BRISTOL, VERMONT

TOWN PLAN

APPENDIX

Adopted by Town Vote
NOVEMBER 5, 2012

BRISTOL TOWN PLAN APPENDIX

The following maps, reports, etc are attached as appendices to the Bristol Town Plan dated November 5, 2012.

The maps herein are reduced size copies and in many cases will be difficult to read. Large size copies of the maps may be found at the Town offices or at the Addison County Regional Planning office in Middlebury. Note that many of these maps are periodically updated and, thus, the copy shown herein may be out of date at the time of reading.

The reports attached here, or referenced, including the Natural Resources Plan and the Traffic Study, are attached for information only and not necessarily to be considered as part of the Town Plan.

Appendicies

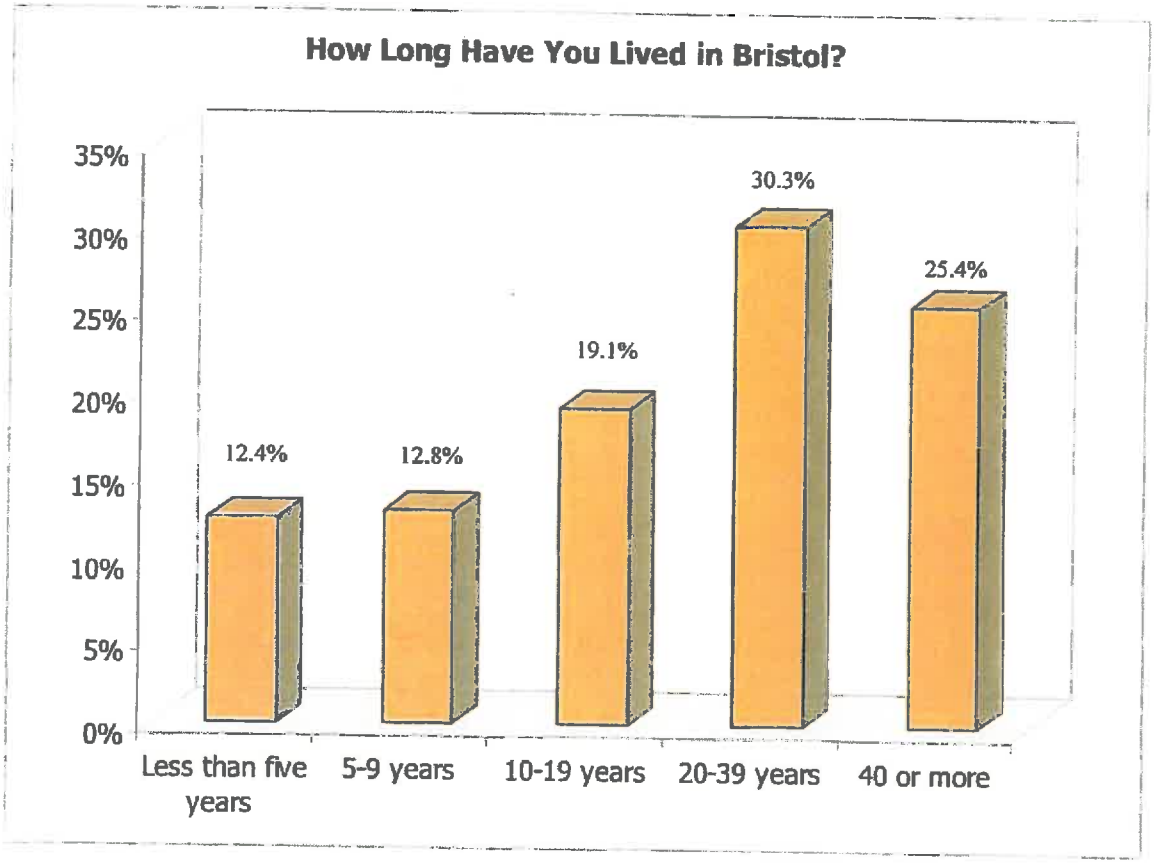
A –Land Use Planning Areas – Town of Bristol
B – Zoning Districts- Town of Bristol
C – Zoning Districts – Bristol Downtown Area Map
D – Land Use Planning Areas - Inset
E – Bristol Designated Downtown District
F – Flood Hazard Areas
G – Aggregate Resource Potential
H – Transportation
I – Transportation – Downtown
J – Utilities and Educational Facilities
K – Utilities and Educational Facilities – Downtown
L – Population Density
M – Land Cover
N – Landscape Slope
O – Government or Non-Profit Property (Working Draft)
P – Watersheds
Q – On-Site Septic Suitability
R – Soil Parent Material
S – Generalize Bedrock Geology
T – Ground Water Favorability
U – Biologically Significant Areas
V – Commute Shed
W – Labor Shed
X – Survey Results: Graphs
Y – Urban Compact – Police District
Z – Natural Resources Plan
ZZ – Traffic Study

Appendix X

A. Survey Results: Graphs

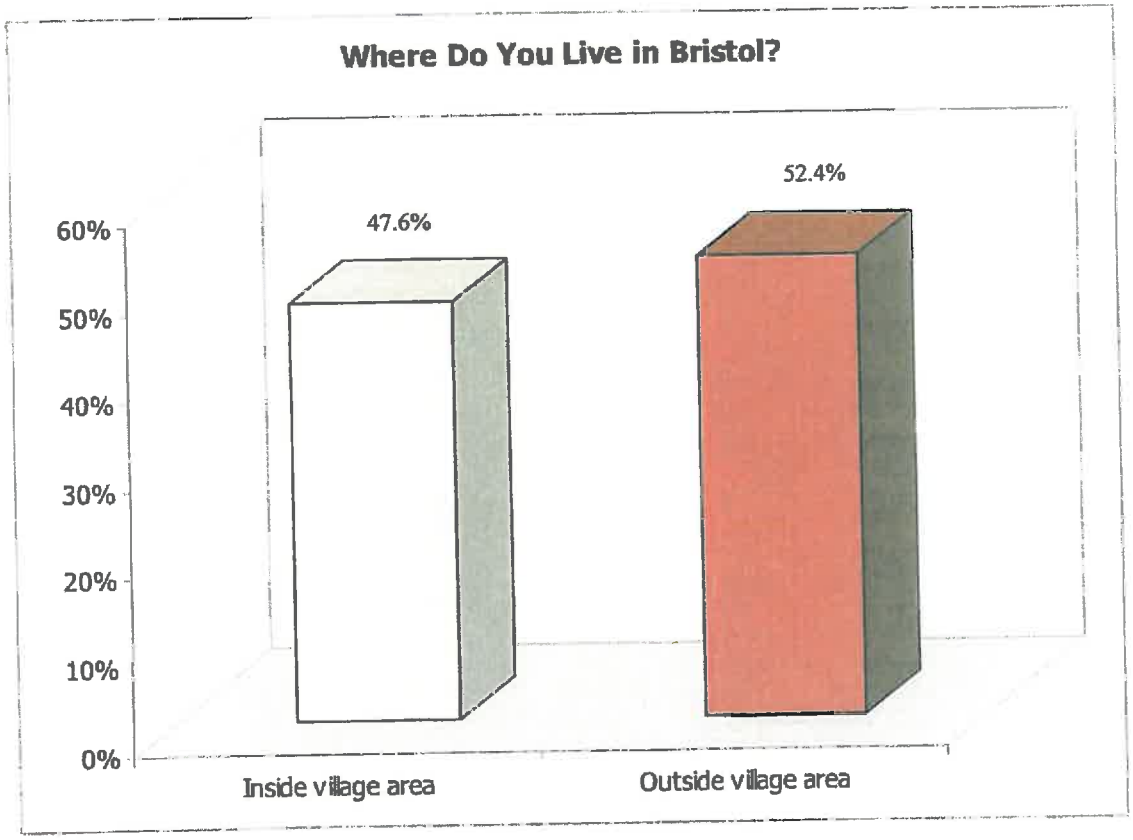
Question 1. How long have you lived in Bristol?

People who have lived in Bristol for 20+ years responded in high amounts, contributing to over 50% of the total amount of respondents to this question. Yet there is also a significant representation from people who have lived in the town for fewer than 20 years. This reflects a mix of newcomers and long-timers.



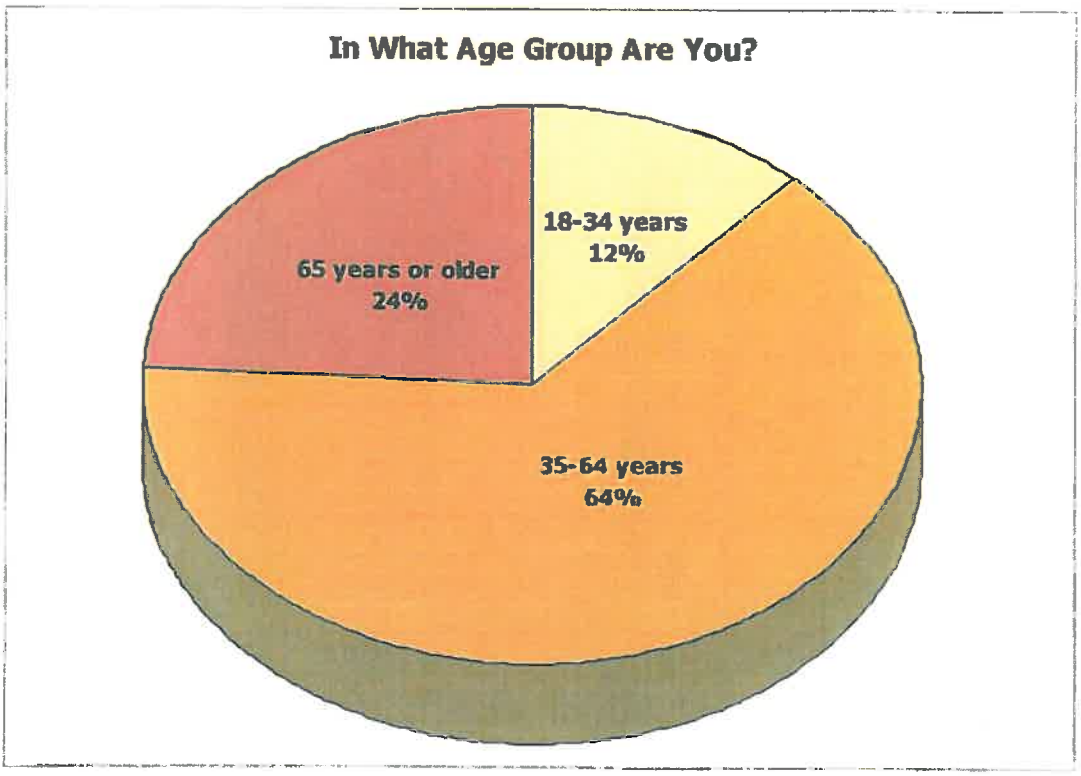
Question 2. Where do you live in Bristol?

There is a balance between people who live inside the village area and people who live outside the village area, with just over 50% of survey participants living outside the village area. This split makes for an accurate representation of both rural/suburban and downtown residents.



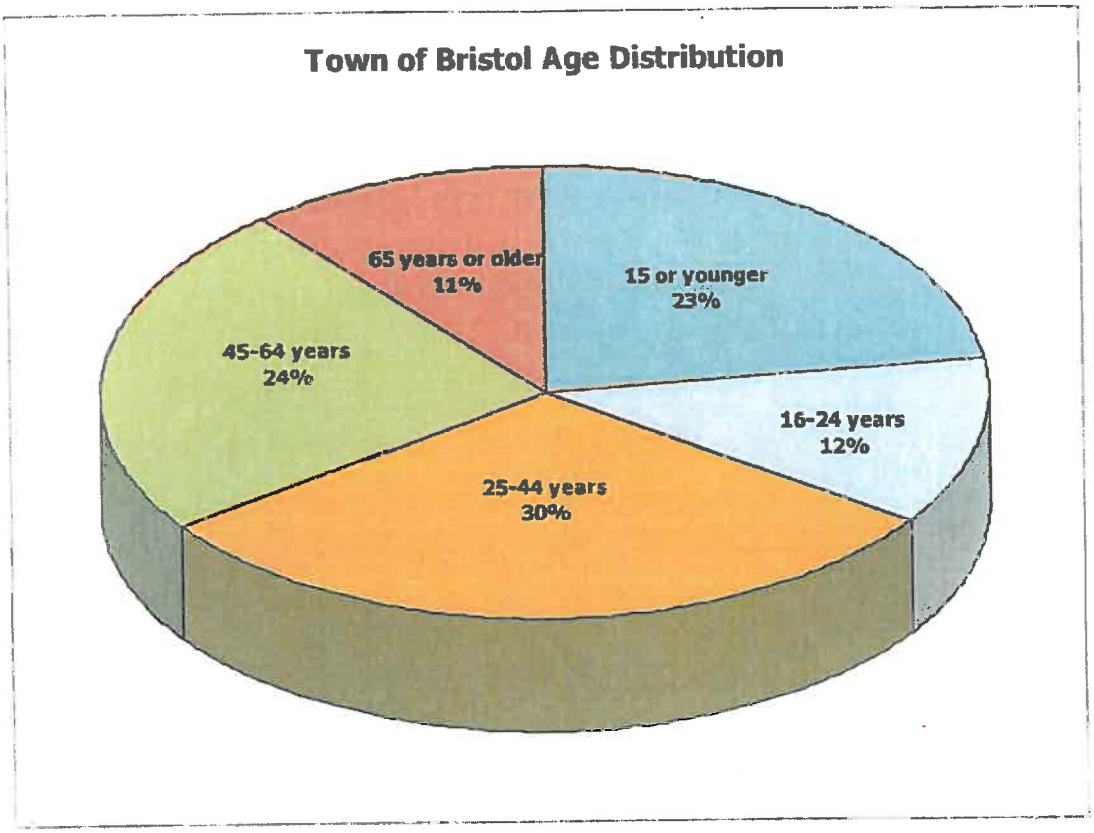
Question 3. In what age group are you?

64% of the people who responded to this question fall between the ages of 35 and 64 years. This amount correlates with the age demographics of Bristol as a whole, with 54% of the town's population falling between the ages of 25 and 64 years. This shows that a majority of the town will be seeking elderly services. The population of young adults is quite low for both this survey and the town. This correlates with the expressed concern of creating opportunities for young adults in question #11. The census results for comparison are on the following page.



Question 3. In what age group are you?

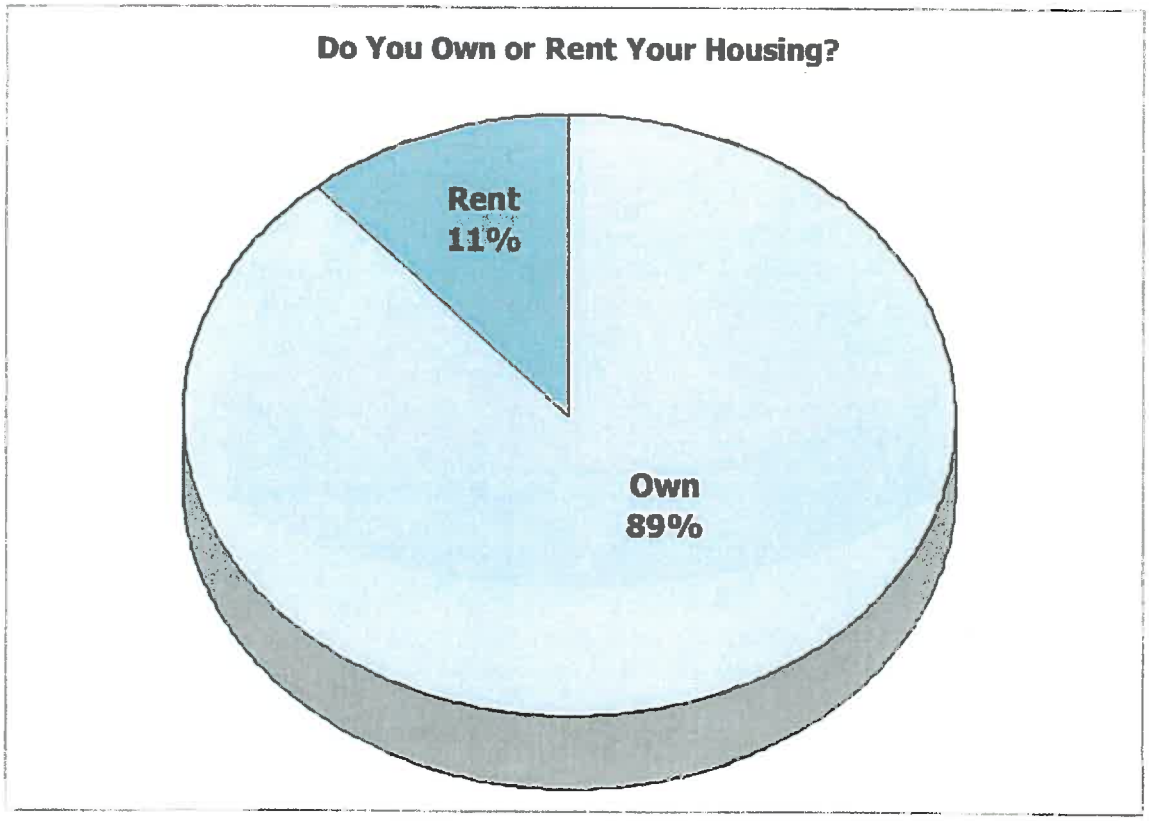
In comparison, below is the U.S. Census demographic distribution for Bristol.



Source: U.S. Census Bureau, 2000 Census, ePodunk

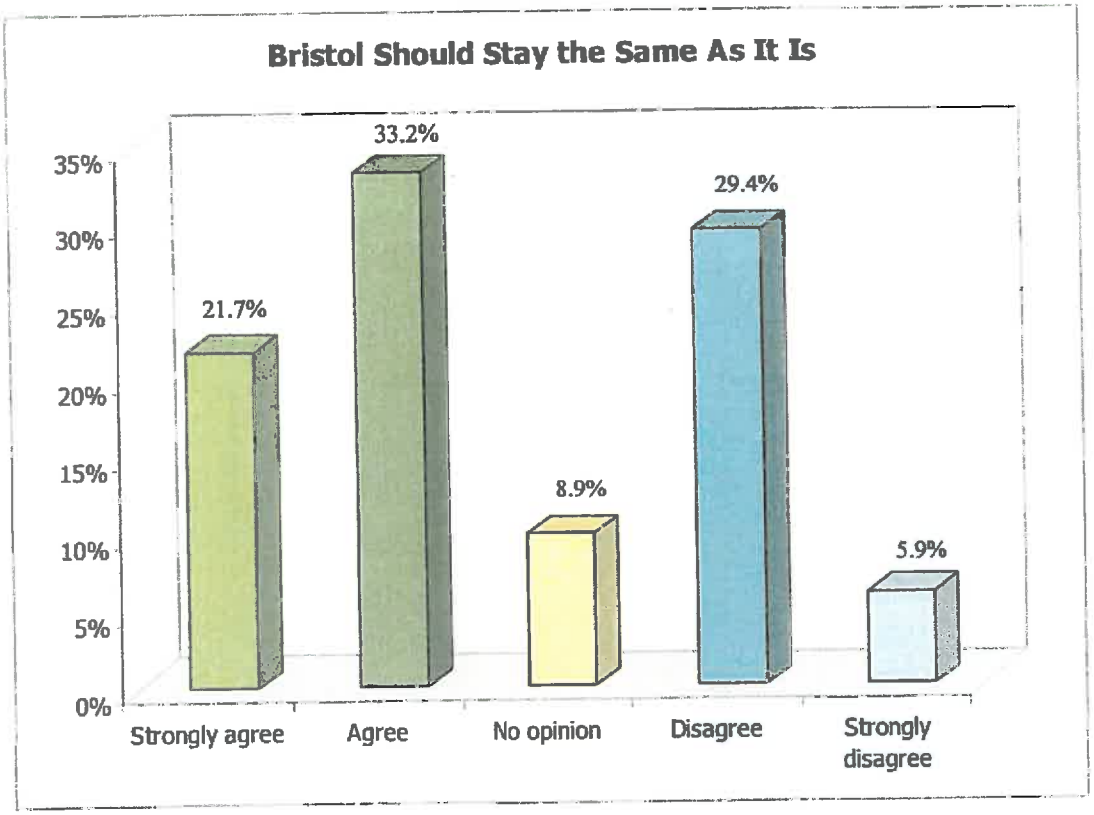
Question 4. Do you own or rent your housing?

89% of respondents to this question own their housing rather than rent. This could indicate that the majority of the participants are invested in the town and felt compelled to contribute their opinions and concerns through this survey.



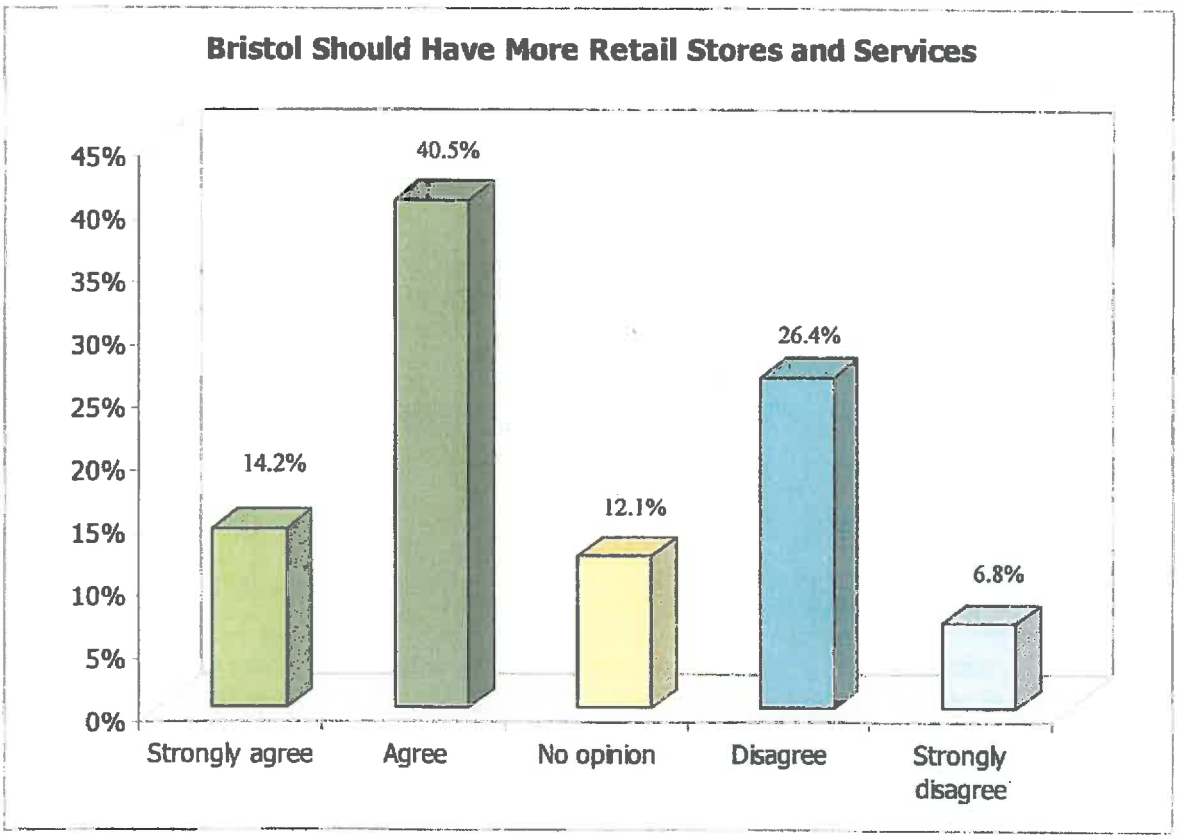
Question 5. Bristol should stay the same as it is.

There is a contrast between people's visions of where Bristol should go from here. 55% of participants agree or strongly agree that Bristol should stay the same, while 35% disagree or strongly disagree.



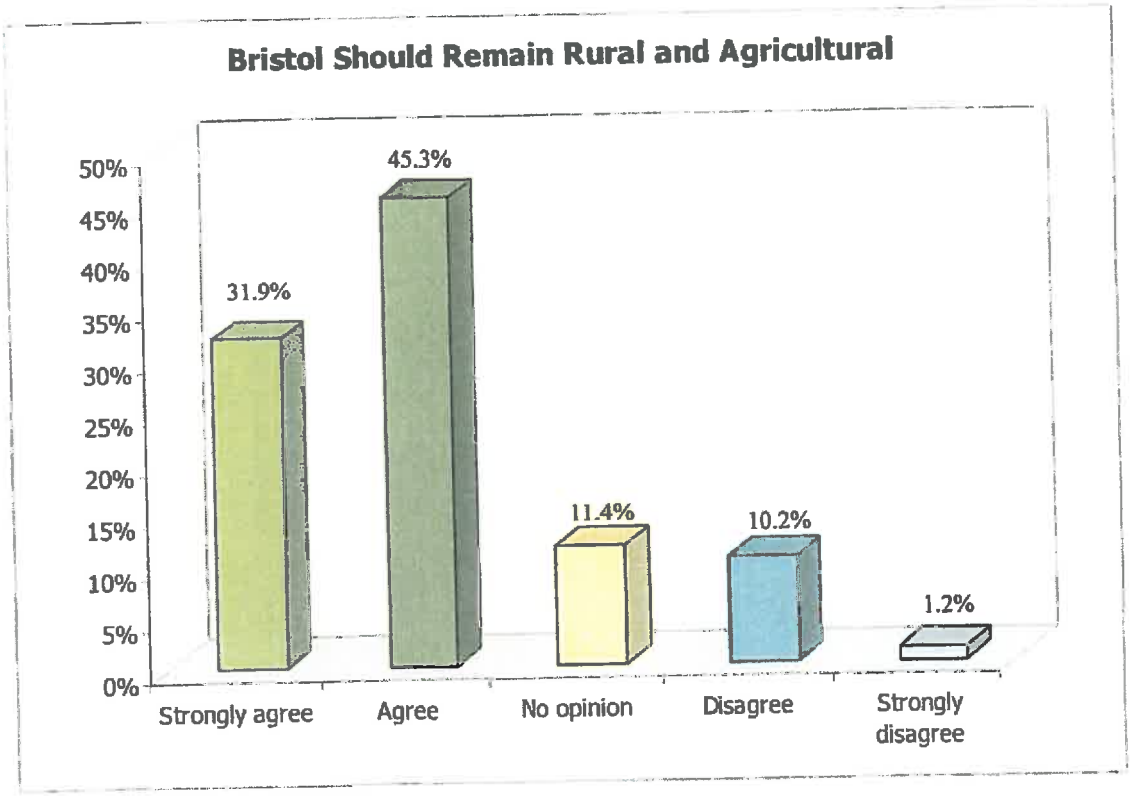
Question 6. Bristol should have more retail stores and services.

55% of respondents to this question agree or strongly agree that Bristol should have more retail stores and services, while 33% disagree or strongly disagree. This question does not specify the scale of these proposed stores and services. The support of light industry surfaces in many different questions in this survey, and resistance to large-scale industry may provide further information on this question.



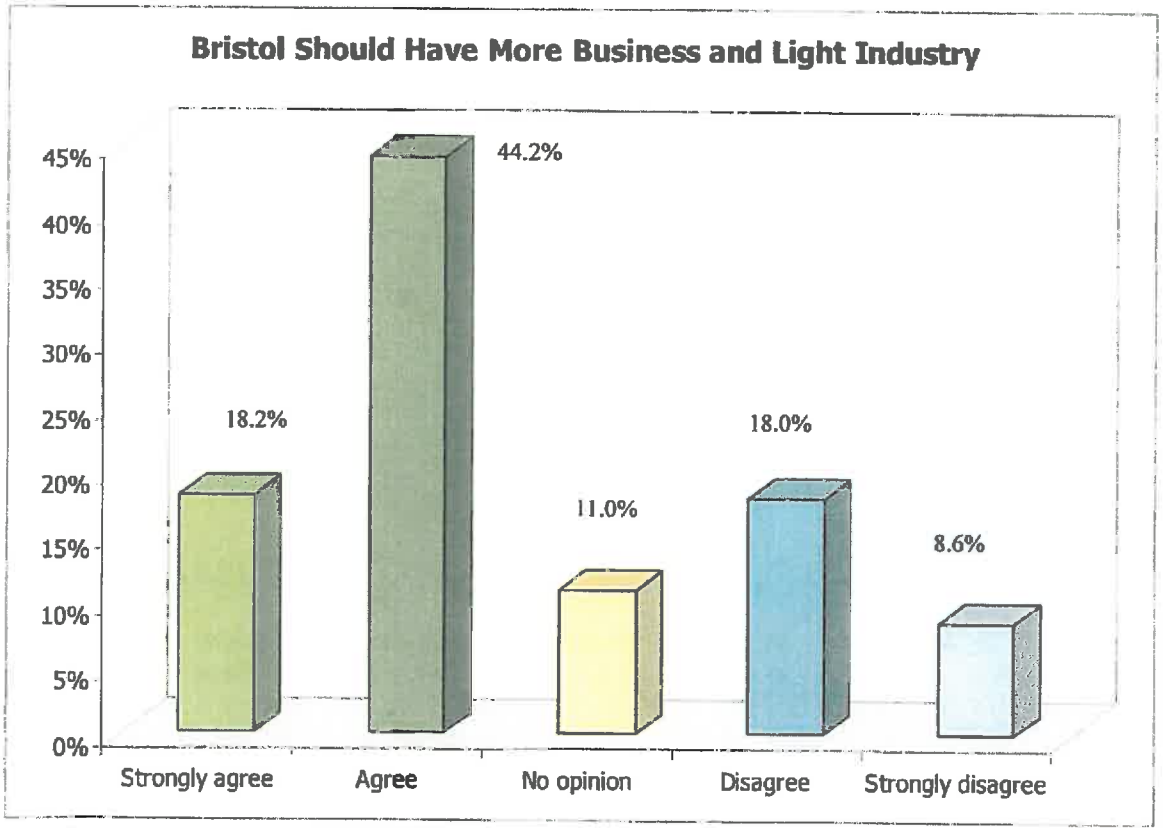
Question 7. Bristol should remain rural and agricultural.

A large majority of people value the rural and agricultural character of Bristol, with 77% agreeing or strongly agreeing that Bristol should remain rural and agricultural. Only 11 % disagree or strongly disagree.



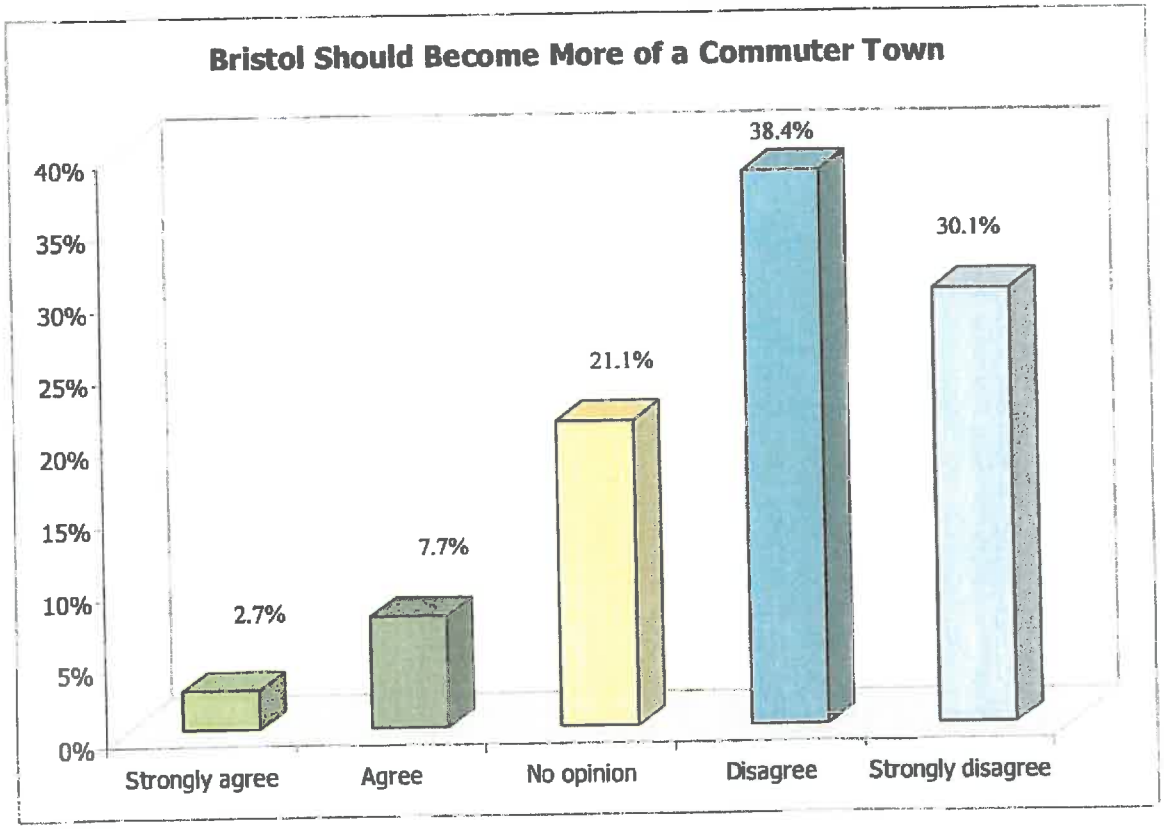
Question 8. Bristol should have more business and light industry.

62% of participants agree or strongly agree that Bristol should have more business and light industry, while 27% disagree or strongly disagree. Note that there are conflicts between these results and the results from question #5 where the majority of people want Bristol to stay the same, and the results from question #7 where the majority of people want Bristol to remain rural and agricultural. In order to provide the business and light industry, Bristol may have to change. This tension must be addressed by future planning efforts.



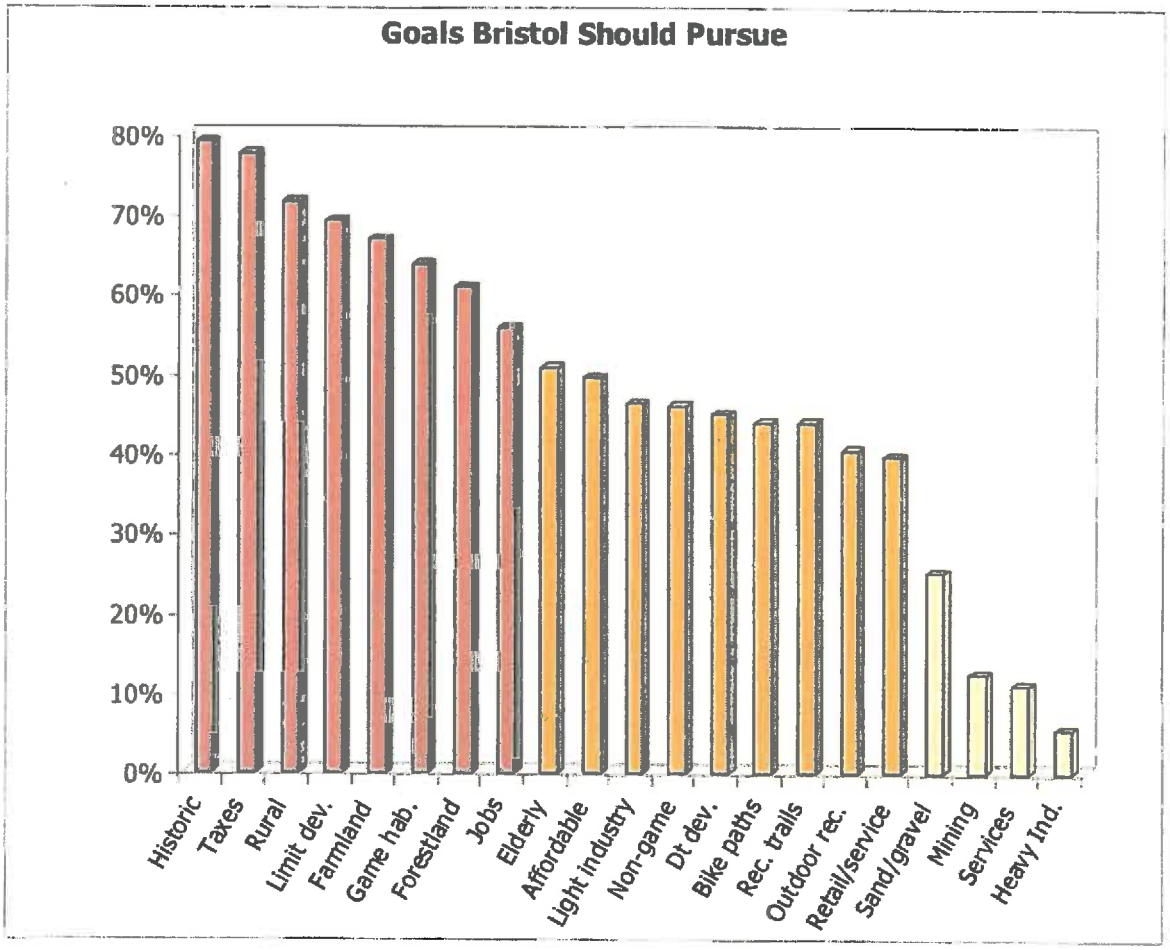
Question 9. Bristol should become more of a commuter town.

The majority of people do not want Bristol to become more of a commuter town, with only 10% agreeing or strongly agreeing with the idea and 69% disagreeing or strongly disagreeing. This shows that people want more housing, job and recreation opportunities in town so that they can continue to live, work and play in Bristol. It is also worth noting that 21% of people responded with no opinion to this question. This high level of indifference or indecisiveness could be due to people not understanding what a commuter town is and what becoming one would mean to the community.



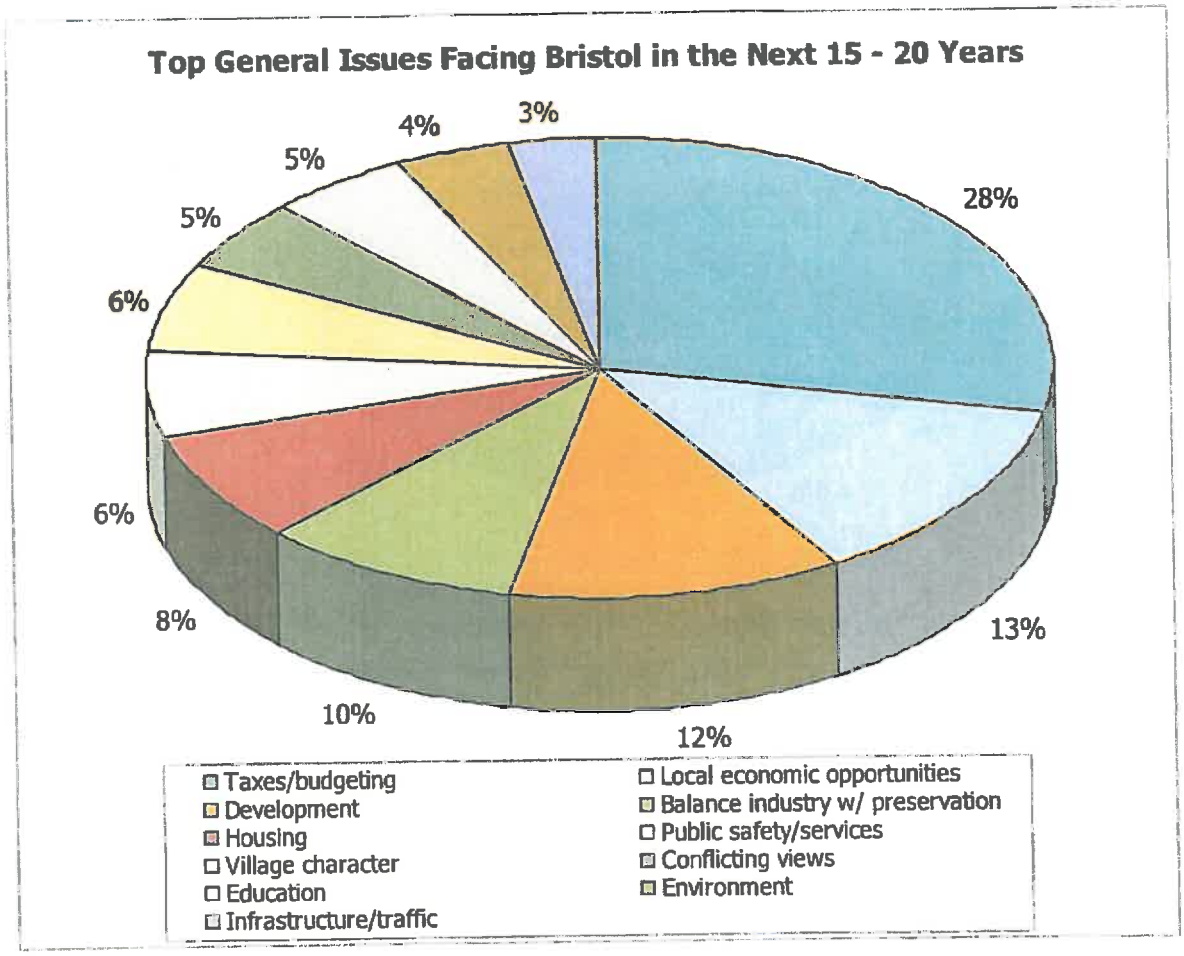
Question 10. What are the goals that you feel Bristol as a community should pursue?

The percentages for this question were taken using all 610 survey participants. Of the top 5 goals that people feel Bristol should pursue, except for taxes, they all revolve around preserving the rural and agricultural character of the town. People seemed to care least about pursuing extraction activities and heavy industry. The table is on the following page.

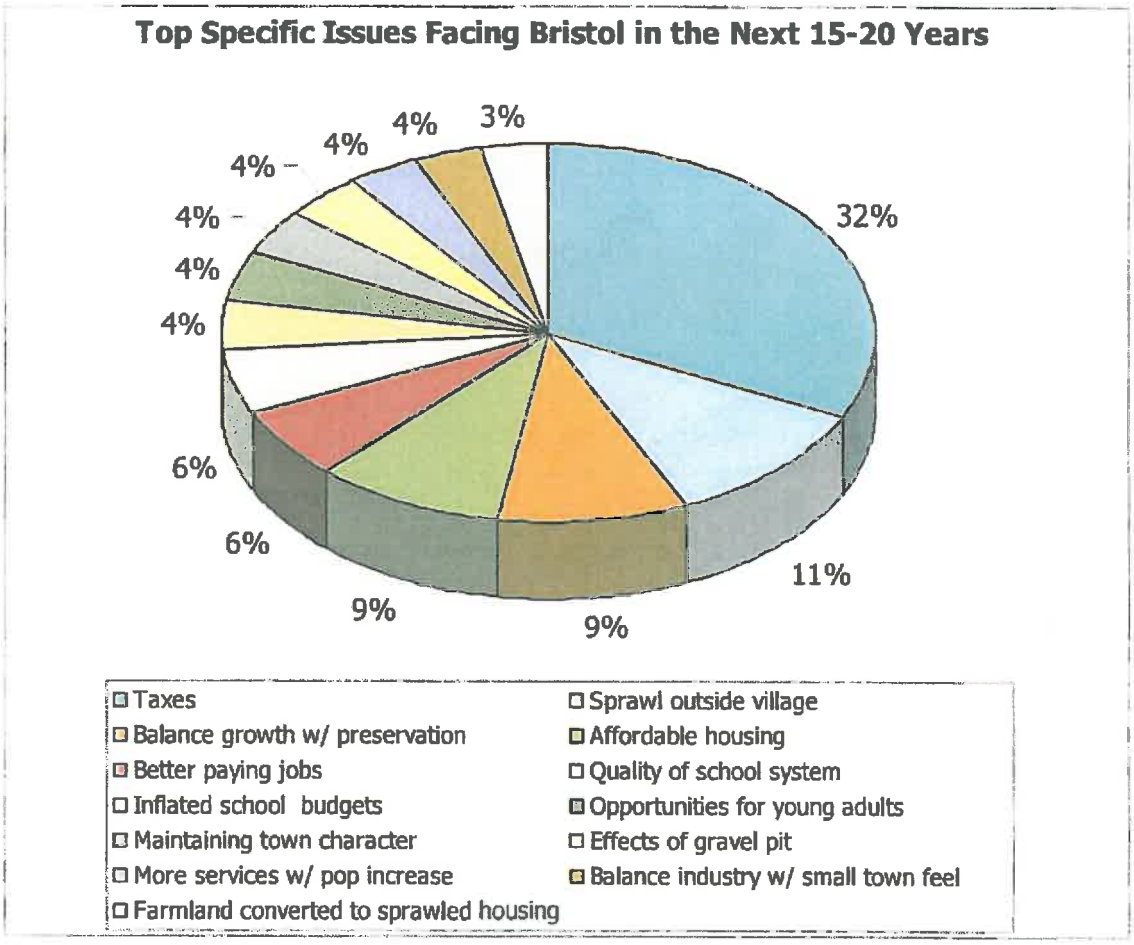


Question 11. What do you consider to be the most important issue or problem facing the Town of Bristol in the next 15-20 years?

Taxes are by far the most important issue facing Bristol in the next 15 to 20 years, with 175 people listing it as their biggest concern. This shows consistency with question #10, with taxes as a top response for both. Other major concerns include sprawl outside of the village into agricultural lands and the need to balance light industrial growth with agricultural and rural preservation.

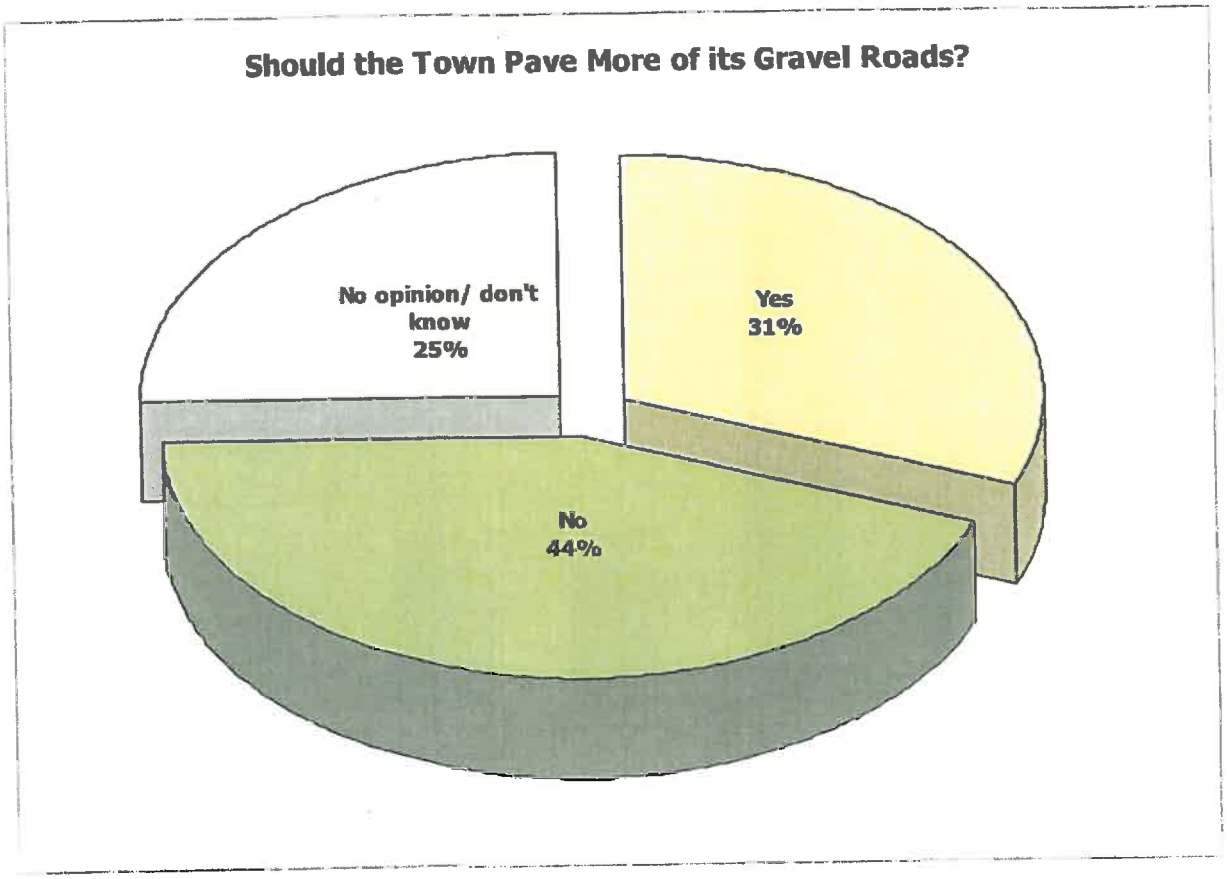


Below is a breakdown of specific issues identified by respondents.



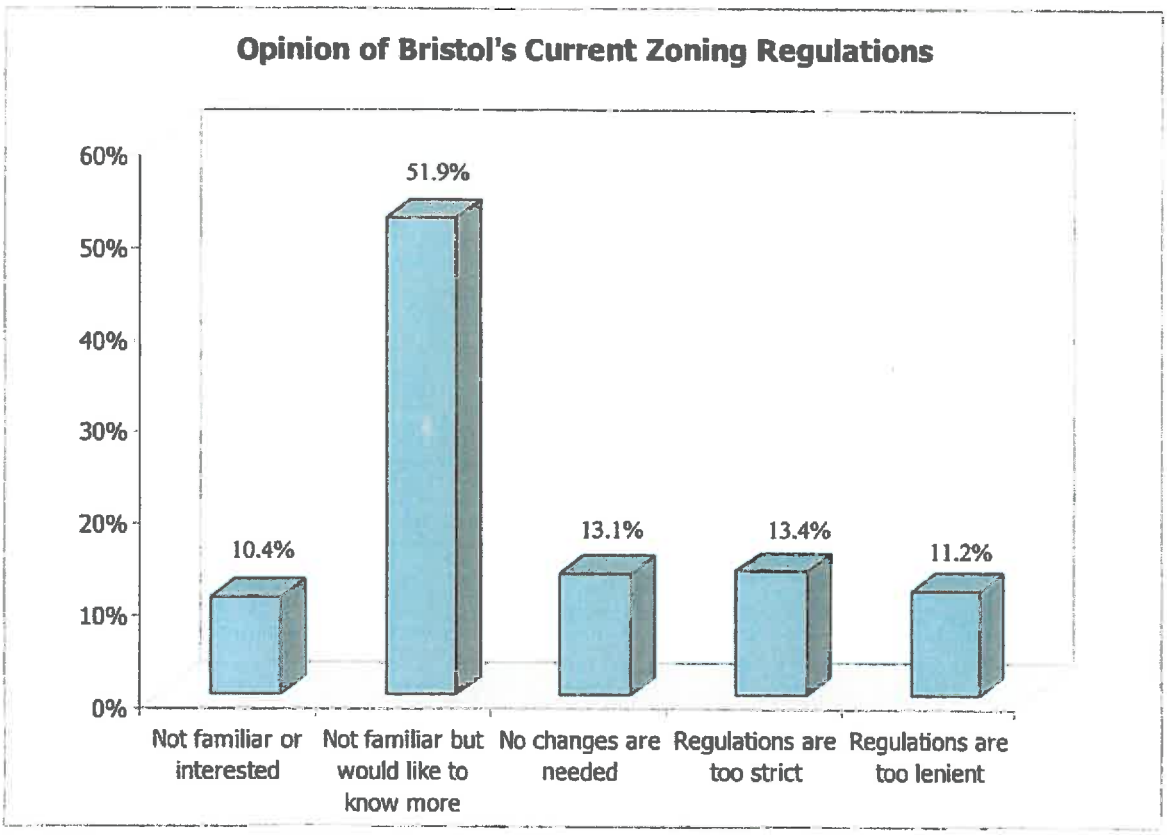
Question 12. Should the town pave more of its gravel (dirt) roads?

44% of respondents to this question believe that Bristol should not pave more of its gravel/dirt roads, while 31% said "yes" and 25% either do not have an opinion or do not know. It is worth noting that many people wrote in that it would depend on how cost effective the process would be and whether it would be economically efficient in the long-term.



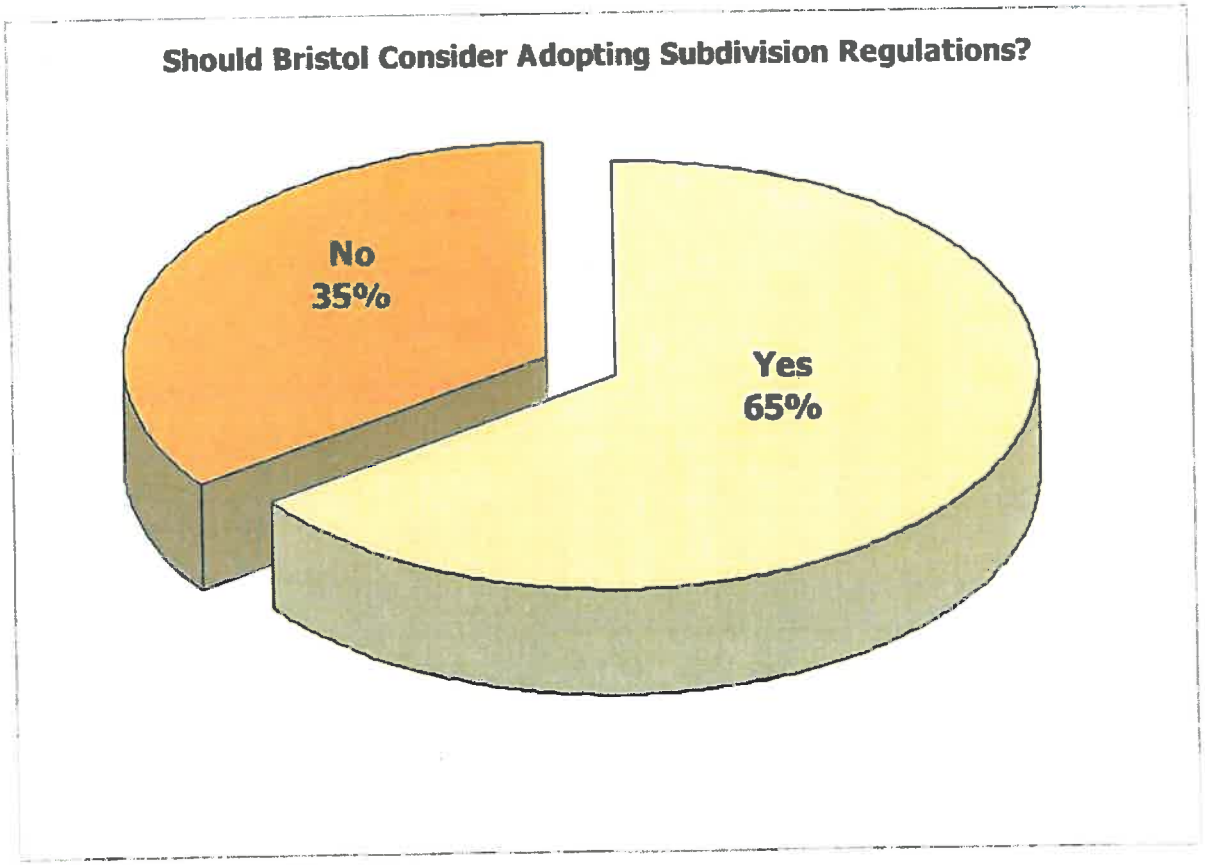
Question 13. What is your level of familiarity with, and opinion of, Bristol's current zoning regulations?

Over 50% of the people who responded to this question are not familiar with Bristol's current zoning regulations but would like to know more. This shows a need for educating the public on these regulations.



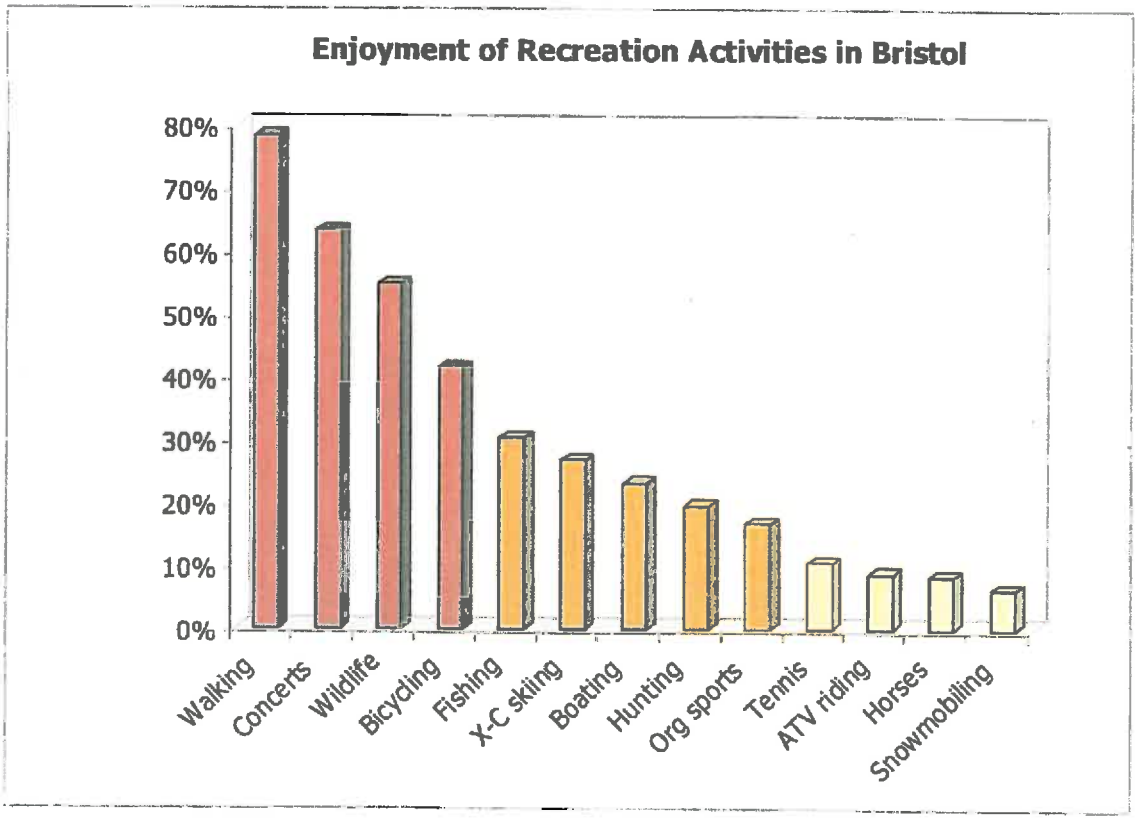
Question 14. Should Bristol consider adopting subdivision regulations?

65% of respondents to this question agree that Bristol should consider adopting subdivision regulations, while 35% disagree. There was no option, such as *no opinion/don't know*, for the participants to express confusion in what subdivision regulations are. Many people wrote in question marks or that they would need more information.



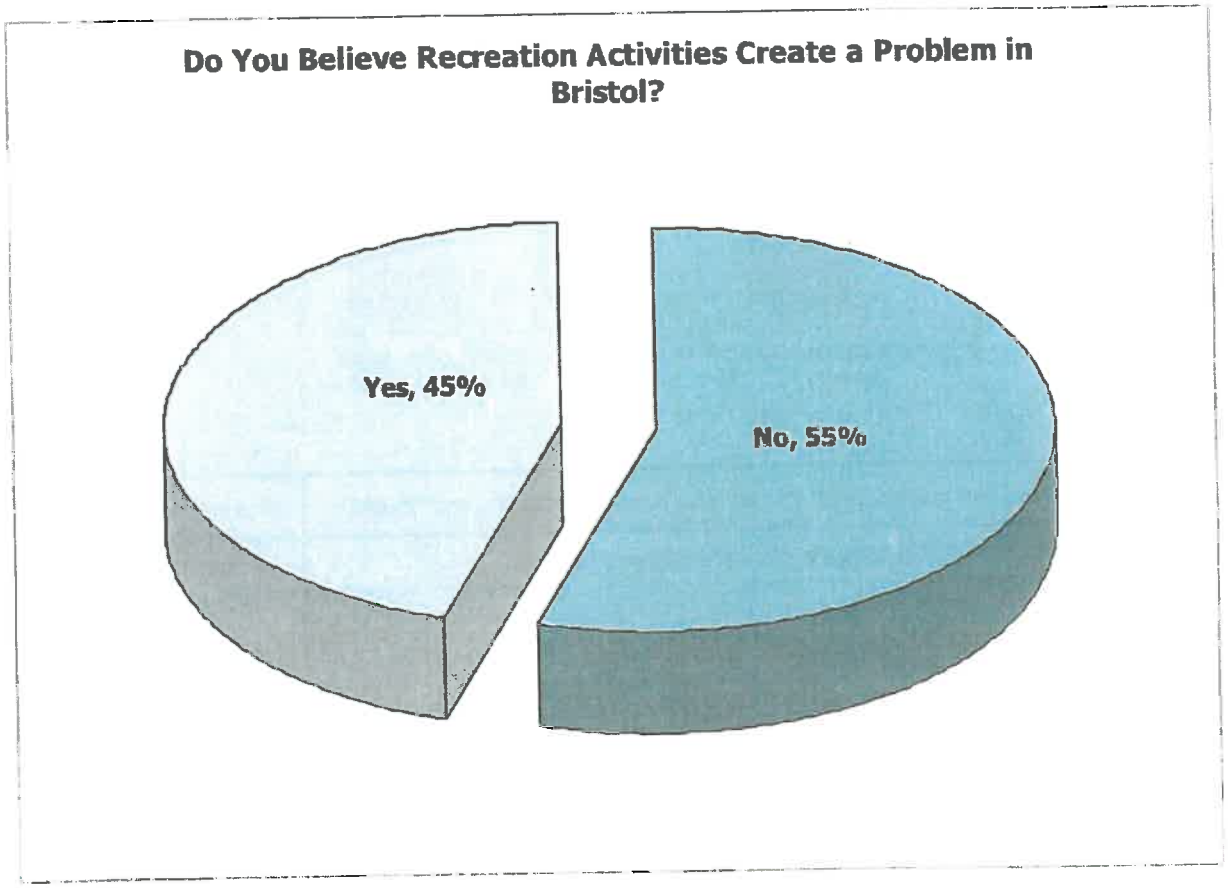
Question 15. Do you enjoy any of the following recreation activities in Bristol?

The percentages for this question were taken using all 610 survey participants. The top three recreation activities that people enjoy in Bristol each were selected in over 50% of the surveys. Walking or running were the most popular, followed by band concerts, and then wildlife viewing. There is also a list of additional responses that were mentioned in the *other* space provided which can be found in the data section.

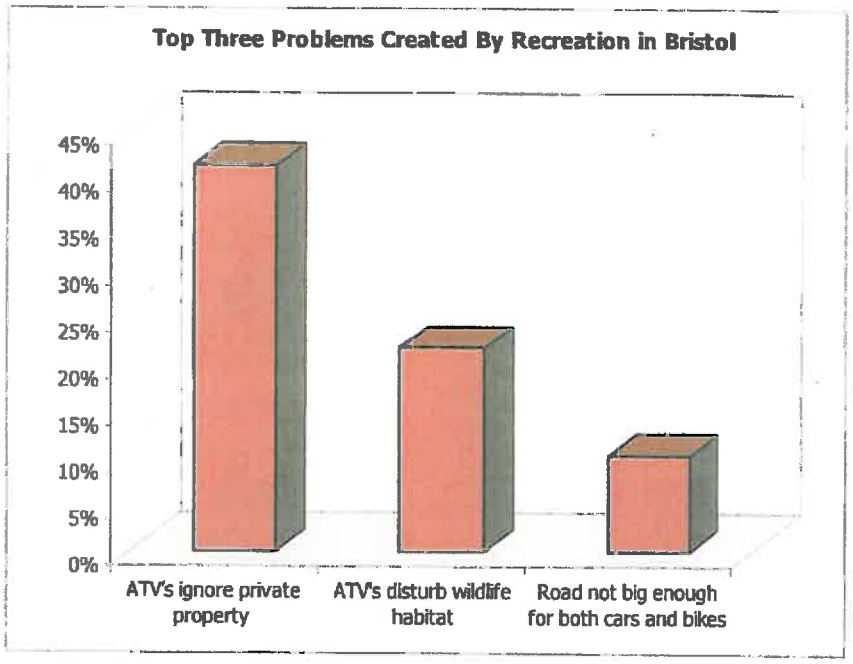


Question 15a. Do you believe that any of these or other recreation activities create a problem in Bristol? Please explain.

Of the people who responded to this question, 55% believe that recreation activities do not create a problem in Bristol. Of the 45% that responded with a problem, the majority of responses revolved around ATV's and their disturbance of private property, peace and quiet, and wildlife habitat.



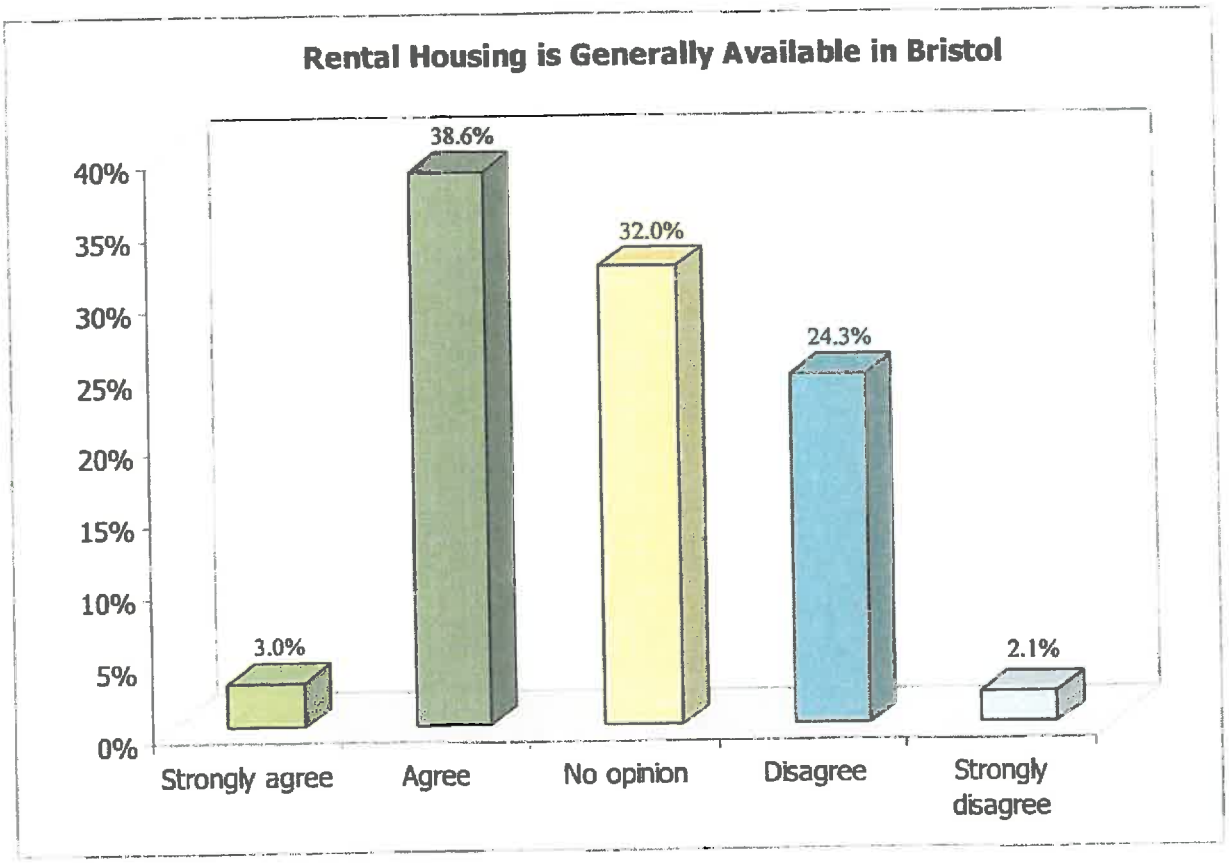
Detail of recreation activities creating a problem in Bristol.



Question 15a: Top issues from those who responded with a problem		Frequency	Valid %
1	**ATV's ignore private property**	**68**	**41.2%**
2	**ATV's disturb wildlife habitat**	**36**	**21.8%**
3	**Road not big enough for both cars and bikes**	**17**	**10.3%**
4	People not using sidewalks for walking	4	2.5%
5	Cost of recreation department activities	3	1.9%
6	Horseback riding on rt. 116 is dangerous	3	1.9%
7	Skateboarding in business areas	2	1.2%
8	Recreation tax dollars are needed elsewhere	2	1.2%
9	Loss of walking/biking paths	2	1.2%
10	Not enough of it	2	1.2%

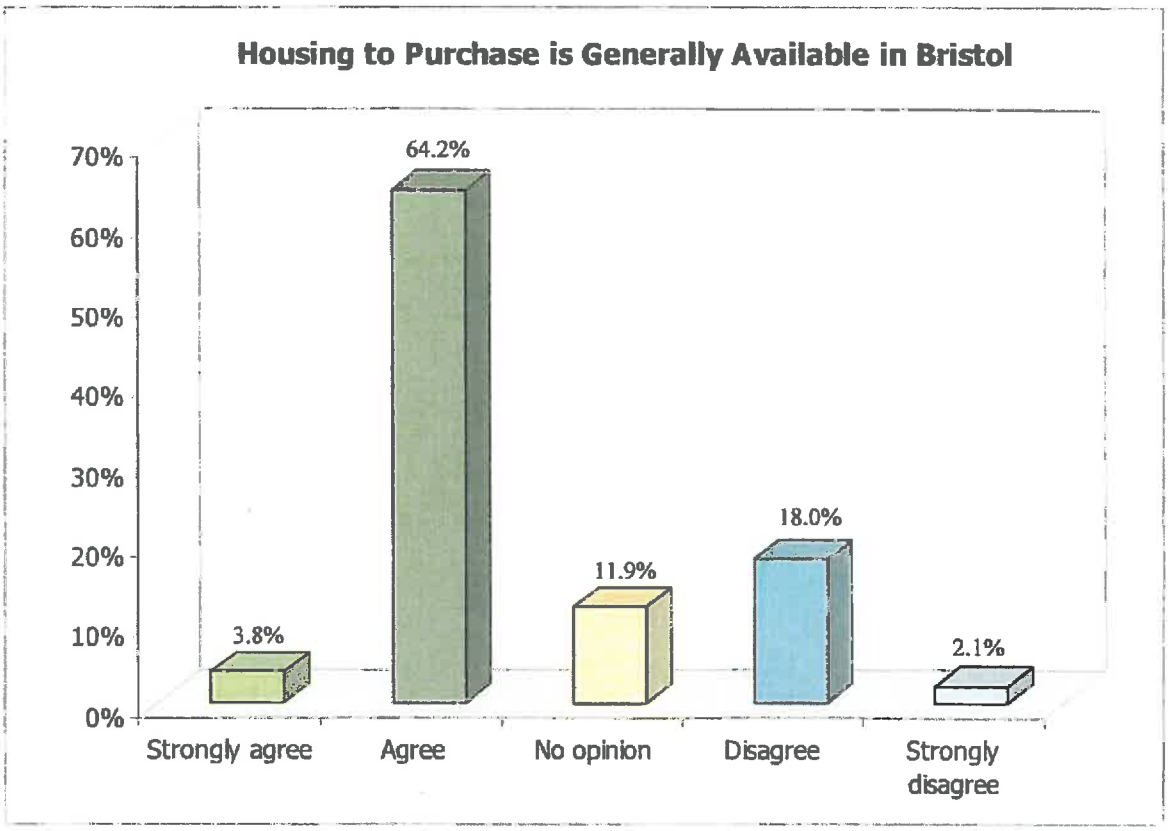
Question 16. Rental housing is generally available in Bristol

42% of respondents to this question agree or strongly agree that rental housing is generally affordable in Bristol, while 26% disagree or strongly disagree. There is also a high 32% of people that have no opinion on the matter.



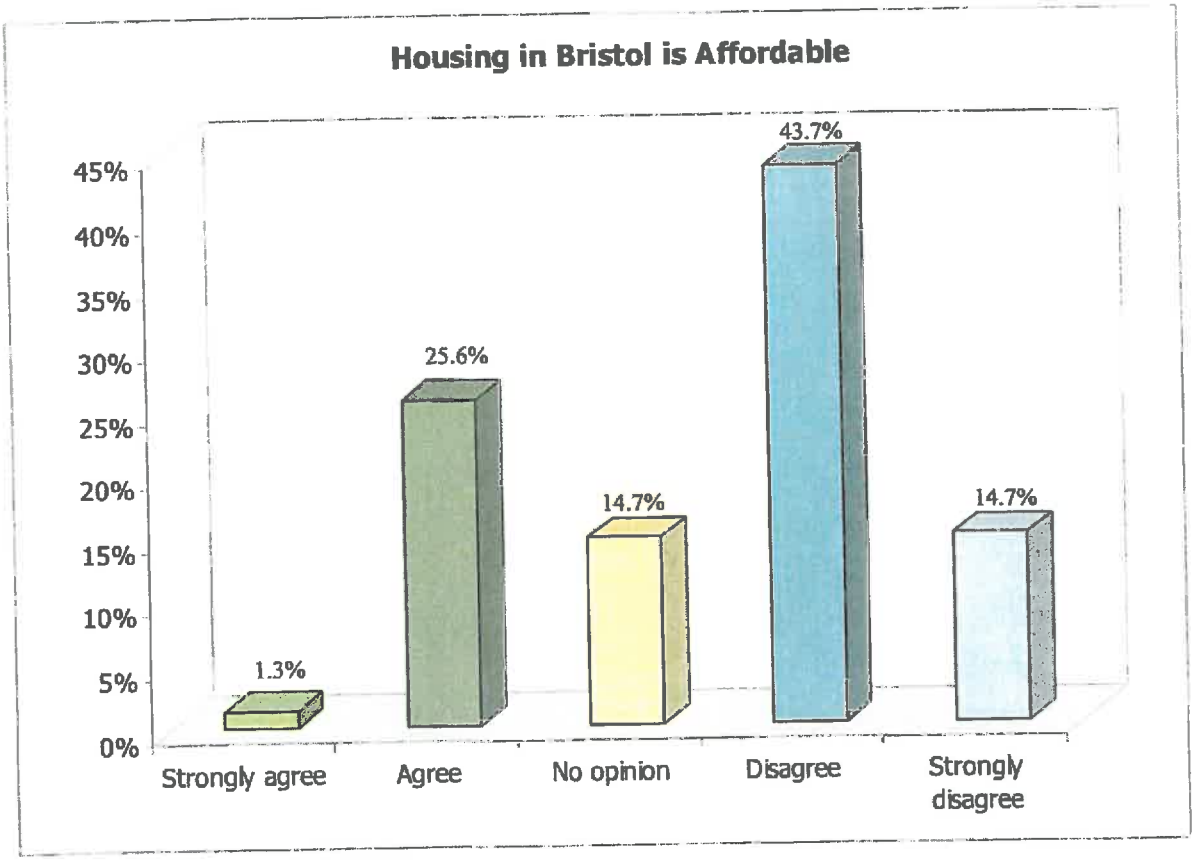
Question 17. Housing to purchase is generally available in Bristol.

A majority of 68% of people agree or strongly agree that housing to purchase is generally available in Bristol, while 10% disagree or strongly disagree.



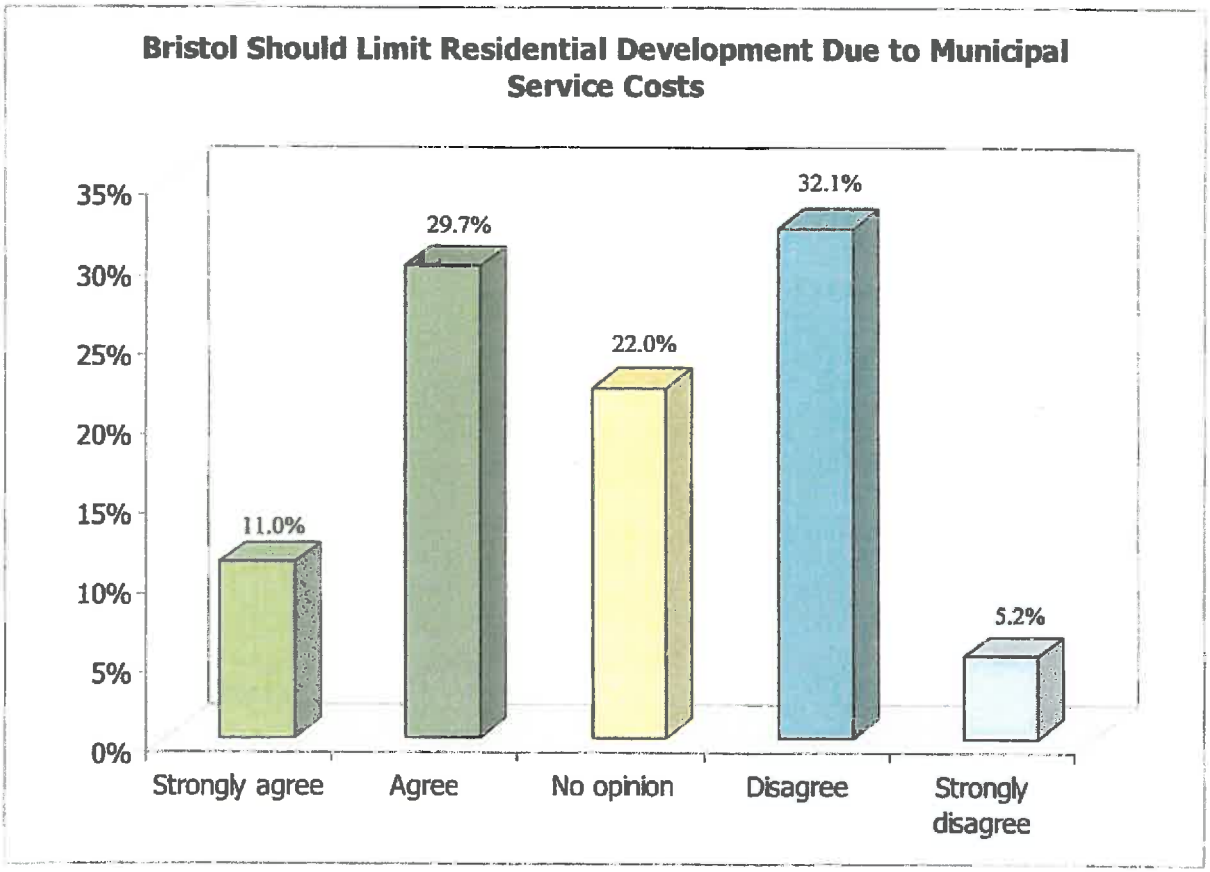
Question 18. Housing in Bristol is affordable.

While people seem to agree with the availability of housing in Bristol, 58% of participants disagree or strongly disagree that housing is affordable. Many people seem to associate the lack of affordable housing in Bristol with the high property taxes.



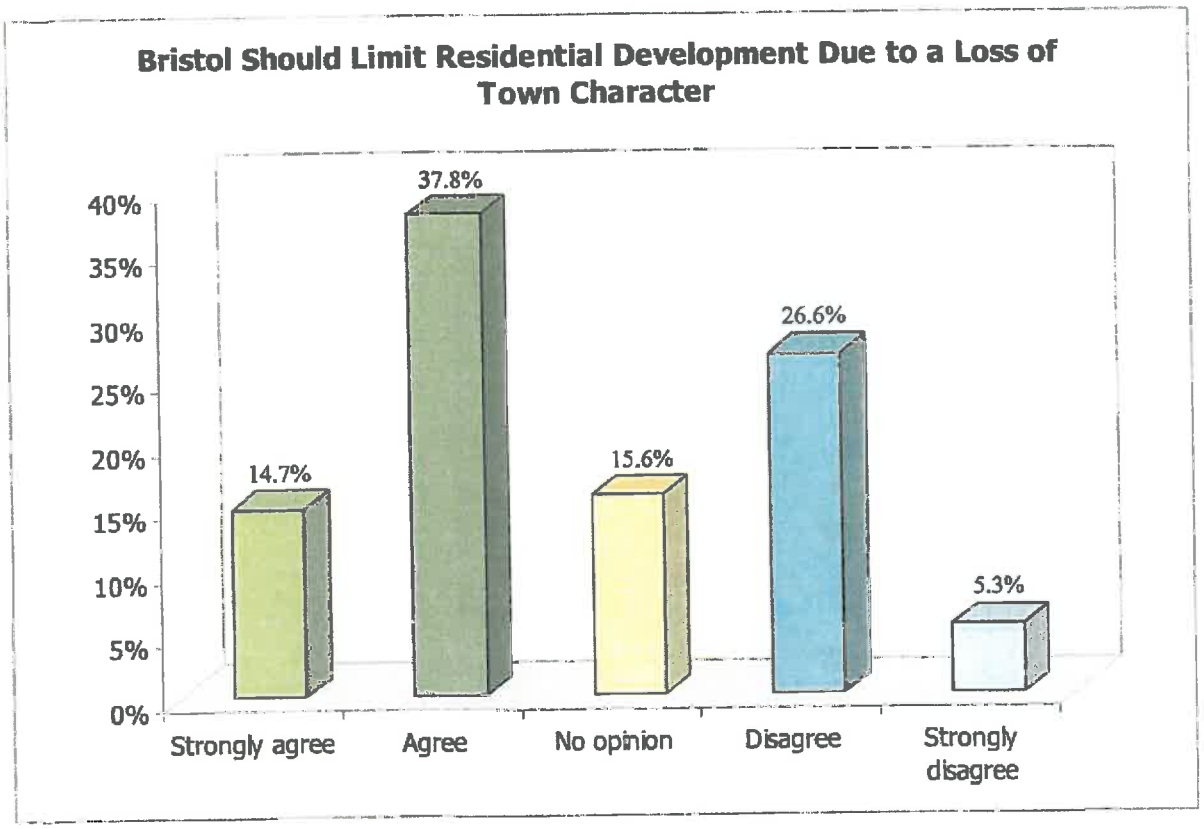
Question 19. The town should limit residential development due to concerns about the cost of providing municipal services.

There is an even split between the 41% of people who agree or strongly agree that the town should limit residential development due to concerns about the cost of municipal services and the 37% who disagree or strongly disagree. The conflicting views could be due to confusion of which types of municipal services the question means to address as well as the impacts they will have on the tax base.



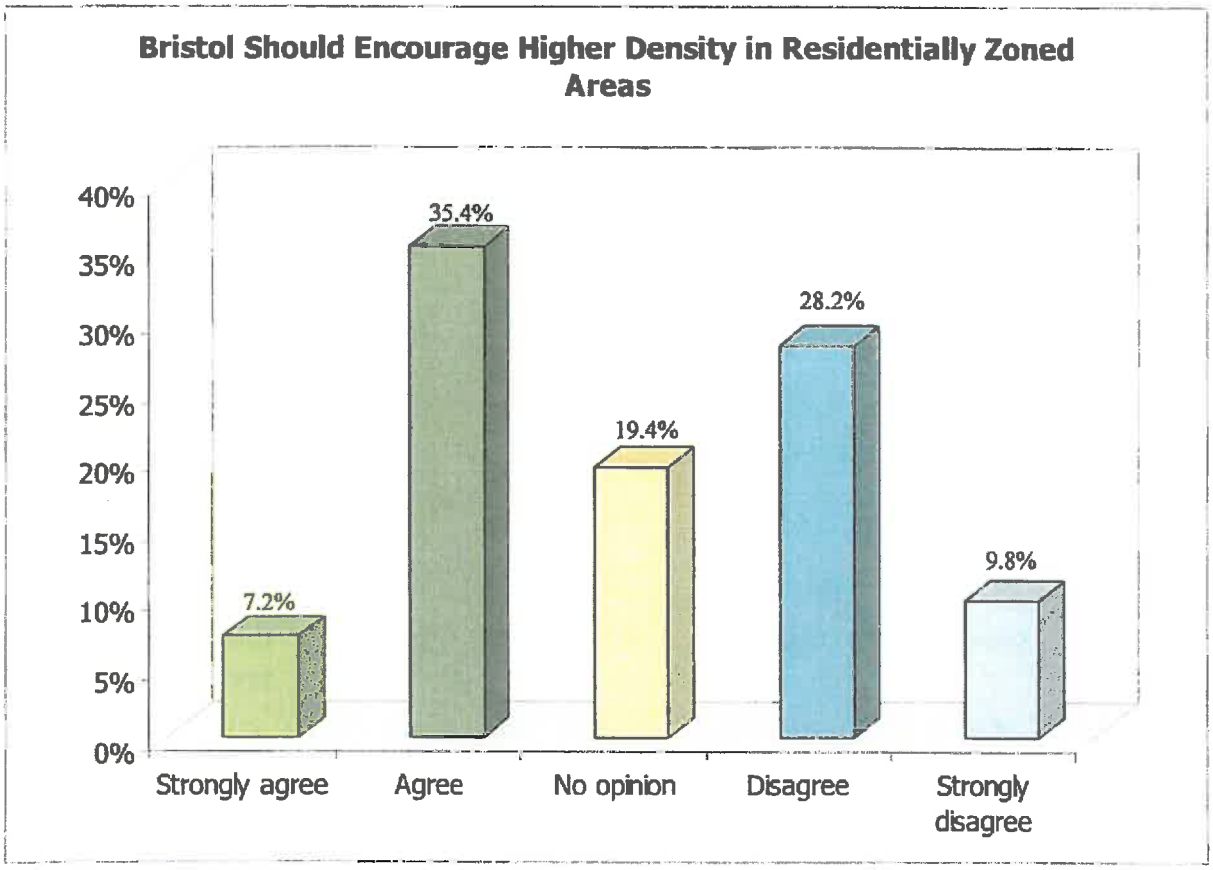
Question 20. The town should limit residential development due to concerns about a loss of town character.

53% of participants agree or strongly agree that the town should limit residential development due to concerns about a loss of town character, while 32% disagree or strongly agree. This majority shows that people are in support of limiting residential development depending on what it will impact most.



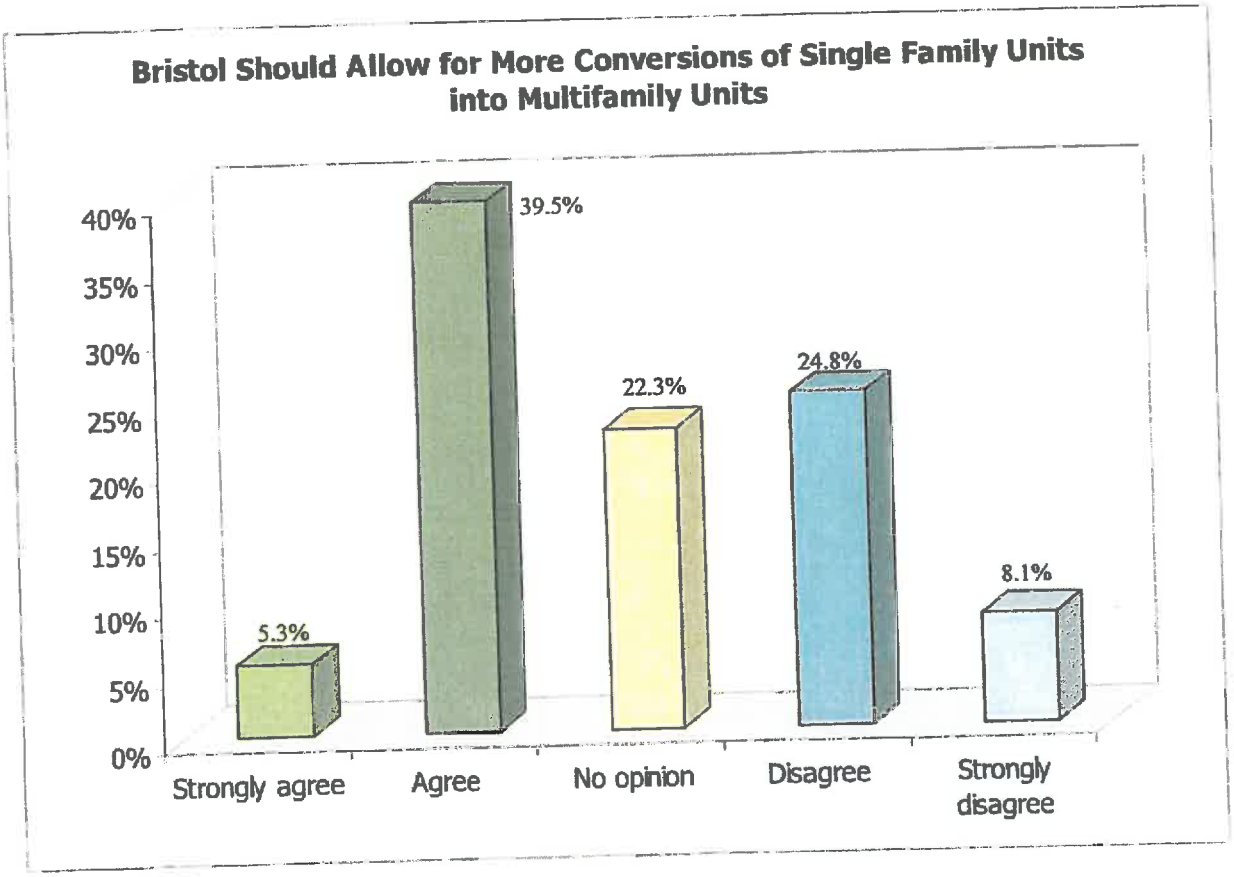
Question 21. Bristol should encourage higher density in existing residentially zoned areas as the primary means to satisfy housing demand.

There is a relatively even split between the 43% of respondents to this question who agree or strongly agree, and 38% who disagree or strongly disagree that Bristol should encourage higher density in existing residentially zoned areas as the primary means to satisfy housing demand. 20% of respondents to this question have no opinion, which could be due to lack of understanding of the term "high density development." Since there is such a strong sense of support for preserving the small town atmosphere with its rural, agricultural and historic character, it could be beneficial to educate the town on the conservation benefits of higher density in developed areas.



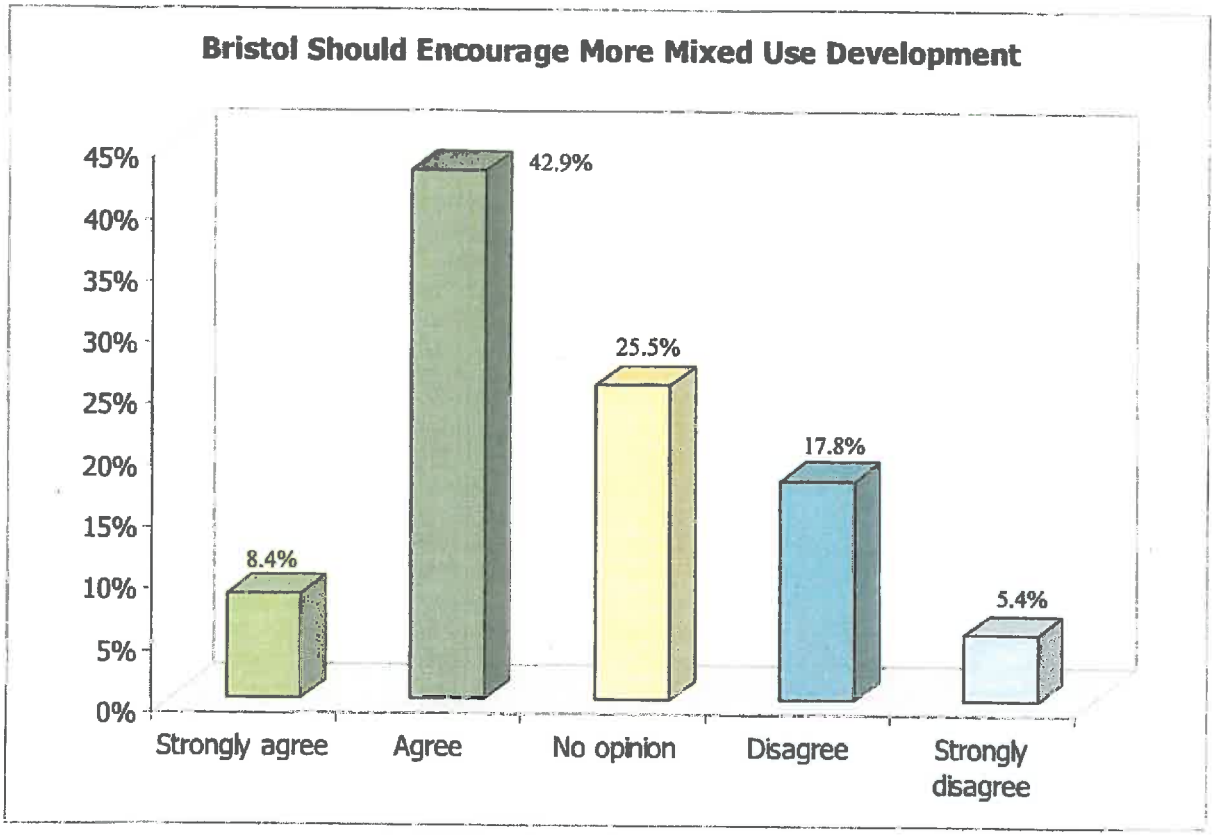
Question 22. Bristol should allow for more conversions of large, single-family housing into multifamily units.

45% of respondents to this question agree or strongly agree that Bristol should allow for more conversions of large, single family housing units into multifamily units, while a close 33% disagree or strongly disagree. It seems that people are split between their desire to preserve space and their value of personal, private space. 22% have no opinion on the issue.



Question 23. Bristol should encourage more mixed-use development in which housing is located near businesses and stores.

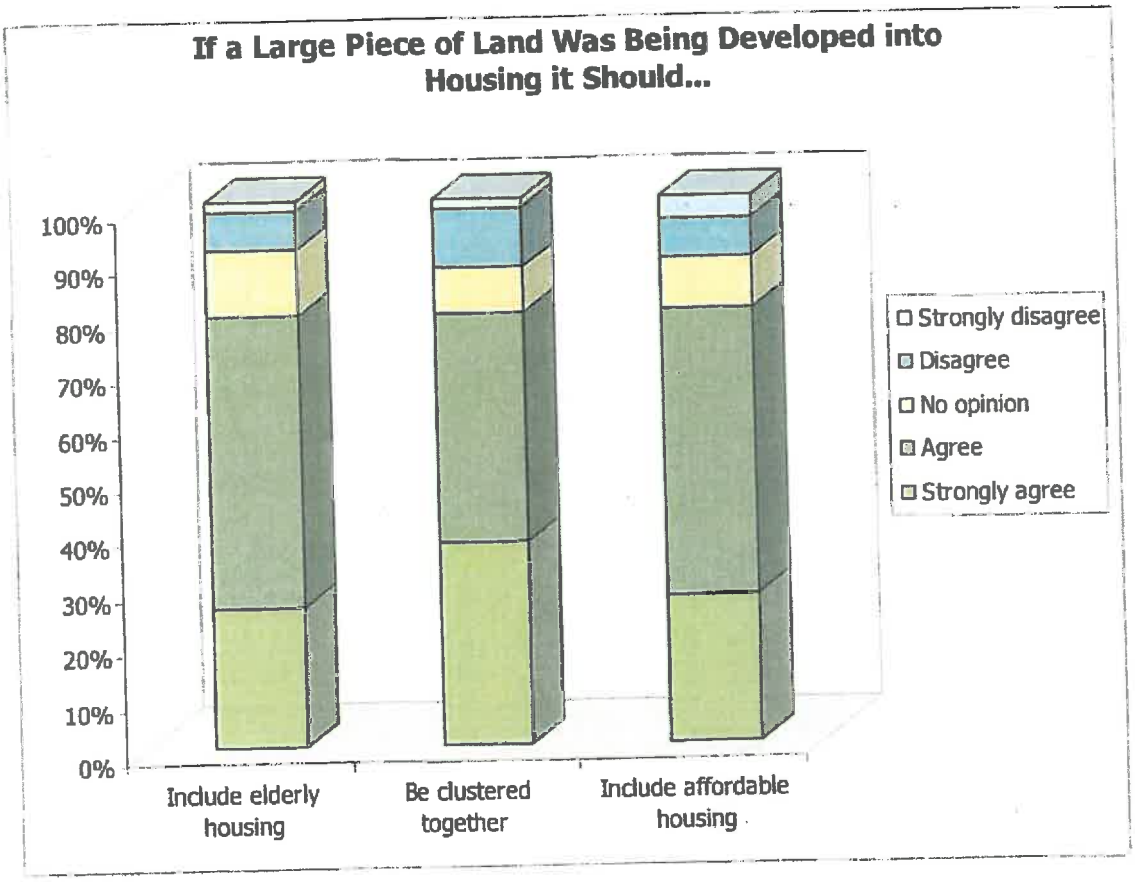
51% agree or strongly agree that Bristol should encourage more mixed-use development in which housing is located near businesses and stores, while 23% disagree or strongly disagree. 26% of respondents to this question have no opinion on the matter, which could be due to a lack of understanding of what mixed-use development means.



Question 24. If a large piece of farm or forestland was being developed into housing, would you agree that the development should:

- **Include some elderly housing.**
- **Be clustered together to preserve farmland, forestland, open space and/or town character.**
- **Include some affordable housing.**

People were very consistent in their responses to each section of this question. Approximately 80% of respondents agree and strongly agree that a large piece of farm or forest being developed into housing should include some elderly housing, be clustered together, and include some affordable housing.



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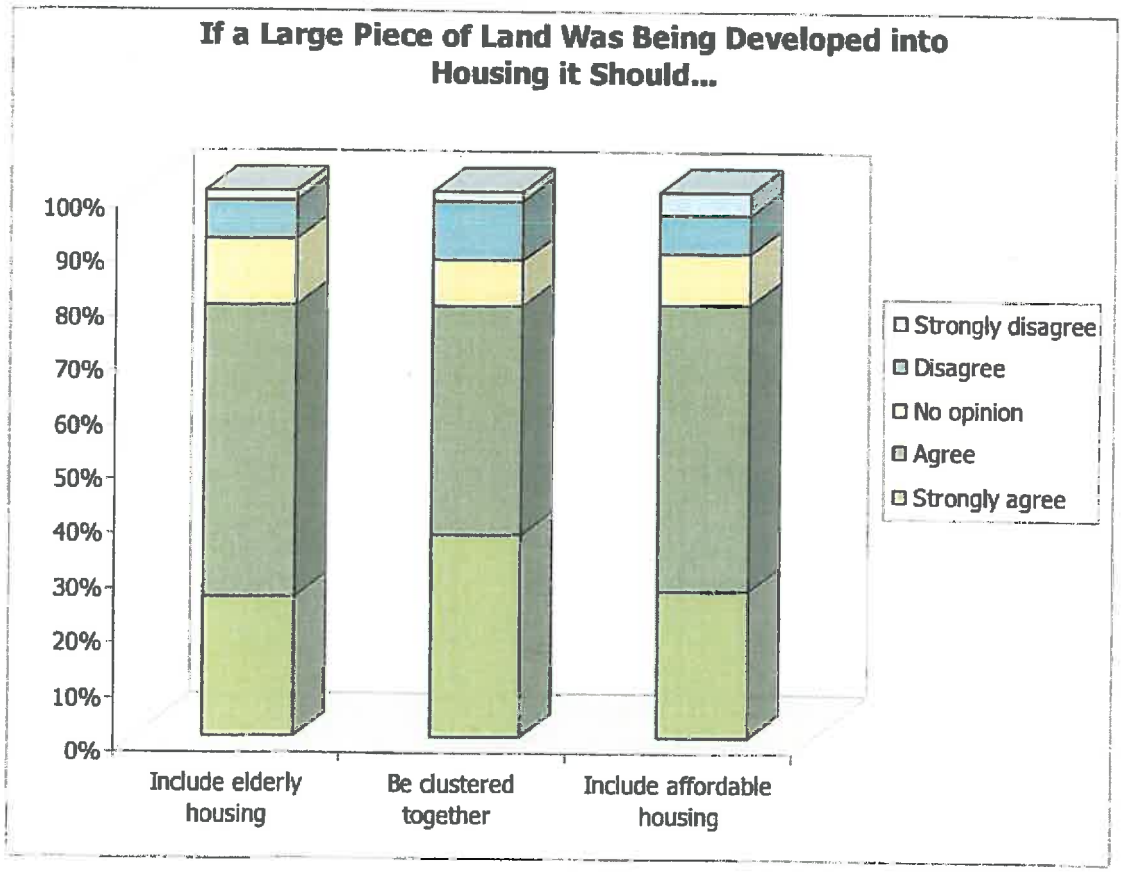
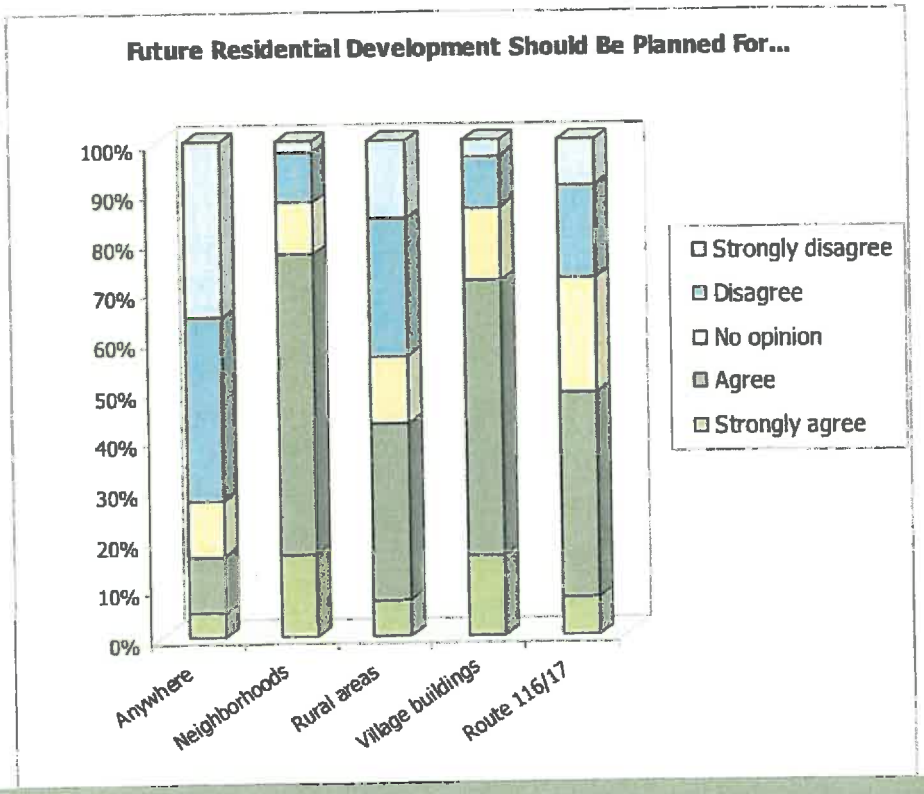


Question 25. Future residential development should be planned for:

- **Anywhere**
- **Within existing neighborhoods**
- **In Bristol's rural areas**
- **In existing buildings in the village/downtown**
- **Along Route 116 and 17**

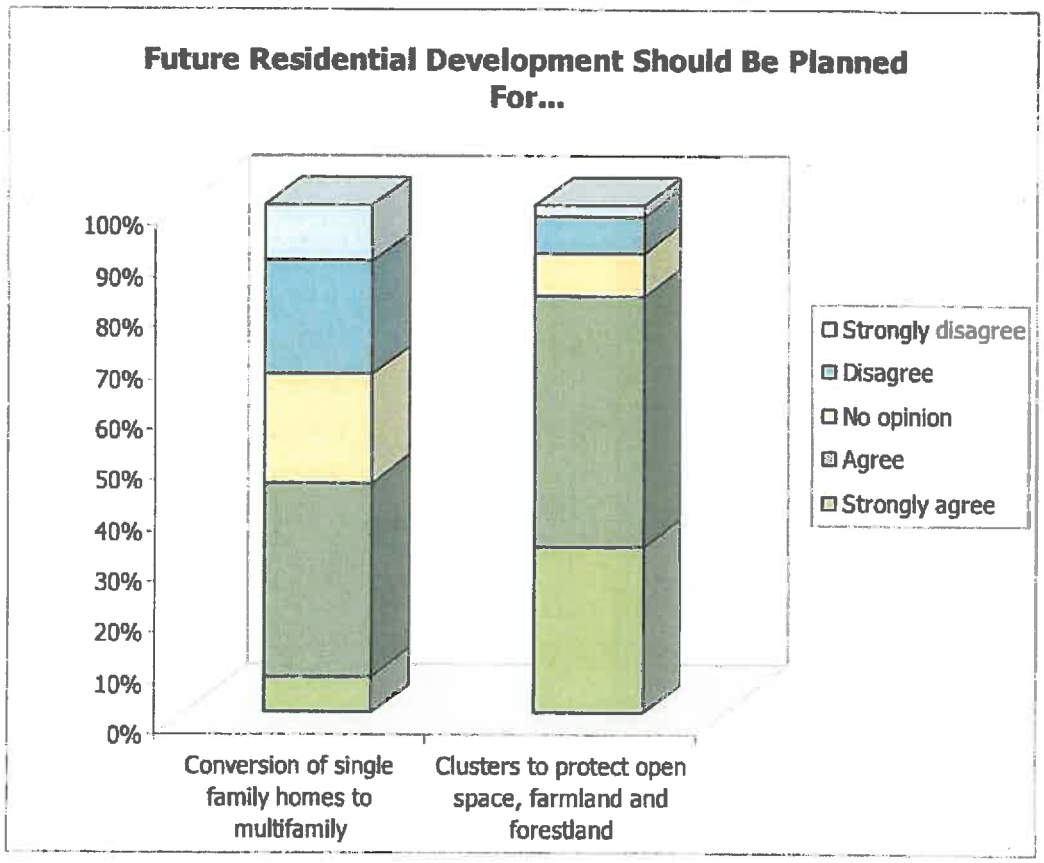
This question was broken into two graphs. The first graph illustrates people's opinions of the proposed physical locations of residential development. 73% disagree or strongly disagree that residential development should be planned for anywhere. This correlates well with the commonly expressed concern of sprawl outside of the village in question #11. Over 70% agree or strongly agree that residential development should be planned for both within existing neighborhoods and in existing buildings in the village. There is an even split between the 43% who agree or strongly agree and the 44% who disagree or strongly disagree with residential development being planned for Bristol's rural areas. This is inconsistent with the majority percentage of people who feel that Bristol should preserve its rural character in question #10. Close to 50% agree or strongly agree that residential development should be planned for along Route 116 and 17.



Question 25 continued:

- **Conversion of single family homes to multifamily**
- **Cluster to protect open space, farmland and forestland**

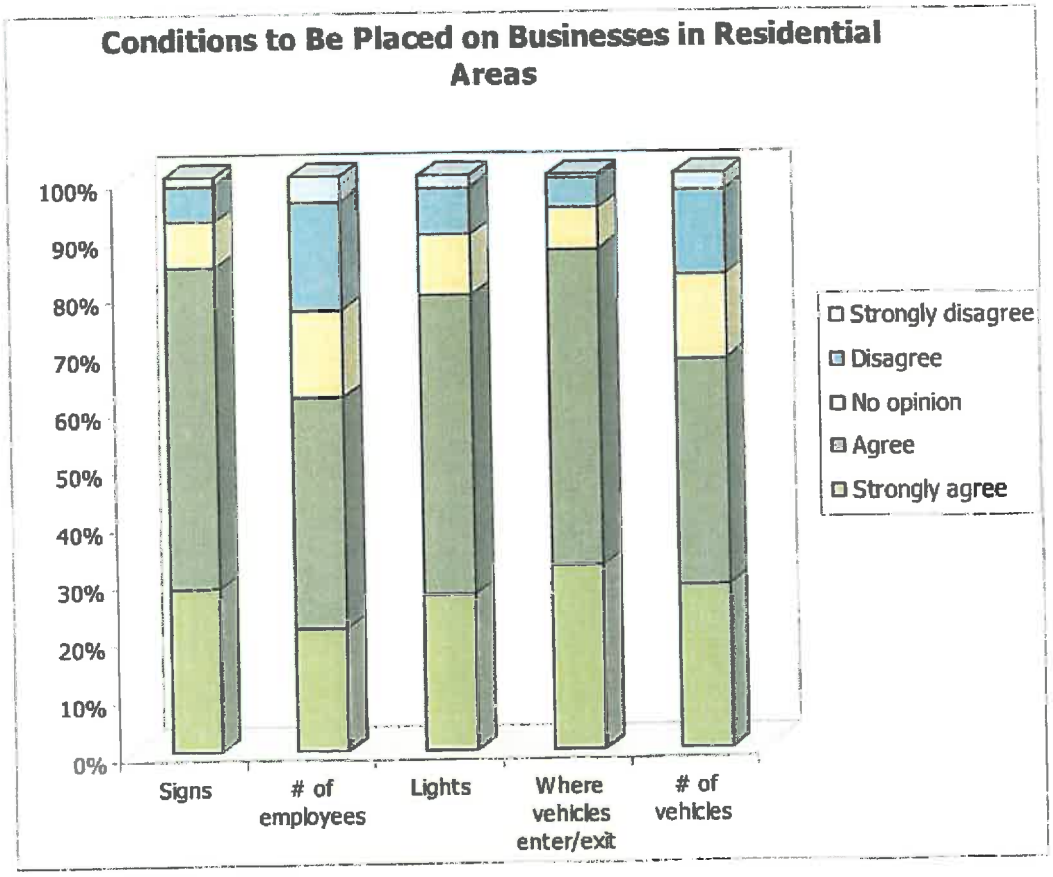
This graphs shows people's opinions of the type of proposed residential development. 45% of respondents to this question agree or strongly agree that future residential development should be planned for the conversion of single family homes into multifamily apartments, while 33% disagree or strongly disagree. 21% have no opinion on this issue. 82% agree or strongly agree with future residential development being planned in clusters to protect open space. There is also a list of additional responses that were mentioned in the *other* space provided which can be found in the data sections.



Question 26. Do you agree that conditions should be placed on the following aspects of a business to be located in a residential area:

- **The size and type of signs allowed**
- **The maximum number of employees**
- **The type, amount and timing of lights**
- **Where vehicles will enter and exit the property**
- **The number of vehicles traveling to and from the facility each day**

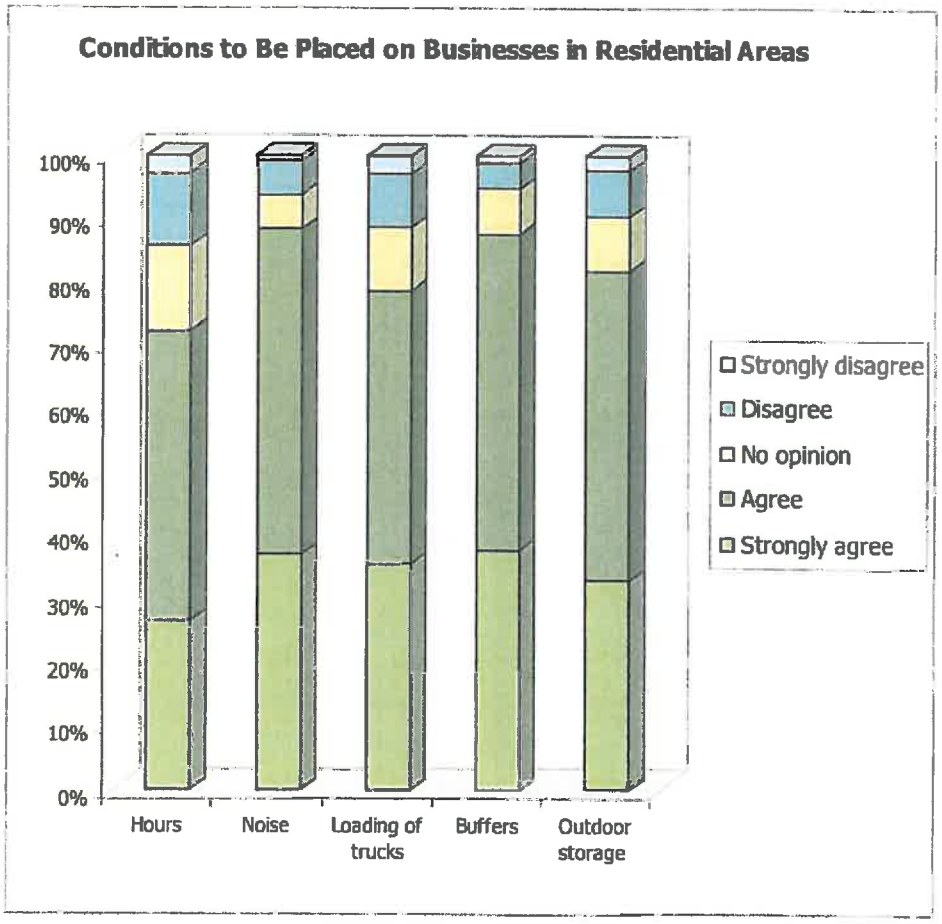
This question was broken into two graphs. In the graph below, there is a consistent majority of people agreeing or strongly agreeing with the proposed conditions to be placed on businesses. People were most concerned with where vehicles will enter and exit the property.



Question 26 continued:

- **Hours of operation**
- **Amount of noise at the property's edge**
- **Where and when trucks will be loaded and unloaded**
- **Landscaping and buffers between this property and its neighbors**
- **Outdoor storage of equipment of materials**

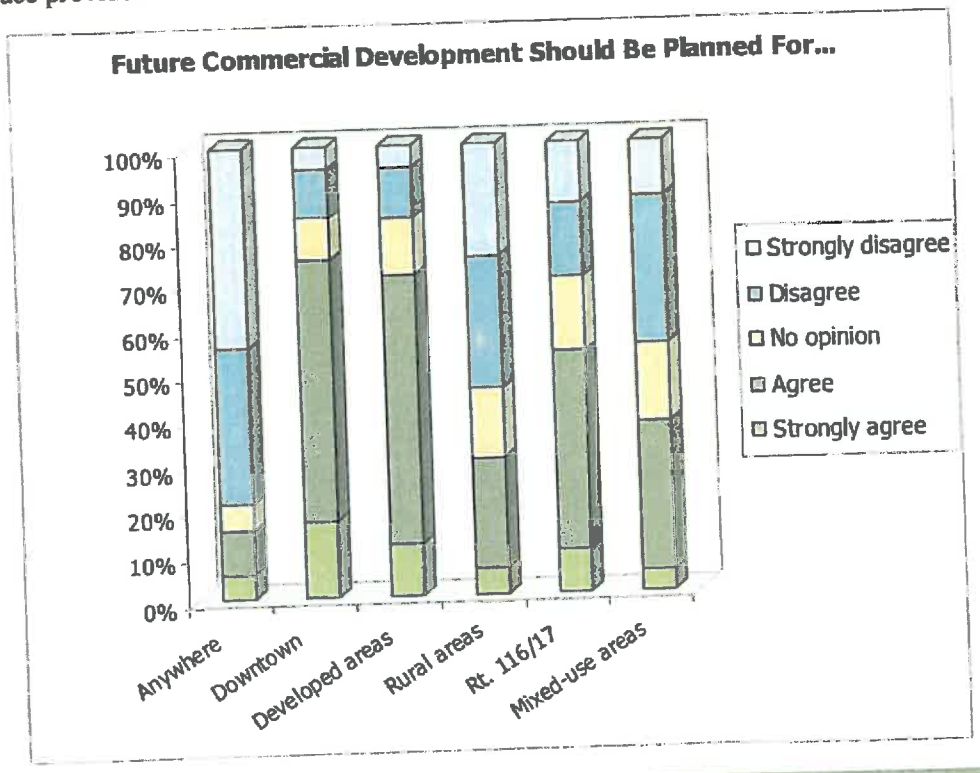
The second series of graphs also shows a consistent majority of people agreeing or strongly agreeing with the proposed conditions to be placed on businesses. The amount of noise at the property's edge and the landscaping/buffers between the property and its neighbors were both the most popular concerns. There is also a list of additional responses that were mentioned in the *other* space provided which can be found in the data sections.



Question 27. Future commercial development should be planned for:

- **Anywhere**
- **Within the downtown area**
- **Within developed areas**
- **In Bristol's rural areas**
- **Along route 116 and 17**
- **In mixed-use areas near housing**

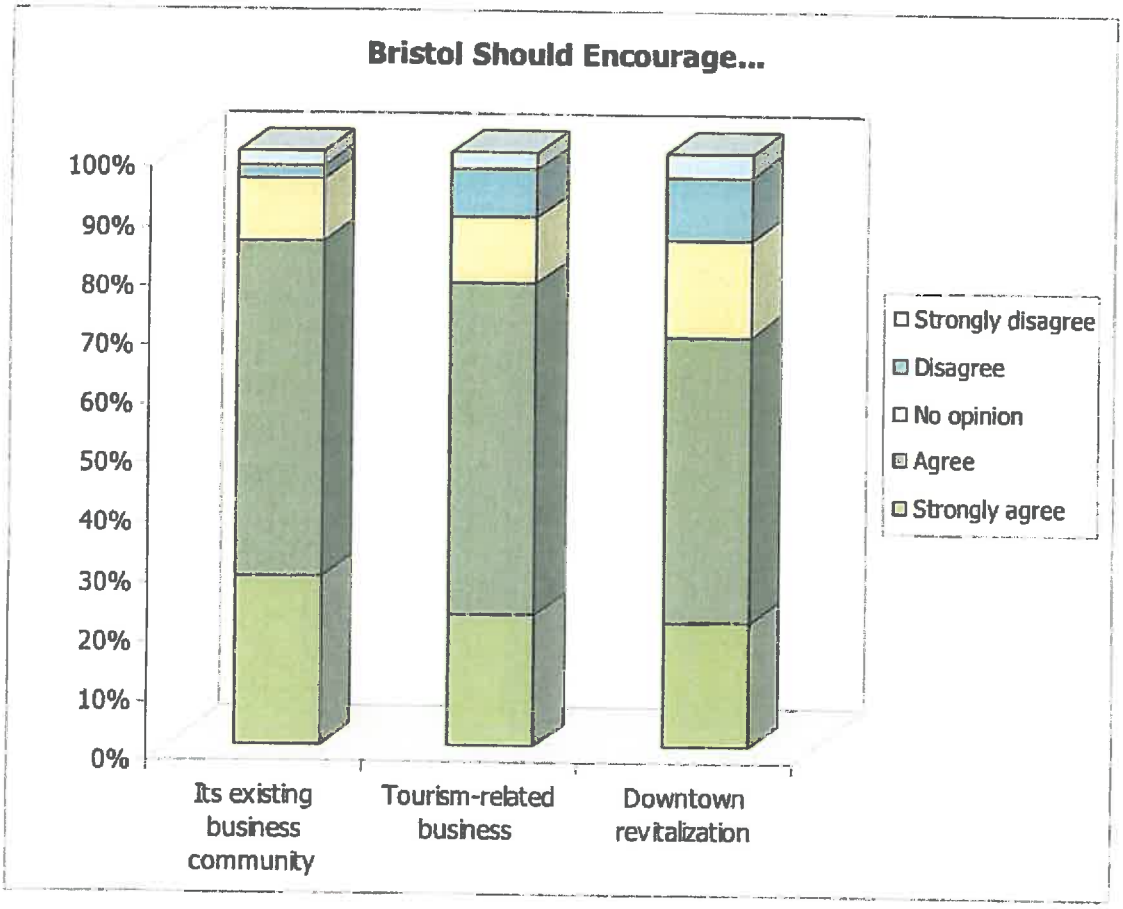
80% of respondents disagree or strongly disagree that commercial development should be planned for anywhere. The similar results of questions #25a and #27a show that people believe both residential and commercial development should be managed in some way. Over 70% agree or strongly agree that commercial development should be planned for within the downtown area and within developed areas. 55% of respondents disagree or strongly disagree with planning commercial development in rural areas, which is a higher amount than those who disagree with planning residential development in rural areas in question #25. Just over 50% agree or strongly agree with planning commercial development along Route 116 and 17. There are conflicting opinions over whether commercial development should be planned for mixed-use areas near housing with 37% agreeing or strongly agreeing, and 45% disagreeing or strongly disagreeing. There is also a list of additional responses that were mentioned in the *other* space provided which can be found in the data sections.



Question 28. Bristol should:

- **Improve the viability of its existing business community**
- **Encourage tourism-related business and industry**
- **Direct more resources to downtown revitalization**

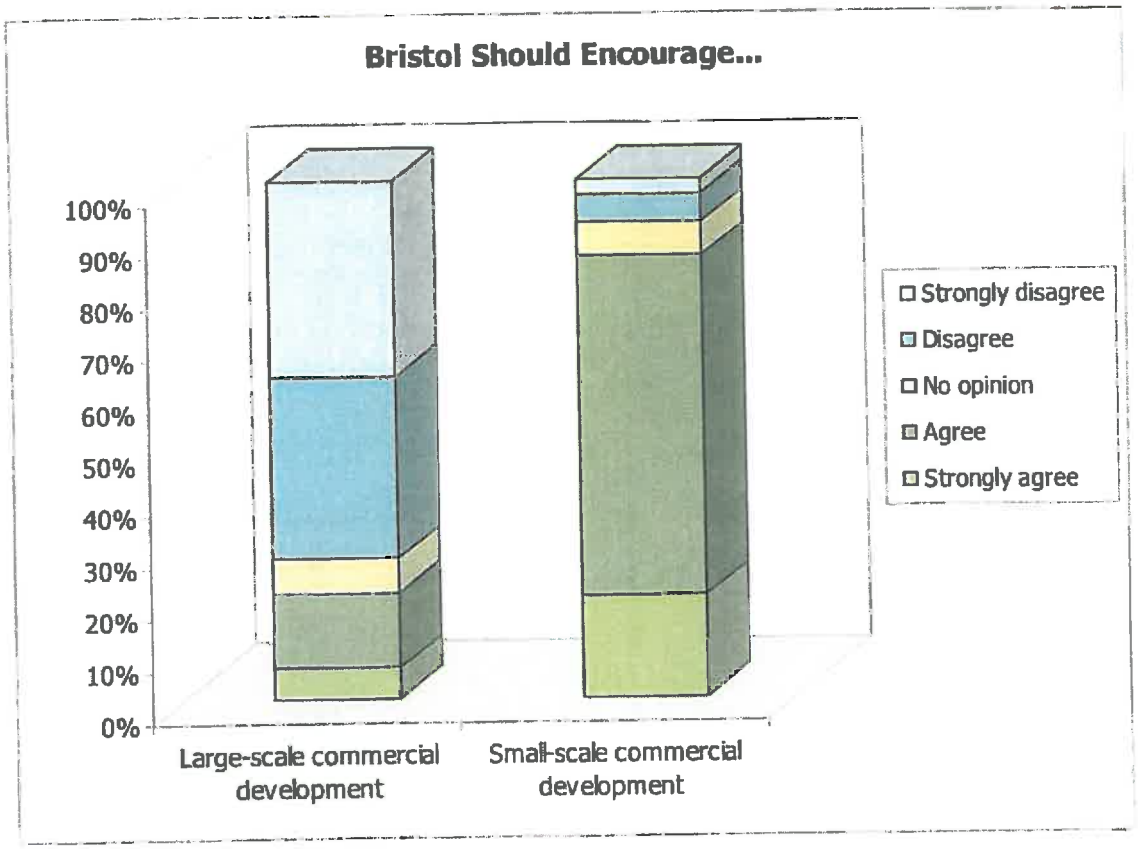
This question was broken into two graphs. The first series of graphs illustrate people's opinions on how Bristol should invest in its economic vitality. 85% agree or strongly agree that Bristol should improve the viability of its existing business community; 84% agree or strongly agree that Bristol should encourage tourism-related business; 69% agree or strongly agree that Bristol should direct more resources to downtown revitalization.



Question 28 continued:

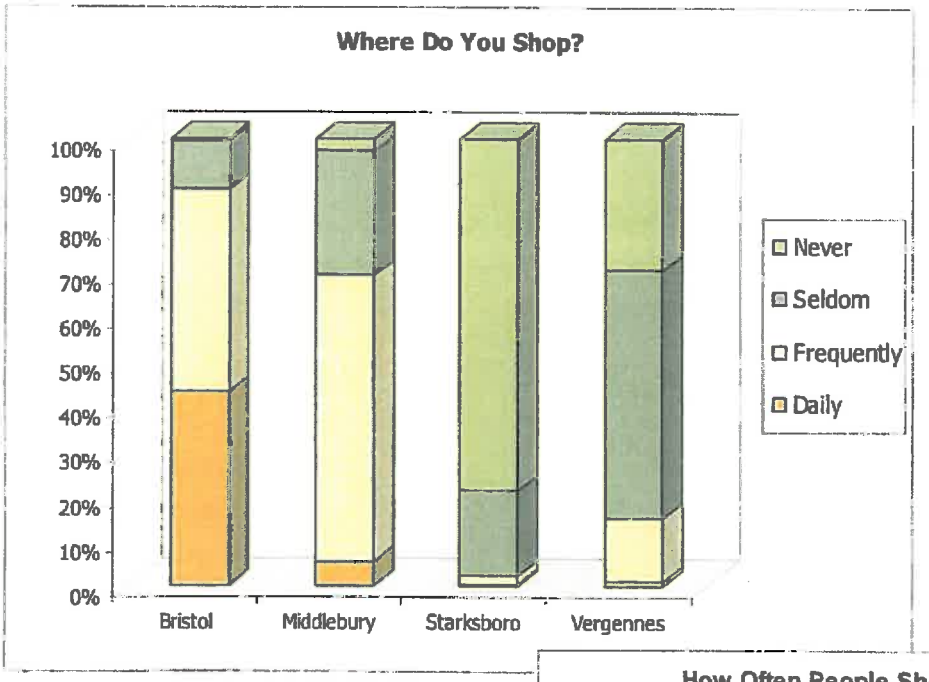
- **Be open to large-scale commercial development**
- **Encourage small-scale commercial development**

The second series of graphs points out the contrast between people's opinions of large-scale and small-scale commercial development. 73% disagree or strongly disagree with Bristol being open to large-scale commercial development, while 85% agree or strongly agree with encouraging small-scale commercial development. These results correlate with people's desire to maintain the small-town atmosphere.



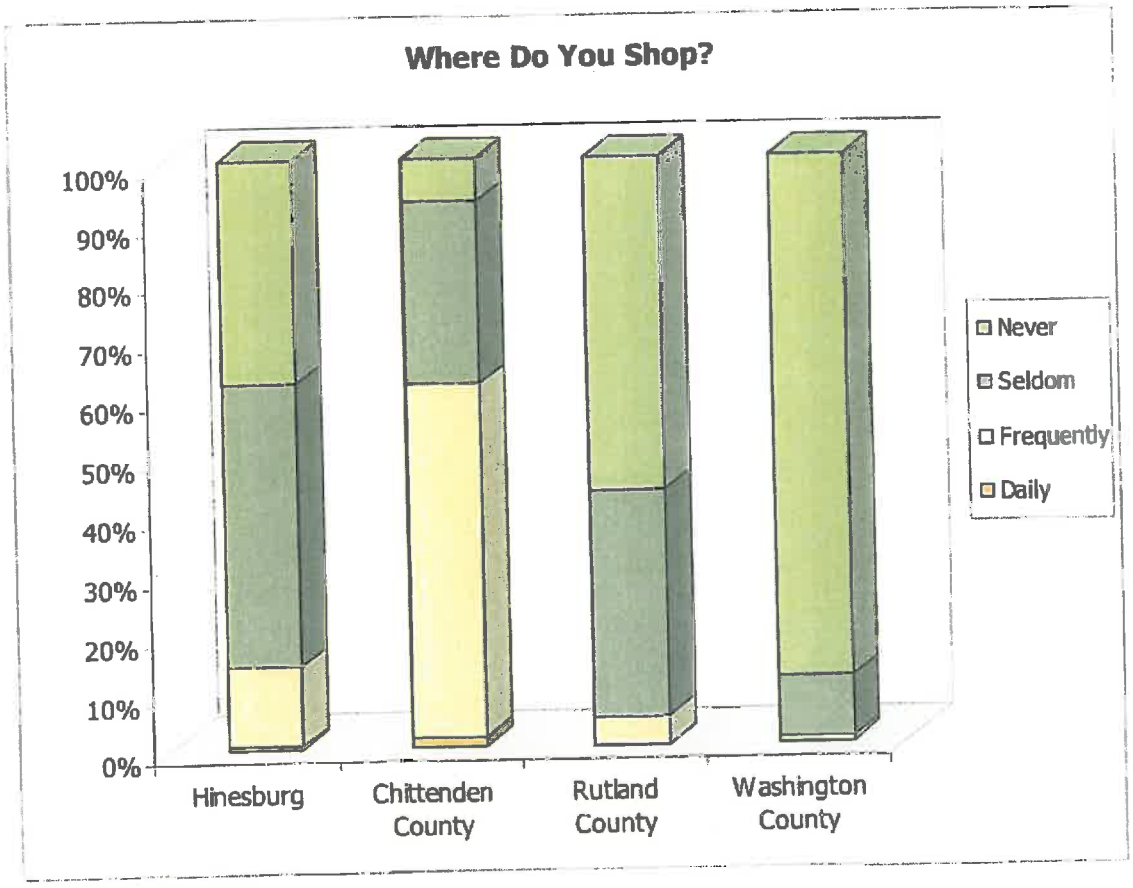
Question 29. Where do you shop?

This question was broken into multiple graphs. The graphs below point out that 89% of respondents shop in Bristol daily or frequently; 64% shop frequently in Middlebury; 79% never shop in Starksboro; 85% seldom or never shop in Vergennes. A breakdown of responses specifically to Bristol can be found in the pie chart below.



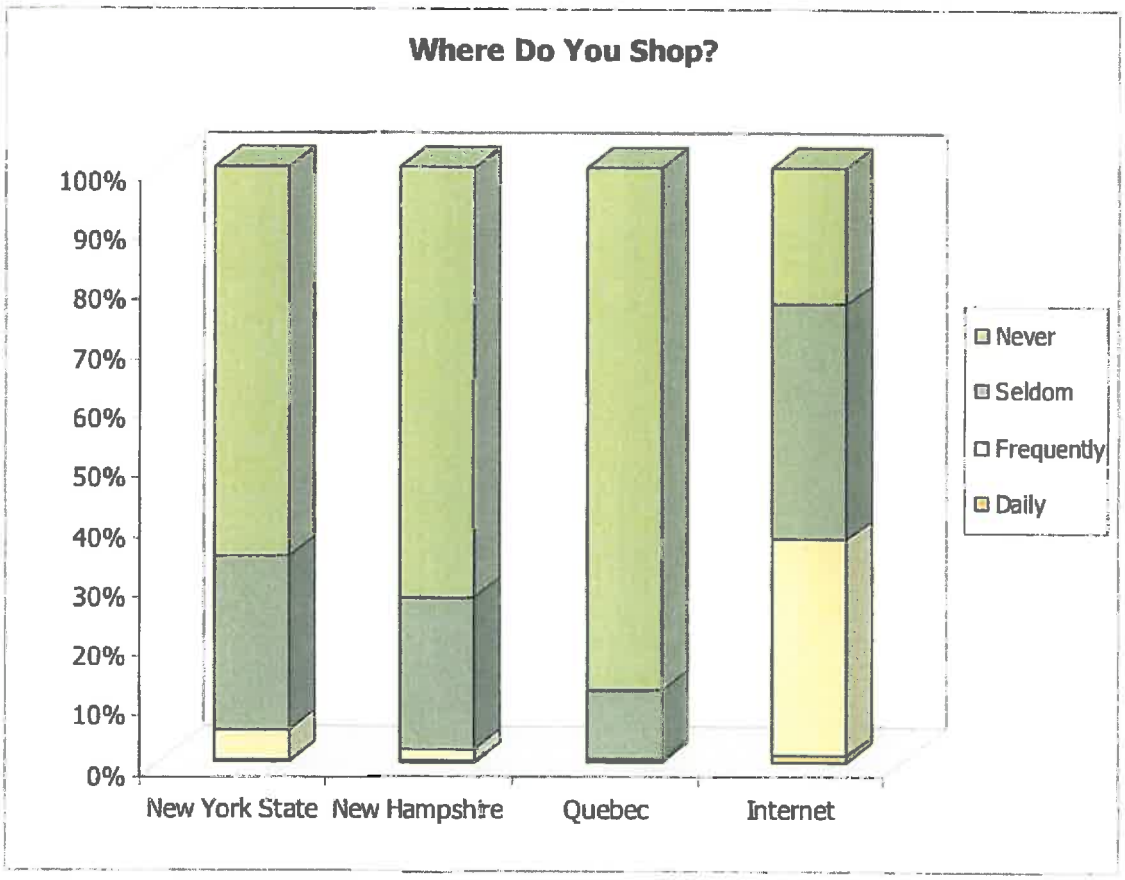
Question 29 continued:

The second graph below shows that 86% of respondents to this question seldom or never shop in Hinesburg; 60% shop frequently in Chittenden County; 95% seldom or never shop in Rutland County; 89% never shop in Washington County.



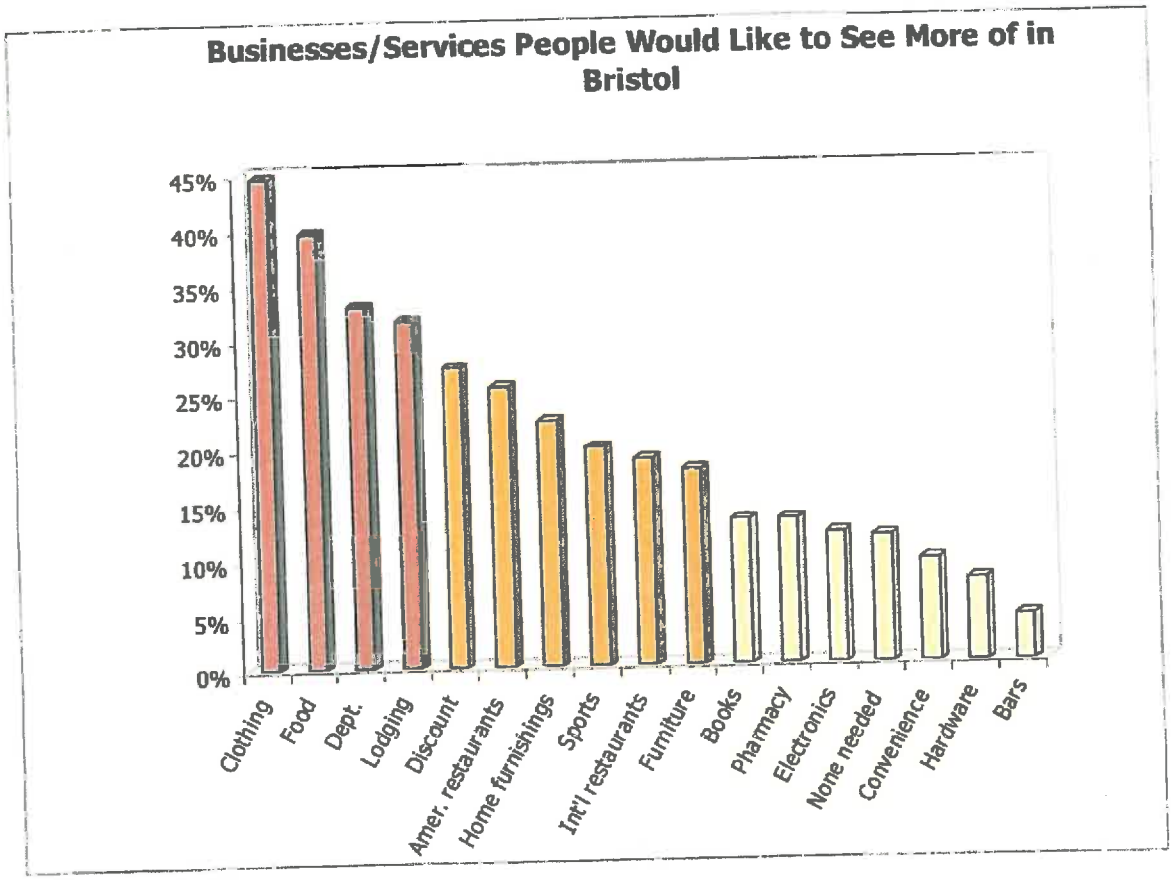
Question 29 continued:

The third series of graphs indicates that 95% of respondents to this question seldom or never shop in New York State; 73% never shop in New Hampshire; 88% never shop in Quebec; a fairly even split between 36% frequently and 40% seldom shop on the internet. There were no responses listed in the *other* space that was provided for this question.



Question 30. Are there types of more businesses or services that you would like to see more of in Bristol? If yes, which?

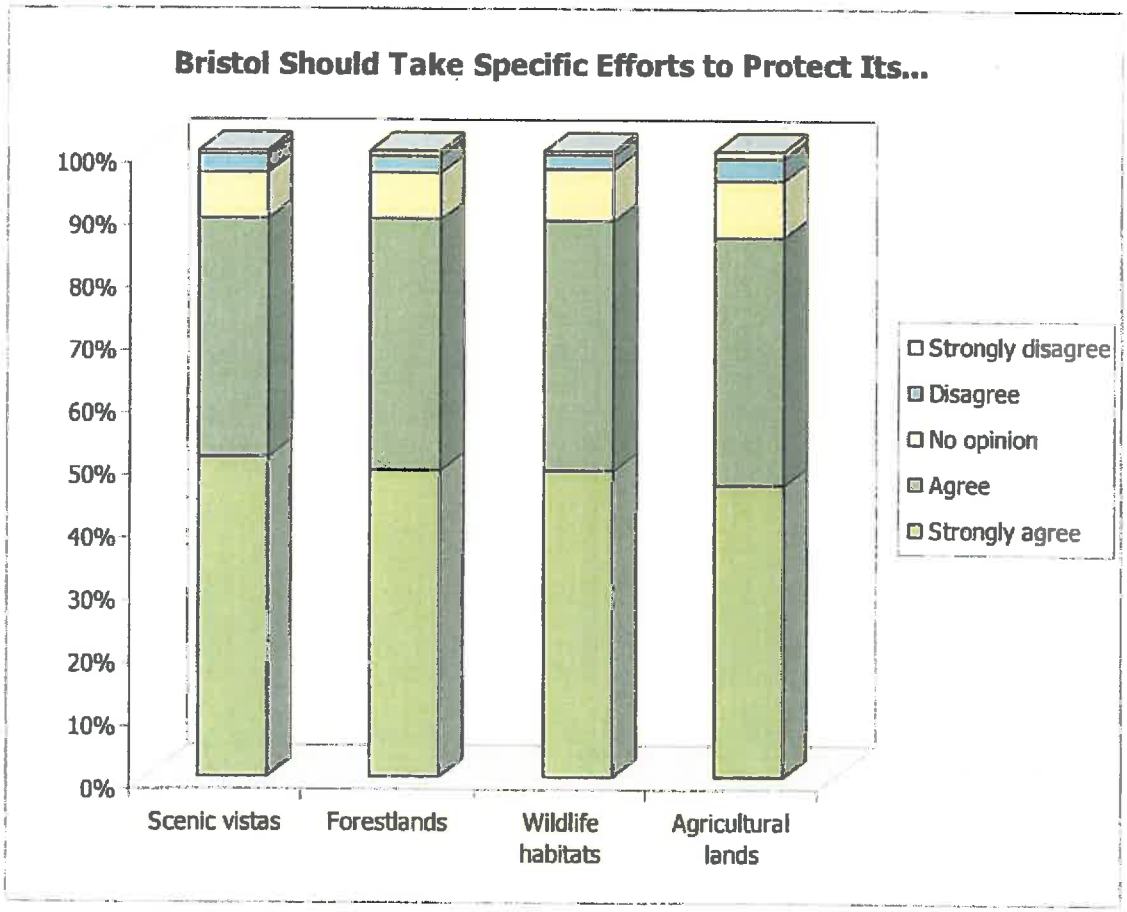
The percentages for this question were taken using all 610 survey participants. The top two businesses or services that people would like to see more of in Bristol are clothing, capturing 45% of total responses, and food/supermarkets/groceries, capturing 40%. Department stores and lodging were also popular responses. The least popular businesses and services include convenience stores, hardware/ building supply stores and bars/nightclubs. There is also a list of additional responses that were mentioned in the *other* space provided which can be found in the data sections.



Question 31. Bristol should take specific efforts to protect its:

- **Scenic vistas**
- **Forestlands**
- **Wildlife habitats**
- **Agricultural lands**

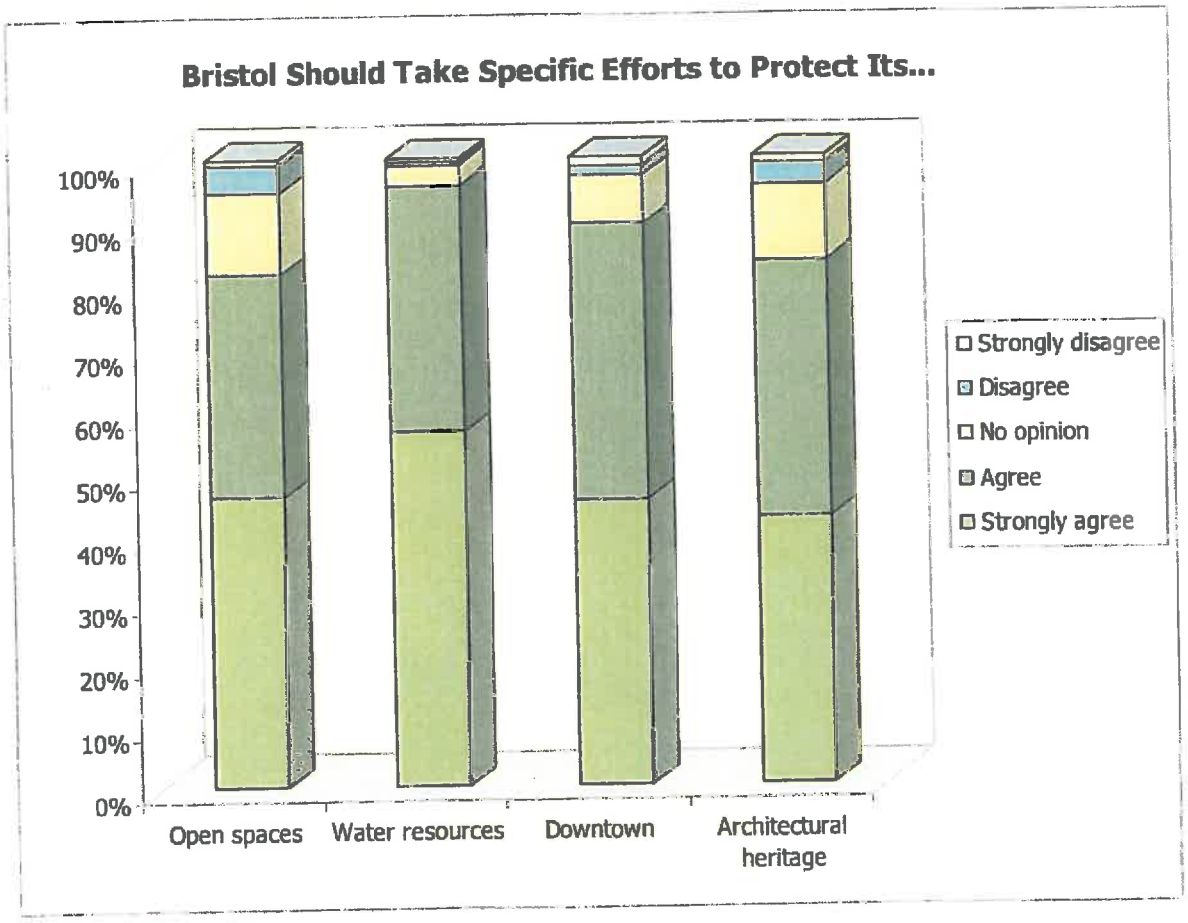
This question was broken into multiple graphs. The first series illustrates that 89% of respondents to this question agree or strongly agree that Bristol should take specific efforts to protect its scenic vistas; 89% agree or strongly agree with protecting forestlands; 89% agree or strongly agree with protecting wildlife habitats; 86% agree or strongly agree with protecting agricultural lands.



Question 31 continued:

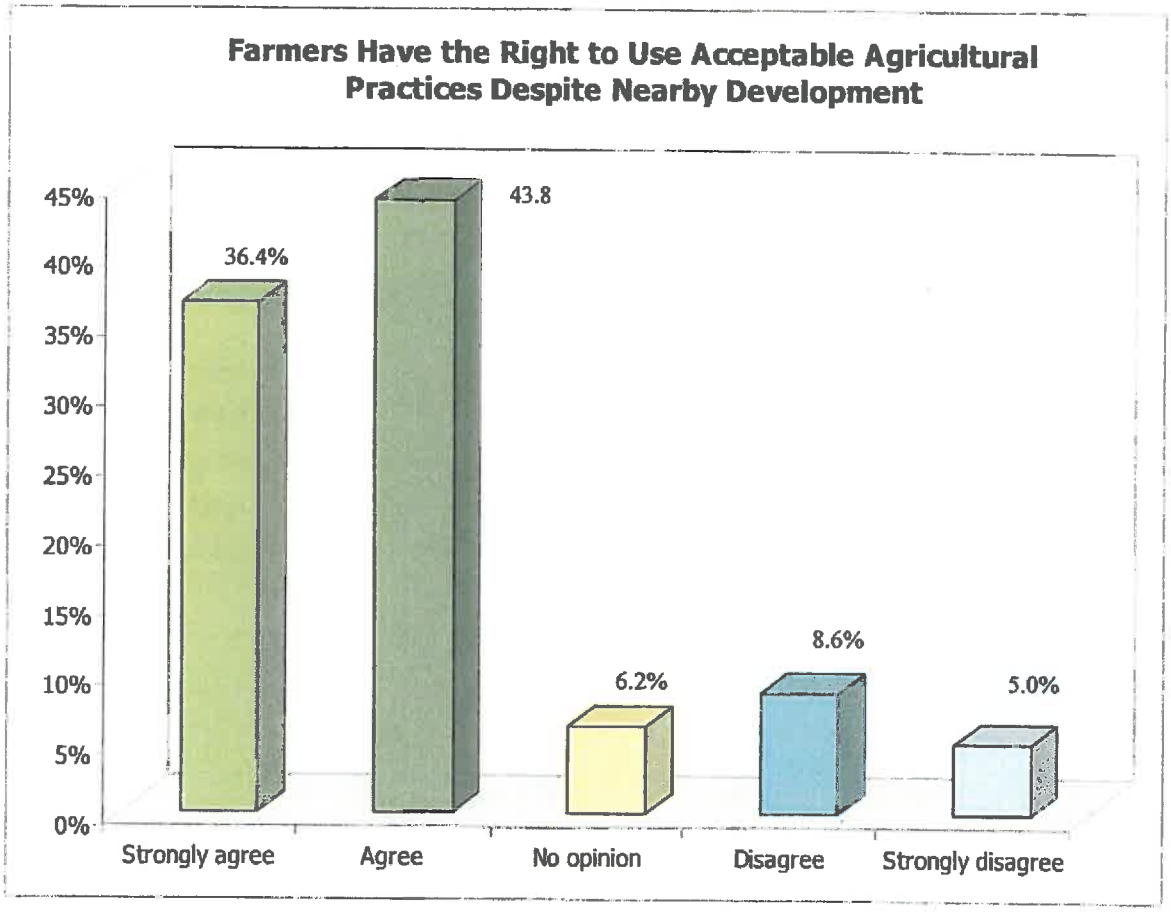
- **Open Spaces**
- **Water resources**
- **Downtown**
- **Architectural heritage**

This section series shows that 82% of respondents to this question agree or strongly agree that Bristol should take specific efforts to protect its open spaces; 96% agree or strongly agree with protecting water resources; 89% agree or strongly agree with protecting Bristol's downtown; 83% agree or strongly agree with protecting its architectural heritage. There is also a list of additional responses that were mentioned in the *other* space provided which can be found in the data sections.



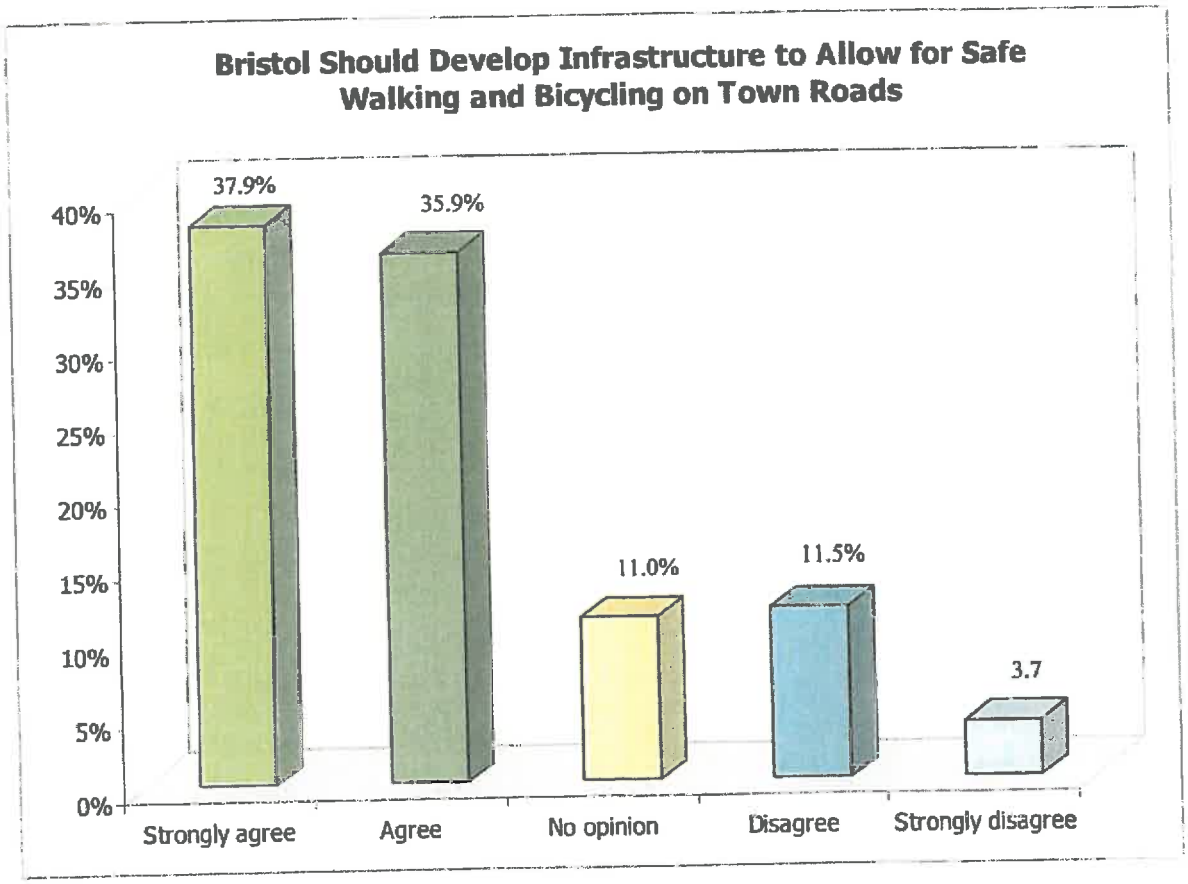
Question 32. Farmers have the right to use acceptable agricultural practices, including those that generate odors and noise, despite the presence of nearby development.

80% of respondents to this question agree and strongly agree that farmers have the right to use acceptable agricultural practices despite the presence of nearby development. These results correlate with the reoccurring theme of agricultural preservation in the results of this survey.



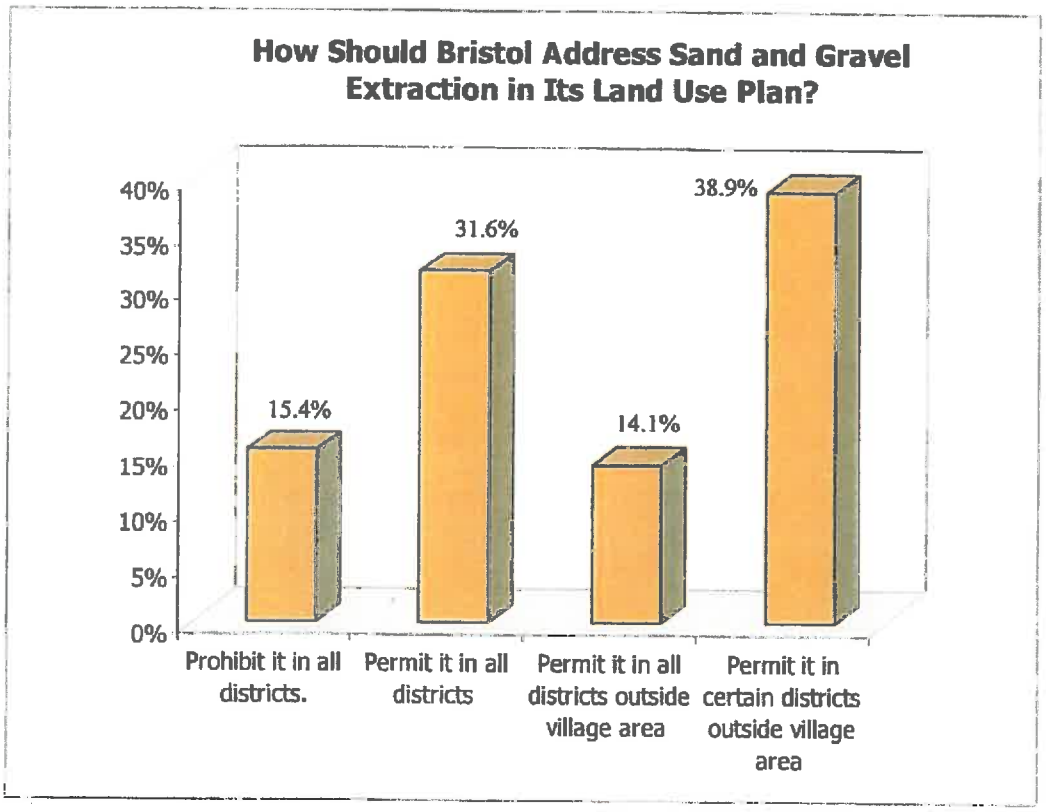
Question 33. Bristol should develop infrastructure so that people can walk and bicycle safely on town roads.

74% of respondents to this question agree and strongly agree that Bristol should develop infrastructure so that people can walk and bicycle safely on town roads. These results correlate well with the results of question #15a, which show the road not being big enough for both cars and bikes as the third biggest problem created by recreation in Bristol.



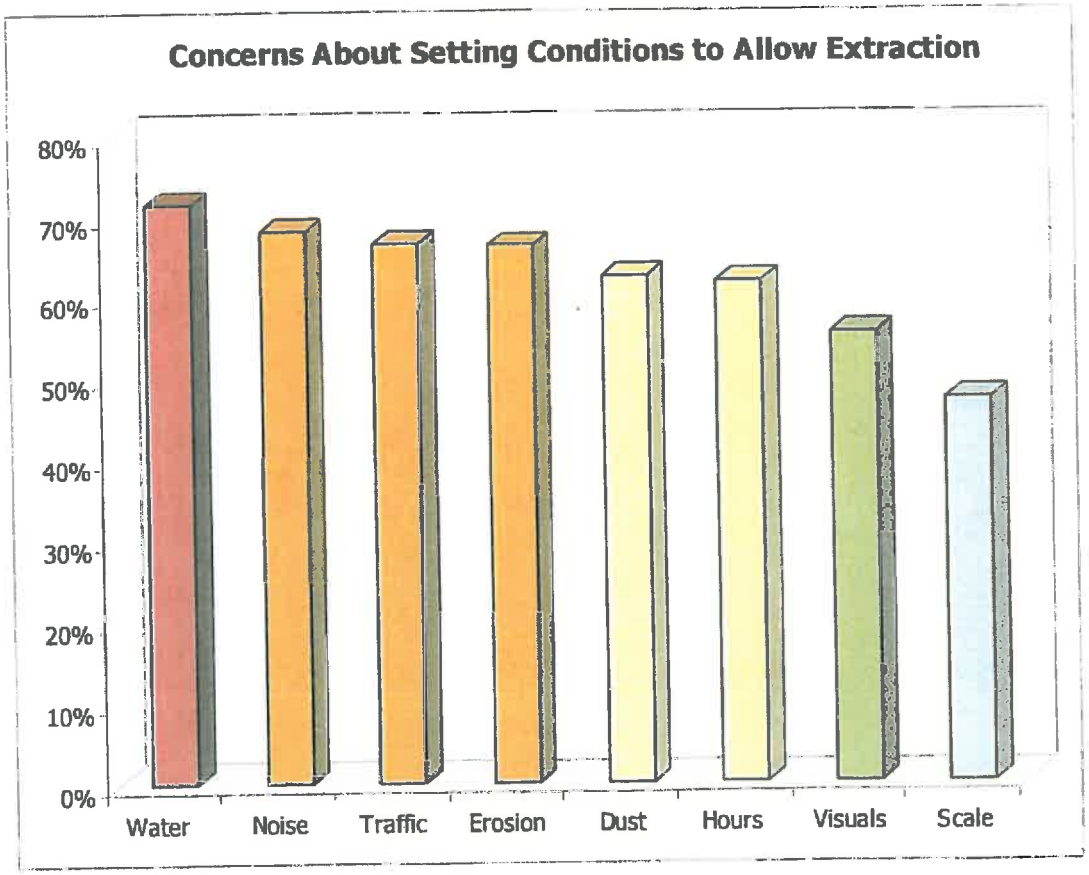
Question 34. Bristol contains significant deposits of sand and gravel. Much of the resources lies within close proximity to the village area. How should Bristol address sand and gravel extraction in its Land Use Plan?

85% of respondents to this question agree that commercial sand and gravel extraction should be permitted. Of that majority, 39% believe it should be permitted in certain districts outside of the village area, 32% believe it should be permitted in all districts, and 14% believe it should be permitted in all districts outside of the village area. 15% of respondents to this question believe that Bristol should prohibit commercial sand and gravel extraction in all districts. The issue of extraction was raised in two other questions as well. In #10, 25% of all survey participants agreed that Bristol should expand and utilize sand and gravel resources. In #11, a total of 21 people responded with 'the adverse effects of the gravel pit' as the most important issue or problem facing Bristol in the next 15 – 20 years.



Question 35. In setting conditions to allow extraction, what are you concerned about (choose as many as apply)?

The percentages for this question were taken from all 610 survey participants. 72% of all respondents are concerned about the water quality impacts of sand and gravel extraction. This high level of concern over water correlates with the results of question #31, which shows water resources as the top response when asked what Bristol should take specific efforts to protect. 68% are also concerned about the noise created by extraction, which correlates with the results of #26 that show the amount of noise as the top condition that should be placed businesses located in residential areas. 67% are concerned about truck traffic; 66% about erosion; 63% about dust; 62% about hours of operation; 55% about visual impacts; and 47% about scale.

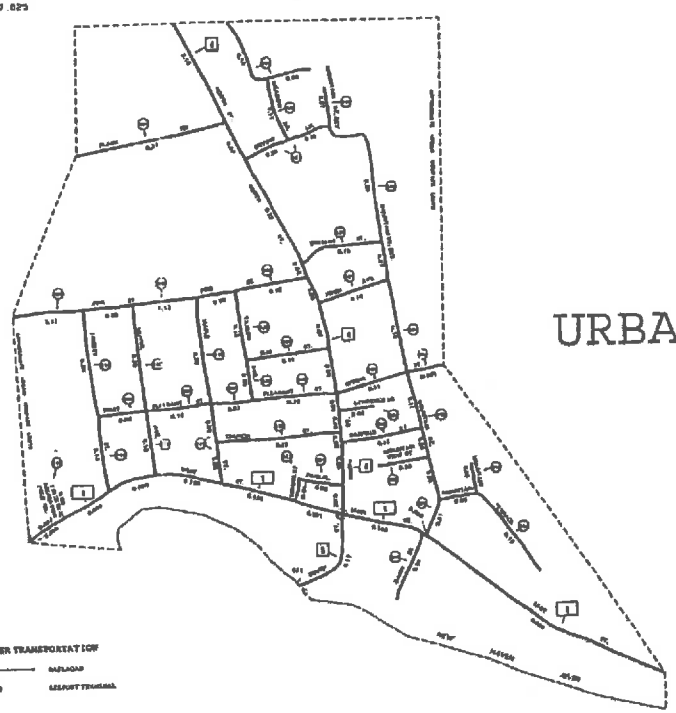


Appendix Y

TOWN HWY NO.	LENGTH IN MILES CLASS 3	CLASS 4
300	0.270	
302	0.530	
304	0.150	
306	0.200	
308	0.230	
310	0.230	
312	0.060	
314	0.240	
316	0.320	
318	0.360	
320	0.200	
322	0.040	
324	0.080	
325	0.110	
326	0.150	
327	0.150	
328	0.140	
330	0.130	(0.050)
332	0.070	
334	0.150	
336	0.100	
338	0.790	
339	0.070	
340	0.100	
342	0.240	
344	0.050	
346	0.210	
TOTAL	5.490	0.050

MILEAGE SUMMARY

CLASS 1 TOWN HIGHWAYS:			
NO. 1	1.225		
TOTAL CLASS 1 TOWN HWYS		1.225	
CLASS 2 TOWN HIGHWAYS:			
NO. 4	0.930		
NO. 5	0.180		
TOTAL CLASS 2 TOWN HWYS.		1.110	
CLASS 3 TOWN HIGHWAYS:			
TOTAL CLASS 3 TOWN HWYS		5.490	
TOTAL TOWN HWYS.			7.825
STATE HIGHWAYS:			
INTERSTATE RAMPS	0.000		
TOTAL INTERSTATE HWYS.		0.000	
TOTAL NON-INTERSTATE HWYS		0.000	
TOTAL STATE HWYS			0.000
TOTAL TRAVELLED HWYS., FEB. 10, 2004 (EXCLUDES CLASS 4 MILEAGE)			7.825



VERMONT
GENERAL HIGHWAY MAP

URBAN COMPACT OF BRISTOL

PREPARED BY THE
VERMONT AGENCY OF TRANSPORTATION
PROGRAM DEVELOPMENT DIVISION
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE 1:9000

FEET

HIGHWAYS

ROAD SURFACE TYPES

NATURAL FEATURES

POLITICAL SUBDIVISIONS

OTHER TRANSPORTATION

MISCELLANEOUS

DISCLAIMER

Highway and bridge data by Vermont Agency of Transportation, Division of Program Development. All other data from Vermont Center for Geographic Information.

Appendix Z

Bristol Conservation Commission
2/7/2007

NATURAL RESOURCES PLAN

This introduces the features and habitats that continue to support the beauty and growth of the Town of Bristol: Our natural communities and their environments; the substances of earth and water; and the natural palette from which Bristol has been painted.

A. TOPOGRAPHY

The landscape of Bristol originated approximately 450 million years ago when the forces of plate tectonics created the foundations of the Green Mountains and the Champlain Valley. The carvings of glacial ice masses 18,000 to 10,000 years ago and more recent physical and chemical erosion has refined our topography and created the current Bristol landscape. The terrain of Bristol is generally recognized as mountains and river valleys in the east and gently rolling knolls and fields in the west, both instrumental in the development of the community as it exists today.

The fertile farmland found in the low-lying portions of Bristol has supported our local dairy industry for generations. Located predominantly in the western third of the Town, lacustrine and marine silts and clays deposited from the ancient Champlain Sea have provided excellent agricultural soils from which Bristol and surrounding towns have benefited. The pore structure of these materials enables enhanced retention of nutrients and water, enhancing crop growth. Bedrock in these low-lying areas is predominantly dolomite, which is mildly susceptible to physical and chemical weathering.

The prominent ridgeline running from the north to the south of the town is composed of the Hogback Mountain in the north and South and Elephant Mountains in the south. In many places, receding glaciers have exposed the Cheshire quartzite bedrock, which is largely resistant to erosion. This is most apparent on the western side of South Mountain and on the western and southern sides of the Hogback Mountains, known as the Bristol Ledges and Deer Leap, respectively. In many locations, this rock face rising out of the Champlain Valley is so steep that vegetation cannot maintain a foothold, and occasional rockslides occur. These are readily visible as a different color to the cliff surface, with huge mounds of talus at the toes of the cliffs. Quartzite foothills are also found in the northwest section of Bristol around the former Vergennes Waterworks. The highest point in Bristol is atop South Mountain, with an elevation of 2,325 feet.

The most prominent surface waters in Bristol are Winona Lake (also known as Bristol Pond) and the New Haven River, both of which afford excellent recreation opportunities and provide essential habitats for a variety of plant and animal species. The lowest point in Bristol is where the New Haven River enters the Town of New Haven to the west at approximately 328 feet.

The New Haven River carves one of the several valleys that run through the mountainous eastern section of Bristol. The other major river valleys are Baldwin Creek along the State Route 17 corridor toward South Starksboro, and the Notch Brook flowing out of the Green Mountain National Forest through the gap between South and Elephant Mountains. Much of the Town's historic development has occurred along the New Haven River and in the relatively level terrain

on the western side of Bristol. This was due to the primacy that mills and agriculture once had in the economic vitality of Bristol. As global economics change and modern construction techniques and four-wheel drive vehicle technology have advanced, Bristol's steeper terrain is more easily accessible for development. This development poses several environmental risks including increased storm water runoff, erosion, and stream sedimentation. It is important that both slope and soil information be used to evaluate erosion potential and development difficulty of individual sites.

Additionally, the elevation of hillside and steep slope development increases its visibility from numerous areas throughout the Town. Because our higher elevations compose the backdrop for our more scenic vistas, this type of development should be reviewed for visual as well as environmental impacts. These visual impacts could include: bulk; lighting; and context with the surrounding area.

The Town of Bristol holds several tracts of contiguous, natural land. The two largest are the Green Mountain National Forest, which comprises a great deal of both South and Elephant Mountains, and the Hogback Mountain ridge. The Watershed Center in the northwestern section of town is also minimally interrupted by development. These areas afford superb wildlife habitat and allow larger species such as deer and bear to migrate more freely.

Opportunities and assets provided by our topographic features:

- Scenic vistas from outlooks and pastoral views of fields and streams.
- Wildlife movement and habitat, including Peregrine Falcon nesting on cliff faces.
- Outdoor recreation: hiking trails, swimming holes, and fishing and hunting.
- The potential for siting wind energy facilities and communication towers.

Ref. Appendix 1: USGS Topographic Map of the Town of Bristol
Ref. Appendix 2: Surficial Material and Bedrock Geology of Bristol (VT Geological Survey)

B. SOILS AND SURFICIAL MATERIAL

In addition to providing a base for our local flora, our soil is valuable as an agricultural asset and as a natural filter for rainwater, runoff, and wastewater systems. The soils of Bristol are quite varied due to both the wide differences in terrain and the effects of glaciation. As the glaciers receded approximately 10,000 years ago, bedrock on the ridgelines was left exposed and a vast amount of till was deposited in their wake, with post-glacial lakes and flooding responsible for the deposition of various silts and clays.

Approximately half of Bristol consists of soil types of "Rock", "Very Rocky Complex" and "Extremely Stony Loams". Development in these areas is problematic due to the impermeability of bedrock or limited depth to bedrock, slow permeability and steep slope. Much of this area is set aside as conservation land to maintain water quality, or is part of the Green Mountain National Forest; however there are segments that are privately owned where development should be restricted.

The large area around Bristol Pond, as well as the area west of Vermont Route116 and north of Vermont Route17 consists of muck and peat. This is very hydric, and harbors a wide range of

wetland species. These are rated at Class II wetlands, and are protected by the State of Vermont and the Federal Government.

Along the main north-south corridor on the western side of the town, more or less bordering Monkton Road, Hardscrabble Road, Burpee Road, North Street and Vermont Route116, and including the village area, can be found a mixture of soil types:

- Gravelly sandy loams and loamy fine sands which are well suited for development due to rapid-to-moderate permeability;
- Stony, very fine sandy, and fine sandy loams that are moderately suited;
- Other stony and silt loams that are marginally suited.

Mixed in are some small areas with soil types that are marginally-to-unsuitable for development with soil types of silt, very fine sandy, silt loams, and very heavy clays. It is important to note that this area has the most productive farmland, and has the highest concentration of important farmland soils identified with ratings as prime, statewide and local by the USDA National Resource Conservation Service.

The northwestern section of the town west of Lower Hardscrabble Road has some scattered areas with loamy fine sand, sandy loams and stony loams that are well-to-moderately suited for farming and development.

The northeast section of the town east of Vermont Route 116 and north of Vermont Route17 has a large mixture of loamy, gravelly and sandy soils – all of which are well-to-moderately suited for development. There are also areas with steep slopes having stony loams, rocky complex and rocky soils that are marginally-to-unsuitable.

The northeast section of the town east of Vermont Route116, south of Vermont Route17, and north of the New Haven River has mostly rock complex and stony loams, unsuited for any development. However, there are some areas along Briggs Hill Road with well-suited gravelly sandy loams.

Ref. Appendix 3: Bristol Onsite Septic Suitability Map of Bristol (ACRPC).
Ref. Appendix 4: USDA Soil Survey map of Bristol - two sections as examples (USDA).
Ref. Appendix 5: Map Unit Legend to identify the soil type codes on the USDA Soil Survey maps.
Ref. Appendix 6: Addison County ancillary soil ratings for residential on-site waste disposal (USDA).
Ref. Appendix 7: Hydric Soils Map for Bristol (USDA).
Ref. Appendix 8: Parent Material Map for Bristol (primary substance from which soils are formed (USDA).
Ref. Appendix 9: Important Farmland Soils Rating (USDA).
Ref. Appendix 10: Explanation of a soil catena key (USDA).
Ref. Appendix 11: Soil catena key chart (USDA).

MINERAL RESOURCES

Kame terrace deposits, comprised of sand, cobble and gravel, were deposited throughout the village of Bristol along the eastern spine of the Green Mountains during the retreat of glaciers over some 10,000 years ago. 225 years ago the village of Bristol was established on this level plain of the delta/kame deposits. Gravel is the main subsoil component throughout the village of Bristol. These highly valued gravel deposits are typically non-cohesive with moderate to highly erodable characteristics. Gravel is valued for its use in construction and road maintenance. Most of the village of Bristol residential septic systems benefits from the easily percable soils by allowing conventional septic systems.

There are several active and inactive gravel extraction pits in the town of Bristol listed by the Addison County regional Planning Commission (Stony Hill off VT 116/17 and off Burpee Road). Today gravel extraction is at peak importance. It may pose some social and environmental impacts as well. The potential for the decrease in ground water recharge, increased stream erosion, decreased water quality, soil erosion, dust, noise and increased truck traffic are just a few of the potential negative impacts created from commercial extraction of sand and gravel.

Ref. Appendix 12: Sand and Gravel Resources of Bristol (VT Geological Survey)

C. GROUND WATER

Ground water can be found almost anywhere in Bristol in both shallow and deep aquifers consisting of fractured or porous rock and various sediments. The vast majority of Bristol residents obtain their potable water from ground water aquifers, including the residents of the village area, where water from the municipal distribution system is ultimately drawn from a ground water source on the north slope of South Mountain.

In addition to supplying potable water to residents of the Town, ground water is often responsible for adding water to our ponds and rivers; especially in times of drought. In this capacity, ground water aids in supporting the ecosystems and biodiversity of our lands and helps maintain the natural beauty of Bristol.

There are several bands of moderate to good ground water potential. These areas include the Route 116 corridor, the village area of Bristol, the valley formed by Beaver Brook and Baldwin Creek, the New Haven River and its floodplain, and the valley area at the southwestern extent of Vermont Route 116 through Bristol. These areas could potentially have ground water yields sufficient for municipal or industrial uses due to the thick deposits of coarse grained, stratified glacial drift such as kame terrace and stream alluvium. As surficial material becomes thinner or more finely grained, ground water potential decreases. The majority of the Town has ground water potential suitable only for residential use due to the deposition of more fine-grained glacial drift (silts and clays), swamp deposits, or exposed hardpan till or bedrock ledge.

Preserving ground water quality is a difficult task. The major threats to ground water are rooted in human development, but the best places for community expansion are close to the sources we depend on for potable water. Additionally, activities that used to be common practice such as

pouring out used motor oil or household chemicals onto the ground, while decreasing in frequency, continue to occur.

Threats to Ground Water:

- Fertilizer and Pesticide Infiltration
- Landfill / Septic Leachate
- Leaking Underground Storage Tanks
- Accidental or Intentional Release of Hazardous Material to the Environment
- Aquifer Recharge Area Disruption
- Depletion through Overuse

Ref. Appendix 13: Ground Water Potential of Bristol (VT Geological Survey)

D. SURFACE WATER

Bristol surface waters enter three watersheds. The New Haven River is the largest with Baldwin Creek and Notch Brook being major tributaries. Lands east of the Hogback Mountains and all the area south of the village area drain into Otter Creek via the New Haven. Much of this watershed, including most of Notch Brook, is in the Green Mountain National Forest. Lewis Creek receives the water from the north central part of town between the Hogback ridge to the east and the hills west of Monkton Road. Little Otter Creek drainage extends into the northwest corner of Bristol.

Each of these watersheds have established non-profit local groups dedicated to conservation, including the New Haven River Anglers Association, Lewis Creek Association, the Watershed Center and River Watch. Federal, state, municipal and these citizen groups should continue close cooperation and communication on matters of common interest.

Bristol still waters outside the National Forest include Bristol Pond (Lake Winona), Vergennes Waterworks and a nearby unnamed pond labeled Bristol NW. Bristol Pond is widely known for its bass and pike fishery and attacks local as well as out of state anglers to the Vermont Fish and Wildlife access at the north end.

All of these waters are state class B. Two class A2 (drinking water) designated flows are not currently used for that purpose. They are two small tributaries to the Little Otter near the old Vergennes Waterworks and an upper reach of Notch Brook.

The New Haven River and Bristol's groundwater are closely linked. Hydrogeologic studies have shown the volume of flow to diminish above the village area to be re-established by the springs from above and below South Street Bridge. Natural filtering and cooling of the water results from the thick gravel deposits on both sides of the river. Good wild trout habitat has been well documented repeatedly by Vermont F&W.

However the habitat for vertebrate and invertebrate species in Bristol's surface waters faces challenges from highway, commercial and residential development somewhat under our control. Loss of riparian vegetation and permeable surfaces result in sediments, toxins and pollutants entering the waters more readily. Cooling shade is lost as the channels become wide and shallow with resulting bank erosion and flooding potential as well as warming and loss of habitat.

In addition to traditional enforced setbacks for construction near surface waters newer approaches are evolving. An ongoing geomorphic assessment extending 3.1 miles from the Hewitt Road bridge over the New Haven River to the New Haven town line downstream is in Phase II of study as part of an aquatic ecosystem restoration program. At completion a Fluvial Erosion Hazard Area Overlay District could be superimposed over other zoning districts. This would put in place a scientifically validated system to prevent fluvial erosion from uncontrolled development with its resulting loss of property and habitat. So, since the river and watershed have historically and periodically changed their course and caused flooding, these events need to be taken into account in future planning in the riparian areas.

The Vermont Statutes Title 10: Conservation and Development
Chapter 47: WATER POLLUTION CONTROL
10 V.S.A. 1253. Classification of waters designated, reclassification

(a) The waters of all lakes, ponds and reservoirs, natural or artificial, used exclusively for public water supply prior to July 1, 1971, and all waters flowing into such lakes, ponds and reservoirs, and all waters located above 2500 feet altitude, National Geodetic Vertical Datum, are designated Class A waters and shall be maintained as such unless reclassified.

(b) The remaining waters except as otherwise classified by the board prior to July 1, 1971, are designated Class B waters and shall be maintained as such unless reclassified. All waters designated as Class C waters prior to July 1, 1992, are designated Class B waters and shall be maintained as such unless reclassified.

Ref. Appendix 14: Flood Frequency Map for Bristol (ACRPC)

Future needs for an improved form of sewage treatment for the downtown area will likely put pressure to re-designate classifications for portions of the New Haven River, and some conflicting interests are anticipated.

E. WETLANDS

Many significant Class II wetlands, as defined in the Vermont Wetlands Inventory, can be found in Bristol:

- Lake Winona (Bristol Pond) and the surrounding area. This area includes a significant Northern White Cedar Swamp and a Black Spruce Woodland Bog, and various marshes that harbor many diverse species of plants and animals. Several threatened and endangered species find refuge in Bristol's largest wetland.
- The area west of Vermont Route116, east of Hogback Mountain and north of Vermont Route17. The lower part drains into Baldwin Creek and the New Haven River, and the far northern part flows north in Lewis Creek. This is mostly marshland with some Northern White Cedar Swamp and Bog.

- Much of the area in The Watershed Center where the Norton Brook flows into the Little Otter Creek in the northwest part of the town, including the Old Vergennes Watershed pond and the marshes flowing out from it.
- The area around Sycamore Park where Notch Brook joins the New Haven River near the junctions of Rte 116, New Haven River Road and Carlstrom Road. This includes a rare Sugar Maple-Ostrich Fern Riverine Floodplain Forest, and River Gravel Shore and diverse marshlands.

Many other smaller areas dispersed throughout the town that show on the Vermont Significant Wetlands Inventory Map available from the ACRPC.

Ref. Appendix 15: Vermont Significant Wetlands Inventory Map for Bristol (VT Agency of Natural Resources)

F. WOODLANDS AND VEGETATION

Bristol has a wide variety of vegetation and woodlands. The forest component is largely in the eastern half of the town. The largest segment is the Green Mountain National Forest, which includes the 3,738 acre Bristol Cliffs Wilderness in the southeastern part of the town. This area, along with other adjacent forestland, provides Bristol with a large area of contiguous forest, which provides useful habitat. The other forests are private property with modest acreage in town ownership. The farm component is largely in the western and northern areas of the town. The trend is toward larger farms. Some farms are diversifying to organic vegetables, beef, gravel or other products. Some other farm owners are retiring and developing the land into housing as they have no one interested in continuing to farm. As the land can be the primary asset of the family, subdividing for homes may be the most readily available alternative for providing the funds needed for the family to retire. Any regulatory approach to controlling development will need to consider the financial effects on these landowners.

The Bristol community recognizes and appreciates the value of working lands to the regional farm and forest products economy and to the local and regional community's ability to conserve and provide stewardship for its natural heritage of fish, wildlife, plants, forests, ecological systems and the many public values associated with working lands. Therefore, the town will explore all reasonable and feasible opportunities to support all those lands that meet any of the following criteria:

(i) Lands enrolled in the Vermont Current use program
(ii) Lands owned by those willing to consider the sale and application of a conservation easement
(iii) Lands managed in accordance with a forest management plan that has been reviewed and approved by a professional forester or other appropriate and related professional
(iv) Lands owned by persons willing to consider other not-regulatory mechanisms that promote sustainable forest management or seek otherwise to conserve the lands.

It is important to conserve agricultural lands, including forestlands, for future needs. These lands will help ensure the continued rural nature of Bristol and the surrounding area and help maintain one of the most attractive aspects of where we live, as well as the variety of jobs that are available. The Town should use all available tools to protect agriculture as a viable use of land, and to ensure that agricultural land will be available in the future: zoning regulations;

requirements for use of clustering in residential, commercial, or industrial developments; tax abatement, stabilization, or "current-use" tax policies; and cooperative efforts with land trusts or similar organizations will all help achieve this goal. Landowners should be encouraged to consider carefully all options available to them, including the long-term ramifications for, when considering these issues.

Some issues that are important to the agricultural community are:

> Gaining access to land over their neighboring landowners property. People with an urban background understand less about the realities of the working landscape and resist the idea that passing across their land might be an important public benefit.
>
> People with little exposure to rural working lands can experience difficulty with the working practices common to working lands. Town government and community members can help educate people about the necessities of agricultural production and help reduce conflicts between homeowners and farm and forest owners.

G. NATURAL COMMUNITIES

Bristol is home to a variety of natural ecosystems, including rivers, ponds, bogs, vernal pools, mountain ridges, cliffs, talus slopes, and many varieties of forest communities. A VT Fish and Wildlife database of significant biological areas shows 15 types of natural communities (9 forest community types) in Bristol.

The Bristol Cliffs area, includes northern hardwoods talus forest, dry oak-hickory-hop hornbeam forest, red spruce-white pine forest, hemlock forest, and red pine forest. Other notable features of Bristol Cliffs are its open talus slope (largest in Vermont), unique cold-air community at the base of the slope, Cheshire quartzite cliffs, and nesting Peregrine falcons (they also nest at Deer Leap and Elephant Mountain).

The spine and western slope of Hogback Mountain throughout its entire north-south reach in Bristol, is an area of contiguous habitat and corridors for bear, deer (including deer wintering areas), and smaller mammals. East and Southeast of Bristol Cliffs are North Gilmore Ponds, with their surrounding dwarf shrub bog communities. North of the talus slope is a vernal woodland pool. Other areas of note include Bristol Cobble, near the southwest corner, with its temperate calcareous cliff, lower Bristol Notch road (site of the Jefferson salamander sighting), and Rocky Dale ledges.

The main biologically significant area in Bristol's lower elevations is Bristol Pond (Lake Winona). Its high-density fish population includes northern pike (to at least 30 inches), pickerel, small-mouth bass, perch, panfish, catfish and crappie. Many rare (to Vermont) plant species grow in the surrounding peatlands and marsh. Osprey have nested there since 1992. Also notable are The Watershed Center (the old Vergennes Waterworks) and cedar swamp (home to the eastern black ratsnake), and Hardscrabble Hills, site of a second vernal pool.

Currently, there is no comprehensive compilation of Bristol mammal or bird populations. However, a reptile and amphibian database shows 24 species, including 3 species of turtle, 6 of snake, 6 of salamanders, 8 of frogs and toads. Four of these species are rare or uncommon in

Vermont: the timber rattler, black ratsnake, northern watersnake, and Jefferson Salamander (no recent sightings). Fish species (besides the above listed) include brook, rainbow and brown trout (with some native populations of all three), found chiefly in the New Haven River and its tributaries.

Ref. Appendix 16: Biologically Significant Areas of Bristol (ACRPC)

I. GOALS

- Preserve and enhance Bristol's natural resources for current and future generations.

- Encourage the Bristol community to be aware of the current state of these resources and to take an active role in their future care.

J. ACTIONS

1. Enact land use regulations that are compatible with the town's unique topographical features (i.e.ridgelines, valleys and wetlands) and with existing uses (i.e. farming and forestlands). Establish stringent zoning regulations to control siting of energy and/or communication facilities along ridgeline areas.

2. Discourage development in those areas of the town that have soil type ratings that are marginally-to-not well suited for residential on-site waste disposal, as mapped by the USDA Natural Resource Conservation Service, and work to preserve those areas where the soil is rated as prime, statewide and local for agriculture by the USDA.

3. Develop clear and concise land use regulations and ordinances that address the impacts of mineral resource extraction. Require thorough ecological and environmental review of any commercial extraction, and require incorporation of mitigation measures.

4. Adopt policies to protect ground water in order to:
   - Assure that development doesn't adversely affect the quality of the water used by residents.
   - Incorporate into subdivision regulations and commercial permit requirements the identification of threats to groundwater, and assure that adequate remediation methods are used to ensure both shallow and deep aquifer protection.
   - Assure that Bristol works closely with neighboring towns to conserve this precious resource, because ground water does migrate across town lines.

5. Discourage development in all areas likely to flood and support the designation of a fluvial hazard erosion overlay district as specified in Section E, and enforce setbacks and buffers near riparian corridors and other surface to control pollution in order to protect vertebrate and invertebrate species and to prevent erosion.

6. Require that all development near Class II Wetlands is reviewed in accordance with The Vermont Wetland Rules issued by the Dept. of Environmental Conservation that specify a buffer zone of 50 ft., and any activity within that area requires a conditional use determination, ascertained by ANR staff, before any development project can be considered.

7. Conservation of agricultural and forest lands should be encouraged for future needs and to ensure the continued rural nature of Bristol and the surrounding area. This can be accomplished through zoning regulations; clustering in residential, commercial, or industrial developments; tax abatement, stabilization, or "current-use" tax policies; and cooperative efforts with land trusts or similar organizations.

8. Maintain Bristol's diversity of natural communities through wise stewardship, protection and sustainable management of its important resources. Develop a management plan to minimize introduction of invasive species and to protect natural communities in town-owned properties and encourage the same for private lands.

9. Acknowledge the positive attitude of property owners who have allowed public access to or across their property, encourage continuance of such access, and obtain public access easements from property owners who are willing.

10. Work with adjacent towns to develop recreation trails that links towns and enhances access to our forests and valleys, and research locations of ancient highways and develop trails along them.

11. Work closely with other local non-profit groups dedicated to conservation, including the New Haven River Anglers Association, Lewis Creek Association, the Watershed Center and River Watch, as well as Federal, state, municipal agencies on matters of common interest.

12. Evaluate opportunities to obtain additional town-owned and privately held open space areas by cooperating with local and regional land trusts as well as adjacent towns.

13. Zoning regulations should incorporate open space requirements into subdivision regulations by donating a percentage of acreage for open space, either as town park area within the subdivision or a conservation easement to protect wetlands, forestlands, scenic areas or other natural features.

K. APPENDIX

1. USGS Topographic Map of the Town of Bristol

2. Surficial Material and Bedrock Geology of Bristol (VT Geological Survey)

3. Bristol Onsite Septic Suitability Map of Bristol (ACRPC)

4. USDA Soil Survey map of Bristol - two sections as examples (USDA)

5. Map Unit Legend to identify the soil type codes on the USDA Soil Survey maps

6. Addison County ancillary soil ratings for residential on-site waste disposal (USDA)

7. Hydric Soils Map of Bristol (USDA)

8. Parent Material Map for Bristol (the primary substance from which soils are formed) (USDA)

9. Important Farmland Soils Rating (USDA)

10. Explanation of a soil catena key (USDA)

11. Soil catena key chart (USDA)

12. Sand and Gravel Resources of Bristol (VT Geological Survey)

13. Ground Water Potential of Bristol (VT Geological Survey)

14. Flood Frequency Map of Bristol (ACRPC)

15. Vermont Significant Wetlands Inventory Map of Bristol (ACRPC)

16. Biologically Significant Areas of Bristol (ACRPC)