



# WHATCOM COUNTY LAND CAPACITY ANALYSIS

## Detailed Methodology

August 14, 2009

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### 1.0 INTRODUCTION

This document describes the detailed methodology used in Whatcom County's 2009 Land Capacity Analysis (LCA) as part of a process to review and revise Urban Growth Areas and update the Whatcom County Comprehensive Plan. This document is a technical accompaniment to the conceptual Berk & Associates memo dated October 31, 2008 entitled *Land Capacity Analysis – Proposed Methods*, which includes the policy context and rationale behind the chosen methodology.

### 2.0 GEOGRAPHIC AND TIME PARAMETERS

#### 2.1 Base Point in Time

The Technical Advisory Group (TAG) selected a base point in time, July 1, 2008, from which the developable lands inventory was measured. For the LCA, all structures existing as of July 1, 2008 will be considered developed, while everything else proposed, built or occupied after that date will be counted as future capacity. The Whatcom County Assessors data used by the County will be taken from the same point in time. This common parameter ensures consistency across jurisdictions in processing property and building activity data.

#### 2.2 Study Area Boundaries

The Land Capacity Analysis was carried out for all UGAs in Whatcom County including both incorporated and unincorporated portions of each UGA. An analysis was done early in the comprehensive planning process using adopted UGA boundaries, and again when UGA boundary adjustments were proposed.

### 3.0 LAND SUPPLY ANALYSIS

#### 3.1 Assemble Gross Developable Land Inventory

The first step in the assessment of land supply was to identify all lands within UGAs that are considered vacant, partially-used, or under-utilized. These lands comprise the Gross Developable Land Inventory.

##### Data Needed

- Whatcom County Assessors Office countywide parcel data in shapefile format. Associated attribute data including improvement value and land value.
- GIS shapefiles from cities and the County including: 1) Boundaries for all County UGAs (existing and proposed) and incorporated cities and 2) Zoning for all jurisdictions, including city designations for associated UGAs.
- Recent plat and permit activity data (see **Section 4.1**)

##### Steps

1. Select all residential, commercial, and industrial parcels within UGAs. Distinguish between those parcels in unincorporated areas and those within incorporated cities.
2. Cross-reference local permit and plat data with selected parcels. Separate any parcels with multifamily permits, commercial/industrial binding site plans, and preliminary and final plats that have not been constructed by July 1, 2008. This includes master planned projects that have not been completely built out but have received approval for a certain number of dwelling units or commercial/industrial square footage. Only projects that have received preliminary approval will be included in this list. These developments will be considered pending capacity and will be added to the final land capacity total at the end of the process. (see **Section 5.1**)
3. If necessary, update any Assessors' parcel records that have not incorporated recent plat or permit data issued before July 1, 2008.
4. Select developable parcels that are vacant, partially-used, or under-utilized. Use GIS processes and database queries to apply the definitional thresholds listed in **Exhibit 1**.

**Exhibit 1**  
**Developable Land Definitional Thresholds**

Category	Parcel Type	Definition
Vacant	All Residential, Commercial, Industrial	Improvement value < \$10,000; exclude all parcels < 2,400 sq ft in size
Partially-Used	Single Family	Parcel size > 3 times minimum allowed under zoning; Don't count parcels with improvement value > 93 <sup>rd</sup> percentile <sup>1</sup> of jurisdiction improvement values unless the parcel size is > 3 times the minimum allowed under zoning
	Multifamily, Commercial, Industrial	n/a
Under-Utilized	Single Family	N/A
	Multifamily, Commercial, Industrial	<ol style="list-style-type: none"> <li>1. Multifamily, commercial, and industrial zoned parcels occupied by single-family residential uses</li> <li>2. Ratio between improvement value and land value &lt; 1.0</li> <li>3. Cities can identify development, such as gas stations, as fully developed when the ratio of improvement value to land value is less than 1. Subtract existing floor area from data base.</li> </ol>

5. Make adjustments for mobile homes. The primary concern is that some mobile home parks may show up as vacant if the mobile home value is not captured in the Assessors' improvement value data. County staff will use aerial imagery to truth check developable parcel designations against known areas with mobile home developments. Local jurisdictions will also be given an opportunity to review developable land and mobile home park issues in the local jurisdiction review phase described later. If mischaracterized mobile home parks are identified, manually adjust the developable category designation in the land inventory database.

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<sup>1</sup> The exclusion of parcels with high improvement values is meant to account for the fact that large single family parcels with high-end homes are unlikely to be subdivided. The 93<sup>rd</sup> percentile threshold was determined by analyzing the distribution of housing values in the County and selecting a reasonable value that could be applied across all jurisdictions.

### 3.2 Deduct Critical Areas and Sensitive Environmental Areas

In the next step of the process, subtract all the sensitive environmental and critical areas from the inventory of vacant, partially-used, and under-utilized parcels.

#### Data Needed

- County base critical areas GIS data: National Wetlands Inventory (NWI), streams, steep slopes, seismic soils, floodplains.
- If available, additional critical areas GIS data from local jurisdictions.
- Local critical area ordinances.

#### Steps

1. Integrate local jurisdiction critical area data with County base data. The following types of critical areas will be included in the analysis.

#### *Wetlands*

The primary source of wetlands data available to the County is National Wetlands Inventory (NWI) data, which is estimated by staff to include only 25%-50% of actual wetlands county-wide. Coupled with a few additional wetlands data sets, the County has a wetlands dataset estimated to include 50%-75% of all wetlands. These estimates of wetland accuracy are county-wide, including forested and rural areas where the accuracy of aerial images obscure wetlands. The accuracy of the data within urban areas is far higher, and in many cases, local jurisdictions have a more accurate wetlands inventory that the County has used to update its wetlands dataset for the purpose of this analysis.

#### *Streams*

Since the ordinary high water mark is not universally available in County GIS layers, the County's base stream dataset with stream centerlines and an assumed 25 feet of non-buildable area on either side of the centerline will be used in the analysis.

#### *Steep Slopes and Seismic Soils*

The County will subtract all areas with slopes greater than 35% since there are generally no restrictions on development where slopes are less than 35%. This value is consistent with several other GMA counties that subtract steep sloped areas. The County will also subtract areas with extensive peat soils that are undevelopable. Areas impacted by alluvial fan hazard areas and regulations restricting land division will also be subtracted.

#### *Floodplain*

All land in the floodway will be removed from the inventory. All lands within 100-year floodplains of the unincorporated portions of the Urban Growth Areas will also be removed from the inventory. All lands within floodplains of the incorporated areas will be removed from the inventory where development

would be required to fill two feet above the adjacent grade, or where regulations prohibit the placement of fill in floodplains.

2. Deduct critical areas for residential parcels: Using GIS, overlay the critical areas described above on developable parcels and deduct land area where there is overlap. Critical area buffers are not deducted from residential parcels due to the variety of clustering and density transfer options available on these parcels. Later in the local jurisdiction review process, adjustments to critical area deductions can be made for cases with unique circumstances.
3. Deduct critical areas for commercial and industrial parcels: Since there are limited, if any, density transfer options for commercial and industrial parcels, critical area buffers will be deducted from these areas. Buffer distances will be based on County or city critical area ordinances and regulations.
4. The resulting selection of developable parcels unconstrained by critical areas will be used as the land base to calculate deductions for rights-of-way, other public uses, and market factors.

### **3.3 Deductions for Future Public Uses**

There are a wide range of public uses that should be deducted from developable land totals including schools, police and fire stations, recreation facilities and open space.

#### **Data Needed**

- Capital facility plans for public facilities (water, sewer, stormwater, parks, schools) and public services (police, fire), particularly if they include plans for land usage and specific parcel acquisition.
- Countywide parcel data with associated ownership information.

#### **Steps**

1. Schools, police and fire facilities, and parks are the public uses most likely to have established plans for future facilities needs. These uses will be handled separately from other public uses.

Where available, review existing capital facility plans for schools, police and fire facilities, and parks and identify any confirmed parcels or areas that should be deducted from the developable land inventory. Any property already owned by public institutions for future expansion as well as any known public uses in master planned areas should be identified. Deduct these parcels or acreage totals manually from the inventory if within a financially constrained plan.

2. If appropriate, analyze ownership information for parcels in the developable land inventory and exclude those owned by public entities and likely to be used for future public uses. This step may not be necessary if most future public use parcels were already excluded when the first residential, commercial, and industrial parcels were selected.
3. In order to account for other future public uses (e.g. community centers, daycare centers, churches, etc.) a 5% percent deduction on developable land is used. The deduction should be applied to the

Developable Land Inventory after critical areas are removed but before any other deductions for infrastructure or market factors.

4. During the local jurisdiction review process, adjustments to the 5% other public uses deduction may be considered to account for local conditions and data availability.

### **3.4 Deductions for Future Infrastructure (Rights-of-Way and Other Development Requirements)**

Deductions for future infrastructure, including rights-of-way (ROW) and other development requirements, will be based on the percentages of land dedicated to infrastructure in recent plats, permits, and developments. This percentage is calculated in the analysis of recent development activity step described below in **Section 4.1**. Because this deduction is being carried out on land not constrained by critical areas, it is important that the infrastructure percentage deduction factors also be based on land not constrained by critical areas. If there is insufficient data to calculate deduction for infrastructure, then standard deductions based on reasonable assumptions may be used within the analysis.

#### **Data Needed**

- Results from recent development activity analysis – percentage of developable area (minus critical areas and public uses) devoted to ROWs and other infrastructure

#### **Steps**

1. Summarize acreage of developable land minus critical area and public use deductions by zone for each UGA.
2. Analyze recent development activity to determine infrastructure percentage deduction factors by UGA (see **Section 4.1**).
3. Apply these deduction factors to the inventory of developable land unconstrained by critical areas to calculate the acreage deduction for infrastructure. The infrastructure deduction may be applied by UGA or by specific zone depending on the quantity and quality of recent development activity data.

### **3.5 Local Jurisdiction Review**

Local jurisdiction review of developable parcel designations and other deductions will occur through a series of communication and meetings between County and City staff. Some jurisdictions with complex land supply issues may require more meetings than others. In general, the following review process will be used for the LCA.

#### **Steps**

1. The County will generate parcel maps for each UGA showing vacant, partially-used, and under-utilized parcels as well as critical area buffers overlaid on aerial imagery. Some larger UGAs may need to be presented in multiple maps.

2. The maps, along with tabular parcel data underlying the maps will be sent to each local jurisdiction for review. If appropriate, County staff will meet with city staff to discuss any adjustments to developable designations or critical areas that are necessary. These meetings can also be used to discuss infrastructure deductions, public use deductions, assumed density assumptions, market factor assumptions, and other jurisdiction-specific assumptions described elsewhere in this methodology.

The range of additional issues that can be considered during the local jurisdiction review process includes but is not limited to the following:

- Critical areas not identified through GIS analysis
- Known market interest in development or redevelopment of particular parcels/areas
- Parking and outdoor storage associated with adjacent uses
- Other associated/related uses spanning multiple parcels
- Irregular parcel shapes making development unlikely

### **3.6 Market Factor Deduction**

The market factor is a final deduction from the net developable area to account for lands assumed not to be available for development during the planning period. It is expected that over the 20-year planning period some lands will be kept off the market due to speculative holding, land banking, and personal use, among other reasons.

#### **Steps**

1. Summarize acreage in the Developable Land Inventory by zone, by land use (residential and commercial/industrial) and developable land designation (vacant, partially-used, and under-utilized). This acreage should represent developable land after critical areas, infrastructure, and public uses have been deducted.
2. Apply the following deduction factors to the developable acreage by zone:
  - For vacant residential and commercial/industrial zones: 15% market factor
  - For partially-used and under-utilized residential and commercial/industrial zones: 25% market factor
3. As a reference point, the overall average market factor for all developable land should be calculated for each UGA and Countywide (total acres deducted based on market factor percentage / total acres in the Developable Land Inventory after critical areas, infrastructure, and public uses have been deducted).
4. During the local jurisdiction review process, the base market factors may be adjusted to account for local conditions and future plans. If market factors are adjusted, the final overall average market factor for a UGA should not exceed 25%. For certain areas (e.g. commercial/industrial areas in

smaller outlying UGAs) market factors may exceed 25% but the jurisdiction must have well-documented support for why such a deduction is appropriate.

5. The final acreage totals by zone represent the Net Developable Land Inventory – the land expected to be available to accommodate future population and employment over the planning period.

## **4.0 DEVELOPMENT DENSITY ASSUMPTIONS**

Assumptions about future development density are critical elements in the Land Capacity Analysis because they are needed to convert net developable area (acres) into future population and employment capacity.

### **4.1 Analysis of Recent Development History (Determine Achieved Densities)**

The first step in developing density assumptions is to analyze recent development history to determine the actual densities achieved in different zones and planned land use areas. These achieved densities will serve as reference points and one of the inputs into the determination of assumed future densities in each zone.

The past five years of development activity (both plats and permits) is used to determine actual net achieved densities of development on both residential and commercial/industrial land. Local jurisdictions will provide the development data to County staff. On the land side of the equation, County staff with the assistance of local jurisdictions will calculate the net acreage of parcels housing the recent developments. The net acreage must exclude the same ROWs, critical areas, and public uses excluded from the developable land supply. The final achieved densities will be expressed as dwelling units (DUs) per acre for residential parcels and floor area ratios (FARs) for commercial and industrial parcels.

#### **Data Needed**

- All records of development activity in each UGA over the most recent five-year period (1/1/2003 – 1/1/2008)<sup>2</sup> including:
  - Single family residential final plat activity
  - Multifamily, mixed-use, commercial and industrial building permit activity and binding site plans
- Whatcom County Assessors Office countywide parcel data in shapefile format. Associated attribute data including lot sqft.
- GIS shapefiles from cities and the County describing zoning for all jurisdictions, including city designations for associated UGAs.

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<sup>2</sup> These dates were chosen to match up with Assessor's data records.

- County base critical areas GIS data supplemented by local jurisdiction data: National Wetlands Inventory (NWI), streams, steep slopes, seismic soils, floodplains. (see **Section 3.2**)

**Steps**

1. Cross-reference all plat and permit activity with the Assessors parcel data to select only those parcels that experienced development activity during the five year study period.
2. Using GIS, overlay these parcels with critical area layers and calculate the area constrained by critical areas in each zone.
3. For all plat and permit activity, summarize the total acreage of land by zone dedicated to ROWs, infrastructure, and other public purposes.
4. Subtract the area constrained by critical areas, infrastructure, and public purposes from the gross parcel area in each zone. The resulting acreage is the net area to use in achieved density calculations.
5. Summarize the total number of lots (for single family plats), units (for multifamily residential and mixed-use building permits), and building square footage (for commercial, industrial, and mixed-use permits) for each zone in a jurisdiction.
6. Use the basic calculations listed in **Exhibit 2** to calculate achieved density for each development type in each zone in each jurisdiction. Final achieved densities will be expressed in terms of DUs per acre for residential zones and FAR for commercial and industrial zones.

**Exhibit 2  
Basic Achieved Density Calculations by Development Type**

<b>Development Type</b>	<b>Achieved Density Calculation</b>
Single Family Subdivision Plats	# Lots / Net Plat Area
Multifamily Building Permits and Plats	# Units / Net Site Area
Commercial and Industrial Building Permits	Floor Area / Net Site Area
Mixed-Use Building Permits (Residential Portion)	# Units / Net Residential Portion of Site
Mixed-Use Building Permits (Commercial Portion)	Commercial Floor Area / Net Commercial Portion of Site

Note: For mixed-use buildings, the site area is apportioned between residential and commercial uses based on the share of building square footage dedicated to each use.

7. Calculate the percentage of gross parcel area dedicated to ROWs and other infrastructure uses in each zone and each UGA overall. This percentage is used in future land capacity calculations (see **Section 3.4**)

## 4.2 Determine Assumed Densities.

For each zone and planned land use designation, jurisdictions will develop assumed densities to be used in the Land Supply Analysis. These assumptions are meant to be reasonable estimates of densities to expect over the long-term planning period. Assumed densities will only be used for the purposes of the LCA and will not be used to guide or influence other County or local land use policy decisions.

In determining assumed densities, jurisdictions will consider the following range of inputs: recent achieved densities; County and city land use goals and policies; local knowledge of development plans and pending development; and any other local market or policy conditions that are likely to impact future development densities. The County will work with city staff to ensure that reasonable assumed densities are developed.

The determination of assumed densities in each zone and planned land use area in each jurisdiction is expected to be an iterative and collaborative process between the County and cities. The process will be challenging because each jurisdiction will have its own set of issues depending on the complexity of its zoning code, other land use policies, and market conditions. In addition, the theoretical densities allowed in an area must be balanced with potentially very different achieved densities in those same zones.

Although establishing one common method for determining assumed densities is not possible, the underlying principle in this process is to develop assumed densities that are reasonable given recent development patterns and expected changes in future densities caused by market and policy factors.

A few of the guidelines to assist jurisdictions in determining assumed densities include:

- Using achieved densities as assumed densities if they fit within expected values for particular zones and planned land use areas. Adjustments can be made based on recommendations from local jurisdictions.
- Using a midpoint density between the maximum allowed under zoning and either the minimum allowed or achieved density. This approach may be more appropriate for multifamily zones, which often have a wide range of allowed densities.
- Using selected recent planned developments as models of future development densities in a particular zone.
- Ensuring that incorporated city UGA average assumed densities (over the entire city) remain above accepted thresholds of urban densities (e.g. 4 DUs per acre)
- Ensuring that urban densities increase over current trends.

### **Additional Considerations – Mixed Use Zones**

In addition to the assumed densities assumptions, local jurisdictions will also need to address important assumptions for mixed-use parcels. Mixed-use parcels represent a unique challenge because they include both residential and commercial capacity.

The proposed approach to deal with these parcels is to make an assumption about what share of development will be in residential and commercial uses respectively. These assumptions will be provided by local jurisdictions based on recent patterns in mixed-use development within each planning area, local jurisdiction plans, and local knowledge of trends and pending development.

## **5.0 CONVERT NET DEVELOPABLE AREA INTO NET POPULATION AND EMPLOYMENT CAPACITY**

The final step in the land supply analysis is to convert the net developable land inventory (in acres) into population and employment capacity. A series of conversion factors are used to make these calculations including: net assumed densities of future development in each planned land use designation (see **Section 4.2**), average household size, and non-resident vacancy rates. The final product is an estimate of the number of people and employees that can be accommodated in each UGA on developable land. These estimates will be directly comparable to the forecasted population and employment totals allocated to each UGA over the 20-year planning period.

### **5.1 Determine Population Capacity**

This section describes how capacity to accommodate future population growth is derived from the net developable area in residential zones and the residential portion of mixed-used zones.

#### **Data Needed**

- The Net Developable Land Inventory of residential and mixed-use zones (see **Section 3.0**)
- Assumed densities for residential and mixed-use zones (see **Section 4.2**)
- Whatcom County Assessors Office data for partially-used and under-utilized parcels.
- Pending permit and plat data – permits and plats for developments that have received preliminary approval but have not been constructed as of July 1, 2008. Pending data includes those areas that have been “master planned” by the city, such as the Waterfront area in Bellingham and Semiahmoo Resort in Blaine.
- OFM, US Census, and American Community Survey (ACS) data on occupancy rates and average household sizes at the Block Group, Census Designated Place, and County level.

#### **Steps**

##### *Determine Total Dwelling Units Capacity by Zone*

1. Multiply net acres of residential developable land in each zone by the assumed density (DUs/acre) for each zone. The output will be the total dwelling units of capacity available in each zone before accounting for existing development on partially-used and under-utilized parcels.

2. Summarize total existing dwelling units on partially-used and under-utilized parcels by zone. Subtract these units from the totals from the previous step so that existing units are not counted as part of partially-used or under-utilized parcel capacity.
3. Earlier in the process, parcels with pending developments were set aside. These parcels included preliminary or final plats, permits, and binding site plans for developments that have received preliminary approval but have not been constructed by July 1, 2008. Master planned projects that have not been completely built out but have received approval for a certain number of dwelling units are also included. (see **Section 3.1**).

The estimated capacity in these developments is more accurate than calculated theoretical capacity. Summarize total dwelling units in these pending developments by zone. Add these units to total dwelling units from Step 2. The output will be total dwelling units of capacity available in each zone.

*Determine Total Occupied Dwelling Units by Zone*

4. Determine occupancy rate assumptions for each UGA city by using 2008 OFM estimates. OFM does not provide reliable occupancy rates for unincorporated areas so 2000 Census data are used to calculate occupancy rates in unincorporated UGAs (e.g. Birch Bay and Columbia Valley). The 2000 Census occupancy rate assumptions are adjusted based on more current ACS estimates on how these rates have changed countywide since 2000. In particular, the occupancy rates in UGAs with large concentrations of seasonal housing<sup>3</sup> will be assessed carefully. If more accurate occupancy rate assumptions are available from a reliable local source, these may be used instead of the OFM and Census values.
5. Multiply the total dwelling units of capacity in each zone by occupancy rate assumptions for each UGA. The output will be total occupied dwelling units in each zone.

*Determine Total Population Capacity by UGA*

6. Determine average household size assumptions for each UGA city by using 2008 OFM estimates. OFM does not provide reliable household size estimates for unincorporated areas so 2000 Census data are used to calculate average household sizes in unincorporated UGAs (e.g. Birch Bay and Columbia Valley). Average household sizes for single family and multifamily households are calculated separately. The 2000 Census average household size assumptions are adjusted based on more current ACS estimates on how these values have changed since 2000. If more accurate household size assumptions are available from a reliable local source, these may be used instead of the OFM and Census values.
7. Aggregate the total dwelling units in each zone into two categories, single family and multifamily. The distinction between single family and multifamily zones is challenging because each jurisdiction may interpret “single family” and “multifamily” differently and have zoning codes that allow different levels of density in each of these categories. To improve consistency and common

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<sup>3</sup> Seasonal housing is considered vacant according to Census definitions. These housing units are not included in the occupied housing unit category and are not folded into Census calculations of average household size.

understanding regarding land use categories, the following single family/multifamily threshold will be used: all zones allowing more than 7 DUs/acre will be considered multifamily and all those allowing up to 7 DUs/acre will be considered single family.

8. Multiply total occupied dwelling units in the single family and multifamily categories in each zone by average household size assumptions for these categories. The final output will be total population capacity within each UGA.
9. The population capacity in each UGA can be compared to the population allocated to each UGA to determine where excess or insufficient developable land capacity is an issue.

### **Reverse Conversion Steps**

If desired, the reverse conversion from population allocation to net acres of residential land needed can be carried out using the following calculations, which are essentially the reverse of the steps listed above.

1. Calculate weighted average occupancy rates, assumed densities, and average household sizes for each UGA using the net developable land inventory.
2. Divide the population allocation for each UGA by the weighted average household size value for each UGA. The output will be total future occupied households demanded.
3. Divide the total occupied households demanded by the weighted average occupancy rate for each UGA. The output will be total future dwelling units demanded.
4. Divide total dwelling units demanded by the weighted average assumed density (DUs/acre) for each UGA. The output will be total acres of net residential land demanded over the planning period.

## **5.2 Determine Employment Capacity**

This section describes how capacity to accommodate future employment growth is derived from the net developable area in commercial and industrial zones and the commercial portion of mixed-used zones.

### **Data Needed**

- The Net Developable Land Inventory of commercial, industrial, and mixed-use zones (see **Section 3.0**)
- Assumed FAR values for commercial, industrial, and mixed-use zones (see **Section 4.2**)
- Whatcom County Assessors Office data for partially-used and under-utilized parcels.
- Pending commercial and industrial building permit data – permits and binding site plans that have received preliminary approval but have not been constructed as of July 1, 2008. Pending data includes those areas that have been “master planned” by the city, such as the Waterfront and Airport areas in Bellingham and Semiahmoo Resort in Blaine.

## Steps

### *Determine Total Square Footage Capacity by Zone*

1. Multiply net acres of commercial and industrial developable land in each zone by the assumed FAR for each zone. The output will be the total square footage capacity available in each zone before accounting for existing development on partially-used and under-utilized parcels.
2. Summarize total existing commercial and industrial building square footage on partially-used and under-utilized parcels by zone. Subtract this square footage from the totals from the previous step so that existing buildings are not counted as part of partially-used or under-utilized parcel capacity.
3. Earlier in the process, parcels with pending developments were set aside. These parcels included commercial and industrial permits or binding site plans for developments that have received preliminary approval but have not been constructed by July 1, 2008. Master planned projects that have not been completely built out but have received approval for a certain amount of commercial/industrial square footage are also included. (see **Section 3.1**).

The estimated capacity in these developments is more accurate than calculated theoretical capacity. Summarize total commercial and industrial building square footage in these pending developments by zone. Add this square footage to the totals from Step 2. The output will be total commercial and industrial square footage capacity available in each zone.

### *Determine Total Occupied Square Footage by Zone*

4. Multiply the total square footage capacity in each zone by a 95% occupancy rate assumption. The occupancy rate assumption can be adjusted based on current and accurate data provided by local jurisdictions (e.g. annual real estate market reports). The output will be total occupied commercial and industrial square footage in each zone.

### *Determine Total Employment Capacity by UGA*

5. Aggregate the occupied commercial and industrial square footage capacity by zone into the three categories used in the future employment allocation process: Commercial, Industrial, and Retail. These categories each include specific NAICS-based industries, which are described in greater detail in the *Allocating Countywide Forecasts – Proposed Methods* memo (see **Exhibit 3** in last section of this document).
6. Determine employment density (square footage of floorspace occupied per employee) assumptions for future commercial, retail, and industrial development. The City of Bellingham has conducted a recent employment analysis that includes an assessment of employment density averages within the city. The County will use the Bellingham analysis as a starting point in determining final employment density assumptions, with adjustments to account for jurisdictional differences.

Another reference point in determining employment density assumptions is the ECONorthwest 2002 Whatcom County Land Capacity Analysis, which used the following values:

- Industrial: 650 square feet per employee

- General Commercial: 400 square feet per employee
- Retail: 600 square feet per employee

The final employment density assumptions can be adjusted based on local jurisdiction review.

7. Divide the total occupied commercial and industrial square footage in each category by the employment density assumptions. The final output will be total employment capacity within each UGA.
8. The employment capacity in each UGA can be compared to the employment allocated to each UGA to determine where excess or insufficient developable land capacity is an issue.

### **Reverse Conversion Steps**

If desired, the reverse conversion from employment allocation to net acres of commercial and industrial land needed can be carried out using the following calculations, which are essentially the reverse of the steps listed above.

1. Calculate weighted average FARs and employment densities for each UGA using the net developable land inventory.
2. Multiply each UGA's employment allocation in each industry category by employment density assumptions. The output will be total future occupied commercial and industrial square footage demanded.
3. Divide the total occupied commercial and industrial square footage demanded by the assumed occupancy rate for each jurisdiction. The output will be total future commercial and industrial square footage demanded.
4. Divide total commercial and industrial square footage demanded by the weighted average FARs for each UGA. The output will be total acres of net commercial and industrial land demanded over the planning period.

## **6.0 DEFINITIONS**

### **Land Use Categories**

- Single Family Residential – Zones allowing a housing density up to 7 dwelling units per acre.
- Multifamily Residential – Zones allowing a housing density more than 7 dwelling units per acre.
- Mixed-use – developments incorporating both residential and non-residential uses.
- Commercial (as term is used generally in main body of this document) – retail and office uses.
- Industrial (as term is used generally in main body of this document) – manufacturing, warehouse, and distribution uses.

- Commercial, Retail, and Industrial (as terms are used specifically in the employment density discussion) – see exhibit below.

**Exhibit 3  
Suggested Industry Classifications for Employment Allocation Process**

Commercial	Industrial	Retail
Information	Utilities	Retail Trade
Finance and Insurance	Construction	Food Service and Drinking Places (3-digit NAICS - 722)
Real Estate and Rental and Leasing	Manufacturing	
Arts, Entertainment, and Recreation	Wholesale Trade	
Professional, Scientific, and Technical Services	Transportation and Warehousing	
Management of Companies and Enterprises		
Administrative and Support and Waste Management and Remediation Services		
Health Care and Social Assistance		
Educational Services		
Accommodations (3-digit NAICS - 721)		
Other Services (except Public Administration)		
Public Administration		

**Developable Land Categories**

- Vacant – property with little or no building improvements;
- Under-utilized – property zoned for a more intensive use than that which currently occupies it (e.g. a single family home on commercially zoned land); and
- Partially-used – property occupied by a use consistent with zoning but containing enough land to be further subdivided without need of rezoning. (e.g. a single family home on a very large lot).

**Other Terms**

- Developable Parcels or Developable Land – all parcels that are vacant, partially-used, under-utilized
- Gross Developable Area or Gross Developable Land Inventory – total area of developable parcels before deductions for critical areas, infrastructure, public uses, and market factors are taken into account.
- Net Developable Area or Net Developable Land Inventory – total area of developable parcels after deductions for critical areas, infrastructure, public uses, and market factors are taken into account.
- Achieved Density – density of residential development (DUs per net acre) and commercial/industrial development (net FAR) achieved over the past five years of development activity.
- Assumed Density – assumption of residential density (DUs per net acre) and commercial/industrial development (net FAR) expected on developable land over the long-term planning period.
- Net Plat Area – total area of plats after deductions for critical areas, infrastructure, and public uses are taken into account.

- Net Site Area – total area of commercial, industrial and multifamily development sites after deductions for critical areas, infrastructure, and public uses are taken into account. Site area will sometimes not be equal to parcel area. (e.g. when multiple buildings are on one parcel)

### **Conversion Factors**

- Employment Density – the average amount of floorspace required to accommodate an employee. For the purposes of this study, expressed as square feet per employee.
- Floor Area Ratio (FAR) – total building square footage divided by lot square footage.
- Average Household Size –the average number of people per occupied housing unit (this is the same definition used by the U.S. Census).