Evaluation of Community Viz Software
As a tool for Planning Boards

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Introduction

Community Viz is an extension to ArcGIS desktop software that facilitates the visualization and comparison of alternate development scenarios. There are two components to Community Viz. The first is called Scenario 360, which is the map and data analysis portion of the software. It augments the usual spatial data development and map viewing use of ArcGIS with the dynamic formula and charting aspects of a spreadsheet. The second is called Sitebuilder 3D, which is a tool that can construct three dimensional, virtual models of buildings, roads, landscapes and even entire communities – allowing planners to visualize proposed developments within the context of its surroundings.

There's been a fair amount of talk about Community Viz among some planners in New Hampshire but to this point in time, not any actual local use of it that we are aware. RPC wanted a chance to evaluate the software for the potential benefit of our communities and to gain some experience in its use. We wanted to 'pilot' the use of the application using one or more current development proposals to test both its effectiveness as a development evaluation tool, and the practicality of applying Community Viz in this way on a routine basis.

With limited funding for this effort, we determined to test only the Scenario 360 portion of Community Viz. We felt that any application produced with this component would be more easily replicable and therefore, more useful to land use boards, in the long run. Additionally, the Sitebuilder 3D portion appears to require more set-up time per development proposal to achieve a realistic effect. Scenario 360 could make use of existing GIS datasets of natural resource layers and could potentially reveal more about the impacts of proposed developments.

This report discusses our first attempt to use Scenario 360 to set up an application that would report a set of development impacts associated with a sample development to a planning board. The application is actually a Scenario 360 'Analysis' that could be used for any property with the proper input files and assumption input pertaining to the subject development. The analysis looks at the current conditions of the subject property and the development impacts of up to three alternate development scenarios for the property.

How Community Viz Scenario 360 works

Key Terms

The following are a few key terms that must be known in order to get a clear understanding of the software.

Analysis, a Scenario 360 project that contains the ArcMap mxd file and all the dynamic datasets, charts and reports used in the project.

Scenario, an alternative development instance; contains a map data frame and a distinct version of all dynamic data layers, reference data layers, indicators and assumptions that pertain to a possible development plan.

Assumption, numeric or logical (true/false) values that are user input. These are the variables of the analysis which may differ for each scenario and that may be changed during analysis.

Indicator, numeric or logical impact or performance measures that are created by writing formulas using one or more assumptions, dynamic attributes or built-in spatial relationship functions. Indicators can be presented in chart or tabular format and are the 'results' of the analysis.

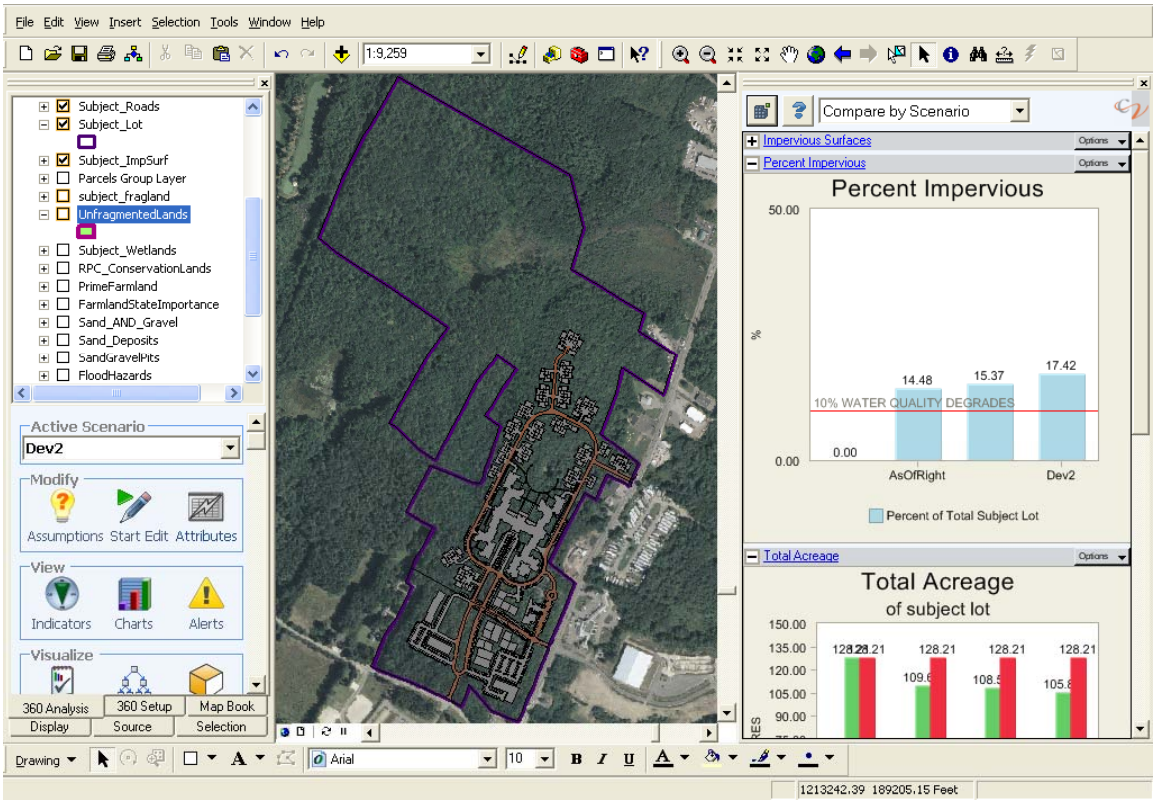
Dynamic Attribute, are numeric attributes that can be added to a data layer's feature attribute table. These are similar to indicators because they are created by writing a formula to produce their result. They are dynamic in that if their related assumptions or other formula inputs are changed, they may change. They are used by Indicator formulas.

Functionality Described

Scenario 360 adds the functionality of a spreadsheet to ArcMap. This is achieved primarily with the ability to add dynamic attributes to GIS layers in your analysis. These dynamic attributes are akin to a calculated field in a spreadsheet that can change values as referenced input values may change. The values of the dynamic attributes are actually controlled by user written formulas. Formulas may be written to supply the result of a mathematical expression involving any other attribute field within the analysis, or with any of the other indicators or assumptions. Formulas can also involve spatial relationships of mapped data layers, such as the area of overlap shared between different map layers.

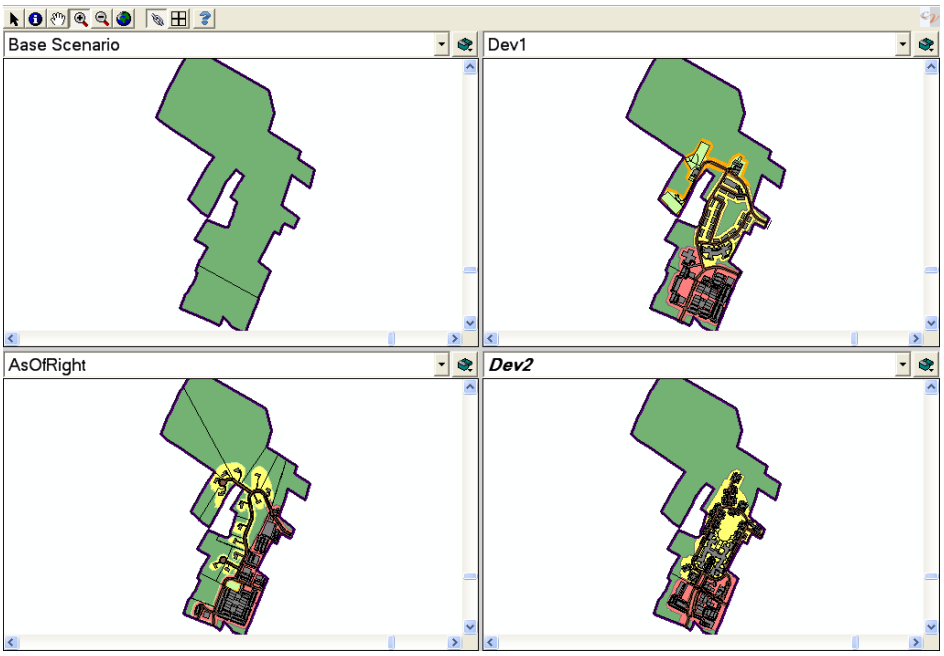
Each scenario has its own ArcMap data frame. All data frames will have the same map layers in them, but will have different *versions* of the specific alternative scenario data. An example of this would be the roads in different versions of a proposed subdivision. The roads layer would be the same exact feature class for each scenario, but would have an attribute called 'scenario' which would be used by definition query in each scenario data frame to only display those features pertaining to that specific scenario.

Data layers with dynamic attributes in them are housed within a geodatabase administered by Community Viz. Layers that are not dynamic are called 'reference layers.' They don't contain dynamic attributes but they can be used for visualizing the scenario on the map, and their attributes and spatial characteristics can be used in dynamic attribute or indicator formulas. Examples of reference layers could be aquifers or floodplains.



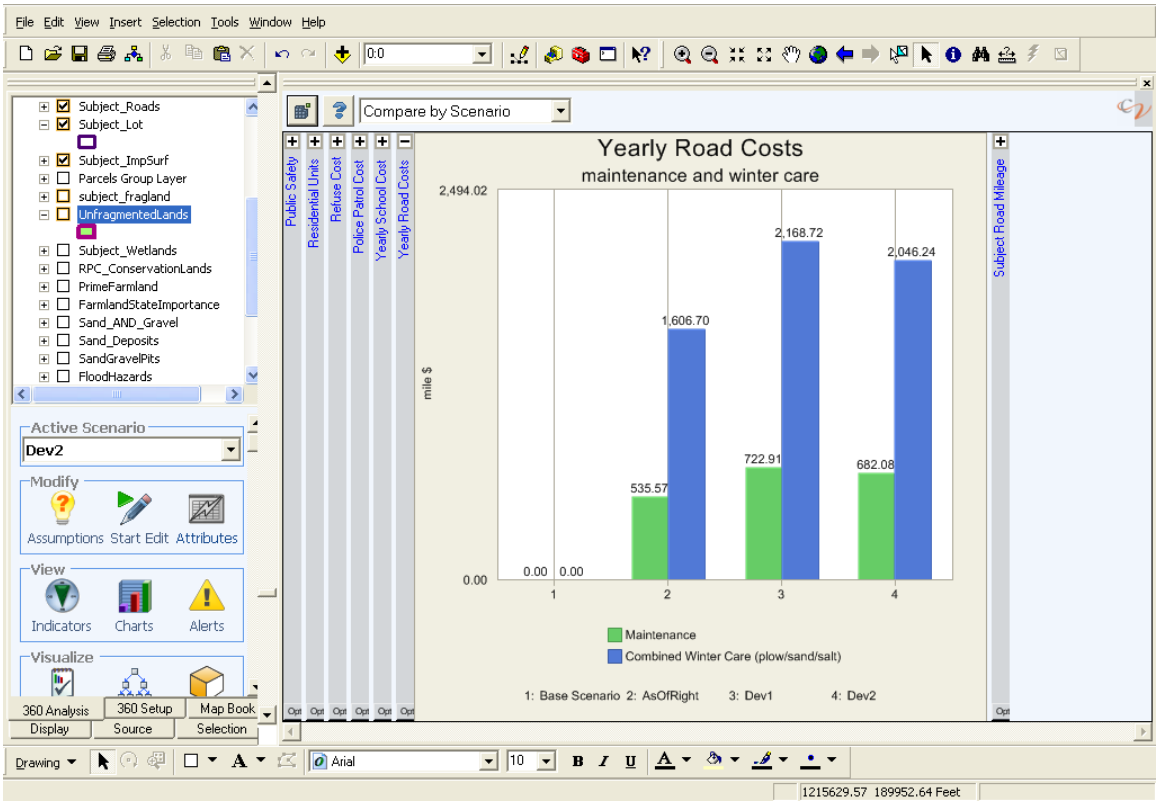
Scenario 360

Scenario 360 also provides great visualization tools. A very useful component of Scenario 360 is the 'Compare Scenarios' presentation tool. This opens a window frame with a panel for each scenario map. The maps are linked to enable simultaneous pan/zoom capability on all scenarios. The software automatically matches each data layer added to any of the scenario frames to all others. It also matches the view state of all layers. If you turn on a layer in the activated data frame, it will be matched in all other scenario data frames. Because of this, the Compare Scenarios tool can show comparison more quickly.



Compare Scenarios

Perhaps the most used visualization tool in Scenario 360 is the interactive chart control. Any indicator or assumption can be put into a chart. Charts can be made in bar, line, point, pie or doughnut format. The bar format is generally favorable over the others because when you change your assumptions and/or indicator values, bar charts will display a hatch area to show the difference, or delta between the new and old values. This could be particularly useful in an interactive presentation where you may be changing assumptions or the spatial dimensions of an input layer. Charts may be viewed per scenario or, better still, in 'Compare by Scenario' format, in which all charted values from each scenario is presented side by side in the same chart.



Charts View

Methodology

Selection of the Sample Community

RPC selected the Town of Greenland as the pilot community for this project. The town planning board has frequent interactions with RPC Regional planner David West through the RPC circuit rider planning program. Additionally, the Greenland Planning Board was facing a major development proposal for which there existed alternate proposals already devised by the developer.

Selection of the Sample Development Proposal

We had an easy choice in our sample development proposal. The Greenland Planning Board had recently been introduced to a proposed development containing a mix of commercial, residential and recreational development. The developer showed the planning board plans for the property, which were evidently digitally produced, so we thought we might be able to acquire the digital files for use with Scenario 360. The developer also had two alternative development scenarios already mapped out. The first plan was called the 'As of

Right' plan, which showed zoning compliant commercial and single-family residential development. The second plan was that of a 'senior village' having a commercial retail facility and a senior housing collection of buildings and some recreational playing fields to be made open to the public. Later in the project a third plan came forth for a larger senior housing facility having 300 residential units. All three plans were provided in CAD drawing format by the developer for our use, which was extremely helpful and made a big difference in the practicality of this effort.

One drawback to our sample development was that it was only partially in the Town of Greenland. The subject property is located along US Highway Route 1 and is partly in Greenland and partly in the Town of Rye. The subject property is approximately 130 acres with only approximately 18 acres in Greenland. This presented somewhat of a problem because some of our indicators were to rely on town specific assumptions. So for the purposes of our evaluation, we simply pretended that the entire development was within Greenland. Although with additional work, it is actually possible to divide the development by town and then input town specific values for all assumptions. But to keep it realistic, our application was to deal with a development for one planning board at a time.

We also wanted to test at least one other recent development proposal within Greenland but we were unable to obtain the necessary digital CAD files from developers. We also had enough data development with the three development scenarios for our standing sample property that we decided against further pursuance of a second sample development.

Selection of the Sample Indicators

The following were general ideas for indicators that we decided to address in this project. These were seen as information that could be derived from available inputs. These are by no means the comprehensive list of things that communities would want to know or that could be examined using Scenario 360. They are simply a finite list of practical items that we could extract from input development plans, simple municipal assumptions and existing GIS datasets.

- landuse change
- impervious surfaces
- natural resource impact
- unfragmented lands
- open space arrangement of lot
- water use
- Town budget items

Working with the Planning Board

We went to the planning board to tell them about Community Viz and our idea to test its use with their input. The board was given a short list of potential

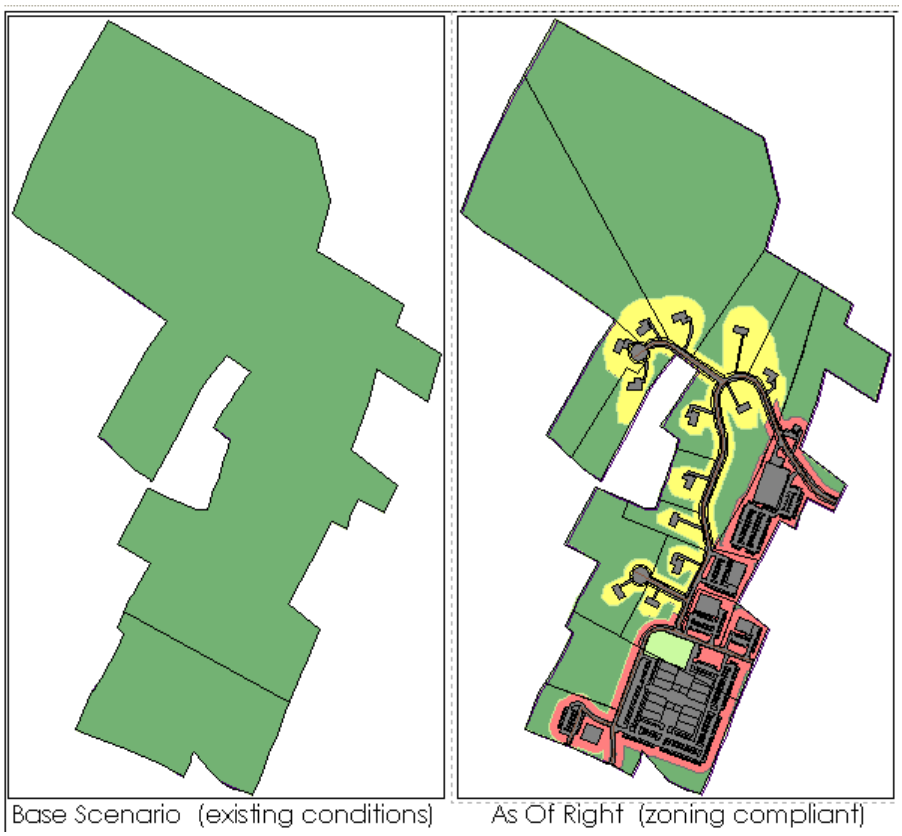
assumptions that would be needed for some of the Town budget items. These included such things as school budget costs, road maintenance costs and the cost of police and fire calls. We also asked the board to let us know of any other things that they may want to determine via Scenario 360. The board asked us to add 'refuse disposal' costs. Unfortunately, the board never was able to pull together the real world assumption values for their town for us, so we had to estimate them ourselves or use arbitrary values. This was not catastrophic to our cause, because all assumptions are easily adjusted in Scenario 360 in case the real values are ever available. It does mean that our pilot study did not deliver true indicator values.

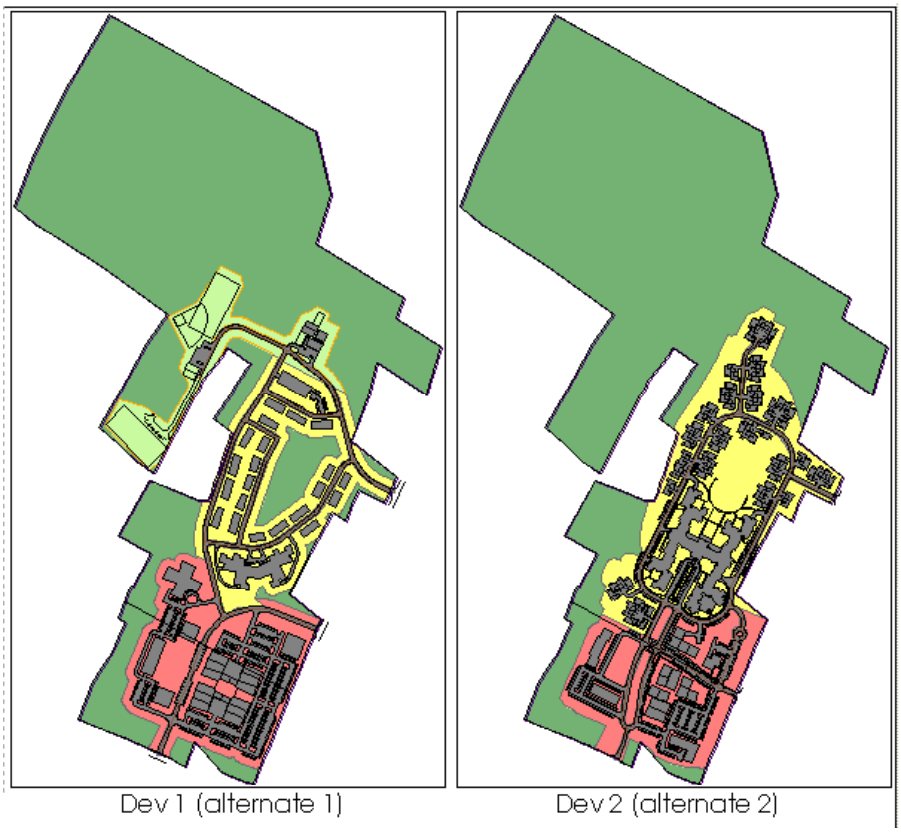
Indicators
1. School Budget (biggest impact on town)
a. Number of new students per new residential unit
i. Need expense per public school pupil
ii. Does town pay anything for private school pupils?
2. Road Costs
a. Additional road miles (in tenths?)
i. Need expense per unit of new roads
1. maintenance
2. snow removal, sanding and salting.
3. Police Calls
a. Additional Police calls
i. Need number of calls per person
ii. Is there a standard ratio for police officers to population or to # of calls? *(Will the development push community into requiring more police officers?)*
iii. Equipment- cost for police cars and other equipment?
4. Fire Calls
a. Additional Fire Calls
i. Need number of calls per person
ii. Is there a standard ratio for firemen to population or to # of calls? *(Will the development push community into requiring more fire personnel?)*
iii. Equipment- cost for fire vehicles and other equipment?
5. Is there an Impact Matrix that the Planning Board considers? No?
6. Are there other costs or impacts that the Town would like us to consider?
From Greenland PB:
Refuse Disposal - transfoer station

Questions for the Planning Board

Analysis Arrangement

The analysis was arranged into four different scenarios. The first of which is the 'Base scenario', which reflects the current conditions of undeveloped forested land. The 'AsOfRight' scenario covers what is permitted by zoning: commercial retail facilities; 13 single-family homes; and recreational playing fields. The third scenario is called 'Dev1' and represents a mixed retail and 'Senior Village' residential arrangement. The final scenario is called 'Dev2' and is a mix of retail and a major elderly housing facility.


Base Scenario (existing conditions)
As Of Right (zoning compliant)


Dev 1 (alternate 1)
Dev 2 (alternate 2)

Data Development

Dynamic Layers

The main data development effort for the project was the creation of the input layers of the different potential development scenarios. These were as follows:
Subject Lot - polygon
Subject Lot lines - line
Impervious Surfaces - polygon
Landuse - polygon
Subject Roads - Line

The subject lot, lot lines and impervious surfaces were created from the conversion of the CAD files that were obtained from the developer. I should mention here that not all the CAD files were georeferenced, which therefore had to be done before use. CAD layers within files are not always easily decipherable and work needed to be done to extract the pertinent layers for creating the impervious surfaces layer. Additionally, the impervious surfaces layer needed to be made as a polygon layer, but at least the outlines for buildings and pavement CAD layers provided a starting place for creating our data.

The landuse polygon layer was created from interpretation of the original hardcopy plan that was given to the planning board.

Subject roads were created as centerlines primarily to be able to provide an indicator for mileage of roads affecting the Town budget.

There had to be four versions of each of these layers, one per scenario. I determined it best to create all input layers as separate shapefiles before bringing into the analysis. Since all of these input layers needed to contain dynamic attributes they needed to be imported to Scenario 360 and sorted into the proper scenario. Dynamic layers used in the analysis are sorted by definition query in each scenario data frame to only display those features pertaining to that specific scenario. Without the definition query each layer looks like a disorganized mess. The best way to deal with this is to:

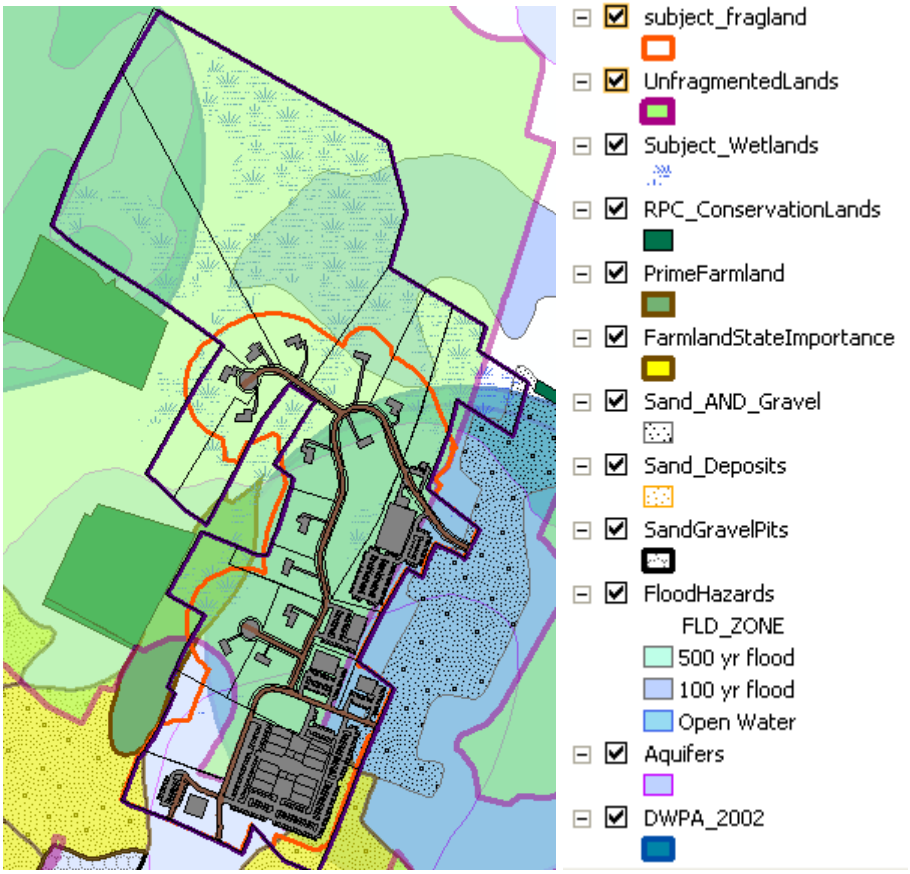
- add one of the shapefile versions into the appropriate scenario data frame
- make the layer dynamic – which copies the source layer into the Community Viz geodatabase and creates a 'scenario' attribute in the feature attribute table and sets the value to the name of the current scenario.
- Copy this layer to the other scenario data frames.
- Edit each layer to add the appropriate features from the original source shapefiles using a cut/paste operation. As the features come in, they will automatically be coded with the proper scenario attribute.

Reference Layers

All layers added to an analysis that do not contain dynamic attributes are called reference layers. You can add all the reference layers you need into the active data frame and Scenario 360 will replicate all the layers into every other data frame. If you fix the symbology in one scenario data frame, it will be reflected in the same layer in the other scenarios.

Reference layers used in our analysis

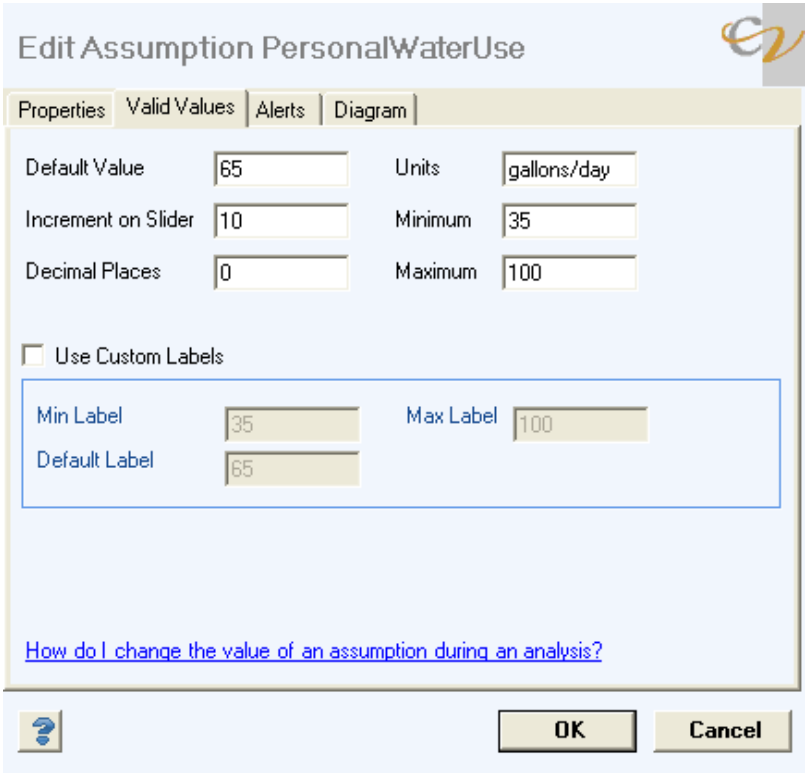
- Subject Wetlands – created from the developer's CAD file
- Conservation Lands
- Prime Farmland
- Farmland Soils of Statewide Importance
- Sand and Gravel Soils
- Sand Soils
- Sand and Gravel Pits
- Flood Hazard Areas (100 year and 500 year)
- Aquifers
- Drinking Water Protection Areas
- 2003 County Orthophoto, Color, 1 meter.



Natural Resource Reference Layers

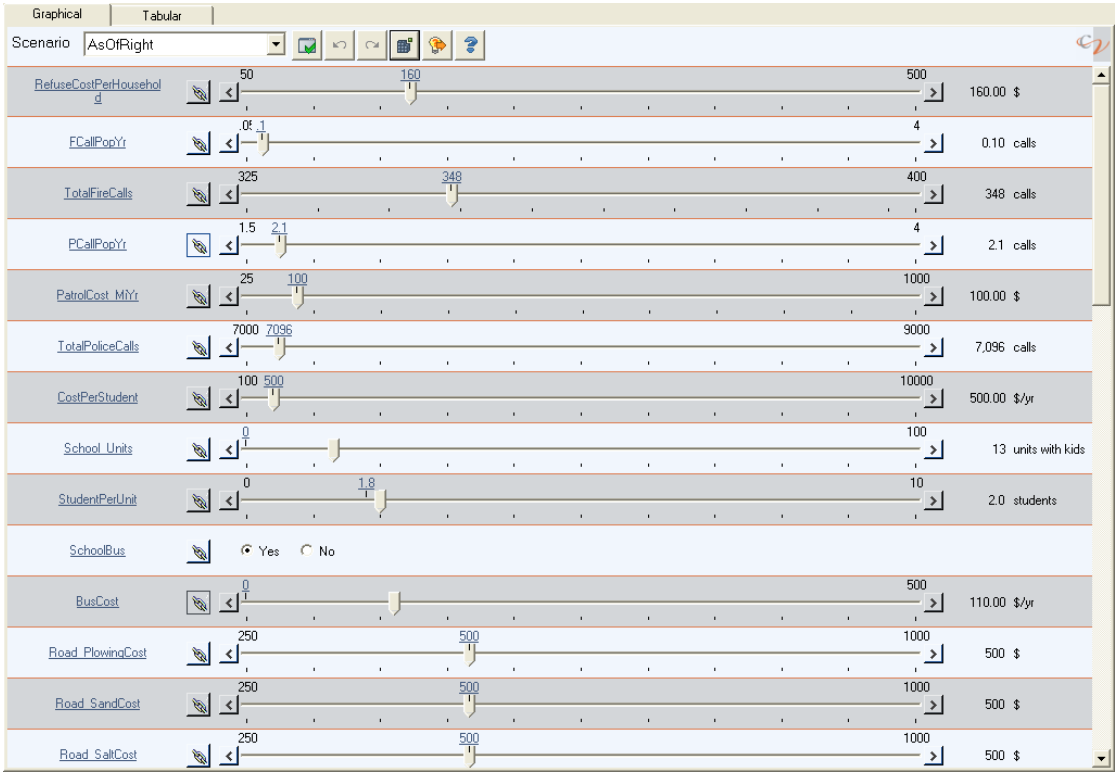
Assumptions

Assumptions are simple to create using the Assumptions management control win the Scenario 360 Setup tab. When a new assumption is started you must give it a name, a category and a type. A category is user-defined and can be used to group assumptions and indicators of similar categories together for ease of viewing or presenting. Type refers to whether the assumption is to be numeric, textual or yes/no.



Defining an Assumption

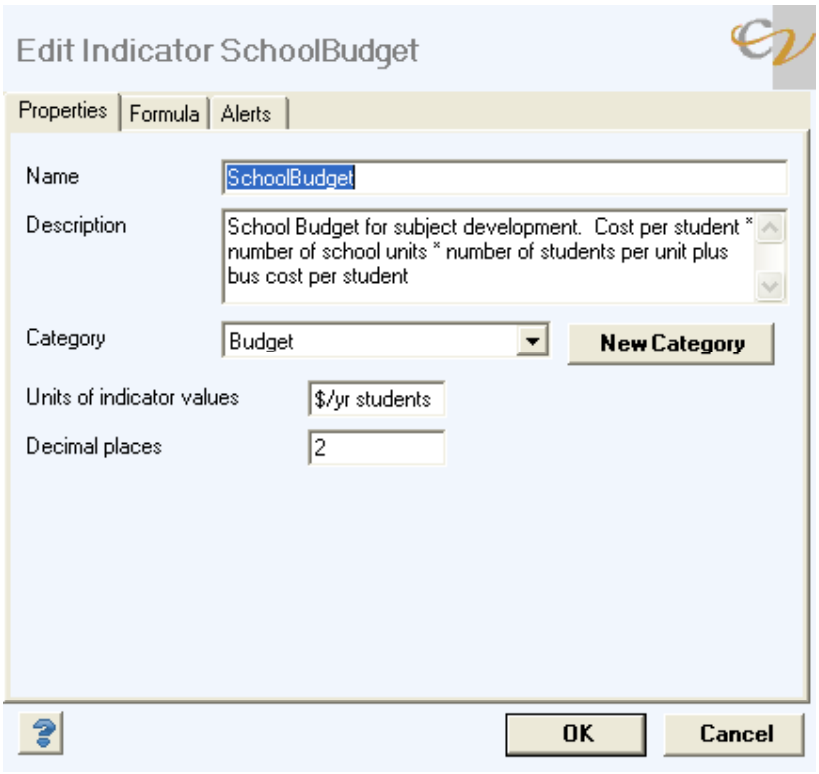
Assumptions are very easy to change, within the range of values that have been defined. You may change the value of an assumption in the default 'slider bar' frame, or in the optional tabular view. I found that the tabular view was preferable for simultaneous viewing of all values of assumptions for each scenario. But changing values is more easily done in the 'slider bar' view. When I tried to edit the values in the tabular view for many assumptions, the input value would not be accepted for some unknown reason.



Assumption values – Slider Bar view

Indicators

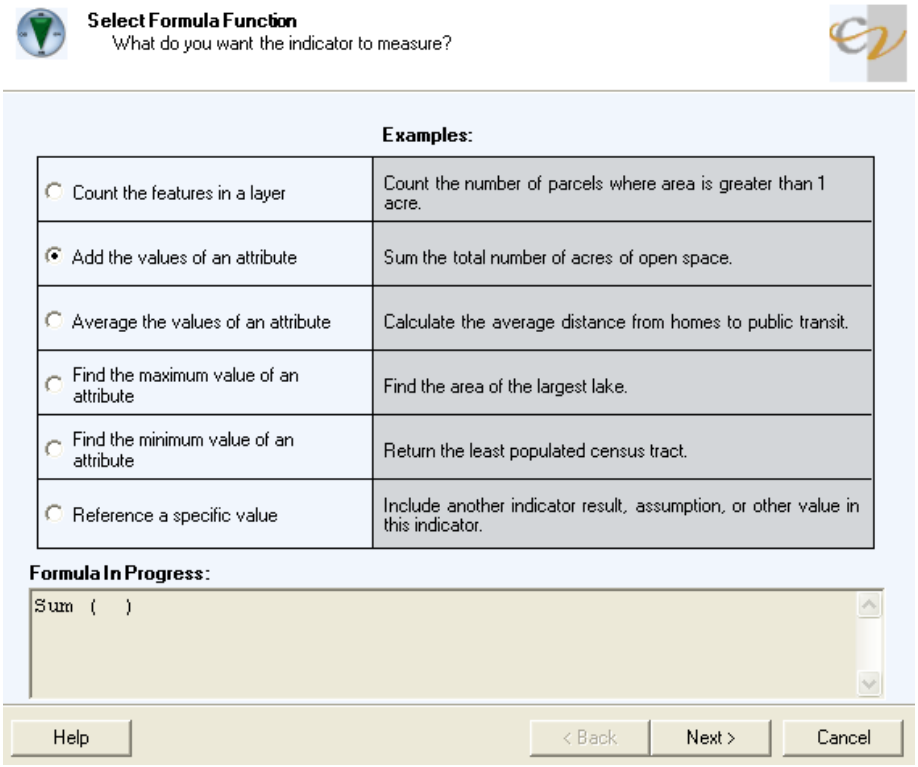
Indicators are more difficult to create than assumptions because they require writing formulas. Indicators are initiated similarly to assumptions and are also managed by user-defined categories. But you must write a formula.



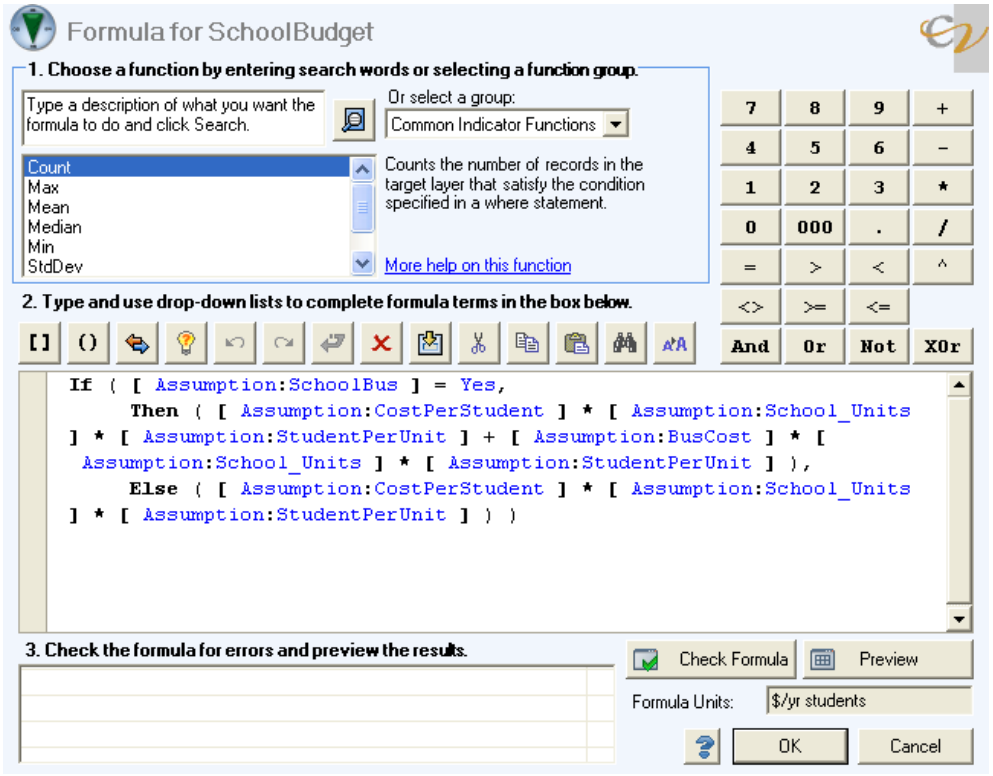
Define Indicator

Writing Formulas

Scenario 360 application development really comes down to writing formulas to produce dynamic attributes and indicators. The formula language is very similar to that of MS-Excel functions. There is a Formula Editor where you compose the formulas. This contains valuable and fairly easy to use tools to facilitate formula creation. There are pick lists for all existing attributes, assumptions and indicators in the analysis and starter expressions for many mathematical, statistical or lookup functions. There is also a very helpful companion Formula Wizard which allows the creation of fairly complex formulas without having to grapple with syntax and bracket hierarchy as you do with the Formula Editor.



Formula Wizard

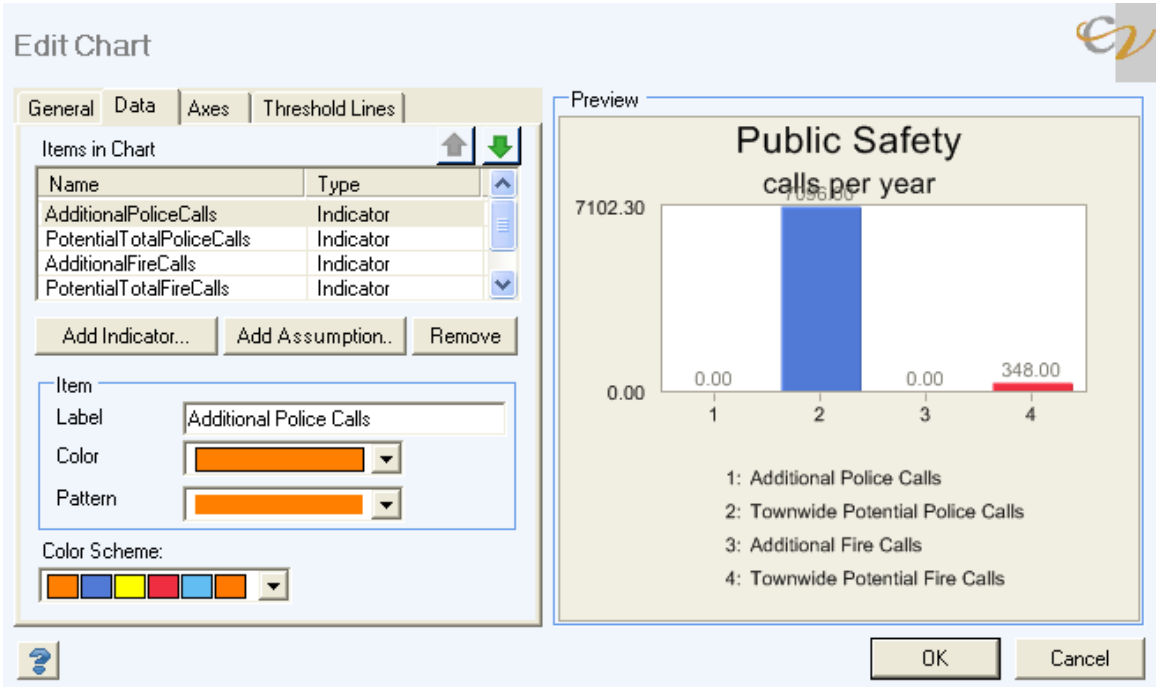


Formula Editor

We won't go into the details of the creation of each indicator within this report. All indicators and their specific formulas can be seen in the Appendix to this document. All the most important indicators are best visualized in charts.

Charts

Charts were created using the chart controls. Any indicator or assumption can be displayed on a chart. In our project, bar charts were most often used. There were also a few pie charts to display percentages. The charts tool will automatically calculate percentage so that it is not necessary to create indicators for percentages.



Saved Views

Scenario 360 allows you to organize assumptions, indicators and charts into 'Saved Views', which can be activated during a presentation. A saved view can contain 360 Analysis window frames of assumptions, indicators and charts. It also can contain 'Compare Scenarios' views. This is especially helpful so you don't have to distress yourself over turning on and off the components that you want to talk about. The software makes automatic saved views for each category that's been created. You can also create a saved view by manually organizing the assumptions, indicators or charts that you wish to show (each component has its own 'organize' button) and then use the Saved Views control to create of saved view of the active components.

Generally, the categories should help you to organize saved views. However, if there is a particular order that you wish to view the charts, you must create a saved view. The category saved view will show the charts (and assumptions and indicators) only in the order in which they were created. Since I wanted to present my charts in a particular order, I opened each category saved view, then reorganized the charts and then created saved views.

Perhaps the best way to present the indicators and assumptions used in our study is to list the final charts. The following lists the charts that we devised, as presented by Saved Views. Printed versions of all charts are also contained in the appendix of this document.

Analysis Charts Summary

Saved View	Category	Chart Name
General	General	Population
Description		
Bar chart with bars for population of the development and population of the town with the development.		
Assumptions		**Indicators**
TownPopulation New_Units PersonsPerUnit		DevelopmentpPop

Saved View	Category	Chart Name
General	General	Population Percentage
Description		
Pie chart showing percentage of new development population to the current population of the town.		
Assumptions		**Indicators**
New_Units PersonsPerUnit TownPopulation		DevelopmentpPop Population

Saved View	Category	Chart Name
Landuse	Landuse	LandUse Acres
Description		
Bar chart with bars for acreage of landuses		
Assumptions		**Indicators**
		Residential Roads Commercial_Industrial Forest Recreational Agriculture

Saved View	Category	Chart Name
Landuse	Landuse	LandUse Percent
Description		
Pie chart showing percentage of different landuses of the subject property		
Assumptions		**Indicators**
		Residential Roads Commercial_Industrial Forest Recreational Agriculture

Saved View	Category	Chart Name
Landuse	Landuse	Developed and Undeveloped Acreage
Description		
Bar chart with bars for acreage of developed and undeveloped landuses		
Assumptions		**Indicators**
		Developed Landuse UnDeveloped Landuse

Saved View	Category	Chart Name
Landuse	Landuse	Developed Land Percent
Description		
Pie chart showing percentage of developed and undeveloped landuses of the subject property		
Assumptions		**Indicators**
		Developed Landuse UnDeveloped Landuse

Saved View	Category	Chart Name
Impervious	ImpSurf	Impervious Surfaces of development
Description		
Bar chart showing acres of impervious and other surfaces		
Assumptions		**Indicators**
		ImpervSurf PervSurf

Saved View	Category	Chart Name
Impervious	ImpSurf	Percent Impervious
Description		
Bar chart showing percentage of impervious surfaces of subject development - This contains a threshold line across the 10% mark on the chart that is labeled “10% WATER QUALITY DEGRADES		
Assumptions		**Indicators**
		PercImpervSurf

Saved View	Category	Chart Name
Natural Resources	NatRes	Aquifers covered by impervious surfaces
Description		
Bar chart showing acreage of aquifers coincident with impervious surfaces		
Assumptions		**Indicators**
		AquiferCov

Saved View	Category	Chart Name
Natural Resources	NatRes	Flood Hazard Zones covered by impervious surfaces
Description		
Bar chart showing 100 year and 500 year flood hazard zones coincident with impervious surfaces		
Assumptions		**Indicators**
		Flood Hazard 100yr Cov Flood Hazard 500yr Cov

Saved View	Category	Chart Name
Natural Resources	NatRes	Drinking Water Protection Areas covered by impervious surfaces
Description		
Bar chart showing acreage of Drinking water protection areas coincident with impervious surfaces		
Assumptions		**Indicators**
		DWPACov

Saved View	Category	Chart Name
Natural Resources	NatRes	Farm Soil Acres covered by impervious surfaces
Description		
Bar chart showing acreage of Prime Farmland and Farm Soils of Statewide importance coincident with impervious surfaces		
Assumptions		**Indicators**
		Prime Farmland Coverage Statewide Farmland Coverage

Saved View	Category	Chart Name
Natural Resources	NatRes	Sand and Gravel Sources covered by impervious surfaces
Description		
Bar chart showing acreage of sand and gravel soils and sand/gravel pits coincident with impervious surfaces		
Assumptions		**Indicators**
		Sand Deposits Coverage Sand and Gravel Coverage Sand and Gravel Pits Coverage

Saved View	Category	Chart Name
Natural Resources	NatRes	Wetlands covered by impervious surfaces
Description		

Bar chart showing acreage of wetlands coincident with impervious surfaces - this uses the subject wetlands supplied by the developer	
Assumptions	**Indicators**
	WetlandCov

Saved View	Category	Chart Name
Unfrag OS	OpenSpace	Unfragmented Land Lost to Development
Description		
Bar chart showing acreage of unfragmented land that would be converted to fragmented land- this uses the subject developed lands merged with a 300 foot road buffer to define fragmented lands. Fragmented land is land that is either developed or is within 300 feet of a road. Conversely, unfragmented land is undeveloped and roadless. When development occurs on previously undeveloped land and roads are built into unfragmented areas, the size of the original unfragmented land unit is decreased. Besides the obvious loss of open space, this has a negative impact on wildlife habitat and may potentially degrade water and air quality.		
Assumptions		**Indicators**
		UnfragLandLoss

Saved View	Category	Chart Name
Unfrag OS	OpenSpace	Unfragmented Area Change of most affected block
Description		
Bar chart showing the potential acreage of the unfragmented land block that would suffer the most loss to development. A threshold line at 1000 Acre mark says "1000 Acre Block in Coastal Watershed" to remind chart readers of the rarity of that situation - this also can point out where a block would be converted from over 1000 acres to under 1000 acres. Viewing the chart in the 'Compare by Scenario' mode will allow for the Base Scenario to show the original value of the unfragmented block, while the other scenarios will show the potential block size following the proposed development.		
Assumptions		**Indicators**
		MaxUnfragPotNew

Saved View	Category	Chart Name
Unfrag OS	OpenSpace	Open Space Arrangement Compactness of Largest Unit
Description		
Bar chart showing the 'compactness' value of the largest unit of open space within the subject development. This attempts to quantify the value of compactness or regularity of shape of the largest unit of open space. The higher the compactness value, the higher the value of the open space. Compactness is akin to an area to perimeter ratio. Generally speaking, an elongated or sinuous parcel of open space is of lesser value as that of a same sized, regular polygon parcel. A circle would have perfect compactness (value = 1). The formula for compactness is $4\pi A/P^2$, where A = area and P = perimeter. The compactness formula was built into the Subject landuse dynamic layer. A threshold line at 1.00 mark says "Perfect Compactness Ratio (area to perimeter)"		
Assumptions		**Indicators**
		Compactness

Saved View	Category	Chart Name
Unfrag OS	OpenSpace	Open Space Arrangement Land Use Acreage of Largest Unit

Description	
Bar chart showing the acreage of the largest unit of open space	
Assumptions	**Indicators**
	maxOSLandAC

Saved View	Category	Chart Name
WaterUse	WaterUse	Water Use Gallons Per Day
Description		
Bar chart showing the water use for Residential, Commercial/Industrial and Total gallons per day.		
Assumptions		**Indicators**
PersonalWaterUse New_Units CommInd_WaterUse PersonsPerUnit		ResiWaterUse CommIndWaterUse TotalWaterUse

Saved View	Category	Chart Name
Budget	Budget	Subject Road Mileage
Description		
Bar chart showing the miles of road in subject development		
Assumptions		**Indicators**
		TotalRoadLength

Saved View	Category	Chart Name
Budget	Budget	Yearly Road Costs
Description		
Bar chart showing the road costs forin subject development		
Assumptions		**Indicators**
Road_Maintenance Road_PlowingCost Road_SaltCost Road_SandCost		Road_Maintenance_Cost Road_WinterCare_Cost

Saved View	Category	Chart Name
Budget	Budget	Public Safety calls per year
Description		
Bar chart showing the additional police and fire calls for the town and the subject development		
Assumptions		**Indicators**
PCallPopYr PersonsPerUnit FCallPopYr TotalFireCalls New_Units TotalPoliceCalls		AdditionalPoliceCalls PotentialTotalPoliceCalls AdditionalFireCalls PotentialTotalFireCalls

Saved View	Category	Chart Name
Budget	Budget	Police Patrol Cost per year
Description		

Bar chart showing the additional police patrol cost for the subject development	
Assumptions	**Indicators**
PatrolCost_MiYr	AdditionalPatrolCost

Saved View	**Category**	**Chart Name**
Budget	Budget	Refuse Cost per year
Description		
Bar chart showing the additional refuse cost for the subject development and the town.		
Assumptions		**Indicators**
RefuseCostPerHousehold New_Units TotalHouseholds		AdditionalRefuseCost PotentialTotalRefuseCost

Saved View	**Category**	**Chart Name**
Budget	Budget	Residential Units assumptions
Description		
Bar chart showing the number of residential units and number of school student eligible units - these are both input assumptions		
Assumptions		**Indicators**
New_Units School_Units		

Saved View	**Category**	**Chart Name**
Budget	Budget	Yearly School Cost for new development
Description		
Bar chart showing the number of residential units and number of school student eligible units - these are both input assumptions		
Assumptions		**Indicators**
CostPerStudent School_Units StudentPerUnit BusCost SchoolBus		SchoolBudget

Problems Experienced in the Use of the Software

This section lists some of the software problems that were faced in this evaluation. These issues may not be experienced by all users and is not meant to be any condemnation of the software. This just merely describes some of the software issues that occurred during this project.

Creating Analysis from an Existing MXD

There were some initial problems in setting up the analysis, namely the software would crash. I actually had to recreate the analysis three times in the beginning of the project. Scenario 360 allows you to convert an existing ArcGIS mxd file into an analysis. Users may set up all the input layers and reference layers into an

existing mxd, or use an mxd having many of the needed layers and then simply convert to an analysis. This however, did not work very well because I found that each time this was tried, Scenario 360 would have error messages and would not proceed. I found that starting a new blank analysis and saving frequently worked best.

Error Messages During Update Analysis

Sometimes during the Update Analysis, certain layers would not update and error messages would be generated. At one point, I simply had to delete and remake certain indicators. This may have to do with putting layers into Group Layers in the dataframe. Don't use any dynamic layer or any layer that is referenced by dynamic layers within a group layer.
(not verified by Community Viz tech support, since we were not current on our maintenance/tech support)

Docking of windows

Window frames within the program would often not resize and dock very well. I found that the ArcMap Table of Contents, along with the Scenario 360 icon panel could often become unattached to the view frame. It would then hover over the map frame, or would reattach horizontally along the bottom or top of the map data frame, which is inconvenient and not what you need it to do. Similarly, chart windows would act in this manner. I would have to mouse wrestle the window frames, or put up with it until success prevailed when using the program.

Maximized assumption and/or indicator windows

Sometimes assumptions and indicator window viewing would only be possible when maximized. This can be a problem since you may wish to simultaneously view a combination of map, charts, indicators and assumptions. Making the window smaller to would not be possible, it had to be viewed as maximized (and opened with a *right-click, maximize*) to be seen at all. At other times however, the assumptions and indicator windows were resizable. It is likely that this reflects the state of each window when the Saved View was created. It would probably be best to keep the number of indicator categories smaller to avoid having many saved views and thus make it easier to avoid this problem.

Compare Scenarios Tool in a Saved View

When using the Present Compare Scenarios tool as part of a saved view, ArcMap would often crash and I would need to restart the program. This actually happened twice during our presentation to the Greenland Planning Board. A more stable alternative would be to not use this tool within a saved view and to open the Compare Scenarios tool manually. Although the drawback to that would be that you'd need to activate and deactivate the

pertinent map layers manually also, which may not be easy to do during a live presentation.

Conclusions

Overall, I found Scenario 360 to be a valuable tool for visualization and for making ArcGIS more dynamic. It is a great concept and has wonderful potential for planners. There were however, some problems in running the software and there is a learning curve associated with getting the program up and running. Probably, given time and experience these issues could be resolved.

In total, I spent over 200 hours on this evaluation project. This does not mean that any Scenario 360 analysis would take nearly that long. Much of that time was spent in discovering what could be done and how to do it, and included some dead ends with lost effort. For instance, we researched domestic water usage per dwelling type for use with our Water Usage indicator, but found that to be too large an effort in itself. A project starting with some pre-defined indicators and some existing assumptions would take much less time to produce. Clearly defined development plans would also reduce data preparation time. I cannot say what percentage of time would be spent in the preparation of the various inputs. It depends on the complexity of the indicators and how 'readymade' the input GIS data is. You may have georeferenced development plans and established indicators to work with.

It must be remembered that as with all GIS data and spreadsheet applications, the output is only as good as the input (as well as the process logic). The accuracy of the indicator depends on the accuracy of the input GIS layers and how legitimate the assumptions are and how well the indicator formulas are composed. Whether you must devise your own indicators or adopt preexisting ones can make a big difference.

Beyond this, in order to put this type of application into practice, there needs to be support from the planning board. The planning board for the town involved with our study was not prepared to help us. This was not because they were opposed to the idea. In all fairness, *they* did not approach *us* to do a Community Viz application for them. We came to them at a time when they did not have the time to more actively participate. We had asked them for a number of 'real world' values for our assumptions, but they were not provided. This did not hinder the evaluation of the software, however, since any assumption can be easily changed. The assumptions I used were either arbitrary guesses or they were derived with some study of town reports from multiple years. Presumably, anyone working with a planning board on a Community Viz project will be doing so at the board's request and would therefore have their full input.

Members of Greenland planning board were invited to come to the RPC office to hear about the software and to see what had been created in Community

Viz. We sought the point of view of a planning board to further test the practicality of Community Viz use, for such a community. Since the software requires an ArcGIS license to run, and the analysis used network GIS data, we had to have board members come to our office, rather than we come to them.

A presentation was given of the charts, side by side scenario comparisons and discussion of assumptions and indicators. It did create much discussion and many questions. There were questions about things that could potentially be done using the software – although not without much more work, and a few things that could not be done with the software since the data did not exist.

The overall response was that this was not likely to be put to use in Greenland other than possibly hiring RPC on occasion for larger potential developments like the sample analysis used.

My reaction is that if this had been a sales presentation, I don't think we sold them on Community Viz. I do think this was a valuable experience for the RPC, in getting acquainted with the Scenario 360 software.

To improve the application

Town-wide – or watershed wide data and indicators and charts
Each natural resource and land use indicator could have town-wide or better still, watershed-wide indicators. For example, the acreage and percentage coverage by impervious surfaces could be given for the subject development as well as the whole watershed. Therefore, the town could monitor the cumulative effect of each development within the watershed.

Planning Board Support
Get all departments that are affected by any change in population and/or development to supply any assumptions and indicators that they use – or may wish to use, to submit them to the planning board for inclusion in Scenario 360. Since the planning board is in the vanguard of the community's control over development and growth, they could consider, or at least have knowledge of as many of the issues that a potential development may have on the community, watershed and region. Additionally, the planning board could require applicants to submit digital plans in a ready to use format for Scenario 360.

Appendix A

Outline of Scenario 360 Planning Board Presentation

Order of Presentation

1 Overview of site of development
- location of subject land within town, roads
- watershed location
- zoning districts
- developed lands

2 Overview of Development Scenarios
- map of 3 landuse alternatives showing IS and buildings.

3 General assumptions of the scenarios
- assumptions
  - # of units
  - persons per unit
  - population of Town
  - number of housing units in town
- INTERACTIVE HERE

4 LandUse
- hardcopy map is seen
- **charts**
- LandUse Acres
- Landuse Percent
- Developed and Undeveloped
- Developed Land Percent

5 Impervious Surfaces
- look at hardcopy of natural resources
- chart for coverage acreage and %
- charts for impervious coverage of Natural Resources

6 Open Space
- chart to show largest undeveloped unit - size and 'compactness'
- show compare by scenario for comparison on Unfrag/frag lands
- look at overview hardcopy to see conservation lands spread.

7 Water Use
- assumptions
- charts

8 Budget
- assumptions
- charts for each item
- modify assumptions?

Appendix B

Reports generated by Scenario 360

Reports may be generated as:

Summary of the analysis
Detailed Scenario Comparison Report (compares 2 scenarios)
List of files needed to run the analysis.

The following reports were generated by Scenario 360 for our study

1. Summary of the analysis
2. Detailed Scenario Comparison Report : Base to AsOfRight
3. Detailed Scenario Comparison Report Dev1 to Dev2
4. List of files needed to run the analysis

Evaluation2 Summary

Analysis Description

This analysis compares up to 4 scenarios of the same subject lot. The base scenario reflect the current conditions, AsOfRight scenario covers what is permitted by zoning and Dev1 and Dev2 are alternate development proposals for exceptional development.

Scenarios in this Analysis

Base Scenario

What currently exists at the subject location

AsOfRight

OK according to current zoning

Dev1

alternate 1

Dev2

alternate 2

Report Summary

Assumptions

Assumption	Details
WaterUse	
CommInd_WaterUse	Type: Number Range: 0 - 100000 Default: 10000 Units: gallons/day
PersonalWaterUse	Type: Number Range: 35 - 100 Default: 65 Units: gallons/day
General	
New_Units	Type: Number Range: 0 - 400 Default: 1 Units: housing units
PersonsPerUnit	Type: Number Range: 1 - 10 Default: 2.63 Units: persons
TotalHouseholds	Type: Number Range: 1000 - 4500 Default: 1211 Units: housholds
TownPopulation	Type: Number Range: 3000 - 5000 Default: 3460 Units:
Budget	

BusCost	Type: Number Range: 0 - 500 Default: 0 Units: $/yr
CostPerStudent	Type: Number Range: 100 - 10000 Default: 500 Units: $/yr
FCallPopYr	Type: Number Range: 0.05 - 4 Default: 0.1 Units: calls
PatrolCost_MiYr	Type: Number Range: 25 - 1000 Default: 100 Units: $
PCallPopYr	Type: Number Range: 1.5 - 4 Default: 2.1 Units: calls
RefuseCostPerHousehold	Type: Number Range: 50 - 500 Default: 160 Units: $
Road_Maintenance	Type: Number Range: 250 - 1000 Default: 500 Units: $
Road_PlowingCost	Type: Number Range: 250 - 1000 Default: 500 Units: $
Road_SaltCost	Type: Number Range: 250 - 1000 Default: 500 Units: $
Road_SandCost	Type: Number Range: 250 - 1000 Default: 500 Units: $
School_Units	Type: Number Range: 0 - 100 Default: 0 Units: units with kids
SchoolBus	Type: Yes / No
StudentPerUnit	Type: Number Range: 0 - 10 Default: 1.8 Units: students
TotalFireCalls	Type: Number Range: 325 - 400 Default: 348 Units: calls
TotalPoliceCalls	Type: Number Range: 7000 - 9000 Default: 7096 Units: calls

Indicators

Indicator	Details
WaterUse	
CommIndWaterUse	Units: gallons/day Formula: [Assumption:CommInd_WaterUse]
ResiWaterUse	Units: gallons/day Formula: ([Assumption:PersonalWaterUse] * [Indicator:DevelopmentPop])
TotalWaterUse	Units: gallons/day Formula: [Indicator:CommIndWaterUse] + [Indicator:ResiWaterUse]
General	
DevelopmentPop	Units: housing units persons Formula: [Assumption:New_Units] * [Assumption:PersonsPerUnit]
LotSize	Units: Formula: Sum ([Attribute:Subject_Lot:Shape_Area]) / 43560
Population	Units: Formula: [Assumption:TownPopulation] + ([Assumption:New_Units] * [Assumption:PersonsPerUnit])
Landuse	
Agriculture	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] = 20)) / 43560
Commercial_Industrial	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] = 12)) / 43560
Developed Landuse	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] < 20 Or [Attribute:Subject_LU:LU] = 24)) / 43560
Forest	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] = 40)) / 43560
Recreational	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] = 17)) / 43560
Residential	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] = 11)) / 43560

Roads	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] = 14)) / 43560
UnDeveloped Landuse	Units: acres Formula: Sum ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] > 19 And [Attribute:Subject_LU:LU] <> 24)) / 43560
ImpSurf	
ImpervSurf	Units: Formula: Sum ([Attribute:Subject_ImpSurf:Shape_Area]) / 43560
PercImpervSurf	Units: % Formula: (Sum ([Attribute:Subject_ImpSurf:Shape_Area]) * 100) / Sum ([Attribute:Subject_Lot:Shape_Area])
PervSurf	Units: Formula: (Sum ([Attribute:Subject_Lot:Shape_Area]) - Sum ([Attribute:Subject_ImpSurf:Shape_Area])) / 43560
NatRes	
AquiferCov	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:AquiferCov]))
DWPACov	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:DWPACov]))
Flood Hazard 100 yr Cov	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:Flood100Cov]))
Flood Hazard 500 yr Cov	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:Flood500Cov]))
Prime Farmland Coverage	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:PrimeFarmCov])) * [Conversion:sq feet to acres]
Sand and Gravel Coverage	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:SandGravelDepositsCov])) * [Conversion:sq feet to acres]
Sand and Gravel Pits Coverage	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:SandGravelPitsCov])) * [Conversion:sq feet to acres]
Sand Deposits Coverage	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:SandDepositsCov])) * [Conversion:sq feet to acres]
Statewide Farmland Coverage	Units: acres Formula:

	(Sum ([Attribute:Subject_ImpSurf:StateFarmCov])) * [Conversion:sq feet to acres]
WetlandCov	Units: acres Formula: (Sum ([Attribute:Subject_ImpSurf:WetlandCov]))
OpenSpace	
compactness	Units: compactness ratio Formula: Get ([Attribute:Subject_LU:A2Pratio], Where (Ceiling ([Attribute:Subject_LU:Shape_Area]) = Ceiling ([Indicator:maxOSLandu])))
MaxFragBloc	Units: acres Formula: Max ([Attribute:UnfragmentedLands:FragCov])
maxOSLandAC	Units: Formula: (Max ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] > 19 And [Attribute:Subject_LU:LU] <> 24))) / 43560
maxOSLandu	Units: Formula: (Max ([Attribute:Subject_LU:Shape_Area], Where ([Attribute:Subject_LU:LU] > 19 And [Attribute:Subject_LU:LU] <> 24)))
MaxUnFragBloc	Units: acres Formula: Max ([Attribute:UnfragmentedLands:Shape_Area], Where ([Attribute:UnfragmentedLands:FragCov] = [Indicator:MaxFragBloc])) / 43560
MaxUnFragPotNew	Units: acres Formula: [Indicator:MaxUnFragBloc] - [Indicator:MaxFragBloc]
UnfragLandLoss	Units: acres Formula: (Sum ([Attribute:subject_fragland:UnfragCov]))
Budget	
AdditionalFireCalls	Units: calls persons units Formula: [Assumption:FCallPopYr] * [Assumption:PersonsPerUnit] * [Assumption:New_Units]
AdditionalPatrolCost	Units: $ per miles Formula: [Assumption:PatrolCost_MiYr] * [Indicator:TotalRoadLength]
AdditionalPoliceCalls	Units: calls persons units Formula: [Assumption:PCallPopYr] * [Assumption:PersonsPerUnit] * [Assumption:New_Units]
AdditionalRefuseCost	Units: $ units Formula: [Assumption:RefuseCostPerHousehold] * [Assumption:New_Units]
PotentialTotalFireCalls	Units: calls Formula: [Assumption:TotalFireCalls] + [Indicator:AdditionalFireCalls]

PotentialTotalPoliceCalls	Units: calls persons units Formula: [Indicator:AdditionalPoliceCalls] + [Assumption:TotalPoliceCalls]
PotentialTotalRefuseCost	Units: housholds $ Formula: [Assumption:TotalHouseholds] * [Assumption:RefuseCostPerHousehold] + [Indicator:AdditionalRefuseCost]
Road_Maintenance_Cost	Units: $ miles Formula: [Assumption:Road_Maintenance] * [Indicator:TotalRoadLength]
Road_WinterCare_Cost	Units: mile $ Formula: [Indicator:TotalRoadLength] * [Assumption:Road_PlowingCost] + [Indicator:TotalRoadLength] * [Assumption:Road_SaltCost] + [Indicator:TotalRoadLength] * [Assumption:Road_SandCost]
SchoolBudget	Units: $/yr students Formula: If ([Assumption:SchoolBus] = Yes, Then ([Assumption:CostPerStudent] * [Assumption:School_Units] * [Assumption:StudentPerUnit] + [Assumption:BusCost] * [Assumption:School_Units] * [Assumption:StudentPerUnit]), Else ([Assumption:CostPerStudent] * [Assumption:School_Units] * [Assumption:StudentPerUnit]))
TotalRoadLength	Units: miles Formula: Sum ([Attribute:Subject_Roads:SHAPE_Length]) / 5280

Dynamic Attributes

Attribute	Details
Subject_LU	
A2Pratio	Type: Double Formula: ([Attribute:Shape_Area] * 4 * 3.14) / [Attribute:Shape_Length] ^ 2
Subject_Lot	
LRPdist	Type: Double Formula: MinDistance ([Layer:lrp_pt_2004])
Subject_ImpSurf	
AquiferCov	Type: Double Formula: (OverlapArea ([Layer:Aquifers])) * [Conversion:sq feet to acres]
DWPACov	Type: Double Formula: (OverlapArea ([Layer:DWPA_2002])) * [Conversion:sq feet to acres]
Flood100Cov	Type: Double Formula: (OverlapArea ([Layer:FloodHazards], Where ([Attribute:FloodHazards:FLD_ZONE] = "AE" Or [Attribute:FloodHazards:FLD_ZONE] = "A" Or [Attribute:FloodHazards:FLD_ZONE] = "VE" Or [Attribute:FloodHazards:FLD_ZONE] = "AO" Or [Attribute:FloodHazards:FLD_ZONE] = "OPEN WATER"))) * [Conversion:sq feet

	to acres]
Flood500Cov	Type: Double Formula: (OverlapArea ([Layer:FloodHazards], Where ([Attribute:FloodHazards:FLD_ZONE] = "0.2 PCT ANNUAL CHANCE FLOOD HAZARD"))) * [Conversion:sq feet to acres]
PrimeFarmCov	Type: Double Formula: OverlapArea ([Layer:PrimeFarmland])
SandDepositsCov	Type: Double Formula: OverlapArea ([Layer:Sand_Deposits])
SandGravelDepositsCov	Type: Double Formula: OverlapArea ([Layer:Sand_AND_Gravel])
SandGravelPitsCov	Type: Double Formula: OverlapArea ([Layer:SandGravelPits])
StateFarmCov	Type: Double Formula: OverlapArea ([Layer:FarmlandStateImportance])
WetlandCov	Type: Double Formula: (OverlapArea ([Layer:Subject_Wetlands])) * [Conversion:sq feet to acres]
UnfragmentedLands	
FragCov	Type: Double Formula: (OverlapArea ([Layer:subject_fragland])) * [Conversion:sq feet to acres]
subject_fragland	
UnfragCov	Type: Double Formula: (OverlapArea ([Layer:UnfragmentedLands])) * [Conversion:sq feet to acres]

Alerts

Analysis powered by communityviz

BaseScenario Comparison AsOfRight

Analysis Description

This analysis compares up to 4 scenarios of the same subject lot. The base scenario reflect the current conditions, AsOfRight scenario covers what is permitted by zoning and Dev1 and Dev2 are alternate development proposals for exceptional development.

Scenarios in this Report

Base Scenario

What currently exists at the subject location

AsOfRight

OK according to current zoning

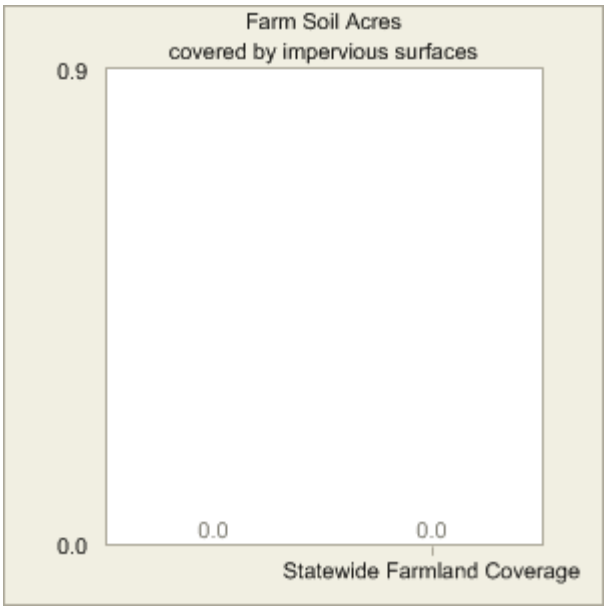
Report Summary

Base Scenario

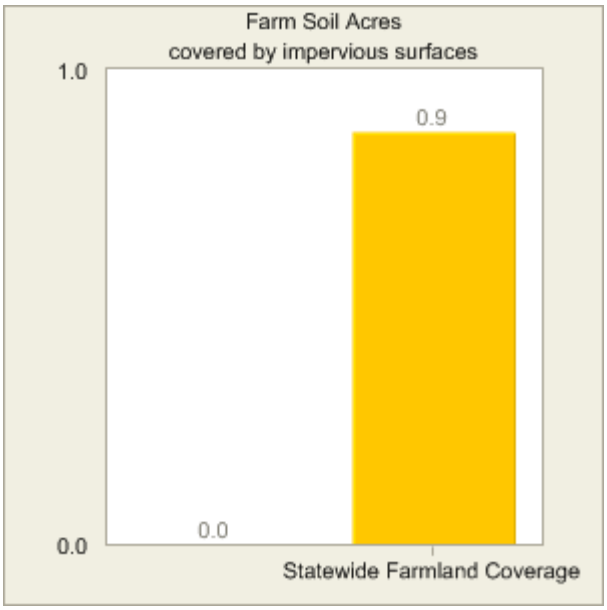
AsOfRight

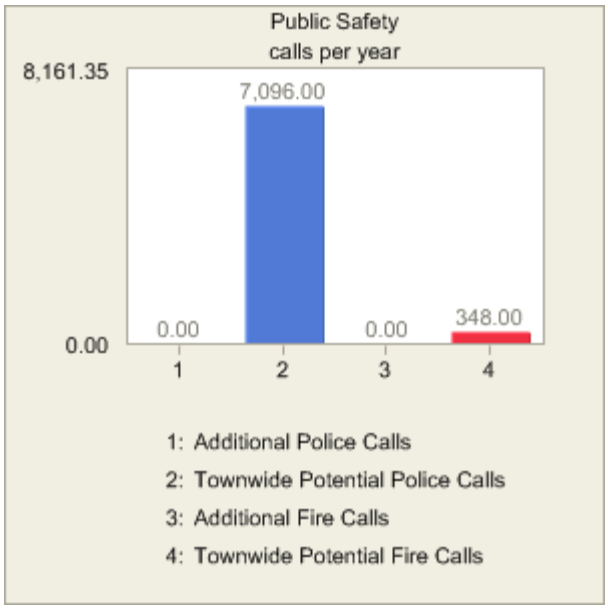
Indicator Charts

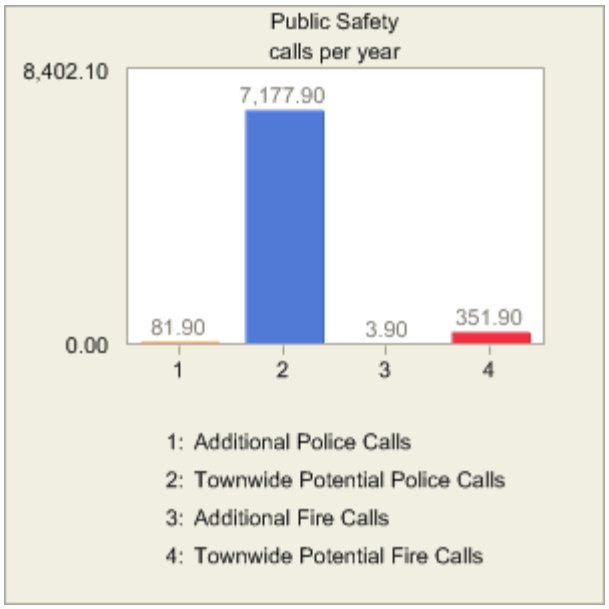
Base Scenario

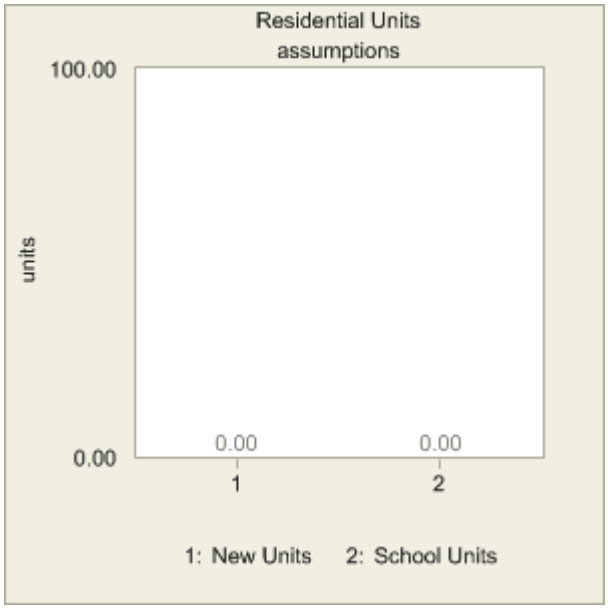


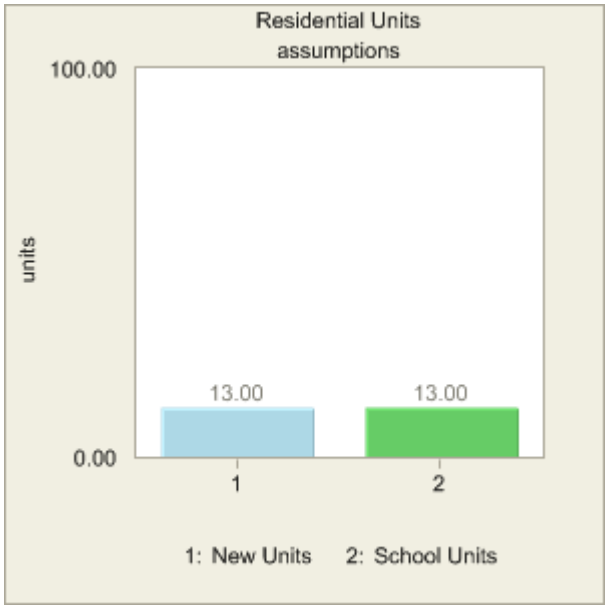
AsOfRight




Public Safety
calls per year
8,161.35
0.00
7,096.00
0.00
0.00
348.00
1
2
3
4
1: Additional Police Calls
2: Townwide Potential Police Calls
3: Additional Fire Calls
4: Townwide Potential Fire Calls


Public Safety
calls per year
8,402.10
0.00
7,177.90
81.90
3.90
351.90
1
2
3
4
1: Additional Police Calls
2: Townwide Potential Police Calls
3: Additional Fire Calls
4: Townwide Potential Fire Calls


Residential Units
assumptions
100.00
0.00
units
0.00
0.00
1
2
1: New Units
2: School Units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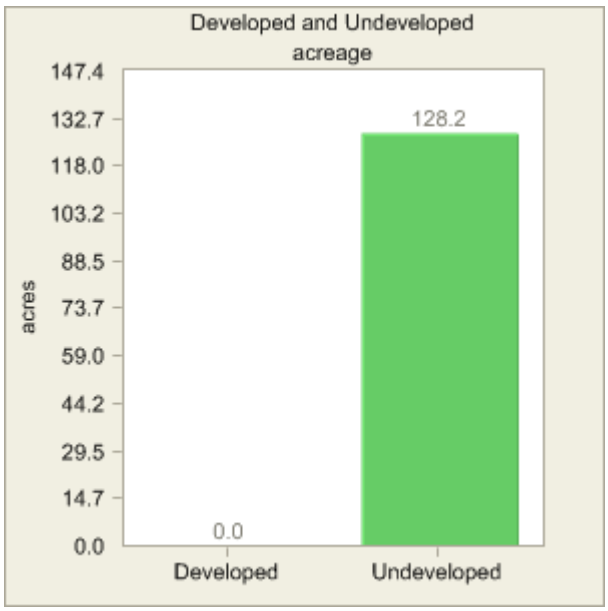
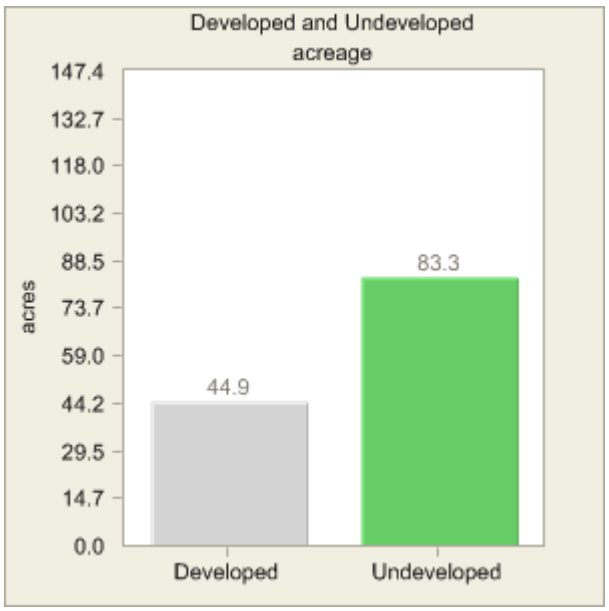
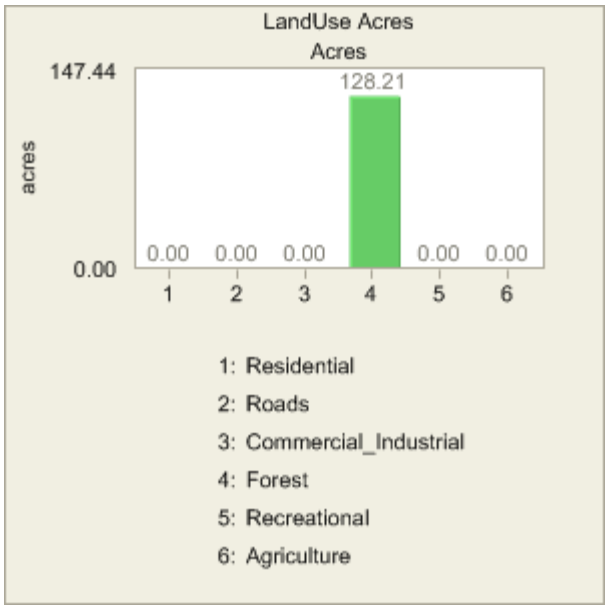
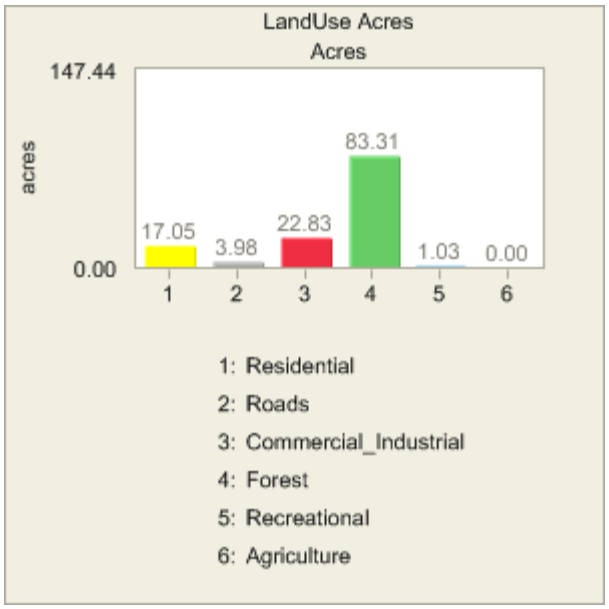
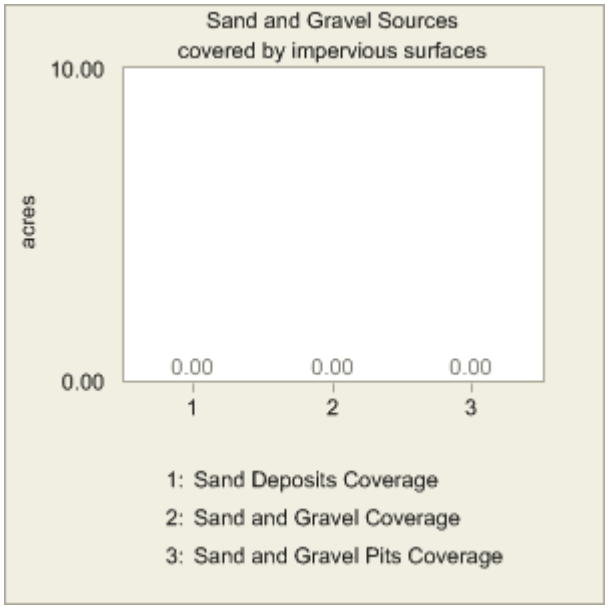
assumptions
100.00
0.00
units
13.00
13.00
1
2
1: New Units
2: School Units

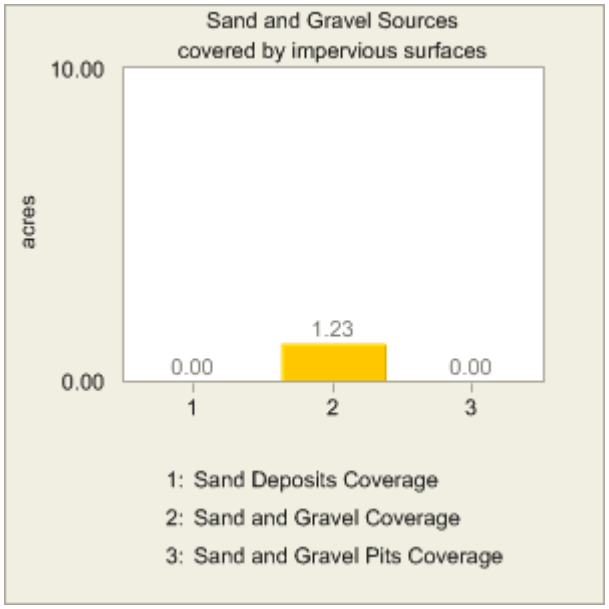

Developed and Undeveloped
acreage
147.4
132.7
118.0
103.2
88.5
73.7
59.0
44.2
29.5
14.7
0.0
acres
128.2
0.0
Developed
Undeveloped

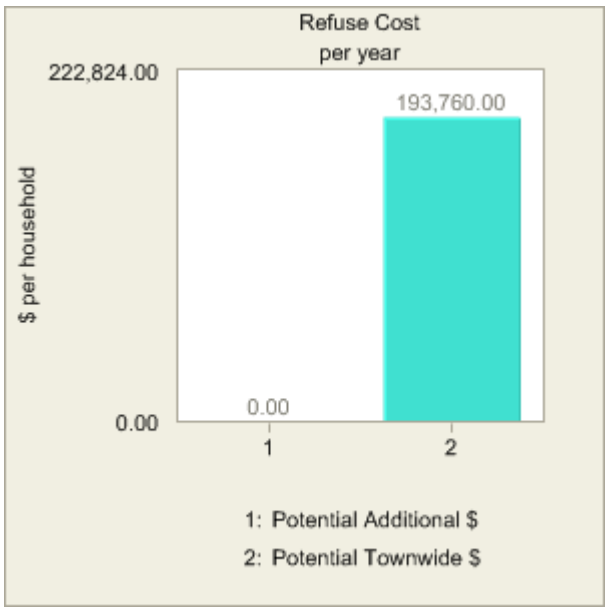

Developed and Undeveloped
acreage
147.4
132.7
118.0
103.2
88.5
73.7
59.0
44.2
29.5
14.7
0.0
acres
83.3
44.9
Developed
Undeveloped

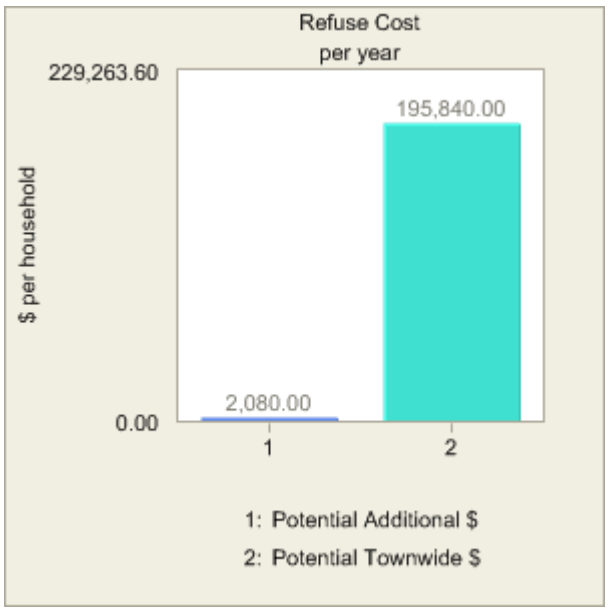

LandUse Acres
Acres
147.44
0.00
acres
128.21
0.00 0.00 0.00 0.00 0.00
1 2 3 4 5 6
1: Residential
2: Roads
3: Commercial_Industrial
4: Forest
5: Recreational
6: Agriculture

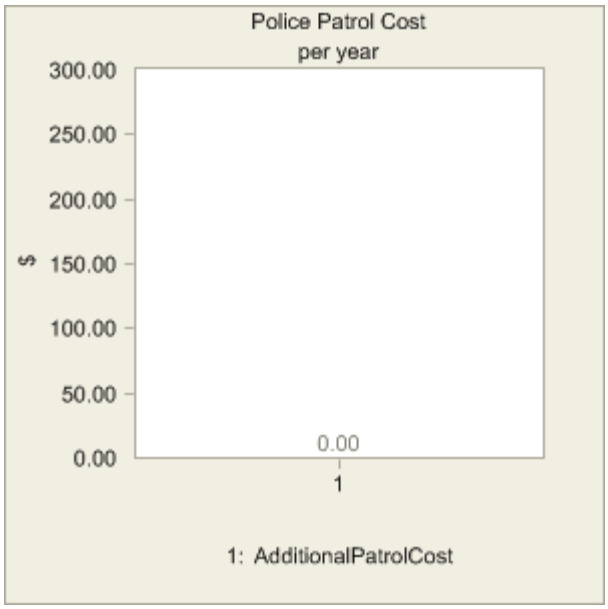

LandUse Acres
Acres
147.44
0.00
acres
17.05 3.98 22.83 83.31 1.03 0.00
1 2 3 4 5 6
1: Residential
2: Roads
3: Commercial_Industrial
4: Forest
5: Recreational
6: Agriculture

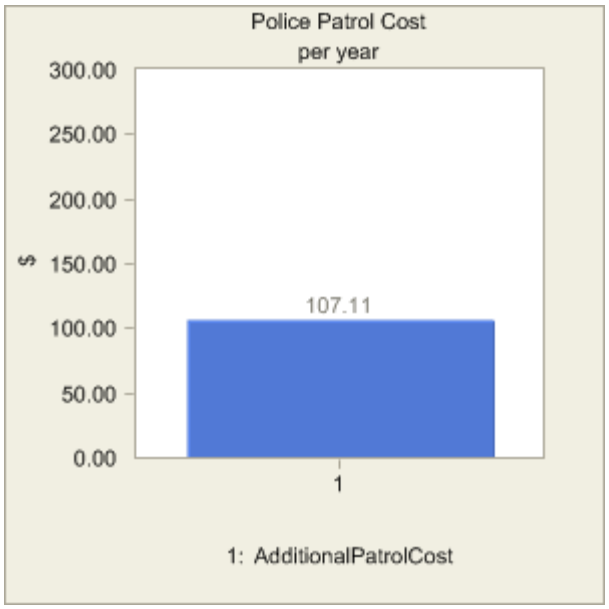

Sand and Gravel Sources
covered by impervious surfaces
10.00
0.00
acres
0.00 0.00 0.00
1 2 3
1: Sand Deposits Coverage
2: Sand and Gravel Coverage
3: Sand and Gravel Pits Coverage

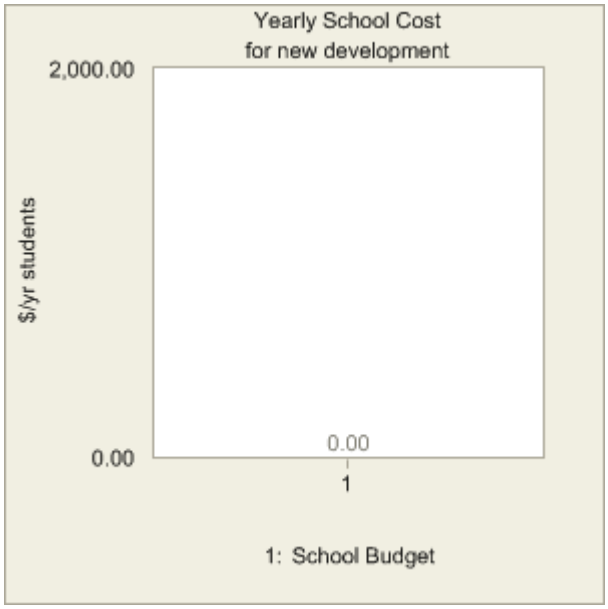

Sand and Gravel Sources
covered by impervious surfaces
10.00
0.00
acres
0.00 1.23 0.00
1 2 3
1: Sand Deposits Coverage
2: Sand and Gravel Coverage
3: Sand and Gravel Pits Coverage

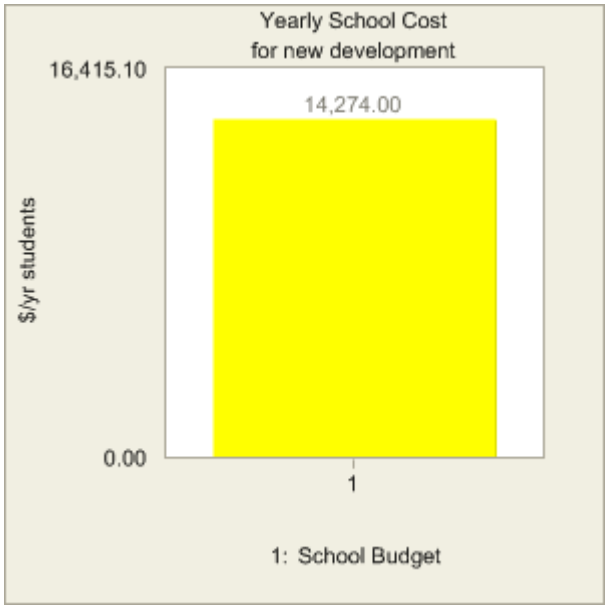

Refuse Cost
per year
222,824.00
0.00
$ per household
0.00 193,760.00
1 2
1: Potential Additional $
2: Potential Townwide $

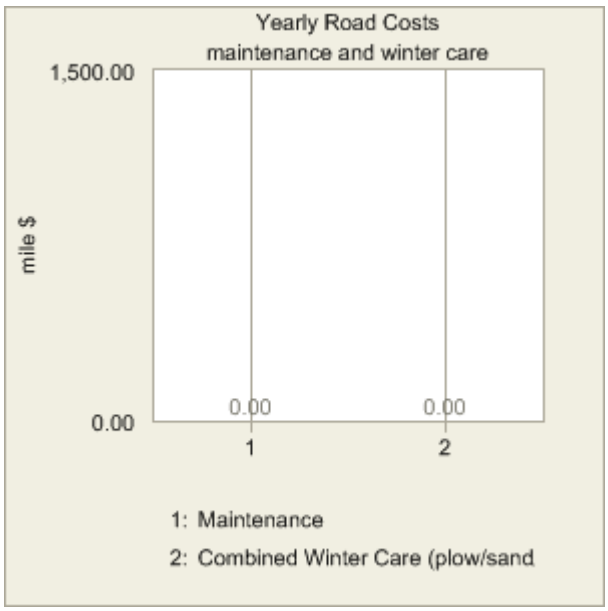

Refuse Cost
per year
229,263.60
0.00
$ per household
2,080.00 195,840.00
1 2
1: Potential Additional $
2: Potential Townwide $

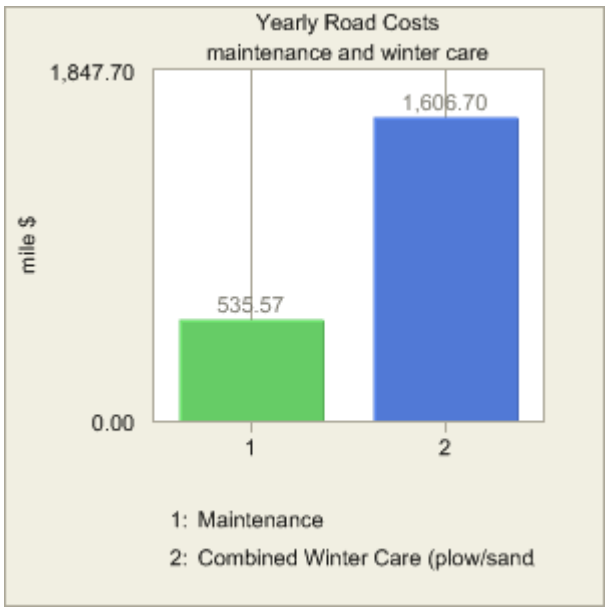

Police Patrol Cost
per year
300.00
250.00
200.00
$ 150.00
100.00
50.00
0.00
0.00
1
1: AdditionalPatrolCost

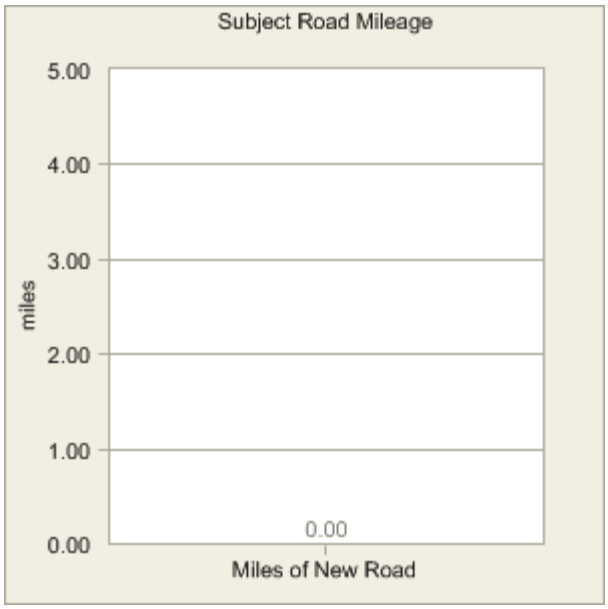

Police Patrol Cost
per year
300.00
250.00
200.00
$ 150.00
107.11
100.00
50.00
0.00
1
1: AdditionalPatrolCost

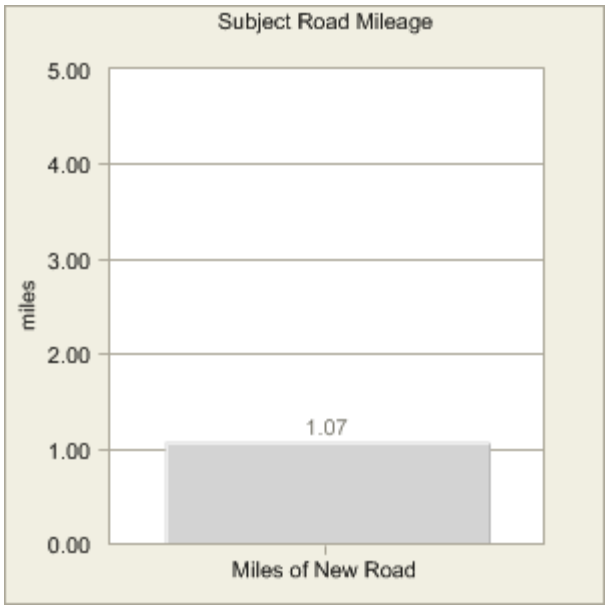

Yearly School Cost
for new development
2,000.00
$/yr students
0.00
0.00
1
1: School Budget

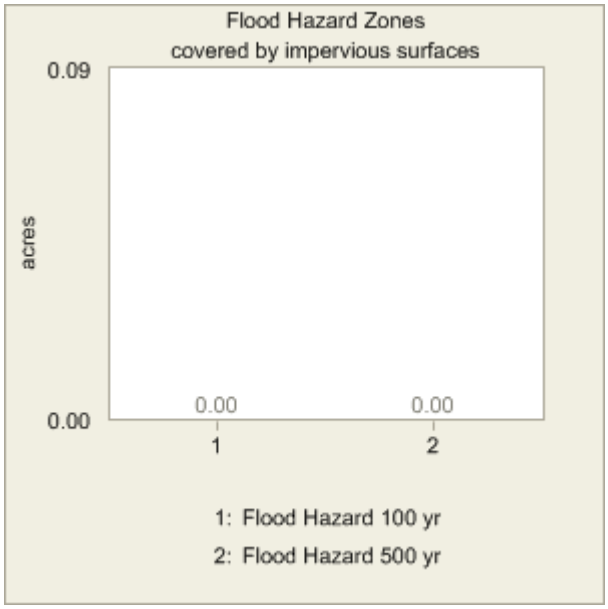

Yearly School Cost
for new development
16,415.10
14,274.00
$/yr students
0.00
1
1: School Budget

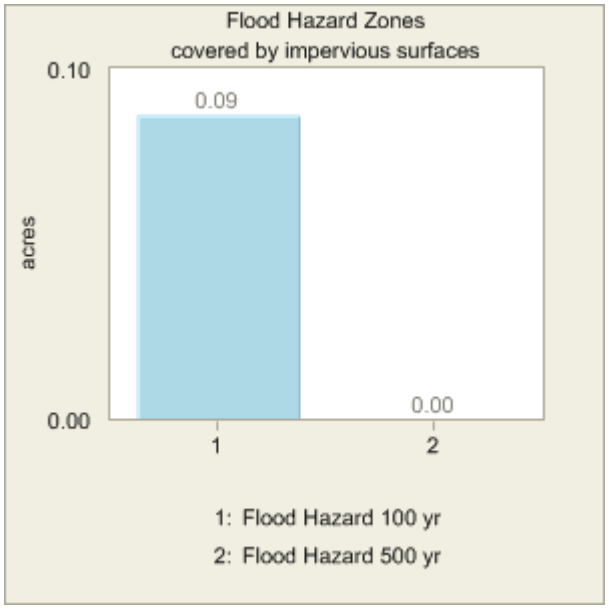

Yearly Road Costs
maintenance and winter care
1,500.00
mile $
0.00
0.00
0.00
1
2
1: Maintenance
2: Combined Winter Care (plow/sand

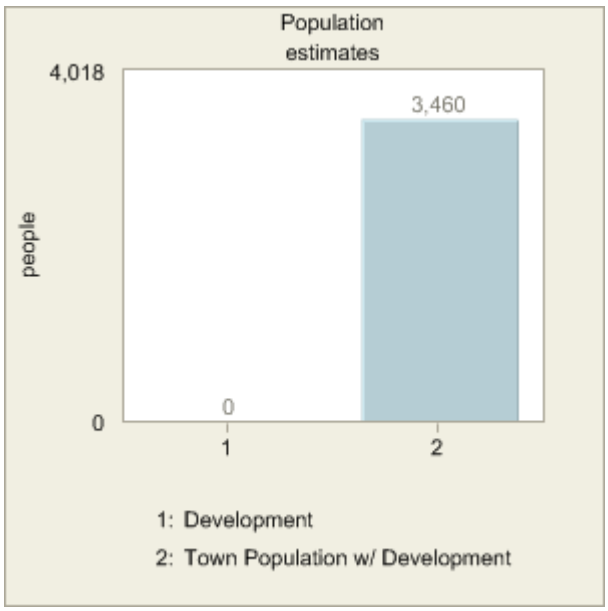

Yearly Road Costs
maintenance and winter care
1,847.70
1,606.70
mile $
535.57
0.00
1
2
1: Maintenance
2: Combined Winter Care (plow/sand

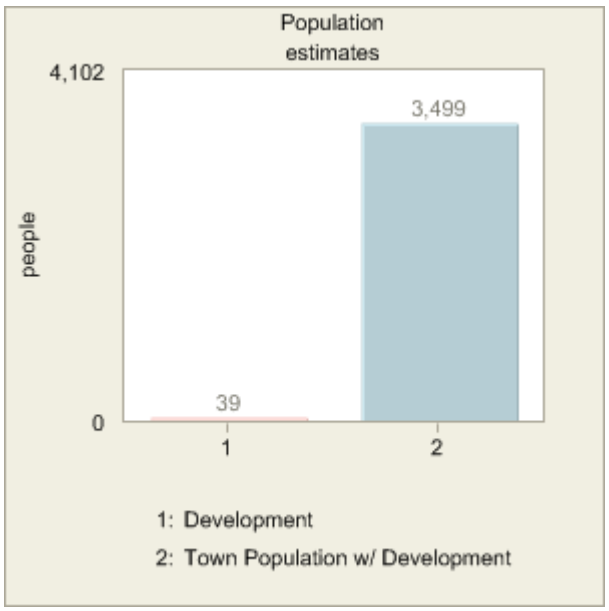

Subject Road Mileage
5.00
4.00
3.00
2.00
1.00
0.00
miles
0.00
Miles of New Road

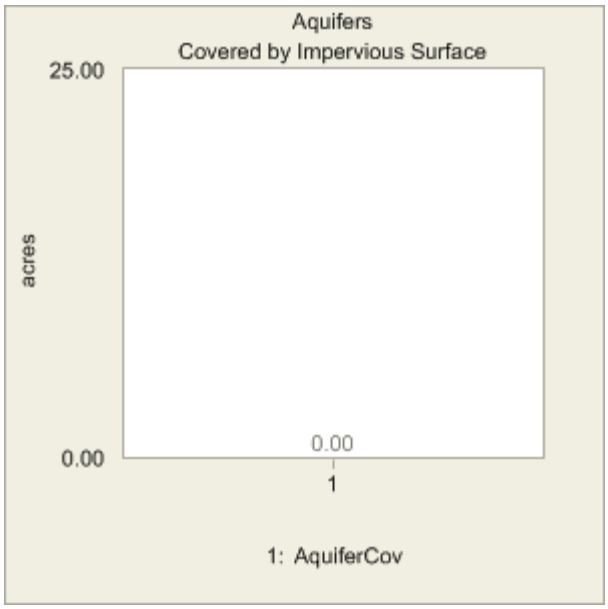

Subject Road Mileage
5.00
4.00
3.00
2.00
1.00
0.00
miles
1.07
Miles of New Road

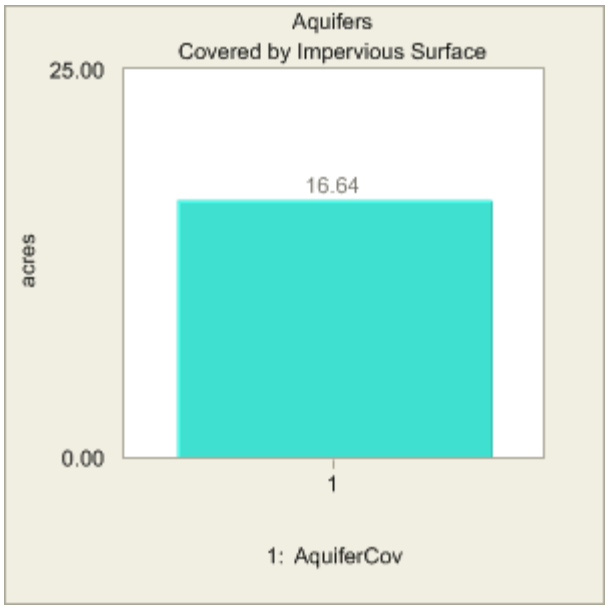

Flood Hazard Zones
covered by impervious surfaces
0.09
0.00
acres
0.00
0.00
1
2
1: Flood Hazard 100 yr
2: Flood Hazard 500 yr

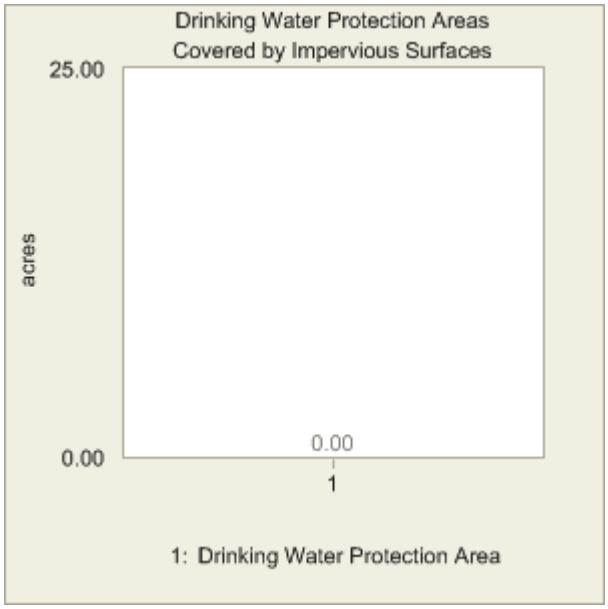

Flood Hazard Zones
covered by impervious surfaces
0.10
0.00
acres
0.09
0.00
1
2
1: Flood Hazard 100 yr
2: Flood Hazard 500 yr

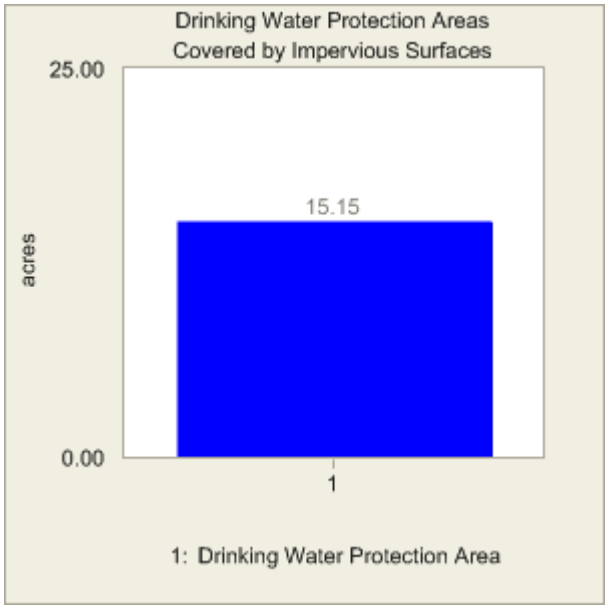

Population
estimates
4,018
0
people
0
3,460
1
2
1: Development
2: Town Population w/ Development

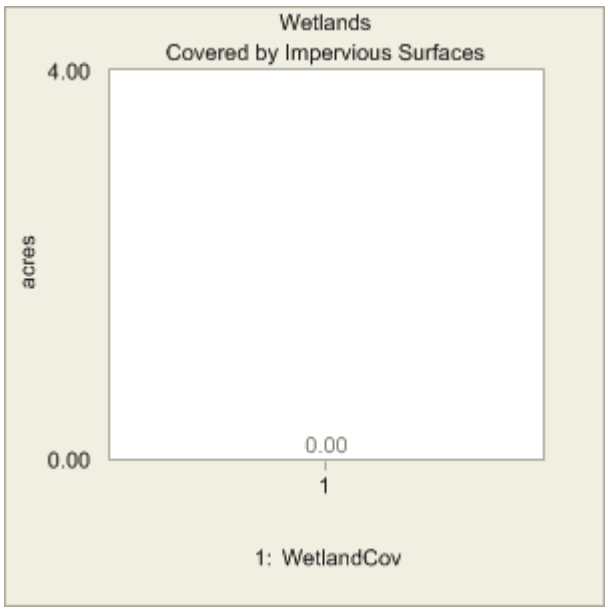

Population
estimates
4,102
0
people
39
3,499
1
2
1: Development
2: Town Population w/ Development

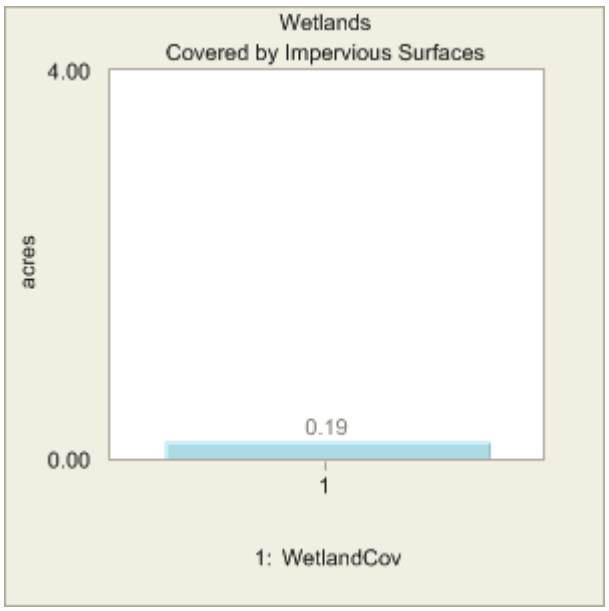

Aquifers
Covered by Impervious Surface
25.00
acres
0.00
0.00
1
1: AquiferCov

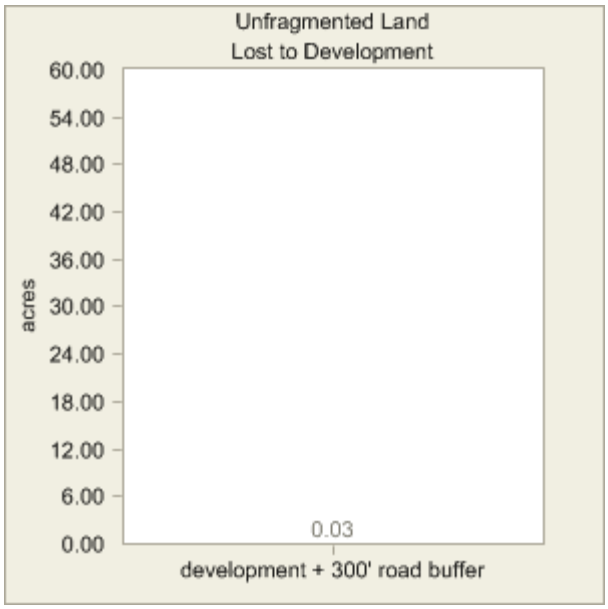

Aquifers
Covered by Impervious Surface
25.00
acres
16.64
0.00
1
1: AquiferCov

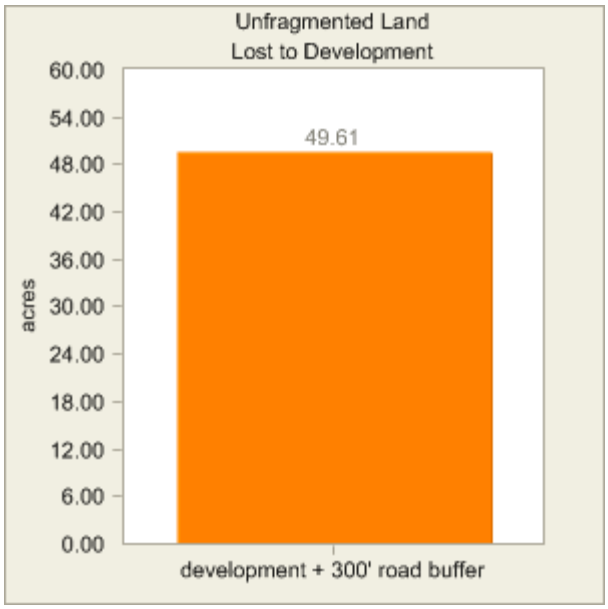

Drinking Water Protection Areas
Covered by Impervious Surfaces
25.00
acres
0.00
0.00
1
1: Drinking Water Protection Area

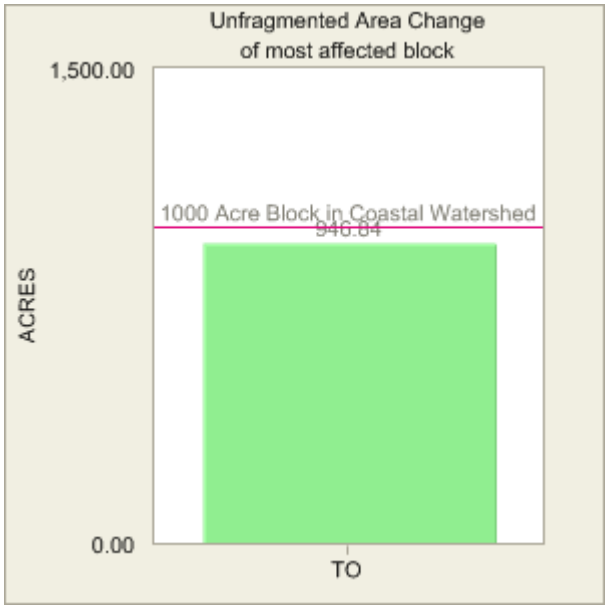

Drinking Water Protection Areas
Covered by Impervious Surfaces
25.00
acres
15.15
0.00
1
1: Drinking Water Protection Area

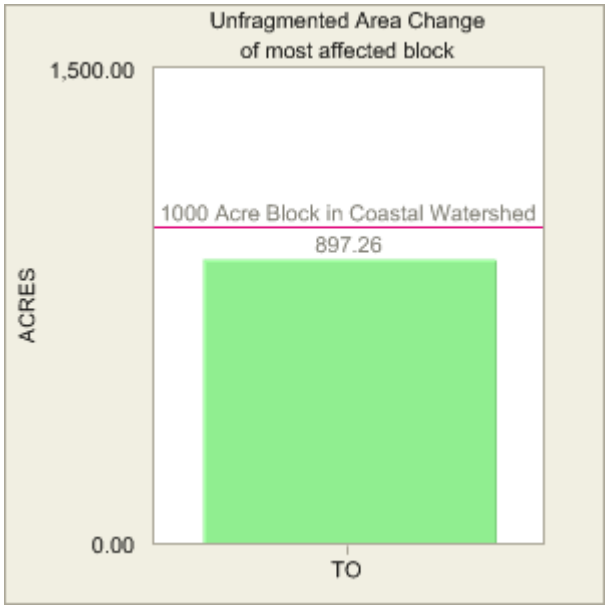

Wetlands
Covered by Impervious Surfaces
4.00
acres
0.00
0.00
1
1: WetlandCov

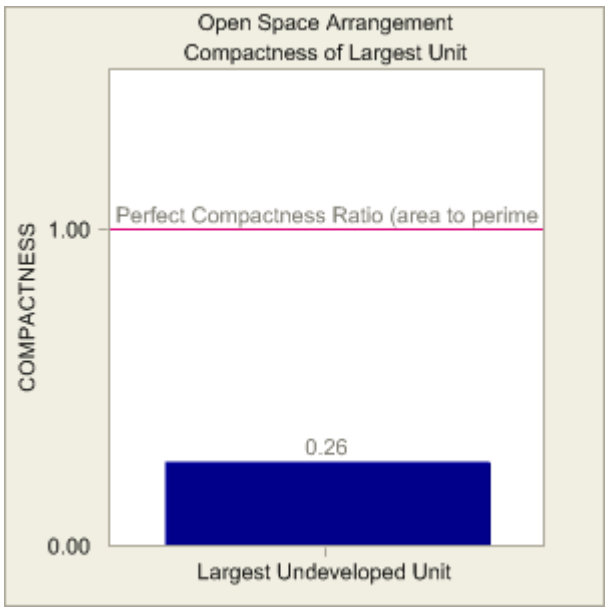

Wetlands
Covered by Impervious Surfaces
4.00
acres
0.19
0.00
1
1: WetlandCov

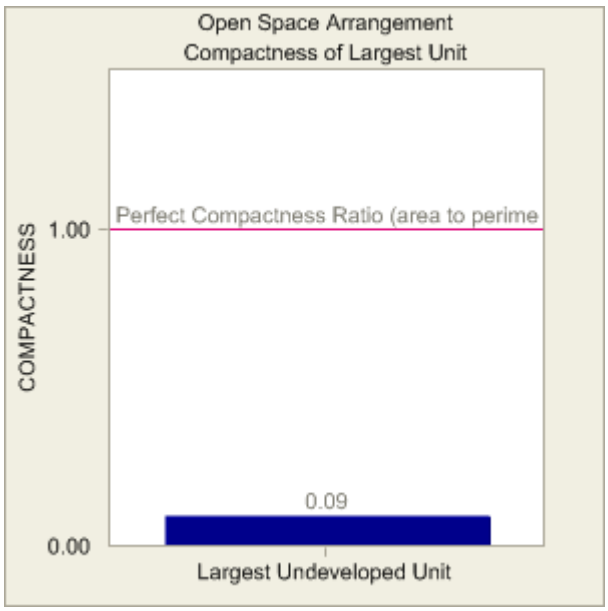

Unfragmented Land
Lost to Development
60.00
54.00
48.00
42.00
36.00
30.00
24.00
18.00
12.00
6.00
0.00
acres
0.03
development + 300' road buffer

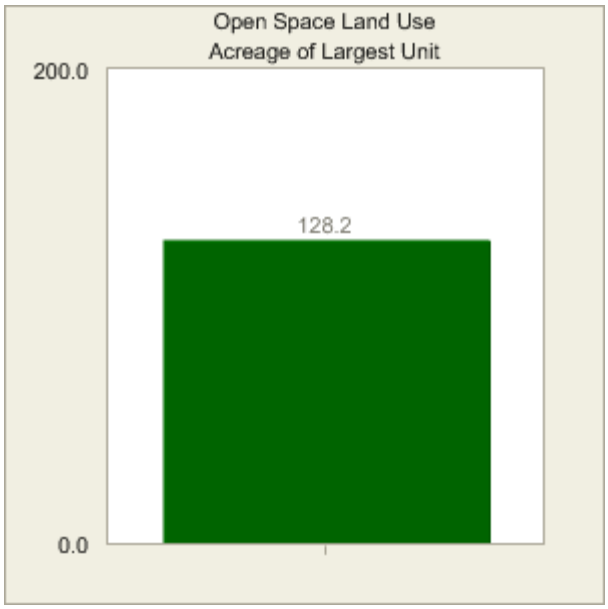

Unfragmented Land
Lost to Development
60.00
54.00
48.00
42.00
36.00
30.00
24.00
18.00
12.00
6.00
0.00
acres
49.61
development + 300' road buffer

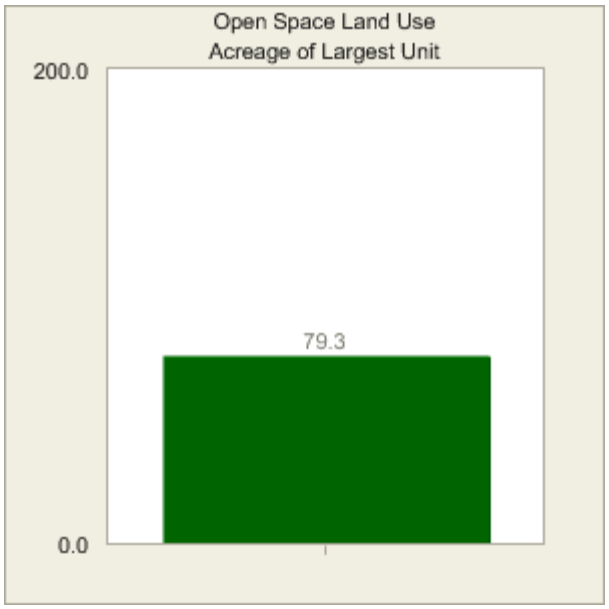

Unfragmented Area Change
of most affected block
1,500.00
1000 Acre Block in Coastal Watershed
946.84
ACRES
0.00
TO

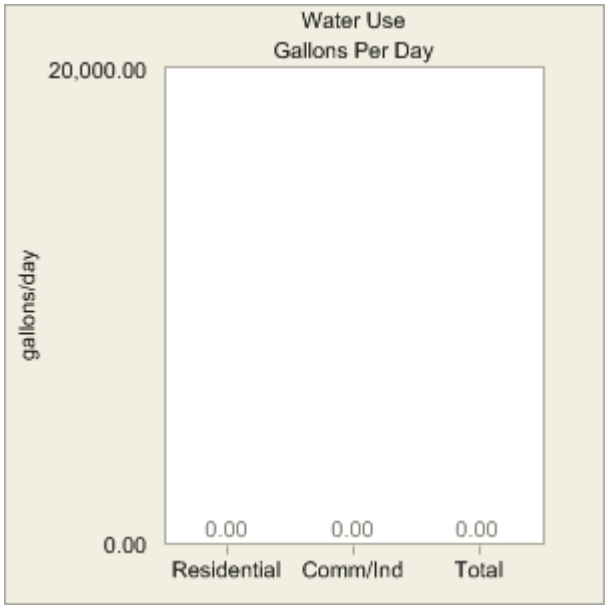

Unfragmented Area Change
of most affected block
1,500.00
1000 Acre Block in Coastal Watershed
897.26
ACRES
0.00
TO

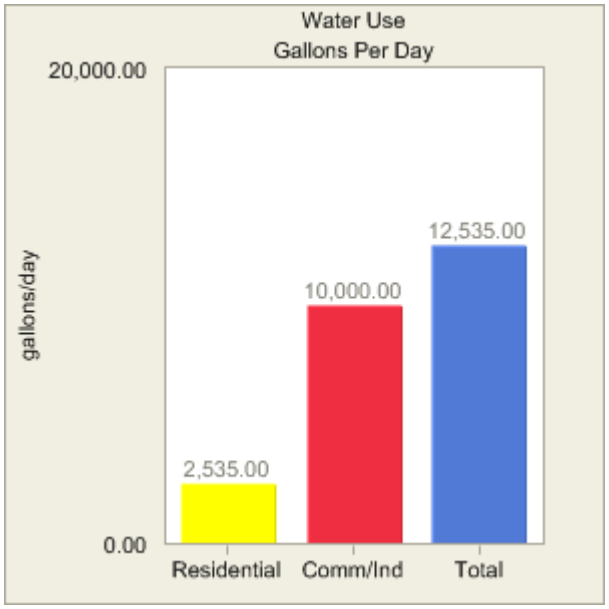

Open Space Arrangement
Compactness of Largest Unit
Perfect Compactness Ratio (area to perime
1.00
COMPACTNESS
0.26
0.00
Largest Undeveloped Unit

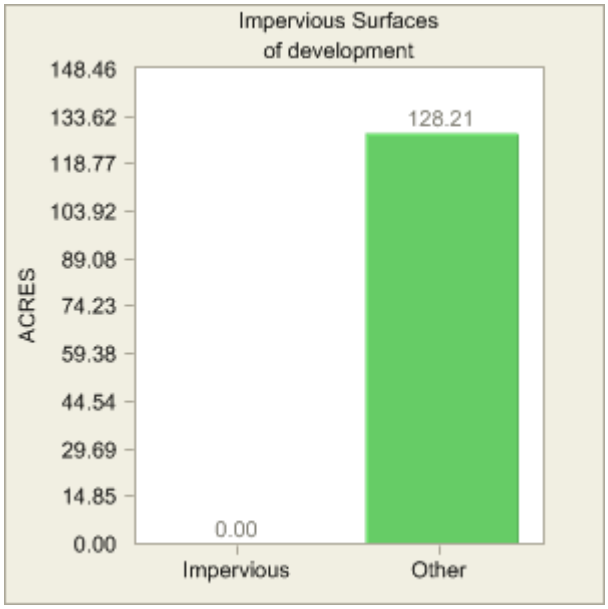

Open Space Arrangement
Compactness of Largest Unit
Perfect Compactness Ratio (area to perime
1.00
COMPACTNESS
0.09
0.00
Largest Undeveloped Unit

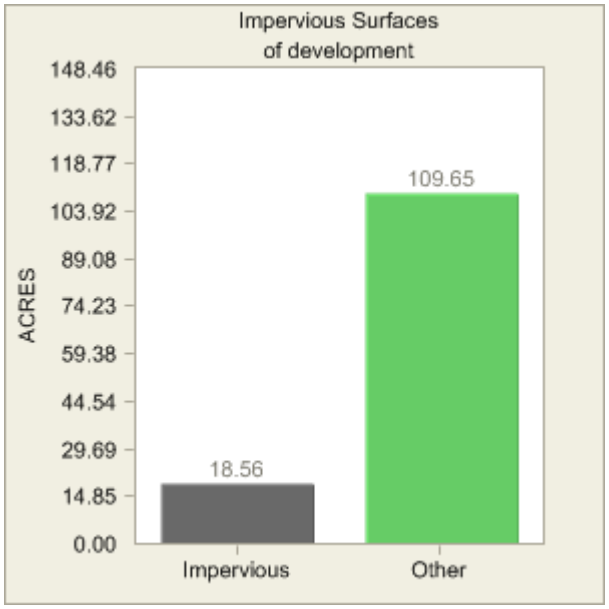

Open Space Land Use
Acreage of Largest Unit
200.0
128.2
0.0

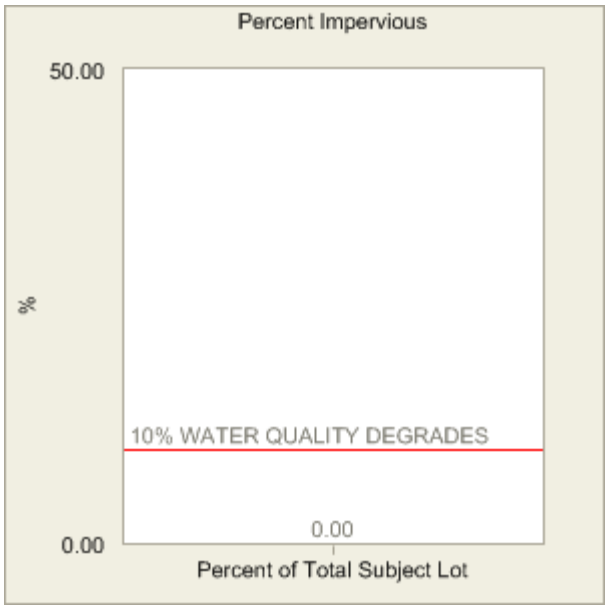

Open Space Land Use
Acreage of Largest Unit
200.0
79.3
0.0

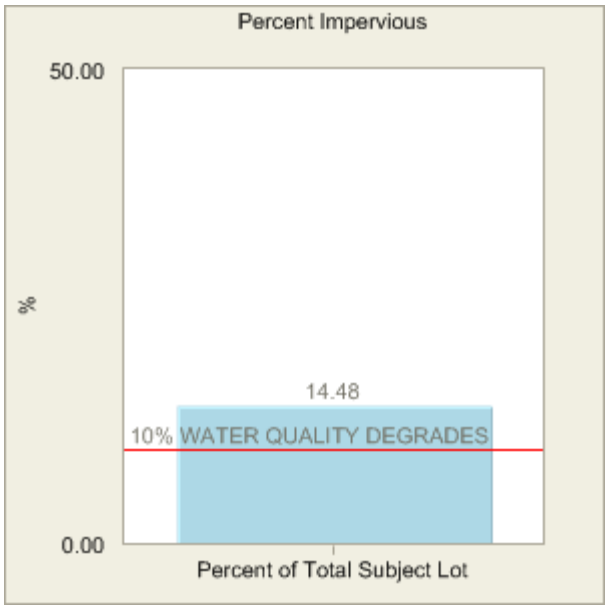

Water Use
Gallons Per Day
20,000.00
gallons/day
0.00
0.00
0.00
0.00
Residential
Comm/Ind
Total

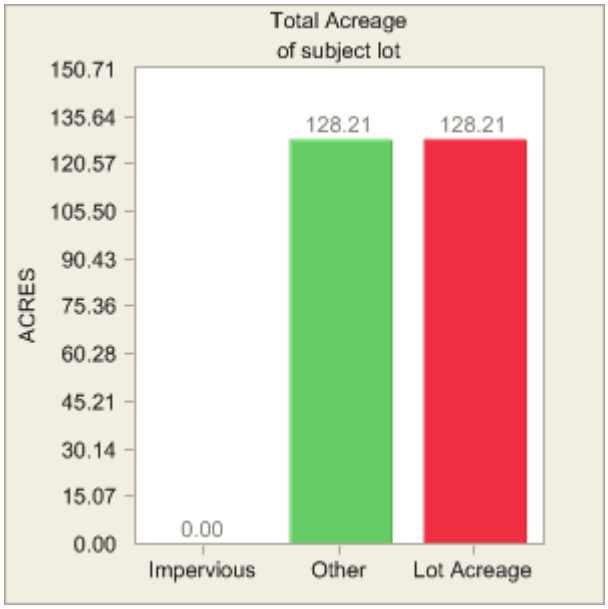

Water Use
Gallons Per Day
20,000.00
gallons/day
0.00
2,535.00
10,000.00
12,535.00
Residential
Comm/Ind
Total

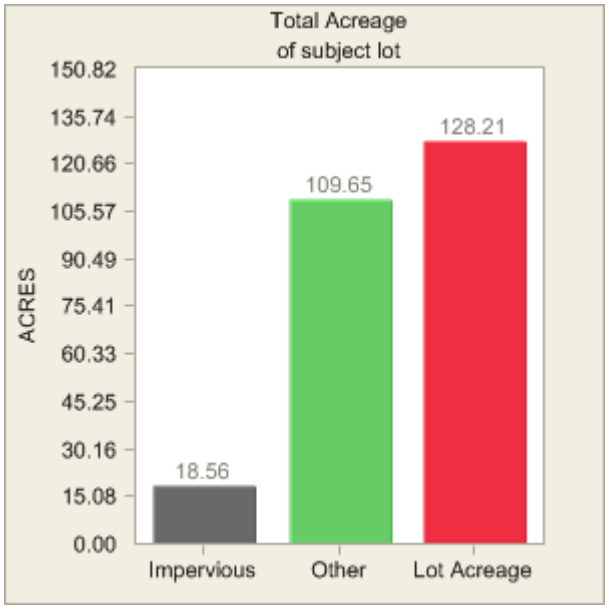

Impervious Surfaces
of development
148.46
133.62
118.77
103.92
89.08
74.23
59.38
44.54
29.69
14.85
0.00
ACRES
0.00
128.21
Impervious
Other

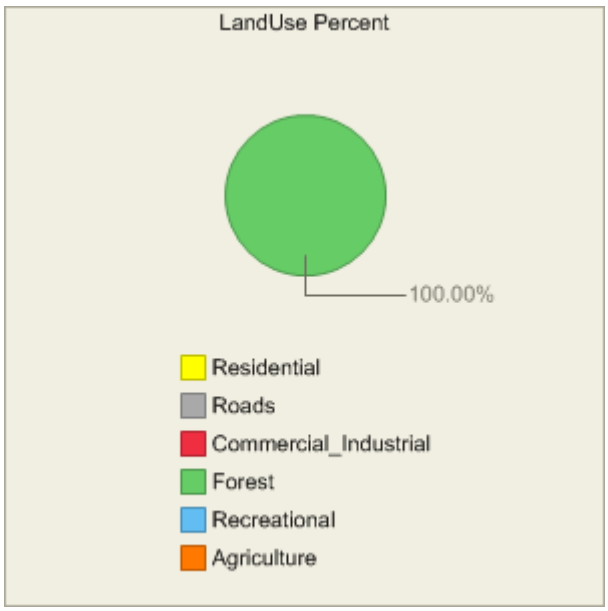

Impervious Surfaces
of development
148.46
133.62
118.77
103.92
89.08
74.23
59.38
44.54
29.69
14.85
0.00
ACRES
18.56
109.65
Impervious
Other

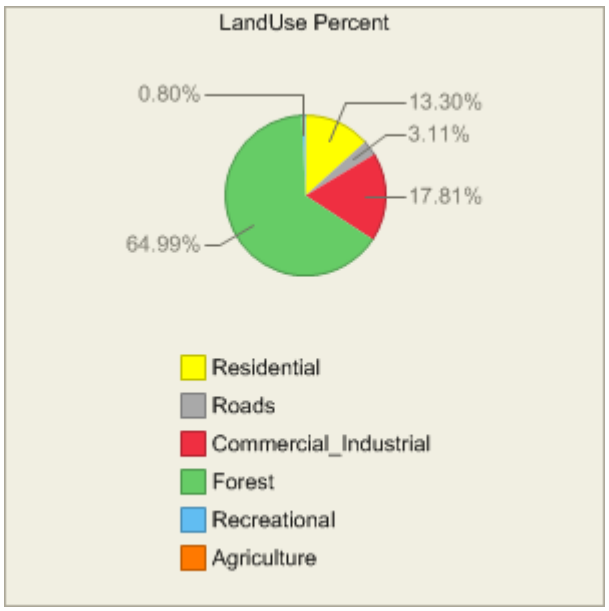

Percent Impervious
50.00
%
10% WATER QUALITY DEGRADES
0.00
0.00
Percent of Total Subject Lot

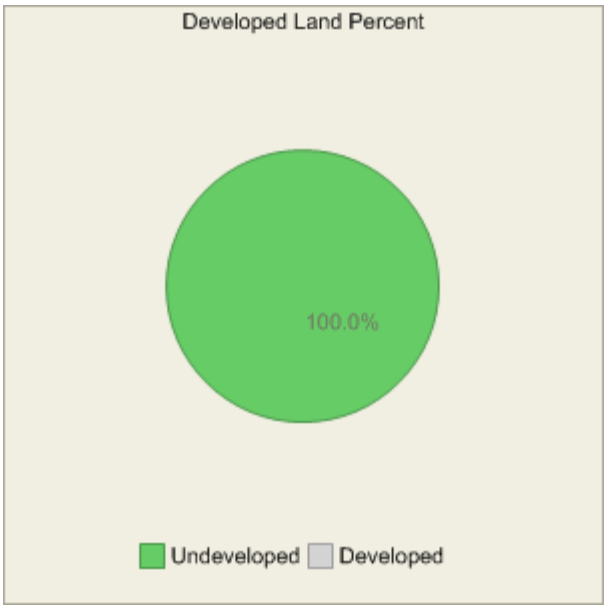

Percent Impervious
50.00
%
14.48
10% WATER QUALITY DEGRADES
0.00
Percent of Total Subject Lot

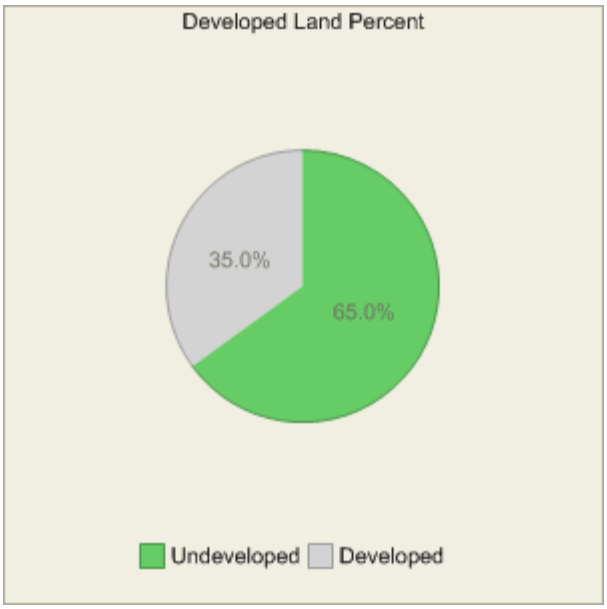

Total Acreage
of subject lot
150.71
135.64
120.57
105.50
90.43
75.36
60.28
45.21
30.14
15.07
0.00
ACRES
128.21
128.21
0.00
Impervious
Other
Lot Acreage

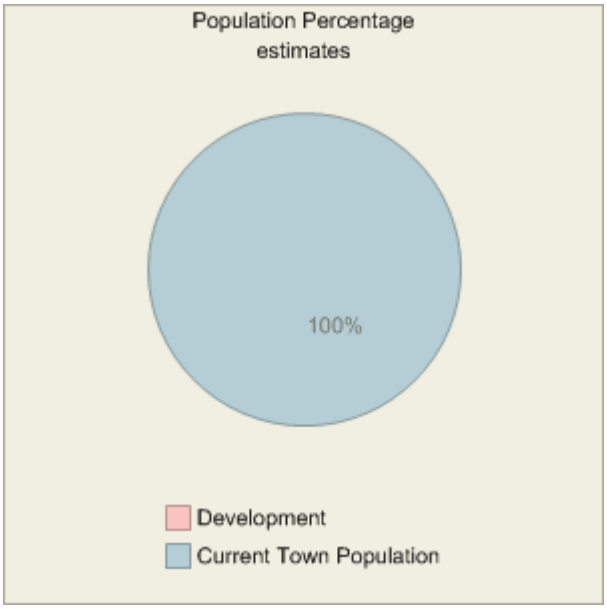

Total Acreage
of subject lot
150.82
135.74
120.66
105.57
90.49
75.41
60.33
45.25
30.16
15.08
0.00
ACRES
128.21
109.65
18.56
Impervious
Other
Lot Acreage

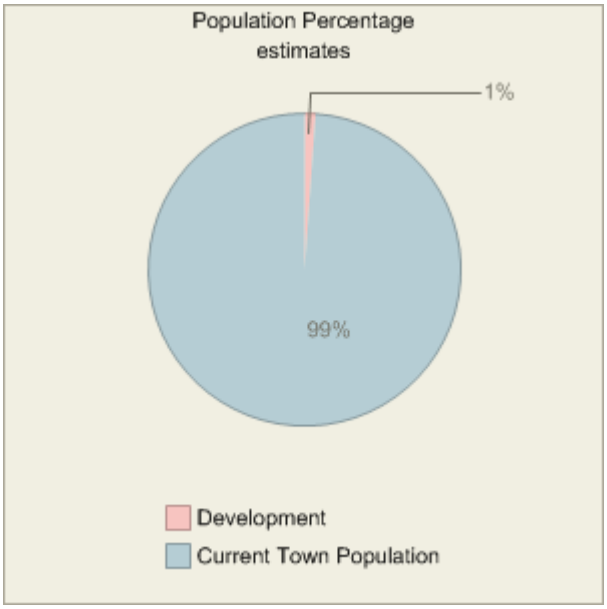

LandUse Percent
100.00%
Residential
Roads
Commercial_Industrial
Forest
Recreational
Agriculture


LandUse Percent
0.80%
13.30%
3.11%
17.81%
64.99%
Residential
Roads
Commercial_Industrial
Forest
Recreational
Agriculture









Assumptions

Assumption	Base Scenario	AsOfRight
CommInd_WaterUse	0 gallons/day	10,000 gallons/day
PersonalWaterUse	65 gallons/day	65 gallons/day
New_Units	0 housing units	13 housing units
PersonsPerUnit	2.63 persons	3.00 persons
TotalHouseholds	1,211 housholds	1,211 housholds
TownPopulation	3,460	3,460
BusCost	110.00 $/yr	110.00 $/yr
CostPerStudent	500.00 $/yr	500.00 $/yr
FCallPopYr	0.10 calls	0.10 calls
PatrolCost_MiYr	100.00 $	100.00 $
PCallPopYr	2.1 calls	2.1 calls
RefuseCostPerHousehold	160.00 $	160.00 $
Road_Maintenance	500 $	500 $

Road_PlowingCost	500 $	500 $
Road_SaltCost	500 $	500 $
Road_SandCost	500 $	500 $
School_Units	0 units with kids	13 units with kids
SchoolBus	False	True
StudentPerUnit	1.8 students	1.8 students
TotalFireCalls	348 calls	348 calls
TotalPoliceCalls	7,096 calls	7,096 calls

Indicators

Indicator	Base Scenario	AsOfRight
CommIndWaterUse	0 gallons/day	10,000 gallons/day
ResiWaterUse	0 gallons/day	2,535 gallons/day
TotalWaterUse	0 gallons/day	12,535 gallons/day
DevelopmentPop	0 housing units persons	39 housing units persons
LotSize	128.21	128.21
Population	3,460	3,499
Agriculture	0.00 acres	0.00 acres
Commercial_Industrial	0.00 acres	22.83 acres
Developed Landuse	0.00000 acres	44.88832 acres
Forest	128.21 acres	83.31 acres
Recreational	0.00 acres	1.03 acres
Residential	0.00 acres	17.05 acres
Roads	0.00 acres	3.98 acres
UnDeveloped Landuse	128.21214 acres	83.31275 acres
ImpervSurf	0.00	18.56
PercImpervSurf	0.0 %	14.5 %
PervSurf	128.21	109.65
AquiferCov	0.00 acres	16.64 acres
DWPACov	0.00 acres	15.15 acres
Flood Hazard 100 yr Cov	0.00 acres	0.09 acres
Flood Hazard 500 yr Cov	0.00 acres	0.00 acres
Prime Farmland Coverage	0.00 acres	0.00 acres
Sand and Gravel Coverage	0.00 acres	1.23 acres
Sand and Gravel Pits Coverage	0.00 acres	0.00 acres
Sand Deposits Coverage	0.00 acres	0.00 acres
Statewide Farmland Coverage	0.00 acres	0.86 acres
WetlandCov	0.00 acres	0.19 acres
MaxFragBloc	0.0 acres	49.6 acres
maxOSLandAC	128.21	79.34
maxOSLandu	5,584,920.72	3,456,180.23
MaxUnFragBloc	946.9 acres	946.9 acres
MaxUnFragPotNew	946.8 acres	897.3 acres
UnfragLandLoss	0.03 acres	49.61 acres

AdditionalFireCalls	0 calls persons units	4 calls persons units
AdditionalPatrolCost	0.00 $ per miles	107.11 $ per miles
AdditionalPoliceCalls	0.0 calls persons units	81.9 calls persons units
AdditionalRefuseCost	0.0 $ units	2,080.0 $ units
PotentialTotalFireCalls	348 calls	352 calls
PotentialTotalPoliceCalls	7,096 calls persons units	7,178 calls persons units
PotentialTotalRefuseCost	193,760 housholds $	195,840 housholds $
Road_Maintenance_Cost	0.00 $ miles	535.57 $ miles
Road_WinterCare_Cost	0.00 mile $	1,606.70 mile $
SchoolBudget	0.00 $/yr students	14,274.00 $/yr students
TotalRoadLength	0.00 miles	1.07 miles

Alerts

Analysis powered by communityViz

Dev1 Comparison Dev2

Analysis Description

This analysis compares up to 4 scenarios of the same subject lot. The base scenario reflect the current conditions, AsOfRight scenario covers what is permitted by zoning and Dev1 and Dev2 are alternate development proposals for exceptional development.

Scenarios in this Report

Dev1

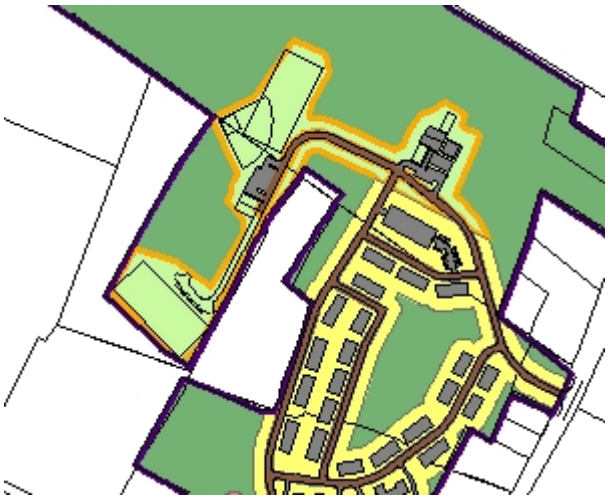
alternate 1

Dev2

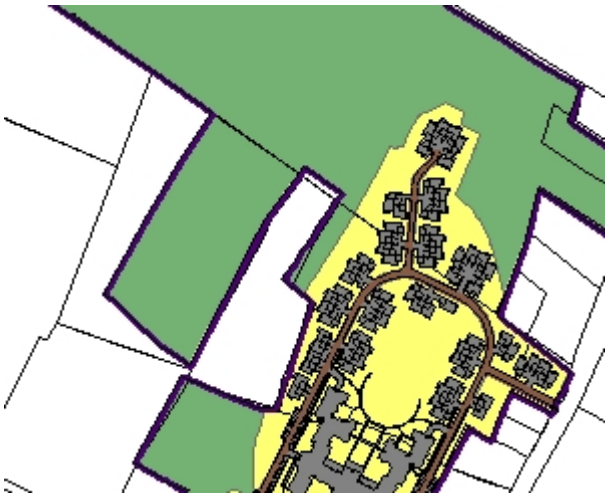
alternate 2

Report Summary

Dev1

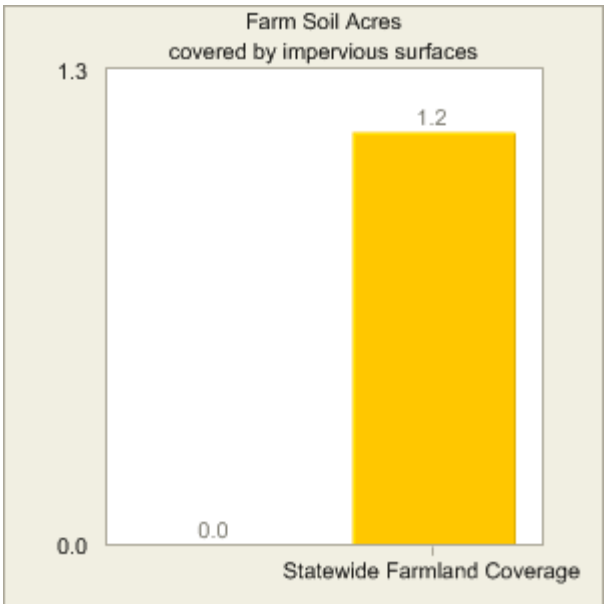


Dev2

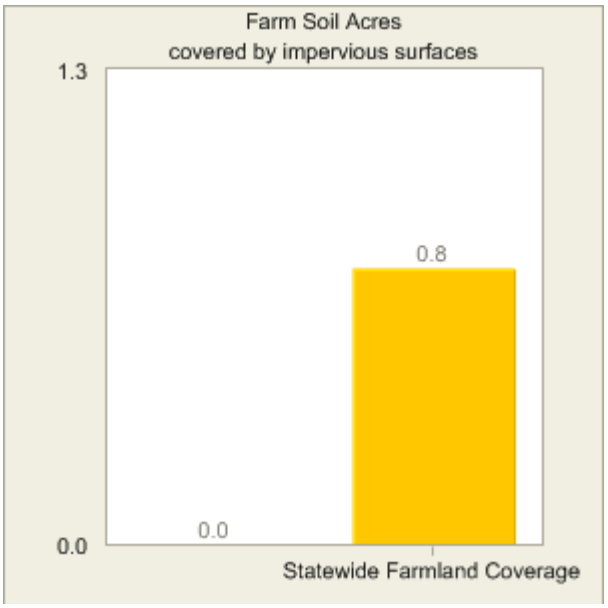


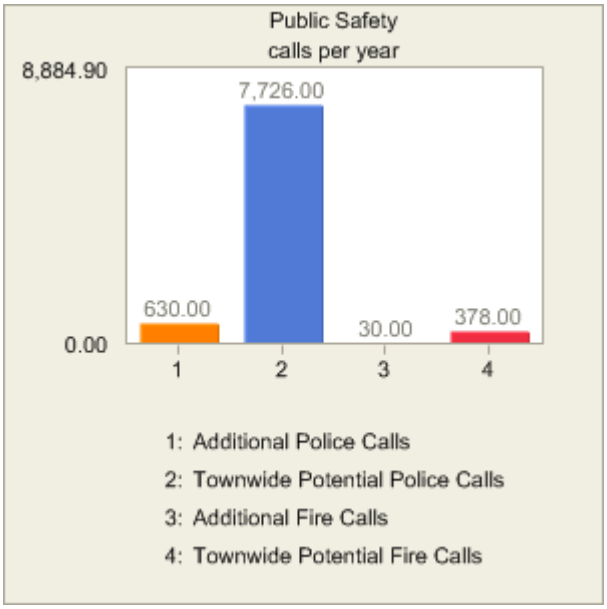
Indicator Charts

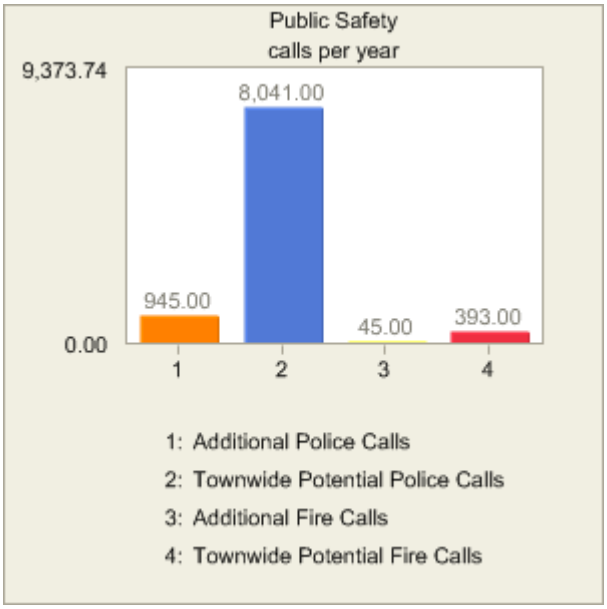
Dev1

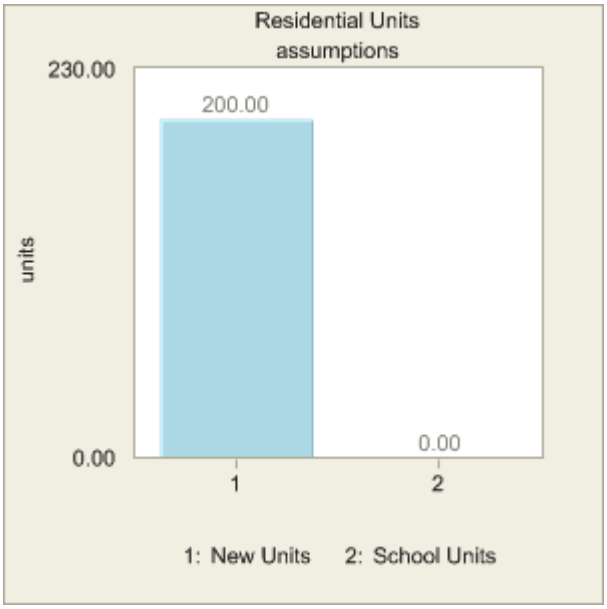


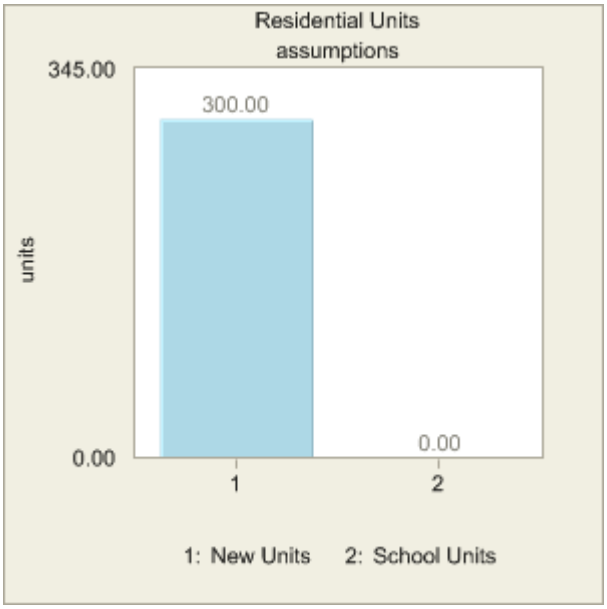
Dev2

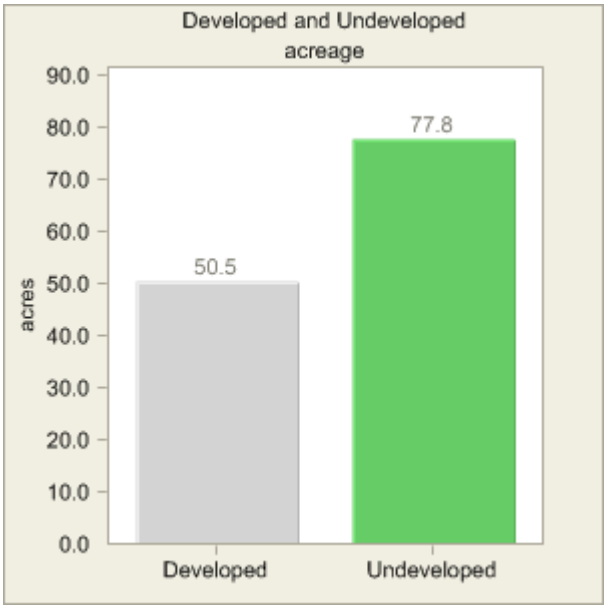


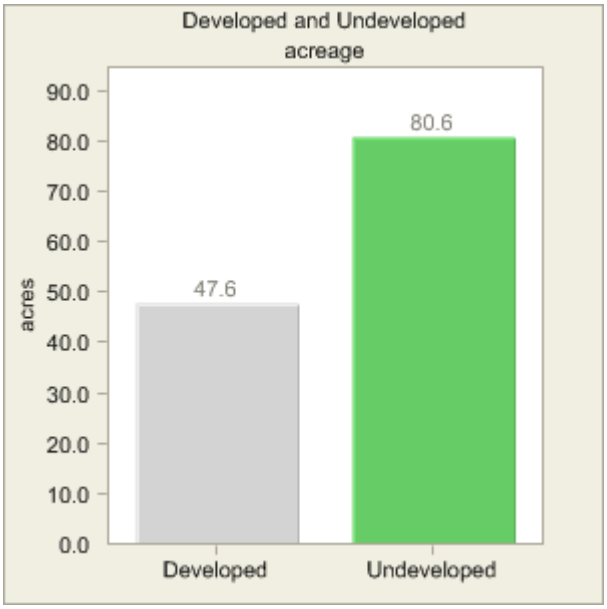

Public Safety
calls per year
8,884.90
0.00
630.00
7,726.00
30.00
378.00
1
2
3
4
1: Additional Police Calls
2: Townwide Potential Police Calls
3: Additional Fire Calls
4: Townwide Potential Fire Calls

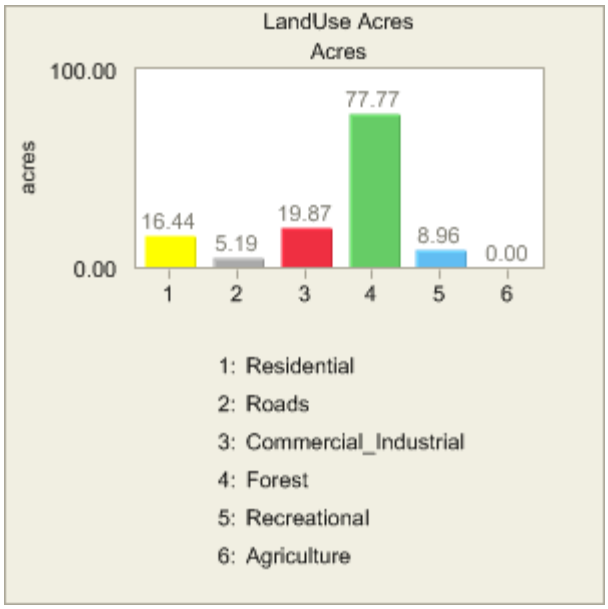

Public Safety
calls per year
9,373.74
0.00
945.00
8,041.00
45.00
393.00
1
2
3
4
1: Additional Police Calls
2: Townwide Potential Police Calls
3: Additional Fire Calls
4: Townwide Potential Fire Calls

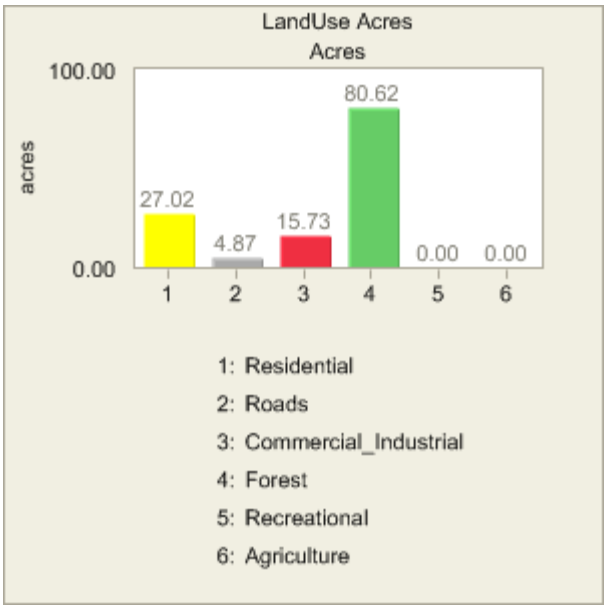

Residential Units
assumptions
230.00
0.00
units
200.00
0.00
1
2
1: New Units
2: School Units

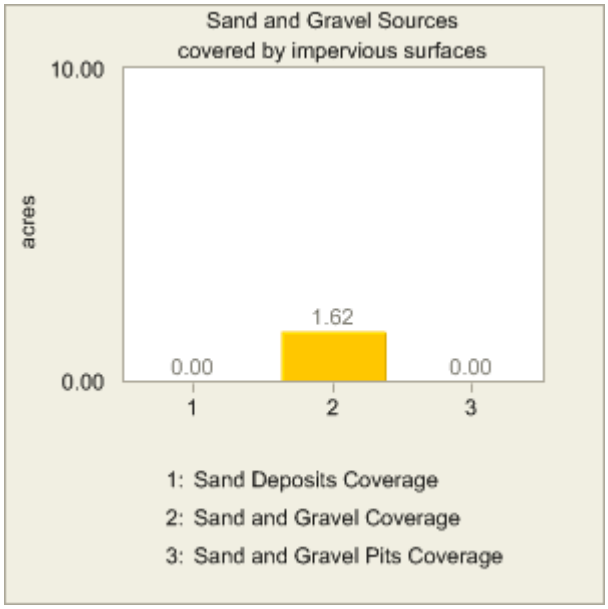

Residential Units
assumptions
345.00
0.00
units
300.00
0.00
1
2
1: New Units
2: School Units

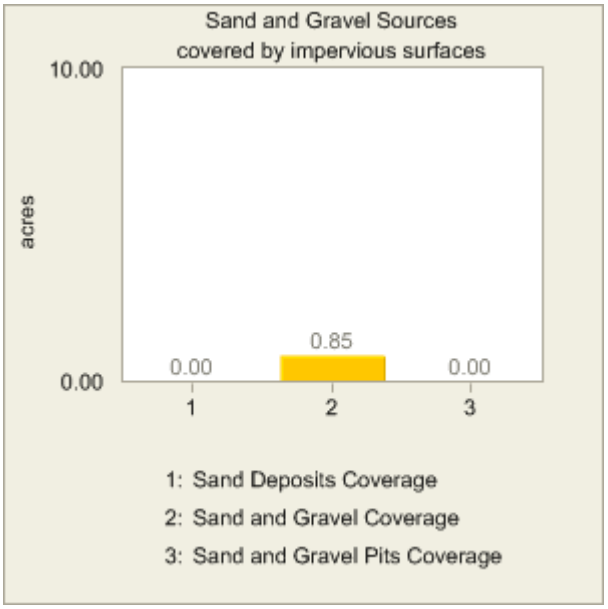

Developed and Undeveloped
acreage
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
acres
50.5
77.8
Developed
Undeveloped

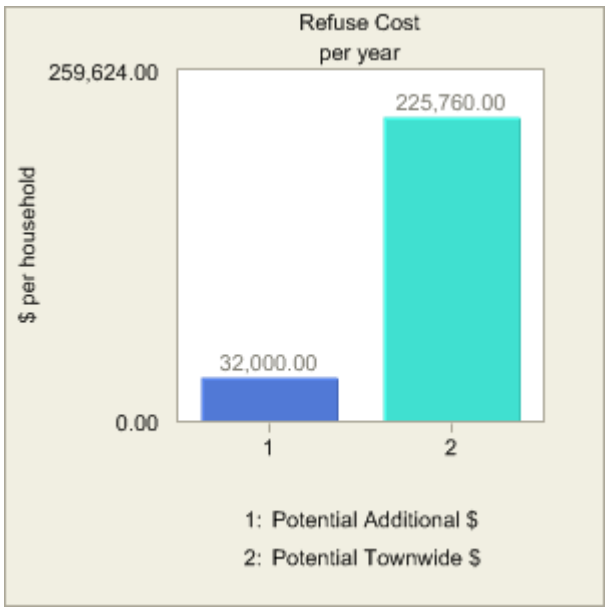

Developed and Undeveloped
acreage
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
acres
47.6
80.6
Developed
Undeveloped

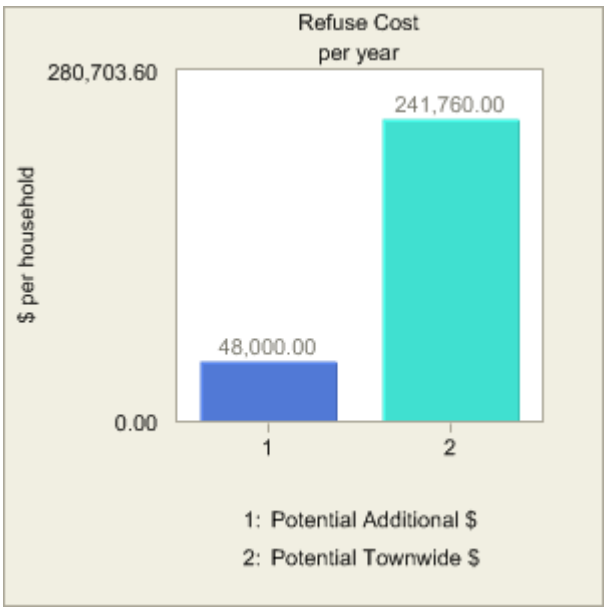

LandUse Acres
Acres
100.00
0.00
acres
16.44
5.19
19.87
77.77
8.96
0.00
1
2
3
4
5
6
1: Residential
2: Roads
3: Commercial_Industrial
4: Forest
5: Recreational
6: Agriculture

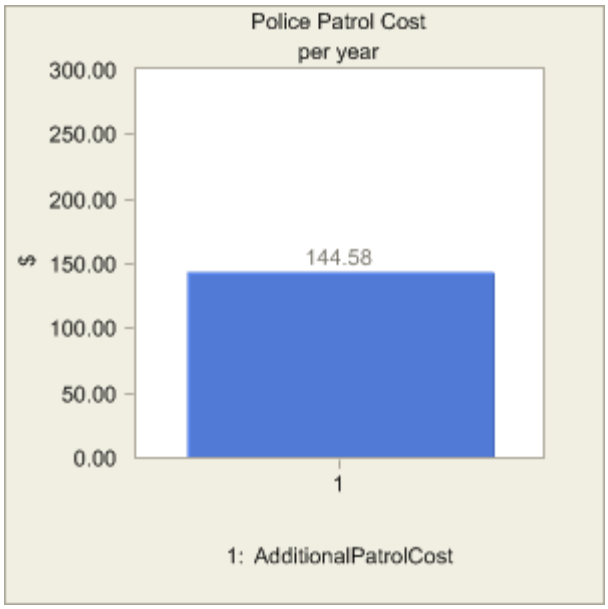

LandUse Acres
Acres
100.00
0.00
acres
27.02
4.87
15.73
80.62
0.00
0.00
1
2
3
4
5
6
1: Residential
2: Roads
3: Commercial_Industrial
4: Forest
5: Recreational
6: Agriculture

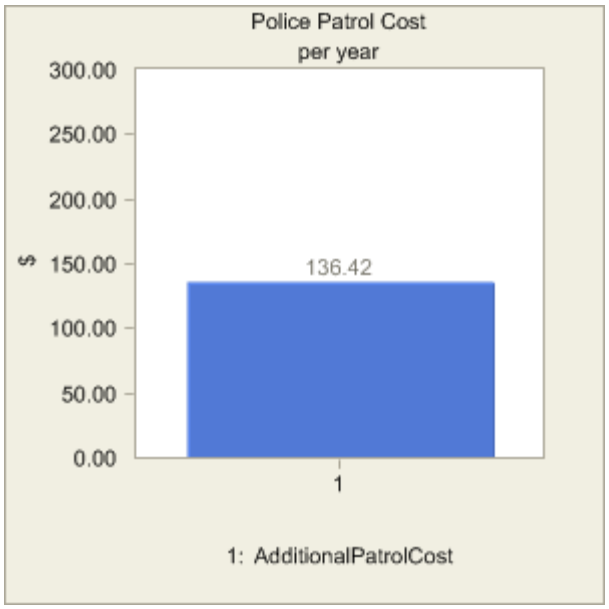

Sand and Gravel Sources
covered by impervious surfaces
10.00
0.00
acres
0.00
1.62
0.00
1
2
3
1: Sand Deposits Coverage
2: Sand and Gravel Coverage
3: Sand and Gravel Pits Coverage

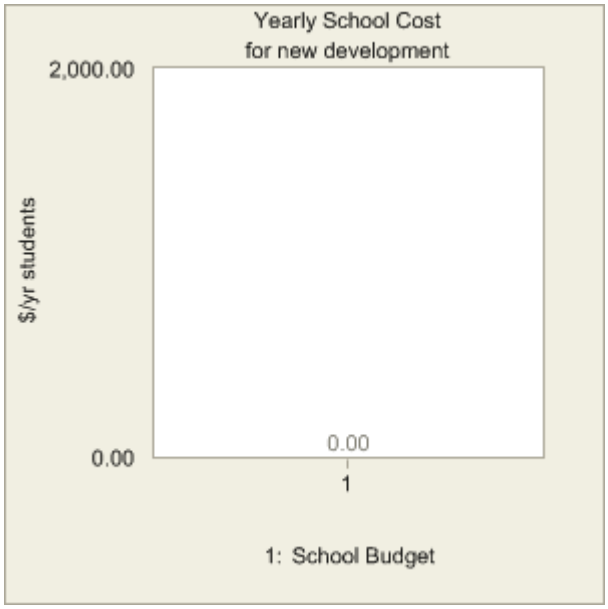

Sand and Gravel Sources
covered by impervious surfaces
10.00
0.00
acres
0.00
0.85
0.00
1
2
3
1: Sand Deposits Coverage
2: Sand and Gravel Coverage
3: Sand and Gravel Pits Coverage

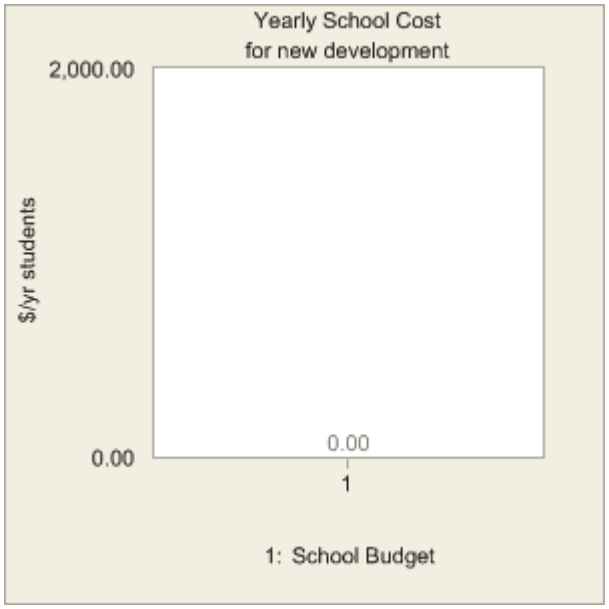

Refuse Cost
per year
259,624.00
0.00
$ per household
32,000.00
225,760.00
1
2
1: Potential Additional $
2: Potential Townwide $

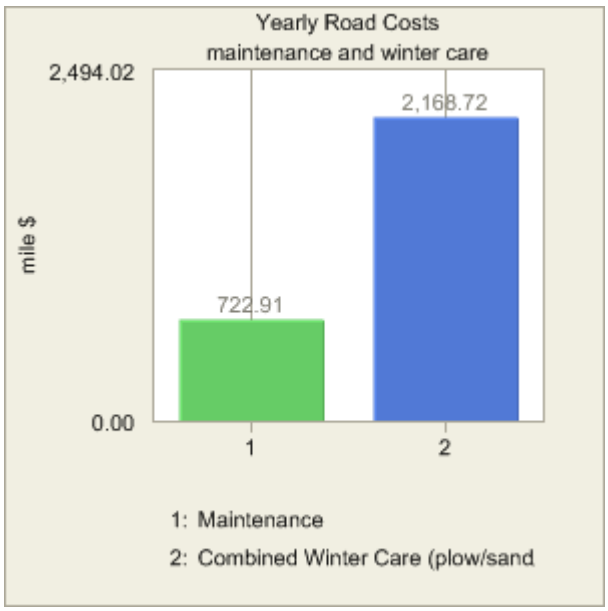

Refuse Cost
per year
280,703.60
0.00
$ per household
48,000.00
241,760.00
1
2
1: Potential Additional $
2: Potential Townwide $

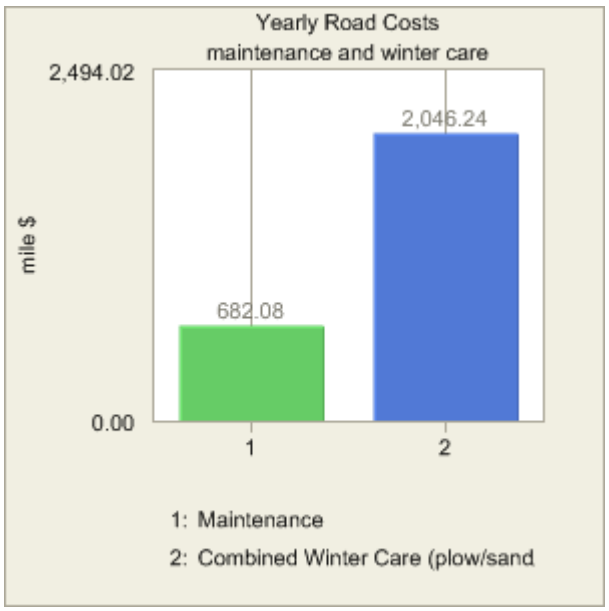

Police Patrol Cost
per year
300.00
250.00
200.00
$
150.00
100.00
50.00
0.00
144.58
1
1: AdditionalPatrolCost

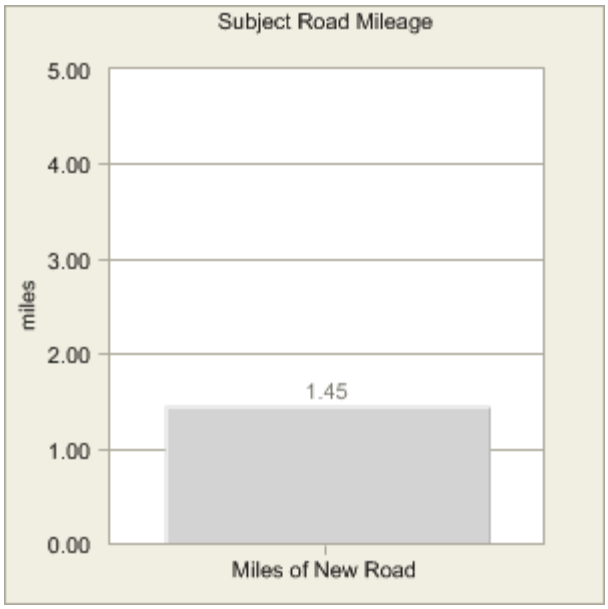

Police Patrol Cost
per year
300.00
250.00
200.00
$
150.00
100.00
50.00
0.00
136.42
1
1: AdditionalPatrolCost

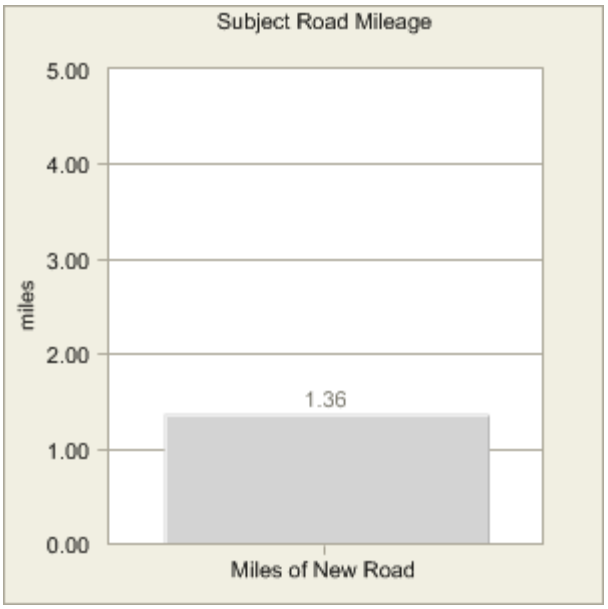

Yearly School Cost
for new development
2,000.00
$/yr students
0.00
0.00
1
1: School Budget

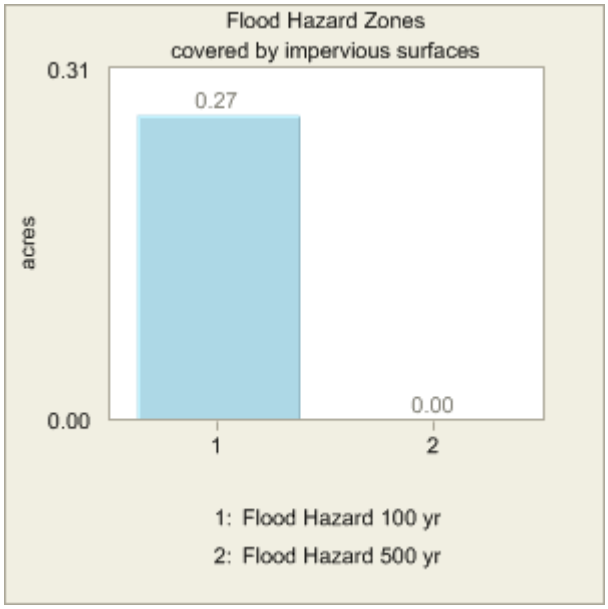

Yearly School Cost
for new development
2,000.00
$/yr students
0.00
0.00
1
1: School Budget

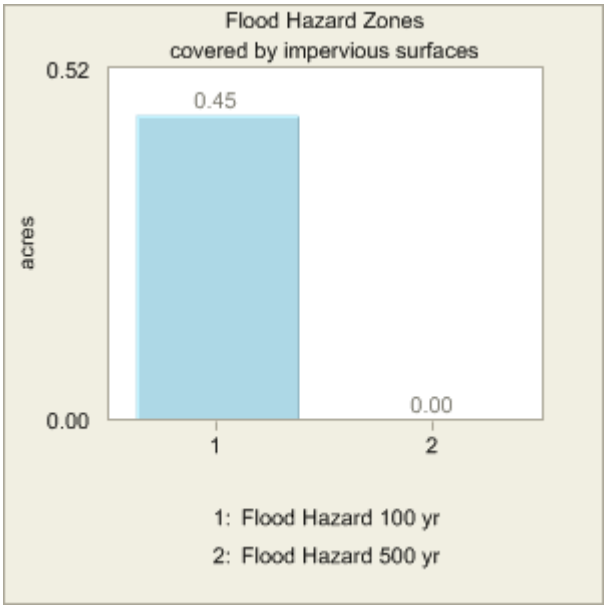

Yearly Road Costs
maintenance and winter care
2,494.02
mile $
2,168.72
722.91
0.00
1
2
1: Maintenance
2: Combined Winter Care (plow/sand

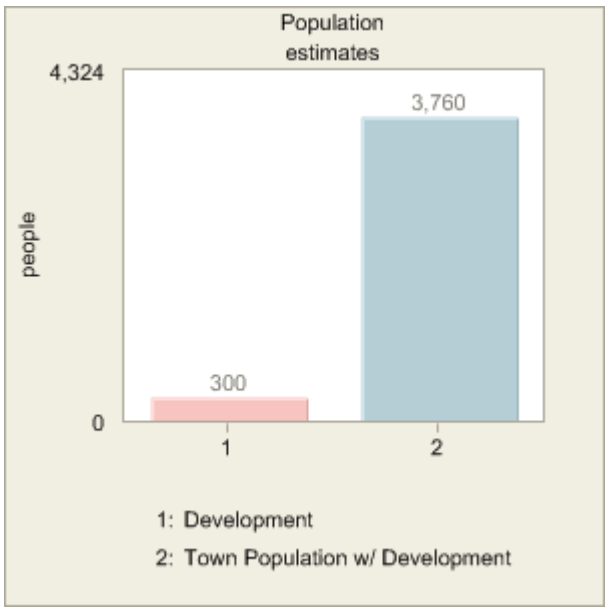

Yearly Road Costs
maintenance and winter care
2,494.02
mile $
2,046.24
682.08
0.00
1
2
1: Maintenance
2: Combined Winter Care (plow/sand

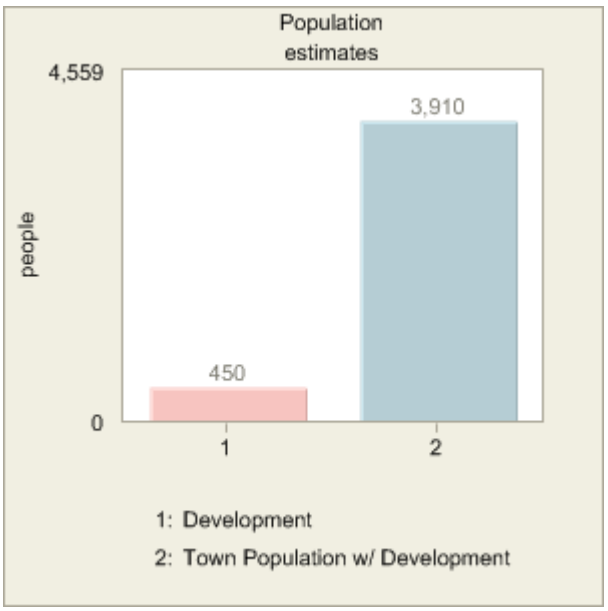

Subject Road Mileage
5.00
4.00
3.00
2.00
1.00
0.00
miles
1.45
Miles of New Road

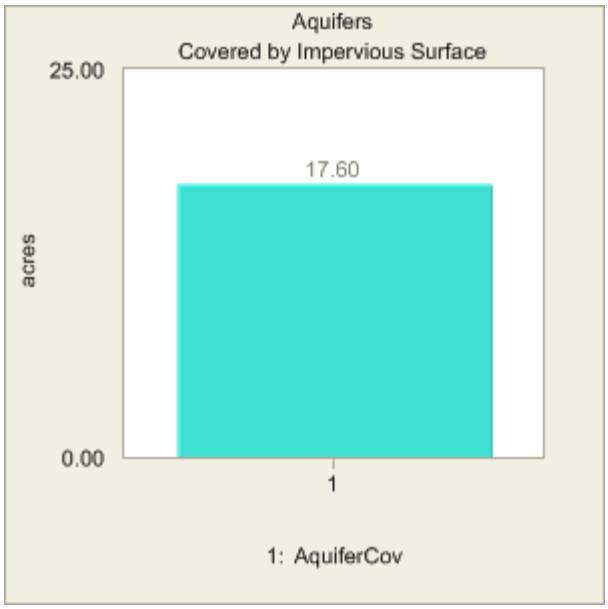

Subject Road Mileage
5.00
4.00
3.00
2.00
1.00
0.00
miles
1.36
Miles of New Road

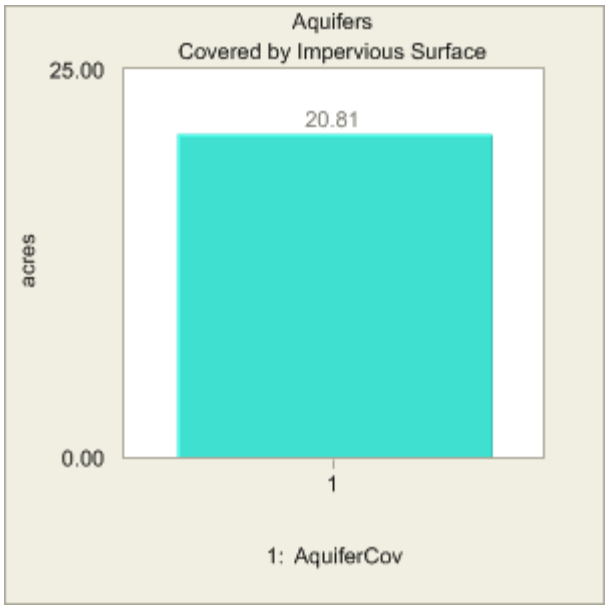

Flood Hazard Zones
covered by impervious surfaces
0.31
0.00
acres
0.27
0.00
1
2
1: Flood Hazard 100 yr
2: Flood Hazard 500 yr

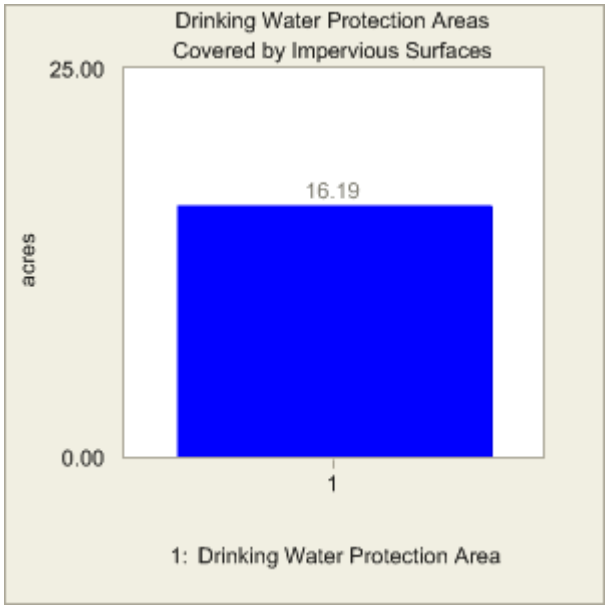

Flood Hazard Zones
covered by impervious surfaces
0.52
0.00
acres
0.45
0.00
1
2
1: Flood Hazard 100 yr
2: Flood Hazard 500 yr

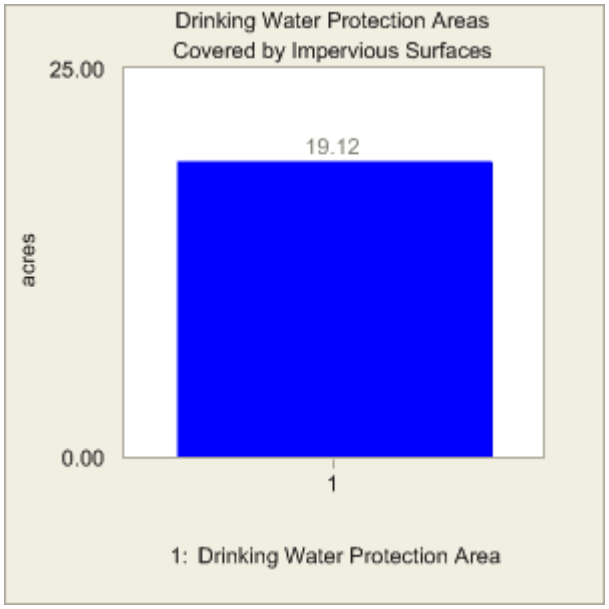

Population
estimates
4,324
0
people
300
3,760
1
2
1: Development
2: Town Population w/ Development

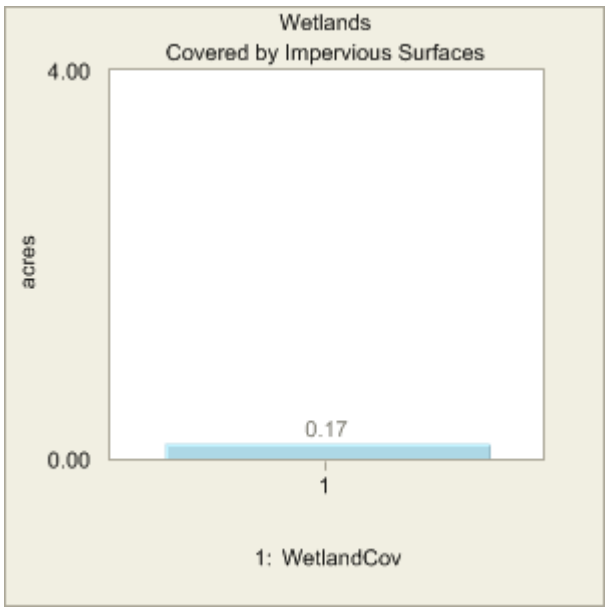

Population
estimates
4,559
0
people
450
3,910
1
2
1: Development
2: Town Population w/ Development

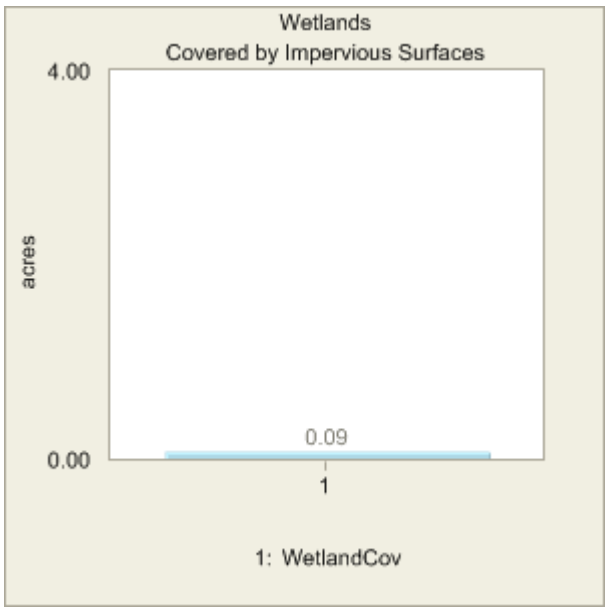

Aquifers
Covered by Impervious Surface
25.00
17.60
acres
0.00
1
1: AquiferCov

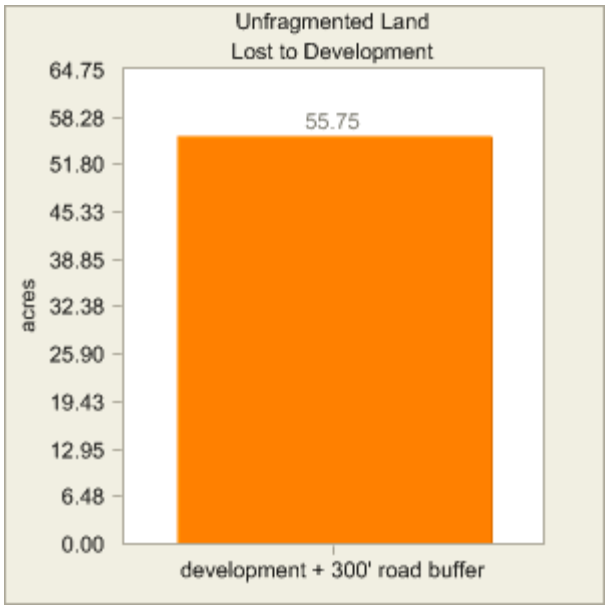

Aquifers
Covered by Impervious Surface
25.00
20.81
acres
0.00
1
1: AquiferCov

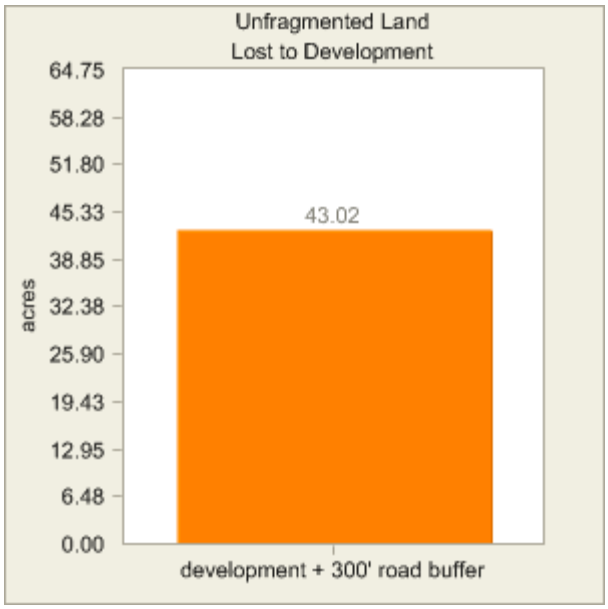

Drinking Water Protection Areas
Covered by Impervious Surfaces
25.00
16.19
acres
0.00
1
1: Drinking Water Protection Area

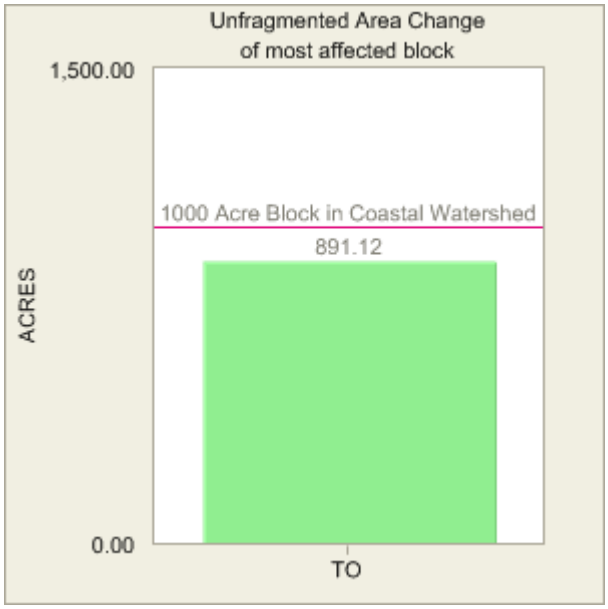

Drinking Water Protection Areas
Covered by Impervious Surfaces
25.00
19.12
acres
0.00
1
1: Drinking Water Protection Area

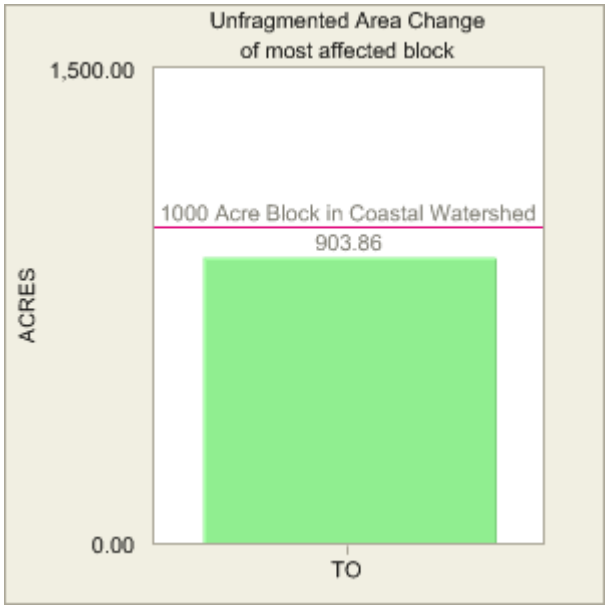

Wetlands
Covered by Impervious Surfaces
4.00
0.17
acres
0.00
1
1: WetlandCov

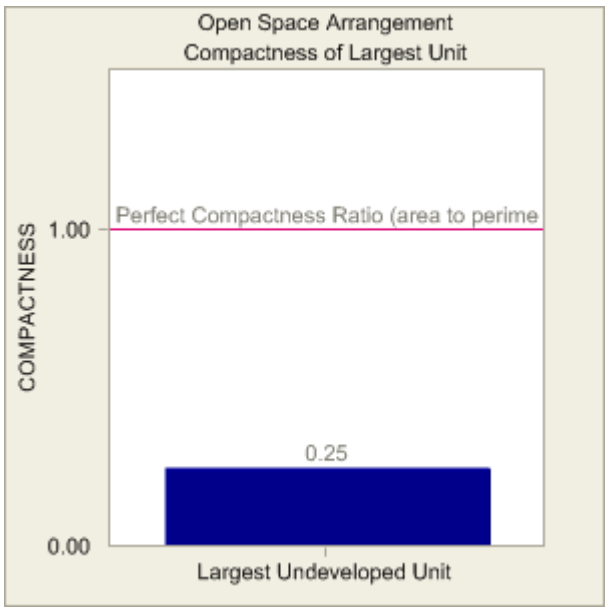

Wetlands
Covered by Impervious Surfaces
4.00
0.09
acres
0.00
1
1: WetlandCov

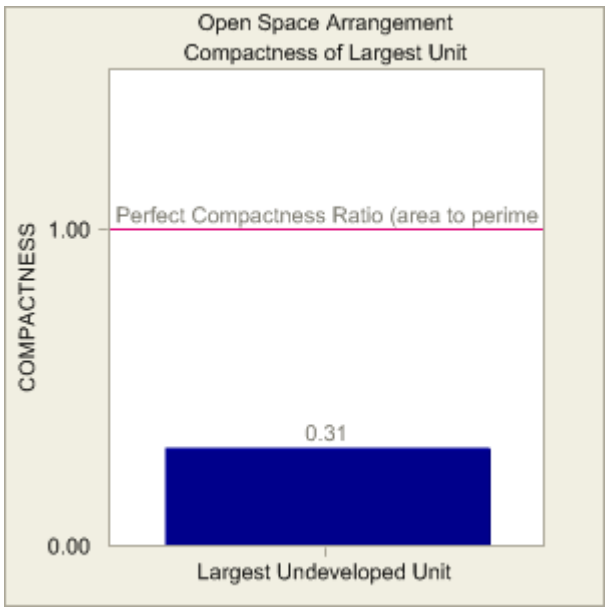

Unfragmented Land
Lost to Development
64.75
58.28
51.80
45.33
38.85
32.38
25.90
19.43
12.95
6.48
0.00
acres
55.75
development + 300' road buffer

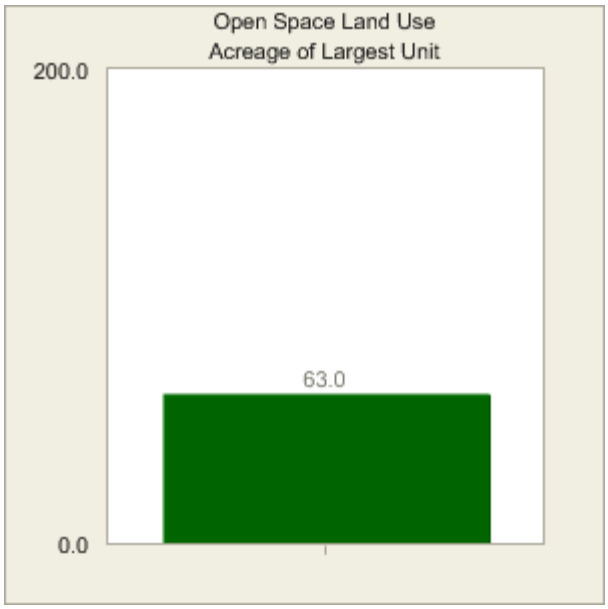

Unfragmented Land
Lost to Development
64.75
58.28
51.80
45.33
38.85
32.38
25.90
19.43
12.95
6.48
0.00
acres
43.02
development + 300' road buffer

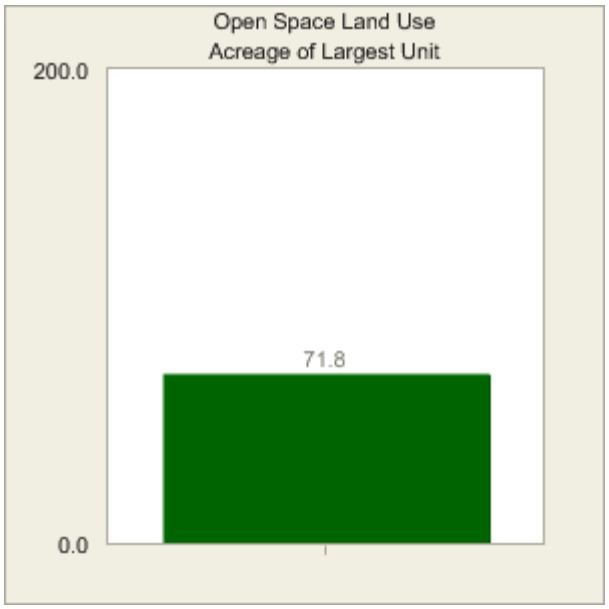

Unfragmented Area Change
of most affected block
1,500.00
1000 Acre Block in Coastal Watershed
891.12
0.00
ACRES
TO

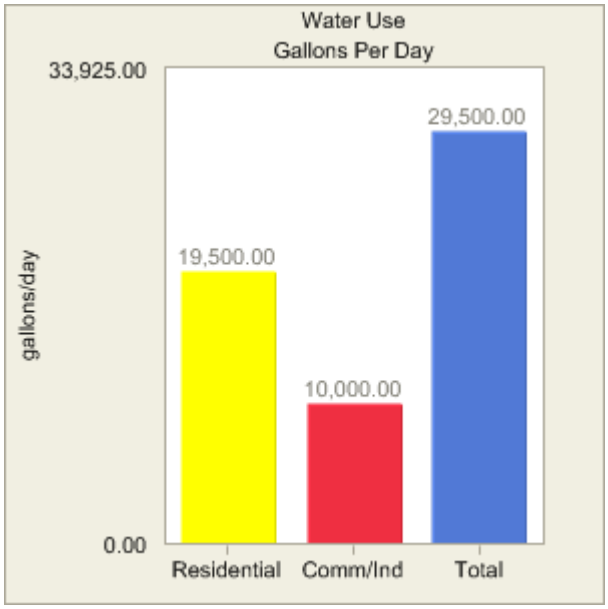

Unfragmented Area Change
of most affected block
1,500.00
1000 Acre Block in Coastal Watershed
903.86
0.00
ACRES
TO

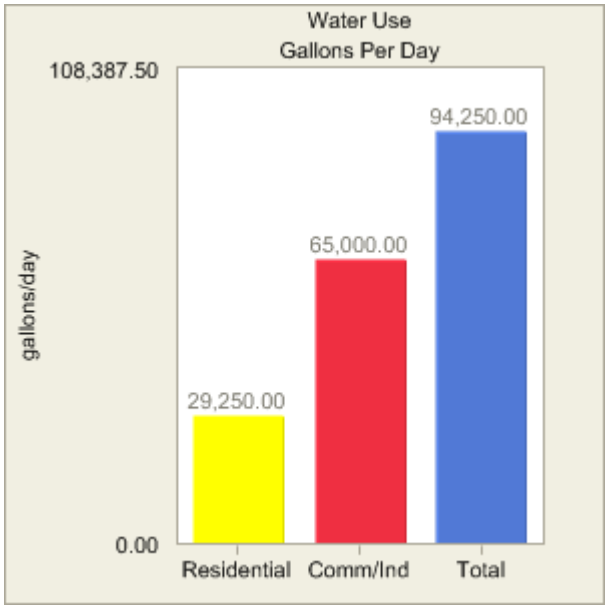

Open Space Arrangement
Compactness of Largest Unit
Perfect Compactness Ratio (area to perime
1.00
0.25
0.00
COMPACTNESS
Largest Undeveloped Unit

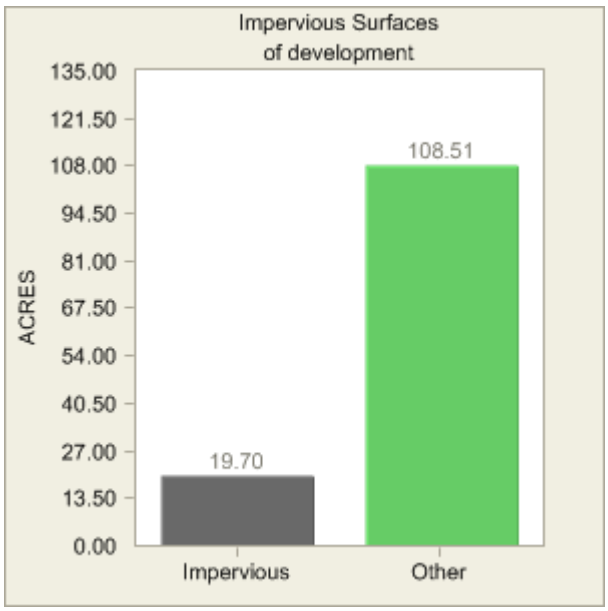

Open Space Arrangement
Compactness of Largest Unit
Perfect Compactness Ratio (area to perime
1.00
0.31
0.00
COMPACTNESS
Largest Undeveloped Unit

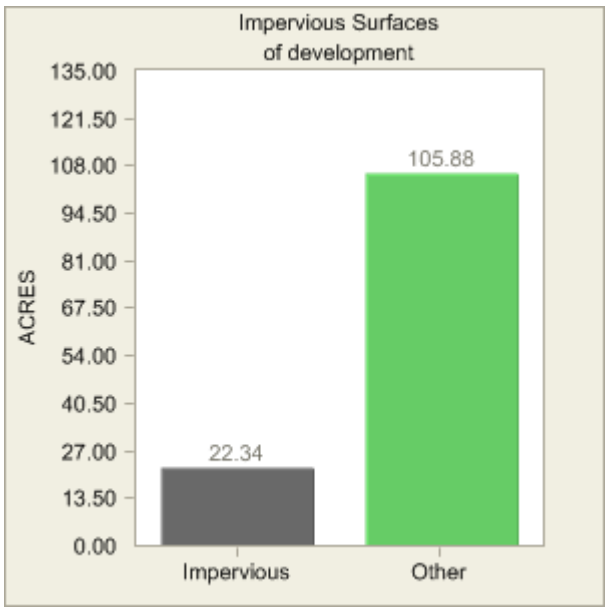

Open Space Land Use
Acreage of Largest Unit
200.0
63.0
0.0

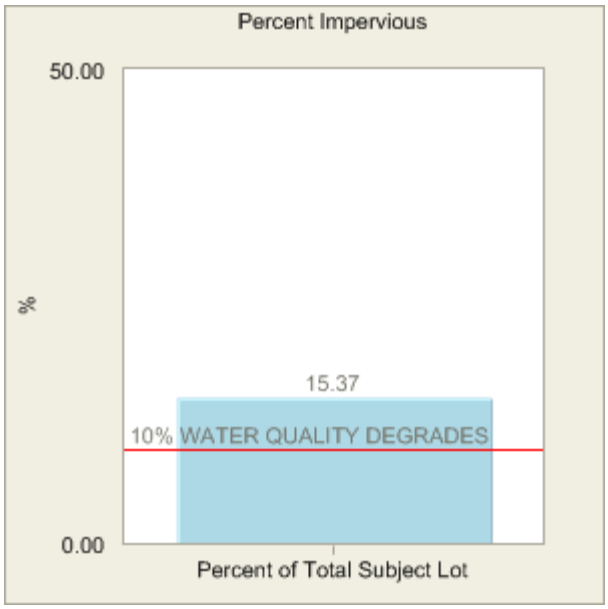

Open Space Land Use
Acreage of Largest Unit
200.0
71.8
0.0

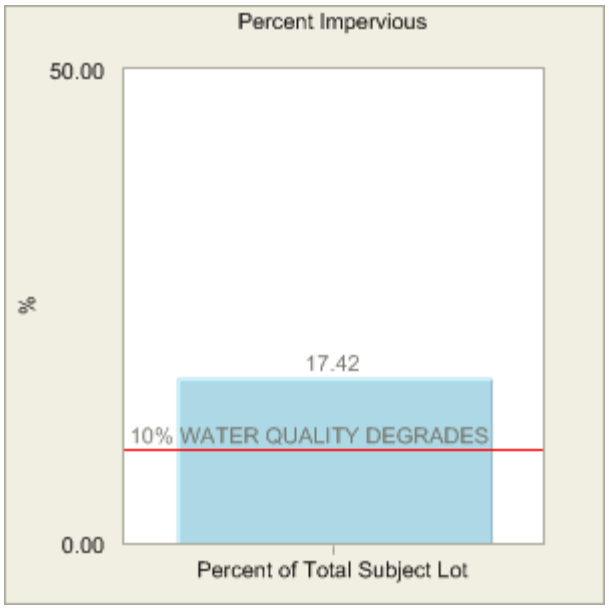

Water Use
Gallons Per Day
gallons/day
33,925.00
29,500.00
19,500.00
10,000.00
0.00
Residential
Comm/Ind
Total

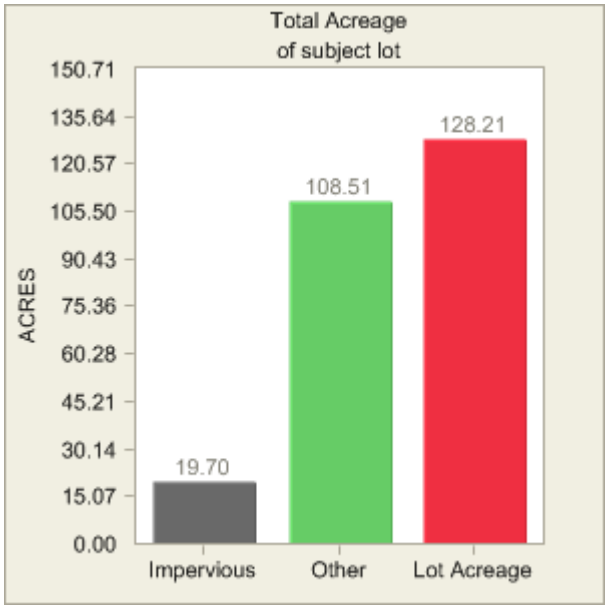

Water Use
Gallons Per Day
gallons/day
108,387.50
94,250.00
65,000.00
29,250.00
0.00
Residential
Comm/Ind
Total

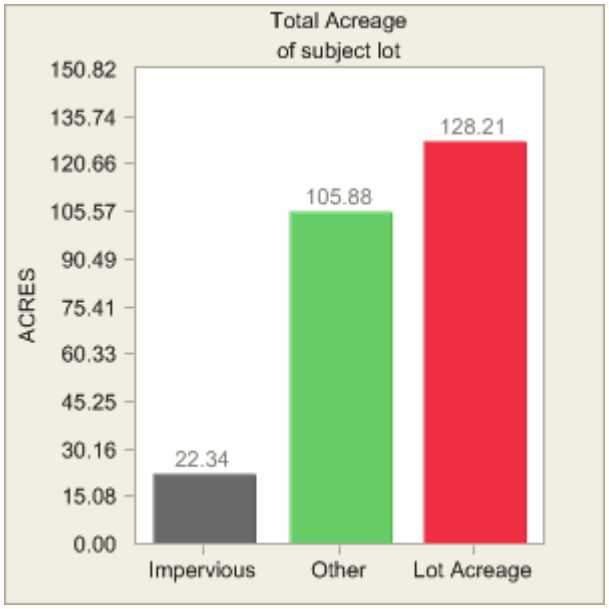

Impervious Surfaces
of development
ACRES
135.00
121.50
108.00
94.50
81.00
67.50
54.00
40.50
27.00
13.50
0.00
108.51
19.70
Impervious
Other

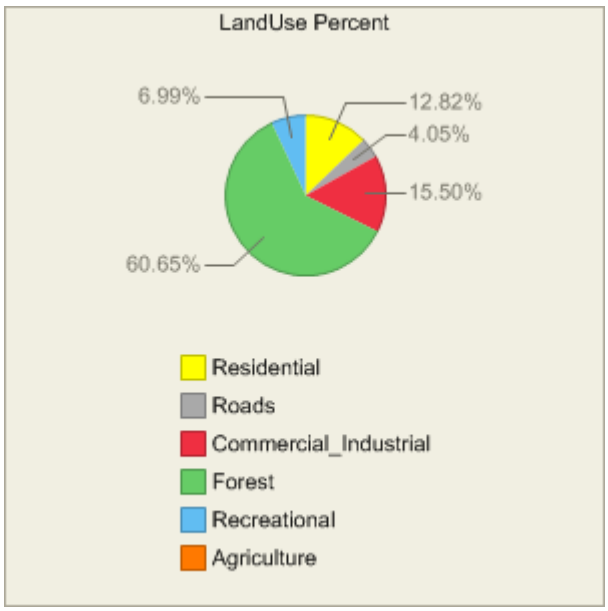

Impervious Surfaces
of development
ACRES
135.00
121.50
108.00
94.50
81.00
67.50
54.00
40.50
27.00
13.50
0.00
105.88
22.34
Impervious
Other

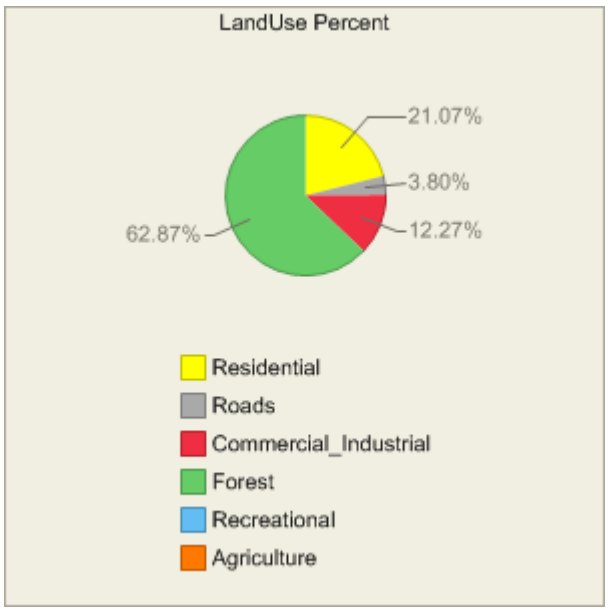

Percent Impervious
50.00
%
15.37
10% WATER QUALITY DEGRADES
0.00
Percent of Total Subject Lot

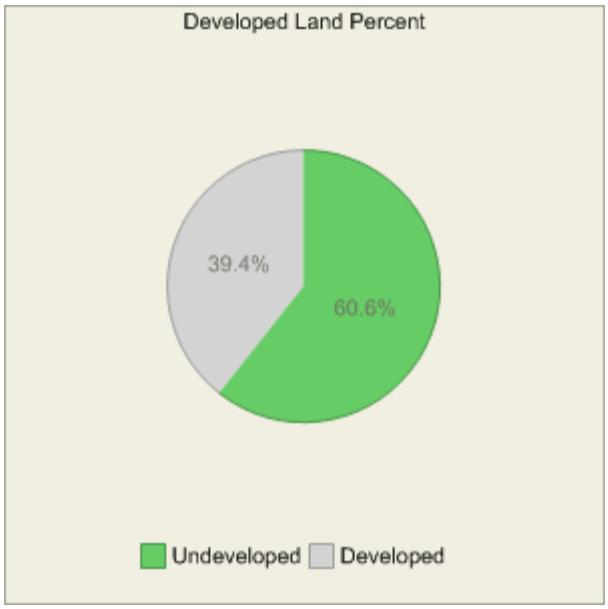

Percent Impervious
50.00
%
17.42
10% WATER QUALITY DEGRADES
0.00
Percent of Total Subject Lot

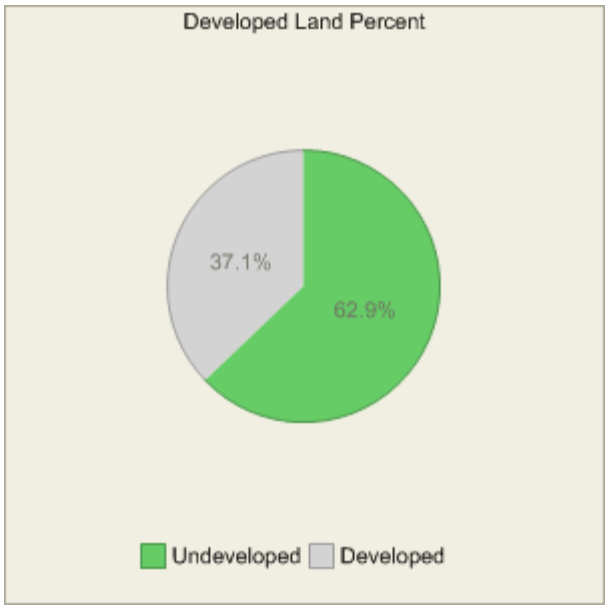

Total Acreage
of subject lot
150.71
135.64
120.57
105.50
90.43
75.36
60.28
45.21
30.14
15.07
0.00
ACRES
19.70
108.51
128.21
Impervious
Other
Lot Acreage

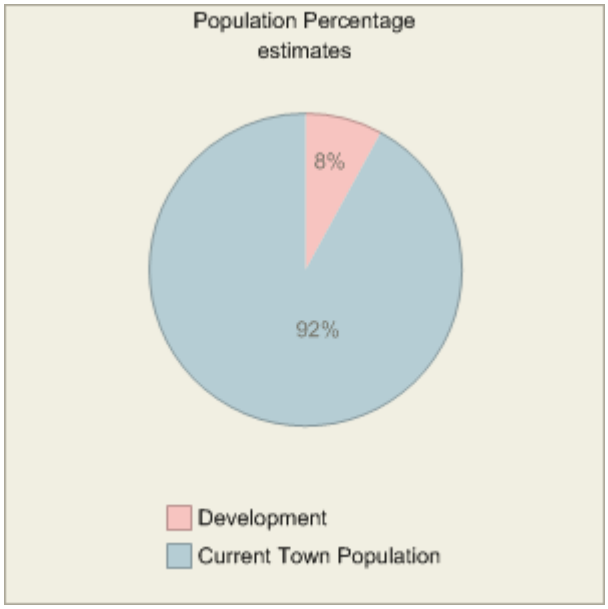

Total Acreage
of subject lot
150.82
135.74
120.66
105.57
90.49
75.41
60.33
45.25
30.16
15.08
0.00
ACRES
22.34
105.88
128.21
Impervious
Other
Lot Acreage

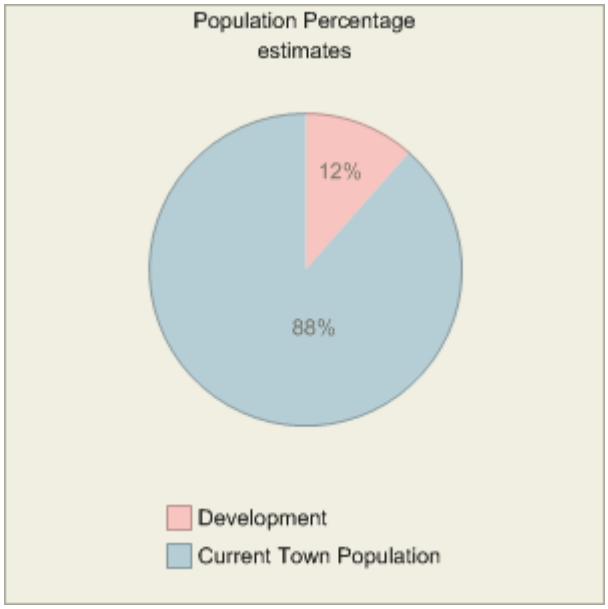

LandUse Percent
6.99%
12.82%
4.05%
15.50%
60.65%
Residential
Roads
Commercial_Industrial
Forest
Recreational
Agriculture


LandUse Percent
21.07%
3.80%
62.87%
12.27%
Residential
Roads
Commercial_Industrial
Forest
Recreational
Agriculture









Assumptions

Assumption	Dev1	Dev2
CommInd_WaterUse	10,000 gallons/day	65,000 gallons/day
PersonalWaterUse	65 gallons/day	65 gallons/day
New_Units	200 housing units	300 housing units
PersonsPerUnit	1.50 persons	1.50 persons
TotalHouseholds	1,211 housholds	1,211 housholds
TownPopulation	3,460	3,460
BusCost	110.00 $/yr	110.00 $/yr
CostPerStudent	500.00 $/yr	500.00 $/yr
FCallPopYr	0.10 calls	0.10 calls
PatrolCost_MiYr	100.00 $	100.00 $
PCallPopYr	2.1 calls	2.1 calls
RefuseCostPerHousehold	160.00 $	160.00 $
Road_Maintenance	500 $	500 $

Road_PlowingCost	500 $	500 $
Road_SaltCost	500 $	500 $
Road_SandCost	500 $	500 $
School_Units	0 units with kids	0 units with kids
SchoolBus	False	False
StudentPerUnit	1.8 students	1.8 students
TotalFireCalls	348 calls	348 calls
TotalPoliceCalls	7,096 calls	7,096 calls

Indicators

Indicator	Dev1	Dev2
CommIndWaterUse	10,000 gallons/day	65,000 gallons/day
ResiWaterUse	19,500 gallons/day	29,250 gallons/day
TotalWaterUse	29,500 gallons/day	94,250 gallons/day
DevelopmentPop	300 housing units persons	450 housing units persons
LotSize	128.21	128.21
Population	3,760	3,910
Agriculture	0.00 acres	0.00 acres
Commercial_Industrial	19.87 acres	15.73 acres
Developed Landuse	50.46990 acres	47.61451 acres
Forest	77.77 acres	80.62 acres
Recreational	8.96 acres	0.00 acres
Residential	16.44 acres	27.02 acres
Roads	5.19 acres	4.87 acres
UnDeveloped Landuse	77.77400 acres	80.61569 acres
ImpervSurf	19.70	22.34
PercImpervSurf	15.4 %	17.4 %
PervSurf	108.51	105.88
AquiferCov	17.60 acres	20.81 acres
DWPACov	16.19 acres	19.12 acres
Flood Hazard 100 yr Cov	0.27 acres	0.45 acres
Flood Hazard 500 yr Cov	0.00 acres	0.00 acres
Prime Farmland Coverage	0.00 acres	0.00 acres
Sand and Gravel Coverage	1.62 acres	0.85 acres
Sand and Gravel Pits Coverage	0.00 acres	0.00 acres
Sand Deposits Coverage	0.00 acres	0.00 acres
Statewide Farmland Coverage	1.16 acres	0.77 acres
WetlandCov	0.17 acres	0.09 acres
compactness	0.25 compactness ratio	0.31 compactness ratio
MaxFragBloc	55.8 acres	43.0 acres
maxOSLandAC	63.00	71.84
maxOSLandu	2,744,330.84	3,129,306.46
MaxUnFragBloc	946.9 acres	946.9 acres
MaxUnFragPotNew	891.1 acres	903.9 acres

UnfragLandLoss	55.75 acres	43.02 acres
AdditionalFireCalls	30 calls persons units	45 calls persons units
AdditionalPatrolCost	144.58 $ per miles	136.42 $ per miles
AdditionalPoliceCalls	630.0 calls persons units	945.0 calls persons units
AdditionalRefuseCost	32,000.0 $ units	48,000.0 $ units
PotentialTotalFireCalls	378 calls	393 calls
PotentialTotalPoliceCalls	7,726 calls persons units	8,041 calls persons units
PotentialTotalRefuseCost	225,760 housholds $	241,760 housholds $
Road_Maintenance_Cost	722.91 $ miles	682.08 $ miles
Road_WinterCare_Cost	2,168.72 mile $	2,046.24 mile $
SchoolBudget	0.00 $/yr students	0.00 $/yr students
TotalRoadLength	1.45 miles	1.36 miles

Alerts

Alerts	**Dev1**	**Dev2**
Attribute Alerts		
WetlandCross Subject_ImpSurf : WetlandCov > 0	0 records	1 of 1 records

Analysis powered by communityViz

Analysis File Dependency Report

The analysis Evaluation2 uses the following files. To transfer the analysis to another computer, you will need to transfer all of these files.

Analysis Folder

c:\CVFiles\Evaluation2\

Data Layer Files

T:\d-parcels\d-towns\D-RYE\RyeTax02.dbf
T:\d-parcels\d-towns\D-RYE\RyeTax02.sbn
T:\d-parcels\d-towns\D-RYE\RyeTax02.sbx
T:\d-parcels\d-towns\D-RYE\RyeTax02.shp
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T:\d-parcels\d-towns\D-RYE\ryetax02metadata.txt
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C:\CVFiles\Evaluation2\CV_REG_NR.mdb
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