



REPORT CARD FOR  
**KERN COUNTY'S**  
INFRASTRUCTURE

**2018**



Southern San Joaquin Branch of the American Society of Civil Engineers  
[INFRASTRUCTUREREPORTCARD.ORG/KERNCOUNTY](http://INFRASTRUCTUREREPORTCARD.ORG/KERNCOUNTY)



# TABLE OF CONTENTS

Executive Summary.....	1
Grading Methodology.....	3
Grading Scale .....	4
5 Steps We Can Take.....	5
Aviation .....	7
Bridges .....	12
Drinking Water .....	17
Parks.....	23
Rail.....	27
Roads.....	32
Solid Waste .....	40
Transit .....	46
Wastewater.....	53
About the Southern San Joaquin Branch .....	58





## EXECUTIVE SUMMARY



Kern County is the 3<sup>rd</sup> largest geographically in California with 8,161 square miles – *larger than Connecticut and Delaware combined*. Bakersfield is the largest city and the county seat with 376,000 people. This makes Bakersfield the 9<sup>th</sup> largest city in California and the 52<sup>nd</sup> largest in the nation – *larger than Cincinnati, Ohio, or St. Louis, Missouri*. We are the largest agricultural producing county in California at more than \$7 billion annually, and the 2<sup>nd</sup> largest oil producing county in the nation (4% of total U.S. oil production).

Infrastructure is the backbone of our daily lives and communities. While we don't always acknowledge it, the condition of our infrastructure has a very real impact on every person and business. We all depend on roads and bridges to get us where we are going, water infrastructure that delivers clean water to our taps, and a system of roads, rail, and transit to move goods and people that fuel our economy.

An expert team of local civil engineers and industry professionals from public agencies, private consultants, and contractors were assembled to evaluate nine infrastructure categories of Kern County. The results have been reviewed and scrutinized by ASCE's team of national experts, the Committee on America's Infrastructure.

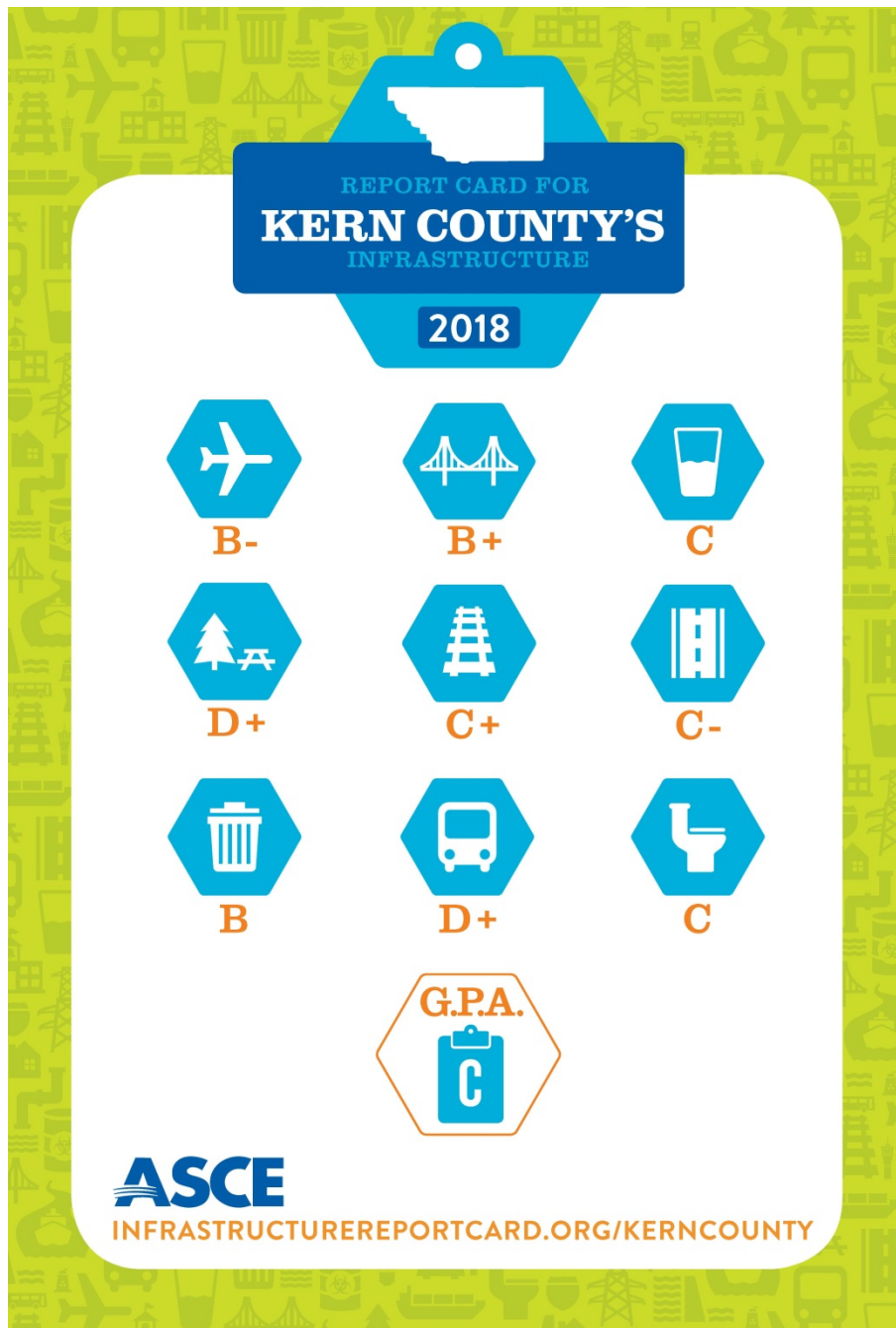
***Thanks to major investments over the past 10 years, Kern County's transportation network has increased capacity and improved levels of service, but sustainable funding is needed to maintain these upgraded assets.*** The Thomas Roads Improvement Program and the Caltrans State Route widening project have increased capacity and helped maintain an acceptable level of service or better for Kern County residents. Additionally, the number of bridges requiring significant repair or upgrades decreased from 9.1% in 2008 to 2.5% in 2017, which is well below the national average. The funding provided by the state legislature through passage of the 2017 transportation package is helpful, but a local funding source must be identified to supplement state funding and sustain recent road and bridge improvements.



***Transit and parks infrastructure have been shortchanged by recent budget cycles and must be prioritized going forward. In both cases, as existing revenue sources have remained constant or declined, costs have continued to rise.*** Ten years ago, a full-time parks employee would have been responsible for 9.2 acres, but today that same employee is responsible for 12.6 acres. Additional staff is needed to maintain the existing level of service. Meanwhile, public transit in Kern County GET & Kern Transit have invested in fleet upgrades over the last 10 years, but significant funding will be required in

the coming years to accommodate potential growths in ridership and to meet anticipated state-wide zero emission requirements.

The Report Card was created to help Kern County residents understand the state of our infrastructure. As civil engineers, our job is to plan, design, construct, and maintain our infrastructure networks and this document allow us the opportunity to share that information with the public. The Report Card provides a snapshot for residents and policymakers to engage in conversation about where we are and where we want to be. We hope that this information provides the insight needed to start that conversation and ignite action.



## GRADING METHODOLOGY

Using a simple A to F school report card format, the Report Card examines current infrastructure conditions and needs, assigning grades and making recommendations to raise them.

ASCE Southern San Joaquin Branch compiled a team of regional infrastructure experts to gather data and prepare detailed summaries for each infrastructure category. Summaries provided for each infrastructure category were peer reviewed by subject matter experts.

The Report Card Committee assessed all relevant data and references, consulted with other technical and industry experts, and assigned grades for each infrastructure category using the following criteria:

- **CAPACITY:** Does the infrastructure's capacity meet current and future demands?
- **CONDITION:** What is the infrastructure's existing and near-future physical condition?
- **FUNDING:** What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?
- **FUTURE NEED:** What is the cost to improve the infrastructure? Will future funding prospects address the need?
- **OPERATION AND MAINTENANCE:** What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?
- **PUBLIC SAFETY:** To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?
- **RESILIENCE:** What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?
- **INNOVATION:** How does future technology integrate with today's infrastructure?



## GRADING SCALE



### Exceptional, Fit for the Future

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.



### Good, Adequate for Now

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable, with minimal capacity issues and minimal risk.



### Mediocre, Requires Attention

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.



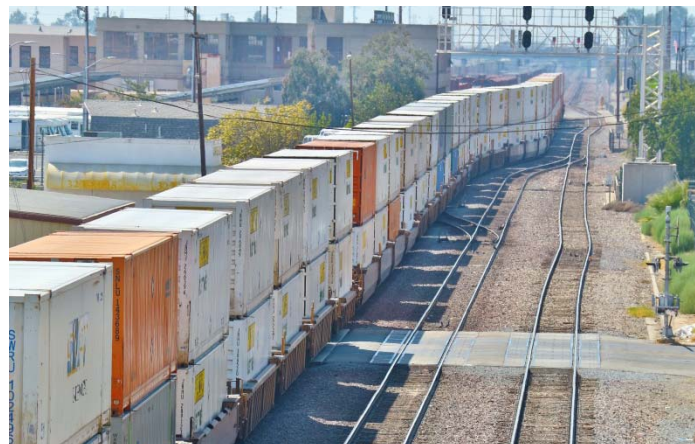
### Poor, at Risk

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of serious concern with strong risk of failure.



### Failing/Critical, Unfit for Purpose

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.





## 5 STEPS WE CAN TAKE

1. **Vote no on Proposition 6 in November 2018.** This ensures Senate Bill 1 (SB1), which is an essential source of funding for local agencies to maintain highways, roads, transit systems and bridges, remains intact. Traffic in Bakersfield is significantly better today than 10 years ago because of one-time grant funding. The funding through SB1 will ensure we can maintain that infrastructure for the future.
2. **Enhance public transit service.** Kern County has a robust transit system, yet only 1% of the population uses it. Innovation – such as mobile ticketing, free Wi-Fi, and streamlined routes – will help make transit a preferred option for Kern County residents. Increased use of transit reduces our traffic and keeps our air cleaner.
3. **Provide consistent and reliable funding for Parks and Recreation agencies.** People in Kern County love their parks year-round. Yet, maintenance staff and budgets are stretched thinner each year. We need to make parks a priority.
4. **Construct additional water storage reservoirs.** Water supply and availability are perennial topics in Kern County, but the challenges in having enough water for our growing population will continue to increase. We need to be proactive in working together with other central valley and southern California agencies to permanently solve our regional water problem.
5. **Increase revenue for local airports.** Kern County is fortunate to have received \$49 million in grant funding from the Federal Aviation Administration for rehabilitation of runways and taxiways at Meadows Field. Local matching funds are required to obtain grants. There are many other projects that are needed throughout the county to maintain general aviation and commercial service.







## AVIATION



### Executive Summary

Historically Meadows Field, our sole commercial airport, was well funded. Commercial passenger service has decreased since 2006, however, even while Kern County's population has surged. Fewer passengers and fewer flights have reduced revenue. Fortunately, runway and taxiway pavement conditions at Meadows Field are improving thanks to \$49 million in grants from the Federal Aviation Administration. Providing the matching funds to get these grants, however, has stretched the County's Airport Enterprise Fund to its limits. Additional funding will be required in the future to maintain our infrastructure and keep us competitive for grants.



### Overview

Kern County has 16 public use airports, 12 of which are included among the 3,340 airports that comprise the National Plan of Integrated Airport Systems (NPIAS) and are determined to be significant to national air transportation. The public use and private airports accommodated 350,000 aviation operations in 2017, the majority of which are general aviation.

Commercial service is provided at Meadows Field (BFL) in Bakersfield. Currently there are two carriers, United Express and American Airlines, which provided service to 100,000 commercial passengers in FY 2016/17 with daily flights to Denver, San Francisco, and Phoenix. Meadows Field is also one of only two international airports in the San Joaquin Valley. A flight school is also located at the airport where commercial airline pilots train.



The Mojave Air and Space Port (MHV) is a FAA certified spaceport and is home to variety of private aerospace companies that are conducting research and development. Among these is the Spaceship Company, which is the sister company of Virgin Galactic that is developing the first commercial spaceline. The airport is also home to the National Test Pilot School, which is a civilian training facility, and a storage area for commercial aircraft.

Kern County is also home to two large military research and testing facilities; Edwards Air Force Base and Naval Weapons Station China Lake. See Table 1 for a complete list of airports in Kern County.

**Table 1 – Airports in Kern County**

Airport Name	Operator
Bakersfield Municipal Airport	City of Bakersfield
California City Municipal Airport	City of California City
Delano Municipal Airport	City of Delano
Tehachapi Municipal Airport	City of Tehachapi
Elk Hills-Buttonwillow Airport	County of Kern
Kern Valley Airport	
Lost Hills Airport	
Meadows Field (BFL)	
Poso Airport	
Taft Airport	
Wasco Airport	
Edwards Air Force Base	
Naval Weapons Station China Lake	
Mojave Air and Space Port (MHV)	Mojave Air and Space Port
Inyokern Airport (IYK)	Indian Wells Valley Airport District
Shafter Airport (Minter Field)	Minter Field Airport District
Mountain Valley Airport	Privately Owned
Rosamond Skypark Airport	

**Capacity and Condition**

The commercial terminal at Meadows Field was constructed in 2006 and is in excellent condition. With six gates and ample available space the terminal has excess capacity to accommodate many more flights than it currently receives.

Another key indicator of the condition of an airport is the runways and taxiways. Meadows Field is currently undergoing a \$49 million runway rehabilitation project, which will ensure they will be up to Federal Aviation Administration (FAA) standards for the next 40 years. Repairs include reconstruction of the north and south runways, replacement of the approach and centerline lighting system, and removal and replacement of connector taxiways.



Work is also progressing at the general aviation airports in the County:

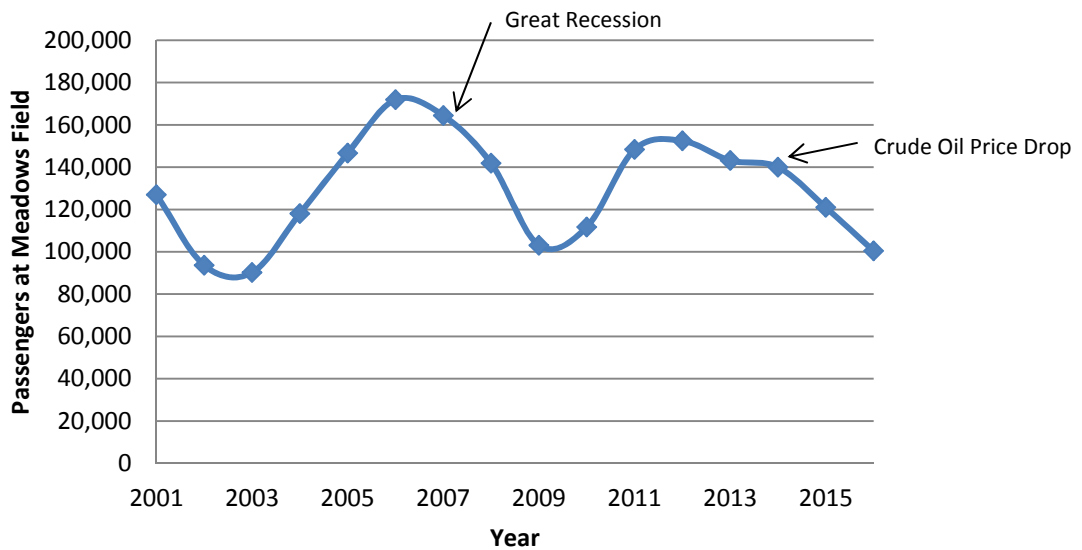
- FAA grants were awarded in 2017 for safety and operational improvements at Kern Valley, Bakersfield Municipal, California City, and Shafter (\$3.5 million total).
- City of Delano is currently working on the environmental documents for their \$51 million future airport relocation project.
- City of Tehachapi is not looking to expand their facilities and their airport is adequate to support their current needs; they budget \$150,000 annually for their maintenance program.



Edwards AFB is the command center for conducting and supporting research and development of flight and continues to evaluate aerospace systems from concept to combat. With the *Final Environmental Assessment* issued in July 2017, continued forward progress has been made to issue a launch operator license to allow orbital reusable vehicle missions.

**Funding and Future Need**

Over the last 15 years, commercial passenger enplanements at Meadows Field have varied from 90,000 to nearly 180,000 according to FAA records. The reason for these drastic changes are related to both the economy and changing habits by passengers. The highest number of enplanements coincided with construction of the new commercial terminal and the beginning of the national economic recession. The next peak occurred in 2014, after which global oil prices fell sharply. Our local economy is closely tied to the oil industry and a downturn in oil reduced the number of business travelers. The number of seats offered by commercial airlines has decreased by 20% between 2014 and 2017.



Airports in California are generally required to be self-sustaining based upon fees charged, landings, takeoffs, fuel, property leases, parking, concessions, and Passenger Facilities Charges (PFCs). Reducing the number of flights and passengers then reduces the revenue that the County can generate. At the same time expenses remain relatively constant. This means that each year less money is available for maintenance of existing facilities or to provide matching funds for federal grants.

Another issue is that PFC's have remained capped by FAA at \$4.50 per person since 2000 and are not indexed to inflation. Because costs continue to increase over time, the purchasing power of this revenue source decreases over time.

Capital improvements are funded primarily by the FAA's Airport Improvement Program (AIP). AIP is a grant program that provides funds for planning and construction of improvements at public-use airports that are included on the NPIAS. Federal grants require a "local match," usually 10% per project. Kern County's *2018-19 Recommended Budget* states that the Airport Enterprise Fund has a \$13.7 million deficit that will come due in future years. Additional revenue is needed to meet these costs and provide matching funds for future projects.

### Public Safety, Resilience, Innovation

The Kern County Fire Department provides Aircraft Rescue and Firefighting (ARFF) services at Meadows Field (Fire Station 62) and Inyokern Airport (Fire Station 73) on a constant staffing (24-hour) model. The fire department operates a fleet of three airport crash rescue vehicles. These personnel responded to nearly 90 emergency calls in 2016.

Meadows Field includes a staffed control tower with airport surveillance radar and lights. All other public airports in the County are uncontrolled. All airports are fenced to prevent public access. Vegetation within the airports are maintained to reduce fire hazard and to discourage wildlife from living in these areas.

In July 2018, Kern County received a \$500,000 grant from the U.S. Department of Transportation's Small Community Air Service Development Program to help restore passenger service between Bakersfield and Dallas/Fort Worth. The grant is planned to be used for advertising and not a subsidy.

### Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- Update the Passenger Facilities Charges to restore purchasing power and index the fee to inflation.
- Develop and implement a long-term plan to increase budget available to the Airports Enterprise Funds that we are ready for future grant opportunities.
- Promote public awareness on why flying locally makes sense. Most people do not factor the costs of gas, parking, and additional time when flying from Los Angeles.
- Continue to promote expansion of commercial flights and destinations available at Meadows Field.

## Selected Information Sources

- *Delano Municipal Airport Master Plan Final Report*, prepared by AECOM, April 2011.
- *Final Environmental Assessment and Finding of No Significant Impact for Issuing a License to Virgin Orbit (LauncherOne), LLC for LauncherOne Launches at the Mojave Air and Space Port, Kern County, California*, prepared by FAA, July 2017.
- Meadows Field Airport, <http://www.meadowsfield.com/>. Interview with Richard Strickland, C.M., Airport Director.
- City of Tehachapi, <http://liveuptehachapi.com/>. Interview with Jay Schlosser, Development Services Director.
- *Mojave Air and Space Port*. [www.mojaveairport.com](http://www.mojaveairport.com). Accessed April 2018.
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- Federal Aviation Administration. Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports. [https://www.faa.gov/airports/planning\\_capacity/passenger\\_allcargo\\_stats/passenger/](https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/). Accessed July 2018.





## BRIDGES



### Executive Summary

Kern County has beaten the national average, reducing the number of bridges requiring significant repair or upgrades from 9.1% in 2008 to 2.5% in 2016. This tremendous success is due in part to the Thomas Roads Improvement Program (TRIP), which is a cooperative effort between the City of Bakersfield, County of Kern, Caltrans, and the Kern Council of Governments. Working together, these agencies were able to obtain state and federal grants to construct needed improvements.



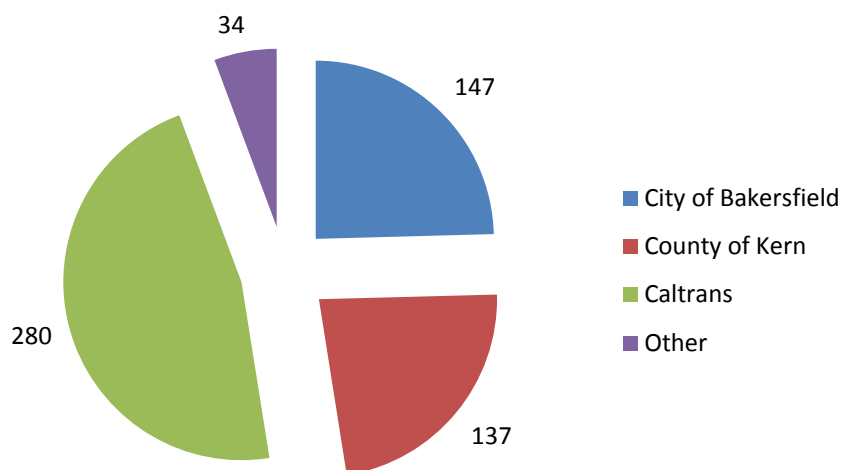
Grants are one-time revenue sources and permanent funding, including revenue from California Senate Bill 1 (SB1), is necessary for local agencies to maintain these facilities into the future. This is especially important as Kern County's bridges continue to age; 53% of bridges in the region have exceeded their original 50-year lifespans and require regular maintenance and upkeep to remain in working condition and ultimately, be replaced.

### Overview

Public agencies own 598 bridges within the county, with the majority being owned by Caltrans, City of Bakersfield, and County of Kern. Since 2010 a total of 47 new bridges have been constructed – primarily through the Thomas Roads Improvement Program (TRIP) – on Westside Parkway, State Route 178, State Route 99, State Route 58, and 7<sup>th</sup> Standard Road among others.



### Bridge Ownership in Kern County



### Capacity and Condition

All public bridges in Kern County are inspected by Caltrans on a rotational basis and a report with repair recommendations is sent to the bridge owner. Depending upon the results of the inspection, a bridge can be designated as functionally obsolete or structural deficient.

**Structurally Deficient** is a status used to describe a bridge that has one or more structural defects that require attention. Structurally deficient bridges are not unsafe, but could become so without substantial improvements. These bridges are inspected more frequently to ensure the safety of the traveling public.

Local agencies (not including bridges owned by Caltrans) have done a tremendous job in reducing the overall number of structurally deficient bridges since 2008 from 25 (9.1%) to 8 (2.5%). By rehabilitating or replacing bridges over the last 10 years, the area is now well below the national average of 9.1%. Additional work is needed, however, to rehabilitate or replace these remaining bridges. Proactive maintenance is also needed to ensure that new bridges are not added to this list in the future.

#### Structurally Deficient Bridges in Kern County

	Kern County		2017 National Average
	2008	2016	
Local Agency Bridges	276	318	
Structurally Deficient	25 (9.1%)	8 (2.5%)	9.1%

It should be noted that in May 2018 the Federal Highway Administration changed the definition of “Structurally Deficient”, which now applies to a significantly greater number of bridges. According to the *Local Bridge Report* released by Caltrans in July 2018 the number of structurally deficient bridges in Kern County is now 35 total. Although the new definition cannot be compared directly with the historical data, it is clear that Kern County has made significant progress in bridge repair and replacement. Much



work remains, however, to comply with the new rules and reduce the structurally deficient bridges even further.

### Operation & Maintenance

Bridges built in the 20<sup>th</sup> century were designed for a 50-year lifespan. More than 53% of all bridges in Kern County (local agency and Caltrans) were constructed prior to 1968 (50 years), with the oldest bridge turning 106 years old in 2018. While regular maintenance can extend the lifespan of a bridge, in general, older bridges require more maintenance and care to keep them in good condition. As our bridges age, more funding will be required to maintain them.



### Funding and Future Need

Funding is provided through Federal Aid Highway funds, state and local resources. In addition, Kern County continues to utilize the maintenance and improvement funding for public bridges in California through the federal Highway Bridge Program (HBP) as authorized under the Transportation Equity Act for the 21<sup>st</sup> Century (TEA21). For the 2017/2018 Federal Fiscal Year, \$7,263,001 has been allocated to Kern County. As stated above, our bridges are aging and the costs for repair and replacement are growing. Kern County must provide the 11.47% matching fund for the HBP. With construction costs continuing to rise, this could be a significant impact to Kern County. Passage of SB 1 helps alleviate this concern by providing additional funding. Construction costs for future rehabilitation and alternative methods of funding need to be evaluated for these older bridges, to make sure there are ample funding mechanisms to complete the work.

### Public Safety, Resilience, and Innovation

Inspection of bridges can be difficult for local agencies, especially when those agencies do not have trained inspection staff. To protect public safety, all bridges are inspected by Caltrans Structure Maintenance and Investigations at intervals of not more than 24 months. Bridge owners receive a detailed inspection report of the bridge condition and any recommended repairs.

New bridges are designed to meet California's strict seismic requirements and accommodate future capacity. The type of bridge used is often done based on life-cycle cost, so that the best long-term solution is used.

## Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- Do not repeal SB 1, which is an essential source of funding for local agencies.
- Increase funding at all levels of government (federal, state, and local) to continue reducing the number of structurally deficient bridges.
- Bridge owners should consider the life-cycle costs as part of design.
- Bridge owners should plan for long-term funding to provide proactive maintenance.

## Selected Information Sources

- *Structure Maintenance and Investigations* prepared by Caltrans, October 2016.
- *Material Storage Under Bridges, Structure Policy Directive SPD 1-8*, prepared by Caltrans, January 19, 2018
- *Scour critical bridges in California*, webinar by FHWA, February 4, 2016.
- California Department of Transportation. *Structural Maintenance and Investigations*. [www.dot.ca.gov/hq/structur/strmaint](http://www.dot.ca.gov/hq/structur/strmaint). Accessed August 2018.
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## DRINKING WATER



### Executive Summary

What would you do if you turned on the faucet and nothing came out? Most Kern County residents are fortunate enough to never think about that question. The majority of metropolitan Bakersfield is served by large utilities that are proactively maintaining their infrastructure and preparing for the future. Many of the smaller water systems, especially in the rural areas, often lack the economic resources or technical expertise to adequately maintain their infrastructure, let alone plan for the future. This is exacerbated by water supply, as a changing climate and increased regulation has limited the functional capacity of the State Water Project and Central Valley Project. Additional reservoirs are needed to capture runoff when it is available.



### Overview



Drinking water in Kern County is provided by approximately 330 private utilities, mutual water companies, and public utilities. That number accounts for only those systems with 15 or more service connections, which are regulated by the State Water Resources Control Board. In addition, there are hundreds of privately owned wells that provide water to individuals and very small communities.

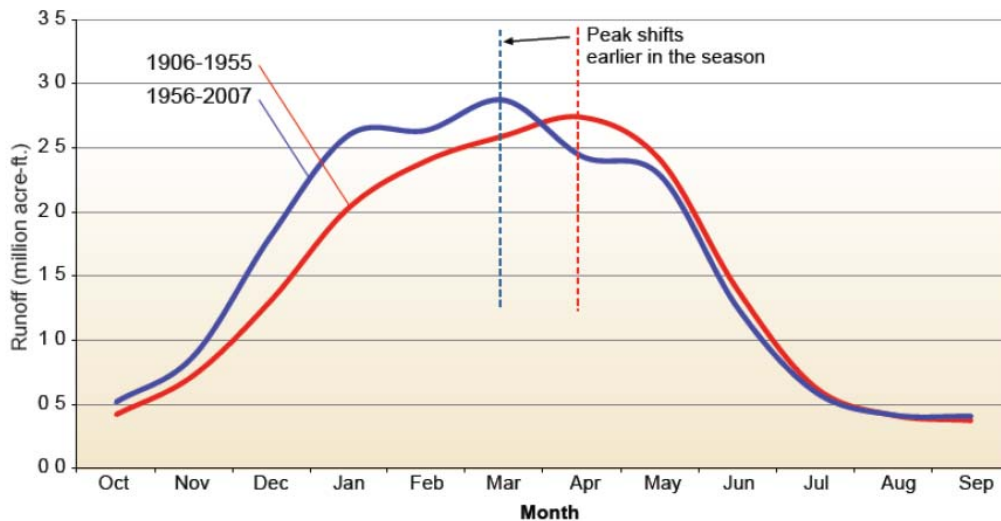
The majority of water systems utilize groundwater, which is relatively easy to obtain and, depending upon location, can meet drinking water quality standards without treatment other than disinfection. With very little precipitation in the county (less than six inches per year), groundwater recharge occurs primarily from the Kern River and other smaller streams. The Central Valley Project (CVP) and State Water Project (SWP) are imported supplies from northern California that are also used for recharge as part of water banking projects.

There are several surface water treatment plants in the county, the largest of which is the *Henry C. Garnett Water Purification Plant*, operated by the Kern County Water Agency. This is a 72 Million Gallons per Day (MGD) facility that provides potable water to approximately 185,000 people in the Bakersfield metropolitan area.



## Capacity and Condition

The climate is changing in the Sierra Nevada Mountains with warmer and wetter winters than in years past. **Figure 1** illustrates this by comparing peak monthly runoff on the Sacramento River between 1906 and 1955 (red line) with 1956 and 2007 (blue line).



**Figure 1. Monthly Average Runoff of Sacramento River System.**

Source: "California Climate Science and Data for Water Resources Management" prepared by California Department of Water Resources.

Peak runoff has shifted a month earlier, which means that a greater quantity of water is available in a shorter period than originally planned by CVP or SWP. Water in northern California that is not captured drains to the ocean and is lost. Locally, this means that less water is available for imported supply. A similar problem exists in getting water across the Sacramento–San Joaquin River Delta, which is ecologically sensitive. Decreased storage and conveyance through the Delta has resulted in significant reductions in imported supplies since the 1990s. Groundwater is used to offset any deficit in surface supply, which results in overdraft when pumping is greater than recharge.

To address this issue, the state of California enacted the Sustainable Groundwater Management Act (SGMA) in 2014 to create a framework to bring groundwater basins into sustainable levels of pumping and recharge by 2040. SGMA will affect the communities in Kern County as they mostly rely on groundwater for their urban water use. Additional water supply projects (e.g. recharge projects, use of recycled water, and surface water storage) along with water conservation measures will be needed to reduce overdraft of the aquifer and bring groundwater use into a sustainable condition.

Changes in water supply and SGMA will impact smaller water systems more severely than larger ones due to the high cost of infrastructure and the ability to purchase reliable water supplies.

## Public Safety

Local groundwater typically requires no treatment other than disinfection. Depending on the hydrogeology at a specific location, contaminants commonly treated are arsenic (naturally occurring) and nitrates (related to agricultural production).

Changes in regulation are the biggest challenge to water systems to comply with water quality standards. For example, the maximum allowable concentration for arsenic was changed from 50 parts per billion (ppb) to 10 ppb in 2008. This resulted in many water systems becoming non-compliant even though their operation had not changed. Larger water systems were able to add the necessary treatment; however, treatment is a much larger financial burden for smaller water systems.



Another example is 1,2,3-trichloropropane (TCP), which was regulated for the first time starting in January 2018. Over 100 wells in Kern County have detected TCP that exceeds the newly established MCL. Before this report is published, many of the larger water systems will have already completed construction of treatment systems; smaller water systems will likely take much longer to comply.

## Operation and Maintenance

Water system infrastructure throughout the county is in generally good condition due to our dry weather and recent construction. Most water infrastructure was constructed after the 1960s with pipelines constructed of asbestos-cement and PVC, which both have a long service life. Service connections are most commonly copper and polyethylene with very few being made of lead.

A challenge for smaller water systems is to regularly maintain their infrastructure by flushing pipelines, and exercising valves to keep them in good condition.

## Funding and Future Need

Funding for drinking water is expected to be generated at the local level. New residential and commercial developments pay a one-time capacity fee, which funds construction of new infrastructure to expand capacity and service area. Maintenance and operation of existing infrastructure is paid by rate payers as part of their utility bills.



Municipal drinking water infrastructure is expensive and requires careful planning to save sufficient funds for repairs and replacement of equipment. Drilling a new water well, for instance, can cost \$1 million. A well site that includes a hydropneumatic tank, booster pump station, and a reservoir can cost millions more. Larger communities are generally proactive in keeping

rates updated so that sufficient funds can be built up over time to provide for planned upgrades and maintenance (i.e. true cost of service).

According to the American Water Works Association (AWWA), the average price of water in the San Joaquin Valley is \$39.79 per month. This cost assumes a 5/8-inch water meter for a single-family home using 1,500 cubic feet (11,220 gallons) per month. That same quantity of water would cost \$27.84 for City of Bakersfield customers or \$45.32 from California Water Service Company's Bakersfield District. The AWWA study showed that Northern California residents paid an average of \$61.46 and those on the



Central Coast paid \$81.52 per month. The actual amount of water use in each of those geographic areas varies with climate and is not a reflection of actual water use by Kern County residents.

Smaller communities, especially those that are economically disadvantaged, have a more difficult time setting rates to cover the true cost of service. Often, they lack the economy of scale that larger systems have which results in a higher per-capita cost to operate their water system. A failure, such as a well casing collapse, can be economically devastating to small water systems. Grant funding and loan programs from the state of California, State Revolving Fund, and U.S. Department of Agriculture help cover needs when they arise, but do not address the long-term problems of financial sustainability as they cannot be used to offset operational costs.

Long-term, the solution for smaller water systems is to become fiscally self-sustaining and charge rates that will provide adequate funding. Alternatively, smaller water systems can consolidate with larger ones, which will provide financial stability through a larger population and rate base.

## Resilience and Innovation

Water banking projects are critical to the future of Kern County and local water districts have constructed a significant amount of raw water infrastructure. In wet years, imported supplies from the CVP and SWP, as well as the Kern River can be used to recharge the groundwater table. That water can then be extracted sustainably during dry years and used for agriculture and drinking water. The *Henry C. Garnett Water Purification Plant* is designed to accept water from SWP, Kern River, and groundwater wells depending upon which source is available.

## Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- Construct additional storage reservoirs to capture peak runoff, which occurs at different times and quantities than it did when the CVP and SWP were designed.
- Construct infrastructure to convey water through the Delta to increase reliability.
- Further encourage the use of groundwater recharge in the San Joaquin Valley.
- Partner with wastewater treatment plant operators to maximize the beneficial use of treated effluent, which can offset potable water use.
- Consolidate non-compliant water systems that cannot afford to operate the necessary treatment systems.
- Require new residential and commercial developments to prepare water supply assessments based upon surface water supply.

## Definitions

**Central Valley Project (CVP)**, operated by the U.S. Bureau of Reclamation, conveys water along the eastside of the San Joaquin Valley in the Friant-Kern Canal from north of Fresno to Bakersfield.

**State Water Project (SWP)**, operated by the California Department of Water Resources, conveys water from northern to southern California in the California Aqueduct.

**Imported supply** is any water that is brought into Kern County from another location using artificial means, such as canals or pipelines.

**Local supply** is any water that is naturally available in Kern County, which includes rivers, streams, and precipitation.

**Sustainable Groundwater Management Act (SGMA)** is a state law that creates a framework to bring groundwater basins into sustainable levels of pumping (i.e. reduce overdraft). is a state law that creates a framework to bring groundwater basins into sustainable levels of pumping (i.e. reduce overdraft).

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## PARKS



### Executive Summary

The Trust for Public Land ranked Bakersfield #65 of the nation's 100 largest cities in regards to public parks. This score is better than both Los Angeles (#66) and Fresno (#94), but still far behind many other, smaller urban areas. One of the key reasons for the low score was access; while we have many great parks that you can drive to, very few are within walking distance of residents. Whereas the *Kern County General Plan* and *Metropolitan Bakersfield General Plan* both include a goal of 2.5 acres of park per 1,000 residents, the current average is at 1.6 acres per 1,000 residents, once you exclude large regional



parks. In addition to access challenges, park and recreation agencies do not typically have dedicated sources of funding, and instead rely on the general fund for operation and maintenance and public safety. As existing revenue sources have remained constant or declined, costs have continued to rise. Ten years ago, a full-time parks employee would have been responsible for 9.2 acres, but today that same employee is responsible for 12.6 acres. Additional staff is needed to maintain the existing level of service, let alone improve it.

### Overview

No matter the time of year or temperature, people in Kern County love to be outdoors. We are fortunate to have a diverse set of parks available locally that provide opportunities for biking, jogging, rafting, kayaking, water-skiing, hiking, fishing, youth sports, tennis, golf, concerts, camping, equestrian trails, swimming, and various outdoor events.

Parks and recreation services are provided by the County of Kern, eight recreation and parks districts, and by four of the eleven incorporated cities. The largest city system is the City of Bakersfield, which has 59 parks across 5,362 acres<sup>1</sup>.

There are a wide array of parks and facilities in the county that can be generally classified as follows:

**Neighborhood Parks** serve small populations within densely populated areas. The majority of parks in the county would be considered "neighborhood," but they constitute a relatively small area. Examples include Saunders Park, Centennial Park, and Jastro Park (all in central Bakersfield).

<sup>1</sup> This total includes both the Kern River Parkway and the 2800-Acre Groundwater Recharge Project. These facilities are publicly accessible as open spaces and include equestrian trails and bike paths.

**Regional Parks** are those large facilities that provide recreational opportunities for entire communities. Examples include Hart Park, Buena Vista Recreational Aquatic Center, and Kern River Parkway. The majority of park area in Kern County is considered "regional".

**Special Use Facilities** are facilities with a specific use such as the Valley Children's Ice Center of Bakersfield, McMurtrey Aquatic Center, senior centers, and county-owned public golf courses.

**Open Space Preserves** are privately owned and managed facilities that provide hiking and educational opportunities in a natural setting. Two of the largest and most accessible sites are Windwolves Preserve and Panorama Vista Preserve.

**State and National Facilities** available in Kern County include Red Rock Canyon State Park, Fort Tejon State Historic Park, Chavez National Historic Monument, Sequoia National Forest, and Lake Isabella.

## Condition and Capacity

The Trust for Public Land ranked Bakersfield as #65 of the nation's 100 largest cities for parks. This score is better than both Los Angeles (#66) and Fresno (#94), but still far behind many other, smaller urban areas. One of the key reasons for the lower score was access. The area has many great parks that you can drive to, but very few that are within walking distance of residents.



Kern County's *Parks and Recreation Master Plan* made similar findings in that there is sufficient acreage of regional parks, but a significant deficit of neighborhood parks. The *Kern County General Plan* and *Metropolitan Bakersfield General Plan* both include a goal of 2.5 acres of park per 1,000 residents. When you exclude the large regional parks, the actual area of Neighborhood Parks is at 1.6 acres per 1,000 residents. This is below both the locally set goal of the general plans and the national average, which is 10.1 acres per 1,000 residents.

Interviews with local parks officials indicate the largest problems today is the heavy use of existing facilities. Fields cannot be rested, causing damage to landscaping. Irrigation systems are often older and do not meet current water conservation standards. Theft and vandalism are also huge issues.

## Funding and Future Need

Parks and recreation agencies typically do not have dedicated funding sources and instead are reliant upon the general fund. As existing revenue sources have remained constant or declined, costs have continued to rise. Whereas 10 years ago a full time parks employee would have been responsible for 9.2 acres, that same employee is now responsible for 12.6 acres. Additional staff is needed to maintain the existing level of service.



Construction of new parks is funded primarily by development fees, which occur in new neighborhoods. Currently the City of Bakersfield has three park sites designated that will be constructed when sufficient fees are collected. There is no dedicated funding source to develop new parks in existing residential neighborhoods. This is increasingly problematic as infill development can increase population, but without triggering requirements for more parks.

Theft, vandalism, and homelessness are a significant problem at parks. This causes parks officials to make reactive funding decisions to replace stolen or damaged equipment, whereas that funding would have otherwise been used on proactive improvements. Some parks departments employ their own police officers (i.e. Rangers) to regularly patrol facilities to combat this problem.

The County of Kern has attempted several creative ways to reduce cost and generate additional revenue. In 2017, the County of Kern restructured the Parks and Recreation Department into the General Services Department to reduce cost and make better use of staff time<sup>2</sup>. That same year the Board of Supervisors also considered implementing a parking fee at Hart Park, which drew significant public attention before the idea was ultimately abandoned.



## Innovation

Maintenance of street landscaping often falls to parks crews, who must work along sidewalks and in medians of arterial streets. Because of the relative low population density in metropolitan Bakersfield, there is a significant amount of street landscaping. This landscaping is important to the ascetic character of individual neighborhoods, but is not beneficial for public use. To reduce maintenance in median areas, the City of Bakersfield is currently testing the use of artificial turf as a replacement for grass.

## Resilience

Parks can also be used as part of storm water management. Emerald Cove Park in northwest Bakersfield, for instance, includes large soccer fields that are used to attenuate runoff during storm events. The fields will flood for several hours and slowly drain to downstream retention basins, which reduces the size of such facilities. Other parks, such as Centennial in central Bakersfield, include a fenced retention basin that doubles a leash-free dog park. Facilities such as these increase resilience for our communities while providing public access.

<sup>2</sup> Both departments did significant landscape maintenance work and had overlapping responsibilities.



## Recommendations to Raise the Grade

The Southern San Joaquin Branch offers the following recommendations to raise the grade:

- Provide consistent and reliable funding for operation and maintenance of existing parks.
- Create a funding mechanism to create new parks, especially neighborhood parks, in underserved existing neighborhoods.
- Revise planning regulations to encourage new residential developments to be within walking distance to neighborhood parks.
- Replace high-maintenance landscaping in public streets with lower-maintenance vegetation or artificial turf. This will allow existing staff to spend more time at other facilities.
- Upgrade existing landscape irrigation systems to comply with current water conservation standards.

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## RAIL



### Executive Summary

For nearly 140 years, railroads have been a defining force in Kern County and a critical link to the nation's infrastructure. We are fortunate to have two of the nation's largest railroads, BNSF and Union Pacific, provide service locally. Previous private/public partnerships resulted in capacity improvements for the historic Tehachapi Loop. Billions of dollars in private investments by the railroads in Positive Train Control (PTC) will improve safety through our communities. Passenger rail service is provided by



Amtrak on the "San Joaquins" route with service from Bakersfield to both Oakland and Sacramento. The future looks bright with ongoing construction for High-Speed Rail, which will provide rapid service from San Francisco to Bakersfield in the first operating segment. Continued opposition could derail this key infrastructure, however.

### Overview

Kern County is home to two Class I railroads: BNSF and Union Pacific. These two companies own and operate a total of approximately 190 miles of track (not including sidings or double track) and cross the Sierra Nevada Mountains at Tehachapi. Tehachapi is one of only two railroad crossings of the mountains and it is critical for the movement of freight from the San Joaquin Valley and Bay Area to the rest of the country. One train can carry the same load as 280 trucks and can move a ton of freight an average of 400 miles on one gallon of fuel. Class III railroads are short-lines, which provide service between the mainline and individual communities or customers. Local examples of Class III railroads include the San Joaquin Valley Railroad and Trona Railway, who along with others own and operate an additional 123 miles of track that provide service to oil refineries, mines, agriculture, and warehouses.

Amtrak provides daily train service from Bakersfield to both Oakland and Sacramento over the San Joaquin Corridor; the fifth-most heavily traveled Amtrak passenger rail route in the nation. Passenger stations are located at Bakersfield and Wasco with connecting Thruway bus service throughout southern California. The rail service is operated for the San Joaquin Joint Powers Authority (SJJA), which is comprised of local agencies from the San Joaquin Valley. No agency within Kern County is a member of SJJA.

The California High-Speed Rail Authority (Authority) was established in 1996 as the state entity responsible for planning, constructing and operating the state's projected high-speed train system. The planned rail system will operate over its specially designed and constructed trackage, with no at-grade crossings and up to 24 station stops. A trip from Los Angeles to San Francisco is expected to take about 2 hours and 40 minutes compared to over six hours by car. A station will be located in Bakersfield.



There are now more than 119 miles of design and construction underway between Madera and Kern counties with more than \$3 billion executed in contracts for the construction of the system within the Central Valley.

- Construction Package 1: 32-mile segment between Avenue 19 in Madera County and East American Avenue in Fresno County.
- Construction Package 2-3: 65-mile segments between East American Avenue and one-mile north of the Tulare-Kern County line.
- Construction Package 4: 22-mile segment between one-mile north of the Tulare-Kern County line and Poplar Avenue was awarded.

## Capacity and Condition

### *Freight Rail*



The rail segment between Bakersfield and Mojave is shared between both BNSF and Union Pacific and operates near capacity (fifty 6,000 foot trains per day). Capacity is limited by long segments of single track configuration in rugged mountainous terrain, which is mostly unchanged since the railroad's original construction. In 2008, Caltrans began a unique private/public partnership with the railroads to improve capacity by 63%, or sixty-five 8,000 foot trains per day, using Proposition 1B Trade Corridors Improvement Fund (TCIF) funds. Of the five planned double track sections, only two were eventually constructed resulting in a capacity improvement of 12%.

Another private/public partnership is the Wonderful Industrial Park in Shafter. This 1,625 acre master-planned industrial park is located on the BNSF main line with 9,000 feet of track owned by the City of Shafter. The park includes an intermodal facility and free trade zone that allows direct rail service from the ports of Los Angeles and Long Beach.

### *Amtrak*

The San Joaquins travel over both BNSF and Union Pacific track. The on-time performance rating for 2016 was 84%, which is high compared to many other Amtrak routes. Near-term capital improvements include:

- Track improvements at select locations so that maximum speed can be increased to 90 mph.
- Reduce travel times between Bakersfield and Oakland to less than six hours, which would eliminate a crew change for each roundtrip and significantly reduce operating cost.
- Increase passenger capacity between Fresno and Sacramento by adding new service.



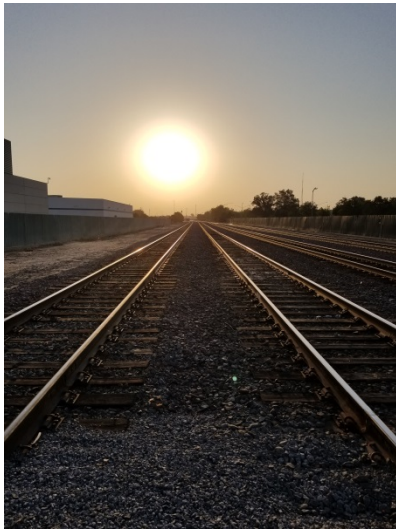
- Installation of a Positive Train Control system in compliance with federal regulations to improve safety.

### *High-Speed Rail*

The Authority projects that construction of the 119-mile Central Valley Segment (Madera to Poplar Avenue) will be completed by 2022 and high-speed rail operation from Bakersfield to San Francisco will begin by 2029. The biggest challenge that the Authority faces to complete the project is funding, which is subject to change by future legislatures. Funding is also a source of opposition to the project from within the San Joaquin Valley and Kern County where ridership projections and construction costs are not seen as realistic or achievable.

As sections of the Authority's track and structures are complete it is possible that Amtrak could use those facilities on an interim basis to increase speed and reduce travel time for the San Joaquins.

### Funding and Future Need



Freight railroads are private companies that self-generate revenue by providing services to customers. Investment in infrastructure is dependent upon the expected return or profitability. Union Pacific expects that their total cost to implement PTC is \$2.9 billion and other railroads likely have similar prorated expenditures. PTC is an important investment in public safety, but is costly to install, and limits available funding for other infrastructure and capacity expansion.

The Central Valley population is expected to grow by over 40% by 2040, which for Kern County translates to an additional 324,000 residents. These residents will generate higher freight volumes and greatly increase the number of passenger trips.

Once constructed, High-Speed Rail will meet the future passenger capacity needs. The success of the Proposition 1B TCIF program could be a model for future public/private partnerships to improve freight capacity in the future.

### Public Safety, Resilience, and Innovation

PTC is a system that monitors and controls train movements. Sensors along the track and inside locomotives can automatically slow or stop trains to avoid train-on-train collisions, avoid work areas, and prevent excessive speeds. Similar systems are used throughout the world and federal regulations require full implementation on U.S. Class I railroads by December 31, 2018.

Union Pacific currently has more than 59% of their 17,000 miles of track in the U.S. operating under PTC, which includes their facilities in Kern County. BNSF is also operating under PTC for that portion of track they share with Union Pacific over the Tehachapi Trade Corridor. BNSF's other facilities in Kern County have PTC equipment installed, but not all tenant railroads have finished upgrading their locomotives and

integrating them with BNSF's system. Because of this, BNSF requested a two-year extension from the federal government to 2020 to achieve full implementation.

While PTC can prevent collisions with other trains, grade separations provide protection for vehicles crossing railroads. Kern County has 50 grade separations, primarily of Class I railroads in the urban areas of Bakersfield. There are an additional 138 at-grade crossings, many of which cross Class III railroads and are in more rural areas. Several important grade separation projects have been completed since 2009 that has greatly increased safety for both motorists and trains; all of which were constructed by local agencies.

- 7<sup>th</sup> Standard Road at State Route 99
- 7<sup>th</sup> Standard Road at Santa Fe Way
- Santa Fe Way / Allen Road / Hageman Road
- Mohawk Street

Further work is needed to eliminate remaining at-grade crossings, especially on major roadways and in populated areas.

### Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- Dedicate additional private/public funding to continue expanding capacity of the Tehachapi Trade Corridor. Doing this will reduce truck traffic over State Routes 58 and 99, reduce emissions, and provide more capacity to move goods to and from Kern County.
- Plan for and encourage the expansion of freight rail and intermodal facilities for industrial zones in General Plans, Specific Plans, and other planning documents by cities and Kern County.
- A local agency from Kern County should join SJJPA, which will give our communities a voice into how Amtrak's San Joaquins are operated.
- Provide a realistic and achievable budget for high-speed rail and dedicate sufficient funding to complete the Bakersfield to San Francisco operating segment. Doing so will foster community trust and support.

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## ROADS



### Executive Summary



Public agencies in Kern County have done an exemplary job of constructing regional transportation projects to increase capacity and maintain an acceptable level of service. Much of this success is due to the Thomas Roads Improvement Program (TRIP), as well as Caltrans' State Route widening projects. While capacity has improved, pavement condition on older roads is a concern. Approximately \$375 million is needed to bring Kern County's roads to a good condition. Fortunately, the newly-approved SB1 funding will

provide the region with \$35 million in additional funds over the next two years for maintenance projects. However, voters must reject an effort to repeal SB1 in November 2018 by voting No on Prop 6 in order for Kern to receive this much-needed funding.

### Overview

There are approximately 6,400 miles of public roads in Kern County. Approximately 30% of these are major facilities (aerials, highways, and freeways) that are essential to the movement of goods throughout California. Keeping our roadways in reasonable, safe condition is vital. Kern County roads serve a growing community and an agriculture and oil industry that our country depends on.

### Capacity

Kern County continues to grow and its population is expected to nearly double by 2040. Traffic congestion has been a growing problem for the region, especially in the Bakersfield area where residents spend an average of 19 hours each year stuck in traffic, at a cost of \$531 in lost productivity and fuel. However, there have been significant efforts, especially over the last decade, to increase capacity of the County's roadway network to meet this demand. New development in this region continues to be held to standards addressed by the (traffic circulation element of the) Kern County General Plan. This insures that new roads are built to handle future traffic projections.

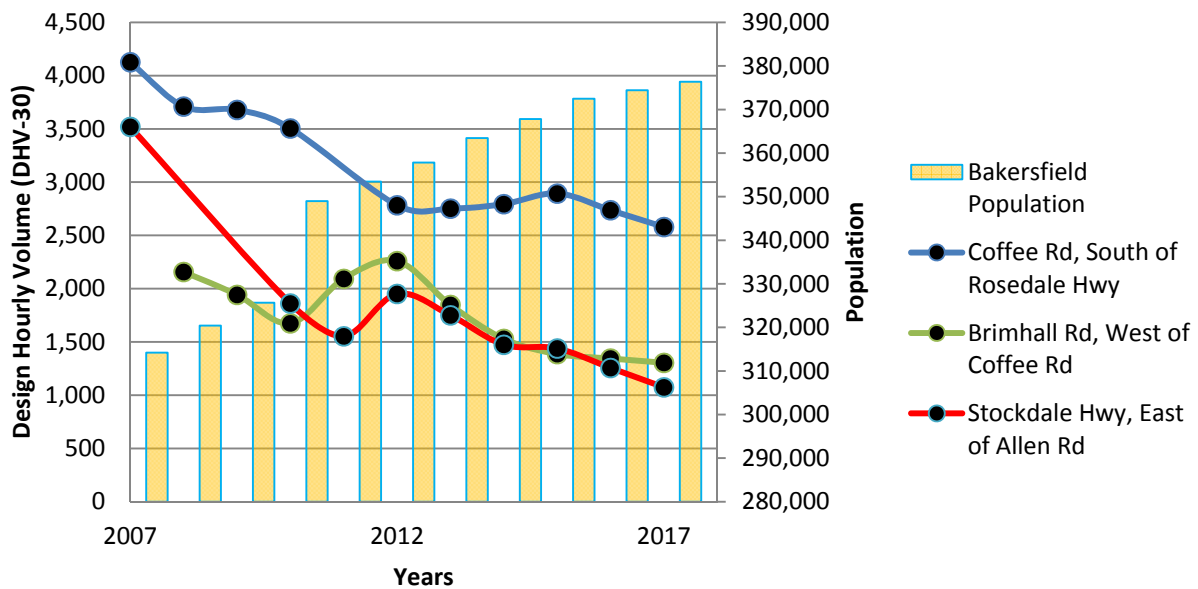
Over the last decade, multiple regional transportation projects have been completed, which increased capacity and helped maintain an acceptable level of service (LOS D) or better on our major roads and freeways. Much of this success is due to the Thomas Roads Improvement Program (TRIP), which is a cooperative effort between the City of Bakersfield, County of Kern, Caltrans, and the Kern Council of Governments (Kern COG). Completed and in-progress roads projects are summarized in Table 2.

There are still several key TRIP projects remaining, but the benefits to traffic in west Bakersfield is already apparent. Figure 2 shows a reduction in peak traffic on several major arterials that historically

had significant congestion. Many of these vehicles are now preferentially using Westside Parkway and 7<sup>th</sup> Standard Road.

**Table 2. Thomas Road Improvement Program (TRIP) Project List**

Completed	In Construction
<ul style="list-style-type: none"> <li>• SR-178 Widening</li> <li>• SR-99 Auxiliary Lane/Rosedale Highway Off-ramp Improvements</li> <li>• Rosedale Highway (SR-58 West) Widening</li> <li>• SR-99 Hosking Avenue Interchange</li> <li>• SR-178 at Morning Drive Interchange</li> <li>• Westside Parkway</li> <li>• SR-58 Gap Closure</li> <li>• 7th Standard Road Widening</li> <li>• Mohawk Street Extension</li> <li>• SR-178 at Fairfax Road Interchange</li> <li>• SR-99 at 7th Standard Road Interchange</li> </ul>	<ul style="list-style-type: none"> <li>• 24th Street Improvements</li> <li>• Beltway Operational Improvements</li> <li>• Kern River Bridge Improvements</li> <li>• Centennial Corridor</li> <li>• Hageman Flyover<sup>3</sup></li> <li>• Truxtun Avenue Operational Improvements Project</li> </ul>



**Figure 2. Changes in peak traffic on selected arterial streets in Bakersfield.**

Source: Kern Council of Governments

<sup>3</sup> According to the City of Bakersfield, the project is 100% designed and is awaiting funding.

Additionally, Caltrans (through the SHOPP Program) has completed significant widening projects on sections of State Routes 14, 46, 99, 119, and State Route 58/178. The County of Kern also completed a very complicated railroad grade separation at Hageman Road, Allen Road, and Santa Fe Way that greatly relieved congestion.

Though roadway capacity is not yet a major problem for Kern County, bigger investment is being made in other modes of transportation that will take some of these vehicles off the road. The Kern COG recently adopted an Active Transportation Plan (ATP), which has identified where pedestrian and bicycle facilities are needed, and to develop a holistic plan for Kern County communities. This County has already utilized more than \$26 million in Caltrans ATP Funds to start implementing this program, and provide better opportunities for the public to “stay off the road”.

## Condition

A recent study found that 50% of all California roads are in poor condition. Kern County roads are approaching this condition and have become noticeably worse over the last few years. In Bakersfield, 53% of roads are in poor or mediocre condition. The majority of our roads were built or improved 20 to 30 years ago and have exceeded their useful life. Condition of Kern County roads has deteriorated and become a serious problem, especially for most rural and local roads which do not have a dependable funding source for upkeep and maintenance.



Throughout Kern County, all municipalities have a pavement management program in place to monitor and evaluate pavement conditions. Kern County roadways are evaluated annually, and are most commonly graded using the Pavement Condition Index (PCI). Ratings of 51 to 70 are in the fair (at risk) category. A common goal is to achieve an overall “good” rating of 70 or better. Kern County roads are well below this benchmark with an overall rating of 62, which is less than the State average (66). Major roads and highways within Kern have a slightly better rating than this. However, local and rural roads rate poorly at 58. For County roads alone, it will take an annual budget of \$15 million (maintenance construction cost alone) to maintain a 70 PCI rating. Approximately \$375 million is needed to bring Kern County's roads to a good condition.

## Funding and Future Need

Transportation funding has traditionally been provided through various means including Federal Gas Tax, State Gas Tax (HUTA and Proposition 42) and local sources. These sources are inadequate to meet our needs. Over the last two decades road construction costs have nearly tripled. During this same time,

there has been no increase in the Federal Excise Gas Tax, and up until last year, there had not been an increase in the State Gas excise tax since 1994. As a result, transportation revenues stayed stagnant while inflation reduced the purchasing power of these funds by roughly 65%. These same factors, and a fluctuating economy, have also increased the competition for funds at the local level. It has become increasingly difficult for agencies to depend on local revenue sources for road maintenance.

Fortunately, one-time funding sources have helped Kern County region tremendously over the last decade. Both the American Recovery and Reinvestment Act (ARRA) funding and State Proposition 1B have provided funding for local improvement and road maintenance projects, including Grade Separation projects within the Bakersfield Metro area.

Senate Bill 1 (SB1), the Road Repair and Accountability Act of 2017 is expected to provide additional and critical funding to help improve road conditions throughout Kern county, as well as provide funding for federal grants and other regional federal aid projects that require local match monies. Over the next two years alone, Kern County overall is estimated to receive \$35 million, which will fund much needed street maintenance projects. However, the sustainability of this new funding source is unclear, as there is "repeal" process underway that may ultimately suspend SB1. Kern County is the largest county in the state without a self-imposed sales tax earmarked for roads. Without SB1 (or a local, dedicated revenue source), this region will not be able to complete remaining regional transportation projects nor maintain Kern County's roadway network adequately.



In 2016, Kern County also adopted an Oil Impact Fee Program, which assesses a fee on new oil development. These fees are to be used to improve roads that specifically serve the oil industry (mostly in West Kern). It is estimated this program will provide \$1 million annually (depending on oil activity and development) for road improvements, and the first contract utilizing these funds is planned for bid in 2018 (by Kern County Public Works).

## Operations and Maintenance

In general, practices and methods to maintain roads have not changed appreciably and are currently satisfactory throughout Kern County. The reason for a degradation of road conditions is inadequate funding. Operations and Maintenance funding (for most agencies) is through State and local funding sources. These funding sources continue to be inadequate and Maintenance Divisions are generally understaffed and overall do not have the equipment and materials need for adequate maintenance of our roadway system.

Our inability to properly maintain our roadway system puts Kern County agencies (and communities) at greater risk. As one indicator, the number of claims filed by Kern County residents (relating to poor road conditions) has increased 100% over each of the last two years.

## Public Safety

Overall, accident statistics do not indicate public safety is a severe problem on Kern County roads, but certain aspects of roadway safety are becoming a bigger priority. There were nearly 3,000 traffic accidents on Kern County roads alone last year. This is an increase of approximately 20% from a decade ago, and correlates as expected with population growth and the increased number of drivers now on the road. A good sign is that traffic fatalities have not generally increased on average over the last decade (28 each of the last two years as compared to 27 in 2006). However, accidents involving pedestrians have slightly increased and pedestrian safety is becoming a bigger priority for Kern County resulting in the formation of a *Safety Task Force Committee*. This group, comprised of local politicians, field experts, and public input, is developing a plan to improve safety for pedestrians and bicyclists in all parts of Kern County. Since 2012, more than \$26 million has been spent (through the ATP) to construct trails, sidewalks, curb ramps and other improvements meeting ADA standards that should help improve pedestrian safety. Kern County Public Works has developed a program version called "Walk Kern." In the



last decade alone, this Department has utilized more than \$53 million in grant funding to construct sidewalks and bike paths in several Kern County communities.

In recent years, there has also been more emphasis on pedestrian safety near schools. Funding has been provided to complete sidewalks and walking paths near schools throughout Kern County. Advance Electronic Warning Signs have been installed near several schools in different areas including Metro Bakersfield, Taft, Mojave, Buttonwillow, and Wasco.

## Resilience

Kern County's road and highway system are proven to be resilient. Severe weather events and natural disasters have challenged the resiliency of Kern County's road and highway system in recent years. Fortunately, our roadway system has not been significantly damaged and has recovered quickly from the effects of earthquakes and major flooding.

This County has had two significant El Niño weather years since 2010. Though these events have brought major flooding and temporarily closed some of our roadways, our transportation system has still proven to be functional without significant effect on the public or significant loss to business. Kern County agencies have utilized FEMA funding after these events, and where possible, look to mitigate roadways that are susceptible to flooding and rebuild these road segments to better withstand future weather events.



## Innovation

New products, concepts and construction methods are being considered in the transportation field. Different, more environmentally sensitive methods are being utilized in design and reconstruction of roadways. As example, full depth reclamation and recycling of existing roadway materials is being done more frequently due to higher materials and transportation costs. Job Order Contracts are being utilized more frequently for quicker delivery of projects.

More innovation and techniques are also being implemented in the traffic engineering field to help accommodate pedestrians and improve traffic flow. Additional traffic signal interconnect projects are programmed through the CMAQ program for sequence and timing of traffic signals. Lighted crosswalks and Pedestrian Crosswalk Countdowns are now being utilized in Kern County.

Roundabouts are also being constructed in Lamont, western Bakersfield, and on SR-155 to improve traffic flow at high-volume rural intersections.

## Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- Do not repeal SB1, which is an important source of transportation funding.
- Provide local sources of reliable transportation funding, such as a local tax dedicated to roads.
- Support pavement recycling in asphalt pavement rehabilitation to increase cost efficiency.
- Support increased local sources of sand, gravel, and aggregate all of which are in short supply in California and necessary for construction.
- Encourage alternate methods of transportation and logistics, including transit and rail.

## Definitions

LOS	<b>Level of Service</b> is a measure of how easily traffic flows, graded from "A" to "F". LOS of "A" is an indication of free flowing traffic, where as LOS of "F" is a forced breakdown of flow.
CMAQ	<b>Congestion Mitigation and Air Quality</b> program is a funding source from the Federal Highway Administration. Funding is used to reduce air pollution resulting from congestion.
ATP	<b>Active Transportation Program</b> is a consolidation of existing state and federal transportation funding programs. ATP is administered by Caltrans Division of Local Assistance.
ADA	<b>Americans with Disabilities Act of 1990</b> is a civil rights law that, for the purposes of transportation planning, sets requirements on slopes, grades, and access to public facilities.

- TRIP            **Thomas Roads Improvement Program** is a collaborative partnership of the City of Bakersfield, County of Kern, Caltrans, and Kern Council of Governments to improve transportation in metropolitan Bakersfield.
- ARRA            **American Recovery and Reinvestment Act of 2009** is an economic stimulus package that has provided funding for transportation projects.

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## SOLID WASTE



### Executive Summary

Kern County has sufficient existing solid waste disposal capacity for the next 50 years and has planned for the needs of the next 100 years. Local jurisdictions are currently complying with state laws and regulations aimed at reducing solid waste generation and increasing recycling. Available funding is increasing, from \$30 million in 2011 to \$48 million in FY 2017-18. Tipping fees are \$45 per ton, which is less than the national average of \$50.59 per ton. Because solid waste management requirements become more stringent over time, continued diligence is required to maintain compliance in the future. New technologies that should be further expanded, including Engineered Municipal Solid Waste, which is now helping to fuel the Lehigh Cement Plant in Tehachapi instead of coal. Projects such as this decrease greenhouse gas emissions at the plant while helping to increase diversions of waste to landfills.

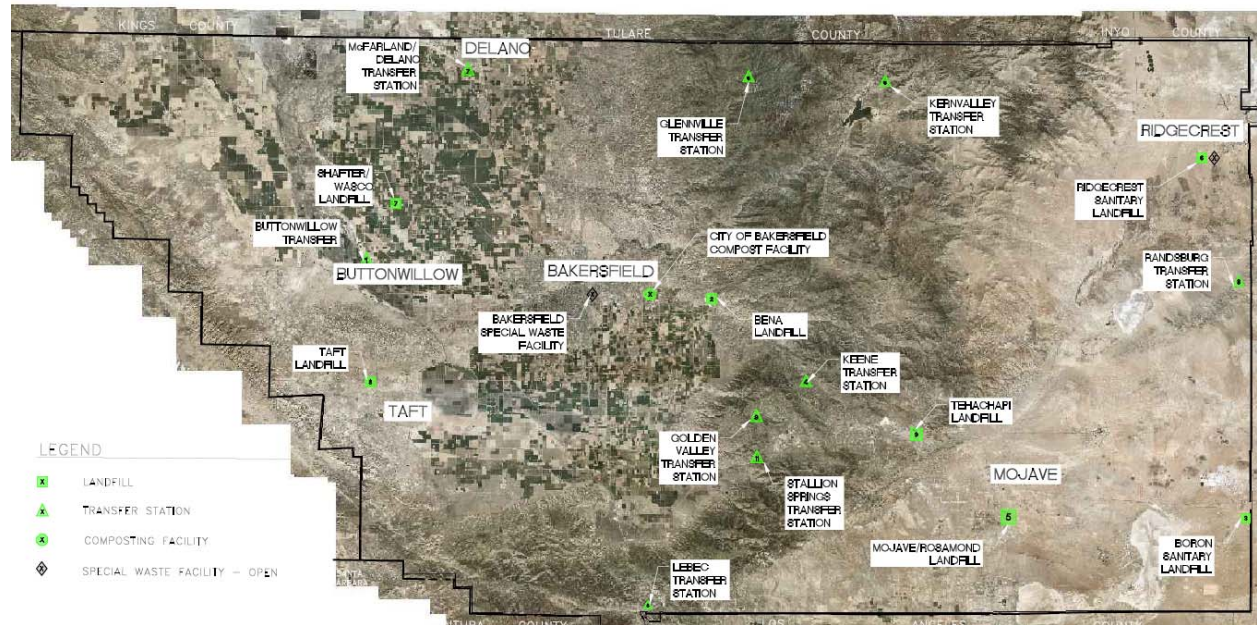
### Overview

In Kern County municipal solid waste (MSW) is disposed by burial in one of seven county-owned, permitted landfills, which are operated by the Waste Management Department. The County does not provide waste centralized collection, which is instead done by both cities and private haulers. Approximately 90% of all waste generated within the county is diverted or disposed within the county and not exported to other jurisdictions. Solid waste infrastructure in Kern County includes:

- 7 active municipal solid waste landfills, each with recycling functions
- 4 privately-owned landfills, (1) Class III, (1) Class II, (1) Class I w/Class III cell and (1) inert landfills
- 7 Transfer Stations
- 4 Privately-owned single-stream Material Recovery Facilities
- 1 Construction and Demolition Recycling Facility
- 5 Composting facilities, (1) Municipal and (4) privately-owned
- 3 Special Waste (Household hazardous waste) Facilities

Solid Waste handling infrastructure has grown over the past 5 years to meet the needs of Kern County. Local landfill capacity has increased along with recycling capabilities and capacity. Recycling, composting and biomass end markets have been inconsistent and have become more restrictive.

See Figure 3 for the location of active municipal landfills in Kern County.



**Figure 3. Location of Kern County Municipal Landfills**

Source: Kern County Public Works Department

Green waste is recycled at the City of Bakersfield's Mt. Vernon Recycling and Composting Facility, where it is chipped and composted. This facility received both the 2008 and 2012 Silver Composting System Excellence Awards from the Solid Waste Association of North America. Wood chips from this facility have been extensively used as a low cost erosion control material for recent highway construction.

### Capacity and Condition

As of January 2017, the existing active county landfills have a remaining capacity of 34.8 million tons and disposes of approximately 775,000 tons annually. This capacity greatly exceeds the minimum 15 years required by the state. According to the *Kern County Integrated Waste Management Plan*, capacity is sufficient through at least 2076 (58 years) and the master-planned capacity approved in the California Environmental Quality Act (CEQA) documents is estimated to provide 120 years of capacity.

California has enacted a myriad of laws and regulations with the goal of reducing solid waste generation and increasing recycling. It is the responsibility of the counties and cities to comply with these mandates. Compliance is complicated to determine and there are multiple targets set for each jurisdiction based upon population, number of employees, and recycling rates for differing types of materials. And all of these targets change with time.

To provide a sense of how jurisdictions in Kern County are performing the per capita disposal rates are presented in Table 3.



**Table 3. Per Capita Waste Disposal Rates for Jurisdictions in Kern County for 2015<sup>4</sup>**

Jurisdiction	MSW (tons)	Population Disposal (PPD)		Employment Disposal (PPD)	
		Target	Actual	Target	Actual
Arvin	9,610	3.0	2.5	15.9	17.7
Bakersfield	314,063	5.4	4.5	14.2	13.0
California City	7,655	3.7	3.0	49.6	20.2
Delano	28,782	4.0	3.0	11.9	6.4
Kern-Unincorporated	336,688	7.6	5.9	24.2	16.7
Maricopa	1,169	5.7	5.6	38.6	44.8
McFarland	7,026	2.9	2.6	8.7	4.4
Ridgecrest	28,119	5.5	5.5	20.6	14.2
Shafter	19,714	17.2	6.0	72.1	11.1
Taft	7,431	11.0	4.3	31.0	10.7
Tehachapi	14,289	9.2	6.4	50.9	25.9
Wasco	17,019	4.8	3.5	32.3	14.2
<b>Total</b>	<b>791,564</b>				

*Legend:* ppd = pounds per person per day; MSW = municipal solid waste.

*Source:* Cal Recycle "Countywide, Regionwide, and Statewide Jurisdiction Diversion/Disposal Progress Report"

The per capita rate in 2016 for all of California was 6.0 pounds per person per day (ppd) compared to the baseline rate of 10 ppd in the 1990s. Kern County's solid waste diversion in the 1990s was estimated at 19.9% and in 2014 it was reported at 64.4%. These statistics do not tell the entire story, but local communities are making a good faith effort to comply with state regulations.

### Funding and Future Need

Kern County Waste Management is funded by the Solid Waste Enterprise Fund. The fund has three main sources of revenue: Gate Fees, Bin Fees and Land Use Fees. The Gate Fee is charged to all commercial waste brought to a Kern County solid waste facility. The Land Use Fee applies to all residential parcels within Kern County, which appears on the property tax bill as "KCSWMP Land Use." Latest reports show available funds to be increasing in the previous years, from \$30 million in 2011 to \$48 million in FY 2017-18. Tipping fees are \$45 per ton which is less than the national average of \$50.59 per ton.

China's recent decision to halt imports of recyclable materials has left local municipalities throughout California scrambling to find alternatives. China has historically received 62% of California's recycling. The City of Bakersfield, for instance, was able to sell recyclable materials at \$25 per ton in 2017. Today, the City has to pay \$70 per ton to have that same material removed. According to CalRecycle, local jurisdictions across the state are responding by "...taking steps to encourage waste prevention, reduce contamination of recyclable materials, and improve post-collection processing."

### Public Safety, Resilience, and Innovation

Residential household hazardous waste can be disposed of for free at three different Hazardous Waste Collection facilities. These facilities accept paint products, automotive fluids, pharmaceuticals, electronic

<sup>4</sup> This data comes from California Department of Resources Recycling and Recovery (CalRecycle) for 2015; which is the most currently reviewed and approved data. CalRecycle cautions that this data is only one of several "factors" in determining compliance with state regulations.

waste, and many others. Providing this service keeps corrosive or potential harmful materials out of local streams and groundwater, protects residents, and helps protect sanitation workers.

The Waste Management Division has coordinated with cities and haulers to facilitate community clean up events and curbside pickup of large, bulky items such as furniture, mattresses, and major appliances. These programs allow for multiple bulky waste and community events that provide large Bins for disposal, alley clean and street clean up's, and hauler and municipal vehicles that provide the equipment power for regularly scheduled events or as request of residents. A related program allows for free curbside pickup of motor oil and filters with the City.

Generally, all facilities are located outside of floodplains, and are designed and monitored to prevent impacts to groundwater. Landfills are also located in rural areas with good transportation access to minimize impacts to residents. Both active and closed landfills have landfill gas monitoring and collection systems designated to manage methane generation in accordance with Title 27 regulations.

The *Kern County Integrated Waste Management Plan* states that long-term the County's landfills should be consolidated into three regional waste management facilities at Shafter-Wasco, Mojave-Rosamond, and Bena. Advanced technologies can be implemented at these sites in the future to keep Kern County in compliance with state regulations into the future.

One of these technologies is Engineered Municipal Solid Waste (EMSW). In 2015 Kern County became the first county in the state to amend its Siting Element to include a EMSW Conversion Facility. The Lehigh Cement Plant near Tehachapi received a permit to utilize EMSW and biomass to produce cement in lieu of coal and coke. This is a benefit for both diversion of solid waste, but also helps Lehigh meet their AB 32 greenhouse gas emission goals. Kern County supports EMSW technology in conjunction with biomass conversion as a "cost effective strategy to jointly meet waste diversion and GHG reduction goals."

## Recommendations to Raise the Grade

The Southern San Joaquin Branch offers the following recommendations to raise the grade.

- Educate the public on what materials can be recycled. The Kern County Public Works Department has initiated public recycling outreach through Conservation Corps. State grants support Conservation Corps efforts and the department will continue to leverage these resources.
- Protect landfills from encroachment of incompatible uses by acquiring buffer zones around disposal sites. The Public Works Department continues to purchase buffer property.
- Continue source reduction measures, including the educational outreach. Public source reduction education will be enhanced through a newly designed website. Residential source reduction efforts have been affected by the growth internet commerce and resulting home delivery services.
- Expand use of EMSW conversion in Kern County and the rest of California. EMSW conversion continues to be a solid waste handling option, however given State regulations, using this

technology counts towards jurisdictional disposal which is in direct conflict with the State recycling goal of 75%.

- Continue to monitor emerging technologies that could be potentially used in Kern County in the future. The Kern County Public Works Department is evaluating in-vessel composting and anaerobic digestion of food wastes to address State organics recycling mandates.

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# TRANSIT



## Executive Summary

One of the largest agencies is Kern Transit, which provides service to the unincorporated communities of Buttonwillow, Lamont, Kern River Valley, Frazier Park, Rosamond, and Mojave. The other is Golden Empire Transit (GET), which serves the metropolitan Bakersfield area, a population of 495,000. These two transit agencies provide routes that reach most population centers in the county, but only 1% of the population commutes by transit, primarily due to high rates of automobile dependency. GET & Kern Transit have invested in fleet upgrades over the last 10 years, but significant funding will be required in the coming years to accommodate potential growths in ridership and to meet anticipated state-wide zero emission requirements. And while Kern Transit ridership is increasing, GET transit is losing customers, and its long-term sustainability may be at risk if low ridership continues to pose a financial hardship.



## Overview



Public transit in Kern County consists primarily of buses and vans provided by local agencies. Routes reach most population centers in the county, but only 1% of the population commutes by transit.

Automobile dependency is the source of numerous challenges including congestion, poor air quality, and low-density land use. Based on the ridership surveys, most of the population in the county do not seem to be concerned with these environmental problems associated with automobile dependency or are unaware of the impacts. Local transit ridership shows trends are mostly dependent on the economy. During a down economy, ridership rates increase, and during a strong economy, ridership rates decrease. This is a historical trend experienced not only in Kern County, but throughout the U.S. Surveys indicates that regular riders either do not drive a car or are not financially able to do so.

Some of the largest transit providers in the county include:

- **Golden Empire Transit (GET)**

GET serves the metropolitan Bakersfield area, which covers approximately 160 square miles and serves a population of 495,000. For FY 2017/18, weekday ridership was approximately 20,000 and annual ridership was 6.4 million. The highest ridership in GET's history was in FY 2008/09, at the height of the recession, which was 7.5 million riders.



- **Kern Transit (KT)**

The County of Kern operates Kern Transit, which provides service to the unincorporated communities of Buttonwillow, Lamont, Kern River Valley, Frazier Park, Rosamond, and Mojave. Since 2002, Kern Transit partnered with the Carson Ridgecrest Eastern Sierra Transit (CREST) route to meet the transportation needs of people living and traveling along US 395 and SR 14 connecting them to Antelope Valley.

- **Consolidated Transportation Service Agency**

North Bakersfield Recreation and Park District was designated as the Consolidated Transportation Service Agency (CTSA) in 1999. CTSA provides low-cost transportation service for seniors 60+ and disabled community members.

- **CalVans**

CalVans is a public vanpool service that serves central California and is a member of the Kern County Council of Governments.

- **Delano Area Rapid Transit (DART)**

Delano Area Rapid Transit (DART) provides service to the Delano area, which includes a population of approximately 60,000. DART offers both fixed-route and dial-a-ride services.

Ridership for GET, KT, and Delano account for 97% of all transit riders in Kern.



## Capacity and Condition

Public transit providers in Kern County have invested in significant fleet upgrades over the last 10 years. All of GET's buses run on compressed natural gas (CNG) and 25% of Kern Transit's buses use CNG. These buses are in good condition and local agencies believe they have sufficient capacity for current demand.

GET operates 109 buses, of which 88 are between 5 and 16 years old. In the next five years, 46 buses need to be replaced. GET has the capacity to maintain existing infrastructure, but not the financial ability to bring buses up to the new zero emission standard anticipated to be required by the ARB. GET also requires a new administration building and maintenance facility due to their aged infrastructure. The existing facility is too small and was planned to be replaced several years ago, but it is located in the planned alignment for California High Speed Rail (HSR). As a result, there is a hesitancy to upgrade a

facility because they will need to relocate within the next 5 to 10 years. The High-Speed Rail Authority plans to acquire GET's entire property to construct an elevated transit station with below-grade parking.

Kern Transit has purchased 28 new buses over the past four years, representing nearly half of their fleet. Approximately 75% of their fleet is six years old or newer. The remaining 25% of their fleet will need to be replaced within the next five years.

Fleet expansion will be required over the next 10 years to provide capacity for new routes and anticipated increased ridership, due to population forecasts and planned growth in both the rural areas and the metropolitan areas. GET specifically will be challenged by demand for new routes to up-and-coming development and job centers.

## Operation and Maintenance

Public transit averages 90% on-time performance and over the last five years, transit providers have significantly invested in improving bus stop accessibility, paving waiting areas, creating accessible pathways and shelter pads, and constructing bus bays at Transit Centers.

GET's maintenance facility is grossly inadequate, according to their General Manager. There is insufficient room to maintain the existing fleet at the level they would like to.

KT indicated that long-lead times for a bus to be repaired and returned to service is due to lack of staff. However, this is offset by their 50% bus spare ratio to meet each day's pull-out requirement; FTA recommended spare ratio is 10%.

## Public Safety

GET contracts security services at transit centers and relies on the support of the Bakersfield Police Department and County Sheriff to assist in system-wide protection services. GET installed video surveillance cameras on all buses and at the transit centers.

According to the KT Transit Manager, KT has an excellent safety record. Drivers undergo rigorous training before being allowed on the road. Monthly safety meetings and frequent ride-alongs by supervisors are held to ensure continuous training. Drivers perform an extension pre-trip inspection each day before taking a bus into service to ensure vehicle safety.

## Funding and Future Need

Broadly speaking, transit in Kern County and across the country is funded with a combination of federal, state, and local dollars. These investments support fare revenue and other moneys collected, such as parking and ad dollars.

In Kern County, the financial core to subsidize public transit service is the Transportation Development Act (TDA) Local Transportation Fund (LTF). Funds for the LTF are derived from one quarter of one percent that comes from the local sales and use tax attributed to Kern County, (the combined state sales and use tax rate 7.50% includes the County's 1%). Kern Council of Governments apportions these taxes to public transit throughout Kern County. To qualify for subsidies, GET is required to have farebox

revenue account for 20% of all operating expenses. GET's farebox revenue was less than 20% for FY 2016/17, but they are on track to meet 20% for FY 2017/18 through the use additional local revenue sources. Other transit agencies, including Kern Transit and CTSA, are required to generate 10% farebox revenue and they exceed this target.

At the state level, new funding was identified by Senate Bill 1 (SB 1), passed by the legislature in 2017. SB 1 is the first new significant source of statewide transit funding in decades. Funds for SB 1 are derived from a 12-cent increase in the state excise tax on gasoline (the "gas tax"), increased diesel fuel taxes, and new transportation improvement fees. When fully implemented, SB 1 will raise over \$5 billion annually in new transportation revenues. SB 1 prioritizes \$8 billion for local transit and intercity rail for maintenance and rehabilitation and safety improvements.



The additional funding for localities provided by SB 1 is helpful but insufficient to meet anticipated regulatory requirements. The California Air Resources Control Board (ARB) is considering regulations that would require transit fleets to transition to zero emission sources (i.e. electric or fuel cell) by 2040. Additional funding is not currently being considered to offset the associated costs of replacing entire fleets, which

would place the burden on local agencies instead. It will be difficult for transit agencies in Kern County and elsewhere in the Central Valley to comply with this rule and maintain or expand service. For example, GET estimates it will cost \$90 million over 12 years to replace their existing fleet with electric buses. GET receives approximately \$7 million in federal capital formula funds annually that could be put toward that use, however, other capital needs would have to be deferred.

## Resilience

KT operates secondary routes and schedules when roads and highways are closed. GET is currently updating their Emergency Response Plan. GET's ability to respond to disasters is dependent on its ability to fuel buses. GET's fleet is presently 100% CNG, available primarily at their facility, which is in the floodplain next to the Kern River. If the Isabella Dam fails, GET's entire facility would be under water.

## Innovation

Kern Council of Governments (COG), in partnership with seven other San Joaquin Valley COGs, launched a shared-use mobility pilot program providing services in rural disadvantaged communities in Kern County. Although shared-use mobility services, such as Uber, Lyft, and Waze are predominantly successful in metropolitan areas, rural community leaders want to know if these solutions are more cost-effective in rural communities than the existing dial-a-ride and fixed routes.

GET undertook a study to innovate their service model and make public transit more relevant to riders. Traditional fixed route service has become less attractive to the public and on-demand, express, and bus rapid transit (BRT) service is growing in popularity. GET is developing an implementation plan for BRT in 2019.

## Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- For public transit to thrive in Kern County, it must be viewed as a preferred option for transportation to major shopping centers, employment centers, local events, and social venues and not as solely a social service. To increase ridership, offer free Wi-Fi and mobile ticketing.
- Farebox revenue must remain above the 10% and 20% thresholds to be financially viable.
- Encourage higher density urban areas with centrally located services through changes to General Plans and Specific Plans.
- Become the go-to public transportation provider for major events, such as the Bakersfield Marathon and local annual festivals.
- Develop a transportation hub in eastern Kern County, such as Mojave, to facilitate connections between various transit agencies and private services.
- Develop a Bus Rapid Transit Plan and strategically locate park-and-ride lots by partnering with communities and other public transit providers to connect highly frequented venues, such as downtown's Rabobank Arena, Sam Lynn Ballpark, Cal State University, Bakersfield College, Spectrum Amphitheatre, shopping centers, Downtown's First Friday, farmer's markets, and other event centers.
- The "San Joaquin Valley Express Transit Study" conducted by the County of Merced, recommended the creation of a regional transit agency. It also suggested that publicly operated vanpool systems are practical and cost-effective methods of addressing transit needs in the rural areas of the Central Valley.
- Relocate GET's operations and maintenance facility outside of the floodplain to increase reliability during emergency response.
- Integration and partnerships between urban and rural transit providers to unify mobile ticketing and "real time arrival" information would increase the confidence and ease of use for riders and facilitate the connectivity from rural to urban areas.

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# WASTEWATER



## Executive Summary



Wastewater collection and treatment is self-funded, meaning that the rates set by the utilities need to be adequate for both operation and future investment. The larger agencies are already planning for needed upgrades, but smaller communities, especially those that are economically disadvantaged, have a more difficult time being proactive and often their rates are insufficient to cover future need. State and federal grants help these smaller operators when a failure occurs, but appropriate rates are needed for long-term sustainability.

## Overview

Kern County is served by 60 permitted wastewater treatment plants (WWTPs) with a total treatment capacity of 103 million gallons per day (MGD). Table 1 summarizes the largest five WWTPs, which account for 76% of total capacity.

**Table 1 – Largest Five Wastewater Treatment Plants in Kern County**

Owner	Facility Name	Capacity
City of Bakersfield	Bakersfield WWTP#3	32.0 MGD
City of Bakersfield	Bakersfield WWTP#2	25.0 MGD
North of River Sanitary District No. 1	NORSW WWTF	7.5 MGD
City of Delano	Delano WWTF	7.2 MGD
County of Kern	KSA WWTF	7.0 MGD

Raw sewage, or *influent*, is treated within the WWTP to remove suspended solids, dissolved oxygen, and organic compounds. The result of the treatment process is called *effluent*. The majority of local WWTPs treat effluent to undisinfected secondary standards, which means the treated water can be used for some industrial or agricultural applications, but not for human consumption. State regulations require all effluent to be beneficially used and the majority of treated effluent is used for agricultural irrigation of feed and fodder crops. This supports local farmers and provides a revenue source for wastewater operators. Effluent is generally not discharged to streams or surface water in Kern County.

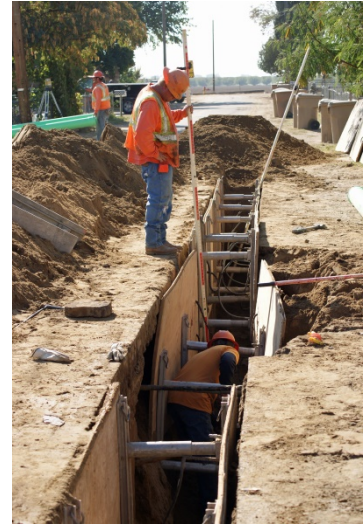
Some parts of the state face challenges related to combined sewer systems, which are designed to collect rainwater runoff, domestic sewage, and industrial wastewater into a single pipe. When heavy rainfall occurs, these combined sewer systems can overflow, discharging untreated stormwater and wastewater into nearby streams and rivers. In Kern County, sewer collection systems are sanitary sewers, meaning sewage is kept separate from storm drainage systems. As a result, sewer flow is very

predictable and the number of sanitary sewer overflows is low compared to the rest of California. Between January 2009 and July 2018, there were 29 recorded combined sewer overflow incidents in Kern County, compared to 4,646 incidents statewide over the same time period.

## Capacity and Condition

### *Pipelines*

Sanitary sewers and storm drain pipelines are in good condition throughout Kern County. This is the case primarily because of our dry climate, low groundwater elevations, and that the majority of the existing infrastructure was installed after 1960. Most pipelines are constructed of vitrified clay, reinforced concrete, PVC, and HDPE – all of which are resistant to corrosion.



### *Treatment & Process*

One of the biggest problems facing local agencies throughout the state is increasing concentrations of organics and solids in wastewater. This concentrated wastewater is a result of California's aggressive water efficiency standards that reduce the amount of water entering the sewer. As a result, many WWTPs are reaching their treatment capacity well in advance of their hydraulic capacity. This makes it challenging for local agencies to proactively budget as upgrades could be necessary years earlier than previously planned.

Kern County presently has nearly double the treatment and process facility capacity it needs. However, that capacity is not distributed evenly throughout the county. State regulations require that WWTP operators begin the planning process for expansion when average daily flow exceeds 80% of permitted capacity. When capacity is changed the state issues a new set of Waste Discharge Requirements (WDRs), which define what level of treatment is required. As a general rule, effluent limits only become stricter over time, which requires more advanced and expensive treatment processes. Recently, new WDRs have included nitrogen limits to protect groundwater. To meet these requirements, WWTPs are either incorporating nitrification and denitrification treatment processes or installing liners in the treatment and storage ponds (to prevent leaching into the groundwater) and applying the effluent at agronomic rates on the crops. The majority of WWTPs in Kern County do not currently have denitrification capabilities.

### *Stormwater*

For at least the last 50 years, agencies in Kern County have required developers to retain all stormwater runoff on-site in excavated basins. Runoff infiltrates into the soil and recharges the groundwater aquifer, eliminating any discharge to surface water. Because much of the county is located on thick layers of sand material, infiltration rates can be high – up to several feet per day. To prevent vector control issues (e.g. mosquitoes), basins must be designed to drain completely within 5 to 7 days depending on the jurisdiction. Pre-treatment is not necessary as debris can be removed from the basins.

Older areas, such as central and east Bakersfield, drain to raw water canals that are used for agricultural irrigation. These canals are owned and operated primarily by water districts and runoff either infiltrates into the soil or is used by farmers. A growing challenge, however, is that these canals were not constructed as flood control structures. Storm runoff can fill canals quickly and there is not always a good place for operators to put it. Solutions can include construction of detention basins, which would attenuate storms and allow discharge to occur at lower flow rates.

## Funding and Future Need



Funding for wastewater collection and treatment is expected to come from rate payers. Larger communities are generally proactive in keeping rates updated so that sufficient funds can be built up over time to provide for planned upgrades and maintenance.

According to the American Water Works Association (AWWA), the average residential wastewater charge in the San Joaquin Valley is \$41.80 per month. The City of Bakersfield charges \$215 annually, which is equivalent to \$17.92 per month. By comparison, the AWWA study showed Southern California residents paid an average of \$28.90 per month and Northern California residents paid \$44.80 per month.

Smaller communities, especially those that are economically disadvantaged, have a more difficult time being proactive and often their rates are insufficient to cover future need. Grant funding and loan programs from the state of California, State Revolving Fund, and U.S. Department of Agriculture help cover needs when they arise, but do not address the long-term problems of financial sustainability.

Long-term the solution for smaller communities is to become fiscally self-sufficient and charge rates that will provide funding for future needs. Alternatively smaller WWTP operators can consolidate with larger agencies, which will provide financial stability through a larger population and rate base. Until this occurs, however, grant funding for economically disadvantaged communities will continue to be essential to keep many of these facilities operating.

## Operation and Maintenance

The largest five WWTPs account for 76% of the total treatment capacity in Kern County. These facilities are operated by large staffs of professionals with the resources available to meet the conditions of their waste discharge permits.

The remaining 24% of treatment capacity is met by 55 WWTPs, of which 30 facilities have permits of less than 0.2 MGD. The owners of these facilities often lack the staff or resources of their larger neighbors. On a per-capita basis these small WWTPs are also more expensive to operate, as they do not benefit from the economy of scale.

## Public Safety

Disposal of treated effluent is highly regulated by the state. Using effluent for agricultural irrigation, for instance, requires careful application and monitoring so that it does not migrate beneath the root zone and potentially contaminate the groundwater. Human contact with effluent is also regulated and only permitted parcels can receive it.

Public safety is used when designing storm water basins. Fences are required when water depth exceeds 18 inches to prevent public access. Outlet structures commonly include bar screens or flap gates to prevent the public and wildlife from entering storm drain pipelines. Locking manhole covers at storm drain inlets also help prevent unauthorized access.



## Innovation

Throughout the nation there is growing interest in increasing the level of effluent treatment to drinking water standards so that it could be used for landscape irrigation or a wider variety of agricultural crops. The first recycled water system in the county was constructed by the City of Bakersfield in 2010. The 2 MGD facility at WWTP#3 supplies in-plant uses and provides landscape irrigation at the adjacent sports complex. Treatment can be expanded further in the future, but the cost of new recycled water infrastructure (i.e. purple pipe) requires significant funding.

California's Sustainable Groundwater Management Act (SGMA) has the potential to drastically change the economics of recycled water production. Under SGMA, agricultural and urban groundwater use will ultimately be limited. This will make surface water from local and imported sources increasingly valuable. Recycled water could become an economical source for irrigation or to augment groundwater supplies (i.e. indirect potable reuse).

Many WWTPs include large open storage ponds with long detention times which results in a significant amount of effluent being lost to evaporation. As treated effluent becomes more valuable in the future these ponds can be retrofitted to reduce evaporation, such as employing a floating cover.

## Resilience

Most WWTPs in Kern County, especially the largest facilities, have significant amounts of on-site effluent storage available. This allows operators the flexibility to hold effluent in the event that problems arise with the users downstream.

## Recommendations to Raise the Grade

The ASCE Southern San Joaquin Branch offers the following recommendations.

- Increase the quantity of treated effluent available for reuse by reducing evaporation at WWTP storage facilities. Currently evaporation is encouraged as a disposal method, but implementation of SGMA will likely make effluent a valuable resource.
- Proactively upgrade existing WWTPs to disinfected tertiary treatment. This will allow effluent to be reused for higher value agricultural crops or as indirect potable reuse.
- WWTP operators should review cash flow annually and update rates every 4 years to ensure that sufficient funds are being saved for future need.
- Consolidate WWTP operators where costs of operation exceed what the population can reasonably afford.
- Evaluate and improve storm drainage in central and east Bakersfield. Attenuate discharges to canals by using detention facilities and reduce flows through low impact development standards.

## Selected Information Sources

- State Water Resources Control Board. "Interactive Regulated Facilities Report." [https://www.waterboards.ca.gov/water\\_issues/programs/ciwqs/publicreports.shtml](https://www.waterboards.ca.gov/water_issues/programs/ciwqs/publicreports.shtml). Accessed April 2018.
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- City of Bakersfield. *Sewer Billing*. [http://www.bakersfieldcity.us/gov/depts/public\\_works/sewer/sewer\\_billing.htm](http://www.bakersfieldcity.us/gov/depts/public_works/sewer/sewer_billing.htm). Accessed on 1 July 2018.





## ABOUT THE SOUTHERN SAN JOAQUIN BRANCH

Established in 1971, the Southern San Joaquin Branch of the American Society of Civil Engineers (ASCE) comprises all of Kern County. Our membership includes approximately 200 of the 338 licensed civil, geotechnical, and structural engineers who live here. These engineers are the public officials and private consultants who design and manage projects that improve our communities.

The objective of the Branch is the advancement of the science and profession of civil engineering through education and outreach in a manner consistent with the objectives of ASCE. The Branch provides a mechanism for the cultivation of friendly relations among ASCE members, particularly through communications such as regularly scheduled Branch meetings and monthly newsletter.

ASCE represents more than 150,000 members of the civil engineering profession in 177 countries. Founded in 1852, ASCE is the nation's oldest engineering society.

