Phase II: Data Collection, Analysis, and Evaluation

This chapter provides recommendations for a comprehensive, coordinated data collection system and steps to analyze and evaluate the data. The methods described in this chapter are derived from the GMA reporting requirements. Specifically, the GMA requires that the five-year monitoring report answer a number of questions:[1]

- What is the actual density and type of housing that has been constructed in UGAs since the last comprehensive plan was adopted or the last five-year evaluation completed? Are urban densities being achieved within UGAs? If not, what measures could be taken, other than adjusting UGAs, to comply with the GMA?

- How much land was actually developed for residential use and at what density since the comprehensive plan was adopted or the last five-year evaluation completed? Based on this and other relevant information, how much land would be needed for residential development during the remainder of the 20-year comprehensive planning period?

- How much land was actually developed for commercial and industrial uses within the UGA since the last comprehensive plan was adopted or the last five-year evaluation was completed? Based on this and other relevant information, how much land would be needed for commercial and industrial development during the remainder of the 20-year comprehensive planning period?

- To what extent have capital facilities, critical areas, and rural development affected the supply of land suitable for development over the comprehensive plan's 20-year timeframe?

- Is there enough suitable land in each county and its cities to accommodate the county-wide population growth for the remainder of the 20-year planning period (based on the forecast by the state Office of Financial Management and the subsequent allocations between the county and cities)?

- Does the evaluation demonstrate any inconsistencies between the actual level of residential, commercial, and industrial development that occurred during the five-year review period compared to the

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[1] *Buildable Lands Program Guidelines*, Washington State Community, Trade, and Economic Development Department, July 2000.

vision contained in the county-wide planning policies and comprehensive plans and the goals and requirements of the GMA?

- What measures can be taken that are reasonably likely to increase consistency during the subsequent five-year period, if the comparison above shows inconsistency?

We considered several ways to organize the research that would respond to these questions. The most obvious is to organize by question. That organization does not work particularly well because many of the questions posed above require data from several sources: the work program would end up describing all the data sources and data collection techniques for the first few questions and then would have to refer back to those questions when answering subsequent ones. Alternatively, one could organize according to the data sources needed to answer the questions. But there are so many data sources that such an arrangement would read more like a long list than an organization.

We chose to organize the discussion of the work plan for Phase II around six major categories of tasks that, collectively, cover all of the data needed to answer all of the required questions about land base, development patterns, and land capacity to support forecasted development:

- Standardized comprehensive plan and zoning categories

- Buildable lands inventory

- Growth, development, and density history

- Development pipeline

- Estimate of land demand

- Estimate of land (development) capacity

Phase II gathers data and does analyses needed to be able to answer the questions above. It does not, however, include the write-up of answers to those questions: that happens in Phase III (Chapter 6).

Much of the data needed for the buildable lands analysis will come from County data systems. The County is in the process of updating its tax lot assessment data so that it is compatible with GIS reporting. But the County intends to verify other data layers and add new ones. According to County staff, that could be a year-long process. Thus, the County GIS update will be occurring at the same time that other data for the buildable lands analysis are being collected and evaluated. This work plan does not break out the County update effort separately: it is assumed to be integrated with data collection related to two key components of the GMA requirements: (1) buildable lands, and (2) development trends.

TASK 2.1 STANDARDIZED COMPREHENSIVE PLAN AND ZONING CATEGORIES

A key first step in the growth monitoring process is getting agreement on the relationship between comprehensive plan designations and zoning districts on a countywide basis. This is necessary for consistency in any countywide analysis.

A regional plan designation classification system will, by necessity, be general. We recommend that the classifications be broken out by broad use categories (residential, commercial, industrial, mixed-use, public, and parks/open space). The regional plan designation classification, however, may not be suitable for local analysis of land needs, particularly when reviewing local plan designation or zone change requests. Jurisdictions should consider performing a more detailed analysis of land needs by local plan designations and zoning.

ECO requested cities provide information on comprehensive plan designations and zoning districts in the *Buildable Lands Questionnaire.* Table 5-1 provides a sample matrix, based on survey responses, that identifies the relationship between regional and local comprehensive plan designations. A more detailed version of the matrix is presented in Appendix E.

The matrix has not been fully reviewed by participating jurisdictions and may change. The result of this task will be a generalized regional plan classification matrix that will allow a regional plan designation classification to be applied as a parcel attribute in the County's parcel database.

CITY	Urban Low Density Residential	Urban Medium Density Residential	Urban High Density Residential	Urban Commercial	Urban Industrial	Mixed Use	Public	Park/Open Space
Snohomish County	R-7,200 PRD-7,200 R-8,400 PRD-8,400 R-9,600 PRD-9,600 WFB	LDMR PRD-LDMR T R-7,200 PRD-7,200 WFB	MR PRD-MR LDMR PRD-LDMR	NB PCB CB GC FS BP	BP LI HI IP			
Everett	R-S	R-1 R-2 R-1A	R-2A R-3L R-3 R-4 R-5	B-3 C-1 B-2				A-1
Edmonds	RS-12 RS-20	RS-6 RS-8	RM-1.5 RM-2.4 RM-2.4 RM-3	CG, CG2 CG/CG2 CW BP BN MU		BC		
Lynnwood	RS-12 RS-9 RS-8 RS-7	RML	RMM RMH RMHR	BC BN CG PRC PCD B-4 B-2 C-2	BTP LI	MU	P-1	
Mountlake Terrace	SFR RS 7200	RS 8400 RML	RML RMM RMM MHP MHP	CG CG SDD BC BC BC/D	LI/OP LI/OP		PFS PFS	POS REC
Marysville	R-4.5 R-6.5	R-8 R-12	R-18 R-28	CB GC DC		MU		
Mukilteo	RD 7.2 RD 7.5 WFB RD 8.4 RD 9.6 RD 9.6 (S) RD 12.5 RD 12.5 (S)		MR MRD	PCB(S) MR BP DB CB CB (S) PCB PCB(S) PSP WMU	BP PI IP LI HI OS			
Bothell (part in Snoh. Co.)	R1 (detached units) R2 (detached units) R3 (detached units) R4 (detached units) R5 (detached units)	R6 (detached units) R8d (detached units) R8a (attached units ok) MHP	R11 (detached units) R15 (detached units)	OP NB CB GC	LI SSHO			
Mill Creek	LDR PRD 7200	MDR PRD 7200	HDR	CB NB OP PCB BP		MU/HDR		
Monroe								
Snohomish								
Arlington	MDR MHDR	OT	HDR	NC GC CBD HC BP	AI I		AR	
Brier	RS RS			BN			P UC	OS
Lake Stevens	LDR ER NC CR P/SP WR WR CR P/SP	MDR SR WR UR HUR NC CR P/SP	HDR MFR NC CR P/SP	D/LC LB CBD CR P/SP SRC SRC CR P/SP P/SP PBD PBD LR P/SP	LI CR LI P/SP GI GI LI CR	MU MU CR	P/SP P/SP CR P/SP SA P/SP SA	
Stanwood	SR-12.4 SR-9.6 SR-7.0	SR-5.0	MR	NB MB I MB II GC	LI GI			
Sultan	LMD	MD	HD	HOD+ UC ED	HOD+ UC			
Granite Falls								
Gold Bar								
Darrington	R-SF	R-MD		CD	LI/M			
Woodway	R-87 R-43 R-14.5 UR			C				

Source: Snohomish County Buildable Lands Questionnaire, ECONorthwest, 2000
Note: Table 5-1 only shows the relationship between regional plan designations and local zoning, but does not show the relationship between local zoning and local plan designation. Some jurisdictions have zoning districts that may fall under more than one local plan designation.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
Local plan designation
Regional plan designation
Local zoning

Summary of steps

1. Gather information on zoning districts by city including minimum lot size standards, coverage requirements, and other pertinent data.

2. Group the districts by use (residential, commercial, industrial, mixed).

3. Look for common breaks in density and group districts by density.

4. Develop regional classification categories and apply a classification to each local zoning district. Present the results in a matrix.

5. Send the regional classification matrix to local jurisdictions for review and comment.

6. Make any necessary adjustments to the classification matrix.

The matrix should be in the form of a spreadsheet or database file that can be merged with the tax lot data. A key issue that is likely to confront the County and cities that have GIS systems is that zoning districts are likely to have data entry inconsistencies in the current databases (for example, a low density residential district might be listed as R1, R-1, or R-1SR [R-1 with site review]). Existing classifications will need to be scrubbed for inconsistencies if the cross-classification matrix is to work properly.

SUMMARY OF TASK 2.1

Product: Regional plan designation/zoning cross-classification matrix
Schedule: Sept-Oct 2000
Discussion: County will develop matrix, cities will provide additional data if necessary

TASK 2.2 BUILDABLE LANDS INVENTORY

The buildable lands inventory involves several steps and may require application of different methodologies depending on the jurisdiction and

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availability of data. Jurisdictions with GIS will probably want to complete the inventory in-house, while jurisdictions without GIS will work with the County to develop and verify land coverage data.

The basic steps in the buildable lands inventory include (1) agreement on definitions, (2) preliminary mapping, (3) local review and proofing, and (4) final amendments to the GIS coverages.

Applying a common set of definitions is important to ensure consistency across jurisdictions. In general, the definitions strive to classify lands into a set of mutually-exclusive categories. The definitions are embedded in the methodological discussions that follow.

2.2.1 LAND EVALUATION

2.2.1.1 Generalized land classification system

Chapter 2 presented a common set of definitions for this study. The definitions include six broad land classifications:

- *Developed land* is land that is developed consistent with the comprehensive plan designation of the tax lot, at densities that do not allow additional land divisions, and is unlikely to redevelop over a 20-year period. Most local governments include park and open space land in this category.

- *Vacant land* generally includes tax lots that have no structures or have buildings with improvement values of under $10,000. The County will develop maps that show: (1) land with $0 improvement value; (2) land with $1 to $10,000 of improvement value; and (3) land with $10,001 to $25,000 of improvement value; and (4) land with more than $25,000 in improvement value. Communities would then conduct field inspections (particularly for larger parcels) to verify whether the $10,000 threshold represents the majority of vacant land. This threshold could be adjusted upwards or downwards based on the results of the field review. In general, the method assumes that communities will accept the $10,000 threshold, but allows local flexibility in making a final determination. In some instances, communities may desire to flag specific parcels as vacant despite their being over the $10,000 threshold. Communities may elect to classify larger parcels or key parcels with strategic locations or planning opportunities as vacant in those instances.

- *Partially-vacant land.* For single-family residential land, the method requires a comparative analysis of actual lot sizes with minimum lot size for the underlying zoning district. This analysis will result in a distribution of lot sizes that the County can use for mapping, local review, and final determination of a

threshold. We expect that threshold will fall somewhere between two and 2.5 times the minimum parcel size for the underlying zone. We recommend 2.5, which accounts for the fact that many parcels will have houses located in such a way that further partitioning will not be practical.

Communities can further refine this screening rule by assuming a maximum improvement value would preclude further development of land. For example, Metro in Portland used a $350,000 threshold for its most recent land productivity estimates. This approach recognizes that some residential development occurs on very large lots and that owners of those residences have no intention to further divide their property. We recommend that the method use the distribution of improvement to land values shown in Table 5-2, cross-correlated with the ratio of actual to minimum lot sizes to set this threshold. This matrix of rules can be implemented in a database or spreadsheet format with look-up tables. Alternatively, it could be simplified into a simple rule of improvement-value-per-acre.

For other uses (multiple family residential, commercial, and industrial) the analysis is more complicated because there is not the simple relationship between development type and amount of developed land that exists with single-family dwelling units (i.e., as a general rule one can be relatively safe in assuming that the house and landscaped yard do not take more than a quarter or half acre). For other uses, however, building footprints can vary substantially. Our understanding is that the assessment data base has a field for "first-floor square footage" that has been completely and reliably populated. It is unclear at this time whether the new version of the assessor database can export this data in the way that it has in the past. If the data can be extracted, then the field can be used as a proxy for building footprint. There are also fields for the square footage of other floors. Outside of large downtowns, a typical floor-area ratio (the ratio of total built space to developed lot size) is around 0.25. Thus, a rule could be something like: add up all floor area; divide by 0.25: subtract from tax-lot size; if result is great than 1 acre, classify all the difference as partially vacant. Using the County's 1998 digital orthophotos already in GIS format, check to see if parcels initially assigned a partially-vacant status indeed have remaining developable land (i.e., ensure that the unbuilt portion of the property is not covered by parking or industrial storage yards, etc). As for single-family uses, an additional screen of improvement-value-per-acre could be added to refine the preliminary selection.

- *Under-utilized land* includes tax lots zoned for more intensive uses than that which currently occupies the property. For instance, a single-family home on multifamily-zoned land is considered under-utilized. The under-utilized land category includes potentially redevelopable land which is defined as land on which development has already occurred but on which, due to present or expected market forces, there exists the strong likelihood that existing development will be converted to more intensive uses during the planning period. For the purposes of this study, redevelopable land will be considered a category of under-utilized land (a more detailed discussion on this topic is in the Definitions section of Chapter 2).

Most jurisdictions use a simple ratio of improvement to land value to determine redevelopment potential. Because improvement to land value ratios are a crude indicator of redevelopment potential, plotting the distribution of improvement to land value ratios provides a continuum of lands that can be considered more to less likely to redevelop. Table 5-2 provides a sample table for displaying the distribution of land with redevelopment potential.

Not all, or even a majority of parcels that meet these criteria for redevelopment *potential* will be assumed to redevelop during the planning period. The issue of *how much* land might redevelop over the planning period can be determined. The amount of land that redevelops depends on a variety of factors including the vacant land supply, regional economic conditions, and City policies. It is reasonable to assume that the range will be between 20% and 80% of lands with low improvement to land value ratios. Table 5-2 below can be filled in with percentages for each cell as an assumption of how much will redevelop. For example, the analysis might assume that 50% of commercial and office land with improvement to land value ratios between 0 and 0.25 would redevelop over a 20-year period, and that 20% with improvement to land value ratios of between 0.5 and 1.0 would redevelop. We recommend the County conduct analysis of selected subareas to develop the redevelopment assumptions.

Table 5-2. Developed parcels by improvement/land value ratio

Description	Comm/ Office	Ind.	Res.	Total Acres	Percent of Total Acres
Parcels with more redevelopment potential					
Imp/Land Ratio Between > 0 and < .25:1					
Imp/Land Ratio Between .25:1 and .5:1					
Imp/Land Ratio Between .5:1 and 1:1					
Subtotal					
Parcels with less redevelopment potential					
Imp/Land Ratio Between 1:1 and 2:1					
Imp/Land Value Between 2:1 and 3:1					
Imp/Land Value > 3:1					
Subtotal					
Total					

Source: ECONorthwest, 2000

The analysis here has two parts: (1) identifying under-utilized land that is *potentially* redevelopable (and, by implication, has a high likelihood of being redeveloped), and (2) estimating what percent of the forecasted development (by type) is likely to be accommodated on under-utilized land.

We recommend the following steps for making a preliminary estimate of under-utilized lands:

1. *Single-family residential.* No lands designated for single-family uses are considered under-utilized. If lands are developed at densities below the allowable density, they should be classified as partially-vacant.

2. *All other uses.* If the land is in any other designation and the current use is inconsistent with a plan designation that allows more intensive use, then the land should be classified as under-utilized. In instances where land is in single-family use, but designated for multiple family use, the development potential is the target density minus the number of existing units. This rule may have to be adjusted for assessed value using an approach as proposed in Table 5-2 (e.g., a high-value single-family unit on land designated for multi-family use is less likely to convert than a low-value unit).

For multiple-family, commercial, and industrial uses, we recommend analyzing, by city, land use and plan designation, lot size, ratios of the value of improvements to land value. This analysis would display the distribution of these variables and create cross-correlations between them. The analysis allows identification of clear break points for different uses and provides a more defensible method than choosing some arbitrary rule-based threshold. Moreover, local jurisdictions would have an opportunity to review and comment on the distributions. We anticipate that final decisions on the rules would be made at a TAC meeting. A typical rule is that ratios of less than somewhere between 1.0 and 1.5 define under-utilized land.

The method above defines land that is under-utilized and, therefore, *potentially* redevelopable. But while it is typical to assume that vacant, unconstrained, serviceable land is readily developable during a 20-year planning period, the same assumptions are not made about under-utilized land, which is generally assumed to be harder to develop. Moreover, a key reason for a buildable land analysis is to determine whether there is a sufficient supply of developable land inside a UGA, or whether methods to increase UGA capacity need to be implemented. That clearly depends on assumptions about *how much of the under-utilized land will redevelop during the planning period.* Since the definition of under-utilized land is somewhat arbitrary, it is not sufficient to simply assume that 100% of all under-utilized land will support redevelopment, and that the need for vacant land will be commensurately reduced. The empirical evidence and casual observation suggests that a lot of the potentially redevelopable land will *not* redevelop, and some land not identified as redevelopable *will* redevelop. In our opinion the key issue is *not* about the amount and location of underutilized land, but about how that land accommodates demand, and reduces the need for vacant land and, hence, expansions of UGAs.

There are several approaches to estimating the amount of population and employment that will be accommodated via redevelopment on under-utilized tax lots (described in order of most difficult/time consuming to least difficult/time consuming):

- Every city completes a redevelopment study, looking at historical evidence about the amount of development

that has gone on tax lots that were not vacant at the time of development;

- The County completes an analysis of sample areas of the County, selected to be representative of different city types; or

- No new work is conducted—the rules are based on work done in King County or other comparable areas.

However the relationship between total development and redevelopment is established, it is then used *to reduce estimates of demand for land, by type, before making estimates of the need for vacant land.* Applying the deductions on the demand side allows communities to set redevelopment targets.

The percentages applied will be based on a redevelopment analysis conducted by the County. That study will look at redevelopment activity in selected subareas. It should include an analysis of redevelopment by type, plan designation, and densities before and after redevelopment.

- *Undevelopable land*—tax lots that are undevelopable by policy.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
Land classification
Improvement value
Land Value
Ratio of improvement value to land value (calculated)
Lot size

Summary of steps

In response to the previous three issues (definitions for vacant, partially vacant, and underutilized/redevelopable land), we are amending the methods in Chapter 5 to reflect the following rule-based method for classifying all land into mutually exclusive categories:

1. *Classify vacant lands.* Flag all parcels in one of the following categories:

   Vacant—no improvement value

Vacant—improvement value between $1 and $10,000
Vacant—improvement value between $10,001 and $25,000
Developed—all parcels with improvement values over $25,000

2. *Classify unbuildable lands.* For all lands classified as vacant in step 1, compare minimum lot size allowed by zoning to actual lot size. Flag all lots that fall under the minimum lot size threshold as *potentially undevelopable because of size*, and map as such for review by local jurisdictions to determine whether truly undevelopable. If review of specific tax lot configurations and set-back requirements determines that some of these lots are, in fact, buildable, reallocate them by hand back to the "vacant" category.

3. *Refine developed land classification.* Re-classify developed parcels as:

   Developed
   Partially vacant
   Under-utilized/redevelopable

   This analysis requires several steps:

   a. Identify partially vacant single-family residential land. Use the threshold based on the analysis described under the partially vacant land definition. The threshold will include a ratio of actual lot size to minimum lot size for the underlying zone (2.5 for example). It will also include a maximum improvement to land value ratio. Land within the two criteria will be classified as partially vacant. Other single-family residential land will be either classified as under-utilized/redevelopable or developed.

   b. Complete analysis of multiple-family, commercial, and industrial land (see discussion above). Identify partially vacant multiple-family, commercial, and industrial land. Use improvement to land value ratios to flag other multiple-family, commercial, and industrial land as either potentially under-utilized/redevelopable or developed.

   c. Flag lots for field inspection. Communities could choose to skip this step or only conduct field inspection for very large lots.

   d. Revise classification based on field inspections.

4. *Classify land as under-utilized/redevelopable.* The steps are described in detail earlier in this chapter.

5. *Develop preliminary maps.* Create maps showing a parcel base with parcel classifications. The County has 1998 digital orthophotos from the State Department of Natural Resources

(DNR) covering most of Snohomish County. Tax lots flagged as partially vacant will be plotted over the orthophotos to facilitate the field inspections.

6. *Field verification.* Distribute preliminary maps to communities for review and comment.

7. *Revise preliminary maps.* Revise maps based on local comments.

2.2.1.2 Land-use classification (property use codes)

The RCWs and WACs define a list of two-digit property use codes with which counties are to code properties for ratio and abstract reporting purposes. Counties may elect to use a more detailed land use code system using additional digits. Historically, Snohomish County used a five-digit Property Use Code. With the implementation of Ascend™ and ProVal™ the county is converting to a three-digit coding system.

The three-digit property use codes used by the county provide more detail than is necessary to meet GMA requirements for land use tracking. The abstract categories and ratio strata, however, do not provide sufficient detail. None of the classification schemes address the issue of mixed-use development on a single parcel or tax lot.

Many options exist for land use classification schemes. The most desirable would allow identification of the various types of uses, and would allow for information on mixed uses. The ideal approach would be to create a related land use table to the standard assessment file. Unfortunately, most GIS programs make it difficult to work with related files without related parcel coverages. Creating a sub-tax lot level parcel coverage is not a feasible alternative for the County at this time. Moreover, in an ideal situation jurisdictions could use the land-use codes maintained by the County.

A review of the ProVal extract files provided by County staff suggests that ProVal includes considerable data on improvements. The system does, however, include the ability to code multiple land uses on a single tax lot. It was unclear, however, whether ProVal allows related records for multiple uses on a tax lot. The ability to assign square footage of floor area to multiple uses is important in evaluating net densities in mixed-use developments.

Alternatives that could be applied include:

- Using the County's codes and floor area data and doing sample analysis to develop rules for calculating net densities in mixed-use zones;

- Applying an approach similar to Federal Way which doesn't use land use codes, but tracks improvements (in square feet of floor area or dwelling units) in nine categories: (1) single-family residential, (2) multiple family residential, (3) retail, (4) office, (5)

industrial, (6) institutional, (7) hotels, (8) recreation, and (9) schools.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier

Property classification (property use code)

Generalized land use classification (see Appendix E for example)

Built area (should be broken down by land use type)

Dwelling units

Summary of steps

1. Review existing County classifications (property use codes).

2. Create a crosswalk table that relates County land use classifications with generalized classifications.

3. Apply the crosswalk to populate the generalized land use classification field.

2.2.1.3   Inventory and mapping of constraints and critical areas

The GMA requires communities to inventory "critical areas" that include environmental constraints. Critical areas include wetlands, groundwater recharge areas, fish and wildlife conservation areas, frequently flooded areas, and geologically hazardous areas. The following sections describe each constraint and methods used to collect data for that constraint.

At its May meeting the TAC decided that communities should only deduct lands for constraints that have a policy basis. In other words, communities must have policies that preclude development for lands to be removed from the buildable lands inventory. In some instances, jurisdictions may have policies that require density reductions. These policies should be recognized in the capacity analysis.

All critical area reductions described in the sections which follow assume that the reductions will be based on the land area associated with the critical area and, if applicable, any surrounding buffer area.

2.2.1.3.1 Wetlands

A comprehensive countywide inventory of wetlands does not exist. Three data sources exist to map wetlands: (1) a 1986-1989 inventory completed by Snohomish County that covers about two-thirds of the UGA, including many cities, (2) the national wetlands inventory (NWI), and (3) soils maps that identify hydric soils.

The County wetland and stream inventory was a field review that provides a relatively high level of accuracy. However, according to County staff, more detailed site inspection at the time of subsequent permit application review revealed an overall 13% underestimate of actual wetland area measured in the original inventory. As a result, previous County land capacity estimates have adjusted the inventoried wetland acres upward by 13% to account for this observation. It is recommended that this adjustment to the County wetland inventory be continued in areas covered by the inventory. This adjustment would not be applied however in areas where the wetland inventory has been overridden by more accurate delineations provided by jurisdictions during the field review stage of the buildable lands inventory process.

The County plans to convert its inventory to a digital format rectified with the County's tax lot boundaries by mid-2001. The County should use its data in areas covered by that inventory.

For areas not covered by the County inventory, NWI data could be applied, however, NWI data typically underestimates wetland areas when field delineations are conducted. Thus, an alternative method is necessary for estimating wetlands in areas not covered by the County inventory.

The SEPA process and local review of development applications require delineation of wetlands as a part of development review. Thus, having an accurate tax lot-level inventory available for the entire county, while desirable, is not necessary.

Using the three data sets, the County can develop a reasonable estimate of wetlands. The analysis would correlate the relationship between the NWI coverage, the County wetland inventory coverage, and hydric soils. Wetland area would be estimated as a function of hydric soils. The process would assume all areas identified in the NWI are wetlands, and some percentage of hydric soils, based on the relationship between the County wetland inventory coverage and soil type, would be applied to areas with hydric soils.

The deduction would be a tax lot attribute in the GIS coverage, however, the result would be a derived value based on the relationship and would be shown only in the aggregate.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
National wetlands inventory
Local wetlands inventories (where they exist)
Soils (from County soil survey)
Wetlands acres
Actual or derived acres flag

Summary of steps

1. Gather data: NWI, soils coverages, and other wetlands inventories or delineations that local jurisdictions have completed

2. For areas with site-specific inventories or delineations, overlay the wetland coverage with a hydric soils coverage for the analysis area

3. Calculate the percentage of areas in hydric soils that are also identified as wetlands

4. Apply that percentage at a tax lot level to tax lots with hydric soils

5. Store the implied wetland area in a separate field in the parcel coverage

6. Use the wetland data as a general deduction; site-specific delineations will still be required when development occurs

2.2.1.3.2 Areas with a critical recharging effect on aquifers used for potable water

Areas with a critical recharging effect on aquifers used for potable water will be inventoried and deducted from the buildable lands base. The County is currently updating its regulations that protect aquifer recharge areas. Should the County's process result in the identification of specific geographic areas for new groundwater recharge protection before the 2002 buildable lands report deadline, then this mapped information will be used in the County's buildable lands analysis.

Like other critical areas, aquifer recharge areas should be mapped as an overlay coverage in the County's GIS. The process for identifying

aquifer recharge areas will rely on a combination of work with water districts, local jurisdictions, the County, and state agencies.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
Area (sq ft or acres) in groundwater recharge areas
Wellhead on site?
Present or future aquifer recharge area

Summary of steps

1. Meet with service districts and cities that presently use groundwater resources, or may potentially use groundwater in the future to identify key issues and gather data on existing groundwater wells and plans for future wells.

2. Map existing identified aquifer recharge areas.

3. Identify and map areas that are identified in service provider plans.

4. Identify potential future aquifer recharge areas.

2.2.1.3.3   Fish and wildlife habitat conservation areas

The proposed 4(d) rules under review by the National Marine Fisheries Service, brought about by Endangered Species Act (ESA) protection requirements for chinook salmon and bull trout, will probably require the County to place greater emphasis on the identification and conservation of critical fish and wildlife habitat areas. Like other critical areas, these areas will be mapped as a separate GIS coverage.

Snohomish County will work with the Department of Natural Resources (DNR) to identify and map fish and wildlife habitat conservation areas. These areas will be mapped as an overlay coverage to the parcel database.

One approach the County could use in the absence of detailed inventories is to apply a buffer around streams with critical anadromous fish habitat. If not all streams have been inventoried for fish habitat, the County could apply buffers based on stream class. GIS applications make buffering a relatively simple operation. The County has already done this analysis for chinook salmon and bull trout habitat.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
Type of conservation area (fish/wildlife, other?)
Area (sq ft or acres) in conservation areas
Area in conservation buffer

Summary of steps

1. Classify all streams by habitat type

2. Determine habitat buffer (possible county policy)

3. Identify fish conservation areas

4. Identify other habitat conservation areas

5. Map conservation areas

6. Use GIS to buffer conservation areas

2.2.1.3.4   Frequently flooded areas

The County already has this data in digital format from the Federal Emergency Management Agency's Flood Insurance Rating Maps (FIRM). The FIRM maps are certainly an acceptable inventory of areas subject to flood damage.

The FIRM maps are updated relatively infrequently; some jurisdictions may wish to revise the flood area boundaries based on more current information such as aerial photos from a recent flooding event. Moreover, as development occurs in the County, the hydrologic cycle of drainages will be impacted. Jurisdictions may want to model the impact of urbanization and creation of impervious surfaces.

Data on frequently flooded areas will be stored as a GIS data layer. The data layer should show floodways and floodplains. If desired, the floodplains could be mapped in contours that represent the frequency of flood events (e.g., 5, 10, 50, 100, and 500 year events).

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
FEMA FIRM District
Area (sq ft or acres) in floodway
Area in floodplain

Summary of steps

1. Review FEMA FIRM maps.

2. Make any desired adjustments to FIRM 100-year boundaries.

2.2.1.3.5   Geologically hazardous areas

These include areas prone to landslides or unstable soils and faults. The County has data that allows analysis of slope based on 20' contours. While slope is a good indicator of instability and landslide risk, soil types are also an important indicator. Some soils are more prone to instability than others. The County has a methodology to use surface geology combined with slope to define geologically hazardous areas. We recommend this methodology be used for any areas that have not been analyzed and mapped.

While the GMA requires communities to inventory critical areas, jurisdictions have discretion to regulate land uses using different methods. For example, some jurisdictions may regulate development on steep slopes by prohibiting development on any slope over 25%; others may not prohibit development, but instead use transfer of development rights (TDRs) that effectively reduce densities on geologically hazardous areas.

In applying the definitions, however, local jurisdictions should review local policies to determine whether the critical areas have "absolute" constraints backed by policy that preclude development, or partial constraints that require development at lower densities.

Areas with geologic hazards will be mapped as a GIS coverage.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
Area in slopes over 25%
Area with unstable soils or landslide potential

Summary of steps

1. Create a digital elevation model using the slope coverage. Develop slope contours at 10% intervals, or other intervals as determined by the County.

2. Identify areas with unstable soils or with high probability of landslide.

3. Map geologic hazards.

4. Local jurisdictions can use the data to determine deductions based on geologic hazards.

2.2.1.4   Comprehensive plan designation and zoning

To evaluate land supply and land need, the County and cities will need to develop GIS layers that show the geographic extent of comprehensive plan designations and zoning. These GIS layers can then be merged into the tax lot database as a parcel attribute.

One foreseeable problem exists with including comprehensive plan designation and zoning as a tax lot attribute: some tax lots have multiple designations. Several possible solutions exist to this problem. One is to create multiple related records to the tax lot with split zoning that includes the area in each district. This is the most accurate, but also the most time consuming to work with. Another is to classify the tax lot as the district that touches the center (centroid) of the parcel. A third is to classify the tax lot with the designation that has the largest area. We recommend using the third approach unless jurisdictions indicate that using single designations will result in significant inaccuracies in the inventory results.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier
Jurisdiction
Plan designation
Zoning

This tax lot attribute should also be accompanied by two lookup table that includes a comprehensive and current list of all comprehensive plan designations (table 1), and zoning districts (table 2).

Summary of steps

1. Obtain GIS coverages of comprehensive plan designations and zoning for those jurisdictions that have them. Rectify with the County's tax lot file.

2. Obtain hard copy maps of comprehensive plan designation and zoning for those communities that do not have digital maps. Digitize the maps.

3. Create lookup database of all comprehensive plan designations and zoning districts.

4. Merge GIS coverages of comprehensive plan designations and zoning districts as new attribute in tax lot database.

2.2.1.5   Other tax lot attributes

The GMA requires additional data to be collected beyond data that allows classification of tax lots and constraints. Two variables that should be included in the database for all tax lots are serviceability (i.e., a flag that indicates the probability of the tax lot being serviced during the planning period), and a market factor (which most communities apply as a general deduction).

For serviceability, buildable land staff will work with local sewer and water utilities to determine whether a parcel is: (1) serviced, (2) able to be serviced, (3) likely to be serviced, or (4) unserviceable during the 20-year planning period. Parcels that are identified as unserviceable during the planning period would be deducted from the 20-year supply of buildable lands.

Other market availability adjustments are of two types. The first category reflects the fact that some land may be held for speculative or other purposes and may not be on the market during the 20-year period. The other reflects the variety of site and other factors (economic conditions, access, location, etc) that affect the marketability of a site.

The market availability factor is intended to account for the fact that not all vacant tax lots will be available for development over the planning period. The market availability factor will be applied as a general deduction after the other steps of the inventory are complete. Different factors will be applied for residential, commercial, and industrial lands.

The key assumption is what percentage of land to assume will not be available for development during the planning period. The County will contact land developers and realtors in different areas of the County to discuss market issues and agree on a market availability deduction.

Commercial and industrial parcels may have other non-environmental constraints that affects their ability to develop. These characteristics include: parcel size, marginal sites (brownfields, high environmental

clean-up costs, new ESA requirements along riverways, poor access), and prime sites (greenfields, urban service availability, good access, few environmental constraints).

For commercial and industrial lands, cities should strive to provide sites in a variety of sizes and locations. Table 5-3 shows a sample matrix for inventorying commercial and industrial sites.

Table 5-3. Sample commercial and industrial site matrix

Type/size class	Number of tax lots	Acres	Env. constraints	Other constraints	Percent of vacant land
Commercial					
Plan Designation 1					
Fully vacant					
< 1 acre					
1-2.49 acres					
2.5-4.99 acres					
5-9.99 acres					
10-19.99 acres					
20-49.99 acres					
50 or more acres					
Partially vacant					
Same acreage categories					
Under-utilized/redevelopable					
Plan Designation 2					

While the acreage categories may change, the table provides a distribution of land by size and classification. Additional variables could be included such as serviceability ratings, access, marketability, etc.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Tax lot identifier

Service classification

Other site constraints

Summary of steps

1. Develop serviceability coding system (for example, 1-serviced; 2- planned for service within 20-year period; 3-not serviced)

2. Assign serviceability code

3. Deduct tax lots not serviceable within 20-year period from buildable lands inventory

4. Classify other site constraints

5. Deduct other site constraints

6. Deduct land based on market availability factor

2.2.2 PRELIMINARY INVENTORY AND MAPPING OF BUILDABLE LANDS

After definitions are agreed upon, the next step is to conduct the preliminary inventory and mapping. The preliminary inventory and mapping may be conducted by individual jurisdictions or by County staff depending on a jurisdiction's capacity to conduct the mapping.

The definitions will result in a set of algorithms that allow the initial classification to be largely automated. This step also requires development of constraint coverages. Specifically, the preliminary inventory and mapping requires the following coverages:

- Parcels (linked to basic assessment data)

- Critical areas (each critical area described in subtask 2.1.2.1 will be mapped with a separate coverage)

- Other deductions (utility easements, areas planned for major roads, water and sewer facilities, electrical substations, and other public facilities)

The next step is for County PDS cartography staff to develop a set of maps that shows land classifications and constraints for review by local jurisdictions.

Summary of steps

1. Gather data and create coverages.

2. Create maps showing tax lots by classification with critical areas and other constrained areas overlays. Maps showing 1998 digital orthophotos as backdrop will also be useful for local ground truthing.

3. Deliver maps to local jurisdictions

2.2.3 LOCAL REVIEW AND PROOFING

After the initial data collection and mapping step, jurisdictions will have a staff level review of the maps with field verification where necessary. Cities will return maps annotated with revisions to the County PDS cartography department for updating. This step may require several iterations to develop accurate maps. It will also require two or more TAC meetings or workshops at which jurisdictions can share problems and solutions, and ensure that any variations in definitions or techniques are acceptable.

Summary of steps

1. Gather recent aerial photographs or other data sources for the review.

2. Review maps for accuracy on land classification, critical area overlays, and other deductions.

3. Annotate maps with proposed revisions. Flag questionable areas and compare with both GIS and tabular data.

2.2.4 REVIEW AND UPDATE GIS

As described in Tasks 2.1.2 and 2.1.3, most of the work with respect to local land supply analyses will be the responsibility of the communities and County staff. For the inventory component, communities will work with County staff to develop a consistent data structure for local communities. The County will be responsible for generating the tax lot-level data from the GIS and the communities will be responsible for analyzing and verifying the supply data.

For unincorporated areas in UGAs, County staff will analyze and verify the supply data, with the possible assistance of staff from cities associated with the unincorporated UGA.

The County will identify which constraints exist in each community and facilitate the development of those data layers in the GIS where they do not presently exist. Communities will conduct field work to verify the constraints. Table 5-4 summarizes the steps and responsibilities for the land inventory process.

Table 5-4. Summary of steps Land Supply Inventory Process

Step	Participant	Comments
1. Develop database structure	County	County staff will develop a consistent database structure for the residential land inventories; city review
2. Create tax lot database	County	County staff will generate a tax lot inventory for all tax lots within the city limit and UGAs of participating communities
3. Preliminary analysis	County	The County will conduct a preliminary analysis of the tax lot databases to identify vacant, buildable lands.
4. Map preliminary analysis	County	The County will pass data from the preliminary analysis back to GIS for mapping
5. Field verification	Local jurisdictions	Local jurisdictions will field check the inventories using the database and maps
6. Revise maps	County	Based on local field work, County staff will revise maps and generate a revised database
7. Revised analysis	County	The County will revise the buildable lands analysis using the revisions from the field verification and revised maps
8. Final mapping	County	County staff will prepare a set of final maps for each participating community

SUMMARY OF TASK 2.2

Product 1: Generalized land classification
Schedule: July-December 2000
Discussion: This is a generalized classification that will be used to determine whether land is in the buildable inventory. Classifications will be agreed on during Phase I startup; County will apply those classifications based on rules described in Task 2.2.

Product 2: Land use classification system
Schedule: July-December 2000
Discussion: The land use classification system is necessary for analysis of densities. The system will allow inventories to include the number of dwelling units and built space by type for each tax lot. Categories will be agreed on during Phase I startup; County will apply based on rules described in Task 2.2.

Product 3: Inventory of critical areas
Schedule: August 2000 - June 2001
Discussion: This product will result in a series of GIS coverages of critical areas, or estimates of critical areas at the tax lot level. Areas will be stored as a tax lot attribute.

Product 4: Other deductions
Schedule: August 2000 - June 2001
Discussion: This product will result in a series of GIS coverages of other areas for deduction from the buildable lands inventory, or estimates of critical areas at the tax lot level. Areas will be stored as a tax lot attribute.

Product 5: Buildable lands inventory
Schedule: January 2001 - December 2001
Discussion: This product will result in a series of GIS coverages of other areas for deduction from the buildable lands inventory, or estimates of critical areas at the tax lot level. Areas will be stored as a tax lot attribute.

TASK 2.3 GROWTH, DEVELOPMENT, AND DENSITY HISTORY

Much of the data required for the growth, development, and density history is already being gathered and analyzed in the annual Growth Monitoring Report. Moreover, the Growth Monitoring Report applied specific methods for gathering and analyzing data. The methods applied for the growth and development trends will be generally based on the SCT 1999 report with local modifications.

2.3.1 POPULATION GROWTH TRENDS

The analysis of population growth trends in the 5-year report should generally follow the analysis in the annual monitoring reports.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Population components (natural increase and net migration) for Snohomish and other nearby counties for the past 10 years.
Vital statistics (births, deaths)
Population by year for Snohomish County, its UGAs, and cities
Forecast population during the planning period for the County, each UGA, and each city

Summary of steps

1. Compare population components (natural increase and net migration) with other nearby counties

2. Analyze vital statistics (births, deaths)

3. Compare annual population increase over the past 10years with other nearby counties

4. Summarize population increase by year for Snohomish County and its cities

5. Compare estimated population with forecast population for the County, each UGA, and each city

2.3.2 EMPLOYMENT GROWTH TRENDS

The analysis of employment growth trends in the 5-year report should generally follow the analysis in the annual monitoring reports.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Employment growth over the past 10 years compared for Snohomish and other nearby counties

Median household income over the past 10 years for Snohomish County

Unemployment rates since 1980

Forecast employment for the planning period years for the county, UGAs, and cities

Summary of steps

1. Compare employment growth over the past 10 years compared to other nearby counties

2. Compare observed population/employment ratios for the past 10 years for Snohomish and other nearby counties

3. Analyze changes in median household income over the past 10 years

4. Analyze unemployment rates since 1980

5. Compare employment estimates and forecast employment for the past 10 years for the county, UGAs, and cities

2.3.3 ANNEXATIONS/INCORPORATIONS

The analysis of annexations in the 5-year report should generally follow the analysis in the annual monitoring reports.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Annexations certified by OFM annually since February 1993 and the population, employment, and area (in acres) annexed for the County and each city
List of all annexations certified by OFM including date of annexation, acres annexed, total number of housing units annexed, total number of vacant housing units annexed, employment annexed, and assessed value by use annexed.

Summary of steps

1. Analyze annexations certified by OFM annually since February 1993 and the population, employment, and area (in acres) annexed for the County and each city

2. Compare the percentage of each UGA annexed as of the date of the 5-year report

3. Analyze all annexations certified by OFM including date of annexation, acres annexed, total number of housing units annexed, total number of vacant housing units annexed, employment annexed, and assessed value by use annexed.

2.3.4 RESIDENTIAL DEVELOPMENT TRENDS

Key indicators of residential development include lot creation, rural subdivisions, and building permits. The following sections describe methods for gathering data on each of these indicators. While a considerable amount of data is already being collected, some jurisdictions will probably have to adopt procedures to collect additional data on residential development, particularly in the area of building permits.

2.3.4.1 Residential lot creation

The discussion of residential lot creation focuses exclusively on lots created through subdivisions or short plats for single-family residences. Within unincorporated portions of the UGA, the County has adopted a minimum density standard of four dwelling units per net acre (a little over three dwelling units per gross acre assuming a 20% net to gross conversion factor). Thus, the key analysis here is a comparison of actual vs. target densities.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Parent parcel identifier (allows determination of location of parcel—city limit, UGA)

Parent parcel comprehensive plan designation

Parent parcel zoning

Parent parcel area

Number of lots in subdivision or short plat

Area of subdivision or short plat in tax lots

Area in subdivision or short plat *not* in tax lots

Area in subdivision or short plat in streets and other public right-of-way

Area in subdivision or short plat in critical areas or open space

2.3.4.2   Rural cluster subdivision activity

The data requirements for rural cluster subdivision activity are basically the same as those for residential lot creation (see above).

2.3.4.3   Residential building permit activity

Monitoring building permits provides a measure of the rate at which residential land is being developed. The data collection requirements differ substantially for single-family and multiple family permits.

All of the necessary data on density for single-family development is available through the subdivision or short plat. As a result, the procedures used to gather the data for the previous growth monitoring reports is sufficient for developing estimates of the number of single-family permits and the net density of the development.

Additional data are required to calculate gross and net density for multiple family or mixed-use development. This will require local jurisdictions to gather new information not provided for previous reports. Ideally, each jurisdiction would provide data for all multiple family and mixed-use development that occurred between 1995 and 2000.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics. This method applies only to multiple family developments; single-family developments have already been analyzed through formal and short plats. The required data elements to develop an accurate estimate of gross and net densities are basically the same as for subdivisions and short plats but at the site level:

Parcel identifier (allows determination of location of parcel—city limit, UGA)
Comprehensive plan designation
Zoning
Area (in square feet or acres)
Number of dwelling units in development
Area (in square feet or acres) in streets and other public right-of-way (if any)
Area (in square feet or acres) in critical areas or open space

Gathering this data will require review and analysis of site plans for each development. For some jurisdictions, this could be dozens or possible hundreds of site plans. Conducting the review on a sample basis would be a possibility where jurisdictions lack sufficient resources to conduct a 100% sample.

Summary of steps

1. Analyze the number and density of lots created by subdivisions and short plats.

2. Compare actual and target densities for lots created by subdivisions and short plats

3. Analyze gross and net densities, by comprehensive plan designation

4. Summarize individual subdivision plats

5. Summarize residential building permits issued by plan designation and housing type (including multiple family and manufactured home permits)

6. Compare recent residential densities with historic densities (pre-GMA)

All summaries need to include county, UGA, and city totals for the period 1995-2000 for each comprehensive plan designation. Previous growth monitoring reports did not include analysis of multiple family development.

2.3.5   HOUSING MARKET TRENDS

Conducting a analysis of housing market trends is not explicitly required by the GMA, but is a useful tool in monitoring housing affordability. The 1999 Growth Monitoring Report included a housing market analysis that reviewed rental rates and housing sales.

The rental price analysis is based on data derived from The Apartment Vacancy Report published semi-annually by Dupre + Scott

Apartment Advisors, Inc. The data are derived from a survey of apartment managers or building owners with 20 or more units.

The housing sales analysis is based on data extracted from the County Assessor's system on deed transfers that are indicative of market sales.

Required data elements

Following is a list of required data elements for this portion of the analysis. Existing data elements are in normal typeface; new data elements are in italics.

Median housing sales price

Number of sales

Vacancy rates

Median apartment rental rates

Average household incomes

Summary of steps

All of the data elements described above are described in detail in the *1999 Snohomish County Tomorrow Growth Monitoring Report*. Subsequent residential market analysis should simply update the data in that report.

2.3.6 COMMERCIAL AND INDUSTRIAL DEVELOPMENT TRENDS

Previous Growth Monitoring Reports have not included an analysis of commercial and industrial trends. An analysis of gross and net densities, and floor area is required by the GMA. The Economic Development Council also maintains a database of industrial sites. This database can be used as a cross-reference on development trends.

Required data elements

The required data elements to develop an accurate estimate of gross and net densities and floor area ratios (FARs) for commercial, office are similar as for multiple family development.

Parcel identifier (allows determination of location of parcel—city limit, UGA)

Comprehensive plan designation

Zoning

Area in tax lot (in square feet or acres)

Gross floor area in development

Area (in square feet or acres) in streets and other public right-of-way (if any)

Area (in square feet or acres) in critical areas or open space

Gathering this data will require review and analysis of site plans for each development. For some jurisdictions, this could be dozens or possible hundreds of site plans. Conducting the review on a sample basis would be a possibility where jurisdictions lack sufficient resources to conduct a 100% sample.

Summary of steps

1. Analyze the amount of land consumed by type of development
2. Analyze gross square feet of floor area by type of development
3. Analyze floor area ratio by type of development
4. Analyze gross and net density of commercial and industrial development
5. Review the EDC database as a cross reference

SUMMARY OF TASK 2.3

Product 1: Population and employment data
Schedule: August 2000 - May 2001
Discussion: The five-year report needs to include a discussion of population and employment trends. Historical data is available in the annual growth monitoring reports.

Product 2: Incorporations/Annexations
Schedule: August 2000 - May 2001
Discussion: This product will be an update of the data on annexations and incorporations in the annual growth monitoring reports.

Product 3: Residential land trends
Schedule: August 2000 - May 2001
Discussion: This product will update the residential analysis in the annual growth monitoring reports.

Product 4: Residential market analysis
Schedule: January 2001 - August 2001
Discussion: This product will be a current county- and city-level discussion of residential trends. The updated analysis should apply data available from the 2000 Census.

Product 5: Commercial and Industrial land trends
Schedule: August 2000 - May 2001
Discussion: This product will be an update of commercial and industrial development trends from the annual growth monitoring reports.

TASK 2.4 DEVELOPMENT PIPELINE

The development pipeline refers to buildable land that is committed for development. The development pipeline includes two elements: formal

and short plats with final approval, and issued building permits. The TAC determined that land in the development pipeline would not be addressed in the buildable land supply analysis, but would instead be considered if necessary to adjust future average density assumptions.

Required data elements

Data gathered as a part of the residential, commercial and industrial trend analysis.

Summary of steps

1. Select base date for buildable lands inventory

2. Identify all formal and short plats with final approval, and issued multiple-family residential, commercial and industrial building permits

3. Include information about the density of development in the pipeline by type with the historical trends in those densities for construction during the last five years (Task 2.3, above) in making the assessment of future development density by land use type (Task 2.5).

SUMMARY OF TASK 2.4

Product 1: Summary of current projects
Schedule: August 2000 – May 2001
Discussion: The development pipeline analysis will include a list of approved projects at the time of the base buildable land inventory date.

TASK 2.5 ESTIMATE OF LAND DEMAND AND CAPACITY

This section presents a discussion of data sources and approaches for density tracking. Cities must evaluate densities since adoption of GMA comprehensive plans. This analysis must go beyond recorded single-family residential subdivisions for the cities and county since 1995; it must include recorded single family residential short plats, multi-family residential development, and commercial/industrial development.

2.5.1 POPULATION AND EMPLOYMENT FORECASTS

Future 5-year reports will require development or evaluation of population and employment forecasts. For this report, however, the County will use the adopted 1992-2012 forecasts contained in Appendix B of the Countywide Planning Policies of Snohomish County.

Required data elements

Local population and employment forecasts. If local forecasts do not exist, then population and employment forecasts by the Puget Sound

Regional Council (PSRC) can be used. The PSRC forecasts are for transportation analysis zones (TAZs) which do not generally follow city limits. Thus, some adjustments to the PSRC forecasts is required.

Summary of steps

Development of new population forecasts is not necessary for this analysis. The following steps represent one approach to forecasting local employment.

1. Gather year 2000, 2010, and 2020 estimated employment as reported in the 1999 TAZ-level PSRC projections

2. Cross-check PSRC TAZ-level against geocoded Department of Employment Security 1998 reported covered employment (augmented by 1995 estimated government/education employment).

3. Allocate forecast non-government employment in TAZs whose boundaries do not correspond to the planning area boundaries based on the 1998 distribution of covered employment for each TAZ.

4. If possible, allocate total employment to PSRC generalized sectors.

2.5.2   LAND NEEDED FOR RESIDENTIAL USES

Appendix B described the basic framework for estimating land needed for residential uses. Residential land need is based on population forecasts.

Required data elements

The housing assessment requires specific demographic and housing data, as well as a local population forecast. Following is a list of data and assumptions required to complete the housing forecast.

Population forecast
Estimated persons in group quarters for the planning period
Generalized vacancy rate
Persons per occupied unit for forecast period
Housing type split
Density by housing type

Summary of steps

1. Project the number of new persons during the planning period.

2. Identify relevant national, state, and local demographic and economic trends and factors that will affect the 20-year projection

of structure type mix. This analysis considers trends in factors such as age, household size, migration patterns, employment, household income, and other factors that affect not only overall demand for housing, but also the type of housing. Key factors include assumptions about average household size and persons in group quarters. Average household sizes in most metropolitan areas have decreased in the past 20-30 years. Also, identify and consider any housing policies or goals adopted by jurisdictions that would affect assumptions regarding future year housing units by structure type. If the housing need assessment assumes a change in household size over the forecast period, that change must be applied not only to new housing units, but also to population in existing housing units.

It is more difficult to find good data to support assumptions on persons in group quarters. Assumptions about persons in nursing homes and assisted living situations can be based off of age distributions and historic ratios; other group quarters such as dormitories may be more difficult. One approach is to conduct interviews with organizations such as universities that manage group quarters facilities.

3. Estimate the number of additional needed units by structure type. At a minimum, communities should estimate the number of single-family and multiple family dwelling units needed over the planning period. More robust models make distinctions between single family lot sizes, and types of multiple family units (i.e., duplexes, row houses, garden apartments, etc). The U.S. Census data provides a baseline for this analysis, however, local policy can have a strong influence on the mix of housing types.

4. Determine the needed density ranges for each plan designation and the average needed net density for all structure types. The density assumptions are generally based on a combination of analysis of past development, and policy. The analysis of past development allows estimates of how close to allowable densities development has achieved. Local policy should provide for density targets both at the community level, and the individual comprehensive plan designation or zoning district level.

2.5.3 LAND NEEDED FOR EMPLOYMENT USES

The forecast of employment-supporting land need is based on employment forecasts and ratios of employee per land area (acre).

Required data elements

Following is a list of data and assumptions required to complete the employment forecast.

Employment forecast (by sector)
Employees per acre (by sector)
Square feet of built space per employee (by sector)

Summary of steps

1. *Develop employment projections.* Based on historic data and regional and statewide projections, or other available data, develop a sector-level employment projection. There are several ways to work from state or county-level forecasts to local forecasts. For the purpose of this project, we simply assume that such forecasts are available and provide no further explanation about how to make such forecasts.

2. *Analyze existing employment patterns by sector.* This step is intended to determine the amount of employment to allocate to broad employment sectors: commercial, industrial, and office at a minimum. While county-level forecasts are commonly more detailed that the three sectors described above, information on employee-per-acre factors to estimate land need is generally not as detailed.

    A further complication arises in that some employment locates on land designated for other uses (i.e., a commercial use in an industrial zone), and that employment types can mix on a single site (i.e., office employees on a mill site). While this may be a useful analytical step, most communities do not have the employment data that allows analysis of employment at the individual firm and tax lot level. It is more common to work with employment at the industry sector level.

3. *Determine employee per acre ratios.* Employee per acre (EPA) ratios allow conversion of jobs into land. Developing the EPA assumptions can be difficult since few empirical analyses of employee per acre ratios exist. Most jurisdictions apply ratios of between 10 and 35 depending on the area and the employment type. Common data sources for EPA ratios include studies in other jurisdictions, or using the Bureau of Economic Analysis ES-202 employment tapes to locate employment on individual sites. Some communities also have business inspection systems maintained by the local fire marshall that tie employment to specific sites.

4. *Apply the ratios to employment forecasts by sector.* This step applies employment per acre ratios to changes in employment by sector for the forecasting period. The output of this analysis is an estimate of land demand by employment sector. For large employers conducting interviews and allocating employment by hand may yield more accurate results. It is particularly important to determine whether a few large employers that may constitute a

majority of employment in a particular jurisdiction are expecting to grow, and if so, the extent to which they expect to do so on land that the buildable land analysis would define as vacant. Many large employers have sufficient land to accommodate future expansion.

5. *Determine aggregate demand for employment-supporting land.* This step divides the employment estimated in the previous step to that which is likely to locate on industrial and commercial (divided, to the extent possible, into office and retail) land, and that which is likely locate on non-industrial lands. The final result is an estimate of the demand for industrial, retail, and office land.

2.5.4 LAND NEEDED FOR OTHER USES (OPTIONAL ANALYSIS)

An optional analysis is to estimate land needed for other uses. The most typical approach is to calculate these on the basis of acres per 1000 individuals. Jurisdictions should gather data on the following uses using adopted standards, interviews with service providers, analysis of existing land use patterns, or application of ratios developed for other communities.

Specifically, the analysis should include the following uses:

- Parks/Open space
- Schools
- Municipal offices
- Rights-of-way
- Police/Fire facilities
- Stormwater drainage/detention
- Water storage
- Wastewater treatment and pump stations
- Landfills or transfer stations

Communities may not have data on all of these other uses, however, an analysis of how much land is presently used for each facility, and whether existing facilities are meeting community standards (if they exist).

Table 5-5 shows an example of how communities should track existing public lands and make estimates of the amount of public land needed over the planning period.

Table 5-5. Example of Public Lands table

		Parks	Service 2 etc
Existing Conditions	Acres		
	% of all City acres		
	Acres/1000 people		
LOS	Acres/1000 people		
Estimated Need	Total Acres		
	Acres in large parcels		

Consideration of public land requirements takes place at the time of the land supply analysis by removing land for public purposes from the potential residential, commercial or industrial land supply, based on local standards or generalized reduction factors. Each jurisdiction must review its local standards to determine reductions for specific public uses; if no standards exist, the data in the table provide information on existing ratios. The existing ratios can be used without modification as *de facto* standards, or communities can make modifications to those values. No matter what values are used, communities need to document clearly the assumptions, and provide rationale for the assumption.

Required data elements

Following is a list of data and assumptions required to complete the assessment of land needed for other uses.

Standards for parkland

Acres per 1000 persons used for other non-residential, non-employment uses

Population forecast

Standards for other uses

Summary of steps

1. Gather existing city or jurisdiction standards for other uses if they exist.

2. Evaluate existing ratios of other land uses on a per 1000 person basis, per 1000 dwelling unit basis, or as a percentage of total land in the planning area.

3. Apply ratios or standards to forecast of new population, dwelling units, or land consumption.

TASK 2.5.5   ESTIMATE OF LAND CAPACITY

Snohomish County's General Policy Plan (GPP) land use policy 1.A.9 requires UGAs to be re-evaluated at least every five years to determine if they are capable of meeting the county's 20-year population and employment projections. The land capacity estimates, when compared with the inventory data, provide the basis for evaluating the need for UGA adjustments.

Land capacity is an estimate of the amount of development that land can accommodate given land use regulations. Several approaches are available to estimate capacity. A starting point is generally an estimation of "theoretical" capacity, or the maximum intensity a site could be developed at given policy constraints (e.g., plan designation, zoning, minimum service requirements, and so on). For example, if a one-acre site has zoning regulations that allow 100% lot coverage and up to three floors, the theoretical capacity on that site would be 130,680 square feet of built space (43,560 sq. ft./acre x 3 floors). Planners commonly describe capacity or intensity of development in terms of floor area ratios (FAR). FAR is simply the amount of built space on a site divided by the area of the site. The example above equates to a (FAR) of 3.0 (130,680/43,560=3.0).

It is typical for capacity analyses to make deductions from the theoretical capacity for public uses, right-of-way, and other land uses that reduce the buildable area of a lot. This approach recognizes real-world factors that affect the amount of buildable area on any given tax lot. Taking deductions for specific factors is one variation on estimating theoretical capacity. FARs based on zoning then allow estimations of the maximum amount of built space that could be built.

Development, however, frequently occurs at densities that are less than what is allowed under existing zoning. Using adjusted FARs based on recent development, one can develop market-based estimates of capacity. The method proposed below is a combination of a theoretical capacity approach and a market-based approach.

Required data elements

The capacity analysis builds on data gathered in the previous tasks. Specifically, the analysis relies on data that will be in the standard parcel file.

Summary of steps

1.   The source of this information is assessor records.

2.   Evaluate parcels based on current ownership and future plans. The following parcels were excluded:

- Parcels owned by public agencies.

- Any parcel with a current approved building permit.

- Parcels unlikely to ever be developed (cemeteries, areas with powerline easements, etc)

- Vacant parcels under the same ownership as intensively developed parcels (for example, a parcel next to a major corporate campus that will probably serve as the corporation's expansion area) [2]

3. Classify parcels as described in the Buildable Lands Inventory section of this chapter: Fully Developed; Partially-Vacant; Under-Utilized/Redevelopable; Vacant; and Undevelopable.

4. Deduct for critical areas at the parcel level. These include (1) wetlands, (2) wetland buffers, (3) streams, (4) steep slopes , and (5) others as required by jurisdictions. The resulting square footage is the buildable area.

5. Use the density analysis to determine appropriate density and floor area ratio (FAR) factors to apply to the buildable area. (Including actual density and FAR factors for areas with approved subdivision/development in the pipeline.)

6. Aggregate buildable areas by zone and compute the amount of lot coverage that could be developed based on zoning restrictions (setbacks, etc).

7. Multiply the buildable area by the density factor to obtain the capacity estimate.

Table 5-5 shows a sample matrix for estimating land capacity.

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[2] Such a parcel is technically available for development. However, its development ultimately depends on the factors that affect development of the business that owns the land. Conducting interviews with major employers is a good approach for gathering information concerning future expansion plans.

Table 5-5. Sample matrix for land capacity

Land Classification/Variable	Plan Designation 1	Plan Designation 2	Plan Designation 3	Total
Vacant Land				
Vacant buildable residential acres (from inventory)[1]				
Target density (DU/net acre)				
Net to gross adjustment factor				
Target density (DU/gross acre)				
Dwelling units				
Partially-vacant land				
Other land classifications…				
Under-utilized land				

[1] Assumes all unbuildable land deductions were already made

SUMMARY OF TASK 2.5

Product 1: Residential land need analysis
Schedule: January 2001 - December 2001
Discussion: Estimate of residential land need, by city and county subarea.

Product 2: Employment land need analysis
Schedule: January 2001 - December 2001
Discussion: Estimate of land needed for employment, by city and county subarea.

Product 3: Other land needs
Schedule: January 2001 - December 2001
Discussion: Estimate of land needed for other uses, by city and county subarea.

Product 4: Residential land capacity analysis
Schedule: January 2001 - December 2001
Discussion: Estimate of residential land capacity, by city and county subarea.

Product 5: Employment land capacity analysis
Schedule: January 2001 - December 2001
Discussion: Estimate of land needed for employment, by city and county subarea.