# Technical Appendix

## FY2020-2024

UTAH INLAND
PORT AUTHORITY

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# 1 Population and Demographics

*Utah is among the nation's fastest growing states with a population that is projected to increase from 3 million in 2015 to 5.8 million by 2065. At the same time, the workforce is also becoming more highly educated, while unemployment rates continue to decline.*

*Utah's future economy and workforce are expected to be shaped by continued dramatic population growth and by increases in educational attainment. These trends are also expected to result in higher consumer demand for goods and services, boosting demand for logistics and supporting infrastructure. These trends may also influence which businesses choose to be based in the state, and how the logistics system and supply chains need to evolve over time.*

## 1.1 Population

Population trends influence how the economy and workforce may develop, and the local demands on the logistics system. These trends and forecasts impact the way UIPA developed its programs and policies in order to meet the logistics needs of people and businesses in Utah.

### Utah is among the nation's fastest-growing states, with a population that is expected to almost double over the next 30 years.

Utah's population is projected to increase from 3 million in 2015 to 5.8 million by 2065.[1] This rapid population growth is due to a high birth rate, low death rate, and high in-migration. For example, last year Utah's natural population increase rate was the highest in the nation at 10.5 percent.[2] The strength of Utah's economy has also brought new residents. Between 2010 and 2018, over 113,000 individuals moved to Utah, with 59 percent moving from other states and 41 percent moving from abroad.[3] Many new residents are young, working-age individuals.

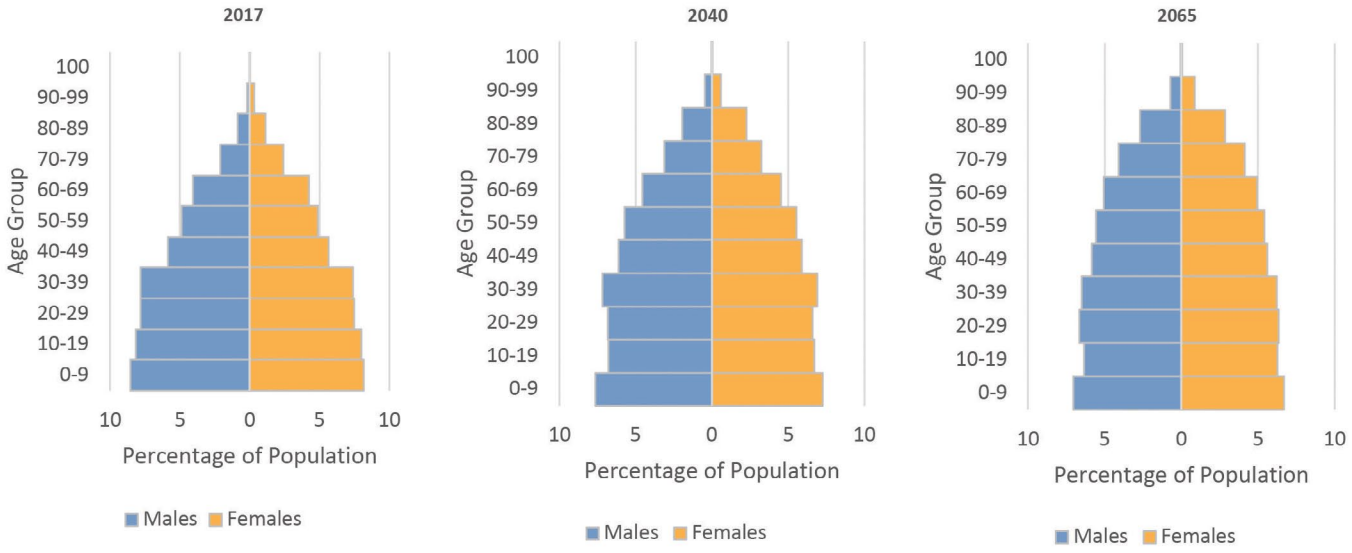
In the coming decades, the Utah population is expected to continue growing, while maintaining a robust working age and youth population. While the overall population is projected to become older, the replacement rate remains high. The projected size of the working-age population remains steady, suggesting that

[1] Kem C. Gardner Policy Institute, Utah's Long-Term Demographic and Economic Projections Summary, Research Brief July 2017
[2] Kem C. Gardner Policy Institute, "Utah Remains Third Fastest Growing State." Blog Post. December 2018, calculated as crude birth rate – crude death rate
[3] "Utah ranks No. 1 for population growth this decade—adds nearly 400K new residents." Davidson, Lee. The Salt Lake Tribune. December 20, 2018. https://www.sltrib.com/news/politics/2018/12/19/utah-ranks-no-population/

high fertility and in-migration rates will remain high. This has implications for the state's workforce and consumption demands, which influences which businesses choose to be based in the state and how the logistics system and supply chains need to evolve to meet growing demands. With these projected trends, the workforce will maintain robust and support industry growth, while growing populations across age distributions will increase and shape consumption demands. Additionally, Utah is expected to age at a slower rate than the nation. While the nation's population of individuals 65 years and over is expected to reach almost 25 percent by 2060, Utah's 65 and over population is projected to fall just short of 20 percent by 2060.[4]

Figure 1-1 below demonstrates the age and sex distribution in Utah and projections over the next half-century. While population is expected to age, the population replacement ratio is high. This allows Utah to maintain a strong workforce even as population ages.

**FIGURE 1-1: UTAH AGE-SEX DISTRIBUTION**



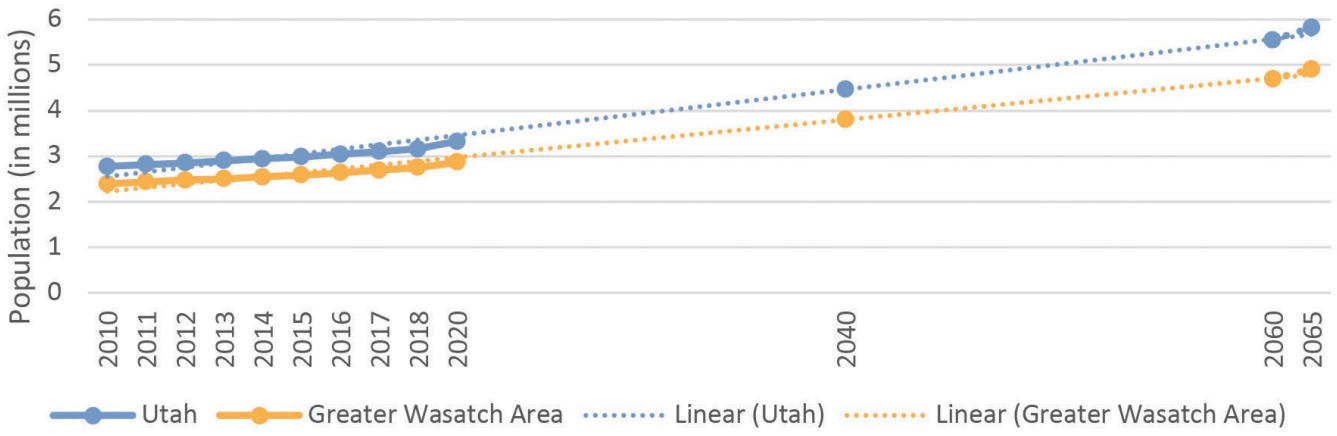

Source: Kem C. Gardner Policy Institute, 2015-2065 State and County Projections

## The State of Utah has a total population of 3.2 million, 2.75 of which live in the Greater Wasatch Area.

[4] US Census Bureau, Population Projections FAQ, https://census.gov/programs-surveys/popproj/about/faq.html#par_textimage; Kem C. Gardner Policy Institute 2015-2062 State and County Projections: Total Population by Sex and Single-Year Age
[5] Kem C. Gardner Population Estimates, 2018. This Working Paper defines the Wasatch Front area as 11 counties: Box Elder, Cache, Davis, Juab, Morgan, Salt Lake, Summit, Tooele, Utah, Wasatch, and Weber counties.

Figure 1-2 below provides the population change for both the state and the Greater Wasatch Area from 2010-2018, and projections from 2018 through 2065.

**FIGURE 1-2: UTAH AND GREATER WASATCH AREA POPULATION ESTIMATES AND PROJECTION**




Source: ACS Population Estimates of as July 1, base year of 2010; Kem C. Gardner Population Projections

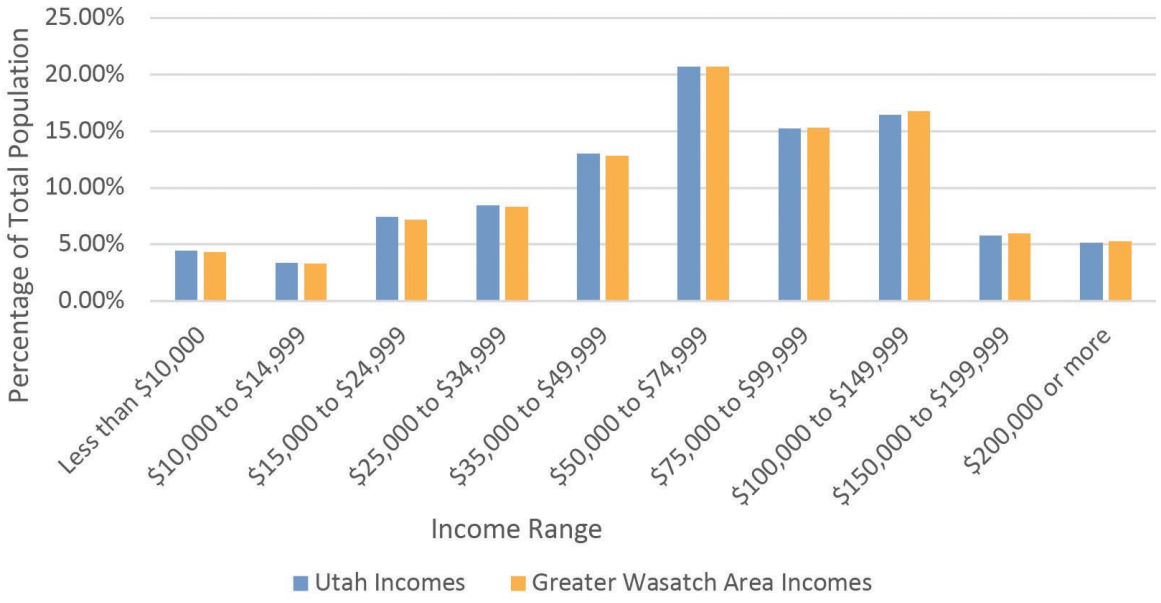
## 1.2 Household Income

### Household income in the state of Utah is comparable or higher than the United States, while the Greater Wasatch Area is significantly higher.

Median household income in Utah is $65,325, higher than the national median household income of $57,652. In the Greater Wasatch Area, the median household income rises further to $67,042. The mean household income in Utah is slightly lower than the national mean ($81,283 in Utah compared to $83,147), while the Greater Wasatch Area's household income remains higher at $85,803.

Over 60 percent of Utah households have incomes of $50,000 or more per annum. Figure 1-3 provides the distribution of household income levels in the state.

**FIGURE 1-3: UTAH HOUSEHOLD INCOME LEVELS (2017)**




Source: ACS Population Estimates Household Income 2017, US Census Bureau

## 1.3 Educational Attainment

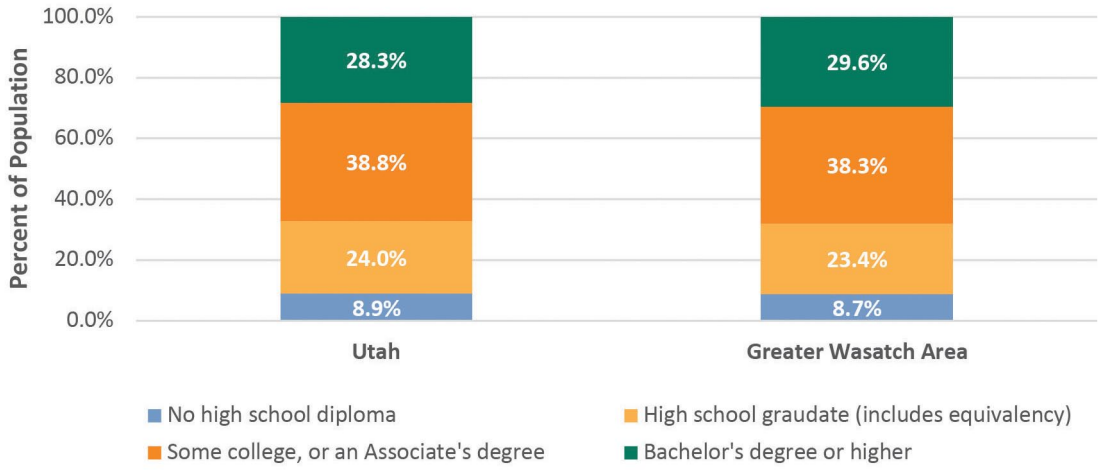
Educational attainment in the state determines what industries can be supported by its workforce. A workforce with both medium and high-skilled labor may be necessary to support certain logistics-dependent industries such as manufacturing.

### Higher educational attainment has increased in both Utah and the Greater Wasatch Area since 2010.

A higher percentage of people in Utah earn some college or an associate's degree compared to the nation. College attainment is in line with the country. Over 91 percent of adults in Utah have graduated high school or higher, compared to 87 percent for the rest of the nation. In Utah, 28.3 percent of adults have completed a bachelor's degree or higher. This number rises to 29.6 percent in the Greater Wasatch Area. Utah provides several technical programs to prepare the workforce for specialized, targeted industries. A more educated population may attract businesses that require a more skilled workforce, while also attracting industries to provide for heightened consumer demand for goods and services.

Figure 1-4 displays the highest level of education attained by residents in Utah and the Greater Wasatch Area in 2017.

**FIGURE 1-4: EDUCATIONAL ATTAINMENT LEVELS (2017)**

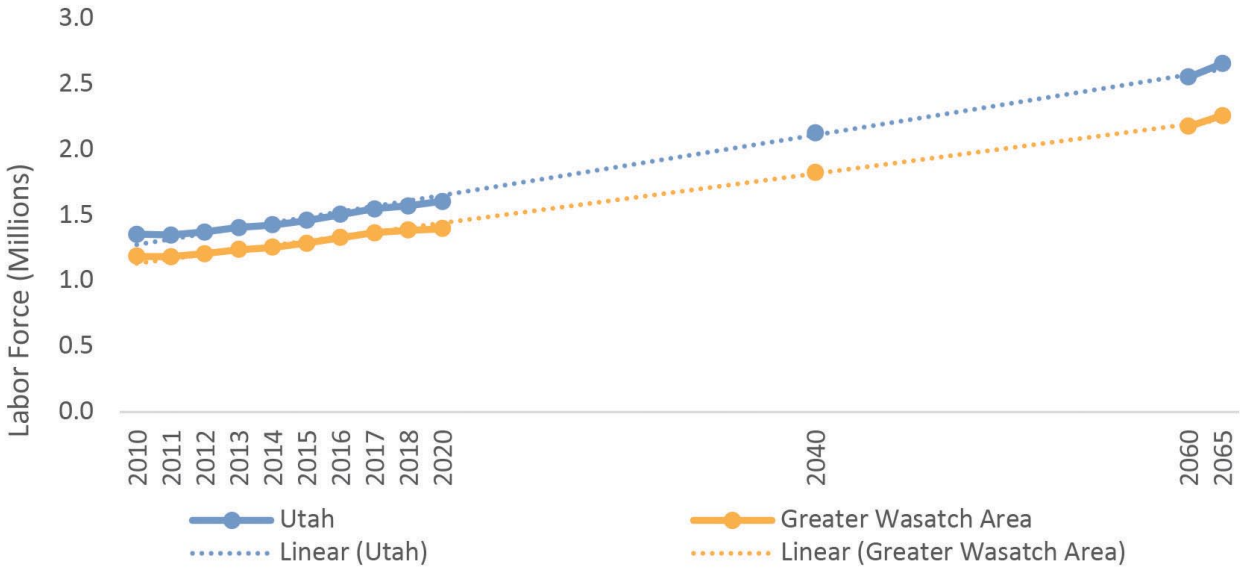



Source: 2017 American Community Survey Data, US Census Bureau

## 1.4 Employment

Employment is another measure of the state's economic well-being and reveals which industries are especially important to the workforce. The labor force is growing in both Utah and the Greater Wasatch Area. As shown in Figure 1-5, between 2010 and 2018, Utah's labor force increased by 15.9 percent, and the Greater Wasatch Area's labor force increased by 16.8 percent. Over the same period, in both regions, the number of employed people increased.

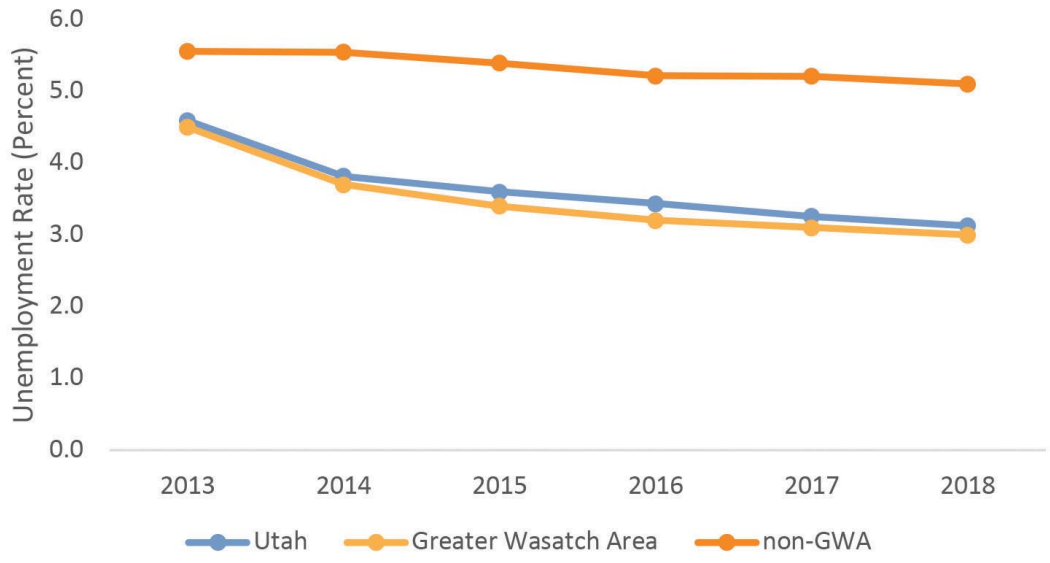
**FIGURE 1-5: UTAH AND GREATER WASATCH AREA LABOR FORCE (2010-2018)**




Source: Local Area Unemployment Statistics (LAUS), Bureau of Labor Statistics and Utah's Long-Term Demographic and Economic Projections Summary, Kem C. Gardner Policy Institute. Note: LAUS labor force: civilian noninstitutional population 16+ classified as either employed or unemployed, labor Force beginning in 2020 incorporates Kem C. Gardner's projections of working-age population 18-64 years of age with assumption of 82% as belonging to the labor force, an approximation from 2015-2017.

Unemployment rates in Utah and the Greater Wasatch Area have declined in recent years, similar to the rest of the country. Between 2013 and 2018, the national unemployment rate dropped from 7.4 to 3.9 percent. The unemployment rate in the Greater Wasatch Area dropped from 4.5 percent in 2013 to 3.0 percent in 2018, while that of Utah's declined from 4.6 percent to 3.1 percent over the same time. According to the Federal Reserve, a rate between 3.6 percent and 4.5 percent represents the natural rate of unemployment as a certain number of workers switch jobs and as workers enter or leave the labor market.[6] This means that Utah and the Greater Wasatch Area may be experiencing labor market shortages as workers are switching jobs or entering/leaving the labor market less often than the national average. Figure 1-6 demonstrates these declines in the unemployment rate.

**FIGURE 1-6: UTAH AND GREATER WASATCH AREA UNEMPLOYMENT RATES (2013-2018)**




Source: Local Area Unemployment Statistics, Bureau of Labor Statistics. Note: WF area Annual Unemployment rates calculated as an average of monthly unemployment rates (unemployment value divided by labor force value)

## 1.5 Conclusion

Utah's future economy and workforce are expected to be shaped by this dramatic growth in population and by increases in educational attainment. These trends are also expected to result in higher consumer demand for goods and services. This may also influence which businesses choose to be based in the state, and how the logistics system and supply chains need to evolve. UIPA developed strategies to ensure the logistics system can support Utah's future economy and workforce to sustain the state's economic vitality.

[6] Federal Reserve, June 2019 https://www.federalreserve.gov/faqs/economy_14424.htm

# 2 Logistics-Dependent Industries

*UIPA policies and programs are positioned to support logistics-dependent industries that rely heavily on the safe, efficient, reliable, and cost-effective shipment of physical goods to support their operations. Utah is home to particularly competitive industry clusters of construction, energy and natural resources, transportation and warehousing, and manufacturing in outdoor products and recreation, life sciences, aerospace and defense, and food. Technology developments, sustainability initiatives, and workforce challenges will change how these industries operate moving forward.*

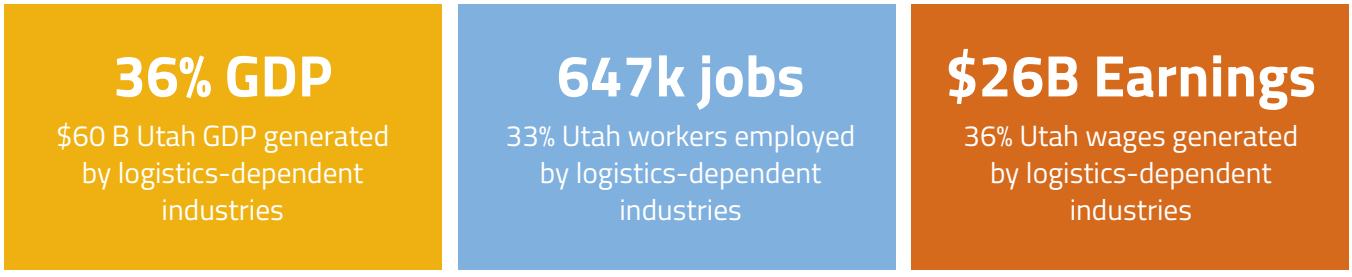
## 2.1 Logistics-Dependent Industries

Understanding logistics-dependent industries is important to the UIPA business planning process because these industries may have specific logistics, market, or workforce needs that UIPA could help fulfill.

Logistics-dependent industries rely on a strong logistics system to remain competitive.

Logistics-dependent industries include natural resources (agriculture and mineral extraction), manufacturing, retail, construction, transportation, and warehousing. Many of these industries, particularly natural resources, agriculture, and transportation, are often location-dependent (farms, mines, railroads, and rivers cannot be moved like factories), and thus are dependent on the performance of the logistics system to remain competitive. Consumer demand, both in traditional retail and in e-commerce, also impacts the need for a competitive logistics system. GDP contributions, employment levels, wage contributions, and relative competitiveness provide insight as to how logistics-dependent industries impact and support Utah's population and economic development.

**FIGURE 2-1: UTAH LOGISTICS-DEPENDENT INDUSTRIES**




Source: GDP by State and GDP by Metropolitan Area in Current Dollars & Full-Tim and Part-Time Employment, by NAICS Industry 2017, Bureau of Economic Analysis

The next section provides a brief overview of competitive logistics-dependent industries in Utah, along with specialized manufacturing industries that the state of Utah has targeted as areas for development and workforce

growth. Since these industries depend on and work with the wider logistics and supply chain system, current trends and future outlooks for each industry informed the development of UIPA programs and policies.

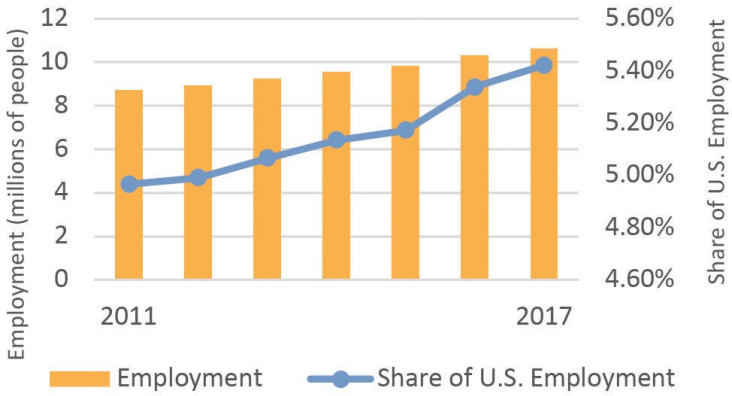
## 2.2 Logistics-Dependent Industry Profiles

### Construction

The construction industry involves residential and non-residential buildings, engineering of highways and utility systems, among others.

The importance of the construction industry in Utah has been growing over the past decade, increasing from 5.4 percent of all state employment in 2011 to 6.8 percent in 2019.[7]

**FIGURE 2-2: U.S. EMPLOYMENT IN CONSTRUCTION (2011-2017)**




Full-Time and Part-Time Employees by NAICS Industry 2011-2017, Bureau of Economic Analysis

The total statewide value of permit authorized construction during the first quarter of 2019 was $2.0 billion, with the non-residential construction industry showing particular strength at a total of $641 million, up 35 percent from 2018.[8] This sharp growth may be attributable to a handful of large-scale projects in Utah, namely the expansion of the Salt Lake City International Airport and state prison work. The expansion and relocation of various large company headquarters will further continue to drive the growth of the non-residential construction industry.[9] While residential permits declined in value and number between 2018 and 2019, rates have remained high relative to the past decade.[10] Furthermore, due to its growing population and economy, Utah has been identified as one of the top states for housing unit growth.[11]

**In 2017, the construction industry contributed the following to Utah:**

**$10B** in GDP

**6%** of Utah's GDP

**$5.0B** in wages & salaries

**125,653** jobs

Source: GDP by State, Wages & Salaries by NAICS Industry, Total Full-Time and Part-Time Employment by NAICS Industry (2017), Bureau of Economic Analysis

[7] Kem C. Gardner Policy Institute, Utah Informed 2019, p. 21
[8] Kem C. Gardner Policy Institute, Ivory-Boyer Construction Report, 2019.
[9] ENR Mountain States, "AGC of Utah Contractors Look Forward to More Growth in 2019," https://www.enr.com/articles/46306-agc-of-utah-contractors-look-forward-to-more-growth-in-2019 [Accessed August 21, 2019]
[10] Kem C. Gardner Policy Institute, Ivory-Boyer Construction Report, 2019.
[11] Utah Business. "Residential Construction is Booming in Utah," 2019. https://www.utahbusiness.com/residential-construction/ [Accessed August 21, 2019]

## Construction Trends

**New Technology.** New applications and types of additive manufacturing (also referred to as 3D printing) are under development, including 3D printing for the construction of buildings, bridges, highways, airport runways, marine structures, and other facilities. Additionally, drones have begun integration into the construction industry in a variety of roles, including construction tasks (e.g. placing materials) surveying and mapping project sites, managing efficient workflow, and increasing worksite safety and surveillance.

**Construction Labor Shortage.** Despite the trending growth in Utah's construction industry, the industry is facing nation- and state-wide labor shortage challenges. The majority of Utah contractors cite difficulty filling positions. This shortage has contributed to increasing costs of construction.

**Rising Material Costs.** Construction materials have been rising in price, further driving up construction costs. In 2018, material costs increased by 10 percent over the prior year.[12] Part of this rise in cost is related to the growth of the construction industry, which has led to an increased demand for construction materials with an unmatched supply. Additionally, the US-China Trade War has contributed to fluctuating tariffs on building materials, further contributing to the increasing costs of construction.

### Utah's Architecture, Engineering, and Construction Pathway

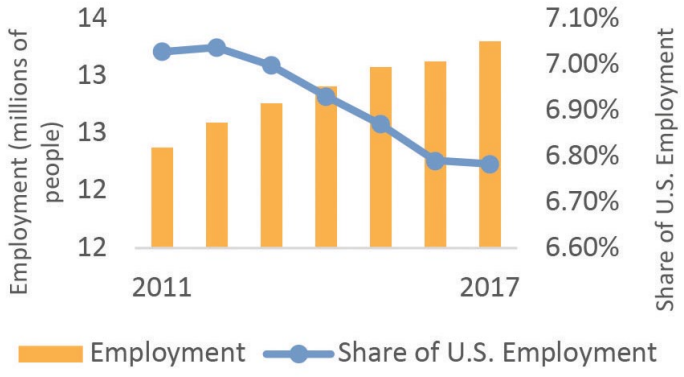
This career pathway program, recently launched by the Utah Governor's Office of Economic Development, encourages students, from 9th grade through college, to engage in and develop skills related to the construction industry. Students collect stackable credentials along the way along one of two tracks: (1) Building, Design & Construction, (2) Building Trades. Education Partners include: Weber State University Department of Construction and Building Sciences, Davis Technical College, Ogden-Weber Technical College.

**Sustainability Practices.** The construction industry has increased its use of sustainable building materials and methods. The global market for sustainable construction materials is projected to grow by over 11 percent through 2026 to become a $523 billion industry.[13] Not only are buildings developed with materials and functions to reduce their lifetime emissions, but construction operations themselves are also becoming increasingly sustainable. Sustainable building practices include using renewable and environmentally friendly materials, tracking carbon embedded in construction materials, and reducing waste during construction.

## Manufacturing

Manufacturing is a highly diversified sector, covering computers and electronics, chemicals, petroleum and coal, fabricated metals, transportation equipment, motor vehicles, furniture, plastics and rubber, food, beverages, tobacco, electrical products, wood products, textiles, and more.

**FIGURE 2-3: U.S. EMPLOYMENT IN MANUFACTURING (2011-2017)**




Source: Full-Time and Part-Time Employees by NAICS Industry 2011-2017, Bureau of Economic Analysis

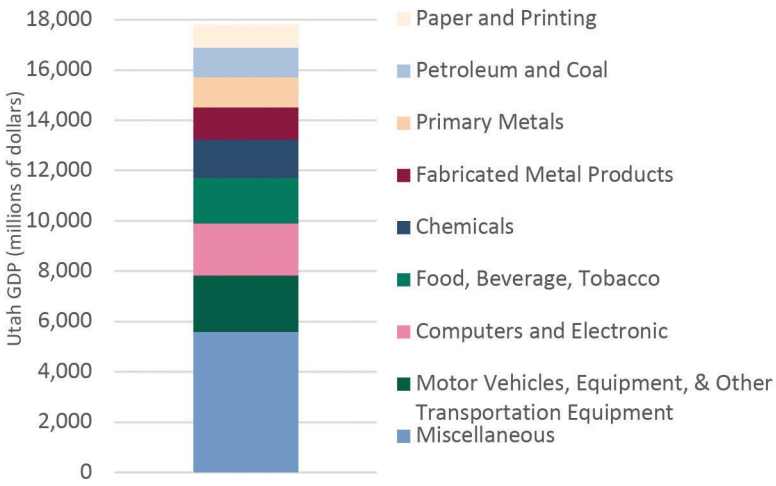
[12] Building Design & Construction, "Construction material prices increase steadily in June," 2018. https://www.bdcnetwork.com/construction-material-prices-increase-steadily-june [Accessed August 21, 2019].
[13] Thomas, "Building a More Sustainable Construction Sector," 2019. https://www.thomasnet.com/insights/building-a-more-sustainable-construction-sector/ [Accessed August 21, 2019].

Utah has significant cost advantages for manufacturing firms, such as low energy costs and access to a reliable network of freight assets.[14]

In 2017, 13 million people nationwide were employed in the manufacturing industry. The number of people employed in the manufacturing industry has increased yearly since 2011. However, the industry's share of total employment has mostly declined from year to year, the only exception being a small increase in 2012

Within Utah's manufacturing industry, miscellaneous manufacturing makes up the largest share of state GDP, followed by computer/electronic manufacturing, food/beverage/tobacco product manufacturing, and chemical manufacturing. Figure 2-4 below breaks down the sectors that make up the manufacturing industry in Utah.

**FIGURE 2-4: UTAH INDUSTRY SHARE OF MANUFACTURING GDP (2017)**




Source: Utah GDP by Industry, 2017, Bureau of Economic Analysis
Note: Sub-industries that are less than 5.2 percent of total manufacturing GDP were collapsed into miscellaneous (12 categories total)

**In 2017, the manufacturing industry contributed the following to Utah:**

**$17.8B** in GDP

**11%** of Utah's GDP

**$7.5B** in wages & salaries

**140,144** jobs

Source: GDP by State, Wages & Salaries by NAICS Industry, Total Full-Time and Part-Time Employment by NAICS Industry (2017), Bureau of Economic Analysis

## Manufacturing Trends

**Technology.** Digitization, automation, and intelligent systems are increasingly present in manufacturing processes. Connected devices and automated data collection provide real-time information, which informs the optimization of supply chain processes, logistics, inventory, operations, and production. With the rise of these technologies, data management has also become increasingly important for effective data utilization.

**Additive Manufacturing.** Additive manufacturing (a.k.a. 3D printing) is increasingly used in specialized applications or as an alternative to maintaining inventories of specialized product components. Additive manufacturing allows for faster production, and prototyping products has become more cost-effective. The aerospace and medical industries are among the top industries that use this technology, such as to produce specialized or custom devices.

[14] EDCU, Energy & Natural Resources, 2017.

**On-shoring.** "Near-shoring" and "on-shoring" refers to shifting production from locations abroad, notably Asia, to locations closer to home markets. This contributes to the creation of new manufacturing jobs in the US. However, many of the jobs initially lost are returning in the form of automated manufacturing processes, requiring fewer jobs to make the same products and jobs that may call for different skill sets than previous manufacturing work.

**Labor Shortage.** Across the nation, the industry faces challenges attracting and retaining a skilled workforce. Those employed in the manufacturing industry are working longer than before, but the median age of the manufacturing worker continues to rise. Additionally, as manufacturing workplaces become technologically advanced, they require a more highly skilled workforce. Meanwhile, the manufacturing industry has continued to grow, adding to the shortage—open jobs in manufacturing reached an all-time high at 509,000 US jobs unfilled this past spring.[15]

**Sustainable Manufacturing.** The manufacturing industry has been increasingly promoting environmentally friendly operations. OECD offers three areas of good practice: building manufacturing facilities with fewer and/or more sustainable inputs, improving energy efficiency of facility operations, and improving products to reduce impact in use and at the end of life.[16] Technological advancements can also contribute to sustainability goals, as "smart" factories utilize technology and data to optimize energy efficiency during the manufacturing process and reduce waste that comes from both manufacturing processes and products.

The next Industry Profiles spotlight the following manufacturing industries: Outdoor Products and Recreation, Aerospace and Defense, Life Science, and Food Manufacturing.

## Outdoor Products & Recreation

Utah's natural assets make the state well-suited for the development, testing, and use of outdoor and recreation products. Utah is highly attractive to the outdoor products and recreation industries. The state features public land, natural and state parks,

### Utah's Outdoor & Recreation Features:

**Ski Resorts:** Beaver Mountain Ski Area, Park City, Deer Valley Resort, and others

**Major State Parks:** Bear Lake, Antelope Island, Great Salt Lake, Wasatch Mountain, Deer Creek, Escalante Petrified Forest, and others

**National Parks:** Arches, Canyonlands, Capitol Reef, Bryce Canyon, Zion

**In Utah, employment in the outdoor products industry...**

**Consists of over 7,000 people**

**Has increased by more than 7% over the last five years**

**Offers an average wage of $43,880**

Source: EDCU, EDCUtah Industry Profile (FY18-19) Outdoor Products in Utah, [Accessed September 6, 2019].

**Utah State University: Outdoor Product Design & Development Degree**

This program prepares students for a career in the outdoor product industry through product research, development, and testing. The program includes academic, field, and industry-based experiences across various disciplines (e.g. design, engineering, outdoor recreation, sustainability, business).

[15] National Association of Manufacturing, "Manufacturing Output Hits All-Time High, Signaling Industry's Strength," 2019. https://www.nam.org/manufacturing-output-hits-all-time-high-signaling-industrys-strength-5546/?stream=workforce [Accessed August 22, 2019]
[16] OECD, Sustainable manufacturing good practices, 2011. https://www.oecd.org/innovation/green/toolkit/sustainablemanufacturinggoodpractices.htm [Accessed August 26, 2019]

mountain ranges and wildlife, rivers and lakes. This makes Utah highly specialized in sporting and athletic goods manufacturing, compared to the rest of the nation.

Utah is home to several major outdoor product and recreation companies that are large employers in Utah, including Lifetime Products, Icon Health and Fitness, Black Diamond, and Hoyt. These companies produce, manufacture, and sell a variety of outdoor recreation apparel, gear, and equipment. For instance, Lifetime Products is a leading producer of plastic and metal products, such as folding tables, chairs and benches, sheds, kayaks, and basketball hoops. Black Diamond offers mountain-related apparel and gear. Icon Health and Fitness specializes in fitness equipment such as treadmills and stationary bicycles. Additionally, Amer Sports Winter and Outdoor Company has recently announced an expansion of headquarters and distribution operations in the state. Racing bicycle company Ventum will also relocate its headquarters to Utah, with all Ventum bikes sold in the U.S. to be assembled in Utah.[17]

In the Greater Wasatch Area, outdoor products and recreation business establishments of varying sizes are located around Salt Lake City, Provo, and Ogden, along the 1-15 corridor. Additionally, some establishments are located farther north by Brigham City and Logan.

## Aerospace and Defense

Utah is one of the top-ranked states in the nation for aerospace manufacturing attractiveness. Utah's favorable business environment, Hill Air Force Base, and workforce development program make the state suitable for aerospace and defense manufacturing. Aerospace product and parts manufacturing includes establishments primarily engaged in manufacturing aircrafts, missiles, space vehicles and their engines, propulsion units, auxiliary equipment, and parts thereof, along with the development and production of prototypes. Regional air service, national air service, and advanced space systems depend on and support aerospace and defense manufacturing.

**In 2017, Utah's aerospace industry:**

**Employed over 33,500 people**

**Paid an average annual wage of $79,000**

Source: EDCU, EDCUtah Industry Profile (FY18-19), Aerospace in Utah, [Accessed September 6, 2019].

The state is home to the Hill Air Force Base, which totaled over $108 million in expenditures for the procurement of materials, equipment, and supplies (or almost $760 million in annual expenditures) in 2018.[18]

### Utah Aerospace Pathways Program

This program aims to develop Utah's workforce in the aerospace and defense industry. The program requires 156 hours of study—60 hours first semester study, 48 hours second semester in aerospace composites and metals, and 48 hours paid internship with local aerospace employer. Upon completion, a certificate indicates demonstrated knowledge and proficiency in basic manufacturing, along with completed classroom study across relevant knowledge areas. The program's industry partners include Boeing, Hill Air Force Base, Janicki, Hexcel, Kihomac, Albany Engineered Composites, Orbital ATK.

[17] EDCU, "Ventum to Move HQ to Heber City," 2019. https://edcutah.org/news/2019/08/07/ventum-move-hq-heber-city [Accessed August 22, 2019]

[18] Hill Air Force Base, Economic Impact Statement 2018

Other institutions, such as Dugway Proving Grounds, the Utah Unmanned Aerial Systems, and Utah State University, also engage in technology research, development, and testing that support manufacturing in the sector.[19] The Salt Lake City Airport also serves as the 23rd busiest airport in North America.[20]

Major aerospace and defense-related employers located in Utah include Boeing, Northrop Grumman, Lockheed Martin, and Duncan Aviation. Last year, Borsight, which offers aviation system engineering, integration, and manufacturing services, announced an expansion of its airport hangar facility in Utah.[21] L3 Technologies is also planning a $50 million manufacturing facility replacement near Salt Lake City, along with an additional 250 jobs and $6.7 million in new state revenue over the next nine years.[22] Industry leaders in Utah have also collaborated to develop an aerospace and defense workforce in the state. The sector is expected to keep growing as Utah's favorable business environment and workforce programs continue to attract and develop aerospace- and defense-specific employers and talent.[23]

There are a few mid-sized aerospace and defense business establishments in the eastern and central areas of the Northwest Quadrant Region. Additionally, there are several aerospace and defense business establishments along the I-15 corridor in the Greater Wasatch Area, with higher concentrations in Salt Lake City and Ogden.

## Life Science

Utah is a leading state in life sciences employment and innovation, with the life sciences industry growing rapidly over the past two decades. The importance of Utah's life sciences industry contributes to medical equipment and supplies manufacturng.

Utah specializes in irradiation apparatus manufacturing and surgical and medical instrument manufacturing. Irradiation apparatus manufacturing involves beta-rays, gamma-rays, X-rays, or other ionizing radiation. The industry encompasses apparatus and tubes for applications such as medical diagnostic, medical therapeutic, industrial, research, and scientific evaluation.[24] Surgical and medical instrument manufacturing relates to various instruments and apparatuses. Products include syringes, blood transfusion equipment, catheters, surgical clamps, and medical thermometers.[25]

### Utah Medical Innovations Pathway

This career pathway aims to encourage continued interest and innovation in the life science industry. The program offers two tracks: (1) Medical device manufacturing; (2) Lab science. Industry partners include BD, BioFire, Biometrics, Edwards Lifescience, Merit Medical, Stryker, and GE Healthcare.

**Utah's life sciences employee base:**

**...has about 42,000 people**

**...makes about 161% of average Utah wages**

**...has grown an average of 5% annually between 2012 and 2017**

Source: EDCU, EDCUtah Industry Profile (FY18-19), Aerospace in Utah, [Accessed September 6, 2019].

[19] GOED, Targeted Industries: Life Science, 2019. [Accessed August 22, 2019]
[20] Salt Lake City International Airport, SLC Fast Facts, 2018. [Accessed August 22, 2019]
[21] GOED, "Borsight to Expand State-of-the-Art Facility in Utah," March 12, 2018, https://business.utah.gov/news/borsight-to-expand-state-of-the-art-facility-in-utah/.
[22] EDCU, Aerospace & Defense, 2017. [Accessed August 22, 2019]; GOED, "Utah Tech Company L3 Technologies to Expand Salt Lake Location," 2019.
[23] ABC4 Utah, "Why aerospace industry might be the next economic powerhouse in SLC," 2019. https://www.abc4.com/gmu/gmu-featured-on/why-aerospace-industry-might-be-the-next-economic-powerhouse-in-slc/ [Accessed August 22, 2019].
[24] NAICS, "334517 - Irradiation Apparatus Manufacturing," https://www.naics.com/naics-code-description/?code=334517

Major life sciences companies, including BioFire, Merit Medical Systems, Varian Medical Systems, and BD Medical, operate in Utah.[26] Companies such as PolarityTE and Stryker have also recently announced plans to expand in Utah, which will add hundreds of jobs and millions of dollars to Utah's economy.[27] Additionally, medical and research institutions across Utah are pioneering innovations in medical devices. For instance, the University of Utah's Center for Medical Innovation focuses on facilitating the development of high-impact medical devices.[28] The life sciences industry anticipates further growth, particularly in the areas of novel medical devices, personalized medicine, and drug discovery and development.[29]

### Life Science and Technology Tax Credits

The Utah GOED offers tax credits for qualifying investors in the life science and technology sectors. The tax credit is a post-performance, non-refundable tax credit for up to 35% of the investment over 3 years.

In the Northwest Quadrant Region, a handful of small- and mid-sized life science business establishments are scattered throughout the southeast and central areas of the region. In the Greater Wasatch Area, most life science business establishments are located along the I-15 corridor, with high concentrations in Salt Lake City, followed by Provo and Ogden.

## Food Manufacturing

Food manufacturing industries transform livestock and agricultural products into products for immediate or final consumption. While agriculture, forestry, fishing, and hunting constitutes a separate industry, its activities consist of growing crops, raising and harvesting fish and animals, and the like, which supports and contributes to food manufacturing activities.

Food manufacturing makes up a growing portion of Utah's exports. Between 2000 and 2014, the value of food manufacturing exports in Utah increased by 340 percent. Further, the share of food manufacturing in Utah's total export products has increased almost twofold, from 3.7 percent in 2000 to 7 percent in 2015.[30]

Major agriculture employers in Utah include Smithfield Hog Production, Black Island Farms (vegetable farm), Elberta Valley Ag (dairy farm),

**FIGURE 2 5: FOOD MANUFACTURING AND RELATED INDUSTRIES EMPLOYMENT IN UTAH**

| Sector | Number of Jobs |
|---|---|
| Food Manufacturing | 17,730 |
| Farm | 21,834 |
| Forestry, Fishing, and Related Activities | 3,722 |

Source: Total Full-Time & Part-Time Employment by NAICS Industry (2017), Bureau of Economic Analysis

### The Wasatch Resource Recovery

In 2019, the Wasatch Resource Recovery opened in Utah. This facility uses an anaerobic food waste digester to convert food waste into renewable energy and bio-based fertilizer. Participating companies, such as Nestle, partner with the program to sort and send food waste to the facility. Food manufacturing waste is one of the main sources of food waste. The facility may also receive organic waste that would otherwise go to landfills, thereby reducing greenhouse gas emissions that comes from organic waste decomposing in landfills.

[25] NAICS, "339112 – Surgical and Medical Instrument Manufacturing," https://www.naics.com/naics-code-description/?code=339112.

[26] EDCU, "Utah Outpacing Nation in Health Care Innovation, Cambia Grove Report Finds," 2019. https://edcutah.org/news/2019/01/29/utah-outpacing-nation-health-care-innovation-cambia-grove-report-finds [Accessed August 22, 2019].

[27] EDCU, Industries: Life Sciences, 2017. [Accessed August 22, 2019]

[28] University of Utah Health, Center for Medical Innovation, https://uofuhealth.utah.edu/center-for-medical-innovation/about_us/ [Accessed September 20, 2019].

[29] GOED, Industry: Life Science, 2019. [Accessed August 22, 2019]

[30] Kem C. Gardner Policy Institute and David Eccles School of Business, Gardner Business Review, "What has been the impact of globalization on Utah?" May 2017, https://gardner.utah.edu/wp-content/uploads/GlobalizationReport-FINAL.pdf

and Great Salt Lake Brine Shrimp Cooperative.[31] Utah's major food manufacturing employers include Nestle Prepared Foods (frozen specialty food), EA Miller (beef production), Schreiber Foods (dairy production and distribution), West Liberty Foods (turkey grower with cold storage and distribution), and Gossner Foods (cheese and other dairy production).[32] Several additional food manufacturing companies have also recently announced plans to expand to Utah, such as Tyson Fresh Meats and Oatly Inc. Collectively, these companies grow and produce dairy, meat, vegetable, and other food products. Major food distribution centers include Albertsons, Costco, Smiths Distribution Center, and Walmart[33]

### Support for Farmers

The Utah Department of Agriculture and Food offers several agriculture and rural loans programs to support agriculture in the state, such as:

**Agriculture Resource Development Loans:** Low interest loans to support agricultural activities that: conserve soil and water resources, increase agricultural yields, maintain and improve water quality, conserve and develop on-farm energy, reduce natural disaster damages to agriculture, and protect crops and animal resources.

**Rural Rehabilitation Loans:** Low-interest loans to help those who want to buy, begin, or improve an agricultural operation (farms or ranches).

**State Revolving Fund Water Quality Loans:** Underwriting for loans (funded by the State Revolving Fund) to prevent non-point source pollution.

In the Northwest Quadrant of Salt Lake County, food manufacturing business establishments are mostly scattered around the southeast area. In the Greater Wasatch Area, most food manufacturing business establishments are located along the I-15 corridor, with high concentrations in and between Provo and Salt Lake City, by Ogden, and north of Brigham City near Logan.

## Energy and Natural Resources

Utah is a leader in traditional energy and renewable energy production – namely solar energy. The Utah Governor's Office of Energy Development aims to deliver high-value results to Utah's economy and its

**FIGURE 2 6: UTAH ENERGY AND NATURAL RESOURCE EMPLOYMENT**

| Sector | Number of Jobs |
|---|---|
| Oil & Gas Development and Production | 8,000 |
| Oil & Gas Refining | 1,220 |
| Coal Mining | 1,500 |
| Solar Jobs | 6,045 |

Source: Utah Department of Workforce Services March 2019, Number of Jobs by Sector; Solar Energy Industries Association, Utah Solar.

**Across all resources, Utah's energy and natural resources industries contribute:**

**$20 billion** to the economy

Over **50,000** high-paying jobs

Source: Utah Governor's Office of Energy Development, 2019. [Accessed August 22, 2019]

[31] UDWS March 2019 Employment Records
[32] EDCUtah, Manufacturing & Distribution, 2017, https://edcutah.org/industries/manufacturing-distribution [Accessed October 15, 2019]; UDWS March 2019 Employment Records
[33] EDCUtah, Manufacturing & Distribution, 2017, https://edcutah.org/industries/manufacturing-distribution [Accessed October 15, 2019.

residents by providing affordable, reliable, and sustainable energy. Major employers in the energy and natural resources sectors include Vivant Solar, Solar City, Scatec Solar, Questar, Chevron, and Rocky Mountain Power. Utah is also particularly unique in the production of other nonferrous metals when compared to the nation, with US Magnesium, Asahi Refining, and Kennecott Copper serving as some of the larger employers.

Utah is also the only domestic producer of Sulfate of Potash. In, 2018, Utah produced 491,000 tons of potash worth $241 million.[34]

### Sevier Playa Potash Project

Utah's Bureau of Land Management recently approved a project for Crystal Peak Minerals to produce potash and extract salt and magnesium chloride from a 125,000-acre complex of evaporation ponds on Utah's dry Sevier lakebed. Construction may begin as soon as next year. Over its 30-year life, the project is anticipated to produce up to 372,000 tons of potash potassium annually, worth about $232 million, along with 175 high-paying jobs in Utah's rural West Desert region.

Large areas of coal reserves can be found in east central Utah, within which the majority of the state's coal mines and gas fields are located. Additional coal reserves are also located across southern Utah, with uranium districts mostly concentrated in the southeast region of the state.

## Energy and Natural Resources Trends

**Changing Role of Coal.** Many utility companies are switching to cheaper and cleaner alternatives, driving down domestic coal consumption. In 2018, U.S. coal consumption levels were 687 million short tons, representing a 42 percent decline since 2005 and the lowest levels of domestic coal consumption in about fifty years.[35]

Coal mining is particularly concentrated in Carbon County and Emery County.[36] Although historically coal mining served an important role in Utah's economic development, coal production and consumption have both been decreasing in the state since 2008, in line with national trends. This particularly affects the economies of the coal-dependent Carbon and Emory counties in Utah.[37] Foreign exports of coal have increased recently, signaling an area for potential market growth. However, this annual trend is not projected to continue.[38]

**Rising Use of Renewables.** Renewable energy consumption has been rapidly increasing over the past few decades due to the unsustainability of current primary sources and global climate change. The capture and use of renewable energy have become more innovative, cost-efficient, and accessible. This, combined with its smaller environmental footprint, make renewables an increasingly attractive energy source.

[34] The Salt Lake Tribune, "Feds approve massive potash mine on dry Utah lakebed; it could bring hundreds of jobs, millions in sales," August 28, 2019, https://www.sltrib.com/news/environment/2019/08/28/feds-approve-massive/ [Accessed August 13, 2019].
[35] U.S. Energy Information Administration, "Petroleum, natural gas, and coal continue to dominate U.S. energy consumption," 2019. https://www.eia.gov/todayinenergy/detail.php?id=40013
[38] Utah Division of Oil, Gas and Mining, Coal Program, 2019. https://www.ogm.utah.gov/coal/index.php [Accessed August 28, 2019]
[39] Utah Geological Survey, "Coal in Utah: Recent Trends, Current Status, Future Options," 2018. https://le.utah.gov/interim/2018/pdf/00002241.pdf; Bureau of Economic and Business Research, University of Utah, "The Structure and Economic Impact of Utah's Coal Industry," 2010. https://gardner.utah.edu/bebr/Documents/studies/Coal%20Final%20Report.pdf
[40] Institute for Energy Economics and Financial Analysis, "U.S. coal exports will drop by more than 15% in 2019," 2019. http://ieefa.org/eia-u-s-coal-exports-will-drop-by-more-than-15-in-2019/ [Accessed August 28, 2019].

Renewable energy comes from natural resources or processes that are constantly replenished.[39] Major renewable sources include wind, solar, geothermal, biofuel, biomass, and hydroelectric.[40]

## By 2017, Utah outpaced the nation in the percent of renewable sources in total electricity generation.

Renewal sources made up almost 10 percent of the state's total electricity generation that year. Of this, geothermal energy makes up just over one percent, wind energy makes up about three percent, and solar thermal and photovoltaic energy makes up about six percent.[41]

Major geothermal zones lie in southwest and northern Utah, with additional geothermal zones concentrated in the northeast region of the state. Major wind zones are located in southwest Utah, with additional wind zones scattered throughout the rest of the state.[42] Utah is also one of the leading states in the solar power industry—the state led the nation for solar jobs added in 2017.[43] The state also ranks second per capita in solar capacity and sixth for installed solar capacity.[44] In Utah, the stretch of land between Tooele county and Washington county serves as a prime location for solar and other renewable projects, and Utah is similarly trending with the rest of the nation toward increased use of renewable energy. Utah has been named by the National Renewable Energy Laboratory as a state with top solar potential.[45]

Utah promotes the growth of renewable energy use through state incentive programs.[46] The Production Tax Credit has helped contribute $1.65 billion in capital investments through 27 new solar PV projects in Utah's

### The Solar Incentive

A tax credit that can be applied to residential solar, commercial solar, and large-scale installations.

**Residential Renewable Systems Tax Credit**
Non-refundable; calculated as 25% of the eligible system cost or $1,600, whichever is less

**Commercial Investment Renewable Energy Systems Tax Credit**
Refundable; calculated as 10% of the eligible system cost or $50,000, whichever is less

**Production Tax Credit**
For large scale solar PV, wind, biomass, and geothermal electricity generating renewable energy projects over 660 kilowatts; calculated as 0.35 cents/kWh of electricity produced during the project's first 48 months of operation

Source: Utah Governor's Office of Energy Development, Solar Tax Credits: Rooftop Solar, [Accessed September 11, 2019].

[39] National Resources Defense Council, Renewable Energy: The Clean Facts, 2019. https://www.nrdc.org/stories/renewable-energy-clean-facts#sec-whatis [Accessed August 28, 2019].
[40] Center for Sustainable Systems, University of Michigan. 2018. "U.S. Renewable Energy Factsheet."
[41] Kem. C Gardner, Utah Informed 2019, pg. 50. https://gardner.utah.edu/wp-content/uploads/2019-Utah-Informed-Final.pdf [Accessed August 28, 2019].
[42] Governor's Office of Energy development, Utah Energy & Infrastructure Map, https://energy.utah.gov/about-us/energy-mineral-resources/ [Accessed September 12, 2019].
[43] Governors Office of Energy Development, 2019, [Accessed August 28, 2019].
[44] Deseret News, "Gov. Gary Herbert unveils 10 goals in Utah 'Energy Action Plan,'" 2018, https://www.deseretnews.com/article/900018619/gov-gary-herbert-unveils-10-goals-in-utah-energy-action-plan.html
[45] Kem C. Gardner Policy Institute, "Renewable energy: The best things in life are free," 2018. https://gardner.utah.edu/renewable-energy-best-things-life-free/ [August 28, 2019].
[46] EDCUtah, Energy & Natural Resources, 2017, [Accessed September 6, 2019].

Millard, Beaver, and Iron Counties. Additionally, Salt Lake City recently accelerated its goal to have the entire city on 100 percent renewable energy by 2030.[47]

## Transportation and Warehousing

Utah is situated in the center of the Western US at the crossroads of national highway, rail, and aviation systems—attributes that attract transportation and warehousing operatons.

The transportation industry can be broken down into multiple modes: road, air, rail, water, and pipeline. The industry includes passenger and cargo transportation, scenic and sightseeing transportation, and additional support activities. The warehousing industry refers to the warehousing and storage for goods. US employment in transportation and warehousing has been increasing annually since 2011, both in total number and share of total employment. The transportation and warehousing industries employed about 7.66 million people across the nation in 2017.

**In 2017, the transportation and warehousing industry contributed the following to Utah:**

**$6.1B** in GDP

**4%** of Utah's GDP

**$2.9B** in wages & salaries

**69,281** jobs

Source: GDP by State, Wages & Salaries by NAICS Industry, Total Full-Time and Part-Time Employment by NAICS Industry (2017), Bureau of Economic Analysis

Utah exports $12 billion in goods and services annually.[48] Trucking is the top freight mode in Utah, employing over 27,000 people in 2017. The headquarters of C.R. England, which is one of the nation's largest refrigerated truck companies, is located in Salt Lake City.[49] The state also specializes in air transportation, an industry that employed almost 7,000 people in 2017. Many large companies also operate warehousing and distribution centers in Utah. Warehousing and storage employed over 11,000 people in 2017.

**The Salt Lake City International Airport** is the 23rd busiest airport in North America and serves as a hub for Delta Airlines and SkyWest Airlines. The airport is currently undergoing an expansion, with a first phase expected to finish by 2020 and full completion projected for 2024. Once finished, the airport's international capable gates will have doubled from three to six, increasing the airport's capacity for non-stop service to long-haul international destinations.

**Amazon** recently opened a regional fulfillment center in the northwest quadrant of Salt Lake City. The facility will employ over 1,500 people, with 130 high-paying jobs. It is also project to generate $85.5 million in new wages and $29.4 in new state tax revenue over the next 8 years. To incentivize Amazon to build the facility in Salt Lake City, Utah GOED offered the online retail giant a post-performance tax credit rebate (the EDTIF tax credit), which may total up to $5.68 million, or 20 percent of generated tax revenue.

In the Northwest Quadrant Region, transportation and warehousing business establishments are mostly located in the southeast and central areas of the region.

[47] Fox13 Salt Lake City, "Salt Lake City moves up goal to be entirely on 100% renewable energy to 2030," May 20, 2019. https://fox13now.com/2019/05/20/salt-lake-city-moves-up-goal-to-be-entirely-on-100-renewable-energy-to-2030/ [Accessed August 28, 2019].
[48] Business Facilities, "Logistics & Distribution: Delivering The Goods in a Real-Time Economy." 2019. https://businessfacilities.com/2019/06/logistics-distribution-delivering-goods-real-time-economy/
[49] UDOT, Utah: Transportation & Economic Development: Crossroads of the West. May 2017. https://le.utah.gov/interim/2017/pdf/00002392.pdf [Accessed August 21, 2019].

## Transportation and Warehousing Trends

**E-commerce.** The rise of e-commerce has changed consumer demands, and transportation and warehousing companies are responding to meet expectations. Companies are testing ways to use technology to more effectively manage and control their operations in response to consumer demands. For example, Amazon is increasingly relying on a network of contractor drivers in passenger vehicles to distribute packages in order to meet consumer expectations for faster delivery. This generates additional vehicle trips to move the same amount of freight, which may contribute to local road congestion.

Warehouses have also adapted to changing consumer demands. For instance, modern warehouses have relocated and expanded, are equipped to store a higher volume of diverse inventory, can better handle more frequent shipping, and have integrated smart technology systems to optimize efficiency and meet consumer demands.

**Integrated Operations.** Shippers are increasingly using instrumentation to track the location and condition (temperature, shocks/shaking, orientation) of freight as it moves through the supply chain. The information generated from instrumented shipping equipment, like "smart pallets," could also become a new transportation-related data source. This added real-time information can be useful for improving transportation and warehousing efficiency and decreasing costs.

**Data and Analytics.** New technology and big data provide insight into transportation and warehousing systems. This aids projections, forecasting, and optimization, which enables more efficient operations and improved investment choices. For example, trucking companies use GPS tracking systems to monitor their fleets and collect data on truck speed, location, fuel consumption, and safety. This speed and location data can be used to alter delivery routes to avoid congestion, inform future route planning, and minimize empty and under-filled miles. Similarly, warehouses can use data and analytics to understand consumer demand and stock the proper amount of inventory to avoid losses due to over- or under-stocking. As transportation and warehousing related technology continues to spread, it will likely further impact operations and investment decisions as companies aim to improve supply chain efficiency.

**Blockchain Technology** provides a means of securely collecting and distributing information about the movement of goods through a supply chain, which may help businesses manage their supply chains. For example, Walmart uses blockchain systems to track the movement of imported pork, recording aspects such as where the meat was grown, processed, and shipped, along with its sell-by date.[50] In the future, anonymized and aggregated supply chain information with access controlled by blockchain protocols could become a valuable data source for transportation and warehouse planning and operations.

### Trucking Industry Needs

(as cited by the Utah Department of Transportation)

- More freight collector routes in urban areas
- More rail crossings grade separations
- Improved interchange and intersection design
- Full-width paved shoulders on freight routes
- More truck acceleration and deceleration lanes
- Improved long-term trucking parking

Source: American Trucking Association, "Updated: New Survey Data Reveals Increases in Driver Compensation," 2018.

[50] Marr, Bernard. "How Blockchain will Transform the Supply Chain and Logistics Industry." Forbes. Mar 23, 2018.

**Trucking Challenges.** One of the most pressing issues is a shortage of truck drivers. Estimates of the U.S. current labor shortage sit at over 60,000, which is a 20 percent increase from the year prior.[51] As the industry loses older drivers while failing to attract new drivers, the driver shortfall is expected to increase. Industry leaders aim to attract new drivers such as by offering higher salaries, but concerns regarding long hours and safety still prove barriers to hiring truck drivers.

**Automation.** Autonomous and driverless vehicles are likely to become integrated components of transportation systems for freight users in the future. A handful of companies are spearheading the development and testing of autonomous and semi-autonomous trucking. Some have begun to test autonomous trucks unmanned in traffic. Recently, Loadsmart and Starsky Robotics partnered to complete the first automatic dispatch and delivery with an unmanned, autonomous truck.[52] Adoption of connected and autonomous vehicles will impact traffic safety, trucking company business models, distribution operations, parking requirements and roadway designs, and overall use of the transportation system. While the integration of semi-autonomous vehicles is on the horizon, the use of fully autonomous operation in trucking is decades away. The future of autonomous trucking implementation is still unclear, as much depends on how state and national regulations adapt to technological developments.

**Legal Regulations.** Changing laws and regulations will affect various aspects of the transportation industry moving forward. Within trucking, the issue of whether truck drivers must be compensated for legally required sleeping hours is facing court rulings that will affect trucking operations moving forward. Regarding the testing and implementation of autonomous trucking, regulations set by state legislatures will influence the rate at which autonomous vehicles and trucks will be deployed.

**Low- and Zero-Emissions Technology.** Transportation and warehousing companies are increasingly using various low- and zero-emissions technologies within their supply chain operations. Various companies and ports have been testing and deploying low- and zero-emissions trucks, particularly for drayage.

**Environmentally Friendly Buildings.** Distribution companies are also designing and retrofitting buildings to become more environmentally friendly and energy-efficient. Often, energy efficiency also improves cost efficiency, making it further favorable for companies.

Figure 2-7 describes features of energy efficiency in warehousing and distribution facilities.

[51] American Trucking Association, Truck Driver Shortage Analysis 2019.
[52] Traffic Technology Today, "Loadsmart and Starsky complete first 'end-to-end' autonomous freight delivery." 2019. https://www.traffictechnologytoday.com/news/autonomous-vehicles/loadsmart-and-starsky-complete-first-end-to-end-autonomous-freight-delivery.html

## FIGURE 2-7: ENERGY EFFICIENT BUILDING FEATURES

| | |
|---|---|
| **Lighting** | De-lamping strategies involve removing unnecessary light fixtures in areas that are producing too much light. Glass windows and skylights can be strategically designed to use the sun to light and heat parts of the facility. The best lighting options are LED lighting fixtures, which have significant energy savings, and fluorescent lamps, which are another energy-saving alternative. Other smart lighting measures include occupancy sensors, scheduled control strategy, and zone lighting. Automated lighting controls work with warehouse activity to improve efficiencies, such as lighting zones that turn on and off based on activity or lack thereof in the zone. |
| **Bird-Friendly Windows** | Bird-friendly design strategies can also prevent bird deaths that happen as a result of window strikes. Window design measures include using minimal glass, placing glass behind some type of screening, and using glass with inherent properties that reduce collisions (angled glass, fritted glass, UV reflective glass). Appropriately shielded outside lighting and turning off interior lighting at night can also reduce bird deaths from glass collisions.<br>Source: Humane Society, "Make your windows bird-safe," 2019; American Brid Conservancy, "Bird-Friendly Building Design," 2015. |
| **Proper Insulation** | Air leaks contribute to energy loss, particularly for heated and refrigerated spaces. Proper insulation measures are important steps for energy saving. In construction, using tilt-up concrete panels allow for airtight seals and continuous insulation. Standing seam metal roofs also eliminate seams. Spray foam insulation and loose fill insulation also provide improved insulation efficiency compared to traditional insulation. For cold storage requirements, insulated cold-storage doors that quickly open and close, along with seal around loading dock doors, prevent loss of cold air. |
| **Cool Roofs** | Cool roof surfaces reflect sunlight and minimize solar heat gain. Surfaces are made of highly reflective paint, tiles, or shingles, or sheet coverings. This reduces the cooling load and cost. |
| **Equipment Energy Controls** | Automated equipment with sensors can turn on or shut parts of a system off if they are in or out of use, respectively. |
| **Permeable Surfaces** | Permeable pavements are porous surfaces that catch rain and surface runoff, allowing rainwater to permeate through the surface to be stored below. Permeable surfaces help manage storm rainwater, prevent runoff and pollution, replenish groundwater, and even help melt and thaw snow and ice during the cold-weather months.<br>Source: USGS, "Evaluating the potential benefits of permeable pavement on the quantity and quality of stormwater runoff," 2018; Landscaping Network, "The Benefits of Permeable Paving." |
| **Ceiling Fans** | Large ceiling fans improve air circulation. In air-conditioned spaces, these fans lower the temperature setting, reducing the need for alternate cooling systems. Fans can also reduce the need for additional heating by recirculating hot air. Costs associated with cooling and heating are also reduced. |
| **Solar Energy** | Solar panels can be installed on warehouse roofs to contribute to powering energy needs. Warehouse roofs are idle assets, making the space an appropriate place for solar panels. Additionally, the solar installation is located near the warehouse electric load, so energy does not have to be transported far. Although solar system installations require upfront investments, reduced energy expenses can lead to cost savings.<br>Source: Forbes, "Should Warehouses Invest in Solar Energy?" May 19, 2014. |

## 2.3 Conclusion

Logistics-dependent industries are significant to the economies of Utah and the Greater Wasatch Area, contributing approximately a third of each region's employment. Logistics-dependent industries in Utah include construction, energy and natural resources, transportation and warehousing, and manufacturing in outdoor recreation, life sciences, aerospace and defense, and food. Various features within Utah make these industries competitive, and state financial and education incentives continue to attract industry-specific businesses and workers to the state. Trends in technology, sustainability, and labor will force industries to adapt in order to continue to grow moving forward. The condition and performance of the state's logistics system will also continue to influence economic development in Utah. UIPA policies and programs aim to prepare Utah for industry and workforce changes in the logistics and logistics-dependent industries, in order to drive business investments in the state.

# 3 Logistics and Trade

*Utah and the Salt Lake City region form an important regional logistics market as a "Crossroads of the West," a hub for the Intermountain Region including Nevada, South Idaho, Western Colorado, and Northwestern New Mexico, and a national and international trade intersection. The Salt Lake region is well connected by inter-state highway corridors, railways, and the Salt Lake City Airport, with direct connections to West Coast ports. Over half of all containerized imports and exports into Utah come from the Ports of Los Angeles and Long Beach.*

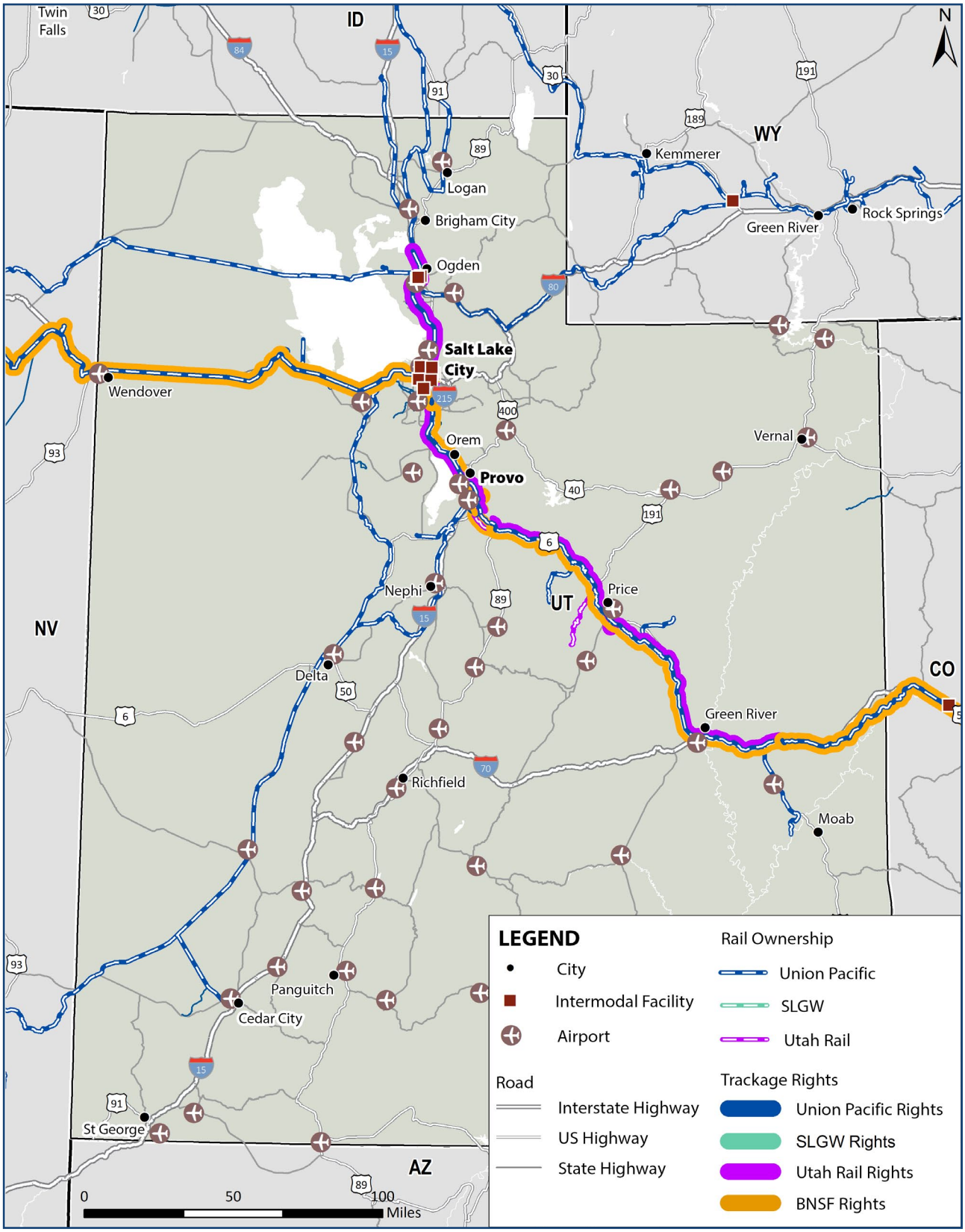
*Top commodities across all modes include parts and components of electronics, machinery, medical equipment, and outdoor equipment by value. California, Nevada, Texas, Colorado, and Idaho are Utah's top trading partners by value. The USDOT's Freight Analysis Framework estimates that by 2045 Utah's total annual freight value will double (+$219 billion). This insight into current and future logistics and trade informs the development of UIPA programs and policies, so that the UIPA can best support the evolution of the logistics system in Utah.*

## 3.1 Utah's Regional Logistics System Overview

The Utah logistics system links producers and consumers together through complex international supply chain networks and multiple transportation modes. Logistics starts from sourcing of raw materials and ends when businesses and consumers obtain the products they need.

The State of Utah possesses compelling characteristics for business investment. Over recent years, the state and region have developed into an important regional logistics market and a rapidly growing technology hub. Salt Lake City is a regional transportation hub for the Intermountain Region including Nevada, South Idaho, Western Colorado, and Northwestern New Mexico. The Salt Lake region is well connected by interstate highway corridors, such as I-70, I-15, I-80, and I-84. This region is also well served by railways, including Union Pacific Railroad, BNSF Railway, and short line and switching railroads. The Salt Lake City Airport (SLC) also offers regular service to both major and minor, domestic and international airports. The region is connected directly to the major West Coast seaports, Port of Oakland and the Port of Los Angeles and Long Beach, by rail and highway. Pacific Northwest Seaports are accessible by highway and could also be accessible by rail if routes are scheduled. Figure 3-1 provides an overview of Utah's multimodal freight network.

## FIGURE 3-1: STATE OF UTAH MULTIMODAL FREIGHT NETWORK




Source: CPCS Analysis of Utah Department of Transportation Freight Network Map



UTAH INLAND PORT AUTHORITY

## Seaport Background Information

As an inland state, Utah relies on several major West Coast seaports which serve as international trade gateways for maritime shipments. Utah's primary global gateways are located in California, particularly the Ports of Los Angeles and Long Beach and Port of Oakland, which collectively serve as the international gateway for nearly 80% of Utah's import and export value by sea. Only a small amount of Utah freight passes through Atlantic and Gulf Coast seaports (e.g. around 5% through Port of Savannah, 4% through Port of New York), as well as those in the Pacific Northwest (e.g. around 2% through Port of Tacoma, 1% through Port of Seattle).

Utah's primary intermodal and bulk commodity links to these California seaports include the Union Pacific Railroad, along with Interstates 15 and 80. UP's Salt Lake City Intermodal Terminal (SLCIT) provides direct rail intermodal freight service to the ports of Los Angeles and Long Beach, with indirect rail service to the Port of Oakland.

West Coast ports are looking to grow their rail use due to road congestion and environmental impact. West Coast ports depend on intermodal rail to move 30% to 50% of their containerized imports to the eastern half of the country.[53] In order to attract more discretionary cargo, the ports are improving on-dock rail and lowering the cost of the intermodal transfer. For example, the Port of Long Beach is proposing to reconfigure, expand and enhance the existing Pier B rail facility to support the more efficient use of "on-dock" rail at the Port's shipping terminals, which will in turn ease roadway traffic congestion and improve air quality. Long Beach now handles about 27.5 percent of its container volume via on-dock rail, has set a goal of 50 percent.

The main container seaports in the Pacific Northwest (Seattle and Tacoma) have combined much of their business and operational strategy – mostly to form a more credible foil to the powerful Southern California ports (Northwest Seaport Alliance). A similar strategy has been employed in British Columbia where the Port of Vancouver merged with the Frasier River Port Authority to create Port Metro Vancouver looking to take additional market share from US West Coast ports.

## Roadways and Truck Movements

Utah has approximately 937 miles of interstate highway, 112 miles of urban highways and 737 miles of rural highway.[54] Utah has immediate access to an important east-west interstate highway corridor. For east-west movements, I-80 and I-70, I-84, US-6, and US-40, and for north-south movements, I-15, US-191, and US-89 are likely to be the major routes used by long-distance truckers. There are other state routes available but they are not major routes for typical long-distance freight trucks.

Truck distances to major West Coast seaports are as follows:

| Area | Distances | Service Time | Corridor(s) |
|---|---|---|---|
| Northwest Seaport Alliance | 840 miles | 14.5 hours | I-84, I-32 |
| Port of Oakland | 725 miles | 12.5 hours | I-80 |
| Port of Los Angeles/Port of Long Beach | 705 miles | 12 hours | I-15 |

Source: GOED, Utah Inland Port Feasibility Report, 2017

[53] https://www.joc.com/port-news/us-ports/port-los-angeles/us-west-coast-ports-drill-down-rail-efficiencies-protect-share_20180928.html
[54] GOED, Inland Port Feasibility Analysis 2017

## Rail Background Information

Freight railroads in Utah are an important component of the multimodal freight network. Northern Utah is located at the crossroads of two major UP intermodal routes, with trains bound for northern California and the Port of Oakland passing through Ogden. Southern California trains serve the Salt Lake City Intermodal Terminal (SLCIT) and then head southwest via Milford and Las Vegas to the Los Angeles Basin. East of Ogden, the trains of both routes use the historic Overland Route mainline across Wyoming and Nebraska, which was part of America's first transcontinental railroad.

Most of the freight carried by Union Pacific's intermodal trains pass through Utah on the way to and from west coast seaports and Midwestern and eastern cities. Salt Lake City is also home to Union Pacific's intermodal freight terminal, designed to support the growing intermodal volume in the Wasatch Front area. It is capable of handling more than 250,000 annual container lifts, greatly increasing UP's intermodal capacity in the expanding regional market.[55] Strategically located in Salt Lake City, this gives trucks serving that facility quick access to the primary freight network highways that link the Wasatch Front with the rest of the Mountain West region.

Of the eight operating railroads in Utah, two are Class I railroads, and seven have access to the national rail system. Union Pacific (UP) is the state's dominant railroad and shares connections with most other general freight rail operators in the state. According to the Association of American Railroads (AAR), there are approximately 1,351 miles of freight rail in operation in Utah, 1,250 of which are operated by Union Pacific.[56]

The approximate distance, estimated duration, and rail routes to/from Salt Lake City to major seaports are listed in Figure 3-2.

**FIGURE 3-2: RAIL CONNECTIONS TO WEST COAST PORTS**

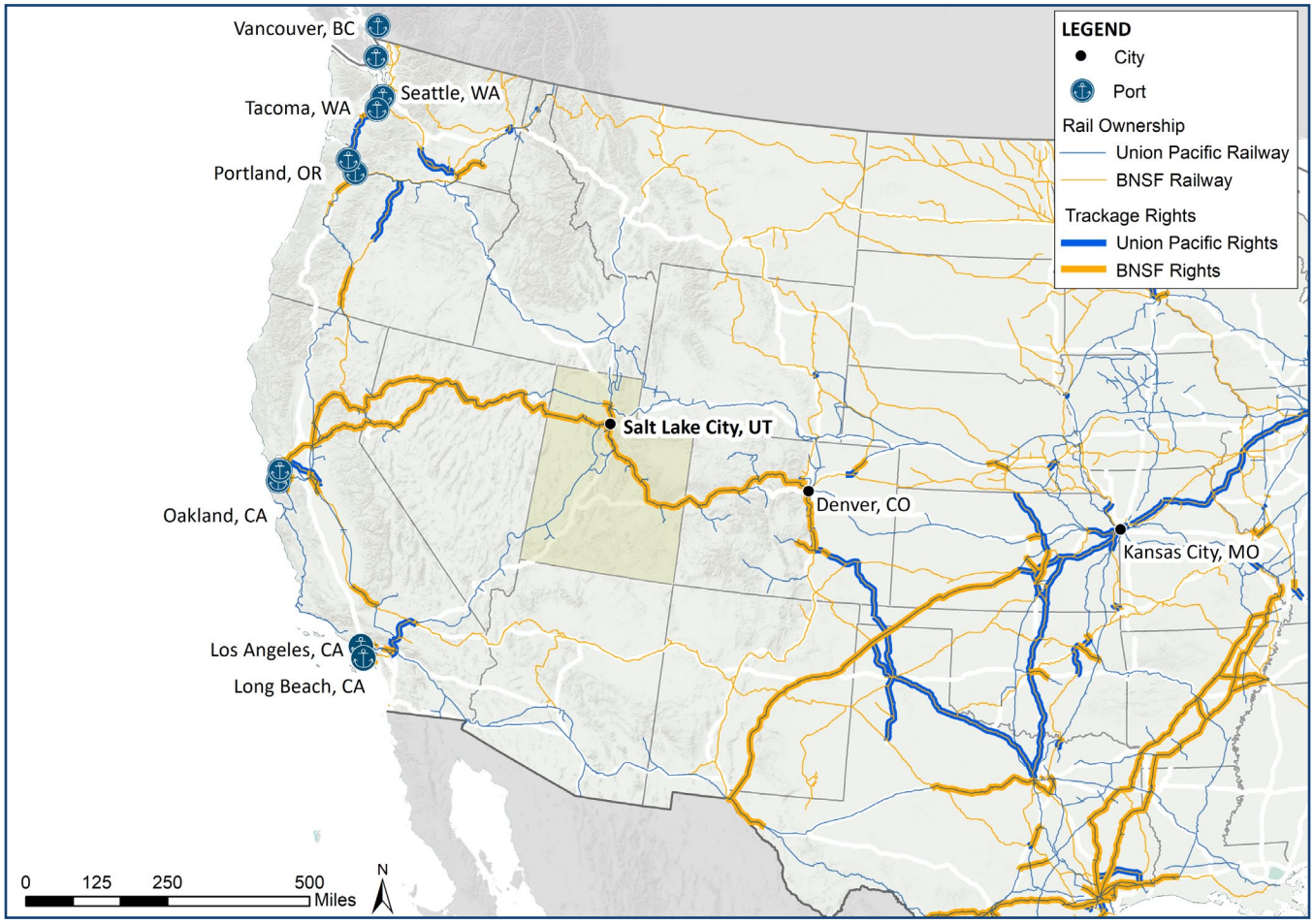
| Area | Distances | Service Time | Ownership |
|---|---|---|---|
| Northwest Seaport Alliance | 870 miles | Not Served | BNSF and UP |
| Port of Oakland | 840 miles | 3 Days | UP with BNSF Trackage Rights |
| Port of Los Angeles/Port of Long Beach | 740 miles – UP<br>1265 miles – BNSF | 3 Days Intermodal | UP from SLC to Barstow |

Source: Utah Inland Port Feasibility Study, 2017

Figure 3-3 below illustrates Class I rail ownership for BNSF and Union Pacific, with bolded lines indicating trackage rights. BNSF is able to ship goods between Salt Lake City and the Port of Oakland through its trackage rights. However, Union Pacific is the only current direct rail service between Salt Lake City and the Ports of Los Angeles / Long Beach – the main international gateway for freight coming into the region.[57]

[55] https://www.up.com/customers/premium/intmap/slc/index.htm
[56] https://www.udot.utah.gov/main/uconowner.gf?n=23980801691013244
[57] Analysis of PIERS 2018

**FIGURE 3-3: UTAH CLASS I RAILROAD NATIONAL CONNECTIONS**




Source: CPCS Network Data

Union Pacific offers direct domestic and international inbound service for containers and trailers (intermodal) to Salt Lake City from 9 origins, and outbound service to 8 destinations.[58]

## Aviation Network

The Salt Lake City International Airport is Utah's principal gateway for air cargo with seven other airports/ airfields providing air cargo connecting service to Salt Lake City. The list of airports are as follows:

- Buck Davis Field (Price)
- Canyonlands Field (Moab)
- Cedar City Regional Airport
- Logan-Cache Airport
- Salt Lake City International Airport
- St. George Municipal Airport
- Vernal Regional Airport
- Wendover Airport

[58] UP Schedules, August 2019

Salt Lake City International Airport air cargo is dominated by air freight integrator routes, which serve the integrated express industry, such as UPS, FedEx, and DHL. According to Salt Lake City International Airport statistics for 2018, there were more than 392 million pounds of air cargo handled by both the four air cargo airlines and wide body passenger and cargo airlines in Utah.

Due to dramatic increases in passenger growth, the addition of a hub airline, and aging, obsolete facilities, the Salt Lake City Department of Airports assessed whether to expand, renovate or rebuild. The project—originally named the Terminal Redevelopment Program (TRP)—broke ground in 2014. In May 2016, the decision was made to add the North Concourse to the program. The project then became known as the Airport Redevelopment Program (ARP). The ARP will update the facility to accommodate the more than 24 million passengers currently served and to address new safety and security needs. The new facility will also meet industry standards for seismic safety.

- The first phase of the new airport, which will include a new gateway center, a 3,600-car parking garage, terminal, and north and south west concourses, is on track to open in late 2020.
- The second phase, which will complete the rest of the concourses and demolish the existing buildings, will be completed in 2023/24.[59]

## Container Movements

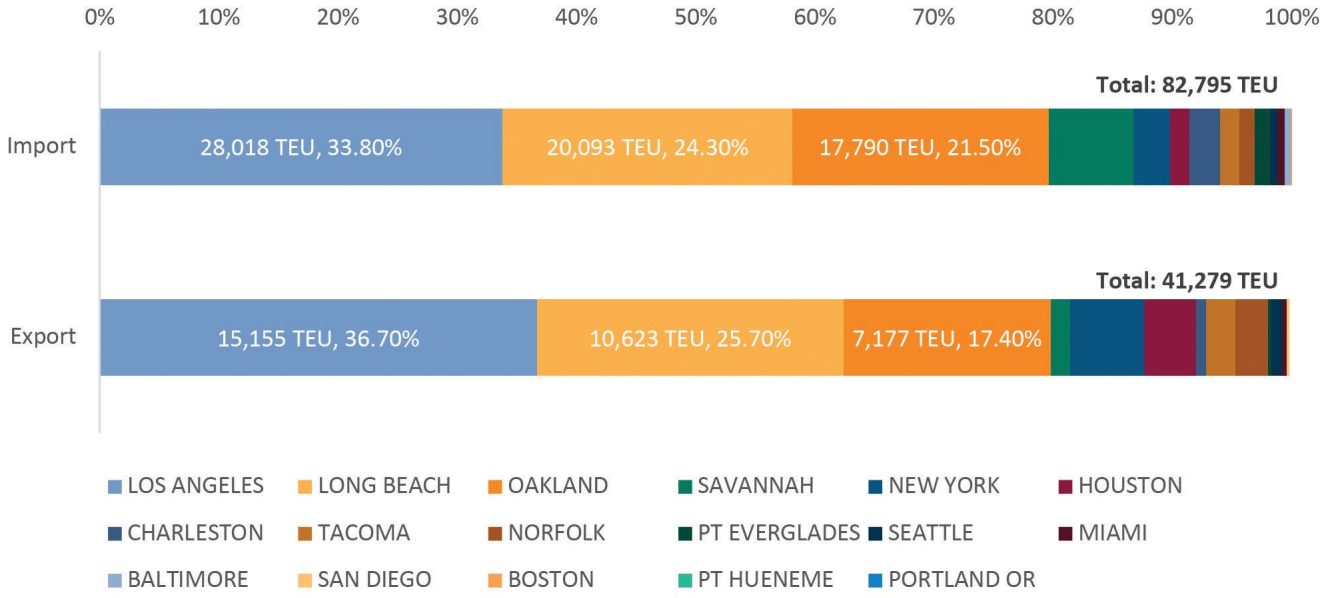
This next section uses the Port Import/Export Reporting Service (PIERS) 2018 bill of lading data for all waterborne cargo vessels to provide containerized movements from US ports of entry inland to the State of Utah. The team used true origins/destinations from the bill of lading, where available[60] and the shipper/consignee address information.[61] This resulted in 73% of overall volume with defined domestic inland origin/destination information. Remaining volumes are allocated to domestic inland origin/destination based on observed share.

### The Ports of Los Angeles and Long Beach represent over half of all containerized imports and exports into Utah, followed by the Port of Oakland.

Figure 3-4 provides Utah containerized volumes by US port of import and export based on PIERS 2018 data.

[59] Salt Lake City International Airport - Airport Redevelopment Program: Economic Impact Analysis 2018 https://www.slcairport.com/assets/pdfDocuments/The-New-SLC/Airport-EIA-Final-Report.pdf
[60] 14% of US volumes list true origins and destinations from the bill of lading.
[61] 71% of US volumes list shipper/consignee address information.

**FIGURE 3-4: UTAH VOLUMES BY US PORT OF IMPORT AND EXPORT (FULL TEUS, 2018)**




Source: PIERS Data, 2018

Most containers are imported to or exported from Salt Lake City. Ogden is the most balanced city by imports and exports. Lindon, West Jordan, Provo, and Springville's containerized movements are made up of nearly all imports, while containers originating in Ephraim are nearly all exports.

Northeast Asia dominates containerized volume for Utah imports and exports, followed by Southeast Asia and North Europe.

**FIGURE 3-5: UTAH CONTAINERIZED VOLUME BY TRADE LANE AND DIRECTION (FULL TEUS, 2018)**

| Trade Lane | Imports | Exports | Total |
|---|---|---|---|
| North East Asia | 66,256 | 25,936 | 92,192 |
| Southeast Asia | 5,320 | 4,743 | 10,063 |
| North Europe | 4,439 | 2,679 | 7,118 |
| Indian Sub-Continent | 1,725 | 1,827 | 3,552 |
| Mediterranean | 2,281 | 634 | 2,915 |
| Oceania | 200 | 1,434 | 1,634 |
| Central America | 1,190 | 437 | 1,627 |
| Unknown | 519 | 682 | 1,201 |
| Middle East | 21 | 1,093 | 1,114 |
| West Coast South America | 327 | 752 | 1,079 |
| East Coast South America | 303 | 424 | 727 |
| Caribbean | 136 | 324 | 460 |
| Africa | 75 | 228 | 303 |
| Other | - | 83 | 83 |
| North America | 2 | 4 | 6 |

Source: PIERS Data, 2018

Top containerized imports to Utah are outdoors and sporting equipment, while top exports include various agriculture raw goods (hay, alfalfa, etc). Top containerized commodities are provided below in Figure 3-6.

**FIGURE 3-6: TOP CONTAINERIZED COMMODITIES (2018)**

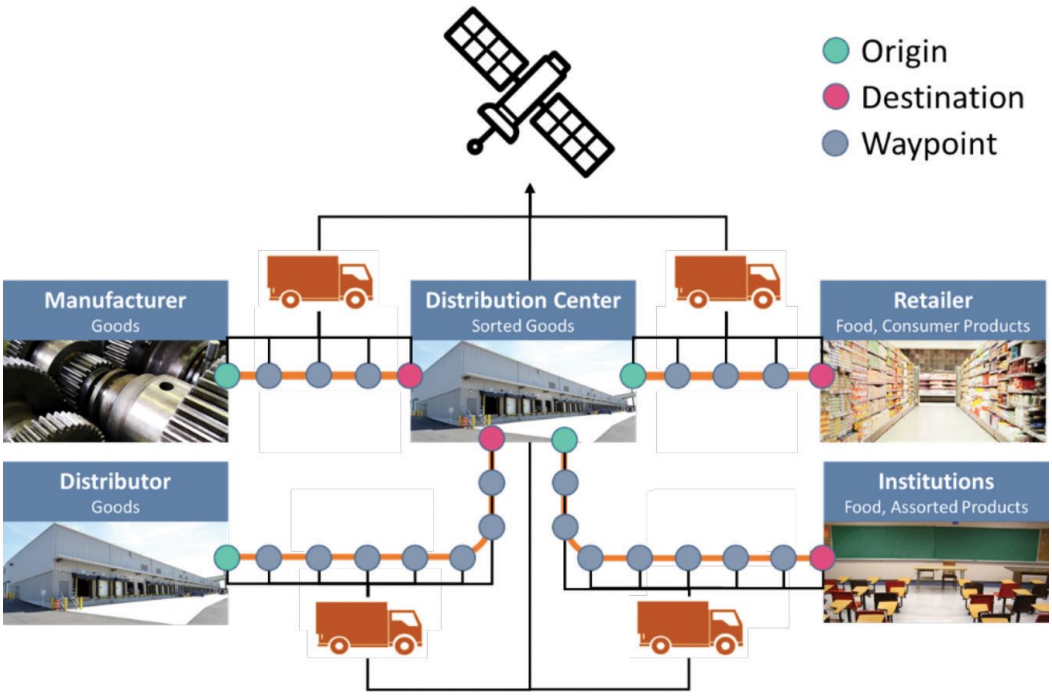
| Commodity | Import (TEUs) |
|---|---|
| **Imports** | |
| Gymnastics, athletics, other sports (including table tennis) or outdoor games equipment, nec in this chapter, swimming pools, and paddling pools | 8,109 |
| Furniture and parts thereof, not classified in chapter 94 | 4,753 |
| Unknown/TBD | 1,634 |
| Seats (other than those of heading 9402), whether or not convertible into beds and parts thereof | 1,626 |
| Other articles of plastics and articles of other materials of headings 3901 to 3914 | 1,408 |
| Other furniture and parts thereof | 1,334 |
| Unwrought aluminum | 1,049 |
| Seats (other than those of heading 9402), whether or not convertible into beds, and parts thereof | 1,020 |
| Parts and accessories of the motor vehicles of headings 8701 to 8705 | 984 |
| Various cases, bags, and containers | 812 |
| **Exports** | |
| Rutabagas (swedes), mangolds, fodder roots, hay, alfalfa (lucerne), clover, sainfoin, forage, kale, lupines, vetches and similar forage products, whether or not in the form of pellets | 8,678 |
| Recovered (waste and scrap) paper and paperboard | 4,068 |
| Unknown/TBD | 2,092 |
| Meat of bovine animals, frozen | 1,875 |
| Instruments and appliances used in medical, surgical, dental or veterinary sciences, including scintigraphic apparatus, other electro-medical apparatus and sight-testing instruments ; parts and accessories thereof | 1,779 |
| Flour, meal, powder, flakes, granules and pellets of potatoes | 1,306 |
| Meat and edible offal, of the poultry of heading 0105, fresh, chilled or frozen | 1,154 |
| Birds' eggs, in shell, fresh, preserved or cooked | 1,110 |
| Meat of swine, fresh, chilled or frozen | 864 |
| Whey, whether or not concentrated or containing added sugar or other sweetening matter; products consisting of natural milk constituents, whether or not containing added sugar or other sweetening matter, not elsewhere specified or included | 692 |

## 3.2 Truck Movements

This next section uses truck GPS data to show preliminary truck movements analysis. Truck GPS observations track a vehicle's trajectory on the transportation network that can be analyzed and mapped as trip origins and destinations. This information allows the UIPA to understand where truck cargo ends up after leaving

a particular area, along with where truck cargo comes from. GPS data provides information about truck movements, offering insight into activities such as critical corridors, clusters of unknown stop events, and truck parking. This type of information is crucial to the development of policies and programs to promote the connectivity, efficiency, and competitiveness of the statewide logistics system. Understanding truck movements also helps the UIPA implement practices to improve traffic and congestion issues in the Wasatch Front.

**FIGURE 3-7: TRUCK GPS DATA CHARACTERIZATION**




According to this sample data, spread across four weeks in 2019, 58 percent trucks in the Wasatch Front are light and medium duty local delivery trucks or vans. 42 percent are heavy-duty, private trucks.

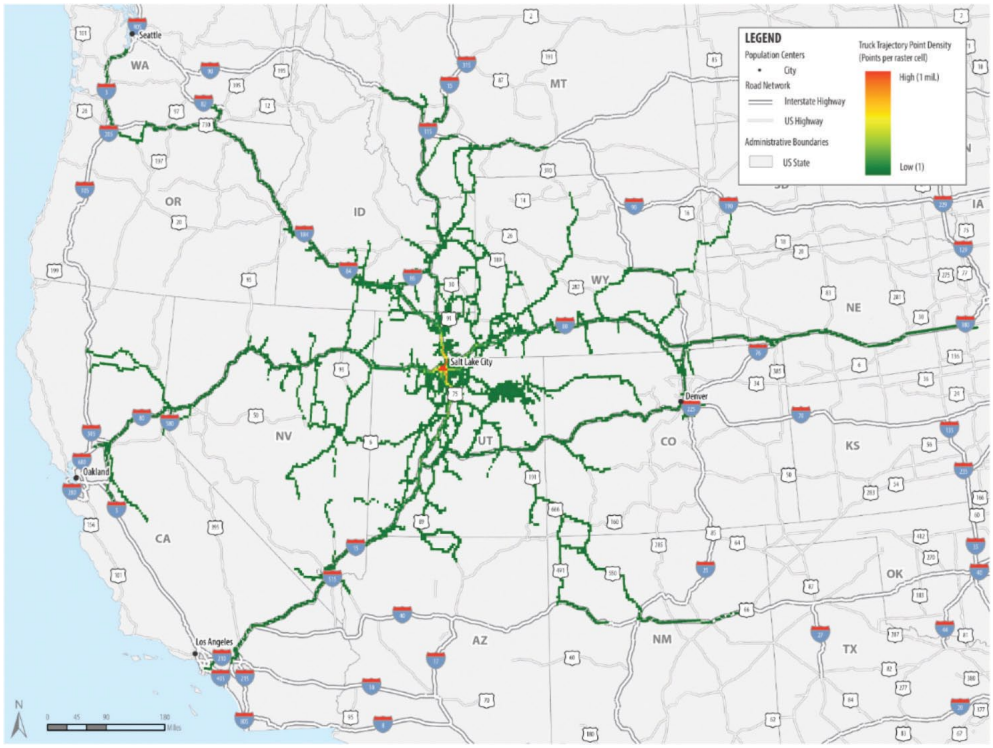
**FIGURE 3-8: TRUCK GPS SAMPLE DATA**

| | Light & Medium Duty Trucks | Heavy-Duty Trucks | Total Trucks |
|---|---|---|---|
| February | 32,631 | 30,341 | 62,972 |
| May | 33,946 | 31,470 | 65,416 |
| August | 37,343 | 29,088 | 66,431 |
| November | 37,906 | 11,349 | 49,255 |
| **Grand Total** | **141,826** | **102,248** | **244,074** |

Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019

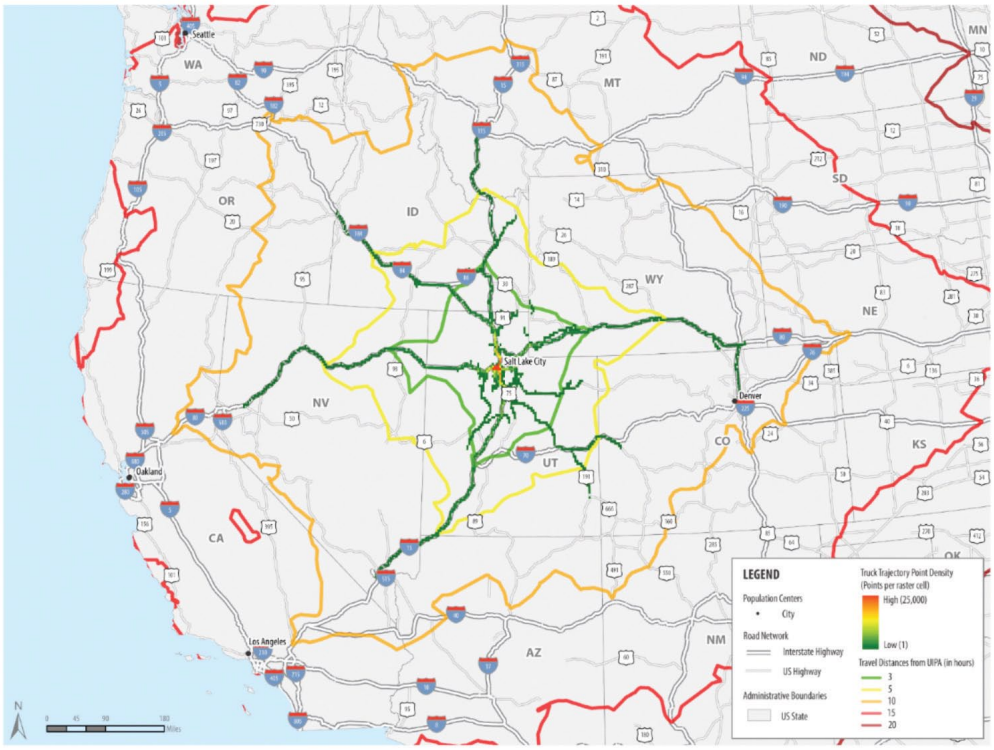
Figure 3-9 illustrates current truck movements coming from, to, and within the Wasatch Front during a typical 14-hour period, indicating connections to all West Coast seaports and with connections throughout the Intermountain West. As displayed, since a majority of trucks are field service or local delivery fleet, the greatest concentration of trucks lies within the Salt Lake City region.

## FIGURE 3-9: TRUCK MOVEMENTS TO, FROM, OR WITHIN THE WASATCH FRONT (14-HOUR TIMEFRAME)




Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019

## FIGURE 3-10: TRUCK MOVEMENTS ORIGINATING IN UIPA JURISDICTIONAL AREA




Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019



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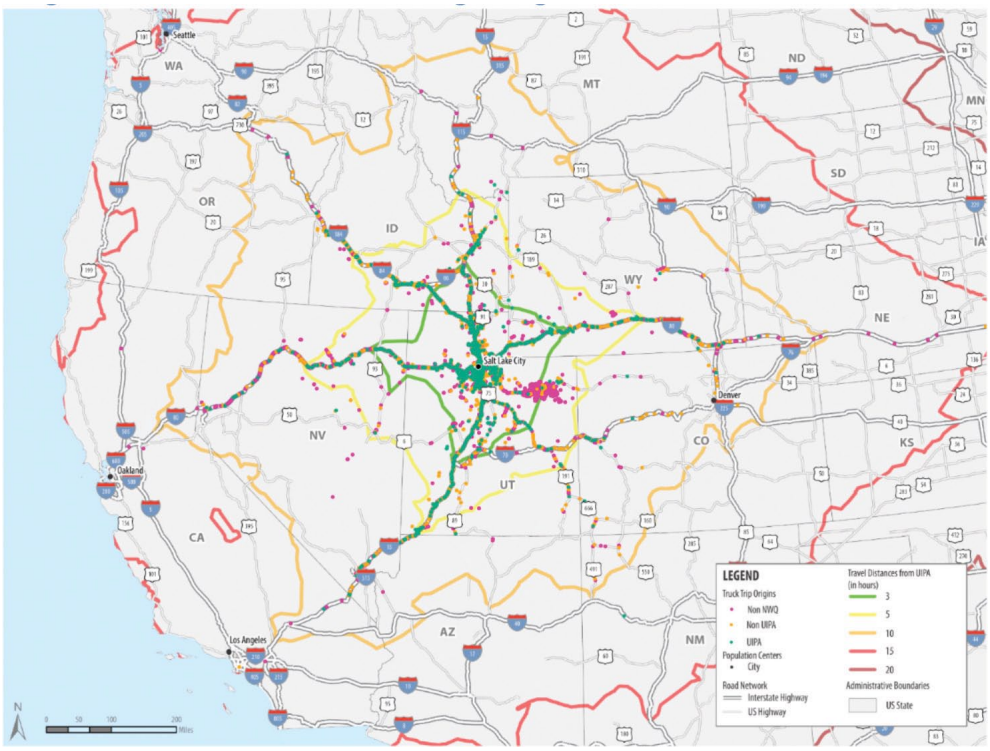
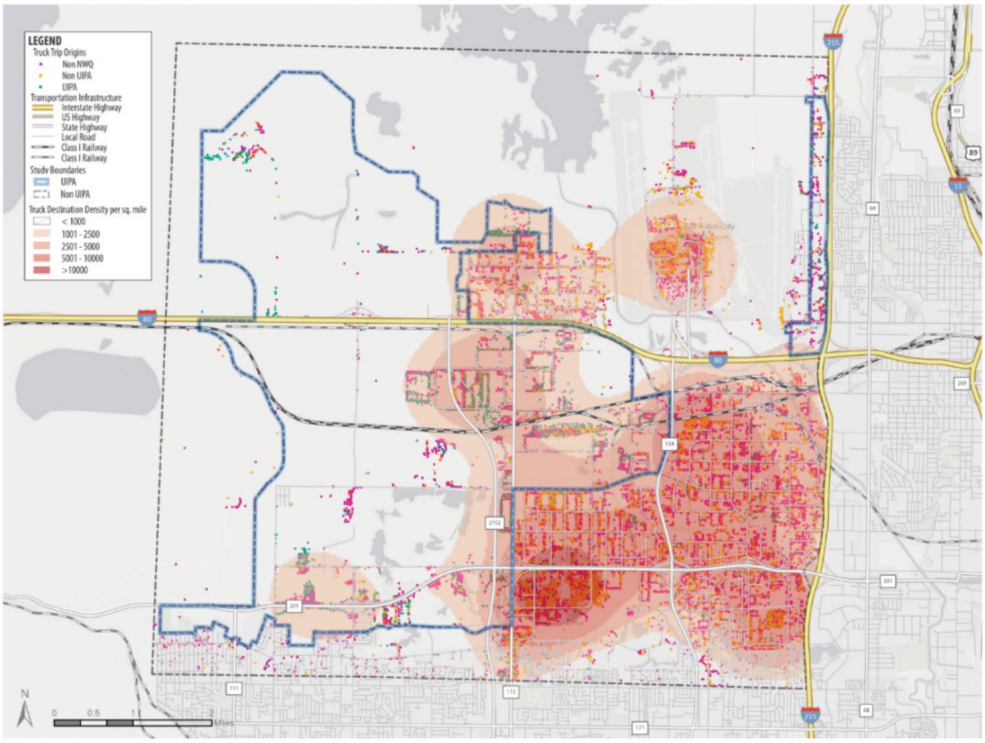
## FIGURE 3-11: DESTINATION OF TRUCKS ORIGINATING IN THE NORTHWEST QUADRANT - VIEW 1




Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019

Figure 3-12 below illustrates the current concentration of truck destinations in and near the Utah Inland Port area. As shown, much of existing warehouse and distribution activity currently occurs outside the area.

## FIGURE 3-12: DESTINATION OF TRUCKS ORIGINATING IN THE NORTHWEST QUADRANT – VIEW 2

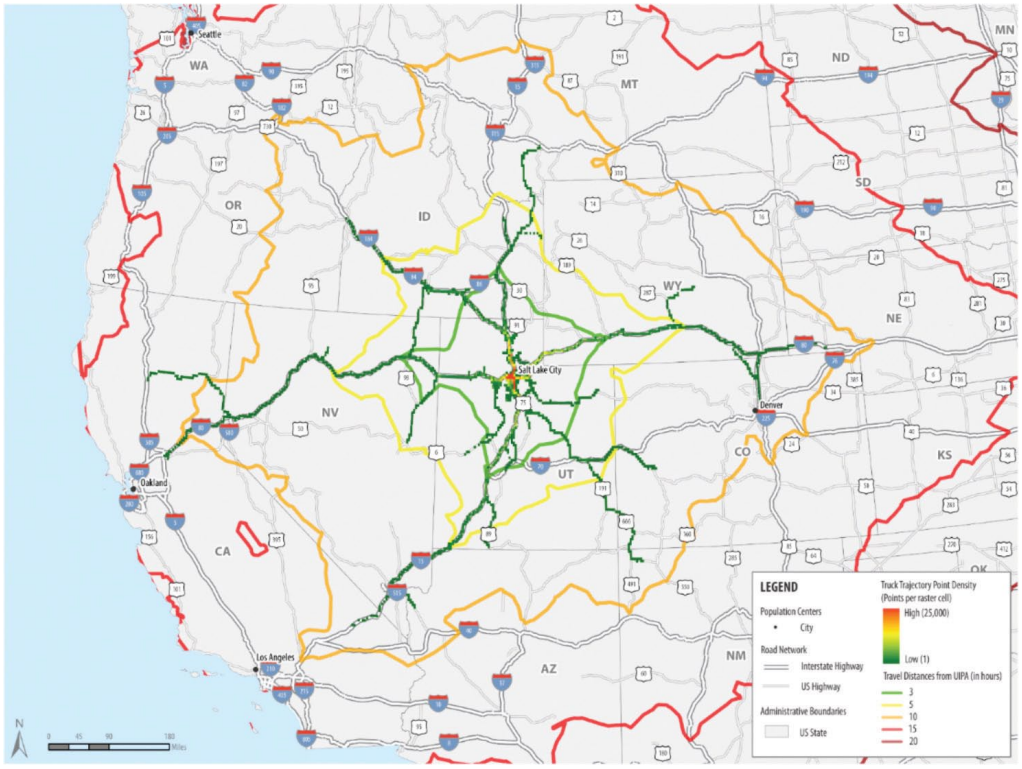



Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019



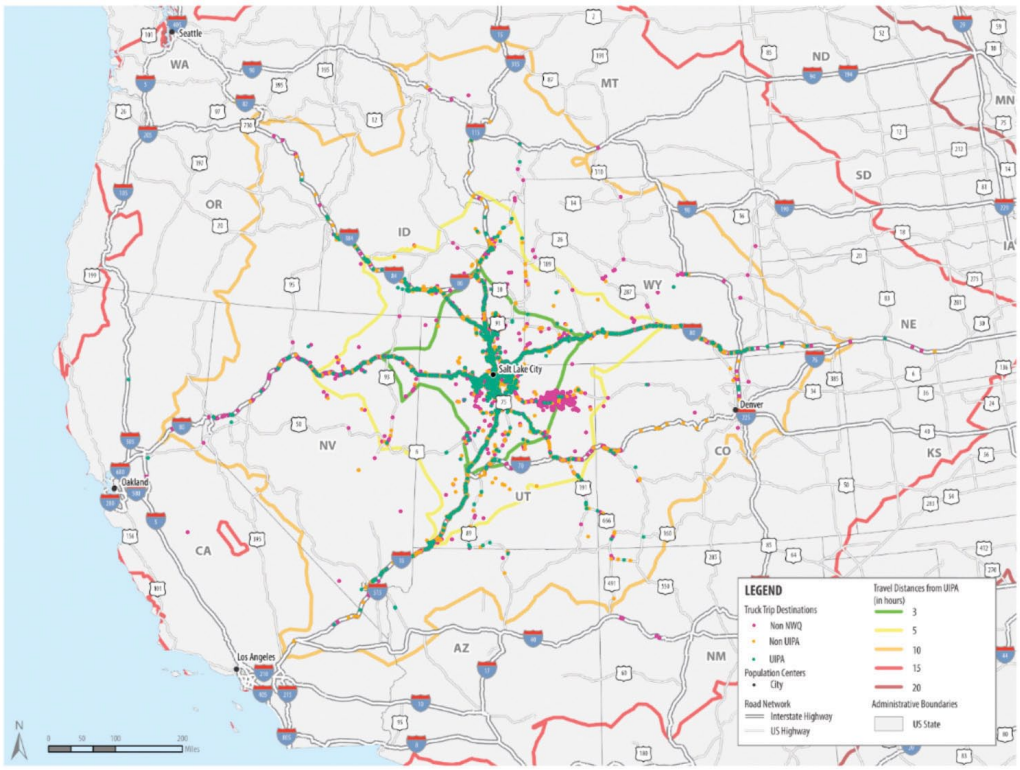
UTAH INLAND PORT AUTHORITY

## FIGURE 3-13: TRUCK MOVEMENTS DESTINED FOR UIPA JURISDICTIONAL AREA




Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019

## FIGURE 3-14: ORIGIN OF TRUCKS DESTINED FOR THE NORTHWEST QUADRANT – VIEW 1



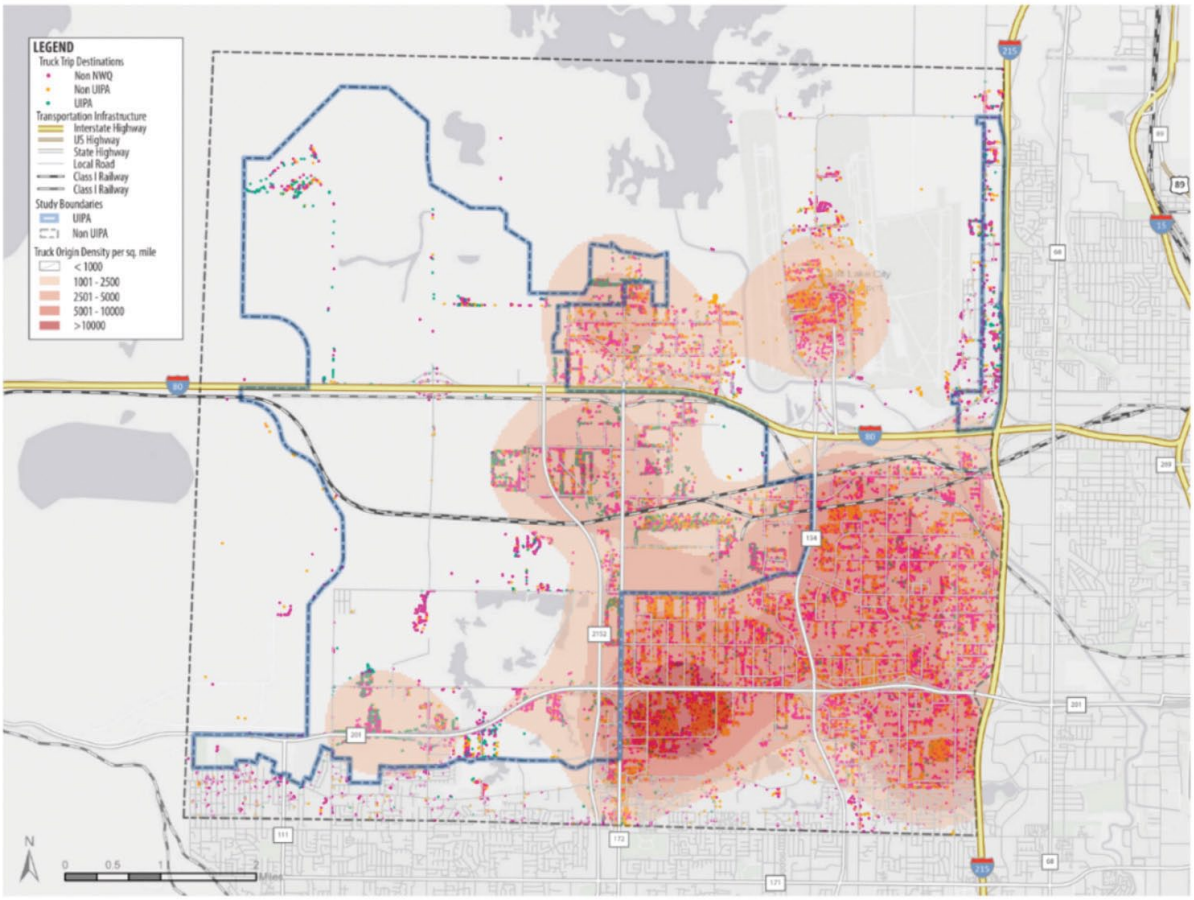

Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019



UTAH INLAND PORT AUTHORITY

Figure 3-15 below illustrates the current concentration of truck origins of trucks destined for locations in and near the Utah Inland Port area.

**FIGURE 3-15: ORIGIN OF TRUCKS DESTINED FOR THE NORTHWEST QUADRANT – VIEW 2**




Source: CPCS Analysis of INRIX Truck Waypoints Data, 2019

## 3.3 Commodity Flows

Commodity flow data provides information on commodities shipped, their value, weight, and mode of transportation, as well as the origin and destination of shipments. Commodity flows for the State of Utah are derived from the Freight Analysis Framework (FAF) version 4.5. FAF is a database maintained by the Federal Highway Administration and is largely based on data from the Census Bureau's Commodity Flow Survey. The FAF estimates flows of commodities between FAF regions for both a base year (2017) and a forecast year (2045). This is the same data source used by the Utah Department of Transportation's Freight Planning Section for the State Freight Plan.

In 2017, the State of Utah's logistics system handled a total of 108 million tons of goods terminating, originating, or passing through in the state, worth $209 billion (excluding pipeline). Top trading partners by value, excluding internal trade within the state, are California, Nevada, Texas, Colorado, and Idaho.

## The top goods Utah trades are parts and components used to manufacture electronics, machinery, medical equipment, and outdoor equipment, along with basic materials such as chemicals, metals, and minerals.[62]

Trucks carry the majority share of Utah's inbound and outbound freight by both tonnage (74%) and value (71%) in 2017. Figure 3-16 below provides total commodity flows in Utah for 2017 by transportation mode.

**FIGURE 3-16: UTAH TOTAL COMMODITY FLOWS BY MODE – BY WEIGHT, 2017**

| | Inbound | | Outbound | | Within | | Total | |
|---|---|---|---|---|---|---|---|---|
| Mode | kTons | % | kTons | % | kTons | % | kTons | % |
| Air (include truck-air) | 69 | 0.3% | 364 | 0.6% | 0 | 0% | 433 | 0.4% |
| Multiple modes & mail | 1,759 | 7.0% | 3,765 | 6.7% | 49.8 | 0.1% | 5,574 | 5.2% |
| Other and unknown | 5.8 | 0.0% | 7.3 | 0.0% | 3,429 | 6.5% | 3,442 | 3.2% |
| Rail | 6,264 | 25.0% | 8,047 | 14.2% | 4,279 | 8.1% | 18,590 | 17.3% |
| Truck | 16,945 | 67.7% | 17,250 | 30.5% | 45,321 | 85.4% | 79,516 | 73.9% |
| Total | 25,043 | 100% | 56,560 | 100% | 53,079 | 100% | 174,950 | 100% |

Source: FHWA FAF 4.5 (2017), excludes pipeline

**FIGURE 3-17: UTAH TOTAL COMMODITY FLOWS BY MODE – BY VALUE, 2017**

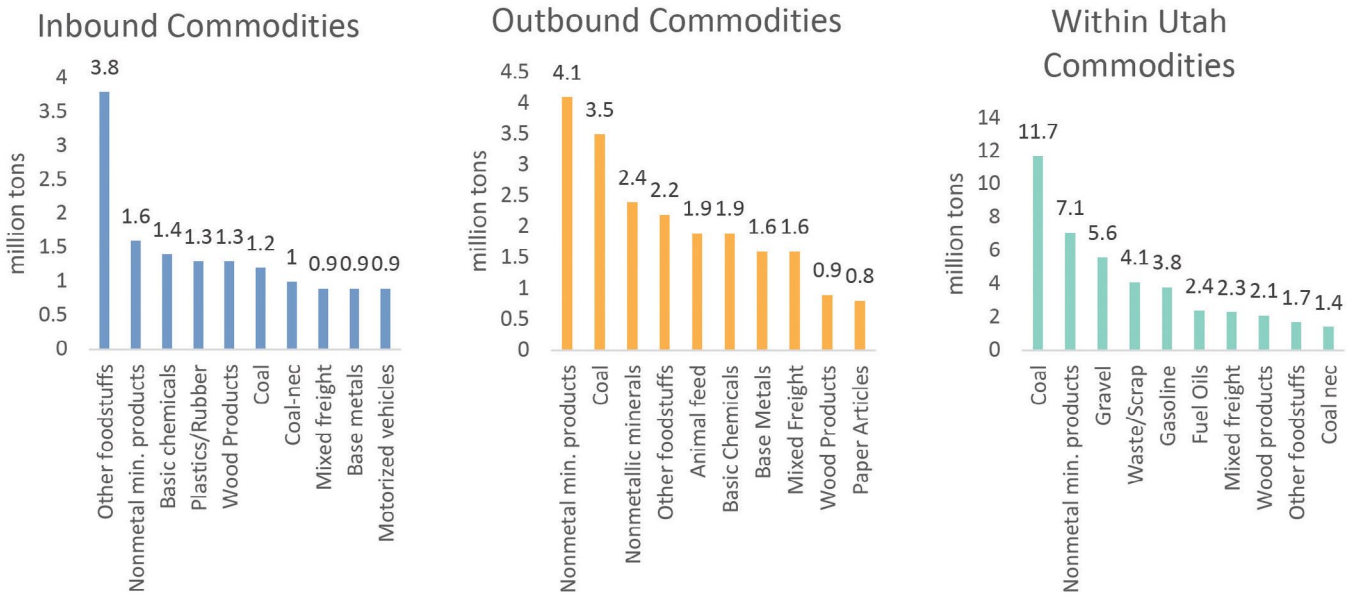
| | Inbound | | Outbound | | Within | | Total | |
|---|---|---|---|---|---|---|---|---|
| Mode | $Millions | % | $Millions | % | $Millions | % | $Millions | % |
| Air (include truck-air) | 7,139 | 7.9% | 7,755 | 10.6% | 0 | 0.0% | 14,894 | 7.1% |
| Multiple modes & mail | 14,497 | 16.1% | 18,791 | 25.6% | 3,277 | 7.2% | 36,565 | 17.5% |
| Other and unknown | 568 | 0.6% | 26 | 0.0% | 676 | 1.5% | 1,270 | 0.6% |
| Rail | 4,275 | 4.7% | 2,910 | 4.0% | 1,200 | 2.6% | 8,385 | 4.0% |
| Truck | 63,610 | 70.6% | 43,833 | 59.8% | 40,508 | 88.7% | 147,951 | 70.8% |
| Total | 90,089 | 100.0% | 73,314 | 100.0% | 45,662 | 100.0% | 209,065 | 100.0% |

Source: FHWA FAF 4.5 (2017), excludes pipeline

Utah's top commodities by weight include coal, non-metal mineral products, gravel, other foodstuffs, waste/scrap, animal feed, and basic chemicals. Figure 3-18 provides the top ten inbound, outbound, and in-state commodities for Utah by weight in 2017. Figure 3-19 provides the top ten inbound, outbound, and in-state commodities for Utah by value in 2017.

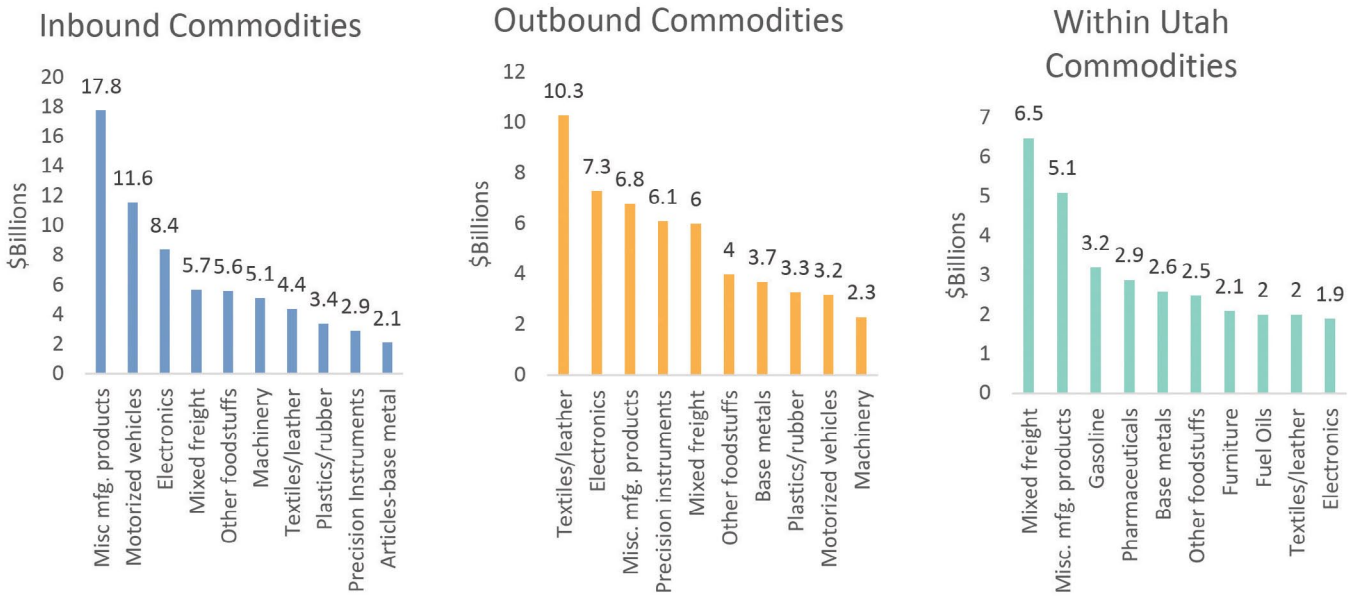
[62] US Federal Highway Administration Freight Analysis Framework Version 4. Parts and components of electronics, machinery, medical equipment, and outdoor equipment by value. Basic chemicals, metals, and minerals by weight.

**FIGURE 3-18: TOP COMMODITIES IN TONNAGE (EXCLUDING PIPELINE), 2017**




Source: FHWA FAF 4.5 (2017)

**FIGURE 3-19: TOP COMMODITIES IN VALUE (EXCLUDING PIPELINE), 2017**




Source: FHWA FAF 4.5 (2017)

Commodity flows by mode of transport with different inbound and outbound characteristics are reviewed in the following sections.

## Trucking

California is Utah's most important trading partner by truck overall. The top commodities by truck include coal and non-metal mineral products (by weight) and misc. manufacturing, textiles/leather, and mixed freight (by value).

**Outbound Freight** – Approximately 17.2 million tons (worth 43.8 billion USD) of freight were shipped by truck from Utah to all the states in the country (excluding Utah internal trade). Total truck freight volume from Utah to its top 10 destinations accounts for 86% of the total outbound truck freight. Outbound truck freight is primarily shipped to Idaho (21%), California (16%), Nevada (12%), and Colorado (9%). Several other states represent smaller percentages of value. In terms of value, 72% of the freight was shipped by truck to the top 10 destinations, primarily to California (16%), Colorado (12%), Idaho (9%), and Nevada (9%).

**Inbound Freight** – In 2017, Utah received approximately 16.9 million tons (worth 63.6 billion USD) of freight transported by truck. 59% of inbound truck freight tonnage originates in California, followed by Colorado (11%), Idaho (10%) and Nevada (8%). Top 10 origin states account for nearly 80% of the total inbound truck tonnage. By freight value, 70% of the inbound truck freight came from the top 10 origin states, where 27% came from California, followed by 10% from Nevada, and 9% from Colorado.

## Railroads

California is the top destination of freight leaving Utah by rail. Colorado is the origin of the most freight-rail tonnage coming into Utah by weight, and Texas by value. The top commodities by value coming from Texas include electronics and motorized vehicles.

Base metals represent nearly 60% of the total value of outbound commodities and 23% of inbound commodities by rail. Other top commodities include non-metal mineral products, coal, and gravel.

**Outbound Freight** – Approximately 8 million tons of freight (worth 2.9 billion USD) was shipped out from Utah by rail in 2017. California is the top destination of the rail freight mainly due to the large market size, industry connections, international trade gateways, and relative proximity to Utah. The outbound tonnage to California alone accounts for 50% of the total outbound rail freight volume. Nevada is the second destination in line, accounting for 11% of the outbound volume. Utah's outbound rail freight volume to its top 10 destinations constitutes 90% of the total outbound rail freight. In terms of freight value, the distribution is more balances among the top 10 destinations. For example, the share of freight value to California takes about 20% of the total outbound value, which is followed by Georgia (18%), Texas (15%) and Missouri (9%).

**Inbound Freight** – In 2017, Utah received approximately 6.3 million tons of freight (worth 4.3 billion USD) transported by rail, of which 80% were originated from the top 10 states. A quarter of the inbound rail freight tonnage originated in Colorado, followed by Texas (14%), and Louisiana (11%). In terms of freight value, 80% of the total outbound flows came from the top 10 origin states, for example, 19% from Texas, 18% from California and 14% from Louisiana.

### Aviation

California (outbound) and Alaska (inbound) are the top partners by value. Top commodities by value include electronics, misc manufacturing, precision instruments, and metallic ores. Massachusetts is the top air cargo destination for Utah products by weight. By air, specialized animal feed represents 83% of outbound weight while specialized chemicals make up nearly 60% of inbound weight.

**Outbound Freight** – In 2017, Utah shipped out about 364 thousand tons of air cargo (worth 7.8 billion USD) to the rest of the country. Enplaned cargo is primarily shipped to Massachusetts (53%), Delaware (28%) and California (8%). Total volume shipped to the top 10 destination states accounts for 95% of the total enplaned cargo tonnage, where the top three destination states alone account for 90%. Almost all of the outbound freight tonnage to Massachusetts and Delaware came from Animal Feed. By freight value, California is the top destination, taking almost 30% of the total value of the outbound freight, followed by New York (22%) and Tennessee (13%).

**Inbound Freight** – Total deplaned air cargo arriving in Utah was around 69 thousand tons (worth 7.1 billion USD) in 2017. In terms of weight, Massachusetts is the top origin state of the air cargo, accounting for nearly 60% of the total deplaned cargo tonnage. All most of the tonnage from Massachusetts was from Basic Chemicals. California is the second in place, accounting for 15% of the inbound tonnage. Utah's inbound rail freight volume from its top 10 origins constitutes 90% of the total outbound rail freight. All the other states represent insignificant shares. In terms of cargo value, 94% of the inbound freight value is from the top 10 origin states, of which 28% from Alaska, 13% from California and 13% from Nevada. Alaska takes about 30% of the total value of the deplaned air cargo to Utah. It mainly comes from the category of Miscellaneous Manufacturing Products.

## 3.4 Utah's International Trade

Internationally, Utah's top trading partners are China, Singapore, Taiwan, and Vietnam for electronics/computers, machinery, medical equipment, and outdoor equipment parts. Peru is also a top trading partner for gold imports into Utah. Figure 3-20 and Figure 3-21 below provide additional details on Utah's international trade.

**FIGURE 3-20: TOP INTERNATIONAL IMPORTS TO UTAH BY COUNTRY, 2019**

| 2019 | Countries | Utah Imports | Top Commodities |
|---|---|---|---|
| **Total** | All | $15 billion | Gold and Silver, Medical Equipment Parts, Aircraft, Electronics, Machinery, Furniture, and Other Manufactured Goods |
| **1** | China | $2.5 billion | Electronics/Computers, Machinery, and Physical Exercise Equipment Parts |
| **2** | Singapore | $683 million | Medical Equipment Parts, Electrical Equipment, and Machinery Parts |
| **3** | Taiwan | $488 million | Bicycles, Motorcycles, and Physical Exercise Equipment Parts |
| **4** | Peru | $468 million ($462 million in gold imports) | Gold, Plastic Parts |
| **5** | Vietnam | $337 million | Footwear, Furniture Parts, Handbags |

Source: US Census Bureau USA Trade Online, State Imports by HS Commodities

## FIGURE 3-21: TOP UTAH EXPORTS BY INTERNATIONAL REGION, 2019

| 2019 | Region | Utah Exports | Top Commodities |
|---|---|---|---|
| **Total** | All | $17 billion | Gold, Food Preparations, Electronic Parts, Medical Equipment, Aircraft, Automobile Parts, Essential Oils, Beauty Products, Stone, Coal, and Ores |
| **1** | Europe | $11.0 billion ($8.9 billion in gold exports) | Gold, Aircraft, Medical Equipment, and Ores |
| **2** | Asia | $3.5 billion | Electronic Parts, Food Preparations, and Medical Equipment |
| **3** | North America | $2.1 billion | Automobile Parts, Aircraft, and Food Preparations |
| **4** | Central and South America | $349 million | Medical Equipment, Aircraft, and Food Preparations |
| **5** | Africa | $80 million | Food Preparations, Electrical Equipment, and Machinery Parts |

Source: US Census Bureau USA Trade Online, State Exports by HS Commodities. Note: Receiving countries are unavailable in this dataset as US Customs and Border Protection does not track the final destination of US exports

# 3.5 Future Forecasting

## The US Department of Transportation forecasts that cargo movements in Utah will double in value (+$219 billion) from 2017 to 2045, outpacing the rate of expected population growth and the movement of personal vehicles.

Figure 3-22 illustrates the forecasted changes in weight and value by inbound and outbound freight from 2017 to 2045.[63]

**FIGURE 3-22: STATE OF UTAH FREIGHT FORECAST (2045), EXCLUDING PIPELINE**

| From 2017 to 2045: | By Weight | By Value |
|---|---|---|
| Inbound | **61% Growth** (+15 Million Tons) | **71% Growth** (+$64 billion) |
| Outbound | **51% Growth** (+15 Million Tons) | **134% Growth** (+$98 billion) |
| Within Utah | **28% Growth** (+15 Million Tons) | **124% Growth** (+$57 billion) |

Source: FHWA FAF 4.5 (2017)

Top trading partners look similar in 2045 as compared to 2017, with some notable differences. These are indicated in Figure 3-23 below.

**FIGURE 3-23: STATE OF UTAH TRADING PARTNERS FORECAST (2045)**

| From 2017 to 2045: | By Weight | By Value |
|---|---|---|
| Inbound | • Wyoming, California, Colorado, and Idaho continue to be top trading partners.<br>• Oklahoma is expected to decline in by 67%, falling from #10 to #27.<br>• All other top trading partners are expected to increase in trade weight. | • California continues to be the top trading partner.<br>• Wyoming and Texas will replace Nevada and Colorado as #2 and #3 respectively.<br>Arizona and Kentucky are also expected to incur outpaced growth with 182% and 215% growth respectively. |
| Outbound | • Nevada continues to be the top trading partner.<br>• California, Wyoming, and Idaho continue to be other top trading partners. California is expected to increase only modestly by 16%, falling from #2 to #4.<br>• Arizona is expected to increase by 121%, jumping from #9 to #8. | • California, Nevada, and Texas continue to be top trading partners. Colorado forecast to fall from #3 to #6, and New York jumps from #6 to #4.<br>• Alaska projected to jump from #37 to #10 due to electronics, precision instruments, and misc. manufacturing. |

Source: FHWA FAF 4.5 (2017)

[63] Freight Analysis Framework v4, 2017 to 2045 figures. Inbound freight tonnage is expected to grow by 55% from 118 million tons to 184 million tons per year, and the outbound freight volume will grow by 62% from 127 million tons to 204 million tons per year. Measured by value, the State of Utah is expected to handle $282 billion in inbound freight, 86% higher than that of 2017, and $303 billion in outbound freight, 125% higher than 2017.

By modal share, trucking and rail are expected to decline modestly while air cargo share increases. Figure 3-24 summarizes the top commodities forecasted in 2045 by inbound, outbound, and within Utah flows.

**FIGURE 3-24: STATE OF UTAH TOP COMMODITIES FORECAST (2045)**

| From 2017 to 2045: | By Weight | By Value |
|---|---|---|
| Inbound | Other foodstuffs, coal, basic chemicals, plastics/rubber, and gasoline make up 40% of inbound goods. | Miscellaneous Manufacturing, Electronics, Motorized Vehicles, Machinery, and Mixed freight make up 60% of inbound goods. |
| Outbound | Non-metal mineral products, non-metallic minerals, animal food, other foodstuffs, and mixed freight make up half of outbound goods. | Precision Instruments, Electronics, Miscellaneous Manufacturing, and Mixed Freight will be the top commodities, making up half of outbound goods. |
| Within Utah | Coal and Non-metal mineral products will be the top commodities (32%). | Miscellaneous Manufacturing continues to be the top commodity (37%), followed by Mixed Freight (12%). |

Source: FHWA FAF 4.5 (2017)

## 3.6 Conclusion

Salt Lake City is a regional logistics hub for the Intermountain West, with major interstate and state highways, rail lines, international airport, and direct connections to West Coast ports. In line with projected population and economic growth, the State of Utah is projected to continue its growth in freight movements over the next 25 years. Understanding Utah's current and forecasted logistics and trade helped the UIPA develop plans and policies for a robust, organized, and agile logistics system. Ultimately, UIPA seeks to plan for different contingencies to ensure the state's future economic competitiveness. Forward planning in logistics will position Utah as the optimal manufacturing and distribution location for businesses to invest in across the Western United States – from the Crossroads of the West, to the Crossroads of the World.

# 4 Environmental Sustainability

This Chapter of the Technical Appendix provides an overview of environmental resources that may be present within the Utah Inland Port Authority (UIPA) jurisdictional boundary area. To capture resources that could be affected by future projects within the UIPA jurisdictional boundary, the study area for this analysis includes a ½ mile buffer around the jurisdictional boundary; this buffer area is referred to as the ½ mile analysis zone. This report is not a detailed environmental investigation. Instead, it provides a planning-level overview of resources that could be affected by future projects in the UIPA jurisdictional boundary. Any development projects that may be proposed within the UIPA jurisdictional boundary will undergo environmental reviews as required under applicable federal, state, and local regulations. Because no projects are being proposed under this strategic planning effort, this environmental review is informational only and is not intended to constitute compliance with any regulatory requirements.

Data was reviewed from studies, reports, and information publicly posted on online databases and websites. No fieldwork was performed. This summary is not intended to provide a comprehensive list of every environmental resource present and is limited by readily available information, which may be out of date. This report instead provides a general description of environmental resources for the purpose of guiding the formation of sustainable best practices for the UIPA Strategic Business Plan.

## 4.1 Environment Context

Land within the UIPA jurisdictional area has historically been used for agricultural purposes, including farming, grazing, hunting, fishing, and wildlife and habitat preservation. Over time, these uses have transitioned to a number of industrial, manufacturing, warehouse uses, in addition to mining and landfill operations. Significant development is present east of the UIPA jurisdictional area at the Salt Lake City International Airport and associated facilities.

Prized natural resources abound within and surrounding the UIPA jurisdictional area. Most of the land west, north, and northeast of the UIPA jurisdictional area is dedicated to the management of wildlife. The most notable resource is Great Salt Lake – the largest saltwater lake in the Western Hemisphere and one of the few terminal lakes in the world. It is situated north and west of the jurisdictional area and is considered one of North America's most important interior uplands and wetlands for birds. The uplands and wetlands are a rich and unique ecosystem that supports a wide range of plant and aquatic life and provides important habitat for resident and migratory birds, including federally and state-listed sensitive species.[64]

[64] Utah Department of Environmental Quality, Division of Water Quality, Great Salt Lake, April 2019, https://deq.utah.gov/waterquality/great-salt-lake

The area surrounding the UIPA jurisdictional area includes many notable natural resource areas, including:

- **The Inland Sea Shorebird Reserve** – nearly 3,700 acres of shorebird and waterfowl reserve area west of the UIPA jurisdictional area. The Inland Sea Shorebird Reserve is part of a larger ecological unit, Gilbert Bay, which was accepted in 2004 as a BirdLife International and National Audubon Important Bird Area, recognizing the area for its outstanding value to bird conservation.[65]

- **South Shore Preserve** – over 3,000 acres of wetlands and uplands containing bird habitat north of the UIPA jurisdictional area. The Audubon Society currently manages the Lee Creek Area and Gillmor Sanctuary as part of the South Shore Preserve.[66]

- **Salt Lake City Airport Wetland Mitigation Site**[67] – 435 acres of wetlands northeast of the UIPA jurisdictional area.

- **Duck Clubs**[4] – numerous duck clubs are located north of the UIPA jurisdictional area. Although primarily used for hunting, these areas also serve as wildlife preserves. The duck clubs form a contiguous band approximately 15,000 acres along the shoreline of Farmington Bay.

- **Bailey's Lake** – north of the UIPA jurisdictional area, this former channel of the Jordan River is more than 3 miles long and up to a half-mile wide. The lake and associated wetland system have been identified as a regionally significant scenic and wildlife resource.[2]

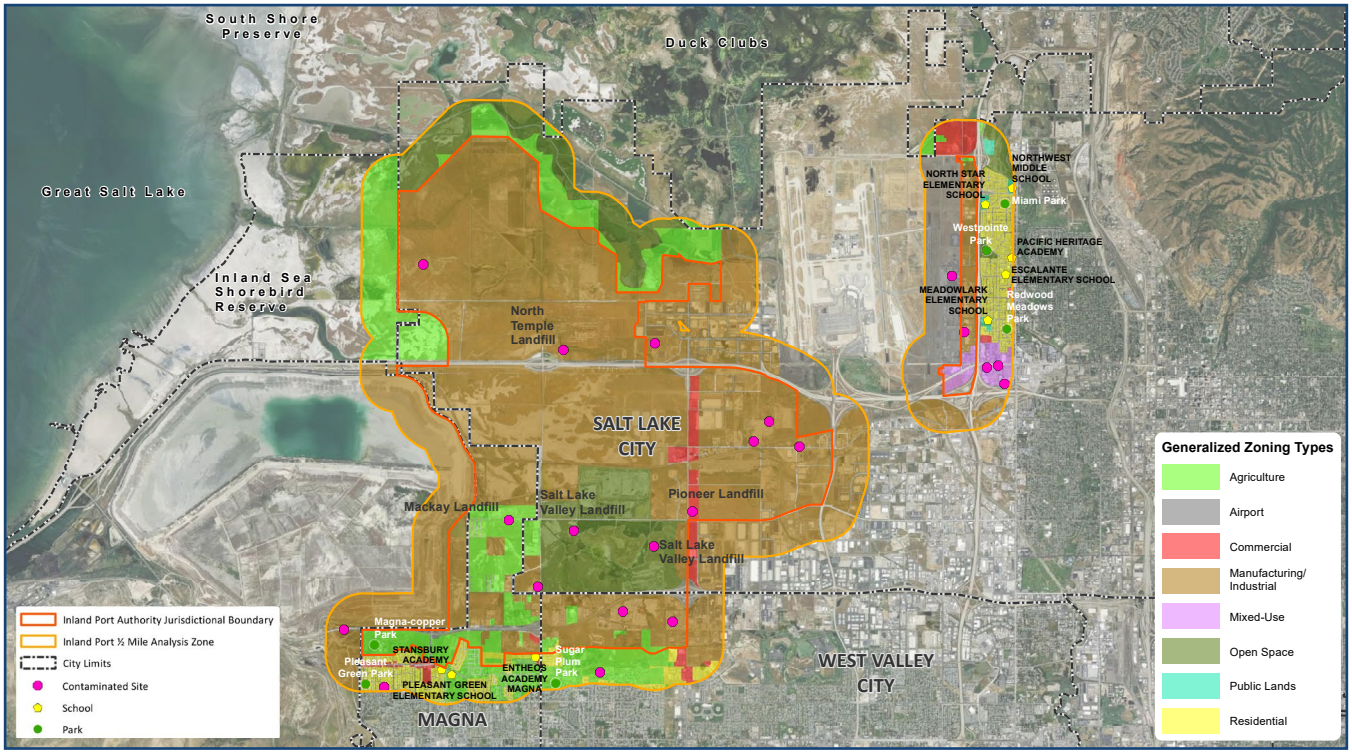
Because UIPA has no land use authority in its jurisdictional area, coordination with all public agency and private sector partners is needed to implement sustainable practices. UIPA will work with partners to implement sustainable practices to protect land and community resources, to address noise, visual, and vibration, logistics safety campaigns, and other practices to promote the community's look and feel. In addition, UIPA strives to implement sustainable practices to protect resources that are valued by the community, including wildlife, natural resources, and water resources (described in Sections 4.2, 4.3, and 4.4).

[65] Salt Lake City, Northwest Quadrant Plan, 2016
[66] Edward L. & Charles F. Gillmor Audubon Sanctuary https://rockies.audubon.org/gillmor
[67] Utah State Correctional Facility Site Assessment Report

# 4.2 Natural Resources

The UIPA jurisdictional area in the Northwest Quadrant of Salt Lake City is predominantly privately-held – UIPA has no statutory land use authority in this area. However, UIPA has undertaken a planning-level overview of environmental resources that could be affected by private development occurring within the area. UIPA will work with local agencies, developers, and stakeholders, to coordinate protection of land and community resources.

**FIGURE 4-1: LAND USE AND COMMUNITY RESOURCES**




Land to the West of Salt Lake City and outside of the UIPA area is in the jurisdiction of Magna Township.

Source: Existing Zoning and Neighborhoods from Salt Lake City, West Valley City, Salt Lake County, and Envision Utah GIS Files (2019); Schools and Parks from Utah AGRC; and Contaminated Sites (CERCLA) from Utah Department of Environmental Quality and Salt Lake City Northwest Quadrant Master Plan 2016.

Figure 4-2 summarizes land use and community resources within or adjacent to the UIPA jurisdiction area, including zoning, parks, schools, and neighborhoods, and contaminated sites, is provided below in Figure 4 2



UTAH INLAND PORT AUTHORITY

## FIGURE 4-2: LAND USE AND COMMUNITY RESOURCE SUMMARY

| RESOURCE | DESCRIPTION |
|---|---|
| **Existing Zoning** | Zoning information from Salt Lake City, Salt Lake County, and West Valley City is shown in Figure 4 1 above. For clarity and simplicity, zoning designations were consolidated into larger groups representing the following zoning types: agriculture, airport, commercial, manufacturing/industrial, mixed-use, open space and public lands, and residential. The approximate acreage of each generalized zoning type within the UIPA jurisdictional area is:<br>▪ Manufacturing/Industrial – 12,200 acres<br>▪ Open Space/Public Lands – 1,700 acres<br>▪ Agriculture – 1,100 acres<br>▪ Commercial – 200 acres<br>▪ Mixed Use – 80 acres<br>▪ Residential – 40 acres<br>▪ Airport – <1 acre |
| **Parks** | There are no public parks or recreation areas within the UIPA jurisdictional area. However, a number of parks are located within a half-mile of its boundary.<br><br>The following parks are located within the ½ mile analysis zone: Magna Copper Park, Magna Community Center, Sugar Plum Park, Miami Park, Westpointe Park, and Redwood Meadows Park. |
| **Community Resources–Schools** | There are no schools within the UIPA jurisdictional area. However, a number of schools are located within a half-mile of its boundary.<br><br>The following schools are located within the ½ mile analysis zone: North Star Elementary School, Northwest Middle School, Pacific Heritage Academy, Escalante Elementary School, Meadowlark Elementary School, Entheos Academy Magna, Pleasant Green Elementary School, and Stansbury Academy. |
| **Community Resources–Neighborhoods** | As indicated above, residentially zoned area makes up a small proportion of the area within the UIPA jurisdictional area (less than 40 out of more than 15,000 acres). However, residentially-zoned land is more common within a half-mile of its boundary, primarily located along the southern and eastern boundaries.<br><br>The ½ mile analysis zone outside the jurisdictional area includes approximately 1,000 acres of residentially zoned areas. These include the Salt Lake City neighborhoods of Westpointe, Rose Park, and Jordan Meadows east of I-215. Residential neighborhoods in unincorporated Salt Lake County (Magna) and West Valley City are present in the ½ mile analysis zone south of the UIPA jurisdictional area. |
| **Contaminated Sites** | A number of known or potentially contaminated sites are present within the UIPA jurisdictional area, including but not limited to brownfield sites and sites regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Currently and formerly operational landfill sites present in the UIPA jurisdictional area include the North Temple Landfill, Cannon Pioneer Landfill, Salt Lake Valley Landfill, and Mountain View Landfill. |

## Select Guiding Practices

Although UIPA has no land use authority in its jurisdictional area, the UIPA will work with local and state agencies, as well as NGOs and private partners, to support best practice noise, visual, and vibration strategies, logistics safety campaigns, and look and feel of the community. Additionally, while UIPA is reliant on municipalities to drive land use decisions, UIPA will work with local government to coordinate the protection of community areas such as schools, residences, parks, hospitals, and other community facilities.

### Noise

#### Site Planning

Site planning and site layout measures promote noise-reduction to protect sensitive receivers (residences, schools, parks, etc.). In addition, noise from activities within the UIPA jurisdictional area may disturb wildlife. Guiding practices for site planning and layout considerations include:

- Locate site entrances for vehicles away from sensitive areas, such as residences and schools.
- Incorporate on-site truck parking at freight facilities to accommodate vehicles before site opening hours (to direct truck parking away from residential areas and environmentally-sensitive areas).
- Designate truck routes to promote noise-reduction, with clear communication to drivers the requirements for arrival times, vehicle movements, and/or idling reduction.
- During site planning, locate operational activities that are noise intensive away from sensitive sites. If noise intensive activities need to be located close to noise-sensitive areas, restricting the hours of operation should be considered.
- Consider the siting and use of acoustic sheds that can contain the noise generating activity.
- If rail operations are part of site development, consider the designation of rail quiet zones at highway-rail grade crossings.

#### Noise Barriers

Incorporation of noise barriers may also protect sensitive receivers. Noise barriers are obstacles placed between a noise source and a receiver which interrupts the path of the noise. This may include berms, walls and fences made of various materials (e.g. concrete, wood, metal, plastic, stucco), vegetation (dense plantings of shrubs and trees), buildings, and buffer zones (e.g. undeveloped open space).

During construction activities, best practice strategies to protect sensitive receivers include: synchronizing timing of construction activities, use of modern construction equipment, use of power through electrical motors instead of diesel, alternative practices to traditional "beeper alarms" (e.g. smart alarms, broadband, quacker alarms), and scheduling of deliveries within certain allowed times. If driving piles is necessary, it is possible to use vibration or hydraulic insertion techniques. Drilled or augured holes for cast-in-place piles are another alternative that may produce noise levels significantly lower than the traditional driving method.

## Visual

Site planning techniques can improve visuals and aesthetic qualities to address community concerns and environmentally-sensitive areas. Some of the techniques include:

- Use of covered bulbs that face light downwards.
- Use of warm-colored LEDs and compact fluorescents (CFLs) bulbs.
- Avoidance of blue lights at night.
- Use of adaptive light controls (dimmers, motions sensors, timers, etc.) to manage light timing, intensity, and color.
- Lighting only the object or area intended – keeping lights close to the ground, directed and shielded to avoid light spill and using the lowest intensity lighting appropriate
- Use of non-reflective, dark-colored surfaces.

## Vibration

Techniques to protect sensitive receivers from vibration include:

- Incorporate the use of "wave barriers" (open trenches, in-filled trenches, or wave-impeding blocks) along one (or both) side(s) along a railway track to attenuate vibrations caused by trains.
- Ensure ongoing maintenance of railway tracks to minimize rail vibration.
- During construction: operation of earth-moving construction on the construction lot as far away from sensitive sites as possible; phase demolition, earth-moving, and ground operations so as not to occur in the same time period (unlike noise, the total vibration level produced could be substantially less when each vibration source operates separately); and avoidance of nighttime activities (sensitivity to vibration increases during the nighttime hours in residential neighborhoods).

## Land Use

**Land use considerations help protect community and environmental resources.** UIPA plans to partner with local governments to guide land use by separating freight facilities from schools and neighborhoods. While there are no schools and limited residential areas within the UIPA jurisdictional area, schools and residential areas are present near the area. Freight facilities and heavy industrial uses should be located away from such schools and neighborhoods, with appropriate buffers, to minimize disruptions. Techniques might include:

- Incorporate minimum buffers and setbacks between industrial sites and nearby sensitive land uses including environmentally-sensntive lands, along with minimum horizontal clearance between road and rail freight corridors and non-industrial land uses.
- Protect undeveloped land near freight facilities to prevent incompatible encroachment through zoning, easements, or purchase.

**CASE STUDY: SEPARATION OF INCOMPATIBLE LAND USES: using zoning codes to ensure freight facilities are located with appropriate access to infrastructure while avoid sensitive land uses**

In its Municipal Code, Layton City describes characteristics for each of the zones in the zoning code, including industrial and freight uses. It states, "The "M" (Manufacturing/Industrial) zoning districts are intended to provide areas for manufacturing and industrial uses, where they will have the necessary services and facilities, and minimize obtrusions by adjoining uses and districts. These districts shall be located near rail lines and shall be near interstate highway interchanges for ease of transportation of goods." In order to minimize conflict among incompatible uses, most non-industrial uses are not allowed in the "M" zoning districts.

- A transition zone effectively serves as a buffer between incompatible uses. Transition zones contain commercial or other uses that are less sensitive to freight activity.
- Non-access easements prevent development in buffers.
- Channel development of warehouses and distribution centers to sites with freight rail access, as relevant.
- Utilize effective site planning methods that optimize lot orientation by placing garages, carports, and other uninhabited spaces between living spaces and incompatible uses
- Adopt a form-based code (FBC) that can be used to regulate the entire building envelope. This includes property line setback, upper-level step-back, and potential landscape requirements of buffer zones.

## Existing Contamination

Contaminated sites require remediation for future use. There are a number of known contaminated sites within the jurisdictional area, including brownfield sites and sites regulated under CERCLA (the Comprehensive Environmental Response, Compensation, and Liability Act). These sites would require remediation under the appropriate state and federal regulatory agency. Guiding practices for cleanup programs include encouraging community involvement in the cleanup process and supporting training related to cleanups. Additionally, the UIPA may consider guiding practices related to hazardous waste management and disposal:

- Work with local agencies to study current hazardous waste policies and the adequacy of existing emergency protocols.
- Support local agency regulations in robust hazardous waste management and disposal practices, such as potentially restricting quantities and certain classes.

## 4.3 Natural Resources

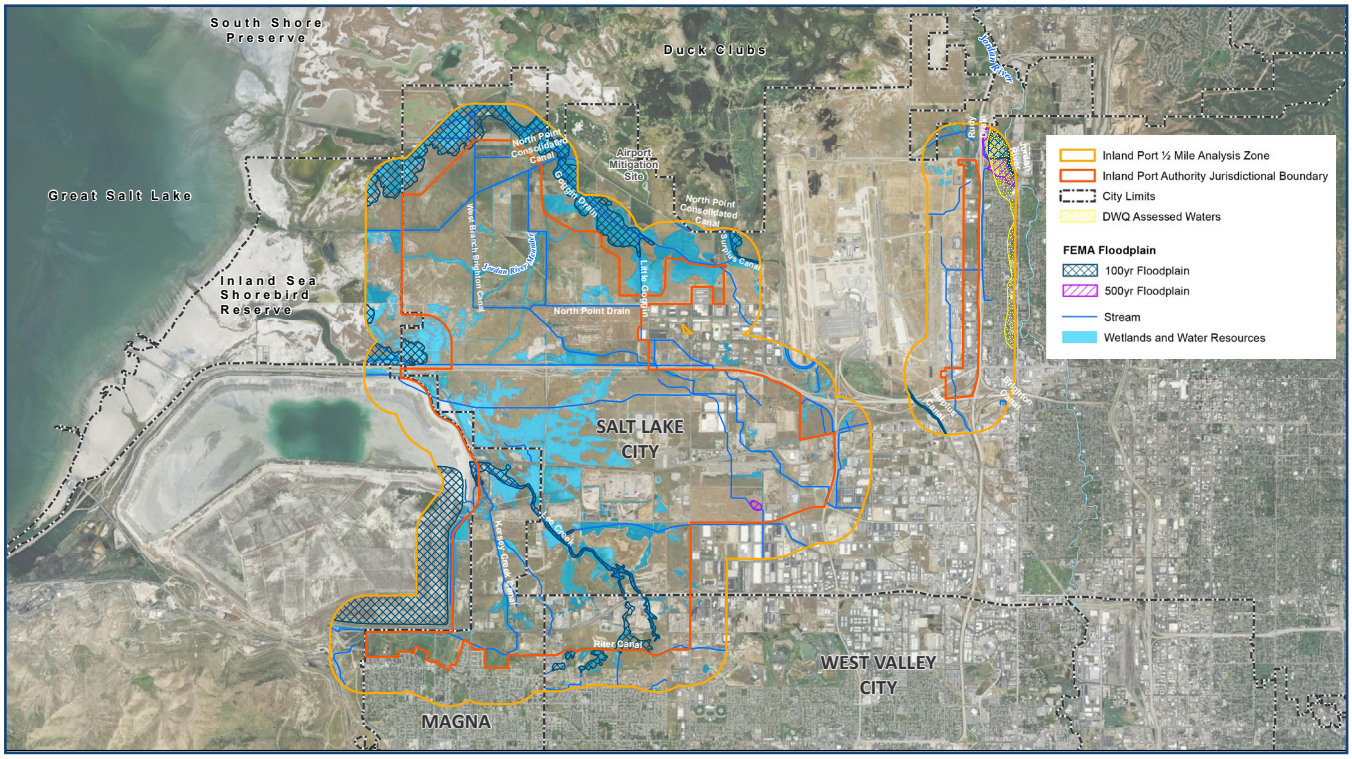
***Protection of important habitat areas can be achieved effectively through a coordinated approach. Because UIPA has no land use authority in its jurisdictional area, coordination with public agency, NGOs, and private sector partners is needed to implement best practices. These guiding practices may include protection of migratory birds, habitat, wetlands, and other sensitive areas.***

A number of noted species are present, or may potentially be present, within the jurisdictional area, including Utah State Sensitive Species, migratory birds on the US Fish and Wildlife Services (USFWS) Birds of Conservation Concern List, and species listed under the Endangered Species Act (ESA). Great Salt Lake, considered one of North America's most important interior wetlands for birds, is situated north and west of the jurisdictional area. Other notable natural resources outside of the area and 1/2-mile analysis zone include the Inland Sea Shorebird Reserve, South Shore Preserve, Salt Lake City Airport Wetland Mitigation Site, and numerous Duck Clubs.

As discussed above, the information presented in this document is not intended to provide a comprehensive list of every environmental resource present. If any development projects are proposed within the UIPA jurisdictional boundary, the potential effects of those projects on natural resources will be evaluated and addressed as required under applicable federal, state, and local regulations.

These are depicted in Figure 4-3 below, with locations described in Figure 4 4.

## FIGURE 4-3: NATURAL AND WATER RESOURCES




Land to the West of Salt Lake City and outside of the UIPA area is in the jurisdiction of Magna Township.

Source: ESA Species and Critical Habitat from US Fish and Wildlife Service IPaC 2019, Utah State Sensitive Species from the Utah Division of Wildlife Resources State listed Species by County 2017, Water Resources from United States Geological Survey (2016), National Wetlands Inventory (2019), and Federal Emergency Management Agency (2014). Archaeological Resources from Utah State Division of History, other natural resources from Utah State Correctional Facility Site Assessment Report, and Salt Lake City Northwest Quadrant Master Plan 2016.

## FIGURE 4-4: NATURAL AND CULTURAL RESOURCES

| RESOURCE | DESCRIPTION |
|---|---|
| **Endangered Species Act (ESA) Species and Critical Habitat** | The following ESA-listed species may be present according to the resource list provided by USFWS Information for Planning and Consultation (IPaC) website[68]: Mammals: Canada Lynx (threatened species), Birds: Yellow-billed Cuckoo (threatened species), Fishes: June Sucker (endangered species), Flowering Plants: Ute Ladies'-tresses (threatened species). It has been reported that several of these species, including Canada Lynx, Yellow-billed Cuckoo, and Ute Ladies'-tresses, have not been observed in the UIPA jurisdictional area in decades.<br><br>No critical habitat for ESA-listed species has been designated or proposed for designation within the UIPA jurisdictional area or ½ mile analysis zone.<br><br>When a potential UIPA project is proposed, the UIPA will consult and coordinate with appropriate local, state, federal agencies, as well as private partners, regarding site-specific information regarding wildlife. |

[68] The US Fish and Wildlife Service IPaC resource list is a list of species and other resources, such as critical habitat, that are known or may be expected to be on or near a referenced area. The list may also include resources that occur outside of an area, but that could potentially be directly or indirectly affected by activities in the area. Determining the likelihood and extent of resources in the area typically requires gathering additional site-specific information. The primary information use to generate the list is the known or expected range of each species. Additional areas of influence for species are also considered. Because species can move and site conditions can change, the species noted in this list are not guaranteed to be found on or near the project area. To fully determine any potential species present in the area, additional site-specific information is required.

| RESOURCE | DESCRIPTION |
|---|---|
| **Migratory Birds of Conservation Concern** | Nearly all birds that use habitats in or near the UIPA jurisdictional area are protected under the Migratory Bird Treaty Act. The USFWS IPaC resource list identifies several species of migratory birds that are also on the USFWS Birds of Conservation Concern List; such species are considered likely to become candidates for listing under the ESA unless additional conservation actions are implemented. Many other species of migratory birds use habitats in or near the UIPA jurisdictional area and the Audobon Society documents and maintains lists of these species. Although outside of the UIPA jurisdictional area, the Great Salt Lake is considered one of North America's most important interior wetlands for birds, as millions of birds use the Great Salt Lake for nesting and as a mitigation stopover. The site is designated as a Hemispheric Site within the Western Hemisphere Shorebird Reserve network, and all major bays are designated as Globally Important Bird Areas.<br><br>When a potential UIPA project is proposed, the UIPA will consult and coordinate with appropriate local, state, federal agencies, as well as private partners, regarding site-specific information on migratory birds. |
| **Utah State Sensitive Species** | Data from the Utah Division of Wildlife Resources (UDWR) Natural Heritage Program identify 24 State-listed species within the UIPA jurisdictional area and ½-mile analysis zone. Several of these have not been observed for several decades, however. Other sensitive species may use habitats in the analysis zone but have not been reported to the UDWR Natural Heritage Program. |
| **Archaeological Resources** | Publicly available data from the Utah Division of State History maps polygons (each polygon is approximately 320 acres) that indicate the presence of recorded archaeological sites. Polygons indicating the presence of recorded archaeological sites are present throughout the UIPA jurisdictional area and are notably located in the northern and southwestern portion of the area. It is important to note that the absence of reported sites does not mean that no archaeological sites are present. Due to the prominent use of this area by Native American tribes, it is likely that additional unrecorded archaeological sites are present throughout the UIPA jurisdictional area. |

## Select Guiding Practices

Great Salt Lake is the largest saltwater lake in the Western Hemisphere and one of the few terminal lakes in the world. The lake and associated wetlands comprise a rich and unique ecosystem that supports a wide range of plant and aquatic life and serves as an important habitat for residents, migratory birds, and federally- and state-listed sensitive species.[69] UIPA plans to work with local governments and the Utah Department of Environmental Quality, Utah Department of Natural Resources, U.S. Fish and Wildlife Service, Audobon Society, Duck Clubs, and others, to identify areas that best support functioning natural ecosystems and establish sustainable development standards to protect wildlife, habitat, and wetlands. Guiding practices to protect natural resources within the UIPA jurisdictional area, as well as protect key resources that are in proximity, include the following:

[69] Utah Department of Environmental Quality, Division of Water Quality, Great Salt Lake, April 2019, https://deq.utah.gov/waterquality/great-salt-lake

## Northwest Quadrant Master Plan

Salt Lake City's Northwest Quadrant Master Plan includes measures to protect certain sensitive natural resources in some parts of the UIPA area.[70] The area covered by that plan largely encompasses the UIPA area; the exceptions are the UIPA's jurisdictional area along I-215 east of Salt Lake City International Airport and the southwestern periphery of the UIPA area, which extends beyond the city limits into unincorporated Salt Lake County.

The Northwest Quadrant Master Plan specifies a goal to "Develop an Eco-Industrial Park Development Strategy for the Area North of I-80." As stated in Section 21A.34.140 of the city code of Salt Lake City, the purpose of the eco-industrial area is to provide a buffer between light industrial use areas and natural areas to the north. The city code's requirements for the eco-industrial buffer include reducing the risk of migratory birds colliding with buildings and other structures. Maps available at the City's website do not show the extent of the area where eco-industrial development standards apply; the master plan document states that an eco-industrial buffer will be established within 400 feet of the mapped natural areas immediately north of the UIPA area.

An effective landscape-scale approach could be developed by building on the strategies and policies of the Northwest Quadrant Master Plan. For example, the City's framework for master planning (Plan Salt Lake) supports the integration of open spaces into developed areas. At the scale of the UIPA area, this would involve identifying and protecting wetlands, watercourses, and other areas that support ecosystem functions.

## Migratory Bird Protection

UIPA will work with the Audubon Society to implement techniques to protect birds and other animals, especially during peak migration periods. These may include the following:

- Avoid building new structures within 300 feet of vegetated areas larger than 2 acres, open water, or high-quality wetlands.
- For any structures in such high-risk locations, minimize the extent of untreated glazing in the collision zone (less than 60 feet above ground) on the side facing the landscaping, vegetated area, wetland, or water. Treatments for reducing collision risk include patterned glass, louvers, or awnings that reduce the apparent fly-through space.
- Place trees or tall shrubs directly adjacent to glazing (within 3 feet) to slow birds down on approach, or far enough away to avoid reflecting canopies in the glazing.
- Avoid the use of untreated glazing in free-standing clear glass walls, greenhouses, or other transparent structures on rooftops or balconies.
- Avoid building passageways or lobbies with clear sight lines through the building, broken only by glazing.

[70] Salt Lake City, Northwest Quadrant Plan, 2016

- Participate in Lights Out Salt Lake, which encourages building owners to turn off unnecessary indoor and outdoor lighting during peak migration periods (March through May and August through October).
- Avoid the use of upward-directed lighting.
- Install motion sensors on outdoor lights.
- Use warm/white bulbs (color temperature less than 3000 K).
- Avoid using of horizontal-axis wind generators and of vertical-axis wind generators that do not present a solid appearance.
- Avoid using rooftop antennae or guy wires.

**CASE STUDY: BIRD PROTECTION: protecting migratory Short-tailed Shearwaters at Victoria's Phillip Island**

Victoria's (Australia) Phillip Island is home to one of the world's largest colonies of listed migratory Short-tailed Shearwaters. It supports more than six percent of the global population of this species. Shearwaters fledglings leave their nests at night and when exposed to artificial light fledglings can be disoriented and grounded. Some fledglings may reach the ocean, but then be attracted back toward coastal lighting. Fledglings are also vulnerable to collision with infrastructure when disoriented and once grounded become vulnerable to predation or road-kill. Phillip Island also attracts over a million visitors a year during peak holiday seasons and visitors drive from Melbourne across a bridge to access the island. The increase in road traffic at sunset during the Easter break coincides with the maiden flight of fledgling shearwaters from their burrows.

In response to the deaths of fledglings, Phillip Island Nature Parks has an annual shearwater rescue program to remove and safely release grounded birds. In collaboration roadway agencies, road lights on the bridge to the island are turned off during the fledgling period. To address human safety concerns, speed limits are reduced and warning signals put in place during the fledgling season. The reduced road lighting and associated traffic controls and warning signals, combined with a strong rescue program, have reduced the mortality rate of shearwaters.

## Habitat and Wetlands Protection

- Identify and protect areas that support functioning natural ecosystems, and key water and natural resources.
- Use landscaping plants that provide breeding and foraging habitat for birds and pollinators.
- Avoid use of non-native plants that are likely to escape cultivation and compete with native species in nearby natural areas.
- Create buffers to protect wildlife, habitat, and wetlands from development.

## Mosquito Abatement

- If necessary, investigate and encourage the use of mosquito control products and procedures that are narrowly targeted
- Use stormwater management techniques (e.g. green roofs, vegetated swales, and pervious surfaces) that do not rely on on-site water storage (which can create breeding habitat for mosquitos).

## Other

- Form a Policy Advisory Council composed of subject matter experts in habitat and wetlands management specific to the ecosystems found within and around the UIPA jurisdictional area.
- Avoid high levels of noise and human activity near sensitive sites (e.g. active nests, feeding aggregation areas).
- Stormwater management practices that protect water qualify and natural hydrologic regimes (storm-related spikes in runoff can damage or destroy nests, eggs, and nestlings of ground-nesting birds).
- Monitor and control noxious weeds.

# 4.4 Water Resources

*The UIPA jurisdictional area has a number of water features both naturally occurring and artificially created. Protecting surface water habitat and floodplains and providing appropriate and adequate infrastructure to manage stormwater and drainage is critically important. Given that UIPA does not have environmental regulatory authority nor land use within its jurisdictional area, the authority is dependent on working with local government entities and stakeholders to conduct site planning early in the process to protect water resources.*

Many surface water features are present in the UIPA jurisdictional area including canals, rivers, streams, and over 1,500 acres of lakes and freshwater ponds. Resources inventoried include surface water features, impaired waters (i.e., those on the Clean Water Act Section 303(d) list of waters where pollutants have impaired the beneficial uses), floodplains, and wetlands. Locations of mapped water resources are described in Figure 4-5 and where data is available, mapped in Figure 4-3 in the previous section.

**FIGURE 4-5: SUMMARY OF WATER RESOURCES WITHIN THE UIPA JURISDICTIONAL AREA**

| Resource | Description |
|---|---|
| Surface water features | Over 230,000 linear feet of water features, both naturally occurring and artificially created, are present within the UIPA jurisdictional area, including perennial rivers and streams, ephemeral and intermittent streams, canals, and ditches. :<br><br>In addition to linear water features, approximately 1,500 acres of lakes and freshwater ponds are present within the UIPA jurisdictional area. |
| Impaired waters – 303(d) listed | The Jordan River, which flows on the eastern side of the ½-mile analysis zone, is a 303(d)-listed water resource. There are no 303(d) impaired waters within the UIPA jurisdictional area. |
| Floodplains | Within the UIPA jurisdictional area the following acreage of floodplains are present:<br><br>• 200 acres of 100-year floodplains – 100-year floodplains are river or stream flood hazard areas where there is a 1% or greater chance of flooding each year (one time in 100 years)<br>• 10 acres of 500-year floodplains – 500-year floodplains are river or stream flood hazard areas where there is a 0.2% chance of flooding each year (one time in 500 years) |
| Wetlands | Approximately 440 acres of wetlands are present within the UIPA jurisdictional area. (Note that field studies to delineate and rate wetlands would need to be performed in advance of any ground-disturbing activities for future projects in the study area). |

A variety of local, state, and federal agencies are currently responsible for implementation of policies regarding water resources. Local agencies play a role in site drainage requirements, stormwater discharge, and floodplain management (following federal guidelines). Regulations are established in municipal codes for jurisdictions within the UIPA jurisdictional area. Coordinated water resource master planning among these agencies is focused on controlling stormwater runoff (the quality and quantity), flooding, and natural resource protection.

Without coordinated, area-wide planning, each site is responsible for providing its own drainage management, upgrades to downstream conveyance, and flood protection strategies. In this case, the practical sustainability measures for individual sites would be limited to footprint reduction within the parcel and Green Stormwater Infrastructure (GSI) type stormwater controls, such as rain gardens, green roofs, and porous pavements.

### Select Regulations

The state of Utah has authorities with jurisdiction over water resources. Facilities that produce, treat, dispose of, or otherwise discharge waste water may need permits from the DEQ Division of Water Quality. The U.S. Environmental Protection Agency has delegated authority to Utah to administer its own water quality regulatory programs. Highlighted programs included:

- **Groundwater:** Any facility that discharges or may discharge pollutants to ground water needs a permit. Major agricultural, municipal, and industrial dischargers are regulated (Governing regulations: Utah Administrative Code Rule R317-6: Ground Water Quality Protection)
- **Stormwater:** Storm water discharge permits are required for certain construction projects, industrial facilities, and municipal separate storm sewer systems. (Governing regulations: Utah Administrative Code Rule R317-8. Utah Pollutant Discharge Elimination System [UPDES])
- **Clean Water Act Section 401 Water Quality Certification Program:** which is designed to ensure that federally permitted or licensed activities (such as 404 permits issued by the U.S. Army Corps of Engineers for fill of wetlands or other waters of the U.S.) will be conducted in a manner that will comply with applicable Utah discharge and water quality requirements. This program is managed through the Utah Division of Water Quality. Additional information on water quality permits can be found at: *https://deq.utah.gov/water-quality/water-quality-permits*

## Select Guiding Practices

Guiding principles to protect water resources during development include the following:

- Identify, avoid, and provide long-term protection for existing habitats and floodplains
- Direct development to more suitable areas of a site to minimize the need for stormwater controls ls
- Review development codes to minimize impervious surfaces and optimize multiple site uses
- Define and size drainage infrastructure, including conveyance pathways, connectivity, and regional controls, to protect downstream aquatic systems and capacity for future upstream development
- Establish an entity to plan, operate, control, maintain, and fund the drainage system

- Provide for shared cost and responsibility for protection of water resources features and infrastructure

Protecting surface water habitat and floodplains and providing appropriate and adequate infrastructure to manage stormwater and drainage can mitigate flood risk and protect water quality. Sustainable practices related to water resources may address conveyance and drainage, stormwater and hydrology, groundwater, floodplains, surface water habitat and wetlands, water supply, water quality, and others. Although UIPA does not have environmental regulatory authority nor land use within its jurisdictional area, the UIPA will coordinate with municipal and statewide policies through the Utah Department of Environmental Quality to promote sustainable techniques, such as those detailed below.

## Conveyance and Drainage

- Develop drainage system connectivity and mapping; Establish level of service and capacity needs; Prepare a drainage plan to define existing and proposed connectivity to all sites; Identify an entity to control and manage the system; Develop a capital plan to acquire land and construct facilities.
- Establish future strategies for climate change, higher downstream stages, and pumping systems.
- Individual sites would need to evaluate downstream drainage capacity or connections to flow-exempt receiving waters.

**CASE STUDY: NATURAL DRAINAGE SYSTEM: West Seattle's natural drainage system reduces stormwater run-off**

High Point is a residential neighborhood in West Seattle, Washington. The area's natural drainage system is one of the largest in the country. This natural system manages stormwater run-off, improves water quality for residents, and protects a vital salmon habitat. The city provided funding to cover the costs of the system, which incorporates bioretention swales, native plantings, permeable pavers, rain gardens, and a retention pond. Prior to these measures, gutters and drainage pipes shunted stormwater (including spilled oil, pesticides, and other pollutants) from streets directly to the creek. Now, stormwater flows through bioswales, yard drains, storm drains, rain gardens, and porous streets and walkways into underground slotted pipes. From there, the water travels into a stormwater pond, and eventually into the salmon habitat in Longfellow Creek. These measures ultimately reduced stormwater run-off into Longfellow Creek by 65 percent.

**CASE STUDY: PROTECTING AQUATIC RESOURCES: SeaTAC Airport Stormwater Retrofit**

Clean water is a top priority for citizens in Seattle. Activities occurring at the Seattle-Tacoma International Airport can be a major source of water contaminants (e.g. re-fueling, equipment cleaning, de-icing, oil and fuel leaks, etc.) The airport also has a number of impervious surfaces, and stormwater from those surfaces runs off into three local streams. To protect these aquatic resources, the airport has implemented numerous Best Management Practices (BMPs) to remove pollutants, reduce flooding, and prevent spills from discharging into the environment. These BMPs guided a complete retrofit of the airport to meet the strictest of environmental standards, which included collecting stormwater into two conveyance systems that treat the water before it enters the Puget Sound. The airport also takes a proactive approach in evaluating water quality monitoring results to determine if additional BMPs are necessary.

## Stormwater and Hydrology

- Reduce impervious surface requirements, including narrower roads, reduced pedestrian access, or limited parking
- Reduce building footprints by increasing building height
- Define flow control-exempt receiving waters
- Evaluate basin-specific stormwater controls
- Define potential regional control sites
- Develop impervious area cost-transfer program (allows for balancing on-site stormwater costs across planning area)
- Require stormwater controls at all sites without regional controls or direct discharge
- Coordination with larger land use planning policies, such as building ranges of development densities, providing for enough open space, and preserving buffer zones.

**Holistic Stormwater Policies:** municipal policies for managing stormwater with green infrastructure

EPA's Green Infrastructure Case Studies (EPA-841-F-10-004) highlights common trends for how twelve different local governments developed and implemented holistic stormwater policies that support green infrastructure. Many of the communities are moving beyond single objective spending and have begun to invest in runoff reduction and stormwater management strategies that have multiple environmental, economic, and social benefits. Common policies used across these case studies include stormwater regulation, review and revision of local codes, demonstration and pilot projects, capital and transportation projects, education and outreach, stormwater fees, stormwater fee discounts, and other incentives.

**Improving Stormwater Management:** Spokane West Plains Public Development Authority conducts a study on how to expand and improve stormwater management in the area

West Plains is one of the fastest-growing areas in Washington State. This growth has been putting pressure on the area's stormwater system. In response to this issue, the West Plains Public Development Authority (PDA) conducted a study, which identified concerns with soil conditions, wildlife, and paleochannels (streams channels carved in bedrock that were filled with sediment during the ice age). The goals set forth in the study include data collection, identifying (and evaluating) conveyance options, identifying guidance for developers, evaluating paleochannels, and developing a Capital Improvement Plan (CIP). This study began in Summer 2019 and is slated for completion by Spring 2020.

## Groundwater

- Protect groundwater quality with stormwater quality source and site controls. These would include avoidance of pollution-generating activities or materials, and pre-treating stormwater before discharge to the ground via infiltration.
- Minimize lost groundwater recharge by identifying key recharge areas and establishing feasibility standards for stormwater infiltration.

## Floodplains

- Determine and map 100-year floodplains and applicable floodways.
- Determine long-term peak stage for the Great Salt Lake.
- Define waters of the U.S. and floodable extents; establish critical infrastructure in flood emergency plan.
- Avoid and/or minimize construction in floodplain.
- Define flood recovery plan to assess recovery measures and avoidance.

## Water Habitat and Wetlands

- Map and categorize existing habitat.
- Develop relationships between water resources, catchments, connected habitats.
- Determine water resource connectivity and hydro periods.

## Water Supply

- Review potential water supply needs that could be developed on-site and coordinate with stormwater capture planning.
- Minimize the need for future landscape water use by site planning and sustainable landscape standards, including the use of drought-tolerant plants.
- Consider opportunities for water reuse, instillation of water saving features, and reducing the amount of water needed for non-essential operation activities.

## Water Quality

- Implement stormwater quality control measures, such as raingardens, media treatment, stormwater settling wetponds, and biofiltration, for all pollution-generating surfaces
- Determine limited allowable use of pollution-generating materials
- Review code and standards for impediments to green-storm water infrastructure (GSI). Incorporate green-stormwater infrastructure (e.g. rain gardens, green roofs, porous pavement) in site development

### Other

- Review landscape, soils, floodplains, and sensitive areas to identify sites that are more suitable for development and provide for the transfer of development rights toward suitable locations and away from areas that would require extraordinary measures for protections.
- Provide incentives to suitable sites to direct development and allow more intense development or reduced-cost regional infrastructure.

***A chief concern of many Utahns on the growth of logistics is air quality in the Wasatch Front. UIPA has conducted technical research on ways to promote sustainable freight and smart logistics best practices to enhance air quality. These practices include clean trucks, cargo-handling equipment, construction equipment, cost-sharing development of truck parking, container depots, and major technology investments such as 5-G network capabilities. In many cases, successful implementation of these best practices require both private land owners and developers collaborating and coordinating with the UIPA and relevant environmental regulators (UDEQ and others) to identify implementation mechanisms.***

## 4.5 Air Quality

The Wasatch Front is designated "nonattainment" for two pollutants: PM2.5, and Ozone, meaning that it does not meet federal health standards in the Clean Air Act. [71] [72] PM2.5 nonattainment areas are being considered for redesignation to "maintenance." Greenhouse gases and climate change are also a concern. While UIPA has no land use authority in its jurisdictional area, UIPA is statutorily responsible for respecting and maintaining sensitivity to the unique natural environment, as well as improving air quality and minimizing resource use (HB433). The UIPA is working closely with the Utah Department of Environmental Quality (DEQ)—the environmental regulator in the state—on implementing sustainable practices to meet and exceed federal and state standards.

The following section summarizes global "green freight" practices and techniques. Practices that would require significant, voluntary private investment may at times require public incentive funding to help offset the costs of implementation. In many cases, successful implementation will require both private landowners and developers to collaborate and coordinate with the UIPA and relevant environmental regulators (DEQ and others) to identify the implementation mechanisms.

*"Green freight" refers to a collection of technologies and practices that improve the efficiency of the freight sector and provide a means to benchmark and track performance. Green freight programs promote these technologies and practices across the freight sector to help cut costs, track carbon, and benefit the environment.*

[71] Utah Air Quality Nonattainment/Maintenance status, EPA Green Book, October 2019
[72] PM10 nonattainment areas of the Wasatch Front were redesignated to "maintenance" areas on February 26, 2020.

## Select Guiding Practices

Techniques to improve regional air quality and reduce greenhouse gas emissions include those listed below. While some of these can be implemented by the UIPA, others require the partnerships of state and local agencies to achieve desired outcomes.

### Mobile Sources

- Promote upgrades of older trucks and rail locomotives to zero or near-zero emissions technology, equipment retrofits, accelerated replacement, and renewable energy sources.
- Develop electric vehicle charging and clean energy fueling infrastructure for commercial vehicles and passenger vehicles.
- Reduce single-occupant vehicle trips by encouraging sustainable mobility best practices and transportation demand management (TDM) strategies. This may include commuter vanpool programs and increasing access to public transit to help shift employees to sustainable transportation modes.
- Study the feasibility of clean energy truck drayage between the Salt Lake City airport and the UIPA jurisdictional area.
- Improve truck parking operations. This includes establishing truck parking sites with auxiliary, renewable energy plug-ins to help minimize idling while addressing truck parking shortages.
- Reduce truck trips, especially long-haul trips, by making rail more attractive with increased rail network connections and service frequency.
- Promote fuel-efficient truck driving (including minimizing idling) and rail speeds.
- Work with developers on site access planning to maximize trip efficiency by ensuring direct access to rail and truck corridors for businesses that require them, while promoting separation of freight facilities from schools and residential areas.
- Promote dynamic vehicle routing optimization (including designated truck routes, hours of operation, and separation from schools and residential areas) through the use of technologies that update truck routes in real time to use fuel efficiently and lessen air emissions.
- Consider additional idling limits, especially during winter seasons, and designation of minimal idling zones, in partnership with environmental regulators and local government.

### Area Sources

- Reduce truck trips, especially long-haul trips, by making rail more attractive with increased rail network connections and service frequency.
- Promote fuel-efficient truck driving and rail speeds.
- Expand air quality monitoring efforts through the deployment of advanced monitoring stations within the jurisdictional area.
- Promote tree-planting initiatives within the jurisdictional area.

### Other

- Expand air quality monitoring efforts through the deployment of advanced monitoring stations within the jurisdictional area. This will help establish baseline air quality conditions and track the progress of the guiding practices.
- Identify needs, such as health services, and safety concerns related to freight operations. Promote energy-efficient HVAC systems and dual-paned windows to schools located in close proximity to port activities.
- Promote native greenery such as trees, shrubs, and other vegetative barriers to absorb fine particulate matter from industrial facilities and commercial activity, create sound barriers, and mitigate heat deflection from concrete and asphalt within the jurisdictional area. Emphasize buffer areas between facilities and nearby residential and protected ecological zones.
- Promote responsible sourcing and procurement training programs to educate companies about their environmental footprints and guiding practices to develop sustainable supply chains.
- Undergo a sustainability performance-based certification process such as the EcoDistricts certification.

## Global Practices

The UIPA also identified examples of industry trends and global practices towards the use of cleaner, sustainable technologies. This section provides a listing of some of these practices that may be applicable to UIPA work. The UIPA continues to monitor changing practices that may improve air quality and greenhouse gas emissions as well as the ability of the organization to implement similar policies and programs in the state and in its jurisdictional area.

The continuing advancement of near-zero and zero-emission transport technologies provides an opportunity for the UIPA to promote sustainable and innovative investments within its jurisdictional area. Promoting equipment retrofits, accelerated replacement, and switch to new alternative fuels and energy sources is important to obtain these new business investments in Utah, along with meeting the state's environmental goals.

Much of the effort by the industry to date has focused on testing and assisting original equipment manufacturers (OEMs) on commercialization and deployment, as well as assessing fueling or recharging infrastructure needs. In California, the major public utilities providers have been engaged in assessing future demand, identifying deficiencies in the electricity grid, and developing future improvements to meet anticipated demand. On the testing and implementation front, the Port of Long Beach and Los Angeles have been able to influence the conversion of cargo handling equipment and trucks serving the ports through tariffs that set requirements for terminal operators who lease from the ports.

### Zero Emission and Near Zero-Emission Fleet.

Truck technology continues to improve. For short-haul clean truck fleets and long-haul truck fleets, practices include equipment retrofits, accelerated replacement, and renewable energy sources. In recent years, California's requirements and incentive programs have driven investment into new zero-emission technologies, most notably all-electric and hydrogen fuel cell.  With the advent of fast-charging and the design of new types of vehicles by major original equipment manufacturers, the potential for commercialization and the ensuing conversion of heavy-duty truck fleets is becoming more of a reality in the near-term.

### Companies Turning to Low-Emissions Vehicle Technology

Companies like Tesla, Volvo, BYD and Freightliner, currently have fully-electric heavy-duty trucks in limited production. PepsiCo announced in October 2019 that 15 Tesla Semi electric trucks will replace all of the existing diesel-powered freight trucks at its Modesto, CA manufacturing site. The first two battery electric eCascadia tractors from Freightliner were shown to have a range of 250 miles on a full charge, which is adequate for many local and intercity trips. One test driver of the Tesla Semi electric truck that transported an almost full load of 75,000 pounds said that the vehicle was meeting or even "exceeding" range expectations. Volvo is also developing autonomous electric tractors ("Vera") for the future.

Replacing older vehicles with more efficient ones that use alternative fuels and energy sources, such as liquified or compressed natural gas (LNG or CNG)-fueled vehicles, electric vehicles, hydrogen fuel cell vehicles, etc., can reduce CO2 emissions and other air pollutants.

Various companies and ports are testing and deploying low- and zero-emissions trucks, particularly for drayage. Figure 4-6 below describes the different types of low- and zero-emissions vehicles currently being tested and used. Ports and warehouses have also begun using low- and zero-emissions container handling equipment. Challenges to these technologies include their added weight, upfront costs, and need for widespread charging infrastructure. However, factors such as improvement in battery performance and the introduction of low and ultra-low emissions zones may help lead to increased adoption of electric vehicles in urban areas.[73]

**FIGURE 4 6: LOW-EMISSIONS VEHICLE TECHNOLOGY**

| Vehicle Type | Power | Technology Description |
|---|---|---|
| Hybrid Electric Vehicles (HEVs) | Petrol and electricity powered vehicles | Electric energy is generated through regenerative braking. The vehicle's braking system has an electric motor that helps slow the vehicle and uses some of the energy normally converted to heat by the breaks to recharge the battery. Starts off by using the electric motor, then the gasoline engine cuts in as load or speed increase. |
| Plug-in Hybrid Vehicles (PHEVs) | | All-electric range of 6 to 40 miles, then switches to an internal combustion engine running on gas when the battery is depleted. |
| Battery Electric Vehicles (BEVs) | All-electric vehicle. Most have all-electric ranges of 80-100 miles, some models have ranges up to 250 miles. | High-capacity battery packs power vehicle. Charges by plugging into an external electrical charging outlet or station. Battery takes 30 minutes (fast charging) to a full day (Level 1) to recharge. |
| Battery Electric Vehicles (BEVs) | | Rather than recharging a battery, FCEVs store hydrogen gas in a tank. The fuel cell combines hydrogen with oxygen from the air to produce electricity, which then powers an electric motor that powers the vehicle. No need to plug-in. |

[73] Such as in Paris, London, Stockholm, Helsinki, Tokyo, Singapore, Hong Kong

The US EPA is considering tightening the existing NOx and PM emissions standards for conventional heavy-duty diesel vehicles. The current standards were last updated in 2000 and phased-in between 2007 and 2010. These standards reduced heavy-duty truck and bus PM emissions by 90% and NOx emissions by 95%. Proposals for new standards range between 50% and 90% lower than the current standards. These standards do not address GHG emissions, which are handled under a different set of joint regulations promulgated by EPA and USDOT. GHG standards were recently relaxed for heavy-duty vehicles.[74]

### Overcoming Clean Vehicle Purchasing Barriers

Freight trucks make up a relatively small percentage of the on-road vehicle fleet, but they are responsible for a disproportionately large share of fuel consumption and greenhouse gas (GHG) emissions. Much research and development resources have been expended in cleaner truck technologies, but today, only a small proportion of heavy-duty trucks in operation have these technologies (Sharpe, 2017). Three main barriers to implementation of the technology are capital cost, fueling availability, and operational constraints (miles that can be traveled on one tank of fuel or one charge).

The margins for trucking companies are razor thin at a time when the workforce is estimated to be short 60,800 drivers nationwide. This shortage is forcing trucking companies to offer higher salaries and more benefits to attract and retain drivers, which means less capital available for investing in new, higher-tech equipment.

Source: Sharpe, Ben. *Barriers to the adoption of fuel-saving technologies in the trucking sector,* International Council on Clean Transportation, 2017. Access 10/23/2019 at: https://theicct.org/sites/default/files/publications/HDV-fuel-saving-tech-barriers_ICCT-briefing_07072017_vF_0.pdf; Costello, Bob and Alan Karickhoff. *Truck Driver Shortage Analysis 2019,* American Trucking Association. July 2019. Accessed on 10/19/2019 at: https://www.trucking.org/ATA%20Docs/News%20and%20Information/Reports%20Trends%20and%20Statistics/ATAs%20Driver%20Shortage%20Report%202019%20with%20cover.pdf

In the case of the UIPA, tariff authority does not exist. Therefore, to move towards the implementation of these technologies, the UIPA will develop incentives that encourage landowners and tenants in the UIPA jurisdictional area to use these cleaner vehicles within their facilities and to require trucks serving them to use cleaner trucks.

## Electric vehicle charging and clean energy fueling infrastructure.

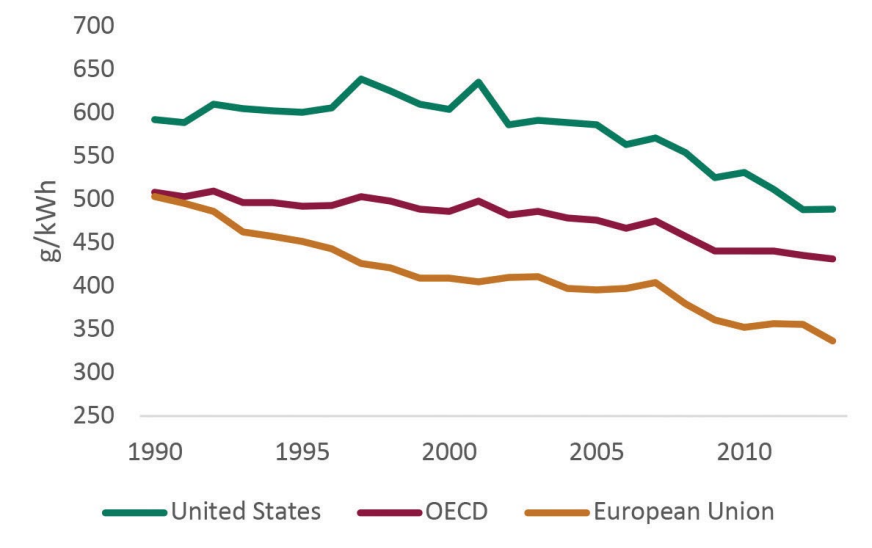
Recharging infrastructure is needed for the widespread implementation of long-haul freight transportation services. Charging infrastructure requires substantial investment, and it remains to be seen whether electric or hydrogen fuel cell will capture the largest market share of next-generation truck technology. In metropolitan regions, recharging infrastructure may be set up for urban freight operations, since the local delivery vehicles generally return to the same depot or network of depots after running their daily routes in the city. For long haul inter-city trips, the availability of recharging stations along the journey becomes a more pressing issue.

[74] Utah Department of Environmental Quality, Division of Air Quality

## Impact of electric vehicles on CO2 emissions depends on the carbon intensity of the electric grid.

The environmental benefits of electric vehicles will gradually strengthen as carbon intensity continues to decline. The figure below illustrates the CO2 from electricity generation comparing the EU, OECD, and the United States. Compared to the OECD and the EU, the United States generates more CO2 from electricity.

**FIGURE 4-7: CO2 FROM ELECTRICITY GENERATION – US COMPARISON**




Notably, Utah is outpacing the nation with its percentage of renewable sources in total electricity generation. Renewable sources made up almost 10 percent of Utah's total electricity generation. Of this, geothermal energy makes up over one percent, wind energy makes up about three percent, and solar thermal and photovoltaic energy makes up about six percent. PacifiCorp's 2019 Integrated Resource Plan also shows that Utah's largest utility is planning to move away from coal and towards wind, solar, and battery storage over the next 20 years.

(Source: OECD International Transport Forum Key Transport Indicators; Kem C. Gardner Policy Institute, 2018, "Renewable Energy"; Pacific Corp 2019 Integrated Resource Plan Volume I)

According to the North American Council for Fuel Efficiency (NACFE), the focus of electric charging infrastructure should be on private, depot, or return-to-base charging. They also recommend that fleets and terminal operators and owners work closely with local utility (power) providers.

## The U.S.'s first DC fast charging stations

In early 2019, Penske Truck Leasing opened the nation's first DC fast-charging stations (14 total, with 6 more planned) at four locations in Southern California designed specifically for heavy-duty commercial electric vehicles. Utilizing 50-150 kW chargers, the stations can fully charge an all-electric class 8 tractor in less than half a shift.

Electric Road Systems (ERS) are roads that support dynamic power transfer from the road to vehicles while the vehicles are in motion – such as overhead catenary, ground conductive or inductive solutions. It is considered as a supplement to overcoming some of the challenges of battery EVs. They can be equipped with batteries, hydrogen fuel cells or other options that power the engine when driving outside the direct supply system – although at least 20 percent and preferably 50 percent of the annual distance driven should be on an electric road.

However, the cost and time associated with constructing these systems coupled with the lack of flexibility and potential conflicts with truck operations and overhead wires point towards a more realistic option of inroad charging within freight terminals as trucks are parking, queuing, loading, and/or unloading.

**CASE STUDY: ELECTRIFYING ROADS IN ACTION**

An overhead catenary system has already been tested on public roads near the Port of Los Angeles on a one-mile connection between terminals of the port and in Sweden on a 2 km stretch of highway that links a port to an industrial site. Several research projects are under-way in Germany and two 10 km field trials are under construction. By electrifying main roads, convenient long-distance transport would be possible, at the same time as allowing the battery size to be relatively small, delivering approximately 150 km of range depending on how much of the road network that is electrified.

## Use of clean construction equipment and clean cargo-handling equipment.

Non-road mobile equipment includes construction equipment and cargo-handling equipment that would operate in the UIPA jurisdictional area. Tier 4 equipment emission standards for PM and NOx are required to be 90 percent cleaner than Tier 1 equipment. Measures that encourage and/or require the use of Tier 4 non-road cargo equipment can achieve much of the emissions reduction benefits of zero-emission equipment without many of the limitations of the latter technologies.[75]

**CASE STUDY: CLEAN CARGO-HANDLING EQUIPMENT: Port of LA unveils the world's first zero-emissions, battery-powered top handlers**

In October 2019, the Port of Los Angeles unveiled two zero-emissions, battery-powered top handlers. The pre-commercial, battery-electric top handlers were designed and built in the US (by Taylor Machine Works, Inc.) and can operate for up to 18 hours between charges – loading containers weighing up to 75,000 pounds. With respect to costs, the ratio of commercial prices for near-zero versus diesel cargo-handling equipment is over 40 percent, fuel cell versus electric equipment is over 60 percent, and electric versus diesel equipment is more than 140 percent. Clean cargo-handling equipment helps push for a shift to sustainable technology that is technically feasible today.

[75] 40 CFR Parts 9, 69, et al. US Environmental Protection Agency Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule.

## "Eco-driving" training and education

In Europe, training programs, such as driving techniques that maximize fuel efficiency have been shown to improve awareness of emissions generation and impacts. The UIPA will similarly promote fuel-efficient truck driving and rail speeds in its jurisdictional area and project areas statewide. Driver training can reduce fuel consumption by up to 10 percent.[76] To maintain an eco-friendly driving style, it is crucial to install technical equipment showing variable fuel consumption at different speeds and monitoring the use of heating and air-cooling systems. Freight operators and logistics service providers have started programs that aim to make the behavior of stakeholders more environmentally/sustainable. Examples include: training all fleet personnel for 'eco-driving' in road and rail transport, 'eco-sailing' in sea transport, and 'green-take off and approach' in air transport. Additionally, DHL has started programs such as 'GoGreen' and 'GoTeach' to educate all personnel about ethical and environmental operations. Telematics-informed driver-training will continue to play an important role in reducing carbon emissions from road freight.

## Vehicle design for fuel efficiency

Vehicle design can also improve long-haul trucking fuel efficiency – reducing fuel usage by up to 6-20% by maximizing aerodynamics.[77] For example, Marks and Spencer in the United Kingdom piloted the use of teardrop design trailers and calculated savings of 10% on fuel and a 10% increase in load capacity.[78]

**Best Practices to Reduce Fuel Consumption:**

- Ensure correct tire pressures and consider automatic inflation systems which can result in fuel savings of around 5%.
- "Lightweighting", the use of lighter-weight metals to construct vehicles, allow tire weight reductions and can result in heavier weight goods being carried.
- Consider speed limiters to limit the maximum speed of trucks, which can produce fuel savings of around 6.8%.

Source: https://www.clecat.org/media/sr005osust101201clecatsustlogbpg2nded.pdf, AEI Consultancy, 2011

Additional other truck technologies underway that can also improve air emissions include truck platooning and automation.

Truck platooning is the grouping of vehicles in operation on a highway to temporarily link their control systems. This allows space between vehicles to be reduced and results in more efficient use of road space and increased energy efficiency for the secondary vehicles. This is due to more efficient braking and acceleration, and lower wind resistance.[79]

[76] Vagg, C., Brace, C., Hari, D., Akehurst, S. et al. "A Driver Advisory Tool to Reduce Fuel Consumption," SAE Technical Paper 2012-01-2087, 2013, 5th International Environmentally Friendly Vehicle Conference.
[77] Cullinane, S. (2014), "Mitigating the Negative Environmental Impacts of Long Haul Freight Transport", Sustainable Logistics (Transport and Sustainability, Vol. 6), Emerald Group Publishing Limited, pp. 31-61. https://doi.org/10.1108/S2044-994120140000006002
[78] UK Department for Transport, "Aerodynamics for Efficient Road Freight Operations" https://aems.ie/download/aerodynamics-for-efficient-road-freight-operations-dft-uk/
[79] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/781295/automation_in_freight.pdf

Automation also has the potential to improve the fuel efficiency of trucks by 15 to 25 percent.[80] These estimates could be greater if automation is accompanied by platooning and electrification. Driverless trucks require robust digital infrastructure, complementary roadside systems (signals, signs, and sensors), and a regulatory framework set by transportation authorities.

### Modal shift from truck to rail.

Moving goods off the road and onto rail significantly reduces air pollutants. Railroads are on average three to four times more fuel-efficient than trucks.[81] Additionally, freight railroads account for only 0.6% of total U.S. greenhouse gas emissions and only 2.0% of the transportation-related sources, while accounting for well over one-third of intercity freight ton-miles.[82] The UIPA will work to shift cargo from truck to rail to reduce emissions and congestion related to truck traffic.

Overall transportation mode share is influenced by economic factors such as international trade, fuel costs, just-in-time delivery, containerization, double-stacking, productivity, and the regulatory environment.[83] Individual US shipment mode choice factors, however, are based on more specific factors as done through a TRB survey.[84] Logistics cost and the quality of service are the top factors influencing modal choice through this study. Costs include order and handling, transportation charges, capital carrying cost in transit, intangible service costs, inventory costs, loss and damage costs, and service reliability costs. Typically, trucks are preferred for a higher quality of service despite the higher cost when compared to rail. As a result, the main types of cargo that may be shifted to rail are long-haul truck movements. In light of this, UIPA will focus on improving the quality of rail service – reliability, level of service, and cargo-handling capabilities – in order to induce long-haul modal shifts.

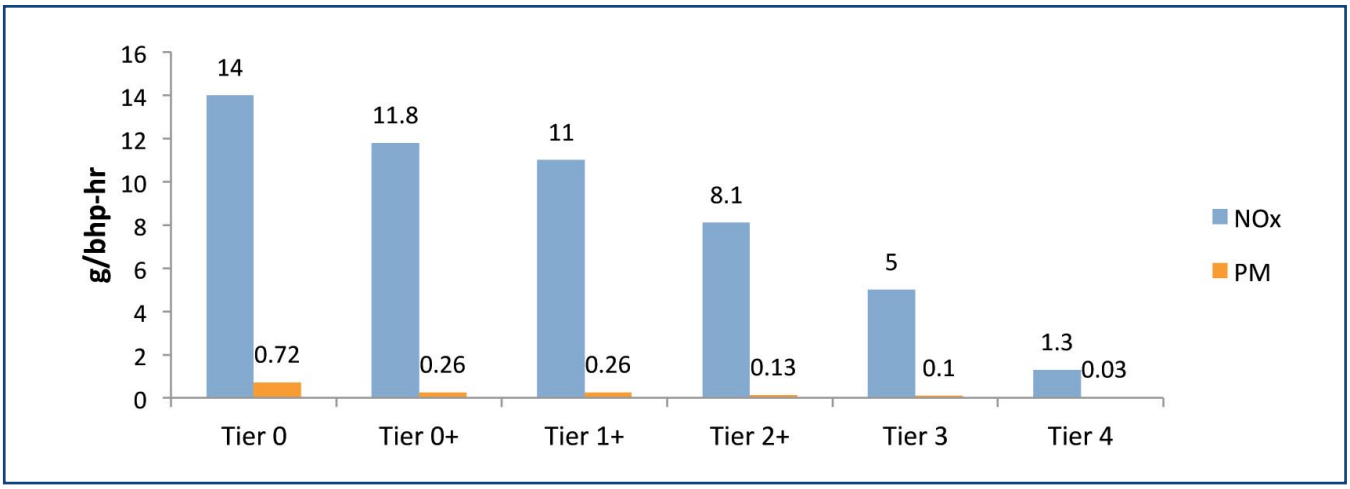
### Sustainable rail practices.

As with trucks, locomotive equipment retrofits, accelerated replacement, and renewable energy sources (e.g. use of electricity instead of diesel) can produce a reduction in emissions. The use of electric traction reduces pollutants at the rail side, but as with any electric vehicle, the overall savings depend on the original source of the electricity.

Figure 4 8 illustrates the emission standards for different types of rail switcher locomotives. The current rail locomotives in the Wasatch Front are Tier 0+ switchers. Tier 4 locomotives offer up to a 90 percent reduction in NOx and PM[85] without the limitations of more exotic fuel and technologies according to the Utah Department of Environental Quality, Division of Air Quality.

[80] International Energy Agency, 2017. The Future of Trucks: Implications for energy and the environment. OECD. https://doi.org/10.1787/9789264279452-en
[81] American Association of Railroads, 2019. "The Environmental Benefits of Moving Freight by Rail."
[82] https://www.aar.org/issue/freight-rail-and-the-environment/
[83] NCFRP 40: Impacts of Policy-Induced Freight Modal Shifts, 2019
[84] NCFRP 40: Impacts of Policy-Induced Freight Modal Shifts, 2019
[85] CFR Part 1033, US Environmental Protection Agency

**FIGURE 4-8: RAIL SWITCHER LOCOMOTIVE STANDARDS**




Other rail sustainability measures involve rail operations, design, and equipment:

***Reduced operating speeds,*** as with all modes, can improve fuel efficiency as can engine shutdowns in diesel trains when the locomotive is idle for 15 minutes or more. More modern diesel locomotives can much more readily restart once they have been switched off. Currently, the locomotives operating in the UIPA run constantly during the winter to ensure reliable operations. The older locomotives in use today, if turned off in the wintertime, risk significant delays to restart. Again, as with other modes, stop-starting, fast acceleration, and breaking and frequent speed changes increase emissions. Providing paths through the rail network that enable trains to make steady progress rather than being constantly interrupted, helps the environment considerably (although it is difficult to assess the exact improvement numerically).

***Design considerations*** can result in fuel intensity improvements. The use of high-cube containers, swap bodies, and low-loaders as well as increases in the length of trains, have all contributed considerably. These improvements have often been led by the freight sector.

***Improved handling equipment*** at rail terminals helped to make rail more efficient and attractive to potential users. In the case of intermodal transport, for instance, benefits have accrued from the fact that terminal and transport equipment has become much more standardized. The railroads are moving towards modern cargo-handling equipment, such as rail-mounted wide gantry cranes, because of the benefits to lifts per hour, capacity increases, and reduced risk of accidents in the railyard. Tier 4 non-road cargo-handling equipment can reduce PM and NOx emissions by 90 percent from Tier 1 equipment.[86]

Barriers to the implementation of newer, more efficient equipment are three-fold: necessary rail network upgrades, necessary capacity for construction, and high costs of new technology.

## Decarbonization

Medium and heavy-duty truck fuel efficiency standards in the US were first introduced at a national level in 2011[87] and updated in 2016[88] to set mandatory targets. This also created incentives for research

[86] CFR Parts 9, 69, et al. US Environmental Protection Agency Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule.
[87] U.S. EPA and U.S. DOT, "Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles; Final Rule", www.gpo.gov/fdsys/pkg/FR-2011-09-15/ pdf/2011-20740.pdf.
[88] U.S. EPA and U.S. DOT, "Final Rule: Greenhouse Gas Emissions and Fuel Efficiency Standards for Mediumand Heavy-Duty Engines and Vehicles—Phase 2", www.gpo.gov/fdsys/pkg/FR-2016-10-25/pdf/2016-21203.pdf.

and development of fuel-saving technologies and their deployment into the vehicle fleet. The truck fuel consumption reduction target is close to 50% for tractors and trailers by 2027.[89]

### Decarbonization Policies

California adopted differentiated standards focused on reducing emissions from various transportation sectors with examples including the Zero Emissions Vehicle (ZEV) Mandate (Collantes and Sperling, 2008), the Goods Movement Emission Reduction Plan (CARB, 2006a) and Sustainable Freight Action Plan (California Sustainable Freight Action Plan, 2016), and the At-Berth Regulation (California Air Resources Board, 2014). Similarly, policy examples at the Federal level include the National Program incorporating both Corporate Average Fuel Economy (CAFE) standards and GHG standards for LDV (Xie and Lin, 2017).

Carbon pricing and carbon emissions trading are two decarbonization methods. While UIPA has no regulatory authority in this area, UIPA may work to promote sustainable and smart supply chains within businesses in its jurisdictional area to reduce the overall carbon footprint. The following information provides additional context behind carbon pricing and emissions trading:

Carbon pricing is used globally by some governments or through market mechanisms to penalize the use of carbon-intense modes and offer grants and subsidies to incentivize a shift to modes with lower carbon emissions. Carbon trading, also known as emission trading, is a market-based tool to limit GHG emissions. It imposes a "cap" on carbon emissions from particular sectors and creates a carbon market within which businesses can buy and sell emission allowances under a cap-and-trade scheme. The world's first and largest Emission Trading Scheme was set up by the EU in 2005. The EU Emission Trading System (EU ETS)[90] currently operates in all EU countries plus Iceland, Liechtenstein, and Norway. It limits emissions from more than 11,000 heavy energy-using installations (power stations & industrial plants) and airlines operating between these countries, which in total accounts for around 45% of the EU's greenhouse gas emissions.

Global carbon prices continue to fluctuate widely (from $3 to $29 between 2013 and 2019) and are considered underpriced.[91] Another issue with the current model of carbon pricing is that carbon-intensive industries can relocate to other countries if there are high carbon price discrepancies between countries.[92]

[89] U.S. EPA and U.S. DOT, "Final Rule: Greenhouse Gas Emissions and Fuel Efficiency Standards for Mediumand Heavy-Duty Engines and Vehicles—Phase 2", www.gpo.gov/fdsys/pkg/FR-2016-10-25/pdf/2016-21203.pdf.
[90] https://ec.europa.eu/clima/policies/ets_en
[91] The High-Level Commission on Carbon Prices determined that the global climate goals of COP21 requires carbon price per ton to be between $40-80 by 2020 and between $50-100 by 2030 https://www.carbonpricingleadership.org/news/2017/5/25/leading-economists-a-strong-carbon-price-needed-to-drive-large-scale-climate-action
[92] McKinnon, A., 2018. Decarbonizing Logistics: Distributing Goods in a Low Carbon World. Kogan Page Publishers.

# 4.6 Sustainability Certifications

Sustainability certifications provide rigorous environmental planning processes. These types of programs seek to encourage more sustainable development and industrial practices within their respective regions. UIPA is considering undergoing a performance-based certification process to enhance environmental sustainability in its jurisdictional area. Examples of sustainability certifications are as follows:

**The EcoDistricts Protocol** is a rigorous certification standard to foster neighborhood and district-scale sustainability. The framework defines a rigorous, sustainable urban development framework for achieving people-centered, economically vibrant neighborhood- and district-scale sustainability. It is a tool for advancing sustainability initiatives that also offers a certification program. The EcoDistricts Protocol is structured around three imperatives: equity, resilience, and climate protection. It encourages community development that:

- Commits to the three imperatives of equity, resilience, and climate protection
- Supports multi-stakeholder collaboration and governance
- Creates a comprehensive district-scale "roadmap" guided by performance indicators
- Reports progress with a commitment to transparency and knowledge sharing

**Envision** is a framework developed by the Institute for Sustainable Infrastructure with 64 sustainability and resilience indicators (credits). Envision provides the guidance needed to initiate systemic change in the planning, design, and delivery of sustainable and resilient infrastructure. Envision is a decision-making guide, not a set of prescriptive measures. Envision provides industry-wide sustainability metrics for all types and sizes of infrastructure to help users assess and measure the extent to which their project contributes to conditions of sustainability across the full range of social, economic, and environmental indicators (ISI 2019).[93]

**LEED** is a set of standards developed by the US Green Building Council (USGBC) focused on building sustainability. LEED incorporates green building practices that design, construct, and operate buildings to maximize occupant health and productivity, use fewer resources, and reduce waste and negative environmental impacts (USGBC 2019). Notably, LEED promotes building design practices that lower energy, water, and resource use. LEED-certified buildings are globally recognized as symbols of sustainability achievement and the design practices apply to almost any building (USGBC 2019).[94]

**The US EPA SmartWay Program** is a voluntary program launched in 2004 to help private corporations understand freight emissions across their supply chains and identify and promote strategies for reducing freight emissions and costs. While not a certification process for ports, the program's components could be adopted by UIPA. As of 2019, over 3,700 organizations currently participate in the program and have reduced 280 million barrels of oil in energy consumption and 134 million tons of criteria air pollutants over the past 15 years.

[93] Institute for Sustainable Infrastructure (ISI) 2019. Envision Sustainable Infrastructure. Accessed at: https://sustainableinfrastructure.org/envision/
[94] U.S. Green Building Council (USGBC) 2019. LEED. Accessed at: https://new.usgbc.org/leed

- The SmartWay Transport Partnership program helps organizations understand, document, and benchmark the environmental performance of their freight and logistics operations in order to reduce environmental impacts.
- The SmartWay Brand provides freight carriers and shippers with a way to communicate their investments in sustainability and reducing emissions.
- The SmartWay Global Collaboration provides support to policymakers in adopting best practices from the SmartWay program through training and educational materials, including *How to Develop a Green Freight Program: A Comprehensive Guide and Resource Manual.*

**CASE STUDY: HOME DEPOT**

The Home Depot Inc. is one of the U.S. companies contributing to the success of the U.S. Environmental Protection Agency's SmartWay program – a program than incentivizes sustainable supply chains. The Home Depot's participation in SmartWay is a major contributor to driving other companies to adopt sustainable business practices. By sharing findings of sustainable business practices, they help demonstrate feasibility, as well as overall benefits like cost-savings and environmental stewardship that encourage other companies to participate in SmartWay.

The Home Depot relies on a combination of measures to improve logistics efficiency, including load consolidation in distribution centers, cube optimization to maximize truck and container utilization, and the use of higher-capacity equipment. In addition, the company prioritizes the use of the most efficient truck carriers registered in the North American SmartWay program.

# 5 Developments and Infrastructure

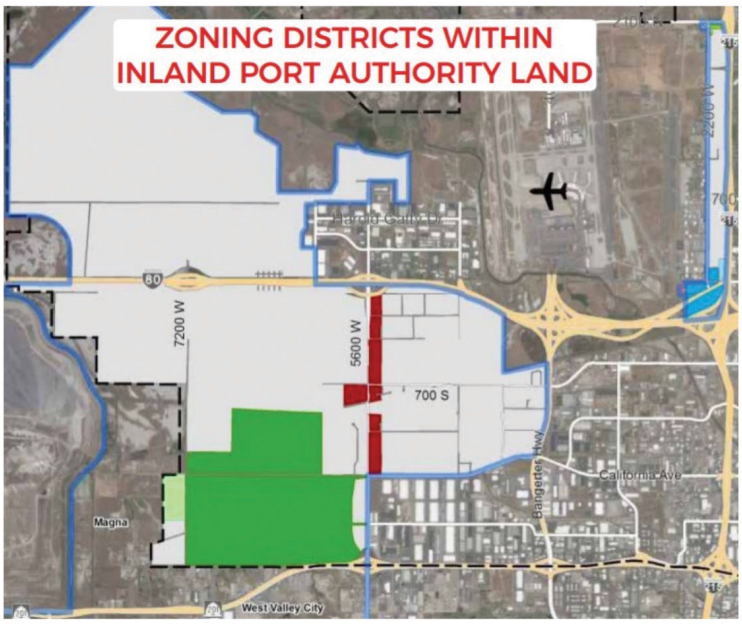
*The UIPA jurisdictional area of approximately 16 thousand acres is mostly privately-owned, 7 thousand acres of which are vacant and suitable for development. Major landowners – Rio Tinto, SITLA, NWQ, LLC, and Suburban Land Trust – own approximately 62 percent of the vacant and developable lands. Additionally, major improvements in rail, highway, and utilities infrastructure are underway in this region. Salt Lake City currently leads the nation in both supply and demand for industrial real estate for both logistics and manufacturing use when accounting for its population size. This contextual information facilitated UIPA in developing its partnerships, policies, and programs in the Strategic Business Plan.*

## 5.1 Site Inventory

Generally, five broad zoning districts govern land use within the UIPA jurisdictional area, depicted by Figure 5-1. Most of this land (roughly 85%) is currently zoned under Salt Lake City bylaws, except for small areas at the southwest portion of UIPA which fall within Magna Metro Township and West Valley City.

- **Gray** – indicates Salt Lake City M1 zoning – Light manufacturing and industrial uses that don't impact adjacent properties and have a clean, attractive industrial setting
- **Red** – indicates GC zoning – General Commercial to provide a variety of services and products, such as retail sales and services, entertainment, and office.
- **Green** – indicates OS zoning – Open Space to preserve and protect areas of public and private open space. In this case, both a nature preserve and landfills are within this part of the UIPA zone.

**FIGURE 5 1: ZONING DISTRICTS WITHIN UIPA**



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- **Light Green** – indicates Agricultural zoning.

- **Light Blue** – indicates TSA-MUEC zoning. "A mixed-use employment station is an area with a high concentration of jobs that attract people from the entire region. These areas generally start with a campus-style development pattern and are dominated by a single type of use that generally employs a high number of people. Buildings are often large scale in nature and may have large footprints."[95]

The following table summarizes the largest planned developments in the UIPA jurisdictional area, representing 62% of total vacant lands within the UIPA jurisdictional area.

**FIGURE 5-2: LARGEST PLANNED DEVELOPMENTS (BASED ON FALL 2019 CONSULTATIONS)**

| Landowner/Developer | Approximate Development Plan Acreage | Location of Holdings |
|---|---|---|
| Rio Tinto | 1,600 | Western and southwestern quadrants of UIPA, below I-80 |
| NWQ, LLC | 1,500 | North of I-80, Phase 1 above SITLA site |
| Utah School and Institutional Trust Lands Administration (SITLA) & Ninigret Group | 770 | North of I-80, fronting I-80 to the south and SLGW rail along the eastern edge |
| Suburban Land Reserve (SLR) | 500+ | Numerous parcels along S. 5600 W, with a large 300-acre parcel just below Union Pacific intermodal terminal |

## Rio Tinto

### Land Holdings

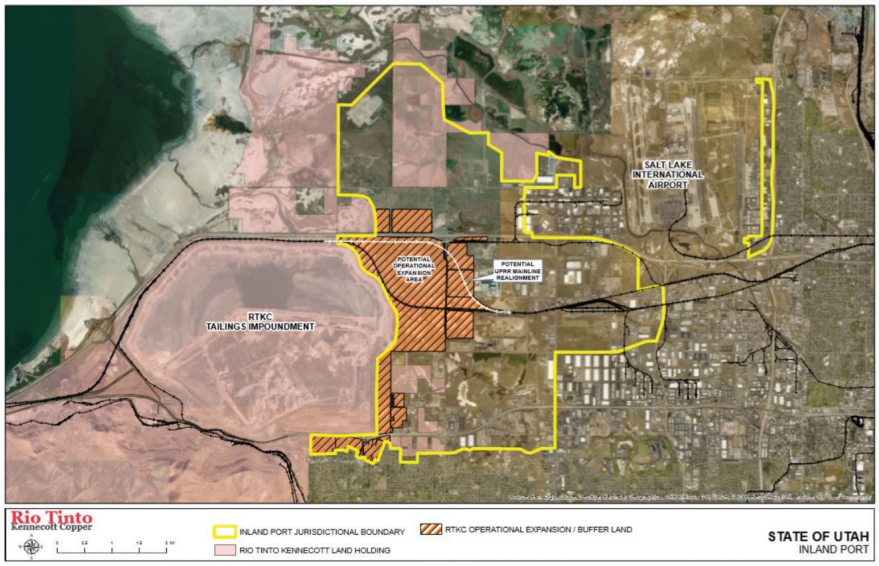
Rio Tinto is one of the largest landowners in the UIPA jurisdictional area through the Kennecott Copper Mine. These parcels within UIPA's jurisdictional area are almost all located on the western edge. Due to the mine's presence, there are major mine tailings adjacent to UIPA which may limit certain types of development. Rio Tinto maintains a 500-acre operational buffer along 8000 West fronting I-80 to allow for compatible land uses.

### Development Plans

Within the UIPA jurisdictional area, Rio Tinto estimates that roughly 1,600 acres are developable with the remainder being reserved for its own operations, either as a buffer or for future tailings expansion.

[95] https://maps.slcgov.com/mws/zoning.htm

**FIGURE 5-3: RIO TINTO LAND HOLDINGS**




Rio Tinto is working with NWQ, LLC as a part of their Salt Lake City Port Global Logistics Center, under M1 zoning. The company specifically noted wanting to avoid M2 development in order to maintain the ecology of the lake and surrounding natural lands. Figure 5-3 depicts Rio Tinto's land holdings within the UIPA jurisdictional area. The orange hatched areas are those which the company has designated as an operational buffer. Rio Tinto mentioned it would allow compatible uses built into these areas, but only on a case-by-case basis.

Where possible within the UIPA jurisdictional area, Rio Tinto would like to see development that would benefit its mining operations, although the breadth of potential 'synergistic' industries (those that would complement Rio Tinto by integrating with its supply or value chain) is relatively narrow due to the specific nature of mining. To that end, Rio Tinto believes that developments in the inland port area be targeted for thoughtful investment attraction towards high-multiplier companies such as high-tech manufacturing, additive manufacturing, and industry 4.0 (the digital integration of machinery, software, and data) by leveraging the region's growing prowess in tech ("Silicon Slopes"). High-multiplier companies bring higher value-added activity, creating more spending, paying higher salaries, and therefore causing a larger indirect economic impact. Such companies tend to generate less waste, utilize energy-efficient technologies, and have smaller employment profiles which may have positive implications on commuter traffic.

## Development Obstacles

The majority of easily-developable land in the Salt Lake City metropolitan area has already been developed. Rio Tinto noted that elevation and soil are the main reasons that the UIPA jurisdictional area is one of the last areas to be developed within Salt Lake City. The cost of developing in the area is very expensive due to the amount of fill that must be used.

Even so, potential investors and users cite proximity to interstate, rail, and airport as important investment factors. The UIPA jurisdictional lands have all these assets, meaning the cost of developing the land is justified by its favorable geographic location – especially for industrial uses.

Another obstacle noted was the challenge of creating sustainable growth that balances economic prosperity with conservation and air quality. The company's representative noted that technology and smart development planning can mitigate or even unite these seemingly opposing goals.

Finally, creating a competitive place for business, and then marketing it successfully, is a challenge. Rio Tinto believes that rail is critical to making the area competitive, but challenges behind funding and execution exist.

## Sustainability and Rail

Rio Tinto is a proponent of rail and the company asserts that the benefits are two-fold:

First, putting more rail infrastructure in place and creating neutrality (i.e., dual access to UP and BNSF) creates a competitive business environment. This will help the local industry access better rates and spur more investment towards rail operational efficiency as a result of the competition. Second, rail is a more sustainable transportation option than trucking. Since most UIPA lands are already entitled, development will inevitably occur. If rail is not planned for, then truck-oriented development will occur, further exacerbating air quality and traffic. Rail can mitigate this potential impact.

Despite mining's reputation as a carbon-intensive industry, Rio Tinto is an advocate for environmental sustainability and nature preservation. Rio Tinto created the Inland Sea Shorebird Reserve to mitigate the impact of its tailings expansion, resulting in over 3,600 acres of reserve lands which have increased bird use by over 1,000 percent, attracting 200 species. Because the UIPA zone is adjacent to the reserve, the company is mindful of potential development impacts and has appropriated buffer land for waterfowl accordingly.

Furthermore, Rio Tinto is pioneering sustainability among mining companies. It is working towards being carbon neutral by 2030 by studying a variety of potential renewable energy resources. Due to Rio Tinto's extensive real estate, long-distance power transmission is a constraint to reaching carbon neutrality. Using its real estate for local power generation via renewables makes as much business sense as it does environmentally. It is examining the potential for wind and solar across its mining sites. The company is also considering hydro storage and combined heat capture (CHC) units. Rio Tinto has already shuttered its own power plant in favor of receiving all electricity via Rocky Mountain Power while making use of renewable energy credits.

## SITLA and Ninigret Group

The State of Utah School and Institutional Trust Lands Administration (SITLA) is a quasi-governmental agency responsible for the management of trust lands to generate revenue for 12 specific institutions: public education; Utah School for the Deaf; Utah School for the Blind; Utah State Hospital; Juvenile Justice Services, Miners Hospital; University of Utah; Utah State University; Colleges of Education; College of Mines and Earth Sciences; reservoirs; and buildings. Its real estate development arm acquired the 770-acre site from the Suburban Land Reserve, which had let the land lay fallow for 30 years for animal grazing. Prior to that, the site was a municipal solid waste landfill for Salt Lake City.

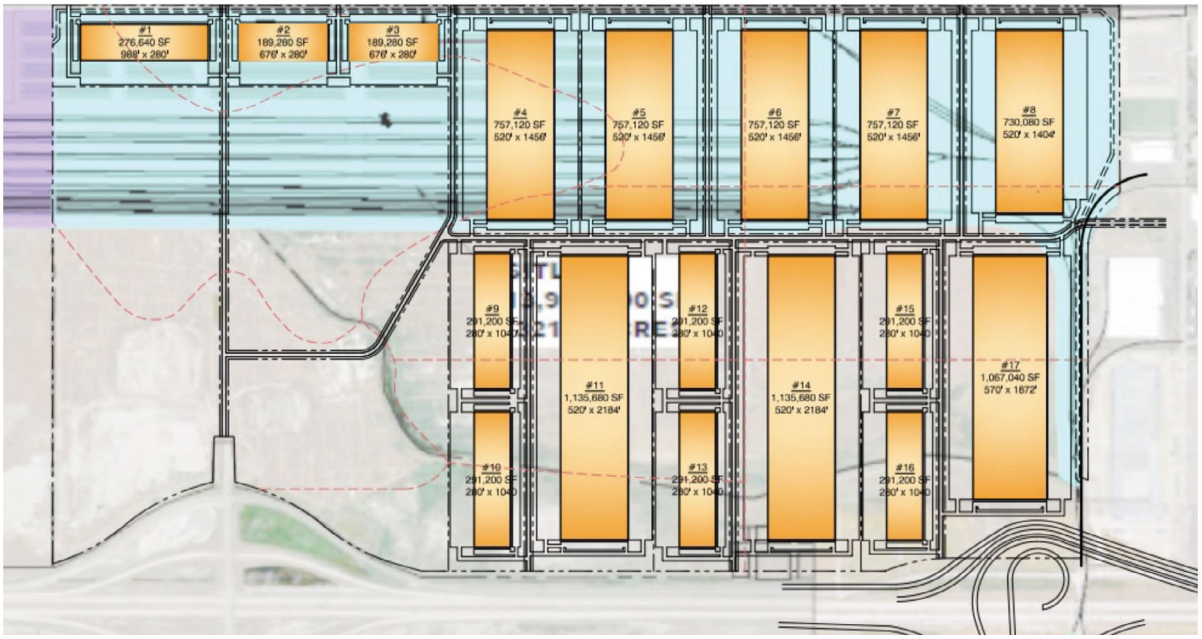
Because the site is a retired landfill, remediation is required before the site can be developed. For this reason, SITLA engaged the Ninigret Group to develop the site. The Ninigret Group has extensive experience developing brownfield sites in need of environmental remediation.

Prior to the legislation creating UIPA, SITLA had an agreement with the City that it would use the tax increment to fund the remediation of the site – the City is liable for the site's remediation regardless of owner. Cost estimates for full remediation of the site exceed $150 million.

## Development Plans

SITLA and Ninigret's original plans to develop the site was a multi-phased plan that would incrementally remediate portions of the site, making pieces available for development one at a time. This would start in the southeast corner of the site, then northeast, continuing counter-clockwise. At each stage, soils would be pushed to the western portion of the site until full remediation is required.

**FIGURE 5-4: SITLA SITE PHASING PLAN**




Source: Ninigret Group

The first 150 acres (southeast corner) will be completed in 18 months. Phase 2 (another 100 acres) depends on demand but will likely be developed another 18-24 months after Phase 1.

In terms of market demand for the developable land (once remediated), Ninigret expects a variety of warehousing, distribution, and manufacturing. If rail terminal infrastructure is put in place, it expects that inland port-related activity will locate alongside terminal infrastructure. For instance, cold storage facilities typically wish to locate near rail as a hedge against fuel prices.

## Environment

Ninigret indicated that all the buildings will have solar panels. Because of the amount of soil remediation, the development's soil repository will function as green space – this space could also be used as a solar field.

## NWQ, LLC

NWQ, LLC is a joint venture between Wadsworth Development Group, Colmena Group, and Stokes Partners to develop a 1,500 swath of land known as the SLC Port Global Logistics Center. Prior to the creation of UIPA, the group had an agreement in place with the City that would give it the ability to receive up to 75% of the City's tax share for the entire project area, roughly $28 million of TIFF. Rio Tinto had the same deal in place.

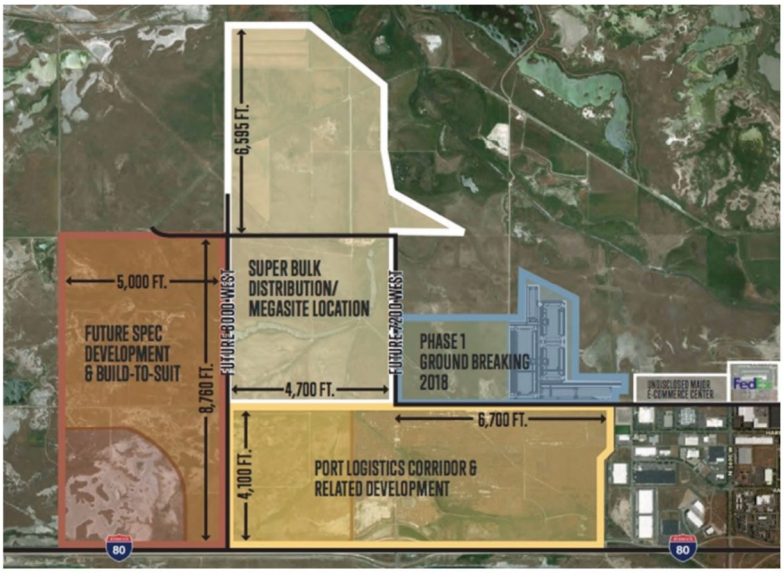
The City's entitlements of M1 zoning are grandfathered. This development was negotiated at the same time as the Utah State Prison for all infrastructure being brought to the site, simultaneously bringing services to much of the vacant land available for industrial development. NWQ, LLC paid for these upgrades, bringing water capacity to 12 million gallons per day which is sufficient for the whole zone. They upgraded the sewer for private development as well through the development of a gravity well.

## Development Plans

As shown in Figure 5-6, the development is focused on three main areas:

- Phase 1 is already platted with construction underway. It will consist of 9 buildings totaling 6 million square feet. These plots will not be rail-served since NWQ, LLC is banking on the rail terminal loop concept to be executed immediately to its south.
- The white portion depicted in Figure 5-6 is envisioned to be an EDCU Mega Site[96], which would be made even more feasible if the rail terminal loop concept is successful.

**FIGURE 5-5: NWQ, LLC DEVELOPMENT PLAN**




Source: NWQ, LLC

- The brown portion of the map will be reserved for future speculative development and build-to-suit opportunities, which can also benefit from possible rail.

## Rail

- NWQ, LLC is also a major proponent of rail infrastructure, partly because the later phases of development depend on rail.
- First, NWQ, LLC maintains that the terminal loop would improve flow and efficiency.
- Second, they assert that it would allow neutral, dual access for users with an eastern interchange with the UP mainline.
- Third, placing rail infrastructure on the SITLA site would require fewer remediation dollars than having to fully remediate the land.
- Finally, the loop would bring rail along the east side of 8000 W, enabling a line to be brought further north to service the EDCU Mega Site location. This would also enable rail to cross 8000 W. to the final phase of the development, allowing manifest service to be brought to users at the northwestern portion of the UIPA zone.

[96] EDCU Mega Sites are large acreage sites expected to create 1,000 jobs or $1 billion in capital investments.

### Environment

NWQ, LLC maintains that the sustainability features of Phase 1 reach beyond any environmental standards in the current code. All buildings will be LEED-certified, use LED lighting, and have solar roofs. Furthermore, NWQ, LLC is open to new environmental sustainability standards to improve air quality and the local environment.

## 5.1.4 Boyer Company

The Boyer Company recently sold one development in the UIPA jurisdictional area and is currently carrying out its due diligence process on new parcels in this area.

### Environment

Boyer Company maintains that construction costs are significant due to soil elevation and the cost of materials that additional costs to implement sustainable practices may be prohibitive to development. However, the company does employ several strategies. Boyer Company is trying to maximize the amount of daylight into warehouses to reduce energy usage. Furthermore, it intends to utilize roof solar power and by considering self-imposing setbacks and dedicating green areas that are adjacent to environmentally sensitive areas.

The company asserts that zoning requirements within the city are easy to work with but it prefers to reduce the amount of landscaping required for individual buildings. Instead, the company proposes to consolidate landscaping into large landscaped lots since landscaping for each individual building is water-intensive. The company is currently discussing this idea with the City.

### Infrastructure

The Boyer Company emphasizes that transportation infrastructure is what will determine the success of UIPA and its goals. In addition to bringing services throughout the zone and the challenges of soil elevations, roads will need to be built or expanded in order to alleviate traffic in other areas and make access efficient for new users.

## 5.1.5 Suburban Land Reserve

The Suburban Land Reserve (SLR) is another major landholder in the UIPA jurisdictional area. SLR has approximately 116 acres under contract and currently under development, with several other pieces of land that the entity plans to develop itself:

- A 68-acre parcel at the northwest corner of 5600 W. and 300 S., bifurcated by a street.
- A 52-acre parcel northwest of 5600 W. and 700 S.
- Numerous other parcels along 5600 W.
- A 300-acre parcel just south of the UP Intermodal Terminal. 250 acres are part of an old landfill that has not been remediated. At some point, SLR believes the cost to clean up the land will be less than the value of the property.

SLR does not have plans to incorporate rail into its development plans. Much of its sites are smaller and dispersed without a clear path to rail. Its development plans are for trucking-oriented warehousing and distribution. In fact, SLR maintains that warehousing and distribution are the highest best use for its land mainly because of access – it concedes that manufacturing could locate at its sites, but does not believe this is as likely.

## Challenges

SLR mentioned several barriers related to logistics that should be considered. It believes the extension of 300 S. and 700 S. westward to 7200 W. is necessary. It is also concerned that Kennecott may eventually increase its tailings which would reroute rail and complicate development south of I-80. Finally, SLR believes that 5600 W. needs significant improvement as well.

## Romney Group

The Romney Group is planning a 900-acre development in Tooele County, as depicted by Figure 5-7. The development's close proximity to the UIPA jurisdictional area makes this a possible opportunity for a 'satellite port' partner. For the Romney Group, the case for the development is clear: 70% of Tooele County residents commute to Salt Lake City. If this development can provide more local employment opportunities, the Romney Group believes the development could reduce the length and volume of commuter traffic to improve air quality and traffic conditions. Romney Group also believes that adding a new interchange along I-80 can also potentially offset trucking traffic into Salt Lake City by diverting some of the activity to this industrial development rather than at another location in the city.

This development proposes connecting two UP lines (one from San Francisco/Oakland and another from LA/Long Beach). Because the site is off the UP mainline, it would allow BNSF trackage rights – making it a dual-served site. The plans currently focus on manifest rail, though the site has the acreage for a large rail facility. However, despite the Romney Group receiving concept approval from UP, the site is 12 miles from the UP mainline, which would require an extensive investment (around $12 million, as least) to reach the site. However, the Romney Group claims that constructing rail in Tooele County is 1/3 the cost to do so within the UIPA jurisdictional area given soil conditions and elevations. State or federal funding would be required to implement rail on this site.

**FIGURE 5-6: ROMNEY GROUP DEVELOPMENT PLANS FOR TOOELE COUNTY SITE**


Source: The Romney Group



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### Environment

While Tooele development may reduce commuter traffic, the development itself might house warehousing and logistics operations that have trucking routes into Salt Lake City to serve the regional market, routes which would be longer routes than if they located more locally within Salt Lake City itself. In this scenario, trucking emissions within the nonattainment area could increase due to longer routes. At the same time, airflow patterns in Tooele County are different than those of Salt Lake County and improvements to air quality could occur if trucking routes to and from the development circumvented Salt Lake City entirely. The Romney Group is currently drafting covenants that are intended to go beyond existing environmental regulations currently in code. The development will incorporate sustainable practices when possible. The development will not be available for heavy water users given the water constraints of the County.

## 5.2 Rail

### 5.2.1 Union Pacific

Union Pacific (UP) is the dominant rail provider in Utah due to its extensive infrastructure in the state. This infrastructure is also a significant presence in the UIPA jurisdictional area. The UP mainline bisects the area, running east-west, with UP's Salt Lake City Intermodal Terminal lying within the area.

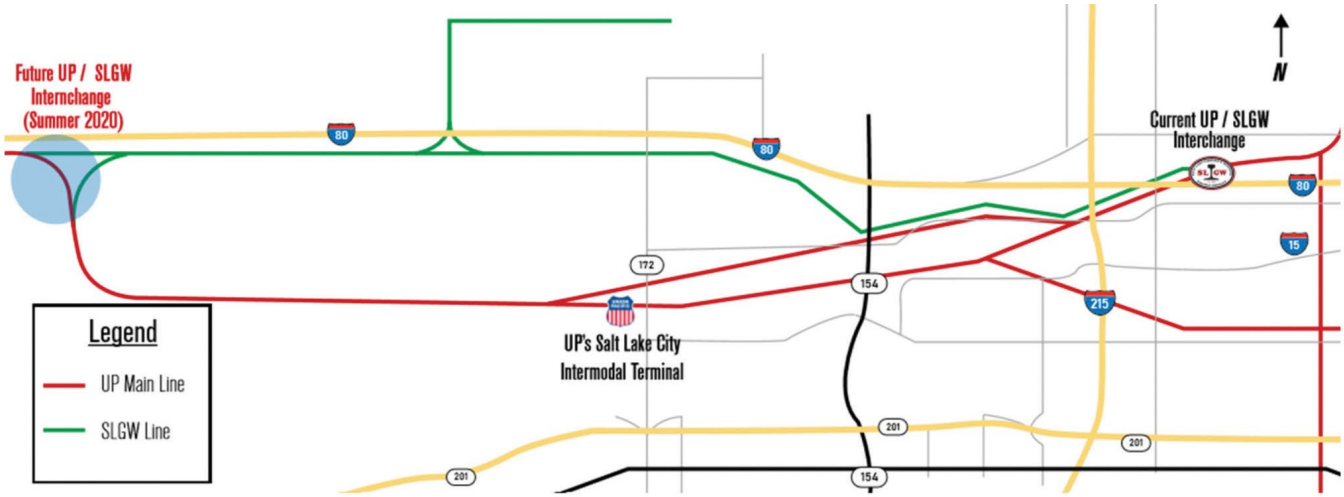
### Planned Infrastructure

In 2018, UP invested $58.7M in capital into Utah.[97] UP plans to expand its intermodal ramp which should help with efficiency and volume as the railroad expands its intermodal service between Denver, Salt Lake City, and Los Angeles.[98] The facility currently has four (4) loading tracks, five (5) storage tracks, 250,000 lift-capacity for intermodal containers and over 1,100 parking stalls for containers.[99] UP will be adding 400 parking stalls on the current footprint on the north side of the intermodal terminal. The railway has also purchased property across 5600 W. to allow expansion. UP could potentially open west side switching capacity which would bring container life capacity up to 400,000 a year (almost a 50% increase).

UP typically waits until it is at almost full capacity until investing to accommodate incremental demand growth. Salt Lake City used to be a 30% surplus market (meaning more cargo was coming in then shipping out), however, this has now shifted to just a 10% surplus. This shift is mainly due to the intermodal growth in parcel freight via carriers such as UPS, FedEx, and Amazon. Because of this shift to just a 10% surplus, UP is looking more seriously at infrastructure upgrades in the area.

[97] https://siteselection.c om/issues/2019/may/union-pacific-big-utah-stake.cfm
[98] https://trn.trains.com/news/news-wire/2019/06/11-union-pacific-expands-intermodal-service-between-denver-salt-lake-city-and-los-angeles
[98] https://www.up.com/customers/premium/intmap/slc/index.htm

**FIGURE 5-7: RAIL INFRASTRUCTURE WITHIN THE UIPA JURISDICTIONAL AREA**




Source: Union Pacific

The Salt Lake Garfield & Western (SLGW) short line railroad plans to construct a new interchange west of UP's intermodal terminal. Apart from this, there are discussions about the possibility of Rio Tinto expanding its copper tailings eastward, which would necessitate the reorientation of the UP mainline. With that said, Rio Tinto is working with SLGW to put together a contingency plan in the event tailings expand. Though this would not necessarily affect the interchange capacity of SLGW, it would require the interchange to be moved further to the east, which might face infrastructure challenges as the Mountainview Corridor it built out in the same area.

UP considers a terminal north of I-80 to be a realistic possibility, though due to SLGW's presence there, it would not be a UP facility. Typically, this sort of investment would require a local funding mechanism such as TIFF, supplemented by federal and state matching grants. UP would envision this facility to have an inbound and outbound track as well as a parking yard.

## Environment

UP is currently working on the following sustainability initiatives:

- Fuel efficiency – UP is implementing software that helps save fuel and predict failures. The railroad also invests in new (Tier 4) locomotives which reduce emissions.
- Energy Conservation – UP reduced its utility consumption by 3.1 million kWh by using solar power and LED lightbulbs.
- Waste Management – UP diverted approximately 71% of its waste from landfills by recycling much of the materials.
- Water Management – UP has a leak reduction initiative that has conserved millions of gallons of water. The railroad also works with NOAA to determine flood risks along its network.

- Biodiversity & Land Preservation – UP implements habitat conservation plans.[100]

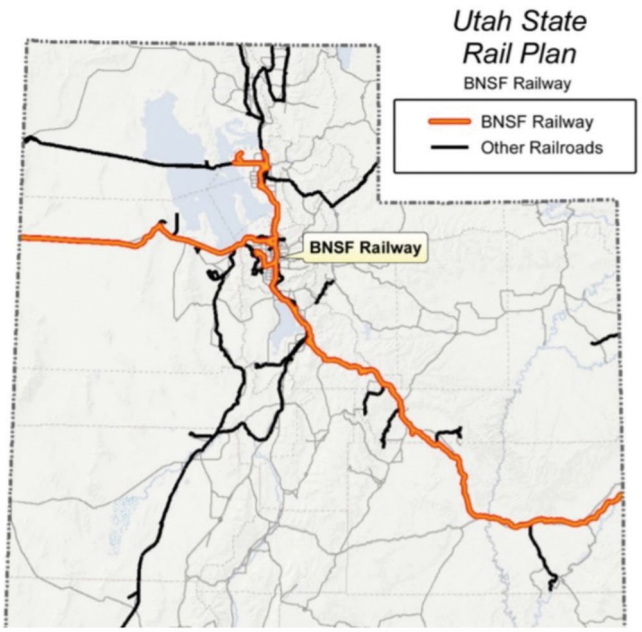
The UP has implemented an Automated Gate System (AGS) at their Salt Lake City Intermodal Terminal which reduces the time of a trucker to process a container at the gate from four minutes to just 60-90 seconds. This improved efficiency can reduce idling time and air quality impacts.

Currently, the cargo-handling equipment used at the UP intermodal yard is powered by diesel fuel, whereas indoor cargo-handling equipment is typically electric-powered, natural gas, or propane (with some hydrogen fuel cell testing). UP locomotives are also currently Tier 0 engines according to EPA standards.

### 5.2.2 BNSF

Though BNSF is present in the area, it is at a disadvantage to UP due to its rival's significant infrastructure in the state. Currently, BNSF can access customers via UP, NLGW, and Utah Railway. As the map depicts, the orange lines are those where BNSF has trackage rights to UP rail due to anti-monopoly regulation. Since BNSF has trackage rights to the UP mainline that runs through the UIPA jurisdictional area, it can potentially serve customers in the area. However, much of the development will occur north of I-80, where SLGW currently has a solid presence. It could access customers via SLGW, but this would make it less cost-competitive.

**FIGURE 5-8: UTAH RAIL INFRASTRUCTURE**




Source: UDOT State Rail Plan 2015

BNSF has expressed interest in competing for new customers in Utah, especially in the Salt Lake City area. The metro area is large and growing quickly, so it is viewed as an opportunity for new customers. This growth typically brings rail opportunities in lumber, steel, aggregates, concrete that is used in construction projects for roads, highways, and new housing.

BNSF envisions competing for manifest/carload business but does not see a short- or medium-term case for intermodal. First, UP has a route advantage from California. Secondly, UP already has an intermodal terminal and, though the Salt Lake City market is growing, there currently not the capacity for a second intermodal terminal in such close proximity.

Over the short-term, BNSF sees itself competing for individual customers on a project-by-project basis at the manifest/carload level. The railroad does not envision proactively making new capital investments unless demanded by customers, or with significant local, state, and federal funding.

[100] "Building America" Report, Union Pacific, 2018

## Environment

BNSF is mindful of the environmental impact of its operations. Across the country, $2.3 of BNSF's $3.3 billion in capital investments made in 2017 were toward maintaining and improving existing track and improving facility efficiency. BNSF has upgraded more than 60% of its locomotive fleet with energy management technology to maximize fuel efficiency, resulting in a 7% increase in efficiency since 2008. The railroad was also the first in the US to deploy wide-span electric cranes at its intermodal facilities, reducing carbon emissions. The railroad also reduced other pollutants, such as nitrogen oxides and particulate matter, by 34% and 45% since 2008, respectively. BNSF is expanding the use of AGS and has reduced its energy consumption by 5.3% since 2014. BNSF would seek to employ the same focus on fuel efficiency within the UIPA jurisdictional area as it competes for new business.

## Competition

In short, for BNSF to compete, it needs any new development to be off the dual-accessed UP mainline so BNSF can serve customers directly and remain competitive. Such a situation would benefit the industry by creating a competitive rail environment that could reduce costs and encourage rail-oriented investments.

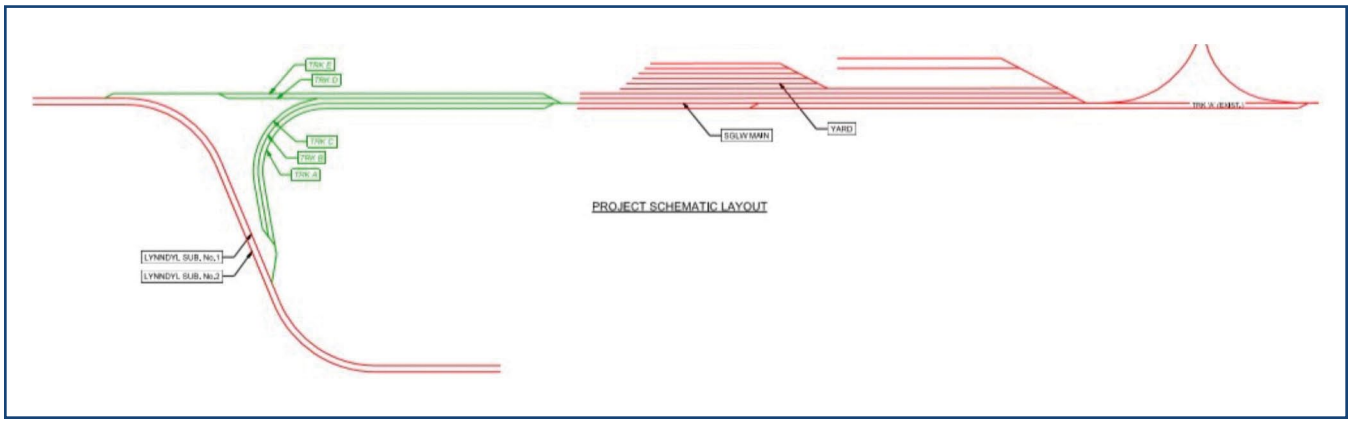
### 5.2.3 Short Lines

## Salt Lake Garfield & Western (SLGW)

Salt Lake Garfield & Western (SLGW) currently serves the International Center north of I-80. Its spurs cross the interstate to serve users, while a large yard provides car storage south of the interstate. Due to the current configuration of the track, SLGW is limited in terms of train size. Their interchange with UP is currently further east between I-215 and I-15. SLGW obtained financing to build an entirely new interchange on the west side of its mainline, connecting with UP. This interchange will be able to facilitate 130 cars' length. It will also make interchanges more efficient for inbound UP coming from the west.

UP believes the improved interchange with SLGW will allow the short line to handle the incremental development north of I-80. However, if the Kennecott Copper Mine's tailings were to expand in the future, the interchange would be affected, and it is unclear how this would affect the capacity and efficiency of the SLGW.

**FIGURE 5-9: SLGW INTERCHANGE PLANS**




Source: Union Pacific



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## Utah Central Railway and Utah Railway

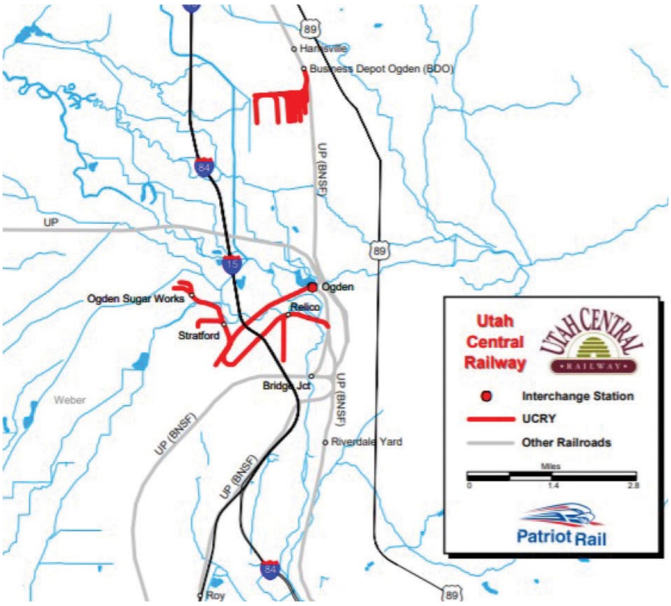
Neither Utah Central Railway or Utah Railway is present in the UIPA jurisdictional area, but they are significant rail players in Utah.

As shown in Figure 5-11, the Utah Railway owns roughly 59 miles of track between Mohrland and the Martin/ Helper Terminal, with trackage rights from Ogden, UT to Grand Junction, Colorado. Utah Railway interchanges with both UP and BNSF at these two locations.

**FIGURE 5-10: UTAH RAILWAY INFRASTRUCTURE**


Source: Utah Railway

**FIGURE 5-11: UTAH CENTRAL RAILWAY INFRASTRUCTURE**



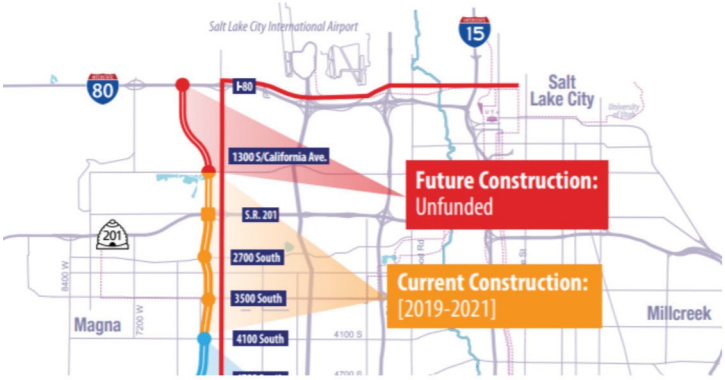

Source: Utah Central Railway

The Utah Central Railway (Figure 5-12) operates over 34 miles of rail in the Ogden area. It interchanges with both UP and BNSF at Ogden and Harrisville. It is the exclusive operator of the Business Depot Ogden industrial park.

# 5.3 Road

Several road upgrades are currently underway or being planned for within the UIPA jurisdictional area. First, the Utah Department of Transportation (UDOT) is currently constructing the Mountainview Corridor, a freeway that will eventually connect I-80 with SR-73 in Utah County. Construction of the freeway is currently underway, but a major portion of the project (from 1300 S./California Avenue to I-80) is currently unfunded. The Mountainview Corridor will allow commuters and trucking alike to bypass I-15 by finding a more efficient route along the western portion of the valley.

**FIGURE 5-12: MOUNTAINVIEW CORRIDOR PLANS**




Source: UDOT



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The unfunded portion includes a planned interchange between the Mountainview Corridor and I-80, as demonstrated below. This interchange will be at the southeast corner of the SITLA site, also where SLGW crosses the interstate to service the International Center. This interchange plan does not currently propose direct access into the portion of UIPA north of I-80 where the most significant developments are likely to occur. SITLA and UIPA have both spoken to UDOT about this, and there is a willingness by UDOT to shift this interchange further west, either along 7200 W. or possibly even 8000 W.

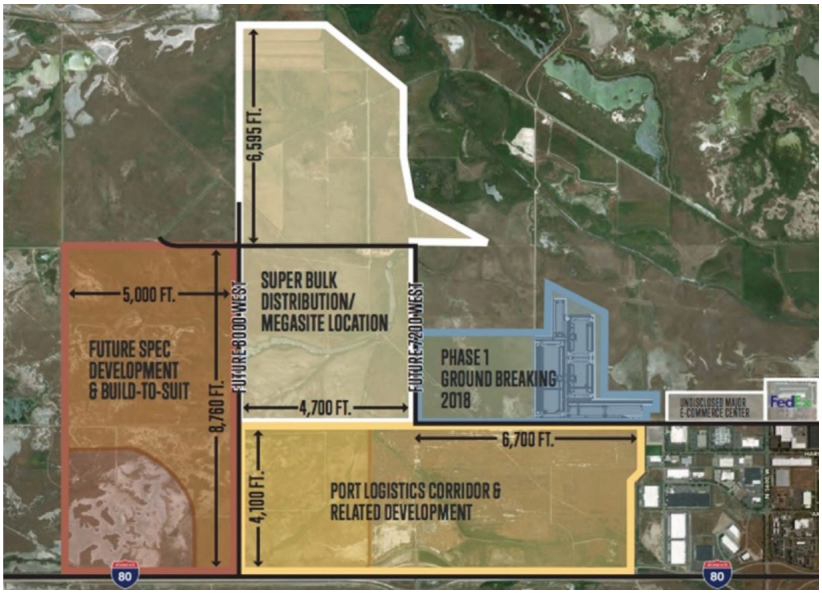
**FIGURE 5-13: MOUNTAINVIEW CORRIDOR - I-80 INTERCHANGE PLAN**

Source: Ninigret Group

Beyond the construction of the Mountainview Corridor, local road construction is occurring to access the Utah State Prison site, specifically 700 N. and N. 7200 W. Utilities will be placed within these roads, bringing services to future development phases.

Magna will also be affected by the development. The municipality conducted a study on the 7200 West Extension in their Master Transportation Plan. According to the Greater Salt Lake Municipal Services District (MSD), developers are already planning projects between 7200 W. and 8000 W. The MSD asserts that road upgrades are highly needed since much of the infrastructure stops shortly into inland port. Two Senate bills have addressed funding to build 2550 South (Senate Bill 234) which will be built for Magna and West Valley City.

**FIGURE 5-14: PLANNED ROAD INFRASTRUCTURE NORTH OF I-80**




Source: NWQ, LLC

Furthermore, Salt Lake County has already conducted a study on the extension of 7200 W. throughout the UIPA jurisdictional area, from UT-201 to 700 N. (the complete study can be found here). The study recommends the construction/expansion of the road to 3-lanes, which would cost approximately $256 million by 2025.

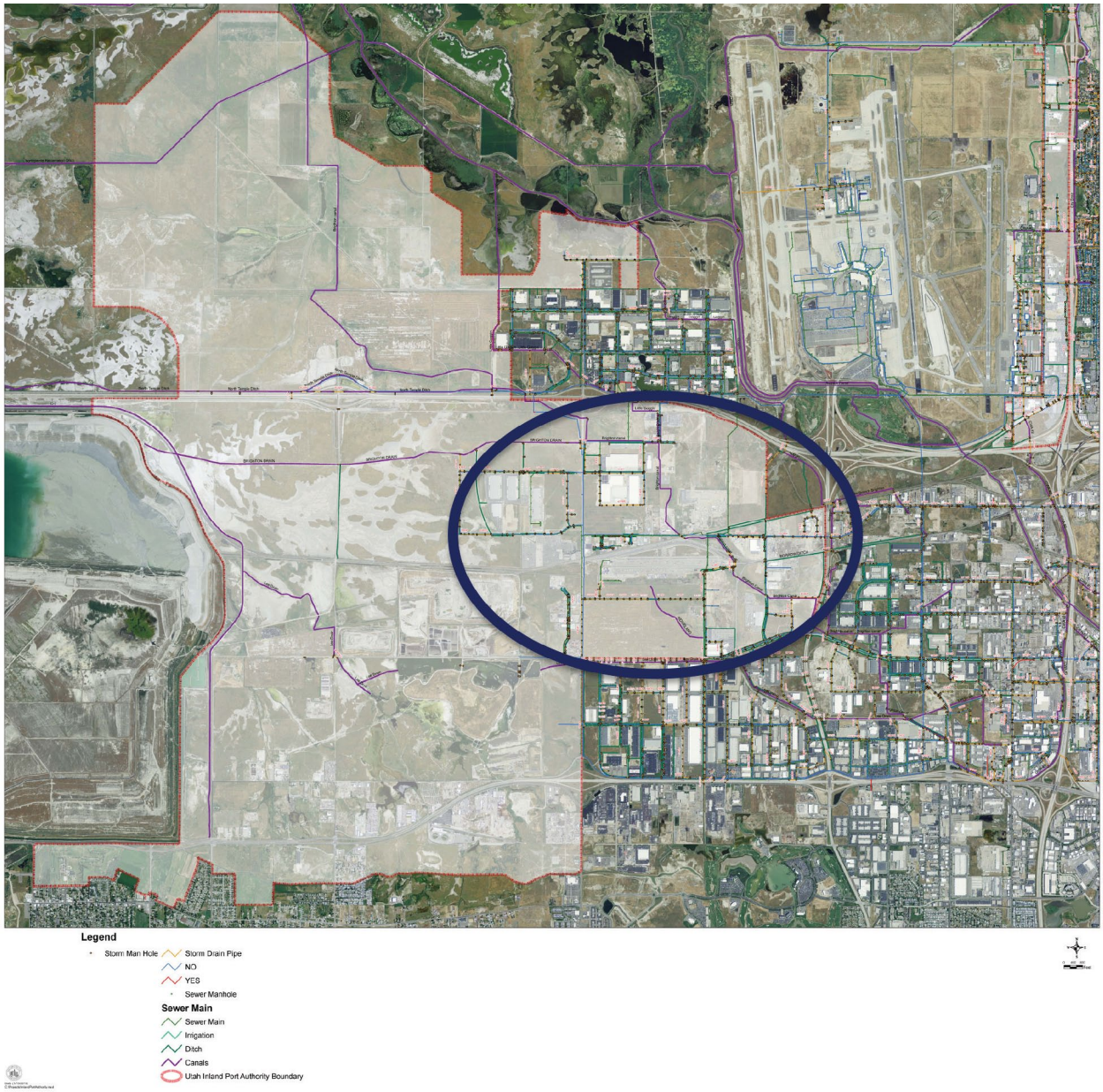
UDOT is also currently in design stages to widen 5600 W. from two to five lanes, building a bridge over UP railroad tracks for grade separation, and converting the I-80 interchange to a diverging diamond interchange with two directions of traffic crossing to opposite sides to enhance safety. The project is estimated to cost $83 million between 2019 and 2021.

# 5.4 Water/Sewer

700 North will have all the services (electricity, water, sewer, stormwater, and gas) along the northern edge of the SITLA site due to the construction of the Utah State Prison site. The maps below depict the existing water, stormwater, and sewer infrastructure within the UIPA jurisdictional area. While north of I-80 appears to lack servicing, infrastructure will be brought on board as the development plans mentioned in Section 2 are executed.

Below I-80, existing infrastructure is concentrated where there are existing users north and east of the UP intermodal terminal. The vacant lands adjacent to this infrastructure are most likely to be developed, where a confluence of services (water, gas, and electricity) are already in place.

**FIGURE 5-15: WATER AND SEWER INFRASTRUCTURE - SALT LAKE CITY**




Source: Salt Lake City



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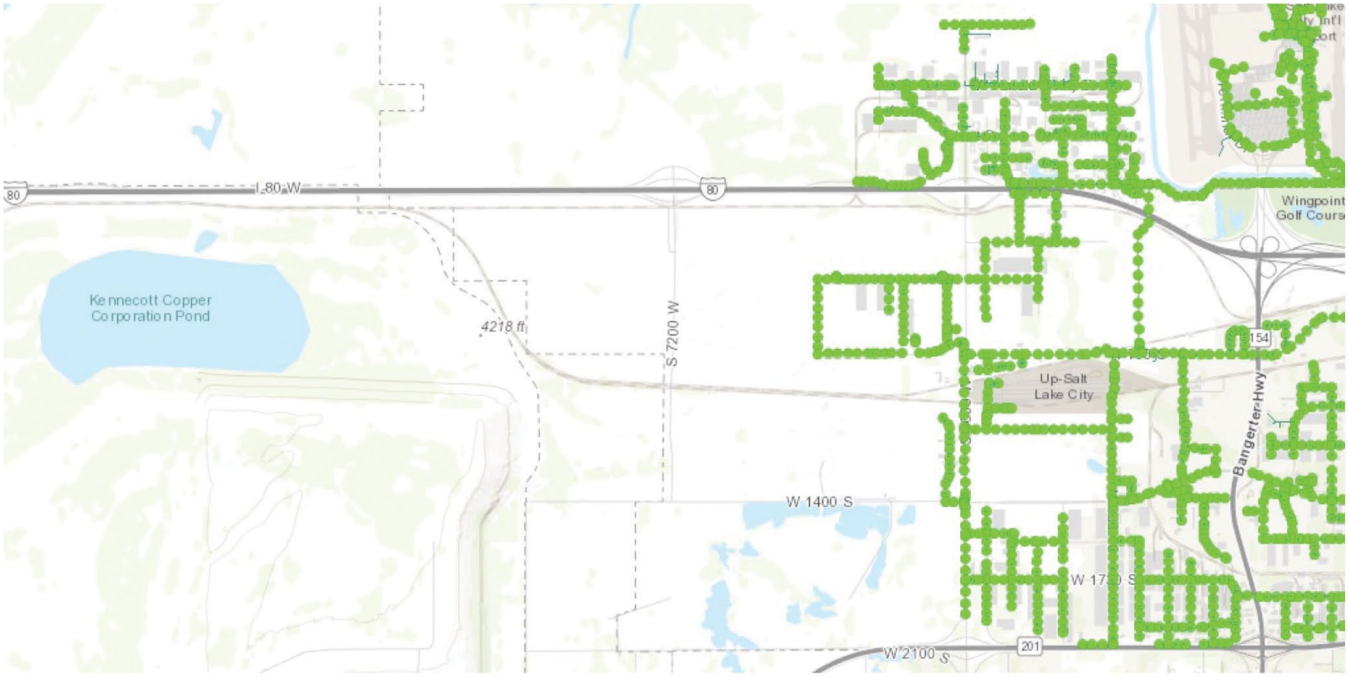
A more simplified map below demonstrating the sewer lateral approximate locations more clearly represents the existing infrastructure in place.

**FIGURE 5-16: SEWER LATERAL APPROXIMATE LOCATIONS**



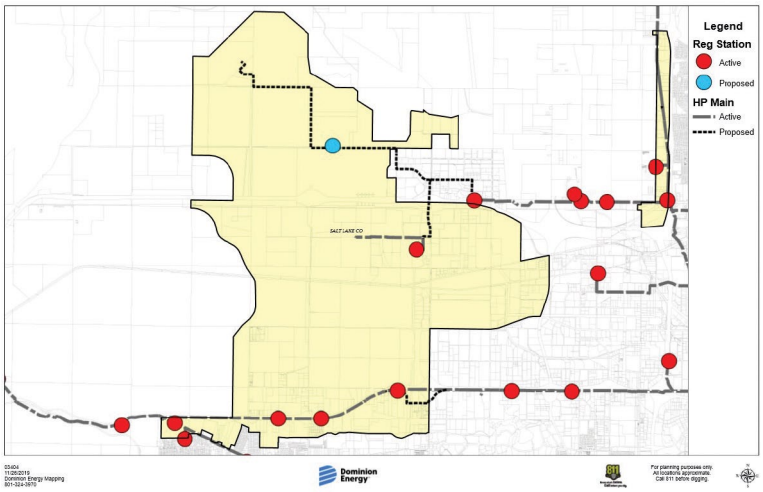

Source: Salt Lake City

## 5.5 Gas

There are two active high-pressure (100 psi) gas mains within the UIPA jurisdictional area. One comes south from I-80 and the International Center along 5600 W before turning west along W. 300 S, ending at S. 6400 W. The second high-pressure main follows along UT-201.

An additional high-pressure system above 100 psi is proposed N of I-80 to reach the Utah State Prison site. This main will run along the northern edge of the SITLA site before jutting northwards along 7200 W, then turning east to the prison. This proposed system has been approved for construction and will be completed by the end of 2020.

**FIGURE 5-17: HIGH-PRESSURE GAS MAIN MAP**




Source: Dominion Energy

An intermediate high-pressure system (between 15 and 60 psi) is also in place within the UIPA jurisdictional area. Most of this infrastructure is in place for existing users just north and east of the UP intermodal terminal,



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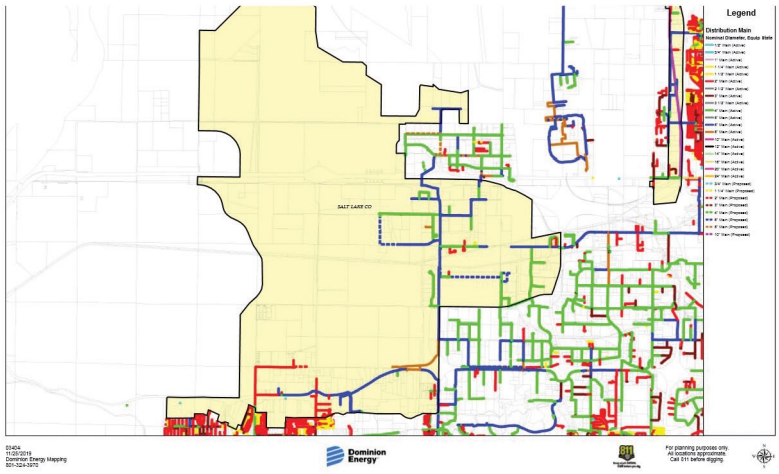
and also along UT-201. There are two proposed intermediate high-pressure mains within the UIPA zone, both of which have been approved and will be completed by the end of 2020:

- A small 2" main extension in the southwest corner of the zone, extending from the existing main on W. 2100 S.

- Two 6" main in the central/eastern portion of the zone – one closing the loop around the distribution center for Costco, Exel Worldwide, O'Reilly Automotive and the other along 1100 South which is just south of the UP intermodal terminal, encircling the FedEx Home Delivery site.

**FIGURE 5-18: INTERMEDIATE HIGH-PRESSURE GAS MAIN MAP**




Source: Dominion Energy

## 5.6 Electricity

Rocky Mountain Power is responsible for providing electricity service to the UIPA jurisdictional area. As a point of practice, Rocky Mountain Power does not speculatively build infrastructure to potential customers unless concrete development plans are in place. Planning for industrial activity is more challenging than planning for residential – the utility can predict the demand for residential based on the building footprint, but the reality is different from industrial users. Manufacturers and logistics companies are varied, and their power demands equally so, Rocky Mountain Power works closely with individual development projects to determine power needs before building out the infrastructure.

The construction of the Utah State Prison provides developers an opportunity to benefit from new electricity infrastructure being brought across the land north of I-80. The electric network in the UIPA jurisdictional area is confidential and cannot be disclosed due to security protocols.

## 5.7 Telecom

Telecom providers in the UIPA jurisdictional area include Comcast, Telecon, ATT, Verizon, and Google Fiber using aerial and underground cables. The infrastructure is mostly centered around the following areas:

- the International Center, with underground cable following along the north side of I-80 to 7200 W.
- much of the central portion of the UIPA jurisdictional area serving existing buildings.

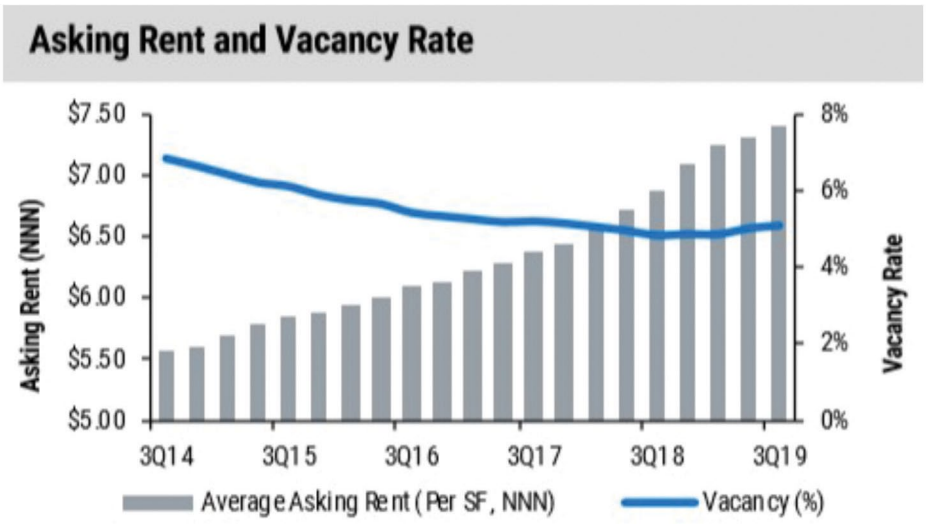
## 5.8 Real Estate Trends

### 5.8.1 National Industrial Real Estate Trends

The unemployment rate in the US remains low as the economy continues to add jobs, though at a somewhat decelerated rate. As of September 2019, Construction was among the higher-performing sectors in terms of employment growth, growing almost 1.5% over a 12-month period, exceeding that of the Finance sector.[101]

The national industrial real estate market remains strong. Vacancy rates, which had been falling for several years, now hover at a low 5.1%. Because supply has remained low compared to demand, average asking rents continue to rise, measuring at $7.40/SF as of third quarter 2019. In fact, industrial rents have been rising more rapidly over the past two years.

**FIGURE 5-19: NATIONAL ASKING RENT AND VACANCY RATES, Q3 2019**




Source: Newmark Knight Frank National Industrial Market Report Q3 2019

Developers are responding to this high industrial demand by increasing the construction pipeline, with 312.1 million SF in the pipeline as of Q3 2019. In urban areas where high demand with limited land area creates a lack of options, developers are using multistory industrial warehouses. In many cases, these sites are used

[101] Newmark Knight Frank, National Industrial Market Report Q3 2019

to enable last-mile deliveries. With over 10% of retail sales resulting from e-commerce, rapid product delivery is putting pressure on retail companies as they seek space to enable same-day delivery, with huge market implications on industrial warehousing markets.[102]

### 5.8.2 Industrial Real Estate Trends of Salt Lake City Region

#### Salt Lake City in National Context

Among the 49 major US industrial real estate markets compared by Newmark Knight Frank, Salt Lake City ranks as a mid-tier city (28th) in terms of total industrial square footage. In terms of total industrial inventory (by square footage), Salt Lake City is in the same tier as cities such as Oakland, Nashville, Milwaukee, Portland, Miami, Greenville, and Silicon Valley, with over 230 million SF as of Q3 2019.

## When accounting for population size, Salt Lake City is among the highest density industrial inventory cities.

Salt Lake City's industrial inventory density by population is on par with Indianapolis and Memphis. Salt Lake City's average asking rent of $6.05/SF is comparable with that of San Antonio ($6.03/SF) or Nashville ($5.93/SF).

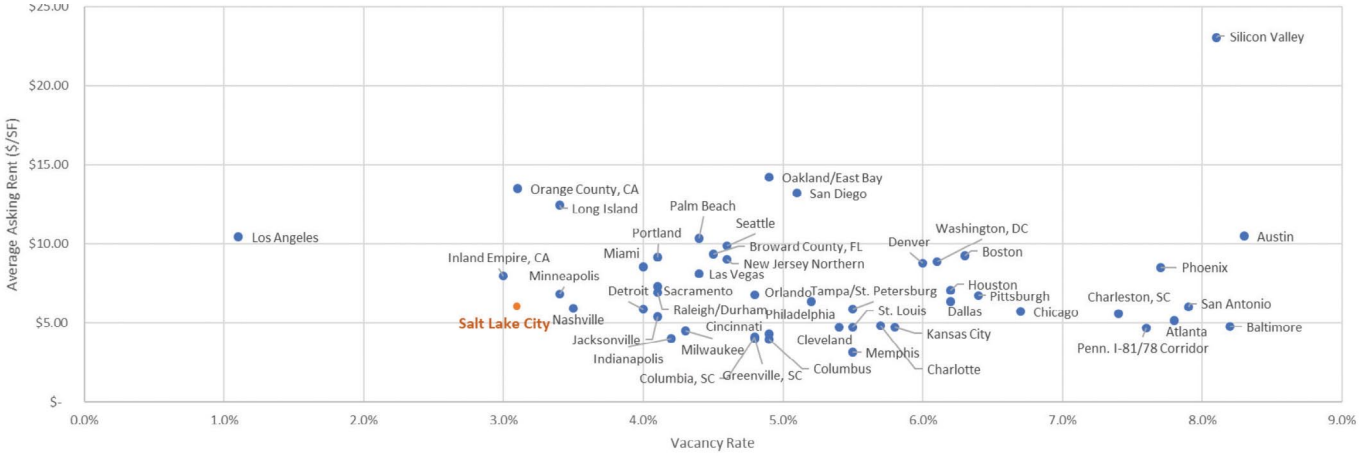
## Salt Lake City also has a high demand for industrial real estate with over 8.3 million SF under construction and the 4th lowest vacancy rate among major cities – at 3.1%.

In fact, when considering the amount of industrial space under construction, Salt Lake City has the 10th highest amount of the 49 cities compared. It also has the 12th highest year-to-date SF absorption (3.3 million SF).[103]

Figure 5-21 illustrates major industrial real estate markets by average asking rents and vacancy rates in Q3 of 2019.

[102] Newmark Knight Frank, National Industrial Market Report Q3 2019
[103] Newmark Knight Frank, National Industrial Market Report Q3 2019

**FIGURE 5-20: MAJOR INDUSTRIAL REAL ESTATE MARKETS, Q3 2019**




Source: Newmark Knight Frank National Industrial Market Report Q3 2019

## Regional Trends

Salt Lake County had over 140 million SF of industrial inventory at the end of the third quarter of 2019, with a vacancy rate of just 3.2% and an average asking rent of $0.50 triple net lease (NNN). About 67% of this inventory is warehousing space, 14% manufacturing space, and 19% office flex.[104] With major markets such as Los Angeles at 1.1% vacancy, Salt Lake has more developable space at lower costs which can be a critical component to the 'inland port' success.

**FIGURE 5-21: SALT LAKE COUNTY MARKET TRENDS, Q3 2019**

| SUBMARKET | TOTAL INVENTORY | SUBLEASE AVAIL. | DIRECT AVAIL. | OVERALL VACANCY | QRTLY NET. ABS. | YTD NET ABS | DELIVERED | UNDER CONS. | GROSS LEASING ACTIVITY | AVG ASKING RATE NNN |
|---|---|---|---|---|---|---|---|---|---|---|
| Central East | 5,587,927 | 3,719 | 6,778 | 0.2% | -2,404 | 123,613 | 0 | 559,535 | 3,080 | $0.92 |
| Central West | 17,121,350 | 2,665 | 224,285 | 1.3% | -31,689 | 132,598 | 0 | 727,933 | 35,813 | $0.74 |
| North East | 6,666,321 | 17,579 | 63,979 | 1.2% | -6,469 | 38,436 | 0 | 0 | 0 | $0.61 |
| North West | 100,020,664 | 195,846 | 3,788,273 | 4.0% | 366,948 | 1,947,602 | 1,375,092 | 3,128,927 | 1,084,117 | $0.47 |
| South East | 3,067,926 | 15,940 | 25,997 | 1.4% | -11,500 | 61,363 | 0 | 0 | 4,418 | $0.75 |
| South West | 7,975,811 | 20,000 | 82,511 | 1.3% | 0 | 120,814 | 42,736 | 1,810,811 | 0 | $0.62 |
| **SALT LAKE TOTAL** | **140,439,999** | **255,749** | **4,189,823** | **3.2%** | **314,886** | **2,424,426** | **1,417,828** | **6,227,206** | **1,127,428** | **$0.50** |
| Warehouse | 94,009,607 | 176,039 | 3,400,624 | 3.8% | 496,511 | 2,022,348 | 1,375,092 | 6,182,622 | 1,096,528 | $0.48 |
| Manufacturing | 20,274,641 | 46,656 | 260,766 | 1.5% | -94,541 | 219,414 | 0 | 0 | 0 | $0.41 |
| Office Flex / High Tech | 26,155,751 | 33,054 | 528,433 | 2.2% | -87,084 | 182,664 | 42,736 | 44,584 | 30,900 | $0.70 |
| **SALT LAKE TOTAL** | **140,439,999** | **255,749** | **4,189,823** | **3.2%** | **314,886** | **2,424,426** | **1,417,828** | **6,227,206** | **1,127,428** | **$0.50** |

Source: Cushman & Wakefield Marketbeat Report – Salt Lake County Q3 2019

The Northwest Quadrant is the center of industrial activity in Salt Lake County, as shown by the overwhelming amount of inventory of this submarket compared to the rest of the area. This submarket accounts for 71% of all industrial inventory in the county. Due to overrepresentation within the Salt Lake market, it tends to skew the regional averages. For example, the Northwest Quadrant's average asking rent of $0.47 brings the Salt

[104] Cushman & Wakefield Marketbeat Report – Salt Lake County Q3 2019

Lake average down to $0.50, when in fact the other areas of the market are far more expensive. Furthermore, its vacancy rate of 4.0% is noticeably higher than the other submarkets, the next nearest topping out at 1.4%.

When considering the amount of vacant land and the cost of space, the Northwest Quadrant is the most natural area for industrial development to occur. Combined with the land entitlements already in place, it is not a question of "if" but "when." In fact, the third quarter of 2019 saw an enormous rise in new construction – with 6.2 million SF under construction compared to just 3.5 million SF under construction in Q2 2019.

Areas outside of the Northwest Quadrant under construction grew in Q3 2019, a total of 3.1 million SF in other areas. In previous quadrants, Q4 2018 – Q2 2019, the Northwest Quadrant accounted for 95% of total space under construction. This has fallen to approximately 50% in Q3 2019.[105]

This could be due to natural development cycles in which older assets in areas outside the Northwest Quadrant are replaced. Indeed, Salt Lake's industrial inventory fell slightly between Q2 and Q3 2019. It could also reflect another trend in e-commerce driving the demand for last-mile warehouse and distribution facilities.

## Industrial Market Challenges

The industrial market is strong in the Salt Lake City region but is not without its challenges. The high demand for industrial real estate with limited availability increases real estate prices. Furthermore, the area with the most potential for industrial development (the Northwest Quadrant) is challenging due to its soil elevations – further increasing development costs. Raw materials costs are also rising, in part due to the trade environment. The road infrastructure in the area also needs to be improved to accommodate the increase in traffic that will occur as development fills out.

## Noteworthy Developments

- Large, big-box users have recently been driving much of the industrial developments in the region:[106]
- Amazon now occupies 857,153 square feet building in the northwest quadrant above I-80, in the International Center.
- UPS occupies a new 840,000 square feet building in the northwest quadrant south of I-80, adjacent to the Mountainview Corridor right-of-way and several other big-box distribution centers such as Costco.
- RWK Legacy Logistics Center is a 214,391 square feet facility located at 485 South 5700 West.
- I-80 Logistics Center 3 in the International Center is a 503,249 square feet facility located at 355 North John Glenn Road.
- The Meridian Commerce Center II is 261,302 square feet located just north of California Avenue at 1111 South 4400 West.

[105] Cushman & Wakefield Marketbeat Report – Salt Lake County Q3 2019
[106] CBRE, 2018 Salt Lake City Commercial Real Estate Benchmark

# 5.9 Site Assessment Matrix

## 5.9.1 Methodology

The UIPA jurisdictional area parcels were assessed across two parameters: attractiveness and preparedness. The attractiveness of a site largely depends on its geographic location and therefore are factors that cannot realistically be changed. The preparedness of the site includes factors that can be influenced, such as proximity to services. Site selection typically occurs with a smaller shortlist of sites, and thus this modeling exercise provides a higher-level site assessment of the UIPA jurisdictional area. This particular model is developed specifically for UIPA to assess across a large number of parcels. The following criteria were used to assess each site:

### Attractiveness

- Size (acres)
- Distance to interstate (miles)
- Distance to international airport (miles)
- Distance to intermodal (miles)
- Rail on-site (Yes/No)
- Rail access potential (Yes/No)
- Located within a flood zone (Yes/No)
- Presence of other undesirable factors such as required remediation, presence of wetlands, rivers, and canals that affect site contiguousness (Yes/No)

### Preparedness

- Zoning (preference given M1 (Light industrial) or CG (General Commercial). M2 (heavy industrial), agricultural, or residential zoning are not desired for scoring purposes
- Land type (flat or rolling – preference given to flat)
- Paved road access (Yes/No)
- Distance to paved road (ft)
- Distance to water (ft)
- Distance to sewer (ft)
- Distance to electrical distribution line (ft)
- Distance to gas line (ft)
- Distance to cable/fiber (ft)

These criteria are scored on a scale of 0-100 and then weighted in order to provide a scoring matrix for all vacant parcels. There are some limitations to this assessment: it does not account for all plots within the UIPA jurisdictional area. It excludes certain types of land, namely:

- Non-vacant land
- Natural preserves/parks
- Landfills
- Right-of-ways for utility and road infrastructure
- Buffer lands of the Kennecott Copper Mine

High-level maps were obtained from utility providers (Rocky Mountain Power, Dominion Energy, Salt Lake City, and Comcast) in order to estimate the distances to services for each parcel. Because these maps were high level, a proximity of zero (0) feet was given to sites where maps indicated there were services fronting or reaching the corner of the site. These maps were not detailed enough to infer which side of road services were, so the assumption of "0" is made. Sites are also given the distance of current and future services planned. For example, if the gas infrastructure is under construction to the site, it is counted as current proximity for the purposes of the assessment.

Much of the large plots of land are not platted, so it is difficult to reconcile with portions of the UIPA where development sites are more clearly delineated. For this reason, it is important to recognize the high-level nature of this assessment.

Furthermore, each project has specific needs and drivers, so the general approach is unlikely to reflect how a site will be viewed on a case-by-case basis. For instance, the scoring considers rail access and rail potential, but many warehousing and distribution projects will not place importance on this criterion.

### 5.9.2 Results

**FIGURE 5-22: UIPA JURISDICTIONAL AREA – ATTRACTIVENESS AND PREPAREDNESS**

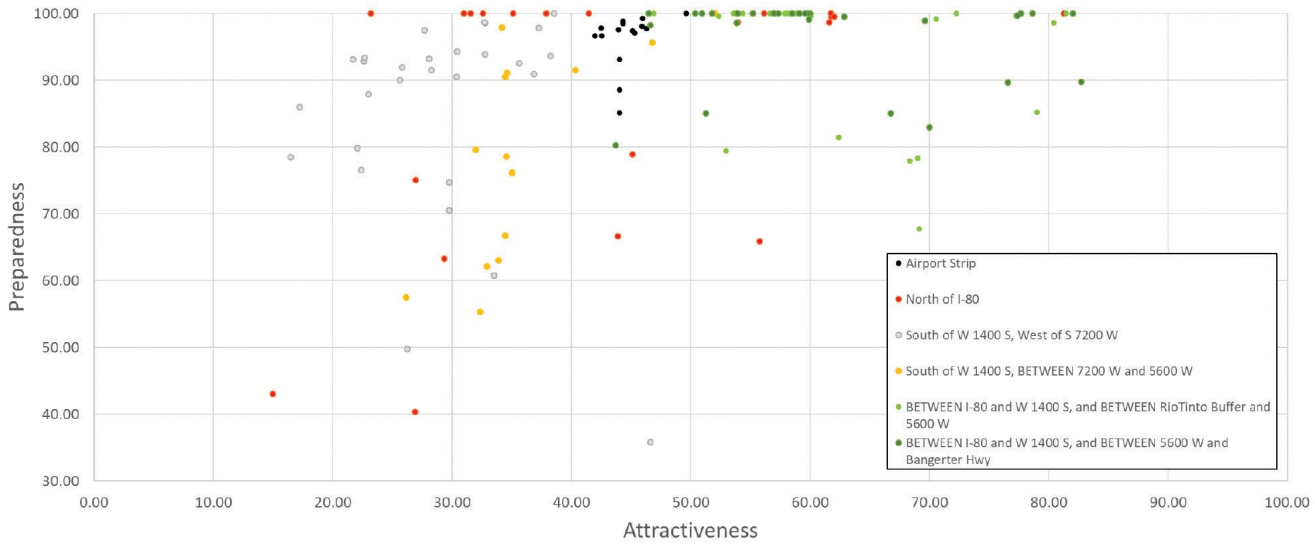
| UIPA Jurisdictional Area | Attractiveness and Preparedness |
|---|---|
| Between I-80 and W 1400 S | Highest 'preparedness' for development – near utility services and closer to intermodal facilities, I-80, and the airport. |
| North of I-80 | Mixed results – attractive for development due to the large size of parcels. However, these parcels are not platted and some may be distant from existing infrastructure. Development likely to occur first along infrastructure upgrades connecting the International Center and the Utah State Prison site (along 700 N and 7200 West) |
| South of W 1400 S (from S 5600 W to west of S 7200 W) | Considered less attractive and prepared – lack of density in development and thus longer distances to utilities, along with environmental remediation challenges. Many parcels lack direct road access and are more distant from interstates and the airport. Smaller average acreages than other areas and lack rail access potential. |

The results of this matrix will likely change if several the larger parcels north of I-80 were platted to provide a more accurate assessment of distance to utilities and infrastructure.

### 5.9.3 Improvement Areas

Any parcel scoring low on preparedness has room for improvement – utilities can be brought closer to sites but this is largely done on a project by project basis. Please note that the model does not incorporate road quality (ie: lanes, traffic), curbs, sidewalks, grading, and remediation.

**FIGURE 5-23: PREPAREDNESS AND ATTRACTIVENESS MATRIX**




The matrix in Figure 5-24 indicates that the remaining parcels between I-80 and W. 1400 S. is likely to develop first, followed by the portions north of I-80 in closer proximity to the interstate, existing paved roads, and utilities (such as the SITLA site or Phase 1 of NWQ, LLC). These scores could be improved with more access options to I-80 from the parcels north of the interstate. The current means of accessing I-80 is solely via N. 5600 W. and may be inefficient if the NWQ, LLC and SITLA parcels continue to develop westward.

# 6 Property Tax Differential Forecast Assumptions

## Property Tax Differential Concept Overview

The concept of a Property Tax Differential is based on the premise of capturing additional property tax revenues above a "baseline" for a defined period within a jurisdictional area. The additional property tax, otherwise known as the tax differential, can be generated by underlying market appreciation, investments made within the jurisdictional area, or a combination of both. The tax differential revenues, or a portion of them depending on local statutes and policies, are then assigned to an agency such as the UIPA to be used for various purposes including operations, housing development, and capital investments.

There are two types of property tax differential funding approaches. In the first, the tax differential revenues are invested directly into the project as it is received by UIPA. This is known as the "pay-as-you-go method." In the second approach, the tax differential revenues can be pledged as a revenue source for issuing debt or securing a loan, known as the "pay-as-you-use" approach. UIPA is using the "pay-as-you-use" approach for purposes of estimating potential debt capacity estimates.

## Assumptions Used for Estimated & Projected Property Tax Differential Revenues

The following key assumptions were used in estimating and projecting the property tax differential revenues available for raising debt capital through FY2025:

- A baseline taxable value of $1.601 billion for the UIPA's jurisdictional area together with an average tax rate of 1.52335% provided by the Salt Lake County assessor's office.
- Three investment cases were developed consisting of Base, Low and High cases.
- The investment cases were developed based on real estate market research related to the amount of remaining developable land within the UIPA area, historical rate of development within the region, average/expected floor area ratios, and average per-square-foot market values.
    - There is approximately 7,000 acres of vacant developable lots remaining within the UIPA area
    - Average Floor Area Ratios (FAR) for distribution properties within the UIPA are likely to remain around 50% resulting in approximately 3,500 acres of buildable space which equates to a maximum buildable capacity of approximately 152.5 million square feet of building space for the total area
    - Based on market data from Colliers, it is estimated that annual delivery of newly constructed space within the UIPA area between 2009 – 2019 has ranged from a low of 70,000 sq-ft (2010) to a high of 2.3 million sq-ft (2018) with an average of approximately 800,000 sq-ft per year over the past 11 years

- The average sale price (market value) per square foot for the area was $95 according to Colliers' 3Q 2019 Salt Lake County Industrial Market Report

- Based on the information above, the following three investment cases were developed:
  - Base Case: approx. $76 million per year (plus 1.5% annual inflation) of additional market value based on 800,000 sq-ft of new inventory is built per year at an initial rate of $95/sq-ft
  - Low Case: approx. $38 million per year (plus 1.5% annual inflation) of additional market value based on 400,000 sq-ft of new inventory is built per year at an initial rate of $95/sq-ft
  - High Case: approx. $114 million per year (plus 1.5% annual inflation) of additional market value based on 1.2 million sq-ft of new inventory is built per year at an initial rate of $95/sq-ft
- 2.0% per year of average appreciation of the taxable value
- Property tax differential revenues begin in 2020
- 75% of the property tax differential revenues can be appropriated to UIPA
- 10% of the property tax differential revenues appropriated to UIPA are to be reserved for housing affordability purposes
- Up to approximately $540,000 of tax differential revenues are anticipated to be used in FY2025 to support UIPA operating expenses until the agency develops additional revenues to supplement or replace these funds

## Estimated Tax Differential Revenue Available for Potential UIPA Debt Obligations

Based on the assumptions described above, estimated net tax differential revenues available for potential use in securing and servicing future UIPA debt obligations range from approximately $43,000 - $757,000 by year-end 2020 increasing to $3.3 million - $7.8 million by 2025 across the three investment cases. The annual projections for each investment case between 2020 and 2025 are presented in the table below.

**Estimated UIPA Property Tax Differential Revenues ($, millions)**

| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|
| Low | $0.04 | $0.6 | $1.2 | $1.9 | $2.5 | $3.2 |
| **Base** | **$0.4** | **$1.4** | **$2.3** | **$3.4** | **$4.4** | **$5.5** |
| High | $0.7 | $2.1 | $3.5 | $4.9 | $6.3 | $7.8 |

## Assumptions Used for Estimated UIPA Debt Capacity Projections

The following key assumptions were used to develop estimated debt capacity projections for the UIPA:

- Debt issuances are structured as revenue bonds secured by the net available property tax differential revenues per the projections above
- The following generalized revenue bond issuance assumptions were used:
  - Bonds are issued with "A" or better ratings
  - Interest rate: 4.0% (based on "A" rated bond yields as of 11/22/19 + 0.5%)
  - 20-year amortization period
  - Target debt-service-coverage-ratio: 2.0x (note that the target DSCR is for rating purposes and not the same as the expected covenant minimum)
  - UIPA's eligible tax differential revenues are not pledged for any other debt obligations
  - Issuance costs: 1.5%
  - First year of issuance likely not until 2022 or 2023 upon building a successful track-record of proven tax increment revenues for rating purposes

## Updated Property Tax Differential debt capacity projections (2020-2025)

Based on the updated assumptions described above, UIPA's net debt capacity estimated projections through 2025 are as follows:

**Net Debt Capacity Summary ($, millions)**

| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|
| Low | N/A | N/A | $8.4 | $12.6 | $16.9 | $21.3 |
| **Base** | **N/A** | **N/A** | **$15.8** | **$22.6** | **$29.6** | **$36.8** |
| High | N/A | N/A | $23.2 | $32.7 | $42.4 | $52.3 |

# 7 Scenario Modeling Documentation

## Data Availability

The policy scenario modeling was guided by industry best practices and constrained by data availability, which immediately puts limitations on the analysis and outcomes. Within these limitations, UIPA sought out the best available data, information and analytical tools published by WFRC, DEQ and the USEPA to illustrate the plausible future scenarios. The objective of this chapter is to lay forth the foundation for the scenario modeling framework and to allow for agencies and experts to help guide the analytical methodology.

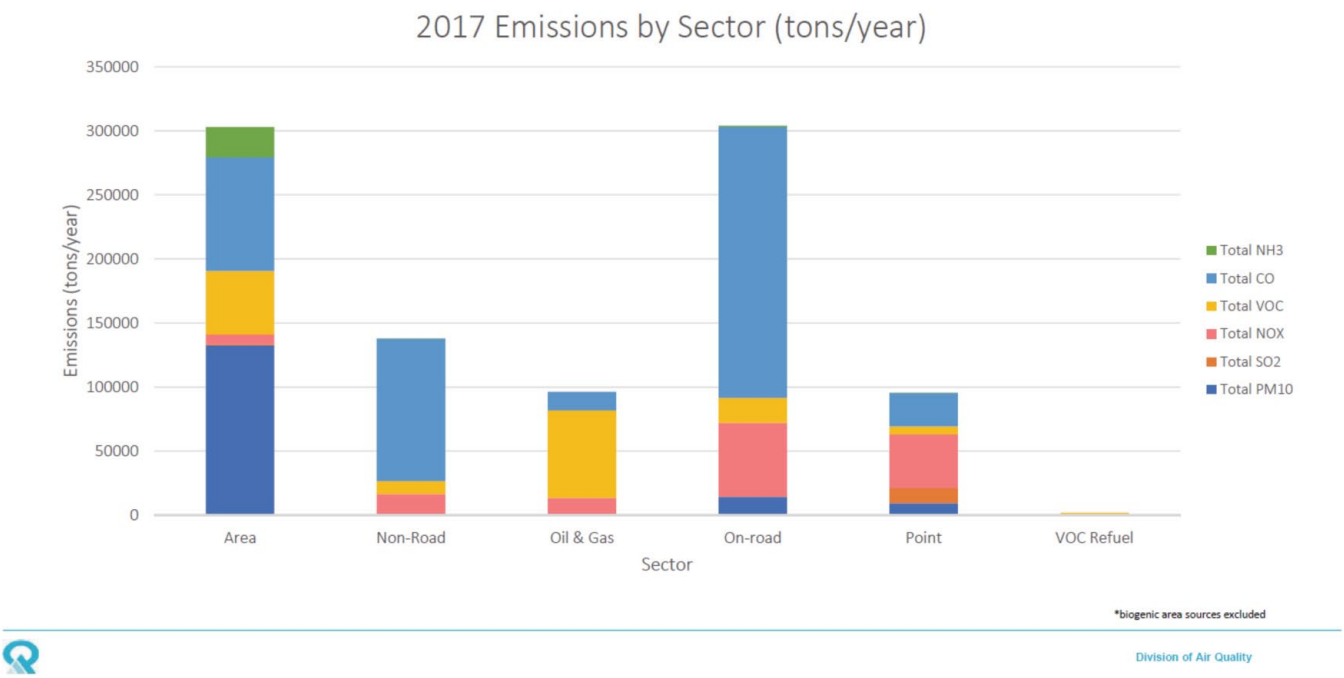
**Study area:** The geographic boundary that makes up the study area for the policy scenario modeling includes the Salt Lake and Tooele counties. These two counties are nearest the UIPA, and are part of the Wasatch Front air basin. Although traffic and air quality may cross these boundaries, the focus of this initial study is on these two counties nearest the UIPA. Future efforts may expand the study area as the methodology becomes more refined. It is important to note that although the study area is bounded by these two counties, the modeling scenario includes traffic data from the WFRC regional travel demand model – which includes external/out-of-state trips (including long-haul truck trips).

## On-road emission inventories for Utah

As a starting point, it is important to first understand the base emissions conditions to help understand the context of the study area and to better guide the modeling methodology. For example, the Wasatch Front air basin (north and south) are currently designated as non-attainment for ground level ozone and PM2.5. And according to the Utah Department of Environmental Quality (DEQ), the basin is currently being considered for a re-designation as a maintenance area for PM2.5 in late 2020. The following chart and table summarize the relative source contribution of on-road emissions in the state and counties of Utah (Figure 1 and Table 1) in 2017 from the Utah Department of Environmental Quality Division of Air Quality (DAQ)[1]. Figures 2 and 3 provide more granular emission data for on-road vehicles in the state of Utah, along with the Salt Lake air basin source distribution in 2014 from the USEPA MOVES 2014b model[2]. These were the most current data sets available at the time of this study. From Figure 1, note that the on-road and area sources account for the majority of 2017 emissions in the state of Utah. On-road sources include, among others, passenger vehicles, light trucks, heavy trucks and buses.

[107] Utah Department of Environmental Quality 2017 Statewide Emissions Inventory obtained from: https://deq.utah.gov/air-quality/2017-statewide-emissions-inventories
[108] USEPA MOVES 2014b, obtained https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves

**FIGURE 7-1 DEQ DIVISION OF AIR QUALITY STATE OF UTAH EMISSIONS INVENTORY 2017**




Source: Utah DEQ Division of Air Quality

Table 1 below shows the total on-road emissions inventory for 2017 for the various air criteria pollutants in the counties of Salt Lake and Tooele only, since these were the two focus study areas for this initial study. This data table was made available by the Utah Department of Environmental Quality Division of Air Quality (DAQ) and their online, open source datasets.

**TABLE 7-1 UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF AIR QUALITY 2017 ON-ROAD EMISSIONS INVENTORY FOR SALT LAKE, TOOELE COUNTIES ONLY**

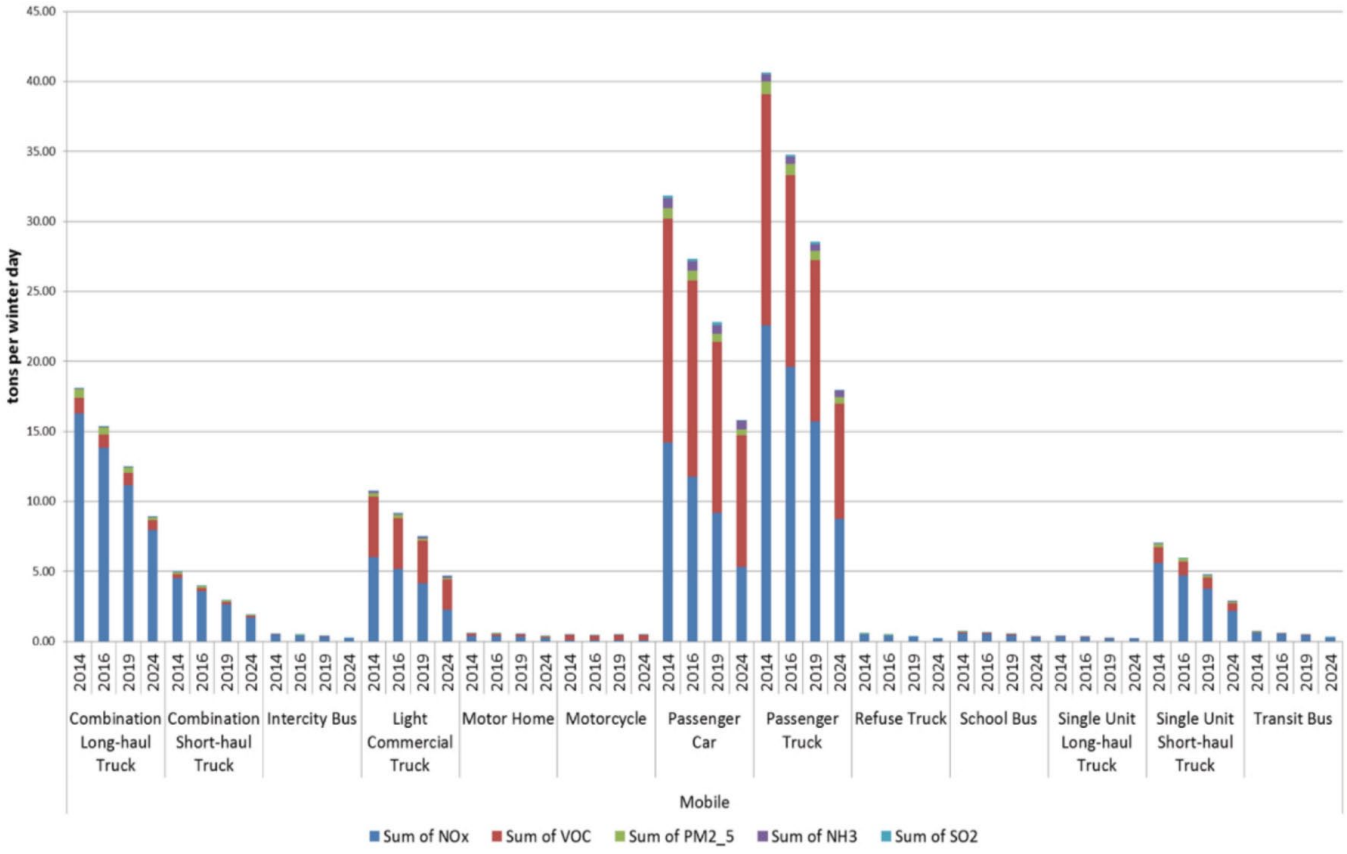
| On-Road Sources Only | Sum of PM10 (tons/year) | Sum of PM25 (tons/year) | SUM of SO2 (tons/year) | Sum of NOx (tons/year) | Sum of VOC (tons/year) | Sum of CO (tons/year) | Sum of NH3 (tons/year) |
|---|---|---|---|---|---|---|---|
| **Salt Lake** | 3,070 | 921 | 99 | 10,932 | 5296 | 58,629 | 305 |
| **Tooele** | 739 | 226 | 10 | 2,362 | 717 | 7,029 | 31 |
| **Total** | 14,213 | 4,532 | 327 | 57,387 | 19,619 | 211,286 | 1,037 |

Source: Utah DEQ Division of Air Quality

**Figure 2** below is from the USEPA MOVES 2014b model and summarizes the relative emission source distribution for on-road vehicles for the state of Utah in 2014. This is the most recent year the data is available from the MOVES model. The Utah mobile source emissions contribution for on-road vehicles shows the relative split of total emissions between light/medium vehicles, buses and heavy trucks. Passenger cars and passenger trucks account for the largest share of emissions (NOX, VOCs and PM), followed by heavy trucks and light commercial trucks. While Figure 3 shows the relative distribution of emissions from the different

sectors in the Salt Lake PM2.5 non-attainment area in 2014 (including Salt Lake, Davis, Weber, Box Elder, and Tooele counties), which mobile sources make up the majority (especially for NOx and VOCs). It is important to note that the statewide emission profile shown in Figure 1 differs slightly from the urban area profile shown in Figure 3; both in the contribution of other source categories, such as industrial, and the mix of on-road vehicle types.

**FIGURE 7-2 UTAH EMISSION SOURCE CONTRIBUTION FOR ON-ROAD VEHICLES IN 2014 (WINTER) – FROM USEPA MOVES MODEL**




Source: USEPA MOVES Model 2014b



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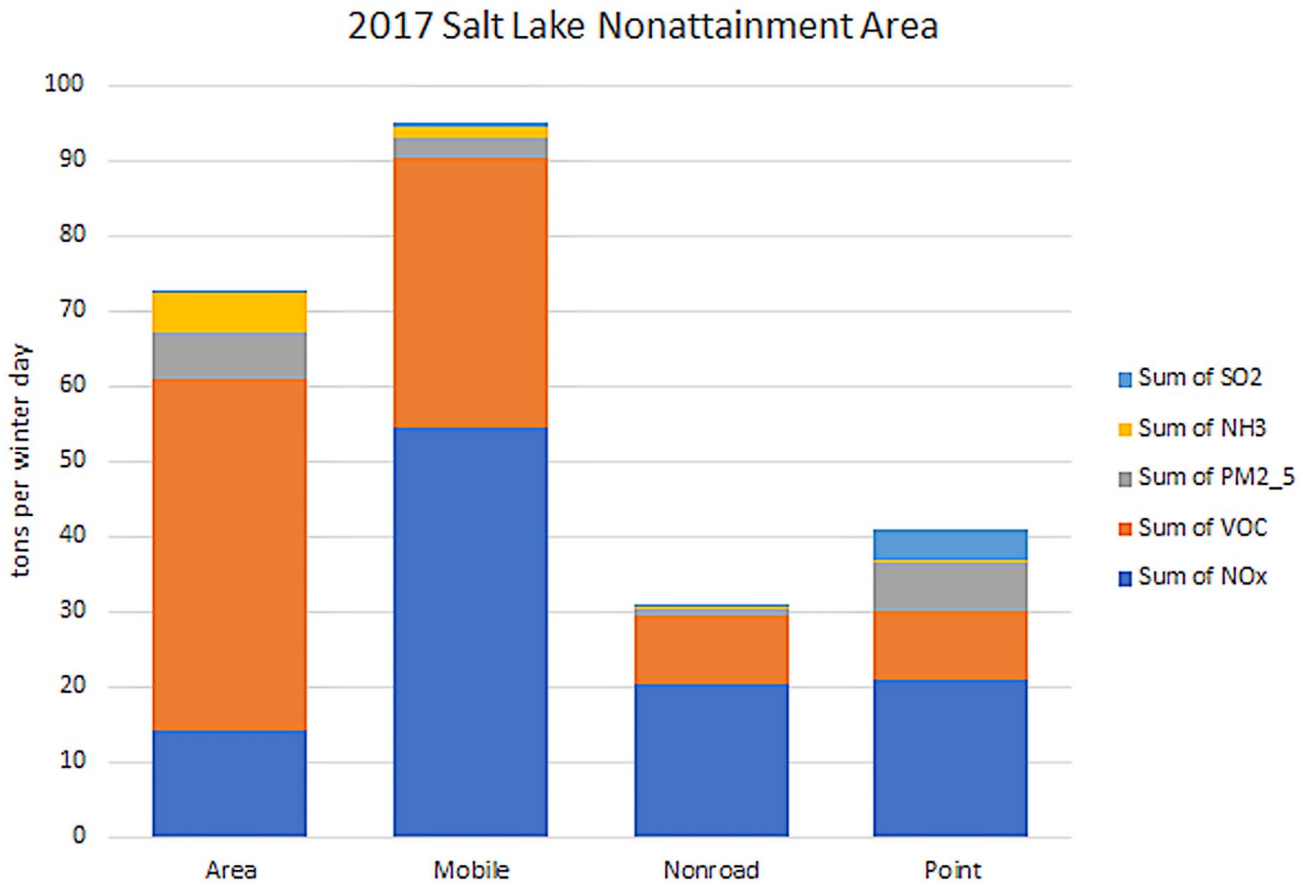
FIGURE 7-3 SALT LAKE NONATTAINMENT AREA EMISSION SOURCE CONTRIBUTIONS IN 2017




Source: Utah Department of Environmental Quality, Division of Air Quality.

## Traffic and Employment Data

The Wasatch Front Regional Council Travel Demand Model version 8.3 is used to model traffic outcomes. This model is guided by existing and forecast year county population and employment totals based on forecasts from the Utah Population Committee and the University of Utah's Kem C. Gardner Policy Institute. Distributions at the traffic analysis zone level are produced by WFRC/MAG Real Estate Market Model (REMM) version 1.0. Critical inputs to this real estate market model include:

- A region-wide parcel land use and valuation database;
- An inventory of local government general plans;
- The results of a multi-year scenario-based visioning exercise;
- A synthesized household population dataset for the model's base year (2015) based on Census data;
- Address geocoded employment totals from the Utah Department of Workforce Services (DWS);

- County-level employment and population control total projections, sourced from the University of Utah's Kem C. Gardner Policy Institute;
- Public and private sector expert advisors; and
- 'Physical constraint' map layers that depict areas where future development is prohibited or not practical due to steep terrain, wetlands, mining, or public lands (formal designations or ownership).

The Wasatch Front Regional Council Travel Demand Model definitions are as follows:

PER, EXT, CV, and TRK are classifications shown in the *summary* and *detailed* networks under the heading "BYGENPURP_". They are defined as follows:

- PER - person trips (HBW+HBO+NHB+HBC+HBSch)
- EXT - external trips (IX+XI+XX, excluding truck)
- CV - 4-tire commercial vehicle (aka LT truck)
- TRK - box trucks and semi trucks (or SU + CU/MU; aka MD + HV)

The *detailed* network breaks out truck volumes by:

- SLT - short haul model, LT truck
- SMD - short haul model, MD truck
- SHV - short haul model, HV truck
- LMD - long haul model, MD truck
- LHV - long haul model, HV truck

The LT truck refers to all 4-tire commercial or service vehicles, including police, company cars, mail delivery, etc.

The WFRC Regional Transportation Plan 2050 shows that the region will be in compliance with state and federal requirements for emissions accounting with respect to air quality conformity under the NAAQS standards.

**TABLE 7-2 AVERAGE DAILY VMT FOR 2019 AND 2050 FROM THE WFRC 2050 RTP: FOR ALL VEHICLES (TOP HALF) AND TRUCKS ONLY (BOTTOM HALF)**

| 2050 RTP Vehicle types | 2019 Total | Total % of VMT | 2050 Total Estimate | Total % of VMT |
|---|---|---|---|---|
| PER - person trips (HBW+HBO+NHB+HBC+HBSch) | 1,547,278.87 | 0.52 | 2,155,780.43 | 0.53 |
| EXT - external trips (IX+XI+XX, excluding truck) | 322,934.07 | 0.11 | 425,580.89 | 0.10 |
| CV - 4-tire commercial vehicle (aka LT truck) | 469,503.92 | 0.16 | 636,745.70 | 0.16 |
| **TRK - box trucks and semi trucks (or SU + CU/MU; aka MD + HV)** | **654,457.86** | **0.21** | **855,658.50** | **0.21** |
| 2050 RTP Truck Classification Only | 2019 Total | Total % of Truck VMT | 2050 Total Estimate | Total % of Truck VMT |
| SLT - short haul model, LT truck | 469,503.92 | 0.42 | 636,745.70 | 0.43 |
| **SMD - short haul model, MD truck** | **366,477.51** | **0.32** | **486,928.60** | **0.32** |
| **SHV - short haul model, HV truck** | **182,762.85** | **0.16** | **218,191.45** | **0.15** |
| **LMD - long haul model, MD truck** | **53,441.80** | **0.05** | **76,912.74** | **0.05** |
| **LHV - long haul model, HV truck** | **51,775.69** | **0.05** | **73,625.71** | **0.05** |
| **2019 Average Daily Vehicle Miles Traveled (VMT)** | **39M** | | | |
| **2050 Average Daily Vehicle Miles Traveled (VMT)** | **57M** | | | |

## Engine Age and Fuel Type Base Data and Future Assumptions

The following studies are used to determine a baseline and 2050 fuel type split for medium and long-haul trucks. The assumptions were then verified with the Utah Trucking Association to ensure they provide realistic baseline and forecasted fuel types.

- Currently 97% of class 8 big-rig trucks are diesel powered, 44% of which are powered by the newest generation of advanced diesel technology. [https://www.dieselforum.org/about-clean-diesel/trucking]
- Conventional diesels will be more than 70% of U.S. heavy-duty vehicles through 2050 [https://www.ourenergypolicy.org/wp-content/uploads/2015/04/JEPO-Final.pdf]
- Indiana, Texas and California rank highest in the greatest total numbers of new Class 8 heavy-duty trucks [https://www.dieselforum.org/news/keep-on-truckin-new-generation-of-diesel-power-now-drives-36-of-u-s-commercial-trucks#]

- A study on several current trucking fleets indicate the following percentages of fleets that operate vehicles with each fuel type: Fleets with 100% Diesel, fleets with 20% gasoline & 80% diesel, fleets with 50% biodiesel B5 and 50% other fuel type, fleets with 40% biodiesel B-10 and 60% other fuel type, fleets with 25% biodiesel B20 and 75% other fuel type, fleets with 17% CNG, 5% LNG, 2% LPG, 1% DME, <1% Fuel Cell, 4% Electric, 2% Other, and the remainder diesel/gas [https://truckingresearch.org/wp-content/uploads/2016/10/2016.ATRI-UMTRI.FuelEconomyReport.Final_.pdf]

## Emission Rates

The emission rates used in the ad-hoc air pollutant calculator for the policy scenario modeling were drawn directly from the US EPA's Motor Vehicle Emissions Simulator (MOVES2014b) model[109]. The model provides technical documentations that outline their respective methodologies for estimating the emission rates for both heavy-duty and medium-duty trucks[110]. For the purposes of this study, the calculator utilizes emission factors for running exhaust emissions only [i.e., average daily vehicle miles traveled (VMT)], and does not consider other levels of truck activity, such as cold-start, idling, brake, tire wear, and other duty cycle processes. Extended idling in particular can be a significant emission contribution issue in the area, including overnight hoteling and refrigeration. VMT is one of the primary performance metrics when evaluating the transportation demand management (TDM) strategies within the policy scenarios.

The technical documents for the MOVES2014 model provide running exhaust emission rates for heavy- and medium-duty trucks for the following pollutants: PM2.5, NOx, CO and VOCs.

## Public Health Considerations

Converting the changes in air *pollutants* to air quality *concentrations* requires an air dispersion model which requires emission rates from other sources (point sources, industrial, agriculture and so forth), along with meteorological factors such as, among others, temperature, wind speed/direction, altitude, humidity. The strategic plan is not an air quality conformity analysis. For conformity analysis, MPOs are instead required to meet a certain budget of pollutants (absolute amount, versus concentrations and densities) that are assigned by the state and federal agencies. A broad range of open-source tools, such as the WHO's AQ+ tool[111] enable an ad-hoc level of impact analysis to estimate the health impacts with respect to changes in quantity of pollutants. For example, according to the WHO, reducing PM10 from 70 to 20 equals a 15% reduction in the number of air pollution-related deaths. In other words, for every 10% reduction in PM10, a 2.1% reduction is achieved in the number of air-pollution related illnesses. PM2.5 was not considered in the WHO analysis, but according to the USEPA MOVES model emission rate documentation, a factor can be applied to PM10 to convert it to PM2.5 – which certain limitations. US EPA Benmap model also provides emission reduction elasticities to translate to other types of health impacts related to chronic illnesses and asthma-related effects. However, this approach provides only an illustrative summary and more precise quantification of public health implications would require further study from state and local environmental/health agencies.

## Economic Considerations

The IMPLAN Multi-Regional Input-Output Model is used to calculate economic impacts, using changes in employment for the UIPA area. WFRC industry counts were used and disaggregated based on actual

[109] USEPA, MOVES2014. On-road technical reports. Accessed https://www.epa.gov/moves/moves-onroad-technical-reports on 1/27/2020.
[110] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NO46.pdf
[111] http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/activities/airq-software-tool-for-health-risk-assessment-of-air-pollution

employment percentages through Utah Department of Workforce Service 6-digit NAICS business establishment records for Salt Lake County as of March 2019. Then, employment counts were cross-walked with 6-digit NAICS codes against IMPLAN's 547 industry sectors to derive IMPLAN industry counts. Since no IMPLAN-NAICS crosswalk exists for the Construction Industry, contractors are classified under maintenance and repair for residential and non-residential. Wholesale in WFRC model correlated with both NAICS Wholesale Trade and Transportation/Warehousing. Food Service was correlated to IMPLAN 511 All Other Food and Drinking Places. "Office" jobs in the WFRC industry counts was correlated back to NAICS Management of Industry and Enterprises. Government/Education was disaggregated based on Salt Lake County BEA records for federal civilian, military, state, and local government. In the IMPLAN Model, state government/education and local government/education are selected to reflect the Government/Education WFRC category. Home-Based Jobs is not a NAICS industry code but is statistically insignificant in the scenario modeling process. The UIPA zone also does not include residential areas. Overall, disaggregation yielded 98.5% of total employment change highlighted in Scenario 2.

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## Utah Inland Port Authority Executive Team

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