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Reuse and the Benefit to Community Kennecott South Zone

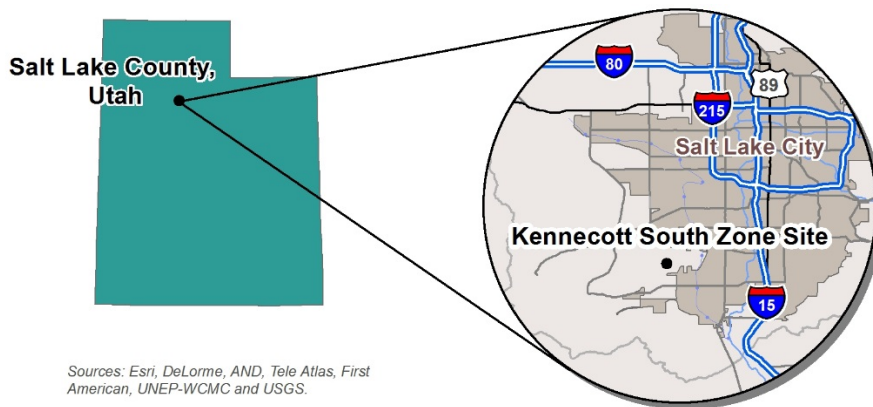
Introduction

Mining has long been a way of life in and around Utah's Bingham Canyon. Few ore deposits in the world have been more productive than those found at Bingham Canyon Mine. The mine has produced millions of tons of copper and tons of gold and silver. Mining operations also contaminated soil, surface water and groundwater in the surrounding area, referred to by regulators as the Kennecott South Zone (the site). During cleanup discussions, the site's potentially responsible party, Kennecott Utah Copper, LLC (Kennecott), proposed a course of action that would address contamination while avoiding placing the site on the Superfund program's National Priorities List (NPL). This approach was the template for the Superfund Alternative Approach, which has since been used at sites across the country. EPA approved the cleanup plan, setting the stage for the site's cleanup and remarkable redevelopment. Open communication, extensive collaboration and innovative thinking helped contribute to the transformation of this once contaminated, industrial site into a thriving residential area and regional economic hub.

Superfund site restoration and reuse can revitalize local economies with jobs, new businesses, tax revenues and local spending. Cleanup may also take place while active land uses remain on site. This case study focuses on the Kennecott South Zone, primarily on operable unit (OU) 7 and an area known as the Daybreak development, which includes and surrounds OU7. Today, OU7 and several other parts of the site support a wide range of commercial, industrial, public service, residential and recreational reuses. Daybreak – the largest and most sustainable master-planned community in Utah – is located on site. The site also supports continued large-scale mining operations. This case study explores the area's innovative cleanup and reuse, illustrating the beneficial effects of site redevelopment.

Beneficial Effects

- **Businesses on site (in operable unit 7) employ about 914 people, providing nearly \$38 million in annual employment income and generating an estimated \$143.2 million in annual sales.**
- **Kennecott operations, at and near the site, employ 1,650 people and generate over \$1.2 billion in annual sales.**
- **Since the early 1990s, cleanup efforts have made possible an estimated 1,000 acres of new wildlife habitat and open space.**
- **All 4,000+ homes in the Daybreak development are Energy Star-certified.**



Sources: Esri, DeLorme, AND, Tele Atlas, First American, UNEP-WCMC and USGS.

Figure 1. The site's location in Salt Lake County, Utah.

Site History

The site is located about 25 miles southwest of Salt Lake City, in the Oquirrh Mountains of Utah, and is part of the larger Bingham Canyon mining area. The Kennecott South Zone covers about 37 square miles and includes active mining operations, mining waste rock dumps, remediated residential and commercial areas, and historic sites. The Bingham Canyon Mine is the second largest copper mine in the United States, providing about 7 percent of the country's copper supplies. The massive open-pit mine is almost three miles wide and a mile deep. While historic mining operations contaminated surrounding areas, the mine itself is not part of the site.

Mining activities began in the 1860s; operations produced lead, zinc, silver, copper, molybdenum and gold ores. In 1873, a rail line was extended into Bingham Canyon, greatly increasing the mine's output. In the early 1900s, the Utah Copper Company took over mining operations, focusing efforts on copper production while revolutionizing the industry with its large scale, open-pit mining approach. At one time, Bingham Canyon Mine employed 8,000 people. Miners historically deposited mining wastes in nearby creeks and on valley slopes, which later eroded and washed downstream.

In 1936, Kennecott Copper Company purchased the Utah Copper Company and took over all mining operations. In 1989, Rio Tinto purchased the Bingham Canyon Mine and related assets. Today, large-scale mining support operations at the site are ongoing; Kennecott Utah Copper LLC, a unit of parent company Rio Tinto, operates the mine.

Decades of mining operations led to widespread contamination of soil and surface water. Contaminants include arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, acids, sulfate and zinc. Mining activities also resulted in a 72-square-mile plume of sulfate-contaminated groundwater.

In 1994, EPA proposed listing Kennecott's South Zone on the NPL. Kennecott, the site's potentially responsible party, instead suggested an accelerated cleanup approach. At the time, Kennecott's proposal was groundbreaking. Never before had a responsible party proposed working collaboratively on cleanup plans with state and federal regulatory agencies. Initial cleanup efforts moved forward while Kennecott continued to negotiate the ultimate scope of the cleanup with EPA and the Utah Department of Environmental Quality (UDEQ).



Figure 2. Bingham Canyon Mine (Source: Rio Tinto)

In 1995, EPA issued a memorandum of understanding stating the Agency would not finalize the NPL listing if Kennecott agreed to complete all required investigations and cleanup work. Since 1995, EPA, UDEQ and Kennecott have collaborated on the site's cleanup. The project has also made possible the redevelopment of large areas of the site as well as continuation of active mining operations.

To manage the complex cleanup, EPA divided the area into two sites – Kennecott South Zone and Kennecott North Zone.¹ Together, the sites include 24 areas, or OUs, requiring cleanup. This case study focuses on the South Zone site, primarily on OU7 and an area known as the Daybreak development, which includes and surrounds OU7.

¹ The Kennecott North Zone site was proposed for NPL listing in 1994. The listing has not been finalized. The Kennecott North Zone site has not officially been designated as Superfund Alternative Approach site; however, cleanup is being addressed by the same alternative approach employed at the Kennecott South Zone.

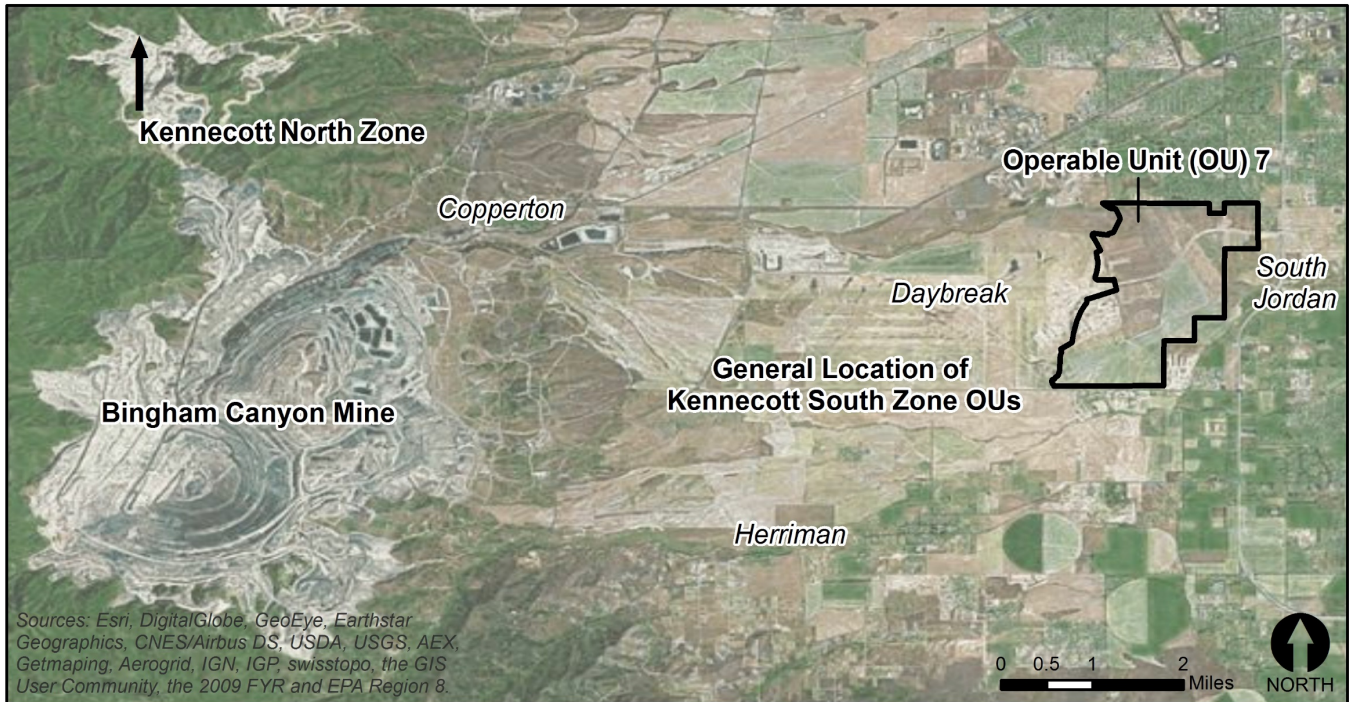


Figure 3. Bingham Canyon Mine, the Kennecott North Zone and South Zone, and surrounding areas.

Site Cleanup

Cleanup of the Kennecott South Zone has included the excavation and removal of contaminated soil from residential and ecological areas, removal and capping of waste rock and tailings, soil regrading, institutional controls, and diversion and treatment of contaminated groundwater.

Continued mining and site redevelopment were top priorities for Kennecott, with mining operations helping to pay for the cleanup. To maximize future redevelopment opportunities, EPA, UDEQ and Kennecott worked together to select a cleanup approach that would meet the highest cleanup standard – unrestricted use, which would support residential land uses as well as other uses.

Kennecott's operations extend about 19 miles along the Oquirrh Mountains in the western Salt Lake Valley. Operations are located in the South Zone around the Bingham Canyon Mine and the North Zone around the smelter, refinery and related facilities. Cleanup of the Kennecott South Zone focuses on removal of mining wastes and old facilities, and groundwater restoration and protection. Mine waste rock cleanup sites include Bingham Creek Tailings, Lark Tailings, the South Jordan Evaporation Ponds, and Butterfield Canyon and Creek.

In August 2004, Kennecott signed an agreement to perform groundwater cleanup in conjunction with UDEQ and the Jordan Valley Water Conservancy District. The cleanup included construction of two groundwater treatment plants and extraction and treatment of contaminated groundwater. To date, Kennecott has



Figure 4. Cleanup at the site in the mid-1990s.
(Image source: Rio Tinto)

spent more than \$350 million on the cleanup of mining wastes and \$100 million on groundwater cleanup. In 2008, EPA officially withdrew the NPL listing proposal for the Kennecott South Zone. Cleanup of parts of the site is ongoing. The cleanup to date, and ongoing cleanup efforts, have been performed through a combination of voluntary actions by Kennecott and in accordance with consent decrees and administrative orders established to ensure that all required cleanup work is implemented.

Kennecott, EPA and UDEQ continue to work together on the long-term management of the site. These efforts include soil management plans, groundwater monitoring, and the implementation of well-drilling restrictions and other institutional controls.

The section below describes cleanup activities at OU7 – the South Jordan Evaporation Ponds. Today, this area supports a wide range of commercial, industrial, public service, and residential reuses and continued uses.

South Jordan Evaporation Ponds – OU7

Between 1936 and 1965, 25 evaporation ponds covering more than 530 acres were constructed in western South Jordan City to manage flows diverted from Bingham Creek. Additional ponds built in 1983 and 1984 managed flood waters. In 1993, Kennecott began cleaning up 50 years of sludge spread over several hundred acres at the South Jordan Evaporation Ponds. Material was consolidated on one part of the site, at a cost of \$15 million. Kennecott officials recognized that the cleanup resulted in a large, potentially reusable land area in the middle of the city of South Jordan, a rapidly growing suburb in Salt Lake County. In 1995, Kennecott managers hired a planning firm to evaluate the potential for the area's future use and create initial redevelopment plans. The study helped spur Rio Tinto to consider reuse opportunities across all of Kennecott's land holdings. At the time, those holdings represented 50 percent of all developable land in Salt Lake County.

By 1996, with substantial sustained population growth projected for the Salt Lake Valley, Kennecott and parent company Rio Tinto recognized that its land holdings could serve the company well beyond the life expectancy of the mine. With Rio Tinto interested in pursuing sustainable development opportunities in the



Figure 5. One of the site's two groundwater treatment plants.
(Image source: Rio Tinto)

Kennecott North Zone and South Zone Cleanup Facts: At a Glance

- More than \$400 million spent to clean up mining wastes and install source-control measures.
- Total of 580 groundwater monitoring wells installed.
- Nearly 5 million square feet of synthetic liner installed across 100 acres to contain contaminated water and wastes in permitted repositories.
- About 16.3 million cubic yards of mining wastes isolated, excavated, relocated, disposed of or permanently stabilized in place.
- Total of 6.3 million cubic yards of clean materials trucked in for backfilling cleaned-up areas.

area, the company agreed to provide Kennecott with the financial backing needed to fully assess its land holdings. From 1999 to 2000, a team of experts conducted a detailed evaluation process. It identified the former South Jordan Evaporation Ponds area as a location well suited for redevelopment. In 2001, Rio Tinto established the Kennecott Land Company (Kennecott Land) to manage and develop its non-mining land resources.

For the project to be successful, Kennecott Land recognized the need to collaborate with the city of South Jordan. According to the South Jordan city manager, the planning and development process has been a partnership from the beginning. Kennecott and the city of South Jordan worked closely to ensure that community perspectives and priorities were an integral part of the project. Kennecott Land developed mixed-use plans for the area that would include residential, commercial and recreational uses.

First, sludge that had previously been consolidated and capped in place a decade earlier needed to be addressed. Kennecott removed the material from the South Jordan Evaporation Ponds and placed the wastes in an on-site repository on a different part of the site used to store other wastes generated during cleanup. Cleanup of the South Jordan Evaporation Ponds to unrestricted use standards set the stage for the area’s successful redevelopment.

Assessing Infrastructure Needs and Facilitating Future Growth

With residential and commercial areas on three sides, the former South Jordan Evaporation Ponds area was well suited for development. In 2001, Kennecott Land began detailed planning for the area’s mixed-use redevelopment. As part of the process, with EPA and UDEQ input, the company facilitated the discussions and meetings needed to build a strong foundation for the Daybreak project. The company brought community stakeholders and site agencies together to discuss development components, potential challenges and opportunities, and next steps. For example, the group identified a need for improved transportation infrastructure near the development. There was no light rail service or major roadways in the area.

The company donated approximately \$13 million in land and betterments to assist the construction of the Utah Transit Authority’s TRAX red line, which now connects Daybreak to downtown Salt Lake City. In 2010, the TRAX Mid-Jordan rail line opened to the public. Today, there are two light rail stations in the Daybreak development. To help facilitate construction of a new main artery road, Kennecott Land coordinated with the Utah Department of Transportation, donating land that would later be used for the Mountain View Corridor. Today, the Corridor freeway connects 13 municipalities.



Figure 6. Utah Transit Authority light rail service in Daybreak.

Beneficial Effects

Daybreak Sustainable Development

Construction for Daybreak, a 4,126-acre master planned community, began in 2003. At full buildout, it could include 20,000 housing units and 9.1 million square feet of commercial space. About 13 percent of the Daybreak community is located on the former site of the South Jordan Evaporation Ponds. The 67-acre freshwater Oquirrh Lake, which covers much of the reclaimed area, is now a recreational amenity. Surrounded by a walking trail, parks and beaches, the lake provides opportunities for boating and fishing. Today, Daybreak is the largest master-planned community in Utah, with 4,388 homes built and sold since 2004.

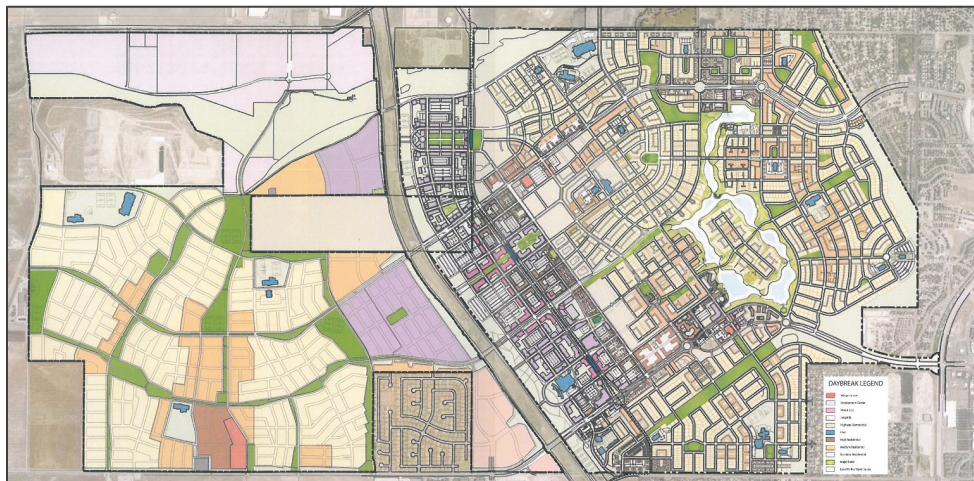


Figure 7. Master plan for the Daybreak development project. (Image source: Kennecott Land)

Developers committed to meeting sustainability measures throughout the project. Three-quarters of all home construction waste is recycled, all homes are Energy Star-certified, and more than 1,000 acres have been set aside for open space. Daybreak's stormwater system retains and manages all runoff on site. A focus on neighborhood walkability means that parks, pools, restaurants and three elementary schools are no more than a five-minute walk from any home. Over 30 miles of walking and biking trails weave through the community. This network of interconnected sidewalks, trails and streets helps keep people out of their cars, reducing air emissions.

Kennecott Land integrated sustainable landscaping practices as part of the Daybreak project as well. To date, the company has planted thousands of trees along community streets and in parks to help diminish the urban heat island effect. Residents are encouraged to maintain landscapes that help conserve water resources. The Daybreak Community Association maintains a list of native plants that require minimal watering. Six organic gardens, with over 300 plots scattered across the community, encourage residents to produce sustainable food supplies.

An innovative secondary water collection and distribution system irrigates parks and open spaces at Daybreak. Secondary water (from Utah Lake) is piped in through existing pipelines and treated at a holding pond. The treated water is then distributed for irrigation to parks and open spaces. To further reduce air emissions, Kennecott has also put in place a vehicle idling reduction program for construction vehicles.



Figure 8. One of Daybreak's community gardens.



Figure 9. An electric bike parked at a community green space.

Cleanup plans integrate remedy and reuse considerations. For example, with EPA approval, Kennecott incorporated site monitoring wells into development features, blending them into the background of community landscapes. It is one of the first and largest planned communities in the United States developed under an environmental management system certified by the International Organization for Standardization (ISO 14001 Certification).



Figure 10. Community volleyball court.



Figure 11. The Rio Tinto Daybreak Information Center.



Figure 12. Examples of different neighborhoods and architectural styles in Daybreak.

Daybreak Community Sparks Thriving Commercial, Industrial and Public Service Reuse

Development of the Daybreak community was a powerful catalyst that attracted residents and businesses to the area. Together, new and long-time businesses at the site have bolstered the region’s economy. This section describes some of the beneficial effects of the new and continued reuses at OU7 of the Kennecott South Zone.

Rio Tinto Regional Center (Daybreak Corporate Center)

The Salt Lake Valley area is the U.S. hub for Rio Tinto. Daybreak hosts its regional headquarters as well as headquarters for Rio Tinto Kennecott at 4700 Daybreak Parkway – in the Rio Tinto Regional Center, also known as the Daybreak Corporate Center.

In 2008, the Rio Tinto Regional Center became the first Leadership in Energy and Environmental Design (LEED) Platinum-rated building in Utah. The state-of-the-art facility covers about 180,000 square feet and provides work space for hundreds of Rio Tinto employees. The building uses 22 percent less energy than standard office buildings through smart lighting, building orientation and a solar energy system on its roof. Rio Tinto saved energy and resources during construction by using recycled materials and recycling more than 95 percent of all construction waste. The facility also captures 100 percent of stormwater on site, uses a secondary recycled water system for irrigating outdoor water-wise landscaping, and has a white reflective coating on its roof to reduce heat absorption. Exterior lighting was designed to reduce light pollution in the night sky.

In total, the Rio Tinto Regional Center, which is located within OU7, hosts 450 employees who work for Kennecott and Rio Tinto. Not all Kennecott mining facilities based in the Salt Lake Valley are technically located within the Kennecott site boundaries. However, the site cleanup and cooperation between stakeholders and regulatory agencies enabled continued mining operations at the Bingham Canyon Mine and the associated mining and support facilities surrounding the mine. The continued mining operations in the area provided the foundation on which the Daybreak Community was built. The entire Kennecott Salt Lake Valley mining operation, including facilities across the Kennecott North and South Zones, employs about 1,650 people and contributes an estimated \$140.6 million in annual employment income. Company-wide 2016 annual sales for Kennecott exceeded \$1.2 billion.

Kennecott Utah Copper

Kennecott's mining activities have been able to continue during cleanup. The company is the largest private-sector economic driver in Utah, generating more production, exports, income and employment than any other business. Kennecott's Bingham Canyon Mine is one of the top-producing copper mines in the world and has produced more than 19 million tons of copper. In order to help reduce the company's environmental footprint, Kennecott has created aggressive goals to reduce air emissions and actively pursues sustainable operations. The company focuses on making a positive difference in areas such as stewardship of natural resources, climate change and local employment.



Figure 13. The Rio Tinto Regional Center. (Image source: Rio Tinto)

Black Diamond Gymnastics & Sports Center

This business provides sports training, academic development and recreation classes, camps and teams. Programs offered include gymnastics, power tumbling and trampoline, dance, cheer, martial arts, camps, language classes, and preschool and after-school programs. The Center provides about \$70,000 in annual employment income to the community. Annual sales in 2016 reached \$150,000.



Tio's Mexican Restaurant

This full-service family restaurant is located in the SoDa Row village center – it is one of two locations in Salt Lake Valley. It contributes about \$200,000 in annual employment income and generated \$306,000 in annual sales in 2016.



eSpokes

In business since 2012, eSpokes is the largest electric bike dealer in Utah. All bicycles are assembled and tested by certified mechanics. The business also provides in-home bike repair services and bike pick-ups for customers. Electric bikes motivate people to get outdoors and result in fewer vehicle trips, reducing air emissions. The business contributes about \$294,000 in annual employment income and generated \$600,000 in annual sales in 2016.



Offices at 4775 West Daybreak

Located in the heart of Daybreak's SoDa Row district, this office complex is home to Dave's Barber Shop and several medical practices. Copper Creek Dental, Johnson Elite Orthodontics and Daybreak Pediatric Smiles Dentistry provide general dentistry and orthodontic services. The staff at the Scranton Clinic of Chiropractic assist patients suffering from fibromyalgia, headaches and chronic pain. Oral Surgery of Utah is a facial and oral surgery practice. Together, these businesses employ 20 people and contribute about \$812,000 in annual employment income to the community. Combined estimated annual sales of the businesses located at 4775 West Daybreak Parkway exceeded \$1 million in 2016.

Figure 14. Examples of Daybreak businesses.



Figure 15. Businesses operating at 4775 West Daybreak Parkway.

Nest Boutique

Located at 11259 Kestrel Rise Road, this business sells home accessories, gifts, and women’s and children’s fashions. It provides about \$41,000 in annual employment income and generated over \$203,000 in annual sales in 2016.

Daybreak Elementary School and Community Center

Daybreak Elementary School serves students in the southwest corner of the Salt Lake Valley. The K-6 curriculum focuses on literacy, writing and language arts. Daybreak Community Center is the result of a partnership between Kennecott Land and the Jordan School District. Connected to the elementary school, the center provides students, school staff and the Daybreak community with a large fitness and recreation center. The Center’s sustainable design includes geothermal energy systems for heating and cooling. Together, the school and community center, which opened in 2005, employ about 104 people, providing over \$3.3 million in annual employment income to the community.

Eastlake Elementary School

In 2007, Kennecott Land donated 8 acres of property to the Jordan School District for Eastlake Elementary School. This public school is located in the middle of the Daybreak community, within walking distance for many students. In addition to the regular curriculum, the school offers several enrichment programs, including leadership training, language immersion, physical fitness and nutrition programs, an art enrichment program, and orchestra and band. The school provides over \$2.6 million in annual employment income to the community.



Figure 16. Nest Boutique storefront.



Figure 17. Two of the schools at the Daybreak development.

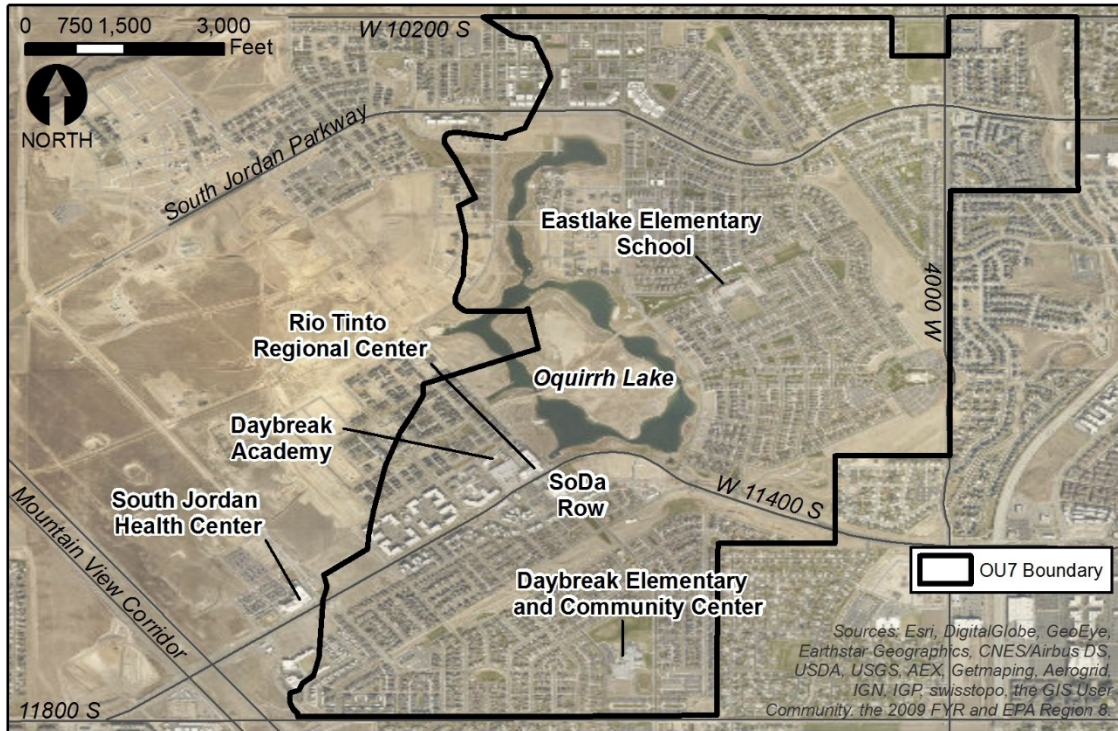


Figure 18. Aerial view of site businesses and other features in OU7 and surrounding areas.

The “Spill-Over” Development Effect

The Daybreak project transformed a vacant, once-contaminated area into a thriving, sustainable community and economic hub. The vision for Daybreak was to create a destination location where people could live and work, rather than having to commute to Salt Lake City. In turn, as people moved to Daybreak, the development attracted additional businesses and services. For example, University of Utah Health Care built a new hospital – the South Jordan Health Center – in Daybreak to better serve the medical needs of area residents. The Health Center opened its doors in January 2012. The business employs 900 people and provides nearly \$55 million in annual employment income. Estimated annual sales exceeded \$282 million in 2016.



Figure 19. University of Utah Health Care’s South Jordan Health Center.

Daybreak Commerce Park is located just outside of the site’s OU7 boundary, in Daybreak’s far northeastern corner. The 225-acre development offers 5 million square feet of commercial space. The Rio Tinto Distribution Center and eBay’s Tier 4 data center are the first two businesses to locate in the Park. The businesses employ large workforces, generating employee income for the local community.

Community Connections – Giving Back

Kennecott Land has focused on community outreach and engagement throughout the development of the Daybreak project. For example, the company supported the creation of the LiveDAYBREAK Council – a nonprofit community group committed to connecting people, lifelong learning, embracing arts and diversity, healthy living and giving back. The organization hosts events, provides education programs and coordinates charitable giving projects and fundraisers.

Some of Kennecott Land’s other community-focused efforts include grants for area teachers, scholarships for local students, contributions to higher education and food drives. Green initiatives include renewable energy installations, electric car charging stations throughout Daybreak, and one of the largest glass recycling efforts in the region.

Ecological Restoration

Cleanup has also resulted in significant ecological benefits, including the creation of about 1,000 acres of wildlife habitat and open space. Site restoration efforts have included planting of more than 135,000 trees and several thousand acres of shrubs, plants and grasses. The creation of Daybreak’s Oquirrh Lake included plantings along the lake’s 4.2-mile perimeter to establish wetlands. Fifty-nine species of birds now live near the lake.



Figure 20. Daybreak’s Oquirrh Lake.

Property Values and Tax Revenues

Cleanup and redevelopment of the OU7 area at the Kennecott South Zone has significantly increased property values in the area, which in turn can increase tax revenues for local government. In 2007, for example, the property at 4700 West Daybreak Parkway was vacant and had an estimated property value of \$206,130. Development of the Rio Tinto Regional Center significantly increased the property's value. Today, the 3.74-acre property has an estimated value of \$31.3 million. In 2016, it generated over \$415,000 in total property tax revenue.

OU7 includes over 3,300 individual property parcels, most of which are residential properties. In 2016, the estimated average property value for undeveloped residential lots within Daybreak is about \$765,000 per acre. The estimated average property value for undeveloped commercial lots within Daybreak is about \$282,000 per acre.² The table below provides examples of current property values and property tax values at the different villages that make up the Daybreak community.

<i>Example 2017 Property Values and Tax Amounts at Daybreak Villages</i>					
Village Name	Village Description	Number of Bedrooms^a	Acreage (acres)^a	2017 Total Market Value^a	2016 Property Tax
Garden Park Village	Community for ages 55+, located west of Oquirrh Lake.	2	0.13	\$283,500	\$2,074
Creekside Village	Home styles are based on some of Salt Lake City's most popular historic neighborhoods, located northwest of Oquirrh Lake.	4	0.11	\$362,500	\$2,605
Heights Park Village	Village sits atop a hill overlooking all of the other villages surrounding Oquirrh Lake.	4	0.20	\$405,000	\$2,975
Lake Village	Daybreak's premier village, located on the north shore of Oquirrh Lake.	6	0.28	\$1,086,500	\$6,356

^a Property information for example property parcels includes both land and improvements and was provided by the Salt Lake County Assessor's Office website: <http://slco.org/assessor/>.

According to the Salt Lake County Assessor's Office, property values within the Daybreak area have steadily increased over the last several years. Home prices and sales within Salt Lake County have also exhibited a strong upward trend. According to the Salt Lake Board of Realtors' 2016 Housing Forecast report, those gains in home prices and sales can be attributed in large part to the state's job growth.

On-site businesses that produce retail sales and services also generate tax revenues through the collection of sales taxes, which support state and local governments.³

² Estimated average property value for undeveloped residential and commercial lots within Daybreak provided by the Salt Lake County Assessor's Office in September 2016. According to the Assessor's Office, there are several large parcels (10-30 acre parcels) of vacant commercial land located on the western portion of Daybreak which skew the estimated average price per acre for commercial property. This results in a low estimated average cost per acre for commercial property.

³ The combined sales tax rate in South Jordan is 6.85 percent. This includes sales tax rates for the state, Salt Lake County, mass transit, county transportation, and a botanical, cultural and zoo tax. For more information, see the Combined Sales and Use Tax Rates Chart at Utah's State Tax Commission website: <http://tax.utah.gov/salestax/rate/16q3combined.pdf>.

Future Site Use

Today, 14,213 people live in Daybreak; an estimated 30,000 people could live there by 2020. At full buildout, the community could include up to 20,000 residential units. Kennecott Land's planning and development team continues to focus on phased growth and sustainability, balancing new development with community needs. New businesses also continue to locate at Daybreak. For example, the Trail Crossing Shopping Center is located at the intersection of Mountain View Corridor and Daybreak Parkway. This development kicks off Daybreak's commercial and residential expansion along the Mountain View Corridor. A 124,000-square-foot Smith's Marketplace, which opened in August 2016, anchors the shopping center, with other businesses to be announced in the future. The Smith's Marketplace employs 200 people.

Moving forward, Kennecott Land plans to share its experiences and lessons learned from the Daybreak development process with other planners and developers in the Salt Lake Valley.



Figure 21. New construction and planned development at Daybreak.

Conclusion

Since the mid-1990s, Kennecott has demonstrated how corporate success can be achieved as part of a broader approach to environmental cleanup, community outreach and economic development. The company looked beyond mining-only interests to explore the long-term value of its land holdings and to tailor cleanups to support future use opportunities.

The use of the Superfund Alternative Approach to address site contamination showed how flexibility in the cleanup process can result in successful, timely and cost-effective remedies. Innovative thinking by Kennecott, EPA and UDEQ, and ongoing collaboration and cooperation with those stakeholders and the community has led to the successful cleanup and extensive redevelopment of the Kennecott South Zone. Today, the Daybreak community is a walkable mixed-use development that provides a wide range of employment and housing options as well as recreational and public service amenities. Businesses operating within OU7 at the Kennecott South Zone employ about 914 people, contributing nearly \$38 million in estimated annual employment income, with additional redevelopment underway. In 2016, estimated annual sales for OU7 businesses exceeded \$143 million. Continued operation of Kennecott mining activities across both the North and South Zones provides 1,650 jobs and \$140.6 million in estimated annual employment income. Company-wide annual sales in 2016 for Kennecott exceeded \$1.2 billion.

Daybreak is a model for sustainable development, and highlights how active mining interests can coexist with community development and environmental protection efforts. Looking forward, EPA will continue to work with Kennecott, UDEQ and the community to support protective reuses and continued uses, and ensure the long-term stewardship of the site's remedy.



Figure 22. Oquirrh Lake and the Daybreak skyline.

*For more information about EPA's Superfund Redevelopment Initiative, visit:
<http://www.epa.gov/superfund-redevelopment-initiative>.*



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Technical Appendix

Employment Information for On-Site Jobs

EPA obtained the data included in this appendix directly from reputable sources and reported the data as presented by those sources. Information on the number of employees and sales volume for on-site businesses came from the Hoovers/Dun & Bradstreet (D&B) database.¹ EPA also gathered information on businesses and corporations from D&B. D&B maintains a database of over 225 million active and inactive businesses worldwide.

When the Hoovers/D&B database did not provide employment and sales volume information for on-site businesses, EPA used the ReferenceUSA database.² In cases where the ReferenceUSA database did not include employment and sales volume for on-site businesses, EPA used the Manta website.³ These databases and websites include data reported by businesses. Accordingly, some reported values might be underestimates or overestimates. In some instances, business and employment information came from discussions with business representatives. While sales values typically exceed estimated totals of annual income, sales can sometimes be lower than estimated income. This could be attributed to a number of business conditions and/or data reporting.

Wage and Income Information for On-Site Jobs

EPA obtained wage and income information from the U.S. Bureau of Labor Statistics (BLS). Part of the U.S. Department of Labor, the BLS is the principal federal agency responsible for measuring labor market activity, working conditions and price changes in the economy. All BLS data meet high standards of accuracy, statistical quality and impartiality.

EPA used the BLS Quarterly Census of Employment and Wages database to obtain average weekly wage data for businesses at the Kennecott South Zone. Average weekly wage data were identified by matching the North American Industry Classification System (NAICS) codes for each type of business with weekly wage data for corresponding businesses in Salt Lake County. If weekly wage data were not available at the county level, EPA sought wage data by state or national level, respectively. In cases where wage data were not available for the six-digit NAICS code, EPA used higher-level (less-detailed) NAICS codes to obtain the wage data.

To determine the annual wages (mean annual) earned from jobs generated by each of the selected businesses at the Kennecott South Zone, EPA multiplied the average weekly wage figure by the number of weeks in a year (52) and by the number of jobs (employees) for each business.

¹ Hoovers/D&B database: <http://www.dnb.com/>.

² ReferenceUSA database: <http://resource.referenceusa.com/>.

³ Manta website: <https://www.manta.com/>.

Table 1. Kennecott South Zone: Information for On-Site Organizations and Businesses Operating at OU7

On-Site Business	NAICS Code ^a	NAICS Title	Number of Employees ^b	Average Weekly Wage (2015) ^c	Annual Wage (Mean Annual) per Employee	Total Annual Income ^d	Annual Sales (2016) ^b
7-ELEVEN	445120	Convenience Stores	3	\$320	\$16,640	\$49,920	\$180,000
Alder Remodeling & Landscaping	236115	New Single-Family Housing Construction (except Operative Builders)	2	\$989	\$51,428	\$102,856	\$200,000
All Lines Insurance Services Inc	524210	Insurance Agencies and Brokerages	1	\$1,192	\$61,984	\$61,984	\$62,000
Alta Docs LLC	323111	Commercial Printing (except Screen and Books)	1	\$986	\$51,272	\$51,272	\$300,000
American Family Insurance- Jeremy Jones	524210	Insurance Agencies and Brokerages	1 ^e	\$1,192	\$61,984	\$61,984	\$302,000 ^e
Best Utah Real Estate LLC	531210	Offices of Real Estate Agents and Brokers	2	\$998	\$51,896	\$103,792	\$122,600
Black Diamond Gymnastics & Sports Center	451110	Sporting Goods Stores	3	\$453	\$23,556	\$70,668	\$150,000
Bonnie Nails LLC	812113	Nail Salons	1	\$373	\$19,396	\$19,396	\$16,120 ^f
Breathe Yoga Studio	611620	Sports and Recreation Instruction	2 ^g	\$397	\$20,644	\$41,288	\$81,000 ^g
Church Of Jesus Christ Of LDS	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA
Church Of Jesus Christ Of LDS	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA
Clean Romances	711510 ^h	Independent Artists, Writers, and Performers	NA	\$532	\$27,664	NA	NA
Compusoft Development LLC	541511	Custom Computer Programming Services	20	\$1,677	\$87,204	\$1,744,080	\$1,960,000
Copper Creek Dental	621210	Offices of Dentists	7	\$680	\$35,360	\$247,520	\$400,000

On-Site Business	NAICS Code ^a	NAICS Title	Number of Employees ^b	Average Weekly Wage (2015) ^c	Annual Wage (Mean Annual) per Employee	Total Annual Income ^d	Annual Sales (2016) ^b
Cover My Prom LLC	532220	Formal Wear and Costume Rental	2	\$245	\$12,740	\$25,480	\$41,790
Crossing at Daybreak	531110	Lessors of residential buildings and dwellings	3 ^e	\$737	\$38,324	\$114,972	\$410,000 ^e
Daisy Tree Photography	541922	Commercial Photography	1	\$666	\$34,632	\$34,632	\$26,700 ^f
Dave's Barber Shop	812111	Barber shops	1	\$301	\$15,652	\$15,652	\$17,450
Daybreak Information Center	541990	All Other Professional, Scientific, and Technical Services	5	\$1,252	\$65,104	\$325,520	\$139,630 ^f
Daybreak Arts Academy	611699	All Other Miscellaneous Schools and Instruction	5	\$515	\$26,780	\$133,900	\$207,060
Daybreak Community Association, Inc. (Daybreak Community Center)	813990	Other Similar Organizations	14	\$546	\$28,392	\$397,488	\$501,450
Daybreak Smiles Pediatric Dentistry	621111	Offices of Physicians (except Mental Health Specialists)	3	\$1,588	\$82,576	\$247,728	\$240,530 ^f
Db Medical I LLC	621999	All Other Miscellaneous Ambulatory Health Care Services	3	\$1,103	\$57,356	\$172,068	\$84,020 ^f
Dbvc1 LLC Care of Commerce Crg	813910	Business Associations	2	\$1,467	\$76,284	\$152,568	\$74,990 ^f
Divya School of Dance	611610	Fine Arts Schools	1	\$194	\$10,088	\$10,088	\$10,350
FAL Food & Beverages LLC	424490	Other Grocery and Related Products Merchant Wholesalers	5	\$992	\$51,584	\$257,920	\$119,210 ^f
Fly Drifters of Utah LLC	713990	All Other Amusement and Recreation Industries	2	\$332	\$17,264	\$34,528	\$105,980

On-Site Business	NAICS Code ^a	NAICS Title	Number of Employees ^b	Average Weekly Wage (2015) ^c	Annual Wage (Mean Annual) per Employee	Total Annual Income ^d	Annual Sales (2016) ^b
Glamour Connection	812199	Other Personal Care Services	3 ^e	\$406	\$21,112	\$63,336	\$114,000 ^e
Gratitude Spa Inc.	713940	Fitness and Recreational Sports Centers	6	\$242	\$12,584	\$75,504	\$89,520
Headstrong Consulting	541618	Other Management Consulting Services	2	\$1,658	\$86,216	\$172,432	\$112,400 ^f
Holiday Oil Co 40	445120	Convenience Stores	3	\$320	\$16,640	\$49,920	\$148,510
Ivory Homes - Garden Park At Daybreak	236115	New Single-Family Housing Construction (except Operative Builders)	2	\$989	\$51,428	\$102,856	\$185,130
Johns, Matthew R. - Johns Matthew R.	621999	All Other Miscellaneous Ambulatory Health Care Services	6	\$1,103	\$57,356	\$344,136	\$125,070 ^f
Johnson Elite Orthodontics	621210 ^h	Offices of Dentists	3	\$680	\$35,360	\$106,080	\$175,520
Jordan School District (Daybreak Elementary School)	611110	Elementary and Secondary Schools	90	\$621	\$32,292	\$2,906,280	NA
Jordan School District (Eastlake Elementary School)	611110	Elementary and Secondary Schools	82	\$621	\$32,292	\$2,647,944	NA
Keller Williams South Valley Realty	531210	Offices of Real Estate Agents and Brokers	2	\$998	\$51,896	\$103,792	\$116,740
Kennecott Utah Copper LLC	212234	Copper Ore and Nickel Ore Mining	104 ⁱ	1639	\$85,228	\$8,863,712	\$78,346,667 ^j
Luxury Limos	485320	Limousine Service	3	\$303	\$15,756	\$47,268	\$172,290
Mathnasium	611699 ^h	All Other Miscellaneous Schools and Instruction	NA	\$515	\$26,780	NA	NA
Mountain Mike's Pizza	722511	Full-Service Restaurants	20 ^e	\$351	\$18,252	\$365,040	\$1,018,000 ^e

On-Site Business	NAICS Code ^a	NAICS Title	Number of Employees ^b	Average Weekly Wage (2015) ^c	Annual Wage (Mean Annual) per Employee	Total Annual Income ^d	Annual Sales (2016) ^b
Nest Boutique LLC	448120	Women's Clothing Stores	3	\$266	\$13,832	\$41,496	\$203,240
Nielsen's Frozen Custard	722515	Snack & Nonalcoholic Beverage Bars	25 ^e	\$252	\$13,104	\$327,600	\$1,272,000 ^e
Nine Salon and Spa	713940	Fitness and Recreational Sports Centers	10	\$242	\$12,584	\$125,840	\$314,680
Oakmond Automation	23821 ^h	Electrical Contractors and Other Wiring Installation Contractors	NA	\$1,097	\$57,044	NA	NA
Oquirrh Mountain Utah Temple	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	\$51,000 ^g
Oral Surgery of Utah	621210	Offices of Dentists	4	\$680	\$35,360	\$141,440	\$61,510 ^f
Painter's Palette LLC	23832	Painting and Wall Covering Contractors	1	\$667	\$34,684	\$34,684	\$46,920
Pechiney Reynolds Quebec, Inc.	331318	Other Aluminum Rolling, Drawing, and Extruding	1	\$1,045	\$54,340	\$54,340	\$278,460
Perry Homes-Midas Creek	236115	New Single-Family Hsng Constr (Exc For-Sale Bldrs)	2 ^e	\$989	\$51,428	\$102,856	\$1,020,000 ^e
Porch	722511 ^h	Full-service restaurants	2	\$351	\$18,252	\$36,504	\$37,100
Rio Tinto Services Inc.	541219	Other Accounting Services	346 ^k	\$745	\$38,740	\$13,404,040	\$45,715,250 ^l
Rowen Christian Couture LLC	424330	Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers	2	\$568	\$29,536	\$59,072	\$235,970
Sagewood at Daybreak	623311	Continuing Care Retirement Communities	40 ^e	\$473	\$24,596	\$983,840	\$2,235,000 ^e
Salt Cake City	445291	Baked Goods Stores	4	\$194	\$10,088	\$40,352	\$122,730

On-Site Business	NAICS Code ^a	NAICS Title	Number of Employees ^b	Average Weekly Wage (2015) ^c	Annual Wage (Mean Annual) per Employee	Total Annual Income ^d	Annual Sales (2016) ^b
Scranton Clinic of Chiropractic LLC	621310	Offices of Chiropractors	2	\$516	\$26,832	\$53,664	\$185,880
Sego Homes Lc	236115	New Single-Family Housing Construction (except Operative Builders)	2	\$989	\$51,428	\$102,856	\$234,370
SkoNet LLC	541613	Marketing Consulting Services	1	\$1,052	\$54,704	\$54,704	\$57,000
Something Vintage Something Blue	485320 ^h	Limousine Service	NA	\$303	\$15,756	NA	NA
South Jordan Fire Department - Station 62	922160 ^h	Fire Protection	NA	\$1,239	\$64,428	NA	NA
Stock Squared, LLC	327390	Other Concrete Product Manufacturing	2	\$906	\$47,112	\$94,224	\$200,000
Swirley Girls	424490	Other Grocery and Related Products Merchant Wholesalers	5	\$992	\$51,584	\$257,920	\$375,420
SWIXEL LLC (eSpokes)	423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	6	\$942	\$48,984	\$293,904	\$600,000
The Break Sports Grill	722513	Limited-Service Restaurants	9	\$284	\$14,768	\$132,912	\$240,890
The Church of Jesus Christ of Latter-Day Saints	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA
The Church of Jesus Christ of Latter-day Saints	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA
The Church of Jesus Christ of Latter-day Saints	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA

On-Site Business	NAICS Code ^a	NAICS Title	Number of Employees ^b	Average Weekly Wage (2015) ^c	Annual Wage (Mean Annual) per Employee	Total Annual Income ^d	Annual Sales (2016) ^b
The Church of Jesus Christ of Latter-day Saints	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA
The Church of Jesus Christ of Latter-day Saints	813110	Religious Organizations	1 ^e	\$466	\$24,232	\$24,232	NA
The Classic Cleaners	812320	Dry cleaning and Laundry Services (except Coin-Operated)	3 ^e	\$339	\$17,628	\$52,884	\$159,000 ^e
Tio's Mexican Restaurant	722511	Full-Service Restaurants	11 ^m	\$351	\$18,252	\$200,772	\$306,000 ^e
Wheaton USA Retiree Benefit Plan	524298	All Other Insurance Related Activities	2 ^g	\$1,201	\$62,452	\$124,904	\$992,841 ^g
Young Chef's Academy	611110	Elementary and Secondary Schools	1	\$568	\$29,536	\$29,536	\$31,850
ZIONS FIRST NATIONAL BANK (Zb, National Association)	522110	Commercial Banking	6	\$1,333	\$69,316	\$415,896	\$1,881,000 ^e
Total			914			\$37,685,700	\$143,214,838

^a NAICS code provided in the D&B database, unless otherwise noted.

^b Data are from the D&B database, unless otherwise noted.

^c Average weekly wage per employee based on BLS 2015 Average Weekly Wage data.

^d Total annual income figures derived by multiplying "Number of Employees" by "Annual Wage (Mean Annual) per Employee."

^e Data are from the ReferenceUSA database.

^f While sales values typically exceed estimated totals of annual employee income, annual reported sales can sometimes be lower than estimated annual income. This atypical condition of estimated income exceeding sales can be a result of business conditions, estimated business wages not accurately reflecting actual wages for the site-specific business, annual sales being under-reported, a business loss for the year or a combination of those factors.

^g Data are from the Manta website.

^h NAICS code assumed based on business type.

ⁱ Employee number provided by Rio Tinto contact John Birkinshaw on July 19, 2016. This business listing represents the economic data for the Kennecott Utah Copper facility operating at the Rio Tinto Regional Center, within OU7. Table 2 (below) captures economic data for the entire Kennecott Utah Copper business, including facilities that operate both within and outside of Kennecott South Zone OU boundaries.

^j Annual sales value for Utah Kennecott Copper operations within OU7 calculated using the company-wide annual sales value provided by the *Rio Tinto 2016 Annual Report*.

^k Employee number provided by Rio Tinto contact John Birkinshaw on July 19, 2016.

^l Annual sales value calculated using the “Sales Per Employee” method. In cases where information sources do not provide annual sales data, an estimated annual sales value was calculated using the “Sales Per Employee Method”. This method involves dividing the company-wide sales value by the number of employees that work at all branches of the business. That value equals an estimated business sales value per employee for the entire business, for all locations. That value is then multiplied by the number of employees at the on-site business location to calculate an estimated annual sales value for the site-specific business location.

^m Employee number provided by the business on July 18, 2016.

NA = not available.

Table 2. Kennecott Utah Copper: Company-Wide Information^a

On-Site Business	NAICS Code	NAICS Title	Number of Employees	Average Weekly Wage (2015) ^b	Annual Wage (Mean Annual) per Employee	Total Annual Income ^c	Annual Sales (2016)
Kennecott Utah Copper LLC	212234	Copper Ore and Nickel Ore Mining	1,650 ^d	\$1,639	\$85,228	\$140,626,200	\$1,243,000,000 ^e

^a Includes economic data for all Kennecott Utah Copper company branches operating at and surrounding the Bingham Canyon Mine, including branches located outside of Site-related OU areas.

^b Average weekly wage per employee based on BLS 2015 Average Weekly Wage data.

^c Total annual income figures derived by multiplying “Number of Employees” by “Annual Wage (Mean Annual) per Employee.”

^d Employee number provided by Rio Tinto contact John Birkinshaw on July 19, 2016.

^e Company-wide annual sales value for Utah Kennecott Copper provided by the *Rio Tinto 2016 Annual Report*.

Table 3. Kennecott South Zone: Information for “Spill-Over Development” Business

On-Site Business	NAICS Code	NAICS Title	Number of Employees	Average Weekly Wage (2015) ^a	Annual Wage (Mean Annual) per Employee	Total Annual Income ^b	Annual Sales (2016)
South Jordan Health Center	622110 ^c	General Medical and Surgical Hospitals	900 ^d	\$1,175	\$61,100	\$54,990,000	\$282,857,143 ^e

^a Average weekly wage per employee based on BLS 2015 Average Weekly Wage data.

^b Total annual income figures derived by multiplying “Number of Employees” by “Annual Wage (Mean Annual) per Employee.”

^c NAICS code assumed based on business type.

^d Employee number provided by Cara Wesson, Assistant to the Director of the South Jordan Health Center, during a phone interview on July 20, 2016.

^e Annual sales value calculated using the “Sales Per Employee” method.

Property Values and Local Tax Revenue Generated from Property Taxes

EPA obtained data on the most recently assessed values for selected property parcels at the Kennecott South Zone in August 2017 through property records accessible through Salt Lake County’s online property appraisal database (<https://slco.org/assessor/new/query.cfm>). EPA also obtained 2016 property tax information for those site parcel. OU7 includes over 3,300 individual property parcels. While it was not feasible to collect property values and property tax information for all OU7 parcels, property data has been highlighted for a prominent commercial site property (the Rio Tinto Regional Center property) and example residential properties within Daybreak in order to help illustrate the beneficial effects of cleanup and redevelopment on property values and property tax revenue.

Table 4. Property Value and Tax Summary for Taxes Payable for the Rio Tinto Regional Center Property

Parcel ID No.	Parcel Address	Acreage	Total Market Value of Land (2007) ^a	Total Market Value of Land (2017)	Total Market Value of Improvements (2017)	Total Market Value of Land and Improvements (2017)	Total Property Tax (2007) ^a	Total Property Tax (2016)
27-19-158-001-0000	4700 West Daybreak Parkway	3.74	\$206,130	\$1,091,500	\$30,169,500	\$31,261,000	Not Available	\$415,501

^a 2007 property value provided by the Salt Lake County Assessor’s Office by phone on July 28, 2016. The total 2007 property value does not include an improvement value; the property was vacant in 2007 at the time of assessment.

Table 5. Property Value and Tax Summary for Taxes Payable for Example Daybreak Village Properties

Parcel ID No.^a	Daybreak Village Name	Number of Bedrooms	Acreage^a (acres)	Total Land Value (2017)^a	Total Improvement Value (2017)^a	Total Market Value of Land and Improvements (2017)^a	2016 Property Tax
26-13-285-002-0000	Heights Park Village	4	0.2	\$85,900	\$319,100	\$405,000	\$2,975
26-13-206-013-0000	Creekside Village	4	0.11	\$59,800	\$302,700	\$362,500	\$2,605
26-24-235-011-0000	Garden Park Village	2	0.13	\$67,100	\$216,400	\$283,500	\$2,074
27-18-301-047-0000	Lake Village	6	0.28	\$137,500	\$949,000	\$1,086,500	\$6,356

^a Property information for example property parcels was provided by the Salt Lake County Assessor's Office website: <http://slco.org/assessor/>.