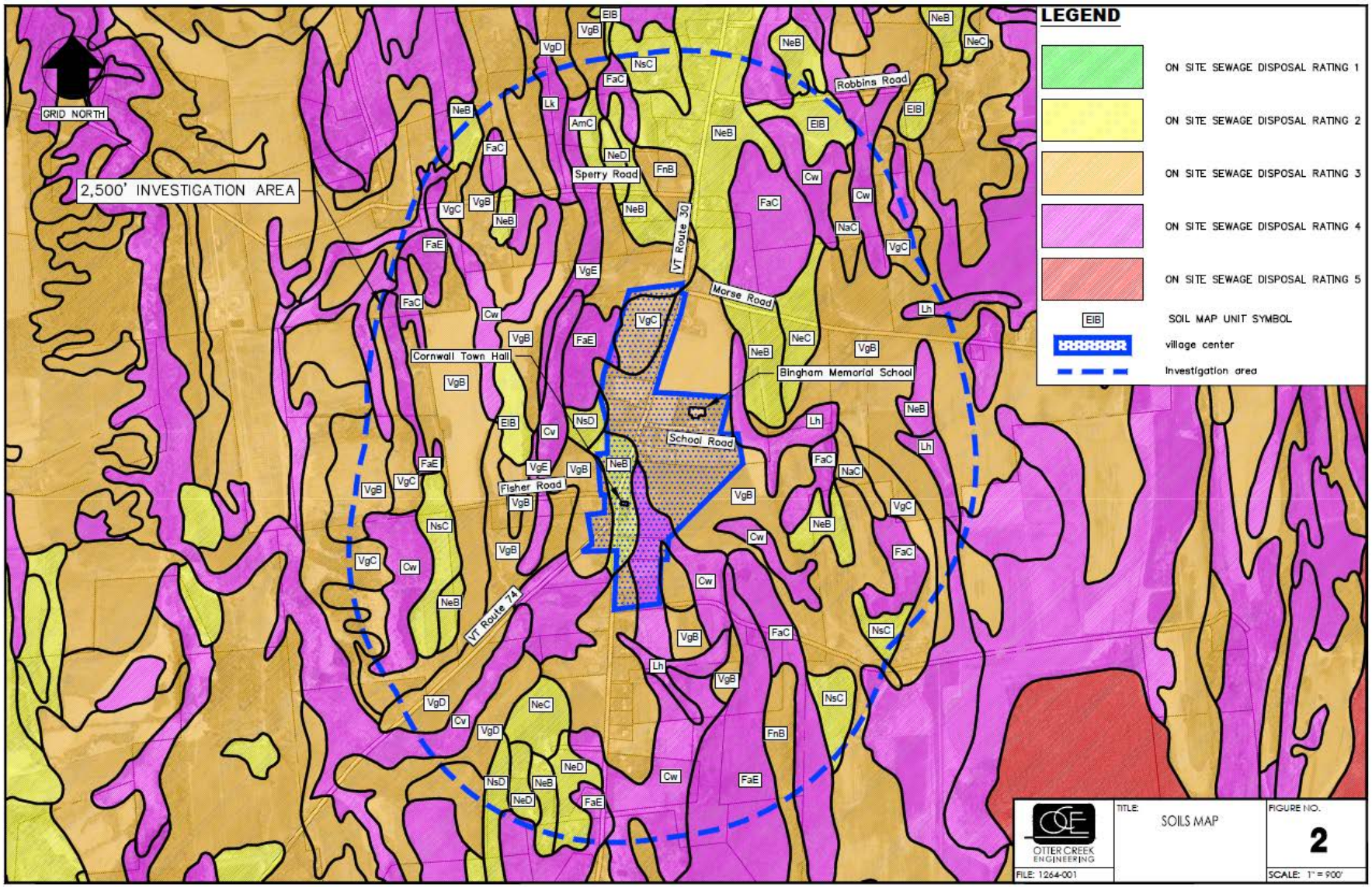
Wastewater systems require specific site and soil conditions and sufficient funding for design and construction. The Town of Cornwall has a variety of soil conditions, ranging from heavy clays to light loams to bedrock. Table 2 explores options for wastewater supply systems, depending on the type of housing. It explores costs for the supply system (excluding collection and ongoing operations), both lump sum estimates and on a per gallon basis. Figure 2 illustrates soil types and they're suitability for on-site sewage disposal. The most suitable soil types are shown in the green and yellow; moderate to poor suitability is shown in orange, purple and red. Key findings are as follows:

- Loamy Nellis soils and clay soils occupy much of the designated Village Center. These soils have shallow depths to the water table and are generally not well suited for community wastewater systems, as shown in Figure 2. Based on existing development patterns and mapped soils in the Village Center, it may be challenging to identify soil areas remain that can support cluster or large-scale community systems. Moreover, State permits for direct discharge into waterways are generally no longer attainable in an effort to improve water quality.

Direct discharge of treated wastewater into waterways such as Lake Champlain, the Cornwall swamp, and Lemon Fair River is generally no longer permitted in an effort to maintain and improve water quality levels. That leaves indirect discharge as the likely option for new development.

- Additional engineering analysis would be needed to determine if remaining sites in the Village have site conditions--soils, slopes and sizes that allow sufficient horizontal and vertical distance from water supplies—to support development. Just outside the designated Village Center, there are some areas (shown in yellow) with more suitable site conditions for cluster or community-based systems. Site-specific evaluations or even an expanded Village Center designation could potentially reveal sites that could support infrastructure for affordable housing development. Moreover, soil conditions could be feasible elsewhere in the Town.
- Individual septic systems may be feasible, but this limits development on a given site to one or two homes on a given site—or if site-specific conditions allow—a small project of fewer than 10 units served by a decentralized system. This lack of density reduces the potential for subsidized affordable housing, though more middle-income housing could be attainable just by the nature of the housing type. This could be in the form of duplexes, attached townhomes, or a small cottage court operated as a cooperative (co-op) or condominiums.
- A land-applied system or aerated lagoon system, which is a constructed wetland that uses mechanical aerators to break down solids, could be technically feasible. However, these systems require sufficient land area, are expensive, potentially malodorous, and would need community buy-in for a less common method of disposal.

Figure 2: Soils Map and On-site Sewage Disposal Suitability, Cornwall Designated Village Center and Surroundings



Source: Otter Creek Engineering, 2024.

Table 2: Wastewater Systems, by Housing Type

Housing Type	*Capacity*	*Management Options*	*Advantages*	*Disadvantages*	*System Cost*	*Cost per Gallon ($/gpd)*
ADU	140 GPD	Small-scale System (Mound Disposal System)[1]	- Low-cost option for residents - Ease of construction	- Limits development of land by landowner	$15,000	$107.14
Single Family	420 GPD				$45,000	$107.14
Duplex	840 GPD		- Low-cost option for residents - Ease of construction -Allows for more clustered development		$80,000	$95.24
Multi Family	6,500 GPD	Cluster Indirect Discharge (*Large* Mound Disposal System)	- Cost effective to connect multiple properties to the same disposal system. - Allows for development of otherwise unsuitable land due to soil conditions.	-The requirements to obtain an Indirect Discharge Permit are significantly more substantial than for systems that are regulated under Chapter 1 of the EPRs (e.g., septics, direct discharge).	$350,000	$134.62
Small Scale Community	Minimum of 6,600 GPD to an excess of 40,000 GPD. Design flow estimate of 20,000 GPD.	Community Based System (indirect discharge multiple mound disposal system)	- Preserves the Village center by reducing septic failures and subsequent property value decreases.	- Systems that provide at or above 30,000 GPD must provide secondary treatment (such as an aerated lagoon), and systems that provide at or above 40,000 GPD must an additional tertiary treatment (such as flocculation/precipitation). - The requirements for secondary and tertiary treatment greatly increase the cost of constructing and maintaining the disposal system. - Based on existing development patterns and mapped soils, it is unlikely that suitable soil areas remain in and around the village center that could support such a design.	$1,400,000	$70.00

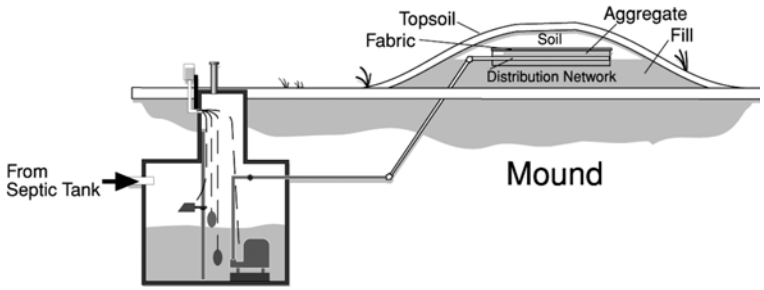
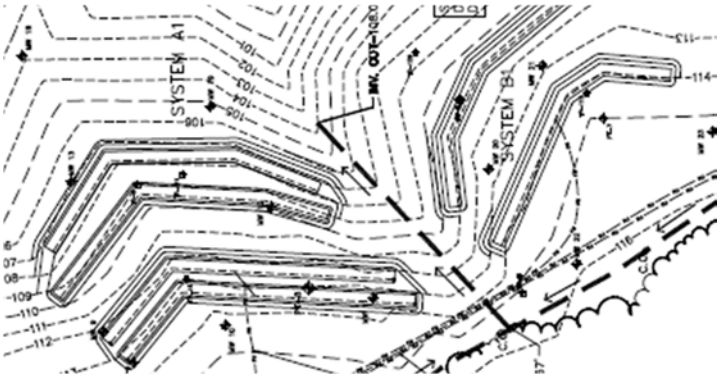
Housing Type	*Capacity*	*Management Options*	*Advantages*	*Disadvantages*	*System Cost*	*Cost per Gallon ($/gpd)*
Large-scale Community	Minimum of 6,600 GPD to an excess of 40,000 GPD. Design Flow estimate of 40,000 GPD.	Large-scale Community Based System (aerated lagoon system)	- Preserves the Village center by reducing septic failures and subsequent property value decreases. - Allows for development of otherwise unsuitable land due to soil conditions.	- Systems that provide at or above 30,000 GPD must provide secondary treatment (such as an aerated lagoon), and systems that provide at or above 40,000 GPD must an additional tertiary treatment (such as flocculation/precipitation). - Requirements for secondary and tertiary treatment greatly increase the cost of constructing and maintaining the disposal system. - 10+ acres needed to use a land application treatment technology such as spray disposal.	$5,000,000	$125.00

Notes:

1. Assumed that in-ground waste disposal and direct discharge are not an option in the Cornwall Village Center due to soil constraints.

Source: Otter Creek Engineering, 2024.

GLOSSARY OF WASTEWATER SUPPLY OPTIONS

	**Small-Scale System (Mound Disposal System):** Septic systems collect and treat wastewater onsite, rather than in a centralized community wastewater treatment plant. Solids remain in the septic tank and pumped out regularly, but liquids are conveyed into the mound system. The mound system is a soil-absorption system that is elevated above the natural surface of the soil using a suitable fill material, such as sand.
	**Cluster Indirect Discharge (Large Mound Disposal System):** Cluster wastewater systems use septic tanks at each individual home or business, but instead of each building having its own soil-absorption system, the effluent is collected from the septic tanks and conveyed to a centralized community drain field. *(Example at left: individual septic tanks with shared leach fields at Foote Farm, Cornwall)*
	**Large-scale Community Based System (Aerated Lagoon System or Land-Applied):** Lagoons function to provide primary and secondary treatment. Aerated lagoons use mechanical aerators to maintain oxygen for beneficial bacteria that break down organic matter. However, sufficient land area is required for the lagoons. *(Examples: Vergennes, Orwell.)* Similar systems use application treatment technology, such as spray disposal that is land-applied in a large area *(Example: Basin Harbor)*

CASE STUDIES & FUNDING SOURCES

To augment the findings in this report, the project team cataloged best practices, opportunities, and constraints from seven rural communities in Vermont who have developed centralized water and wastewater systems or affordable housing in the absence of such systems to inform a potential project in Cornwall. These communities include: Montgomery, Shoreham, Warren, Waitsfield, Westford, Lindale, and Foote Farm (Cornwall).

The Middlebury case study attached provides a deep dive into public financing options and how funding opportunities can be layered to see a project through fruition. Potential funding sources for engineering and construction of infrastructure systems, include:

- USDA – Rural Development: Water and Waste Disposal Loan & Grant
- Vermont Community Development Program (VCDP)
- Community Development Block Grant (CDBG)
- Vermont Housing & Conservation Board (VHCB)
- Congressionally Directed Spending (Earmarks)
- Vermont's Clean Water Revolving State Fund (CWSRF) Loan

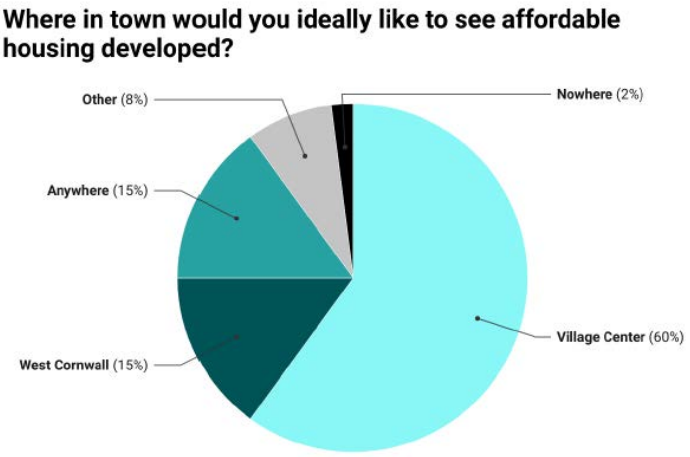
Additionally, case studies also include examples of private developments (e.g., hotels, ski resorts) spearheading infrastructure development and entering public/private partnerships with municipalities to share in infrastructure development and costs.

These case studies reveal the need for (1) a clear objective (e.g., water quality, housing, economic development); (2) State and federal funding for engineering design and construction; and (3) leadership of the town government, businesses, and/or community.

HOUSING PREFERENCES SURVEY

In July 2024, Addison Housing Works surveyed Town of Cornwall residents about their housing preferences. The survey was available in electronic and paper formats from July 5th to July 17th, 2024. There was a total of 115 responses.

Survey respondents overwhelming favored affordable housing in the Village Center (60%). Respondents expressed a preference for affordable housing as single-family housing (71%), though about half of respondents also supported ADUs, multifamily and senior housing. Regardless of age or household income levels, respondents were "concerned" or "very concerned" about the availability of affordable housing in Cornwall. However, younger and lower income respondents expressed the most concern about affordability compared to older and wealthier respondents.



NEXT STEPS

Potential next steps for the Town to consider are as follows:

Site Specific Engineering Analysis: The Town may want to pursue further engineering analysis to analyze specific sites for suitable soil conditions. State programs can provide low-interest loans, some of which are eligible for 100% loan forgiveness. With a $40,000 - $50,000 grant/loan, an engineer could assess site suitability in and around the Village Center to support infrastructure development for affordable housing.

Off-Site Options – Coordination with Town of Middlebury: The Town of Middlebury is undertaking a rehabilitation and modernization of its wastewater treatment plant (WWTP). To fund the approximately $50 million project, the Town may consider processing wastewater of other users' waste to help generate revenue.[1] The Town of Middlebury's WTTP already accepts trucked-in sludge from other communities. The Town of Cornwall could consider coordination with Middlebury as this capital project unfolds.

Cornwall School - Coordination with Addison Central School District (ACSD): Land area in and around Bingham Memorial School could provide opportunities for housing. With the development of the Cornwall Outdoor Recreation Area (CORA) recreation area between Town Hall and Bingham Memorial School, the Town can expect more visits and activity around the Village Center. This can help spur opportunities for community gathering and further support for a general store and affordable housing in the village.

A 2019 facility needs assessment at Bingham Memorial School identified a priority list of facility upgrades for the school. In terms of wet infrastructure, the report identifies a non-transient non-community well drilled in 1959, which provides potable water to the site; and a mound septic system constructed in 1983 and a pump station installed in 2006 to process wastewater. The wastewater system has a design capacity of 203 students and staff, which accommodates the occupancy of the school which is generally less than 100. The Town could work with ACSD on potential repositioning of the school site to allow new uses such as affordable or senior housing, that could capitalize on this existing system and excess capacity.[2]

Other Future Studies. Future analyses by the Town may explore the potential expansion of the Village Center designation by the Vermont Department of Housing and Community Development; Town zoning regulations that accommodate multifamily housing; estimated housing development costs for a small project; and funding opportunities for affordable housing and infrastructure.

[1] "Middlebury Sewer Plant Makeover Pegged at $50M" *Addison Independent*, September 26, 2024. https://www.addisonindependent.com/2024/09/26/middlebury-sewer-plant-makeover-pegged-at-50m/

[2] TruexCullins, Facilities Evaluation Report, "Bingham Memorial School" Addison Central School District, 2019. https://drive.google.com/file/d/19YbLe5rKXk0XJETUgDGVdMRBxUWYYHMQ/view

Appendix A: Infrastructure Case Studies

Montgomery, VT

Wastewater Case Study

https://dec.vermont.gov/village-wastewater

Background

In 2019, the town of Montgomery identified the need for a municipal wastewater system in the Center and Village as a priority area for development. The need for a municipal wastewater system was obvious: 10% of existing systems in the Village and Center are either troubled or failing, and 92% of systems in the Village and Center are on lots that are too small for replacement options that meet current standards. These properties are much harder to finance, and suffer from lower property values and negative marketability.

In addition to these economic factors, 40% of septic systems in the Village conflict with the Town Water System's Source Water Protection Area, which is both a threat to public health from risk of contamination, and an environmental concern.

Montgomery is currently in the final engineering design phase of the wastewater project, which is expected to be completed by the end of 2027. Once the system is online, it will serve residential, small commercial and town-owned buildings. The infrastructure improvement will create opportunities for business development, new senior or low-income housing projects, increased tax revenue, and will reduce the risk of water contamination that currently threatens the health of Montgomery's population.

Timeline

2019 Town votes for feasibility study

2020 Bond vote passes 7/7/2020

2024 (present) Final engineering design phase

2027 Construction finished by end of year, system online

At a Glance

Estimated Project Cost

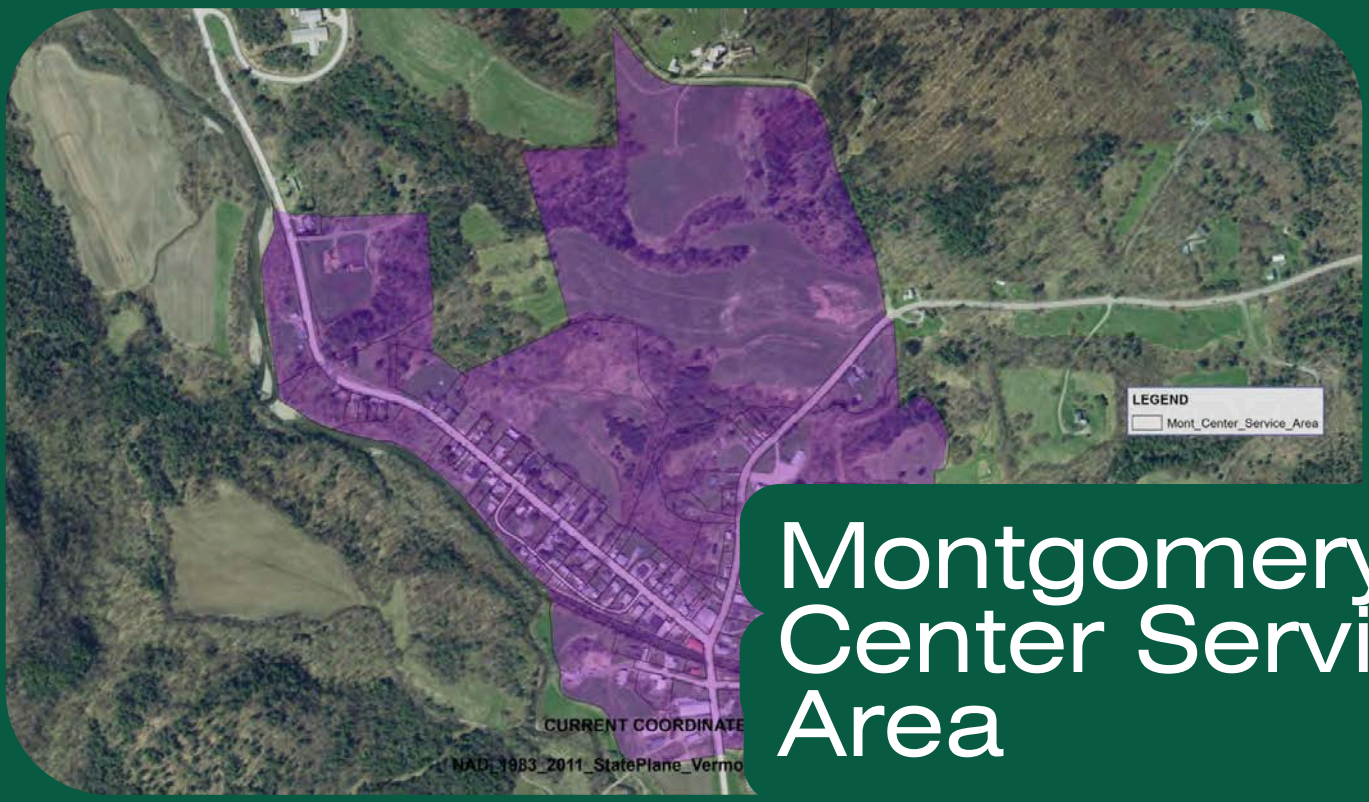
- $11.8 million

Benefits

- Reduced wastewater contamination of the protected area of the Trout River
- Replacement of 165 on-site septic systems in the Village Center, some of which are outdated and failing
- Expanded opportunities for selling properties that were previously hindered by sub-standard septic, and opportunities to increase capacity for existing businesses

"By improving municipal infrastructure, this project will position Montgomery to rebound stronger from the economic slowdown focusing on a long-term vision for the Town's vitality over the next 30-50 years."

Town of Montgomery Official Municipal Website, Public Info and Project Plans



Montgomery Center Service Area

The system components include wastewater collection, treatment, and disposal [as detailed in the Preliminary Engineering Report (PER)].

Overview

- ### Wastewater Collection

  The systems will serve the Village, Center (North) and Center (South). Montgomery selected a grinder pump collection and conveyance system and three separate septic tank and infiltration areas to serve these locations.
  The grinder pump system collects wastewater, grinds up the solids, and pumps it through the sewer system through narrow pipes.

- ### Treatment & Disposal

  Sewage will be pumped directly to a dispersal system similar to a leach-field in well-draining sand approximately 1/2 mile east of the village center.
  Maximum net wastewater treatment and disposal capacity of 40,000 gallons per day (GPD).

- ### Next Steps

  Once the final engineering design phase is completed, the town will begin construction of the systems. Once the system is online, all land parcels within the service area will be required to connect to the system. Users will pay annual operation and maintenance costs.

Funding

The project will be funded primarily through the USDA Rural Development grant. The award total was $6,065,000. Other grants include $507,000 from the Northern Borders Regional Commission, $250,000 from the Clean Water Revolving Fund, and a $30,000 planning grant. The remainder of the project ($4,948,000) will be funded with a 30 year loan at a 1.125% interest rate with Rural Development. The loan will be paid off through revenue from user fees, a 1% local option tax on Sales, Meals, Rooms and Alcohol, and an additional $0.06 on the tax rate per $100 in assessed value on properties.

For More Information: https://montgomeryvt.us/g/selectboard/montgomery-thrives/public-info-project-plans

Shoreham, Vt

Wastewater Case Study

https://www3.epa.gov/region1/npdes/permits/2023/finalvt0120108permit.pdf

Background

In 2000, the town of Shoreham proposed a wastewater collection and treatment system to address urgent environmental concerns. Homeowners in the village center were dealing with failing septic systems that were discharging directly into their backyards, as well as the Cedar Swamp. The town's gas station/service center was unable to provide a public restroom or proper amenities due to septic malfunctions and lack of capacity. Other key features of the village center were unable to renovate or expand due to septic issues. The townspeople brought these issues to attention through signs and local outreach, and the town quickly mobilized to construct a municipal wastewater system. The entire project only took 2-3 years to complete, from planning to finished construction.

The project involved initial funding from the Clean Water Revolving State Fund, USDA rural development grants and loans, and a "grand list" tax to offset some of the debt service costs. Otter Creek Engineering was responsible for the preliminary studies, and the town then purchased around 300 acres of farmland by the Shoreham service station for the centralized collection system. The pump for the system is located near the memorial library, and the treatment facility consists of a primary septic tank with two cells, three recirculating sand filters, and an ultraviolet disinfection system to sanitize 80% of the water, and discharge the remaining 20% to Cedar Swamp. The design capacity for the facility sits at 35,000 gpd.

The project has provided septic for more development around the town green, public bathrooms at the service station, a gastropub at the Shoreham Inn, a bank, and more. Additionally, it has resolved preexisting septic issues for homeowners around the village center.

At a Glance

Estimated cost

- $2-3 million

Benefits

- Fixed sewage problems for homeowners in town center
- Addressed environmental concerns due to unsafe sewage discharge
- Accommodated public restroom in gas station, more town amenities
- Provided capacity for future growth

Timeline

1999 Discharge problems arise, planning begins

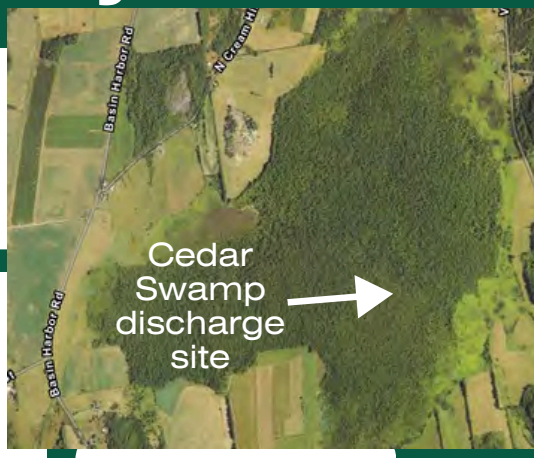
2000 Permitting, construction starts

2001 Treatment facility built

RCAP

Shoreham's Constructed Systems

The system contains a centralized collection system, with a treatment plant using a sand filtration and UV disinfection system to recirculate and discharge water.



Overview

- ### Wastewater Collection

  The wastewater system uses a centralized collection model, meaning the wastewater is collected and treated at the wastewater treatment facility, typically a short distance away from the served area of the system. The facility receives and treats wastewater from the village area of Shoreham.

- ### Treatment & Disposal

  The Shoreham Wastewater Treatment Facility (WWTF) site is located at 1571 VT-22A, Shoreham, VT. The authorized discharge point is located at Cedar Swamp, at the coordinates (43.90444, -73.31110). -ground disposal at the Munn Site - maximum net wastewater treatment and disposal capacity of 89,000 gallons per day (GPD).

- ### Next Steps

  The wastewater treatment facility was finished and operable by June 2001, and currently flows at around 9,000 gpd. A phosphorus testing plan was since created to monitor the levels of chemical discharge. In terms of village development, the facility has opened the doors for the renovation and construction of many public works, such as a bank, and service station, and provides opportunities for future development.

Funding

For initial project planning, the Clean Water Revolving State Fund aided initial feasibility studies. Primary project funding came from USDA rural development grants and loans, and additional funds came from town taxpayers to subsidize the system.

Warren, Vt

Wastewater Case Study

https://dec.vermont.gov/sites/dec/files/WID/Warren%2C%20VT%20Wastewater%20Solutions_finalCaseStudy.pdf

Background

The Village of Warren, situated in the Mad River Valley, implemented a successful wastewater management system to meet the needs of local businesses and residences. Concerns raised by community members and local groups about water quality in the Mad River led to testing, which highlighted the need for a wastewater solution. In 1997, with funding from the Pitcher's Inn, the town constructed a small community cluster system with a capacity of 5,000 gallons per day (gpd) at Brooks Field, the elementary school recreational field. This system served the Pitcher Inn, the Warren Store, the fire station, the Town post office, several town offices, and two residences.

Following a flood in 1998 and over a decade of monitoring by the Friends of the Mad River that revealed contamination in the village, the town seized an opportunity to secure an EPA Special Demonstration Grant. With the support of the Mad River Valley Planning District (MRVPD), a decentralized wastewater system plan was developed. The system was expanded to increase its capacity to 30,000 gpd, and the town subsequently purchased it to manage and maintain the infrastructure.

In all, the town aimed to protect water quality and expand wastewater capacity, beginning with a small community cluster system that served key buildings like the Pitcher Inn, Warren Store, post office, town offices, and two residences. Over time, the project expanded to include voluntary connections, ultimately increasing system capacity to 30,000 gallons per day.

At a Glance

Estimated cost

- $4.6 million

Benefits

- Water quality protection in Mad River
- Expanded wastewater access for key village center businesses
- Public-private partnership success

Timeline

1985	Mad River Watch established by Friends of the Mad River to monitor watershed quality
1987	Feasability study conducted, Brooks Field treatment site rec.
1997	Pitcher Inn pursues wastewater system for capacity needs
1999	EPA Special Demonstration Grant awarded to the town
2001	Draft Needs Assessment Report + recommended project plan
2003	Final project plan and design completed
2004	System construction

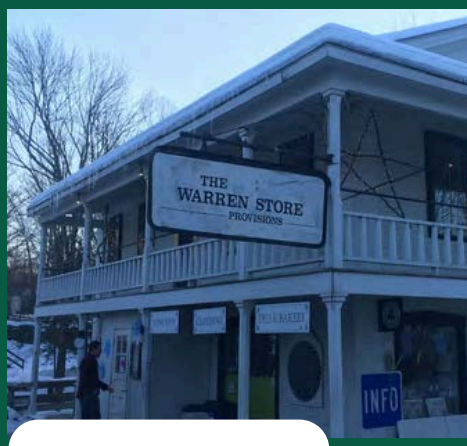
"Many of the lessons learned in the Warren Decentralized Wastewater Management Project can be applied to rural communities throughout the country. Communities facing pollution challenges where traditional sewers and point discharges are unfeasible for their developed village centers need a new way to evaluate the environmental and public health impacts from onsite septic systems. When science-based needs are identified, a range of possible solutions can emerge for consideration, from onsite replacements to large and small cluster systems where an offsite solution is more appropriate."

From "Warren, Vermont: A Different Approach For Managing Wastewater in Rural Villages"

https://www.epa.gov/sites/default/files/2015-06/documents/warren_report_1.pdf

Warren's Constructed Systems

The system components include wastewater collection, treatment, and disposal [as detailed in the Preliminary Engineering Report (PER)].



Overview

- ### Wastewater Collection/Disposal

  The project implemented decentralized wastewater solutions under a single municipality. This included building a septic tank collection system, which involved installing septic tanks and effluent sewers, and upgrading the Brooks Field leach field to increase its capacity to 30,000 gallons per day (gpd). Additionally, the project constructed a shared system with a capacity of 2,000 gpd and replaced and upgraded ten individual onsite systems to improve overall wastewater treatment and disposal in the community.

- ### System Contributors

  The Town of Warren, in collaboration with the MRPVD and a consulting engineering team, prioritized community engagement and voluntary participation in the wastewater collection project. A Wastewater Advisory Committee (WAC) was formed, consisting of community members and elected officials. The WAC led public education and outreach efforts, including door-to-door surveys, newsletters, mailings, and public presentations. To gain community support, they offered to test homeowners' water supplies, revealing contamination in many cases, which encouraged residents to voluntarily connect to the new system.

Funding

Funding sources included an EPA Demonstration Grant, EPA State and Tribal Assistance Grant, Vermont State Pollution Abatement Grant/Match, and the State Revolving Fund Loan. Grants covered most construction costs, with users responsible for annual operation and maintenance expenses.

Waitsfield, Vt

Wastewater Case Study

https://dec.vermont.gov/village-wastewater

Background

Since the fall of 2021, the Town of Waitsfield has been actively pursuing wastewater infrastructure solutions for its twin villages: Irasville and Waitsfield Village. Through detailed studies by consultant engineers DuBois & King and guidance from the town's Water & Wastewater Feasibility Study Committee and Wastewater Planning Project Team, the town has identified and begun design for the preferred wastewater service option identified in the project's Preliminary Engineering Report (PER). Following VT Department of Environmental Conservation's (DEC) December 2023 approval of Waitsfield's PER, the project commenced the final design phase, with construction anticipated to start in 2025. This is a significant milestone towards enhancing town infrastructure to mitigate environmental & human health risks, as well as support future growth in a manner that aligns with Waitsfield's historic settlement pattern of vibrant villages surrounded by rural countryside.

Currently, all sewage disposal needs in Irasville and Waitsfield Village are addressed by private septic systems. This piecemeal approach to wastewater management in the highest-density portion of town is an environmental and public health risk for effluent contamination. These risks increase as septic systems age. Additionally, many properties within the villages are severely limited in their ability to replace leachfields that have exceeded their useful life due to lot constraints.

At a Glance

Estimated cost

- $15 million

Benefits

- Water quality protection in Mad River
- Drinking water protection
- Support for future housing developments and tourism

Timeline

2022 Planning and design begins

2023 Preliminary design

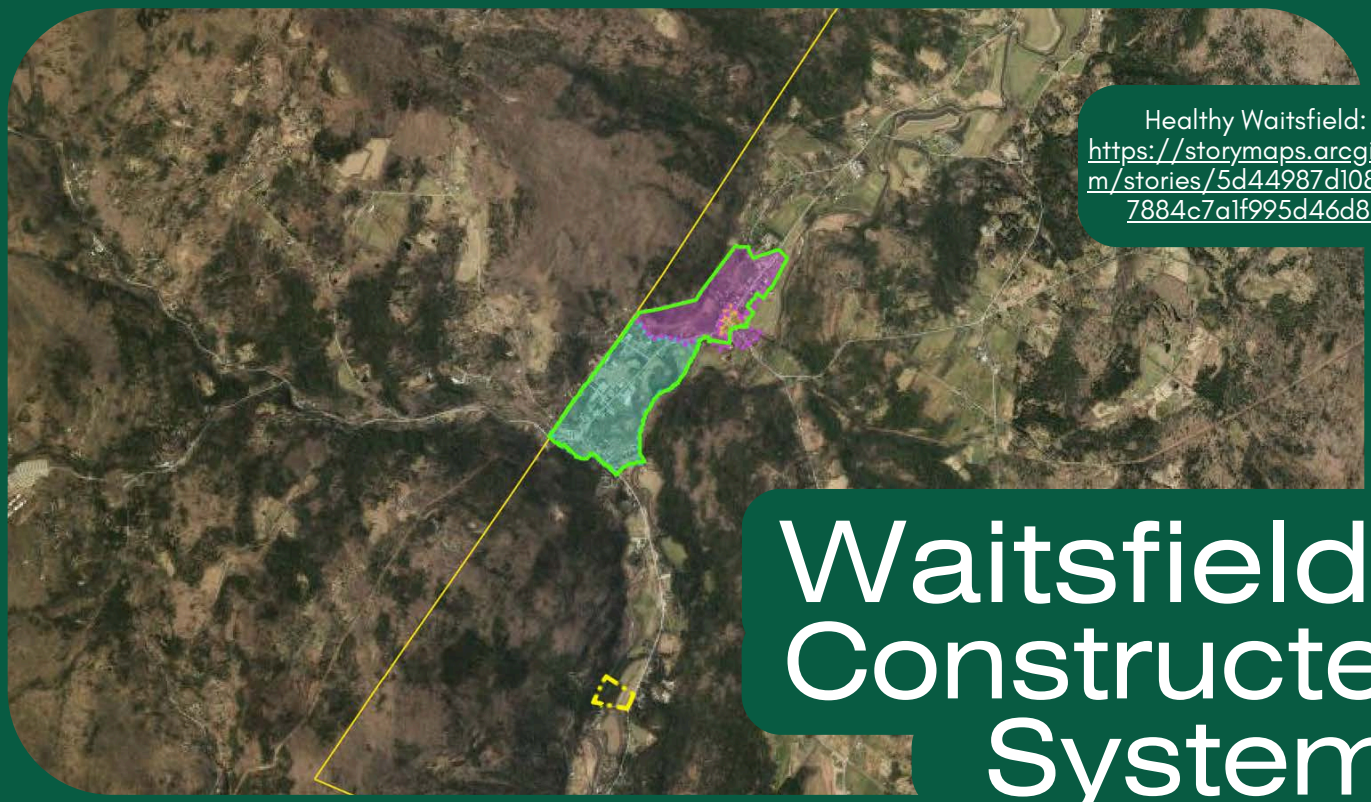
2024 Final design in January begins, bond vote passes 6/11/24

2025 Permitting, construction starts

2026 System online

"The proposed wastewater project provides replacement wastewater treatment for 105 existing properties with leachfields greater than 40 years old and/or located in a floodplain, in a River Corridor, or in a drinking water well isolation shield."

Town of Waitsfield Village Water & Wastewater Project Preliminary Engineering Report (PER) Summary, MRVPD 2024



Healthy Waitsfield: https://storymaps.arcgis.com/stories/5d44987d1089437884c7a1f995d46d83

Waitsfield's Constructed Systems

The system components include wastewater collection, treatment, and disposal [as detailed in the Preliminary Engineering Report (PER)].

Overview

- ### Wastewater Collection

  Serving Irasville & Waitsfield Village (consisting of the Irasville Commercial, Village Business, and Village Residential Zoning Districts).Neighborhood STEP (Septic Tank Effluent Pumping) system, utilizing gravity collection to four municipal septic tanks and associated pump stations for conveyance of liquid waste to the Munn Site.

- ### Treatment & Disposal

  Treatment site is located south of Irasville at the town-owned and undeveloped Munn Site, located on the corner of VT Route 100 and Kingsbury Rd, it is a multi-stage treatment facility to treat all wastewater and remove nitrogen and phosphorus. There is in-ground disposal at the Munn Site - maximum net wastewater treatment and disposal capacity of 89,000 gallons per day (GPD).

- ### Next Steps

  January 2024 marked the beginning of the town's outreach to property owners within the proposed wastewater service area. As of March 1, 2024, members of the Waitsfield Wastewater Planning Project team have met with one-third of property owners within the service area to gauge their interest in participating in the proposed municipal wastewater system. So far, the responses have been positive. This feedback reinforces the pressing need for a right-sized municipal wastewater approach to serve Waitsfield's twin village. In addition, input from property owners within the proposed service area is key to ensuring full coverage of considerations in the project's final design.

Funding

All work to date has been funded through state and federal sources (~$400k) at no cost to taxpayers. ~$13 million of the total $15 million construction cost town hopes to receive in the form of grants, with remaining costs to be covered by a ~$2 million, low interest-rate loan. As a result, this project is not expected to impact Waitsfield municipal tax rates; loan payments and operating costs would be covered by reasonable user fees, just like the existing town water system.

For More Information: https://www.waitsfieldvt.us/waitsfield-community-wastewater-project

Westford, Vt

Wastewater Case Study

Background

Since 2007, the Town of Westford has worked to develop a modern wastewater system to support the vitality of the Town Center. Current septic systems, which serve both public and private buildings in the area, are outdated and failing, threatening the town's future development. The lack of a functional wastewater system limits building use and hinders economic growth. The project was aimed at constructing a community wastewater system that will serve the entire Town Center, allowing continued use of existing buildings and supporting future development such as a town store and more recreation features. The proposed system was designed to meet state standards and environmental requirements, ensuring the longevity of Westford's infrastructure. Initial phases included securing funding, detailed engineering designs, and community outreach to inform residents about the project. The bond vote was scheduled for November 2023, and it failed. Sources highlight a concern about dense housing development in the town center, and possible affordable housing as reasons for backlash over the project.

Timeline

Spring 2023: February - March: initial phase II planning

Detailed engineering of wastewater system, surveys, and property owner contacts.

Fall 2023:

Draft Governing Ordinance, presentation of proposed design

November 7: Bond Vote Fails

At a Glance

Estimated cost

- $3.8 million

Benefits

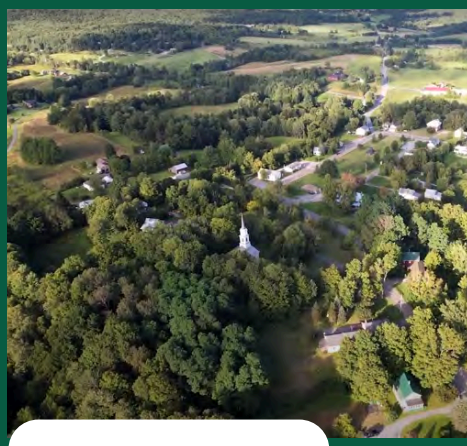
- Community recreation and commerce support in village center
- More housing development
- Resolving failing septic issues

"Through the Westford Future process led by the Vermont Council on Rural Development, Westford residents indicated that they see economic and social revitalization, including business development and the continued use of the structures in the Town Common today, as essential for the survival of the town. A new wastewater system will allow for continued use and future revitalization of the existing civic buildings, including the Common Hall, and thoughtful redevelopment in accordance with the town plan."

From:
https://www.westfordsfuture.com/

Westford's Proposed Systems

The proposed system components included wastewater collection, treatment, and disposal, using "STEP" tanks and an effluent pre-treatment system.



Overview

- ### Wastewater Collection

  STEP: Septic Tank & Effluent Pump: The engineering options evaluated for Westford all involve the use of a low-pressure sewer collection system and "dosing" pump station across from the Maple Shade Town Forest disposal field. A low-pressure sewer system is a network of sealed pipes and small, belowground pump stations called "STEP" tanks & pumps at each connected property. Low-pressure sewer systems, which require electricity, are preferred in places like Westford where topography and bedrock make gravity sewers both impractical and expensive

- ### Treatment & Disposal

  Effluent Pre-Treatment System: In Westford's system, pre-treatment may be installed at individual properties to reduce the organic content of wastewater, bringing it in line with typical residential septic effluent before it is transferred to the main system. The pre-treatment system filters septic tank effluent to remove solids and organic material before it enters the main collection system.

- ### Next Steps

  A collection pump station control building could be implemented to bolster the system further. Incorporating a collection pump station would increase storage capacity within the system, helping to balance wastewater flows. This addition would make the system more resilient during power outages and better equipped to manage high flow periods from community events or business activities.

Funding

Proposed funding from the project came from the Vermont Clean Water State Revolving Fund, Northern Borders Regional Commission / Economic Development Administration, State and Local American Rescue Plan Act funding, and Community Recovery and Revitalization program funding. All funding sources totaled to just over $4 million.

For More Information: https://www.westfordsfuture.com/

Middlebury, Vt

Addison Housing Works - Lindale Manufactured Housing Community Case Study

Background

Lindale is a 67 unit manufactured housing community located 3 miles from downtown Middlebury. Lindale was developed in two phases with the first phase of development occurring in 1968 and the second phase in 1991. The community was purchased by Addison Housing Works (AHW) in 2004 in order to preserve the affordable housing resource for the county.

Lindale is connected to municipal water, but the Middlebury sewer system does not extend to the community. A major issue facing the park in recent years was the condition of the septic systems. 40 of the systems were original to the park and failing. The systems could not be replaced in situ due to clay soil and a high water table. AHW received a planning grant through VHCB in 2017 and began investigating solutions.

Ultimately AHW purchased the neighboring parcel, via a VHFA cash out refinance, to locate a community septic system on. The original construction estimate received in 2022 was $2.6MM. The lowest bid received in January 2023 was $3.7MM leading AHW to sign a reduced scope contract and seek supplemental funding. Construction began in 2023 and the majority of the homes were hooked into the new system by the end of 2023. Supplemental funding was obtained and the original scope was put back into the project. The project will be complete by the fall of 2024.

At a Glance

Total cost

- $5,310,076

Benefits

- Replaced failing individual septic systems in MHC
- Reduced maintenance costs
- Protected affordable housing resource in Addison County

Timeline

2017	VCDP Planning Grant
2021	CBDG & RD Funding Secured
2022	VHCB, CDS, ANR Funding Secured & Permitting
2023	Permits in hand, construction begins
2024	System complete

"The proposed project involves the construction of a gravity wastewater collection system which would eliminate all of the existing onsite septic systems and disposal areas, and concentrate all of the wastewater flow to a single treatment area."

Addison Housing Preliminary Engineering Report (PER) Otter Creek Engineering 2021

Lindale's Constructed System

The system components include wastewater collection, treatment, and disposal [as detailed in the Preliminary Engineering Report (PER)].

Overview

- ### Wastewater System

  A 20,000 gpd full IDR compliant decentralized community septic system that could support modest growth in the future. The system is owned by Addison Housing Works and serves the 67 households in the AHW Lindale manufactured housing community.

- ### Treatment & Disposal

  Gravity wastewater collection system which concentrates all the wastewater flow to a single treatment location. Wastewater is routed to a primary settling septic tank and delivered to a common pump station which discharges to a common disposal field.

- ### Maintenance

  A Grade 1 Wastewater Operator will oversee the system and perform sampling on an annual basis. Addison Housing Works staff is trained to perform routine and emergency maintenance.

Funding

The total development cost of the project was $5.3MM. All work was funded through state and federal sources. Funders included: VCDP, VHCB, ANR, USDA RD, EPA, and the Middlebury Revolving Loan Fund.

For More Information: https://www.addisonhousingworks.org/

Foote Farm

Wastewater Case Study in Cornwall, VT

https://anrweb.vt.gov/DEC/WWDocs/DirectoryDisplay.aspx?P=121369

Background

Foote Farm is a 22-lot planned unit development (PUD) located off Rt. 125 in Cornwall, VT. It was developed privately by the Foote family on former farmland and was divided into 22 building lots and 163 acres of conserved agricultural and forest land through an easement with the Middlebury Area Land Trust. Each lot is approved for a 4 BR house with a maximum of 7 persons per dwelling. The first plan for the water and wastewater system was submitted to the State in December 2003, and approved in December 2005.

The site plan details the locations of the 22 lots, the well locations and the wastewater system components, including piping and pumping stations. The plan was submitted to the VT Department of Environmental Conservation, Division of Wastewater Management in February 2005. The plan specified individual drilled bedrock water wells uphill from houses, separated from individual septic tanks. The single community wastewater disposal system is an Advantex Treatment System with individual septic tanks at each lot and three active leach fields with room to expand for a fourth if needed. It is approved for a maximum of 6,080 gallons per day.

System performance is monitored remotely by an approved Advantex vendor and a remote operator. Visual inspections occur at least annually in springtime. The Foote Farm homeowners are responsible for maintenance of their individual systems while the community (HOA) collectively maintains the pump stations and dispersal site.

Timeline

2003 First plan submitted to state

2005 Plan approved

2006 Construction starts

2007 System complete

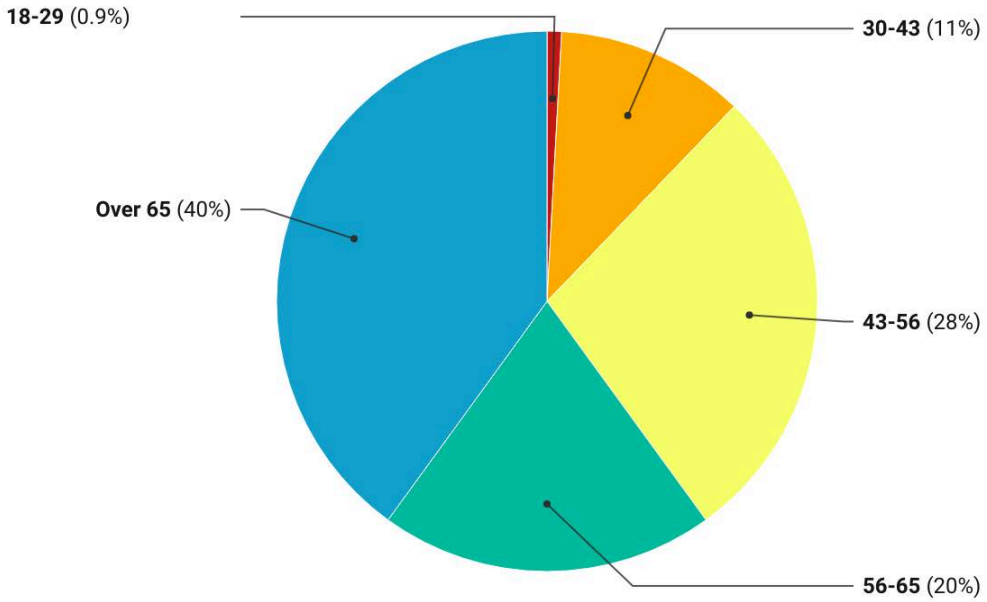
Foote Farm's Constructed Systems

Top view: System pumphouse with mound in front

Bottom view: mound leach field

Section 1: Demographic Information

What is your age?



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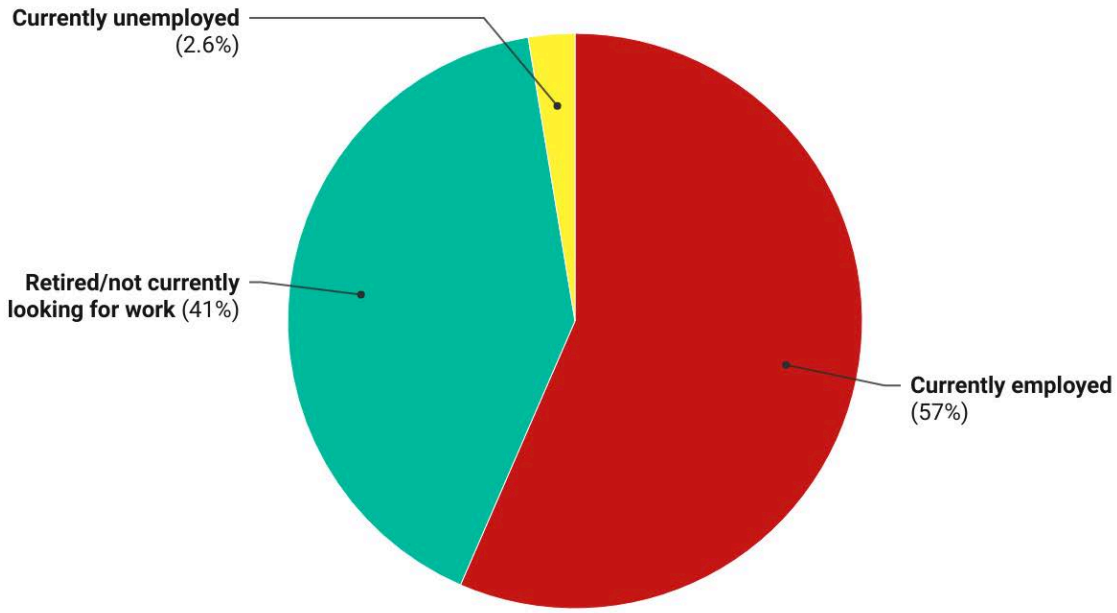
What is your employment status?



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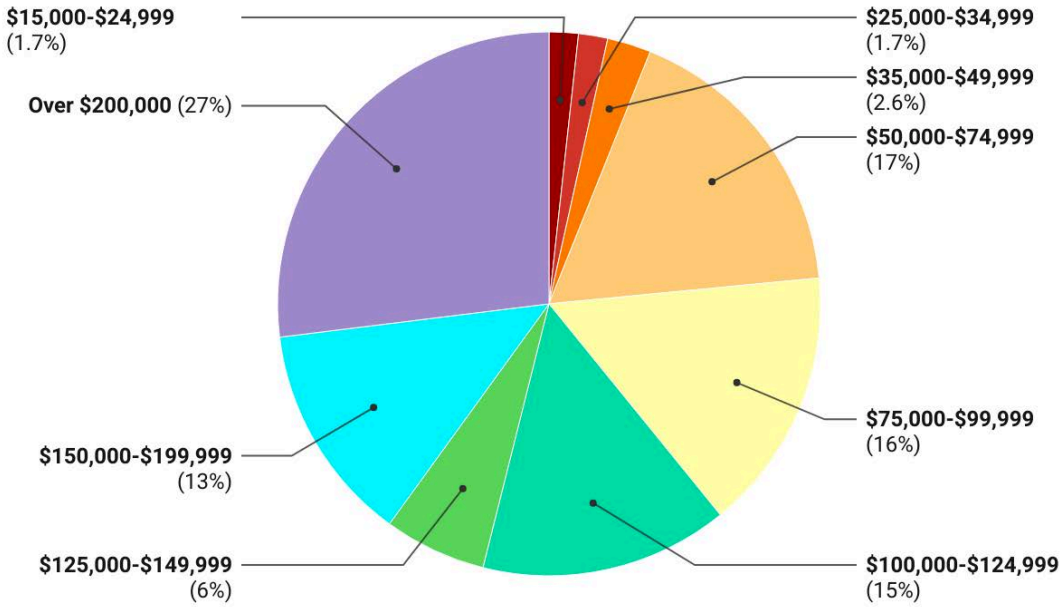
What is your approximate annual household income?



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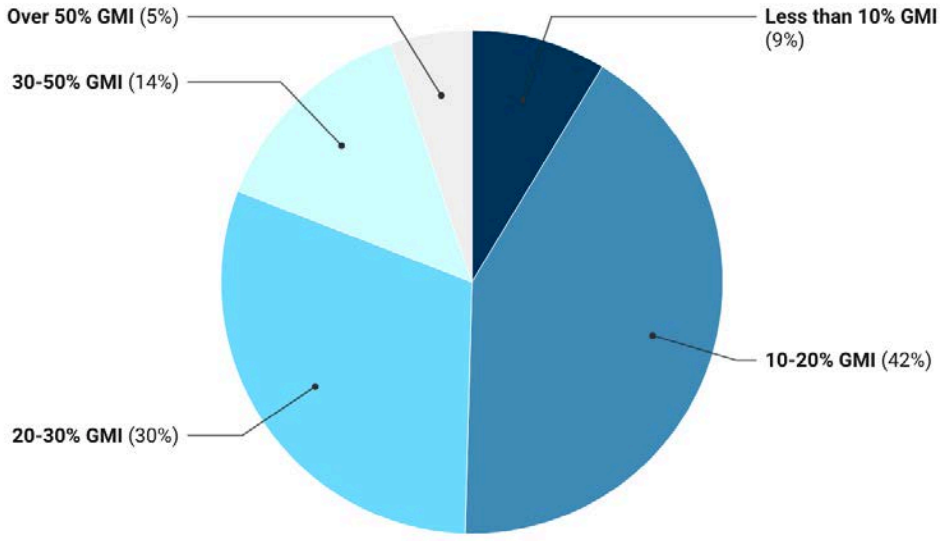
What % of your Gross Monthly Income is spent on housing costs?



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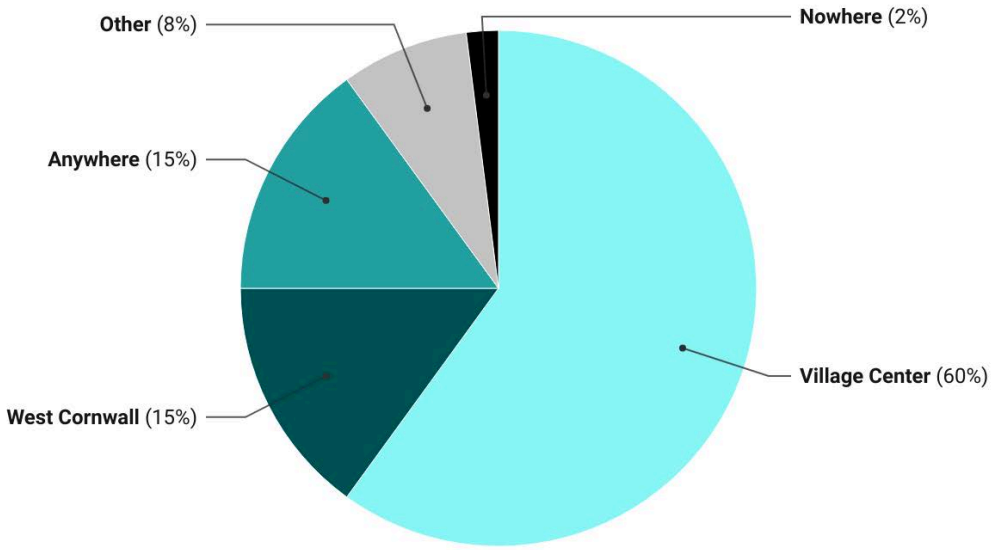
Section 2: Preferences

Where in town would you ideally like to see affordable housing developed?



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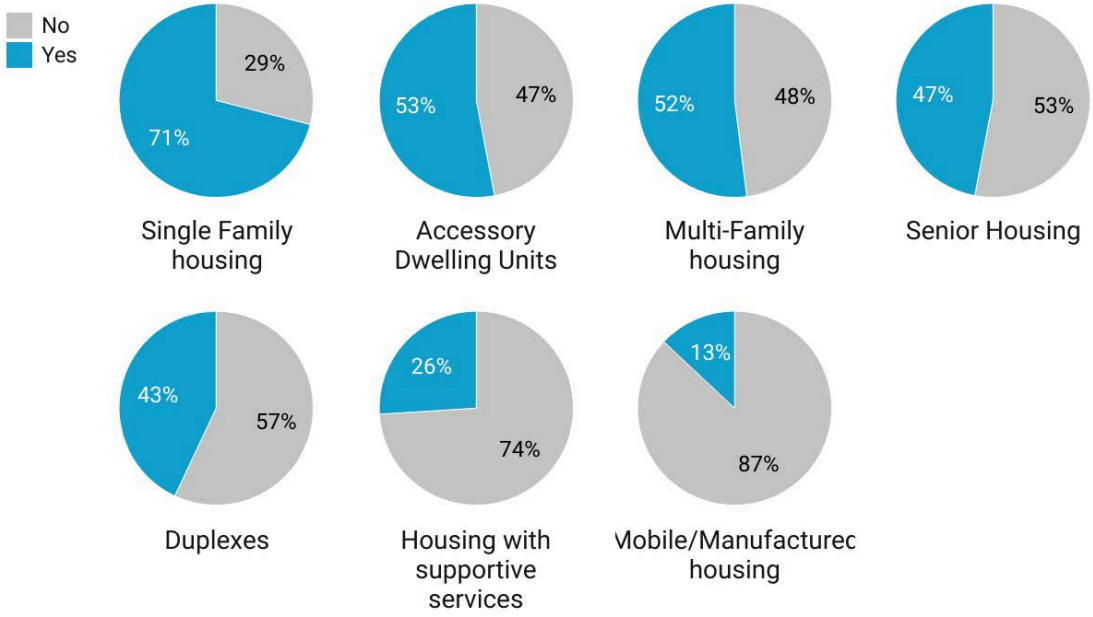
What types of housing would you like to see more of in Cornwall?



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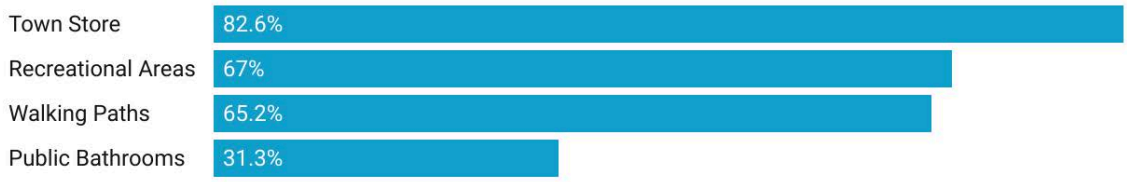
What kind of features would you like to see in Cornwall's village center?



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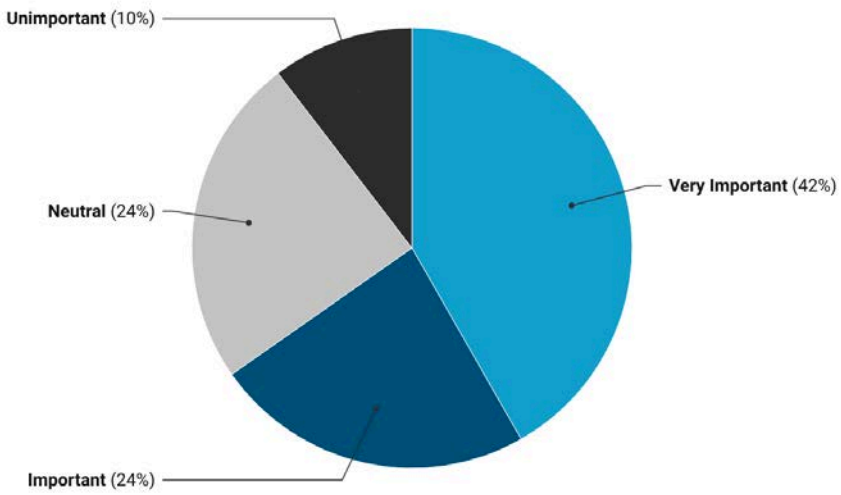
How important is it to you that Cornwall has a functional elementary school?



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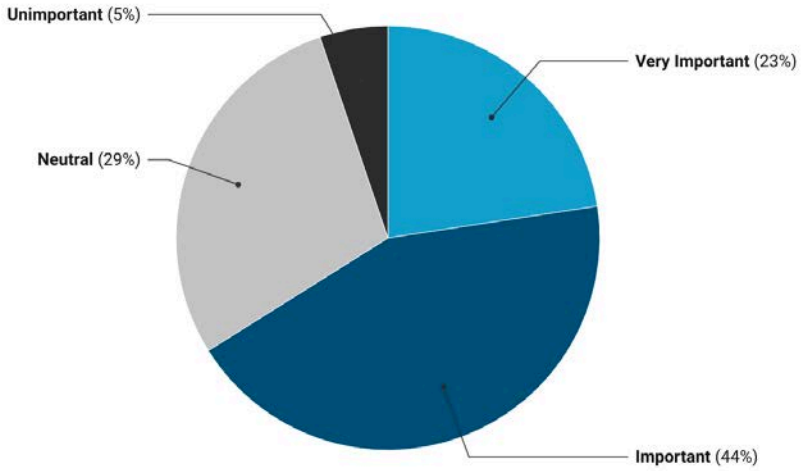
How important is it to you that you will be able to live in Cornwall as a senior citizen?



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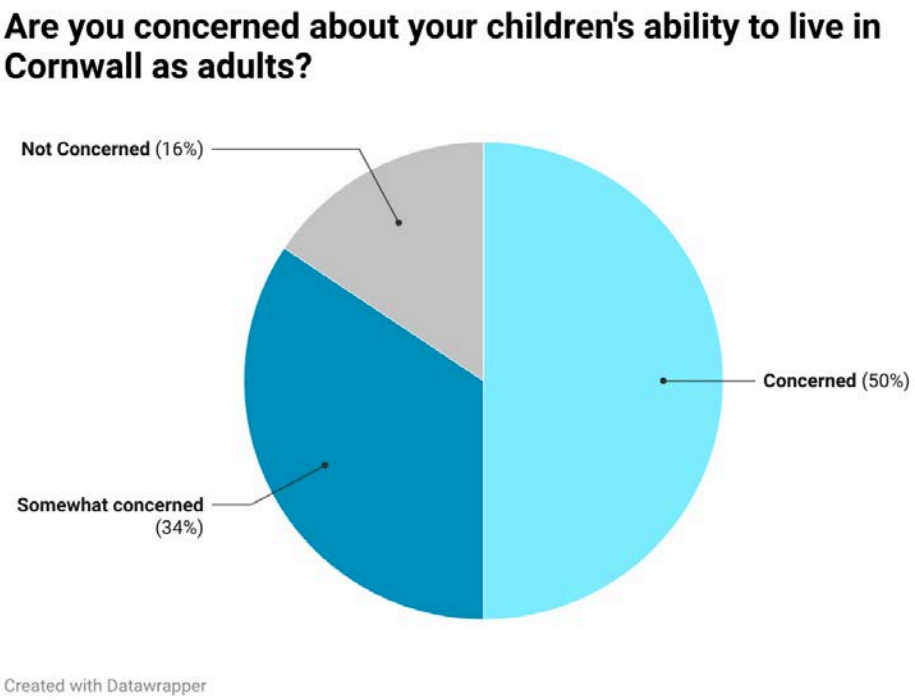
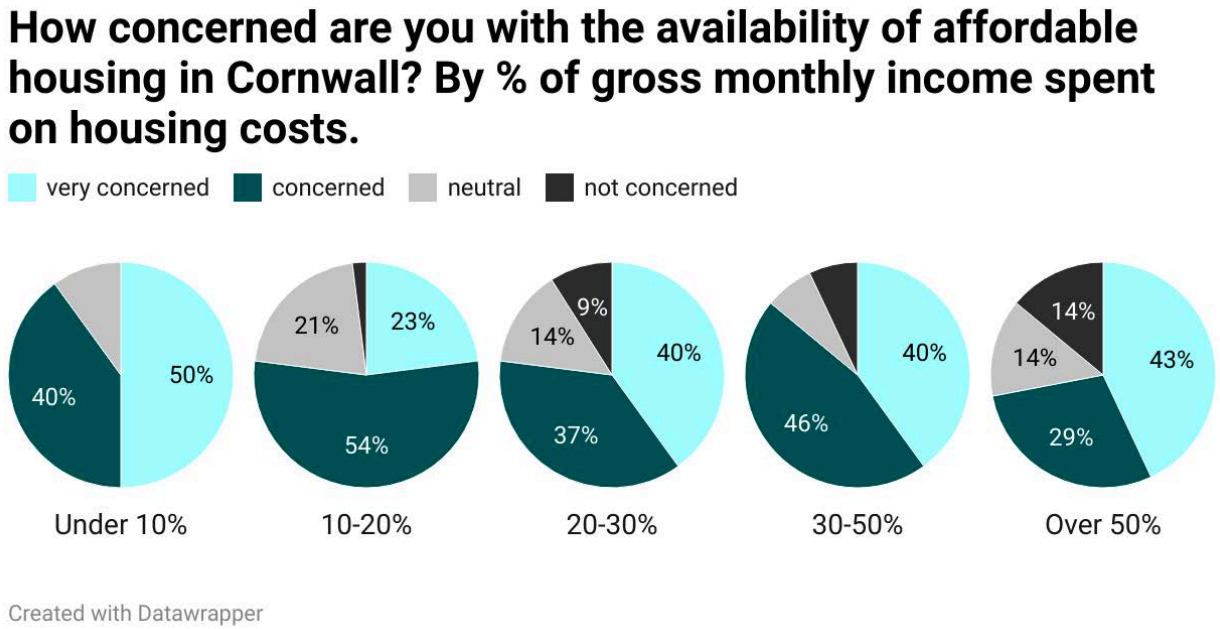
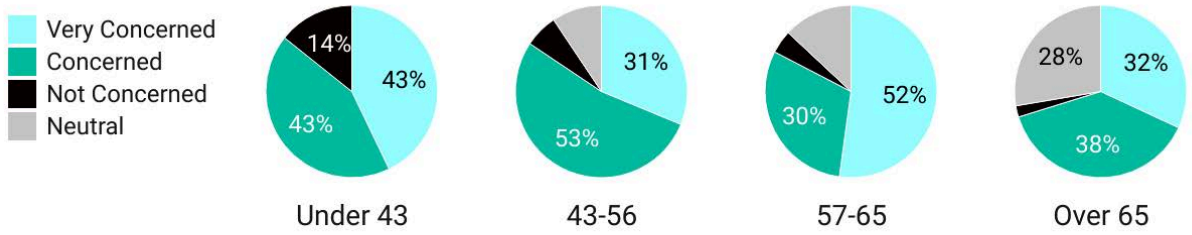


Section 3: Cross-tabulations

- Concern with affordable housing



How concerned are you with the availability of affordable housing in Cornwall? By age group.



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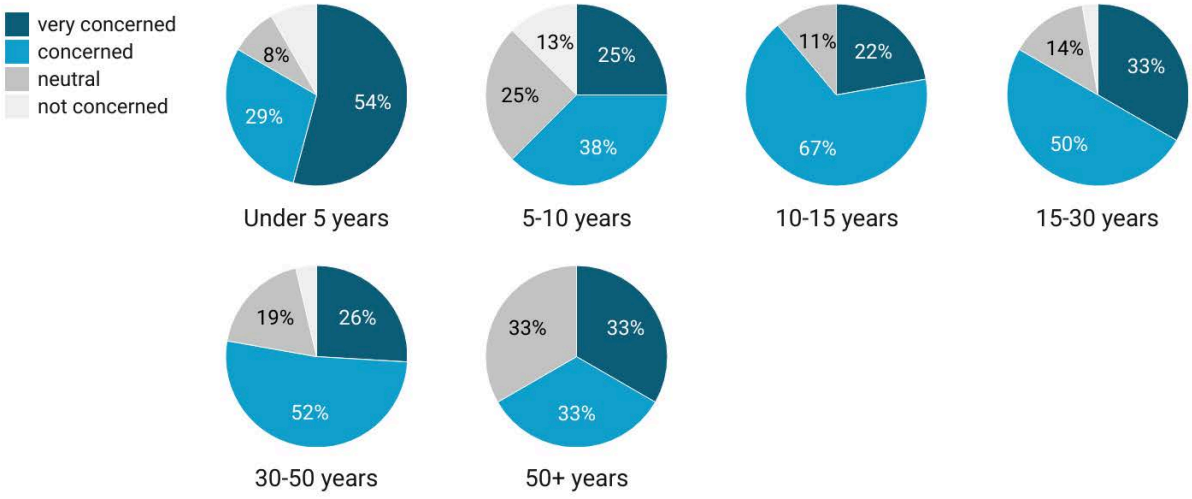
How concerned are you about the availability of affordable housing in Cornwall? By years residing in Cornwall.



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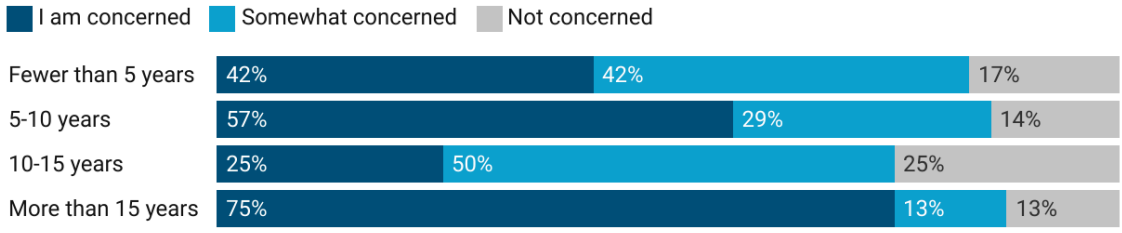
- Concern about children

Are you concerned about your children's ability to live in Cornwall as adults? By years residing in Cornwall.



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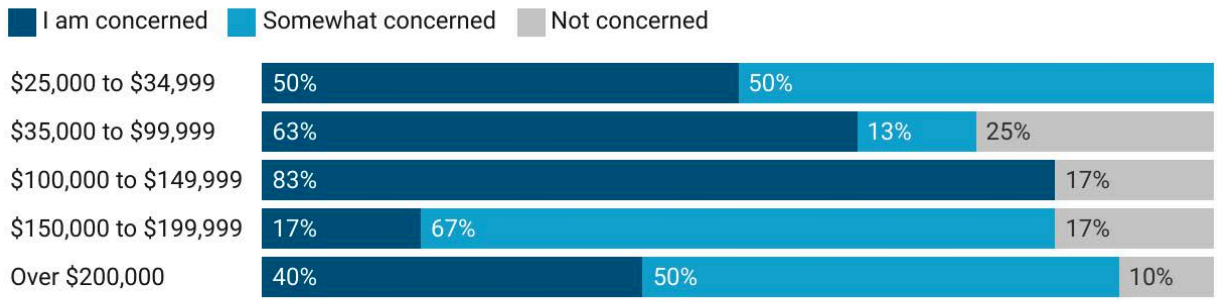
Are you concerned about your children's ability to live in Cornwall as adults? By annual household income.



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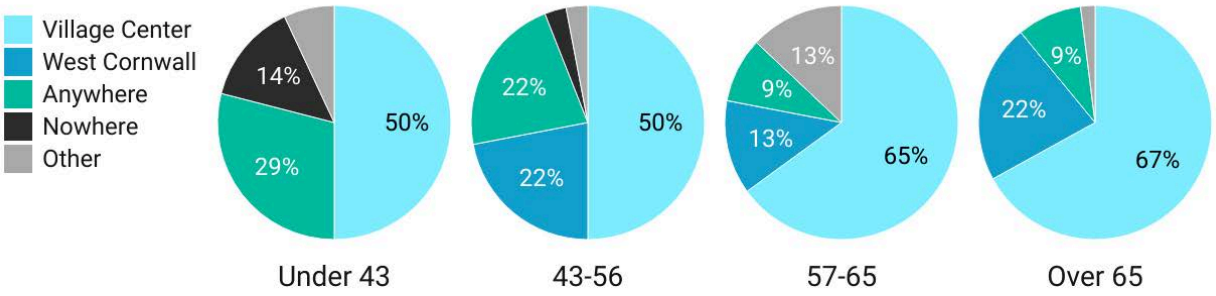
- Town features

Where in town would you ideally like to see affordable housing developed? By age.



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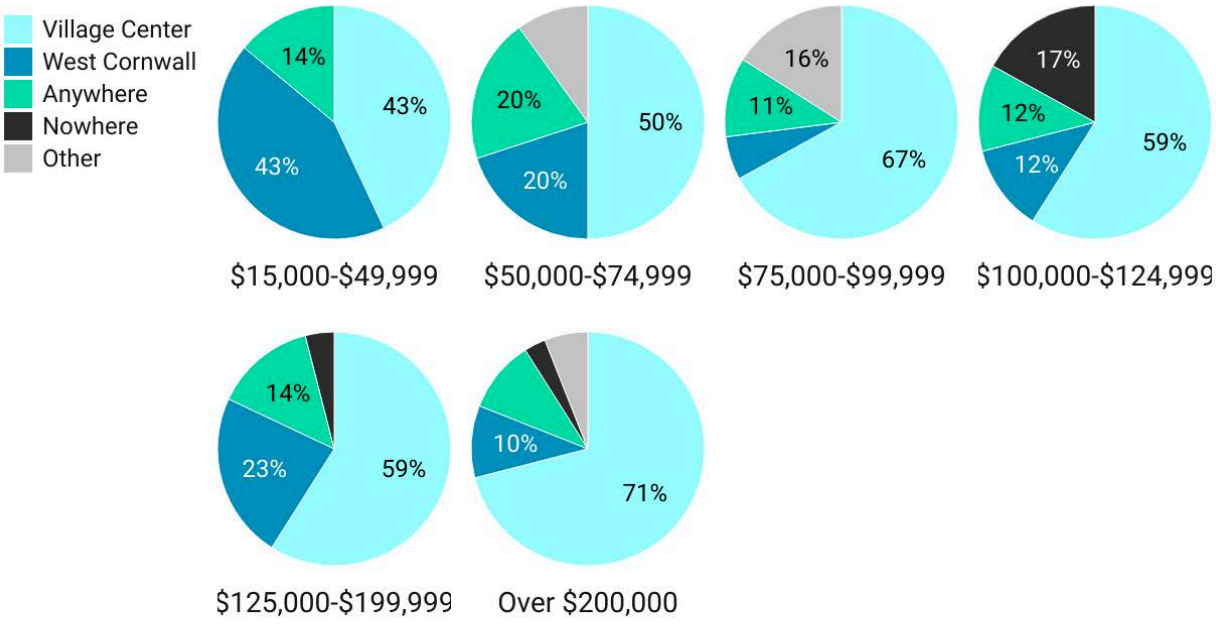
Where in town would you ideally like to see affordable housing developed? By income.



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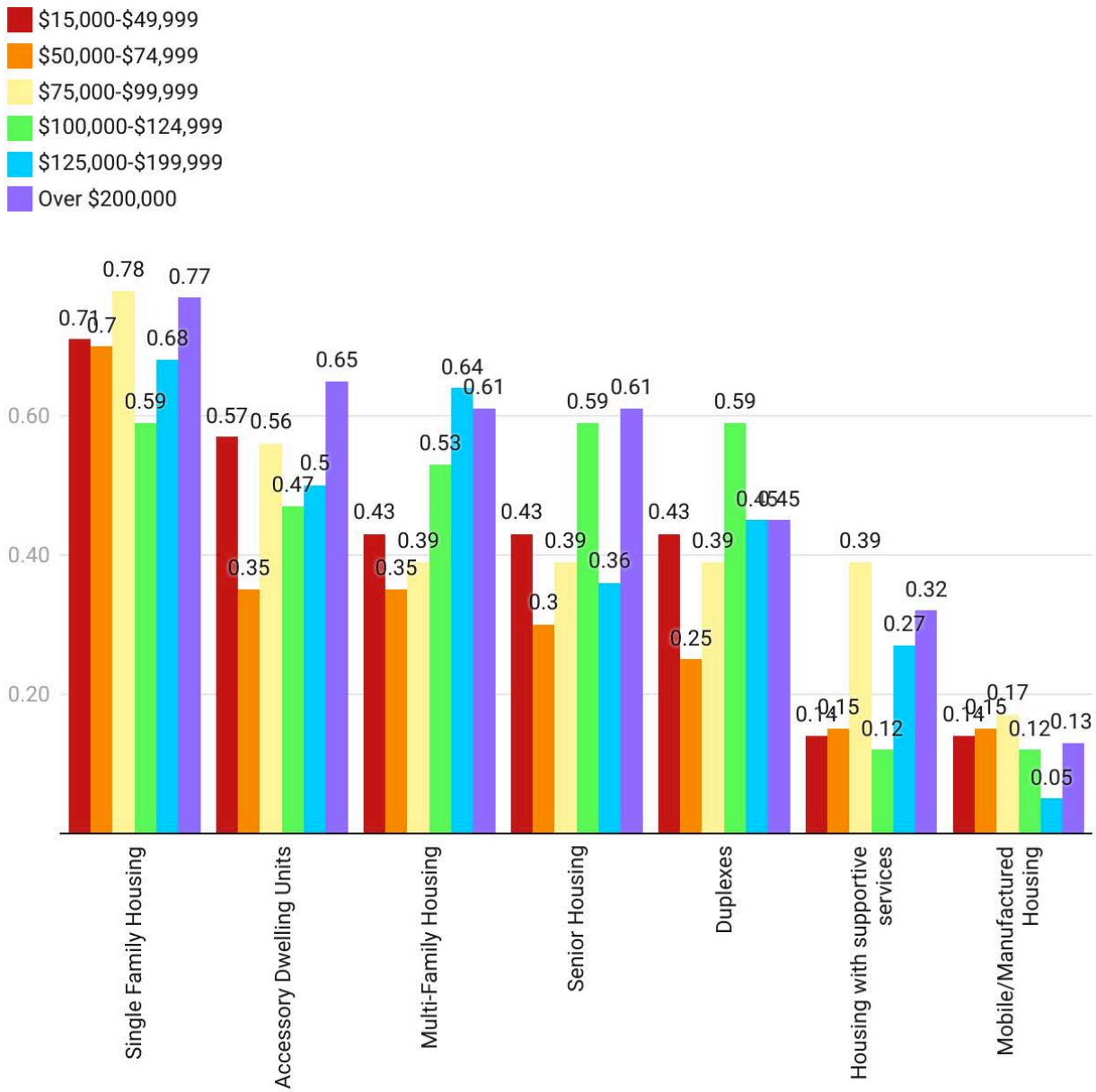
What types of housing would you like to see more of in Cornwall? By annual household income.



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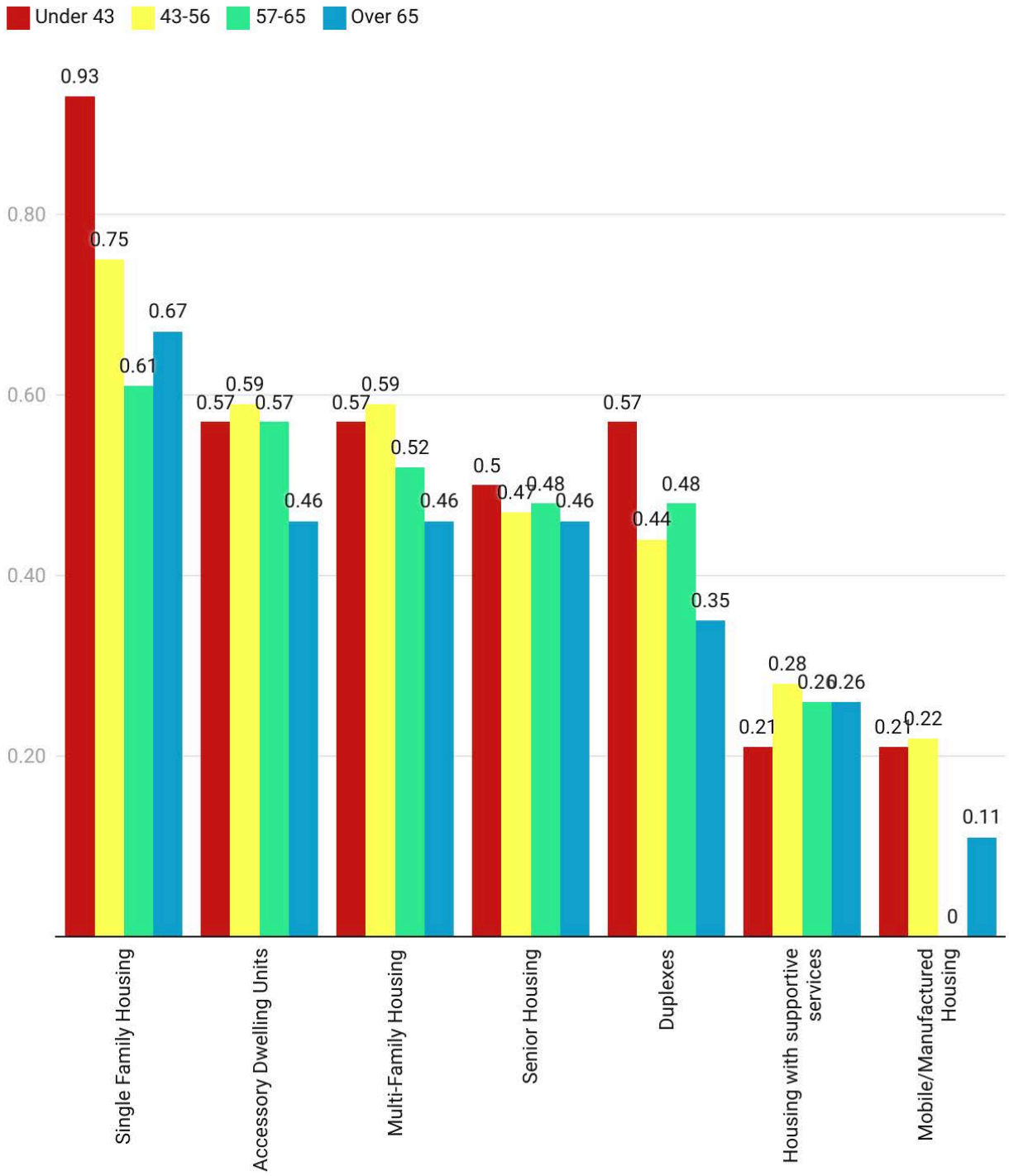
What types of housing would you like to see more of in Cornwall? By age group.



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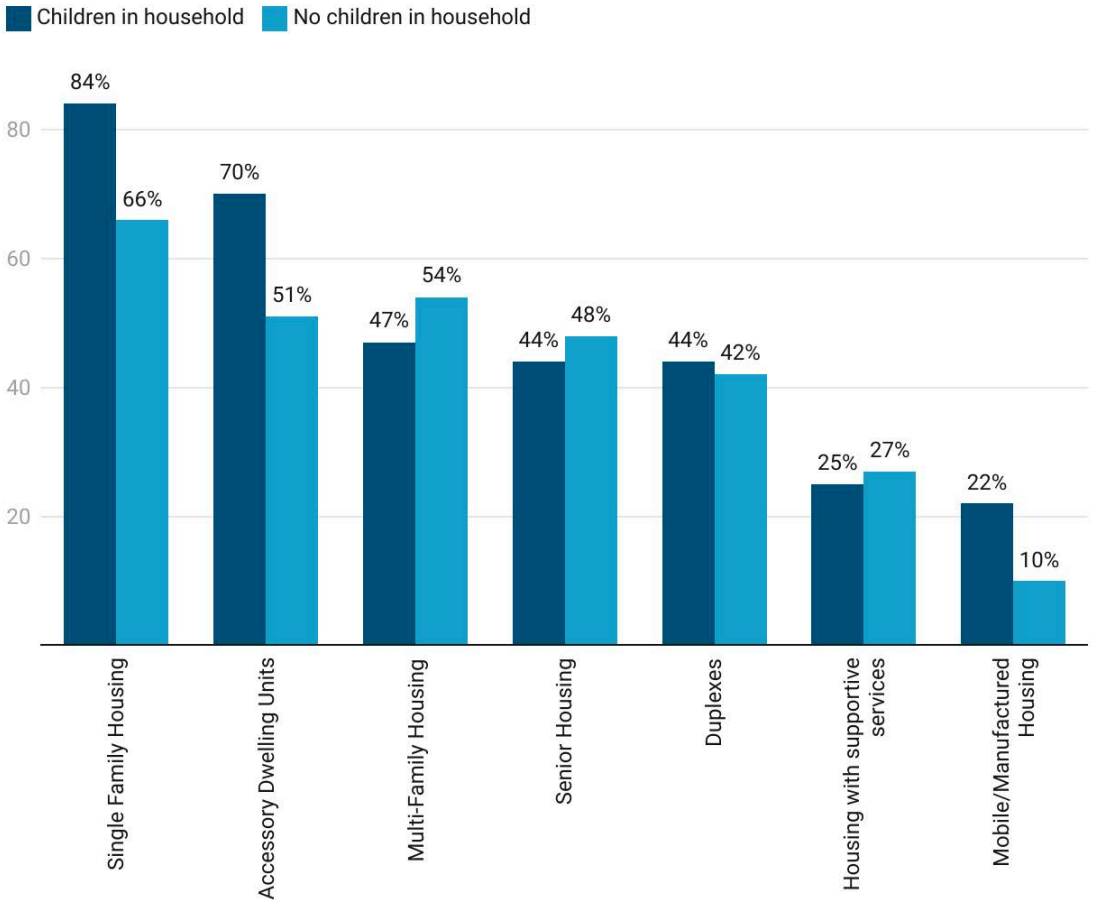
What types of housing would you like to see more of in Cornwall? By whether or not children are living in the household.



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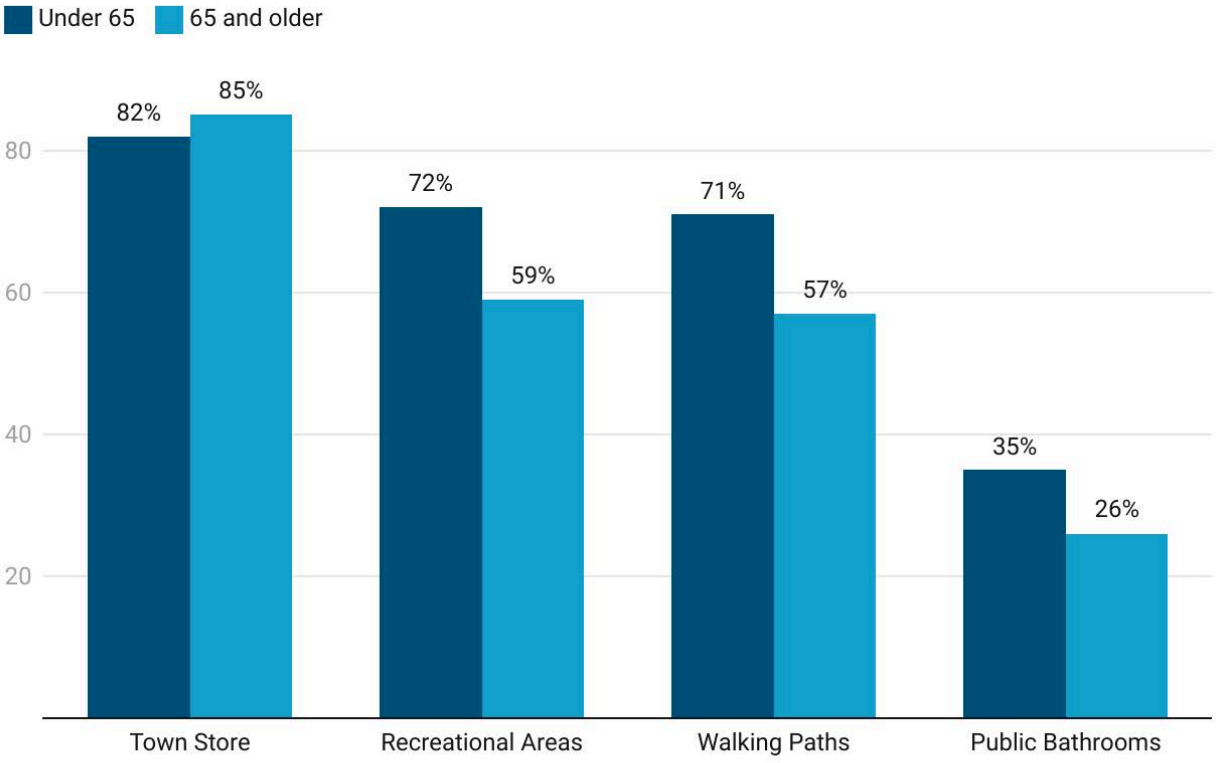
What kind of features would you like to see in Cornwall's village center? By age.



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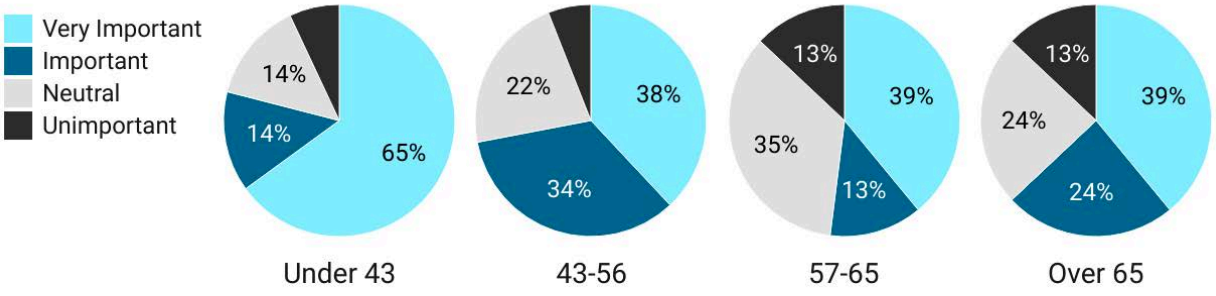
- Elementary school

How important is it to you that Cornwall has a functional elementary school? By age.



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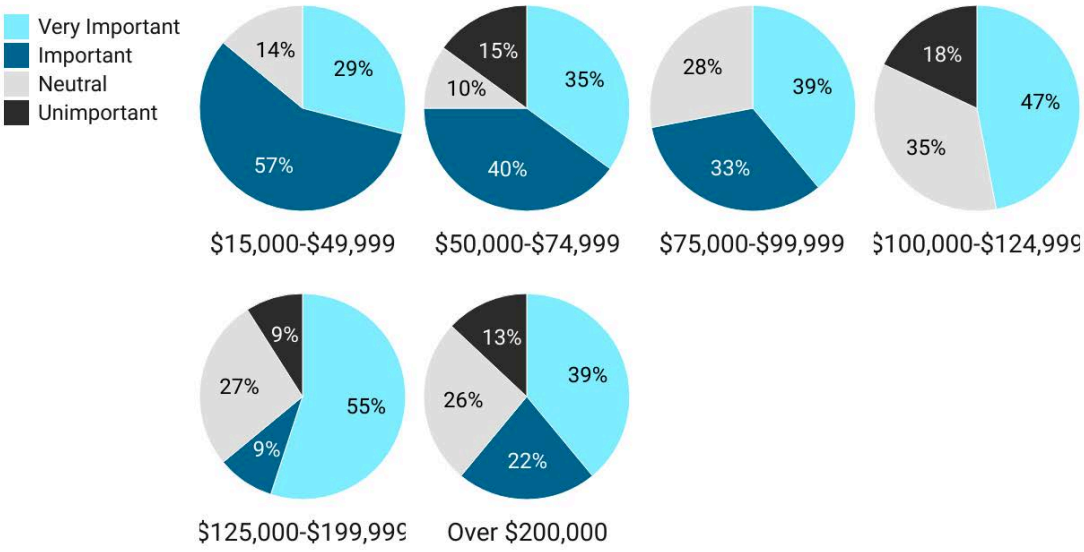
How important is it to you that Cornwall has a functional elementary school? By annual household income.



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