Section 3 Methodology

Section 3 explains the methodology of the industrial land use inventory and estimate of buildable industrial land supply. It describes the analytical process that led to the findings in Sections 4 and 5 of Volume II.

This methodology is designed to provide a general order-of-magnitude estimate of (a) land area taken up by industrial activity; and, (b) buildable land supply, at a community wide and city subarea scale. A more site specific or parcel-by-parcel analysis would require a different analytical method. This inventory is not intended for the individual site scale, but rather supports areawide city land use planning and policy decisions.

Categorizing the Basic Land Supply in the Municipality

The entire land supply of the Municipality includes both vacant and developed lands, buildable and prohibitively constrained areas; uncommitted lands and lands committed to specific uses in all use categories of industrial, commercial, residential, public, institutional, and open space. It comprises some 1,955 square miles in total.

The Industrial Land Assessment study area, as established in Section 1 above, is only a part of this municipal land supply. The industrial study area comprises those areas of the Municipality which are relevant to existing and potential future industrial (PDR) activities. From the perspective of the Industrial Land Assessment, the municipal land supply consists of three kinds of lands:

Industrial Lands – These are lands currently zoned, designated, or utilized for industrial activities. This includes parcels zoned I-1, I-2, I-3, and MI; parcels zoned PC, PLI, or T which are currently in a PDR use; and parcels designated by the Municipality of Anchorage comprehensive plan for future industrial use.

Industrial Study Lands – These lands are other parts of the municipal land supply that, although not zoned or designated for industrial use currently, may potentially be available for industrial use within the 20-year planning horizon, or are subject to speculation by some observers that they could become available under certain scenarios. Examples include major landholdings on Fire Island, JBER, and in the Eklutna vicinity. Industrial study lands also include parcels in B-3 or other districts that adjoin existing industrial use areas and which are geographically interconnected with the industrial activities or which have disproportionate presence of PDR uses. For example, these include B-3 zoned segments of the Old Seward Highway commercial-industrial corridor between Tudor Road and DeArmoun Road.

Non-industrial Lands – The rest of the Municipality was not included in the Industrial Land Assessment Study Area. These "non-industrial" areas were already known or assumed from the outset to be committed primarily to other uses. Because of time and resource limitations, scattered industrial enterprises that exist outside the study area were not inventoried for this study. An example

of a production use outside of the study area is the Franz bakery which is grandfathered (i.e., a legally nonconforming use that was established before the current zoning regulations applicable to the area) on the southwest corner of Spenard Road and Hillcrest Drive in Midtown Anchorage. Distribution and repair uses such as auto repair and service also occur in B-3 zoned areas located outside the study area. Therefore, the inventory of existing industrial uses to some degree understates the presence of industrial uses currently operating in Anchorage.

The Industrial Land Assessment inventory, at a basic level, classified all parcels in its study area as either developed or undeveloped. It documented those parcels in which there was no observable activity or establishment, and the degree to which such sites were in a natural state, cleared or prepared for development, or had empty (vacant) structures on the lot. Lots in the development pipeline or showing signs of active construction were also documented, and attempts were made to classify the pending use. For those lots that are in use, it documented cases in which the lot was partially vacant or only marginally in use. Partially vacant and marginally used parcels are discussed in more detail below.

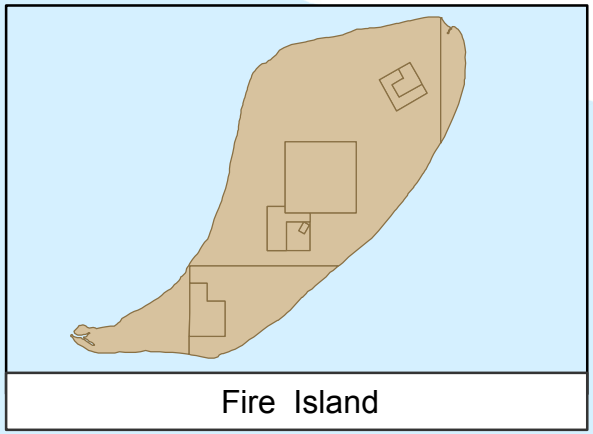
Identifying Industrial Study Subareas

Industrial lands and industrial study lands that comprise the study area include a variety of environments ranging from south C Street to Fire Island to the large northern landholdings of Eklutna, Inc. The Industrial Land Assessment breaks its analysis and findings into 11 subareas:

Anchorage Bowl	Chugiak–Eagle River	Other
North Anchorage	Eagle River	Fire Island
Central Anchorage	Powder Reserve	JBER
International Airport	Chugiak and 770 Tract	
South Anchorage	Birchwood Airport vicinity	
	Eklutna vicinity[8]	

Some subareas include clusters of industrial activity, such as the major industrial areas of the north, central, and southcentral Bowl, as well as smaller clusters in Eagle River and Chugiak. Other subareas are primarily study areas distinguished by geographical location or ownership, such as Anchorage International Airport or Fire Island. Maps 4 and 5 depict the subareas of the Industrial Land Assessment.

[8] "Eklutna vicinity" includes the landholding of Eklutna, Inc. west-northwest of Mirror Lake; the Eklutna Village vicinity north of the Glenn Highway, and the Eklutna Power Generation Plant industrially zoned area.



Joint Base
Elmendorf-Richardson

Glenn Highway
DeBarr Road
Muldoon Road
Boniface Parkway
Northern Lights Blvd
C Street
Tudor Road
Lake Otis Pkwy
Dowling Road
Raspberry Road
Minnesota Drive
Seward Hwy
Dimond Blvd
Abbott Road
Huffman Road

Municipality of Anchorage
Anchorage Industrial Lands Assessment

Anchorage Bowl Subareas and Fire Island

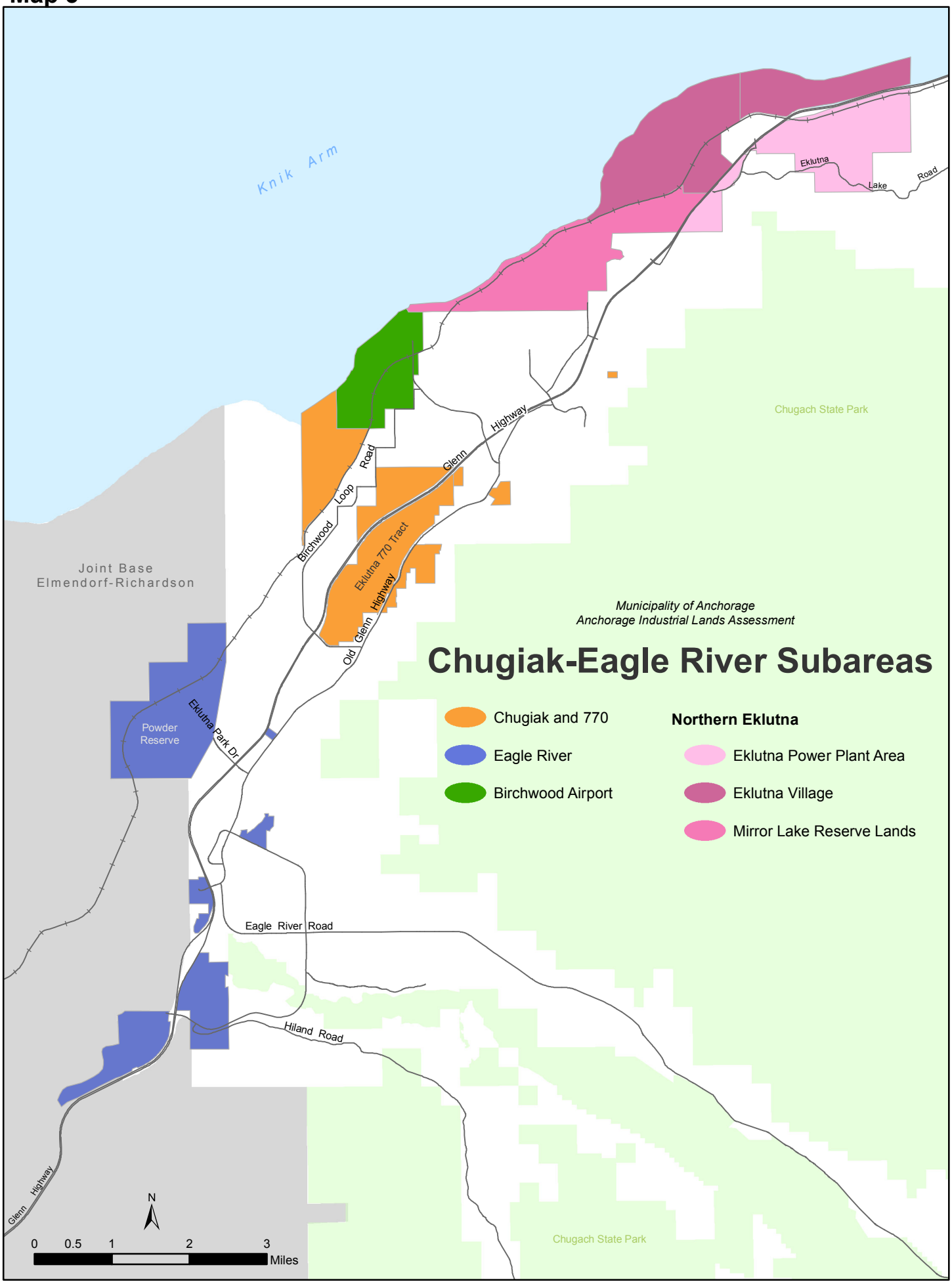
- North Anchorage
- Central Anchorage
- South Anchorage
- Anchorage International Airport
- Fire Island

N

0 0.5 1 2 3 Miles

Map 4

Map 5


Knik Arm
Eklutna Lake Road
Chugach State Park
Glenn Highway
Birchwood Loop Road
Eklutna 770 Tract
Old Glenn Highway
Joint Base Elmendorf-Richardson
Powder Reserve
Eklutna Park Dr.
Eagle River Road
Hiland Road
Glenn Highway
Chugach State Park
N
0 0.5 1 2 3
Miles
Municipality of Anchorage
Anchorage Industrial Lands Assessment
Chugiak-Eagle River Subareas
Chugiak and 770
Eagle River
Birchwood Airport
Northern Eklutna
Eklutna Power Plant Area
Eklutna Village
Mirror Lake Reserve Lands

Classifying Uses

For the developed, partially developed, and even marginally used lands, the land inventory classified the activities observable on the land, economic functions, built structures, and site character of the lot, using the full range of industrial, commercial, residential, public, institutional, and open space categories. This allowed the inventory to determine the nature of industrial and non-industrial development. By aggregating parcel level data, the inventory estimated the amount of development for each type of industrial use type for each zoning district and industrial subarea of the community. Information about current industrial use patterns was used by the *Industrial Land Assessment: Volume I* to inform projections of future industrial growth within the Anchorage Bowl and Chugiak-Eagle River.

An inventory of existing industrial land use on each lot was previously conducted on a citywide basis in the early 1990s. To update its inventory, and to improve its understanding of the kinds of industrial uses that presently exist in Anchorage, the municipal Planning Division adapted the **Land Based Classification System (LBCS),** a multi-dimensional system developed by the American Planning Association (APA) in a partnership with geographic information system software maker ESRI, Inc. to classify land uses based on their characteristics. Among this system's strengths is the ability to cross-reference the land use categories with the North American Industrial Classification System (NAICS) codes. NAICS is the standard method of classifying economic enterprises in the economic development field, and is used by the Anchorage Industrial Land Assessment and similar studies in forecasting future land demand by sector.

The LBCS model classifies land uses on each parcel of land into multiple dimensions. These include the activities, economic function, buildings, and site development characteristics. The LBCS model can be adapted to a variety of planning applications, data collection, data-sharing and data-integrating methods, and color coding and mapping, to accommodate new methods and technologies for analysis, and to customize the model for local needs without losing the ability to share data. The flexibility of LBCS allowed municipal planners to tailor the system, by adding land uses distinct to the region (e.g., snow storage facilities), new land uses (e.g., DIY maker spaces), and simplifying the LBCS database structure to one database table more easily accessible to planners and other potential users.

The multiple dimensions of land use information from the LBCS system that became part of the Anchorage inventory of industrial lands include:

- **Activity:** Actual use of the land based on observable characteristics.
- **Function:** Economic function or type of establishment using the land, which can be cross-referenced to **NAICS** codes.
- **Structure:** The type of structure or building on the land.
- **Site:** Physical development character of the site.

Each dimension has its own categories and subcategories for classifying land uses. By classifying the use of each parcel across four dimensions, users have a more informative system for understanding the nature of industrial land use patterns. Because it cross-references with NAICS, it can be compared with the industrial land demand forecast by economic sector.

Where multiple activities, economic functions, or structures exist on a lot, the inventory team recorded each. Where multiple activities appear in more than one of these dimensions, it documented the activities, functions, and buildings as they related to each other.

The primary source for the industrial land use inventory update was a comprehensive field survey/inventory. Municipal planners conducted a windshield survey stopping at almost every property and establishment in the study area. Where necessary the field team entered the establishment and spoke with the business owner, manager, or employees who were present on site. This level of effort provided a more up-to-date and accurate data gathering process and a more robust level of understanding of the existing industrial uses and services.

Supporting sources of information for the update included municipal (MOA) Property Appraisal data, Google Street View, existing reports and online research, municipal aerial imagery, and municipal address, building permit, and business license files. Consultations and interviews with industrial development organizations including the Alaska Railroad, Ted Stevens Anchorage International Airport, Merrill Field Airport, the MOA Heritage Land Bank, MOA land use review agencies, Eklutna, Inc., CIRI, Chugach Electric Association, ML&P, and industrial operators and others who provided important and timely information.

The inventory field work began in August 2013, progressed northward from south Anchorage, and was completed with quality checking in April 2014. Field data from the four dimensions including Economic Function, Activity, Structure, and Site was entered into a geographic information systems (GIS) database for a total of 5,000 acres of I-1 and I-2 lands, and more than 18,000 acres of additional lands in other zoning districts within the land assessment study area (the field inventory did not include JBER or the majority of the International Airport). Most activities in the Alaska Railroad Ship Creek Terminal Reserve lands occur on Railroad lease lots, which are not platted and not in the municipal parcel database. The Alaska Railroad provided information regarding its existing lease lots and the businesses. The project team incorporated this information into a new parcel map tailored for this project, and conducted field surveys.

Data loading, processing, mapping, analysis, and summary reporting of this data was completed over a 10-month period until February 2015. Existing economic functions were grouped into major NAICS categories. The total amount of acres of land in use per NAICS sector was tabulated by zoning district and subarea.

To determine the total amount of acreage currently in use by economic function, the analysis needed to make certain assumptions about cases in which multiple different functions existed on the same lot. A certain quantity of acreage on the lot is taken up by each kind of use. This analysis needed to either analyze each lot individually or make assumptions about how it should allocate the lot's acreage among multiple economic functions. It being impractical to revisit or research each lot individually to estimate how much of the acreage should be allocated to each use, the planning and GIS team used random sampling to determine the average acreage typically used by each economic function, depending on the number of functions on the lot. These averages became the rule of thumb for the GIS to allocate acreage of lots with multiple uses[9], with the exception of very large tracts which were allocated among multiple uses individually.

Meanwhile, the analysis also had to account for single establishments that occupied sites consisting of multiple parcels in which one business on a site comprised multiple lots. In many instances, a business occupied a set of adjoining parcels that effectively functioned as a single lot. To enable a more accurate inventory and portrayal of characteristics such as the combined Floor Area Ratio (FAR) or Building-to-Lot-Value Ratio (BLVR) of the site, or a count of the number of sites on which individual use categories exist, the inventory team identified which sets of lots were a combined economic/land unit. These multi-parcel functional units are captured in the new land use database.

The acreages by economic sector were aggregated for the entire study area, and then were submitted to the consultant team for comparison with the net industrial land demand forecast by NAICS economic sector (see Volume I). Volume I uses the existing pattern of usage by the industrial economy as information to provide a baseline from which to make projections of land demand by economic sector, based on a plausible range of growth scenarios. While past and current need does not predict the future need, it does help to ground scenario-based projections. The inventory findings and tabulation of the acreage in use by NAICS economic sector within the study area are provided in Section 4.

[9] On lots with 2 economic functions only, 65 percent of the lot's acreage was allocated to the primary function, and 35 percent to the other function, except in cases of the presence of a single-family residence (which received half the acreage) or mixed-use apartments (which got 10 percent of the acreage). Where 3 economic functions existed on a lot, 50 percent of the lot's acreage was allocated to the primary function, and the remaining acreage was divided evenly among the other two functions. Where between 4 and 9 economic functions existed on a lot, 25 percent of the lot's acreage was allocated to the primary function, and the remaining acreage was divided evenly among all the other functions. A lot's acreage was divided evenly among 10 or more economic functions.

Estimating the Buildable Land Supply

The following is a conceptual framework for understanding the buildable land inventory method. The industrial land inventory process generally followed this framework and included four basic steps:

1. Classify land into mutually exclusive categories. As the first part of this section summarized, parcels were classified as vacant, partially vacant, or developed. Some parcels are used only marginally, such as with a temporary use, and so were included with the vacant lands as undeveloped lands. Meanwhile, parcels with permanent uses and structures may be considered redevelopable, for reasons such as low building value, yet remain subsets of developed land. The amount of vacant, partially vacant, and marginal use land is then tabulated as the "gross" acres of land supply.

2. Remove land with prohibitive constraints. Not all vacant land within the study area is developable. Critical environmental constraints, a lack of planned road access, or a specific commitment to a non-industrial use can make industrial development of an area unlikely within the planning horizon. These lands are deducted from the inventory. This deduction yields the "net" acres of land supply for future industrial development. The basic equation is:

   Gross Acres – Prohibitively Constrained Acres = Net Acres

3. Estimate the holding capacity of the remaining lands. The holding capacity of the land is its ability to accommodate employment growth, at prevailing densities of employment (per unit of floor area) and building floor area (per unit of lot area). Lands with favorable development conditions have full holding capacity to accommodate development at prevailing development densities. Favorable conditions include adequate parcel size, flat uplands with good soils, access to utilities, and locations with little market pressure to convert to non-industrial uses. Other areas, however, have constraints which compromise their full holding capacity, either partially or significantly. This analysis reflected reduced holding capacity by a percent reduction of the buildable acreage on the lot available for employment and FAR.

4. Explore redevelopment potential. Some developed land may redevelop to a higher intensity during the 20-year planning period. Exploring redevelopment potential means examining both the supply of redevelopment opportunities (determining which lands are the most likely to redevelop) and the likely demand for redevelopment (projecting the rate of redevelopment as a percentage of forecasted growth over the full planning horizon). This analysis used two basic factors to identify specific lands that may be relatively more likely to redevelop. It also suggests the rate of redevelopment in other cities as a first step toward attempting to determine what may be the likely rate of redevelopment to industrial uses in the future. A next step in such an analysis would be to determine Anchorage's historic rate of redevelopment to industrial uses. Then it could project that rate of redevelopment forward, and match that to the redevelopment supply.

Conceptual framework for buildable land inventory and capacity analysis

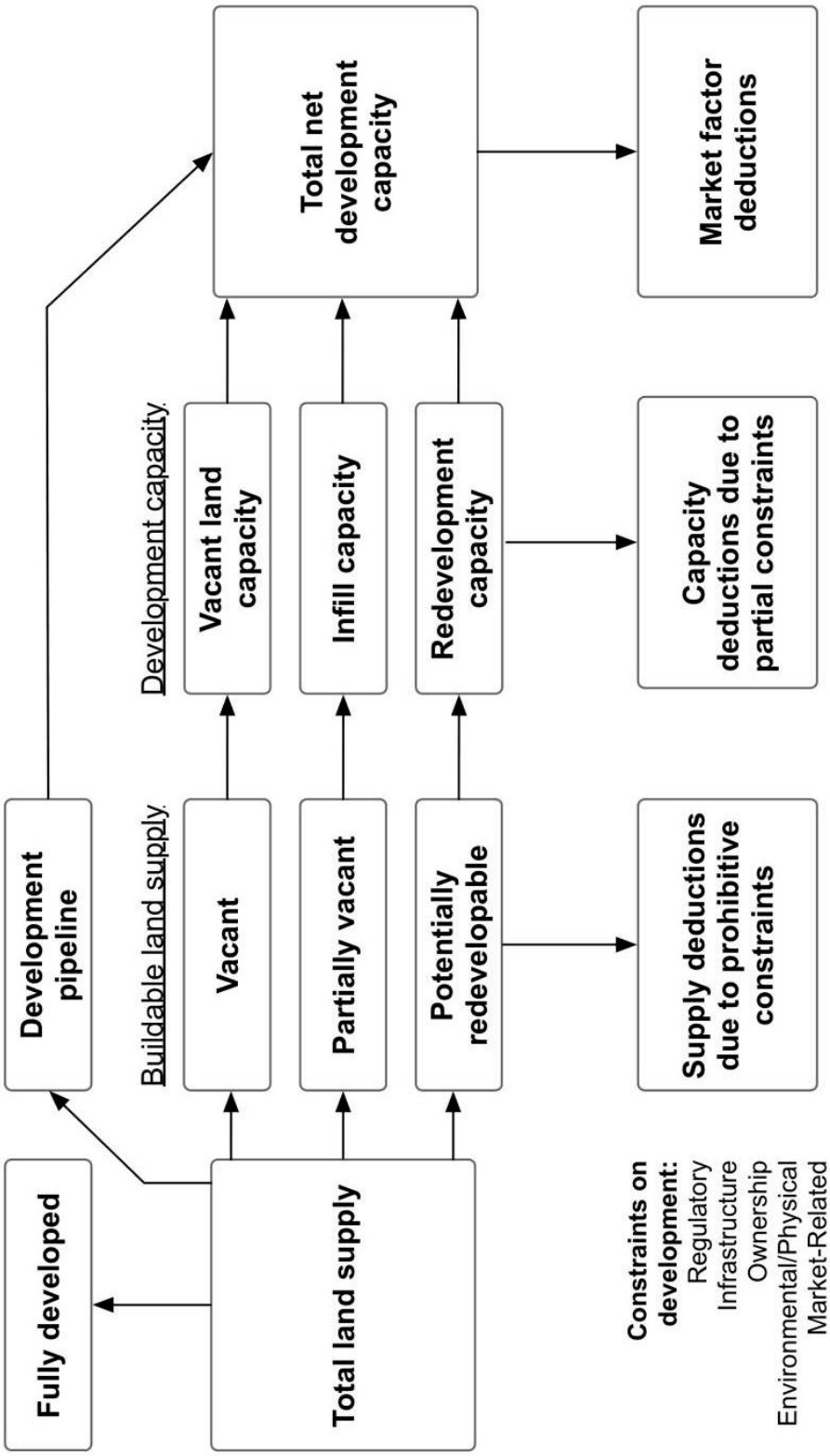


Fig. 7-4 Land supply and capacity analysis process. *Source: Moudon and Huber 2000. This material is used by permission of John Wiley & Sons, Inc.*

Identifying Vacant, Partially Vacant, and Marginally Used Lands

The first step in preparation of the buildable lands inventory was to assemble a gross supply of all undeveloped lands in the study area. These are comprised of vacant, partially vacant, and marginally used parcels. This becomes the "gross" acreage of undeveloped land, before deducting prohibitively constrained lands and lands already committed to a non-industrial use.

Vacant Land is defined as a parcel that has little or no improvements or structures, and is not encumbered by an existing primary or accessory use such as parking or equipment storage for another parcel. The parcel either has no previous use or the previous use was cleared years before.

Vacant lot in I-1 District

Partially Vacant Land is defined as a parcel occupied by a use on part of its area but which contains enough unused or vacant land to be further subdivided or developed with infill. No reuse or demolishing of pre-existing structures is necessary to develop the vacant portion of the land.

Partially vacant lot near Cinnabar Loop area

Marginally Used Land is defined as a parcel with a very low level of development or improvement and is occupied solely by temporary or marginal activities located outside or in moveable structures. The lot may be cleared and unpaved, or paved. It is marginally occupied by uses such as a used car lot, coffee kiosk, mobile food vendor, outdoor topsoil renderer, or potted tree sales. In addition, certain uses that may be seen as more stable in other districts but temporary in an industrial zone were included, such as single-family, duplex, and mobile homes. Lots with only empty, vacant buildings (e.g., an entire building and lot for lease) were also included in this category. Outdoor storage areas observed in the field as not being recently used for the most part were considered marginally used as well. However, outdoor storage or parking lot areas that were fully utilized or integral to a business enterprise are not included.

Marginally used lot with a coffee cart and used car lot on East Dowling Road

The vacant, partially vacant, and marginally used lands comprise the undeveloped land supply with no existing activities or functions, or only marginal or temporary existing uses. The redevelopment potential of developed parcels fully used by active enterprises was explored separately, and is discussed in a later section.

Planners established the eight month land use inventory period from August 2013 through April 2014 as the baseline point in time from which to measure the buildable land supply. For the purposes of estimating the land supply, all structures existing as of the inventory were considered developed, while projects that were proposed or built after the field inventory occurred are counted as future capacity.

Tables 2, 3, 4, and 5 detail the screening criteria used to define and identify the vacant, partially vacant, and marginally used lands. The four-digit numeric codes presented in the right-hand columns refer to the LBCS land classifications of the land use inventory.

Table 2. Vacant Lands Screening Criteria

Screening Criteria	Specific Query in the Land Use Database
No existing use activities or establishments; and	• Activity code is 9000 or 3300 only; and Function code is 9910 only (i.e., no existing use); AND
No existing buildings or vertical structures. Any previous development cleared years ago. Some lots may have movable abandoned structures.	• Structure code is 9000 (no structure), 6910 (kiosk), 6920 (roadside stand), 6980 (temporary building), 5210 (parking), or 5211 (driveway access).

Table 3. Partially Vacant Lands Screening Criteria

Screening Criteria	Specific Query in the Land Use Database
A portion of the lot that is observed to be large enough to accommodate another primary use or principal building has no existing use activities or establishments.	• Activity codes include 9050, and/or Function codes include 9050.

Table 4. Marginally Used Land Screening Criteria

Screening Criteria	Specific Query in the Land Use Database
The lot is underutilized in any one or more of the following ways:	• Any one of the following selections:
The lot is primarily underutilized outdoor storage, snow storage, soil storage/rendering; OR	• Activity codes include 9080 and either 3125, 3126, and/or 4400; and/or Function codes include 9080; OR
Empty buildings or vertical structures exist on site. No activities or establishments. Development would be through re-use, addition, or redevelopment of structure; OR	• Activity code is 9000 only, Function code is 9910 only, and Structure code(s) include types of structures other than or in addition to the following: 9000, 6910, 6980, 5210, and 5211; OR
Only existing use is a food or beverage cart, used car sales, building materials sales, outdoor tree nursery, auctions, or other typically temporary use; and structure is temporary; OR	• The parcel is not associated with another parcel; and the only Function code is 2111, 2112, 2123, 2126, 2145, 2154, 2550, 5320, or 9142; and Structure code(s) are limited to one or more of: 6910, 6920, 6980, or 9000; OR
Only use is a low-density residential use, such as a single-family house, duplex, mobile home on a lot, or a mobile home park; OR	• Activity and Function codes are 1100 only; and Structure code is 1001, 1102, 1103, 1201, 1220, 1240, 1800, 1981, 5210, or 5211; OR
The parcel is a yard associated with a single-family residential use; OR	• Parcel is associated with another parcel; has an Activity and Function code of 1100; and a Structure code of 6980, 8000 or 9000; OR
Is in any other way determined to be underutilized, such as lots determined to be highly likely for use turnover within planning horizon.	• Select for any additional lots in which the Activity codes include 9080, and for lots with low intensity of improvements or establishments that are determined through research and interviews as likely to turnover within the planning time horizon

Forecasting an Industrial Redevelopment Rate

Potentially Redevelopable Land is a developed parcel that is currently fully utilized, but on which there exists the potential that existing development could be converted to a more intensive use within the 20-year planning horizon. This intensification could occur through expansion or demolition and replacement of the pre-existing structure(s).

At the general, city-scale level of analysis, some important factors that determine whether an area will redevelop within the planning time horizon are: market forces that create opportunities or pressures to redevelop, zoning regulations that permit a more intensive use and public or other investments or incentives that encourage redevelopment. For areawide land supply analyses such as this Industrial Land Assessment, a common approach by land use planners to estimate the "redevelopable supply" is to identify those developed lands that have a low building-to-lot floor area ratio (FAR) or building-to-lot-value ratio (BLVR). This information may be used in combination with factors such as existing uses which generate little income.

For example, an industrial zoned lot currently occupied by a small structure with a low assessed value of building improvements, would typically be identified in a citywide land assessment study as part of the potentially redevelopable land supply.

A small construction contractor structure on a large lot

However, many industrial lots have few improvements and a low FAR and BLVR, yet are fully utilized by the business for equipment parking, maneuvering, storage, and maintenance integral to the enterprise. As discussed near the end of Section 2, PDR businesses such as contractors with heavy equipment need ample outdoor space. Section 2 also notes that these enterprises must locate near their customers and suppliers. For reasons such as these, it is a question as to whether the same FAR and BLVR ratios that planners use to identify redevelopment potential on commercial or multifamily zoned lots will necessarily predict that an industrial lot will redevelop. An outdoor, unimproved yard area or lot with no building may be outdoor space that is needed and fully utilized by a local PDR firm.

Meanwhile, industrial lots that according to general FAR and BLVR criteria would not be considered potentially redevelopable might actually be expanded. This can occur when an existing business enterprise wishes to expand however it determines that it has nowhere else to go other than its current location. For example, the food manufacturing plant pictured below recently requested entitlement to expand its building area by approximately 5,000 square feet. Because the building floor area and footprint already covered most of the lot, the lot had difficulty meeting the minimum parking required to allow for an expansion.

Food manufacturing plant that requested expansion in Midtown

The building above is leased to non-industrial commercial uses. Most industrial uses generally have less opportunity to intensify or create more compact development through redevelopment of existing uses. While office or residential uses may replace parking lots and single-story buildings with multilevel structures and mixed-use, industrial uses tend to remain single-story and in need of a lot of space for the storage and movement of goods and equipment.

There has yet to be developed "right" guess-estimate of the total quantity of land in Anchorage that will be available or likely to redevelop to more intensive industrial use within the planning horizon. Depending on market conditions, cost and other factors, theoretically nearly all or almost none of Anchorage's industrial land base might redevelop within a given period.

An alternative approach used by other cities is to analyze the historical rate of commercial and industrial redevelopment, and forecast a future redevelopment rate. In the Anchorage Bowl, this would involve determining recent trends in the local redevelopment rate—i.e., calculating the percentage of development for commercial and industrial sectors that has occurred through redevelopment on already developed land, and compare these rates to other cities. For example,

one study found that 22 percent of industrial development[10] in the Portland metro region in recent history occurred on already developed land.

The municipal Planning Division conducted a similar analysis for the *Anchorage Housing Market Analysis* in 2012. It estimated the redevelopment rate of recent multifamily development, to help estimate how much redevelopment would need to occur in order to supplement the building potential of the vacant land supply and meet future housing needs. Like the housing analysis, a commercial-industrial analysis would limit its research to redevelopment projects where the net building floor area on a site increased substantially. An analysis of recent historical redevelopment rates might therefore be a useful follow-up to the 2012 *Commercial Land Assessment* and this Industrial Land Assessment.

Until the Municipality has such an analysis, this industrial land inventory used certain assumptions about FAR and BLVR to illustrate which lands and subareas may be relatively more likely than other lots to experience redevelopment if the future redevelopment rate in the Anchorage Bowl were to be approximately half of all future industrial development in the 2015–2035 planning horizon were to occur on land already developed.

Table 5. Redevelopable Lands Screening Criteria for this Analysis

Screening Criteria	Specific Query in the Land Use Data Base
Lot utilized for parking, outdoor storage, or other low-intensity improvements with very low ratio of building area to lot area, and low building-to-lot-value ratio.	• Floor area ratio (FAR) of less than 0.10, and building-to-lot-value ratio (BLVR) of less than 0.75.

As discussed in Section 5, the screening criteria yielded 208.2 acres of redevelopable land. This does not mean that Anchorage has 208 acres of redevelopable land supply—it only illustrates one scenario for which lands might redevelop under a particular growth rate and rate of redevelopment. However, the Industrial Land Assessment carries forward the methodology of the 2012 Commercial Lands Assessment and Housing Market Analysis, by not mixing developed lands into its final estimates of remaining buildable land supply reported in Section 5.

[10] This refill rate was measured by square footage. By comparison, 59 percent of commercial development, as measured by square footage, occurred on already developed land. (*Refill Report – Measuring Past Refill Rates and Forecasting Future Refill*, Portland Metro, 2011)

Determining Constraints to Industrial Development

The second step in the construction of the industrial land supply inventory was to identify prohibitively constrained lands and partially/significantly constrained lands. Constraints on development are related to a variety of factors including environmental, land use, and urban service constraints that limit both the supply of land and the development capacity of the land. Lands found to be prohibitively constrained were removed from the gross buildable land supply to yield a "net" buildable land supply.

Unlike the prohibitively constrained areas, lands with only partial or significant constraints were not deducted from the net acreage of land supply. Rather, a deduction factor was applied to these lands for the development capacity analysis, reducing their available acres to the "effective buildable acres."

Partially and significantly constrained lands include permit-developable wetlands, areas without public wastewater service, or other lands with mitigating constraints that do not completely preclude industrial development but nevertheless restrict economic feasibility or limit their development capacity to one degree or another. Based on the relative impacts of these factors as experienced and observed in the Municipality, the analysis identifies two levels of such constraints: "partially constrained" (less severe) and "significantly constrained" (more severe).

Constraints, whether prohibitive, significant, or partial, fall into three main categories: environmental, commitments to non-industrial use, and (lack of) urban services.

Environmental Constraints

Environmental constraints can limit the net supply of buildable land, as well as the capacity of remaining buildable lands. An environmental suitability analysis was conducted at an areawide scale to estimate the overall acreage of buildable land in the Bowl and Chugiak-Eagle River study area that is environmentally unconstrained, partially constrained, significantly constrained, or prohibitively constrained for future industrial development. The methodology was updated for the industrial study to improve upon suitability analyses used in previous municipal plans and land assessment studies.

Table 6 on the next page describes the definitions and criterion for environmentally unconstrained, partially constrained, significantly constrained, and prohibitively constrained land.

Table 6. Environmental Constraints Criteria

Level	Definition	Criteria
Unconstrained	Lands not constrained by environmental factors.	• All areas not affected by environmental constraints.
Partially Constrained	Lands with some environmental constraints that reduce the amount of development that the property can support.	• Class C permit review wetlands and Class P undesignated wetlands and a 15-foot buffer extending from the edge of the wetland. • 100-year floodplain (this does not affect secure and nonhazardous uses, but can be prohibitive for certain industrial activities). • Slopes between 15% and 25%. • High seismic hazard areas (this constraint does not affect certain industrial uses).
Significantly Constrained	Lands with more substantial environmental constraints that further reduce the amount of development that the property can support.	• Class B permit review wetlands and Class D undesignated wetlands, and a 15-foot buffer extending from the edge of the wetland. • Slopes between 25% and 45%. • Very high seismic hazard areas (while this may not affect low-intensity uses, it can be prohibitive for intensive industrial uses).
Prohibitively Constrained	Lands that are assumed to be undevelopable and are subtracted from the buildable land supply for industrial development.	• Class A wetlands and a 15-foot buffer extending from the edge of the A wetland. • Waterbodies such as lakes and ponds, including a 25-foot buffer around the edge of the waterbody. • Floodways. • Marine coastlands. • Slopes greater than 45%. • Stream buffers of 25 feet on both sides of the stream bank except: o increases to 100 feet around anadromous fish streams within wetland areas. o increases to 65 feet in non-anadromous fish streams within wetland areas. o increases to 50 feet in lots 15,000 square feet or larger in size due to potential future changes in stream setback regulations.

After identifying individual environmental constraints, a cumulative analysis was conducted using all of the environmental data layers and allowing the more restrictive constraints to prevail. For example, if a land area was designated as "Class C" wetlands, it would be considered partially constrained for development purposes. However, if that same area was also included in a very high seismic risk area (a significant constraint factor for industrial development), then the "significantly constrained" designation would apply to this land in the cumulative analysis.

In addition, some lands may be *manually* designated as either partially constrained or unlikely to develop within the planning horizon, based on personal interviews or local knowledge. For example, individually selected tracts are identified as unlikely to develop because of peat soil conditions that were not shown on municipal GIS soils data layers.

Partially and significantly constrained lands are still included in the buildable land supply inventory. Partial and significant constraints are factored into the amount of buildable land supply as a final step, to reflect the diminished holding capacity of these lands to support the potential amount of future industrial employment. For this analysis, the development capacity of partially constrained lands is reduced by a factor of 25 percent—i.e., the potential additional new floor area and employment that a given area of land would otherwise be expected to support is reduced by one-quarter. This is a change from previous studies, which assumed the development capacity would be reduced by a factor of 33 percent. This change reflects planning staff observations of recent trends and site examples, and reflects increasing land values and development pressures on Class C wetlands, moderate slopes, and other marginal lands.

The capacity analysis reduces the development capacity of significantly constrained lands—including B wetlands, steep slopes, and very high seismic hazard areas—by a factor of 50 percent. This is a greater deduction than assumed by previous land assessment studies. It reflects recent experience by permit review staff observing wetland cases, and recent changes to zoning regulations on steep slope sites. Commercial and industrial uses must show a strong purpose and need to develop the B wetlands and show how they will offset impacts. The amount (and cost) of mitigation for Class B wetlands is in fact closer to that of Class A wetlands than to Class C wetlands. MOA environmental planners also report that there is a change to U.S. Army Corps of Engineers' (USACE) requirements expected at the federal level that will make it more expensive to develop Class B wetlands. It is also anticipated to become harder to obtain permits as the resource becomes scarcer in Anchorage. Therefore, where previous analyses assumed a 33 percent reduction in capacity, this analysis creates a new category of constraint level, called "significantly constrained" and raises the impact to 50 percent.

These percentage reductions in holding capacity are averages applicable at a citywide or city sub-region level of geography, for use in long-range city planning forecasts. They are not designed to predict development capacity outcomes on specific individual parcels.

Table 7 summarizes how the three levels of environmental constraint—partial, significant, and prohibitive—affect the estimated buildable land supply and the analysis of the future development capacity of those buildable lands.

Table 7. How Environmental Constraints Impact the Land Supply Inventory

Level of Environmental Constraint	Impact on the Net Buildable Land Supply	Impact on the Development Capacity of the Land
Unconstrained land	The land's full acreage is included in the net buildable land supply.	No impact.
Partially constrained land	The land remains in the net buildable land supply, but its capacity is impacted (see right).	Inventory analysis reduces development capacity by a factor of 25 percent (a 25 percent reduction on the effective acreage used to compare with industrial land demand).
Significantly constrained land	The land remains in the net buildable land supply, but its capacity is impacted (see right).	Inventory analysis reduces development capacity by a factor of 50 percent (a 50 percent reduction on the effective acreage used to compare with industrial land demand).
Prohibitively constrained land	The land is deducted from the net acreage of buildable land supply.	The land is not included in the capacity analysis.

Land Use Commitments

The second type of constraint to industrial development is land use commitments to a specific future non-industrial use. Land use agreements, master plans, or other encumbrances designating a future non-industrial use are considered prohibitive constraints which eliminate parcels from the buildable land supply for future industrial development purposes. Land use commitments include:

- Conservation easements and other protections;
- Designated parks;
- Future public utility facility;
- Future road, railroad, or aviation use; and
- Future residential, commercial, or civic/institutional use.

Conservation easements and other protected lands also include other forms of protection such as plat notes and deed restrictions. It also includes municipal Heritage Land Bank parcels that are preserved in the future, such as part of a HLB wetland mitigation bank currently under development. Finally, it includes lands which are likely to remain as privately owned natural areas, such as Eklutna, Inc., lands northwest of the Alaska Railroad Corridor near the village of Eklutna.

Future parks and recreation lands include dedicated parkland and lands designated in the municipal Comprehensive Plan as future parkland.

As documented in Section 5 of this volume, certain public-owned lands are encumbered as future utility facility sites, roadways, or have been identified for future Alaska Railroad or airport operational areas. Aeronautical use areas within Anchorage International Airport and Merrill Field Airport are considered reserved for aviation uses. Consultations with Joint Base Elmendorf-Richardson (JBER) natural resources management staff and federal land managers helped determine that few parcels (if any) in JBER are not already encumbered for military operations such as to be available for non-military industrial use in the planning horizon.

Certain sites within the study area are committed to specific future residential, commercial, and/or civic/institutional uses. For example, as of this writing land use entitlements for an outlet retail mall, an athletic club, and other non-industrial uses are currently in process for development in existing vacant industrially zoned lands in the study area. Other lands within the study area boundaries are zoned for non-industrial use include parcels zoned B-3, RO, PC (in the Bowl), or residential. Parcels in these zoning districts are assumed by this study to be committed to future non-industrial use. In addition, tracts of land in the Chugiak-Eagle River area are committed to primarily non-industrial use, such as part of the Powder Reserve Tract B, and the proposed Eklutna Village Overlay District area.

In summary, areas with land use commitments are subtracted from the buildable land supply, except that future utility and airport use areas are credited toward anticipated land demand of their facility.

Table 8. Land Use Commitments and their Impact on the Industrial Lands Inventory

Type of Land Use Commitment	Impact on the Net Buildable Land Supply	Impact on the Development Capacity of the Land
Conservation easement and other protections	The land is subtracted from the net acreage of buildable land supply.	The land is not included in the capacity analysis.
Land is dedicated park or designated for park or open space use.	Same as above.	Same as above.
Site is committed to a residential, commercial, or institutional use.	Same as above.	Same as above.
Lands zoned for non-industrial use—e.g., B-3, RO, PC (in Bowl), or R.	Same as above.	Same as above.
Tracts of land in Chugiak-Eagle River designated for future non-industrial use, such as Powder Reserve and Eklutna Village Overlay areas.	Same as above.	Same as above.
Land encumbered as future utility facility sites, roads, or railroad or airport operations	The land is subtracted from the net acreage of buildable land supply except for Transportation and Utilities Sectors.	Holding capacity is not included in the estimated land capacity available for non-Utility/non-Transportation sector industrial uses

Urban Service Constraints

The continued absence or limitation of transportation and utility infrastructure through year 2035 would constrain or prohibit future industrial development potential of an area. Urban service constraints considered in this study include:

- **Road Access:** A lack of road access or unlikely outlook for road network development within the planning timeframe is considered a prohibitive constraint for most industrial uses.
- **Water:** A forecasted lack of public water service is considered a partial constraint to industrial development.
- **Wastewater:** Lack of public wastewater service is considered a significant constraint to industrial development.

Access to other services including electric power and telecommunications is essential to most industrial users; however, consultations with utility service providers indicated that most parts of the study area could have access to these services over the planning horizon. (A discussion regarding access to three-phase electrical power lines appears below.)

Future industrial PDR development in the Municipality is expected to continue to follow its historical pattern of dependence on direct access to ground freight and road transportation infrastructure. Likelihood of road access is critical before the Municipality could prudently assume that a given tract of land will be available as part of the industrial land supply.

Three parts of the study area were forecasted to remain without road access or a road network through the 20-year planning horizon. Discussion regarding Fire Island and two affected areas in the northern Eklutna vicinity is provided in the land supply findings of Section 5.

Based on information from personal interviews, interagency consultations, discussion with the advisory committee for this study, and an inventory of existing development, this analysis assumes that water service is a partial constraint on industrial development, therefore moderately reducing development capacity. These sources suggest that, for more intensive industrial uses such as manufacturing, wastewater service is more critical. Therefore, the lack of wastewater service is raised to the level of a significant constraint to development having a stronger impact on development capacity for a range of PDR uses.

Consultation with project Advisory Committee members and the Anchorage Water and Wastewater Utility (AWWU) provided the basis for forecasting the geographic extent of water and wastewater services within the study area through the planning horizon. In general, nearly all areas of the Bowl, except for certain pockets affected by multiple ownerships of land, are anticipated to have access to water and sewer. Sewer service limitations in the South C Street corridor, the eastern portion of the Railroad Terminal lands in Ship Creek, and

several other larger tracts are anticipated to be resolved within the first half of the planning horizon.

Areas needing infrastructure for development are typically charged for the improvements through a Local Improvement District (LID). Past studies have noted that development entities indicated reluctance on the part of some smaller landowners with low demand to enter into improvement districts and take on additional costs.

Geographic limits to the extent of water and sewer service in Chugiak-Eagle River resulted in much of its acreage in the study area being identified as constrained due to lack of water and wastewater services. Lack of sewer service in particular impacted the estimate of available land capacity in Birchwood Airport vicinity, Chugiak and 770 Tract, and Eklutna Power Generation Plant vicinity—reducing the effective acreage of buildable land by 50 percent, for purposes of matching land supply to forecasted demand.

The Industrial Land Assessment Advisory Committee discussed the 50 percent reduction factor over the course of several meetings. Committee discussion and feedback supported the 50 percent reduction as generally reasonable, as it was applied as an average across the study area. These percentage reductions in holding capacity are averages applicable at a citywide or city sub-region level of geography, for use in long-range city planning forecasts. They are not designed to predict development capacity outcomes on specific individual parcels. The Advisory Committee members expressed support for the approach and did not believe the study should get into a parcel-by-parcel constraints analysis.

The lower level of intensity of non-wastewater users was a key reason. Lands with on-site septic are not as desirable for certain manufacturing purposes, for example. Committee members pointed out that some industrial uses are non-intensive but could provide options for firms that need more space that may not need sewer and/or water services with a low employee count, such as storage. This seemed in line with potential users currently looking at lands in Birchwood Airport, which will have access to on-site septic. Committee members considered it possible to do things such as distribution without sewer service. The attraction of lower intensity use outside the wastewater service area boundaries is part of appropriately locating different kinds of industrial uses: moving some lower intensity uses out of the Bowl and making more space available in the Bowl for more intensive users.

Table 9. Impacts of Urban Service Constraints on Buildable Lands Inventory

Type of Urban Service Constraint	Impact on the Net Buildable Land Supply	Impact on the Development Capacity of the Land
Land not likely to receive water service	The land remains in the net buildable land supply, but its capacity is impacted (see right).	Inventory analysis reduces development capacity by a factor of 25 percent. The analysis uses a 25 percent reduction on the effective acreage used to compare with industrial land demand.
Land not likely to receive wastewater service	The land remains in the net buildable land supply, but its capacity is impacted (see right).	Inventory analysis reduces development capacity by a factor of 50 percent. The analysis uses a 50 percent reduction on the effective acreage used to compare with industrial land demand.
Land not likely to receive road access or a road network	The land is subtracted from the net acreage of buildable land supply.	The land is not included in the capacity analysis.

Other Potential Urban Service Constraints Discussed: Power Service

Discussions with the Industrial Land Assessment Project Advisory Committee about potential land constraints to industrial use included a question about electrical power service. Some parts of the study area would require extension of electrical utility service. Other lots are serviced by single-phase rather than 3-phase power, which may not be adequate for certain industrial users and therefore also necessitate an extension. Discussions arrived at the conclusion that there is no place in the study area where extending single or three-phase power would be prohibitive—it is only a matter of cost. Chugach Electric Association provided consultation on this issue.

Chugach Electric Association (CEA) indicated that it has not historically had a problem extending power to lands zoned Industrial in its service territory within the Municipality of Anchorage. In general, the distribution system is well developed within CEA's Anchorage territory. Under CEA's line extension tariff (approved by the Regulatory Commission of Alaska), developers are responsible for the cost of extending primary service to their property, as well as the cost of the service line(s) and related equipment to serve the electric load on their property. Line extensions may be either single-phase or 3-phase, depending

upon the needs of the customer. CEA pays for the needed transformer and applies a credit (based upon the anticipated electric load) toward the cost of the line extension. While on occasion a prospective developer has decided not to proceed with plans, in general the cost of extending electric service has not deterred the development of industrially zoned property in CEA's service territory.

Cumulative Analysis of Constraints

Maps 6 and 7 identify the constrained lands within the study area for the Anchorage Bowl and Chugiak-Eagle River, respectively. They visualize the cumulative layers of environmental, urban service, and land encumbrance constraints on various areas.

After identifying these affected areas, and determining the levels of environmental, land use commitment, and urban service constraints, a cumulative analysis was conducted using all of the constraints' layers. Where more than one constraint was present, the analysis allowed for the most restrictive constraints to prevail. For example, if a land parcel was covered by Class C wetlands, it would be considered partially constrained for development. However, if that same parcel was also determined to be unlikely to receive sewer service (a significant constraint factor for industrial development), then the "significantly constrained" designation would apply to the lot in the cumulative analysis. If the same parcel were also identified as being committed to a future non-industrial use, then the "prohibitively constrained" designation would apply to the lot in the cumulative analysis.

The tables below quantify the acreage of partially, significantly, and prohibitively constrained lands within the overall gross supply of undeveloped lands in the study area, as determined through the constraints analysis. Table 10 summarizes this acreage for the Anchorage Bowl, and Table 11 covers Chugiak-Eagle River. In addition, Fire Island's 4,240 acres and nearly all 73,104 acres of JBER were found to include prohibitive constraints to non-utility facility industrial development within the planning time horizon.

Tables 10 and 11, as the starting place for the land capacity analysis, included the acreage of *redevelopable* lands, a category of lands discussed on page 37, within the gross land supply. For example, approximately 300 acres out of the 635 acres of unconstrained industrially zoned lands in Table 10 are actually "redevelopable" lands. Chapter 5 separates redevelopable lands from the final estimate of net buildable land supply, and discusses them separately.

The industrial land supply is the net supply of buildable vacant, partially vacant, and marginally used land after deducting constrained lands. The net buildable land supply was used as the basis from which to estimate the future industrial development capacity.

Table 10. Acres of Constrained Land within the Gross Industrial Land Supply Anchorage Bowl, 2014

Level of Constraint	Industrial Districts	Other Districts	All Districts Total
Unconstrained			
Subtotal	635.1	213.6	848.7
Partially Constrained			
Subtotal	70.1	21.7	91.8
Significantly Constrained			
Only because of no wastewater service	56.2	67.0	123.2
All other significantly constrained lands	41.9	9.0	51.0
Subtotal	98.2	76.1	174.2
Prohibitively Constrained			
Only because of no future road network access	0	0	0
Committed to utility or transportation facility use	104.2	795.4	899.6
All other prohibitively constrained lands	169.0	681.6	850.6
Subtotal	273.2	1,477.0	1,750.2
Total	1,076.5	1,788.3	2,864.8

Table 11. Acres of Constrained Land within the Gross Industrial Land Supply Chugiak-Eagle River, 2014

Level of Constraint	Industrial Districts	Other Districts	All Districts Total
Unconstrained			
Subtotal	28.2	82.7	110.9
Partially Constrained			
Subtotal	11.3	344.2	355.4
Significantly Constrained			
Only because of no wastewater service	340.0	232.1	572.1
All other significantly constrained lands	2.1	7.0	9.0
Subtotal	342.1	239.1	581.2
Prohibitively Constrained			
Only because of no future road network access	0	1,671.7	1,671.7
Committed to utility or transportation facility use	34.4	406.6	441.1
All other prohibitively constrained lands	239.8	4,255.8	4,495.6
Subtotal	274.2	6,334.2	6,608.4
Total	655.8	7,000.1	7,655.9

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Municipality of Anchorage
Anchorage Industrial Lands Assessment

Constraints on Industrial Development in the Anchorage Bowl

Joint Base Elmendorf-Richardson

Chugach State Park

Point Woronzof Drive
Postmark Drive
Wisconsin Street
Minnesota Drive
I Street
E Street
A Street
Arctic Boulevard
Lake Otis Parkway
Bragaw Street
Boniface Parkway
Turpin Street
Muldoon Road
Post Road
Glenn Highway
3rd Avenue
5th Avenue
6th Avenue
15th Avenue
Fireweed Lane
36th Avenue
Tudor Road
International Airport Road
Dowling Road
Lore Road
Raspberry Road
Sand Lake Road
Jewel Lake Road
Northwood Street
Dimond Boulevard
C Street
King Street
Old Seward Highway
Seward Highway
Johns Road
O'Malley Road
Birch Road
Klatt Road
Huffman Road
DeBarr Road

Environmental Constraints

- no constraints
- partially constrained
- significantly constrained
- prohibitively constrained
- fill site or other site specific conditions (e.g. peat)

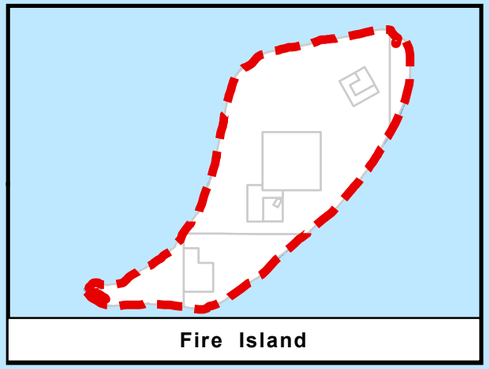
Urban Service Constraints

- Areas Unlikely to Receive Road Access (Fire Island)
- Areas Unlikely to Receive Water Service, for Purposes of Industrial Lands Assessment
- Areas Unlikely to Receive Sewer Service, for Purposes of Industrial Lands Assessment

Land Use Commitments

- Conservation Easements and Other Protections
- Designated Future Parkland or Open Space
- Future Residential, Commercial, or Civic / Institutional Use
- Future Road, Railroad, Port, Aviation, or Utility Use

- Industrial Lands Assessment Study Area Boundary



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0 0.5 1 2 Miles

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Municipality of Anchorage
Anchorage Industrial Lands Assessment

Constraints on Industrial Development in Chugiak-Eagle River

Matanuska Susitna Borough
Municipality of Anchorage

Knik Arm

Eklutna Lake Rd

Glenn Highway

Voyles Blvd

Chugach State Park

Birchwood Loop Road

Joint Base
Elmendorf-Richardson

Old Glenn Highway

Glenn Highway

Alaska Railroad

Business Boulevard

Eagle River Loop Road

Eagle River Road

Driftwood Bay Drive

Hiland Road

Glenn Highway

Hiland Road

Chugach State Park

Environmental Constraints

- no constraints
- partially constrained
- significantly constrained
- prohibitively constrained
- fill site or other site specific conditions (e.g. peat)

Urban Service Constraints

- Areas Unllikely to Receive Road Access, for Purposes of Industrial Lands Assessment
- Areas Unlikely to Receive Sewer Service, for Purposes of Industrial Land Assessment
- Areas Unlikely to Receive Water Service, for Puroses of Industrial Lands Assessment

Land Use Commitments

- Conservation Easements and Other Protections
- Designated Future Parkland or Open Space
- Future Residential, Commercial, or Civic / Institutional Use
- Future Road, Railroad, Port, Aviation, or Utility Use

- Industrial Lands Assessment Study Area Boundary

N

0 0.5 1 2 Miles

Map 7

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Rating Buildable Lands into Three Tiers of Quality

Upon the recommendation of the industrial land assessment consultant, and in consultation with the project Advisory Committee, the buildable lands analysis divided the vacant, partially vacant, and marginal use land supply into three tiers of land quality, in order to estimate the effective buildable land supply for policy consideration purposes.

Tier 1 land supply consists of parcels a one acre or more in size among the vacant, partially vacant, and marginally used lands. The industrial lands consultant recommended a threshold of one acre as a standard threshold.

Tier 2 land supply consists of parcels between a half acre and one acre in size. Based on field observations and consultations, the half acre threshold was considered to be enough space needed to accommodate a majority of small- to medium-size establishments. Lands with partial environmental constraints, a lack of water or wastewater service, or not located in an industrial district were also included in Tier 2.

Tier 3 land supply consists of parcels less than a half acre in size among the vacant, partially vacant, and marginally used lands. These often are 6,000 to 10,000 square foot parcels. In addition, lots with significant environmental or urban service constraints were demoted to Tier 3.

Table 12. Screening Criteria for Tier 1, 2, and 3 Lands

	Tier 1	Tier 2	Tier 3
Lot Characteristics	**Lands with ALL of the following characteristics:**	**Lands with any one of the following, except Tier 3 lands:**	**Lots with any one of the following characteristics:**
Urban Services	Has water and wastewater Service	Has only one of either Water or Wastewater	Has neither Water nor Wastewater Service
Lot Size	Lot (or buildable part of partially vacant lot) is 1.0 acres or larger	Lot (or buildable part of partially vacant lot) is less than 1.0 acre, but not less than 0.5 acres	Lots (or buildable part of partially vacant lots) is less than 0.5 acres
Zoning	I-1, I-2, I-3, or PC, and not in International Airport Subarea	PLI, T, or in International Airport Subarea	
Environmental Constraints	No environmental constraints	Partial environmental constraints	Significant constraints

Factoring in the Commercial (Non-industrial) Utilization Rate

The estimate of industrial land supply takes into consideration the rate of non-industrial utilization of industrially zoned lands in the Anchorage Bowl and Chugiak-Eagle River.

As discussed in Section 1, the industrially zoned land base in the Anchorage Bowl has in recent years experienced increasing pressure by non-industrial uses. Many recently developed industrial parcels in the I-1 and I-2 zoning districts indicate a shift to commercial and other non-industrial uses. The 2012 *Anchorage Commercial Land Assessment* documented that much of the capacity to accommodate commercial office and retail needs is on land zoned for industrial uses. Industrial zoning districts are distinctive among the major categories of land supply that also include residential, commercial, institutional, and open space lands, because of the extent to which the industrial zones are developed for non-industrial uses from these other categories. While there are specific zoning districts designed to allocate space for office, institutional, and residential uses, and which protect retail commercial centers from industrial uses, Anchorage's industrial zoning, has been hierarchical rather than exclusive in nature. It has allowed other uses considered less intensive in their impacts than industrial activities. As a result, office, retail, and residential developers may compete for development rights to the remaining industrially zoned land supply. Market pressure for land conversions to non-industrial use is especially strong if a property has locational and physical attributes consistent with commercial needs.

Therefore, the net acreage of buildable land that is zoned or otherwise available for industrial use—even after deducting for site constraints—overestimates how much land is likely to be available for industrial development.

Based on consultations with the Industrial Land Assessment Advisory Committee, the industrial land supply estimate sought to take into account this non-industrial use. The analysis developed a conservative measure of existing non-industrial utilization of I-1 and I-2 land as a basis for estimating the commercial utilization rate going forward into the future. Although land market trends would seem to suggest an even higher commercial utilization rate in the future as the commercial-industrial land supply becomes more constrained, other trends such as stronger limitations on non-industrial uses in the land use regulations (primarily in the I-2) might have the opposite effect. Rather than attempt to forecast changes in the utilization rate, this inventory uses a scenario in which, on average across the Anchorage Bowl, the historical utilization rate carries forward for new development. Future analyses may further refine this basic approach by breaking out this utilization rate by zoning district (I-1 versus I-2) or type of location relative to transportation networks.

The results from the land use inventory were used to determine the existing utilization rate, using a two-step method. First, municipal planners calculated the percentage of industrial-zoned lands currently in use, not including those lands occupied by public utility/major transportation facilities, that is occupied by the following non-industrial NAICS sectors: retail trade, information, finance and insurance, professional and business services, education and health, leisure

and accommodations, personal and other services (except repair), and government. The findings in Section 4, showing the amount of acreage of I-1 and I-2 land currently utilized by economic sector, provide the basis for determining that percentage.

Table 13. Determining the Commercial Utilization Rate Percentage of Developed I-1 and I-2 Land, Anchorage Bowl, 2013-14

		X	=
Economic Sector (NAICS)	**% of Industrial Land**	**Non-industrial Share of Employment (%)**	**% of Industrial Land in Commercial Utilization**
Retail Trade	15.1		9.1
Retail Trade (except vehicles and heavy goods)	4.9	60	2.9
Vehicle Sales and Heavy Goods Retail	10.2	60	6.1
Communications and Information	1.2	90	1.1
Finance, Real Estate, Leasing, and Self-storage	7.3		6.9
Finance, Insurance, and Real Estate Services	1.3	95	1.2
Leasing, Equipment Rental, and Self-storage	6.0	95	5.7
Business, Professional, and Technical Services	11.3		2.8
Professional and Business Services	3.1	90	2.8
Services to Buildings and Facilities	1.9	0	0
Waste Management, Salvage, and Snow Disposal	6.3	0	0
Education and Health Services	3.0	90	2.7
Leisure and Accommodations	9.7	95	9.2
Personal and Other Services (except repair)	2.2	90	1.9
Government and Public Safety	2.8	99	2.8
TOTAL%	52.6		36.5

Secondly, planners multiplied the percentage of industrial lands used by each of the commercial sectors by the percentage share of non-industrial employment in each of these sectors. This second step is important, because a certain amount of the employment in these commercial sectors is in industrial-type activities. So, for example, if a particular commercial sector occupies 100 acres of industrial land in the city, but 10 percent of its employment and space usage is for industrial-type activities (e.g., warehousing or storage), then only 90 acres of industrial land are being put to non-industrial use (100 acres * 90 percent).

"Industrial Share" percentages provided by the Industrial Land Assessment consultant team were used in Table 13 to determine what percentage of employment in these commercial sectors was devoted to industrial versus non-industrial-type employment. For example, the Retail Trade sector occupies 15 percent of developed industrial land in the I-1 and I-2 districts in the Bowl. Per the consultant team's data, approximately 60 percent of employment in that sector is typically non-industrial. Therefore, the planners multiplied 15 percent x 60 percent to estimate that Retail Trade occupies 9 percent of industrial-zoned lands with non-industrial type activities.

Had this analysis assumed that 100 percent of the land used by retail sector uses would be non-industrial activities, the assumed non-industrial utilization rate would have been much higher—half of all industrially zoned land—and this report's estimate of the industrial land supply would be that much lower. Therefore, the two-step method represents a relatively conservative approach to estimating the existing non-industrial utilization rate.

The two-step method and its findings appear in Table 13. The analysis estimates that 36.5 percent of developed land in I-1 and I-2 in the Bowl is currently used for non-industrial employment. An identical analysis estimated the non-industrial utilization rate for Chugiak-Eagle River separately. The non-industrial utilization rate for Chugiak-Eagle River was found to be much lower, only 5.5 percent, half of that being churches. Table 14 shows how the non-industrial utilization rate was factored into the industrial land supply.

Table 14. Factoring in the Non-industrial Utilization Rate

Subareas	Rate of Utilization for Commercial Use in Industrial Districts	How the Buildable Lands Inventory Factors in the Commercial Utilization Rate
Anchorage Bowl	36.5 percent	Reduces the net buildable land supply by 36.5 percent in the Anchorage Bowl. Exceptions: does not affect JBER Boniface parcel or MOA former Native Hospital site.
Chugiak-Eagle River	5.5 percent	Reduces the net buildable land supply by 5.5 percent in Chugiak-Eagle River.