Chapter 17. Public Services, Utilities, and Energy

17.1 Overview

This chapter describes public and emergency services at ARC, including security and emergency services, schools, water supply, sanitary sewer service, solid waste and wastewater disposal, and energy supply. It also summarizes applicable federal, state, and local regulations applicable to public and emergency services, as well relevant policies, practices, and measures that address potential effects on such services as a result of operations and future development at ARC. Information presented in this chapter was obtained from the November 2009 NASA ARC ERD (NASA 2009), NADP EIS (Design, Community & Environment 2002), and other sources.

17.2 Regulatory Background

17.2.1 Federal Requirements

17.2.1.1 *Federal Guidelines for Energy Consumption*

The National Energy Conservation Policy Act of 1978 (NECPA), the Energy Policy Act of 2005 (EPAct 2005), the Energy Independence and Security Act of 2007, EO 13423 (*Strengthening Federal Environmental, Energy, and Transportation Management*), and EO 13514 (*Federal Leadership in Environmental, Energy, and Economic Performance*) require all federal agencies, including NASA, to implement specific energy resource management goals. These goals include reduction from fiscal year 2003, including a 3% annual reduction in energy use intensity and a 30% reduction by the end of fiscal year 2015. They also require at least half of all renewable energy required comes from sources developed after Jan. 1, 1999.

Other goals outlined in NECPA and EOs 13423 and 13514 include:

- Metering all federal buildings
- Requiring all federal buildings to meet performance standards
- Minimizing reliance on petroleum through development and use of alternative energy sources
- Procuring renewable energy and energy-efficient goods and products
- Participating in demand-side management services
- Using outreach programs to promote vehicle fuel efficiency
- Requiring dual fuel vehicles to use alternate fuel capability
- Achieving a 10% reduction in fuel consumption in federal vehicles by 1995

NASA goals related to these, and progress in meeting these goals are summarized in the NASA SSPP.

17.2.1.2 *National Environmental Policy Act*

NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of all environmental effects of a proposed action and of possible alternative actions. Measures to avoid or minimize the adverse effects of proposed actions and to restore and enhance environmental quality as much as possible must be developed and discussed where feasible.

17.3 Regional Setting

A variety services and utilities are needed to meet both the basic and operational needs of ARC, ARC personnel, and Wescoat Village residents. These include services and infrastructure for electricity, natural gas, water, and telecommunications; solid waste disposal and recycling; childcare and educational services; and an array of security and emergency services. While some of these services are unique to ARC, many extend from broader regional distribution networks such as those that provide drinking water, recycled water, stormwater drainage, wastewater treatment and disposal, and gas and electricity services to ARC, the cities of Mountain View and Sunnyvale, and places beyond. ARC is also served by regional waste hauling and recycling services and community-based services such as schools.

17.4 Existing Site Conditions

17.4.1 Security and Emergency Services

17.4.1.1 *Security*

ARC, with exception of the NRP and other leased areas, is a closed federal facility. Public access to the campus is restricted. The site can be entered through several secured points. Visitors to the NRP are required to show a California driver's license at the main gate. Visitors to the Ames Campus or Eastside Airfield are required to enter through the visitor pass and identification facility (Building 26), where they must sign in and are issued a temporary identification badge. This badge and a picture ID are required to enter through the Ames Campus gates or the Eastside Airfield Gate. ARC employees and contractors are also required to wear identification badges with photographs. The campus is regularly patrolled by NASA Ames' armed security force.

17.4.1.2 *Emergency Services*

In case of an emergency, NASA's Emergency Control Center Duty Office performs dispatch services. The following sections describe the services available to respond to emergencies at ARC.

17.4.1.2.1 Disaster Assistance and Response Team

ARC's volunteer DART is available to respond to catastrophic emergencies (for example, earthquakes or other center-wide emergencies).

17.4.1.2.2 Hazardous Materials Response

ARC has a 24-hour Emergency Spill Response Team responsible for cleanup of hazardous materials spills and releases. The Ames Fire Department provides this response capability, which is activated by calls to 911 from any onsite telephone line.

17.4.1.2.3 Health Care

A health unit for ARC staff and other personnel on the site is located in Building N-215. The health unit is staffed by a physician and two nurses and offers first aid, emergency medical services, and referral services. Medical emergencies can also be handled by the Moffett Field Fire Department (MFFD), which has firefighters trained as emergency medical technicians. In addition, the Duty Office can call the Santa Clara County Paramedics, if necessary.

17.4.1.2.4 Police Protection

The NASA/ARC Protective Services Office, Security Services Branch, oversees Law enforcement at ARC under NASA's Federal Law Enforcement Authority pursuant to the Space Act (42 USC 2456 and 2456a). Currently, NASA contracts with a private company to provide police protection services.

17.4.1.2.5 Fire Protection

NASA provides fire protection services at ARC through contracted services. The fire department's personnel are housed in an onsite building. Most buildings at ARC are equipped with fire detection devices, some of which are connected to the central dispatch facility.

The MFFD is also available to provide fire protection services in an emergency. In addition, ARC participates in the Santa Clara County Fire Mutual Aid Service and has a cooperative response agreement with all the city fire departments in Santa Clara County. Because of its proximity to ARC, the Mountain View Fire Department would be the first department contacted if additional fire response was needed. If Mountain View could not respond, the CANG dispatcher would then contact the City of Sunnyvale Fire Department, which is the next closest to ARC. If Sunnyvale were also unable to respond, the CANG dispatcher would continue to contact Santa Clara city departments until assistance was found.

When a fire department acts under the Santa Clara County Fire Mutual Aid Agreement, the standard procedure is to provide two fire engines, one truck, and one chief officer. The maximum amount of support available to NASA for a serious emergency would be 22 fire engines with four firefighters each, seven trucks, and seven chief officers. The only situation where NASA would be without substantial backup support would be if another event or combination of events occurred that affected all cities in Santa Clara County.

17.4.2 **Schools**

There is no permanent housing at ARC and therefore no demand for school services. Children who live in Wescoat Village, which is located in a portion of Moffett Field not

under NASA control, attend elementary and middle schools in the Mountain View-Whisman School District and high schools in the Mountain View-Los Altos Union High School District. Table 17-1 shows enrollments at the schools that serve the ARC community as of 2001.

Table 17-1. Capacity and Enrollment at Schools near ARC

District/School	Enrollment	Capacity
Mountain View-Whisman School District		
Monte Loma Elementary School	479	479
Crittenden Middle School	514	514
Graham Middle School	731	743
Theuerkauf Elementary School	466	468
Landels Elementary School	498	511
Mountain View-Los Altos Union High School District		
Mountain View High School	1,449	1,400
Los Altos High School	1,379	1,500
Sources: NASA 2009.		

17.4.2.1 *Mountain View-Whisman School District*

The Mountain View-Whisman School District has 14 public schools. Children living in Moffett Field Military Housing attend Landels, Monte Loma, and Theuerkauf Elementary Schools and Graham and Crittenden Middle Schools. As of November 1999, approximately 221 students from the ARC community were attending schools in the Mountain View School District. All schools within the Mountain View-Whisman School District are at slightly below capacity; as of fall 2001, there was capacity for 23 additional students at the five schools in the district that serve Moffett Field.

17.4.2.2 *Mountain View-Los Altos Union High School District*

Students from the Mountain View-Whisman School District feed into the Mountain View-Los Altos Union High School District. In 1998, 21 students from the ARC community attended high schools in this district; 14 attended Mountain View High School and seven attended Los Altos High School. As of October 2001, total enrollment at Mountain View High School was 1,449 students, slightly over the school's capacity of 1,400 students. In 2001, total enrollment at Los Altos High School was 1,379, approximately 92% percent of the school's 1,500-student capacity.

17.4.3 **Water Supply**

17.4.3.1 *Overview of Existing System*

ARC receives its potable water and fire protection supply from the San Francisco Water Department (SFWD). Approximately 85% of this water comes from SFWD's Hetch Hetchy Reservoir and about 15% from other smaller reservoirs. Less than 1 % of the water comes from groundwater sources from the Sunol Filter Galleries. SFWD supply to ARC is chlorinated at the Sunol Valley Water Treatment Plant but is mostly otherwise untreated prior to its delivery to South Peninsula water users. Some of the water from smaller

reservoirs and the groundwater source are also filtered. At ARC, water that is used in steam boilers undergoes softening.

NASA contracts directly with SFWD for the purchase of water. The current annual water demand at ARC, which is roughly 844 megaliters (223 million gallons), is substantially less than demand when the base was fully occupied by Navy personnel. There is no formal allocation of water from SFWD to ARC.

NASA owns and operates the entire potable water system at ARC. The original freshwater distribution system was installed in 1932 using cast iron pipe ranging in diameter from 152 millimeters (6 inches) to 203 millimeters (8 inches). The overall condition of the old cast iron system is fair, and it typically requires only routine maintenance. However, a large portion of the system has deteriorated such that it must operate at reduced pressure to lessen the occurrence of leaks and other malfunctions. In addition, some sections have been repaired in recent years, and the most problematic water lines and gate valves have been replaced, some lines by asbestos-cement, ductile iron, or plastic pipe through progressive repairs.

The present distribution system consists of over 37,000 meters (120,000 linear feet) of water line (Figure 17-1). Although most of the system is well laid out and has adequate internal looping, the pipes are generally undersized and cannot provide sufficient flow to meet public fire protection criteria.

In January 2001, the San Francisco Public Utilities Commission (SFPUC), which is responsible for the Hetch Hetchy System, completed a regional system overview and reliability response study as part of its Facilities Reliability Program (. The study evaluated the reliability of the SFPUC water system in the event of a major earthquake on the San Andreas, Hayward, Calaveras, or Great Valley fault. The study estimated that SFPUC regional water supplies would be unavailable to most system customers around the Bay within hours of such an event, and that service might not be restored for 20-30 days or longer. Until SFPUC water service could be restored, most system customers, including ARC, would need to rely on local sources for firefighting, potable supply, and sanitation. Restoration of full service to meet average daily water demands would require an estimated 6 months, or longer if labor, materials, or equipment were difficult to obtain. Accordingly, SFPUC's report recommends that storage facilities be able to withstand seismic shock. Generally accepted design practices call for storage to provide three days of domestic water use in addition to flow to fight the design fire. For ARC's current needs, this equates to roughly 11.4 million liters (3 million gallons) of storage. Existing storage is limited to 3.6 million liters (1,350,000 gallons), most of which is for the foam fire system used to protect Buildings N-211 and N-248. The additional storage is the Emergency Fire Storage Tank located on the south side of ARC. This has capacity for 400,000 gallons, but is operated at 300,000 to 350,000 gallons to help maintain adequate chlorine residual in the tank water. An additional 2.2 million gallons of storage are planned for construction in the Bay View Area.

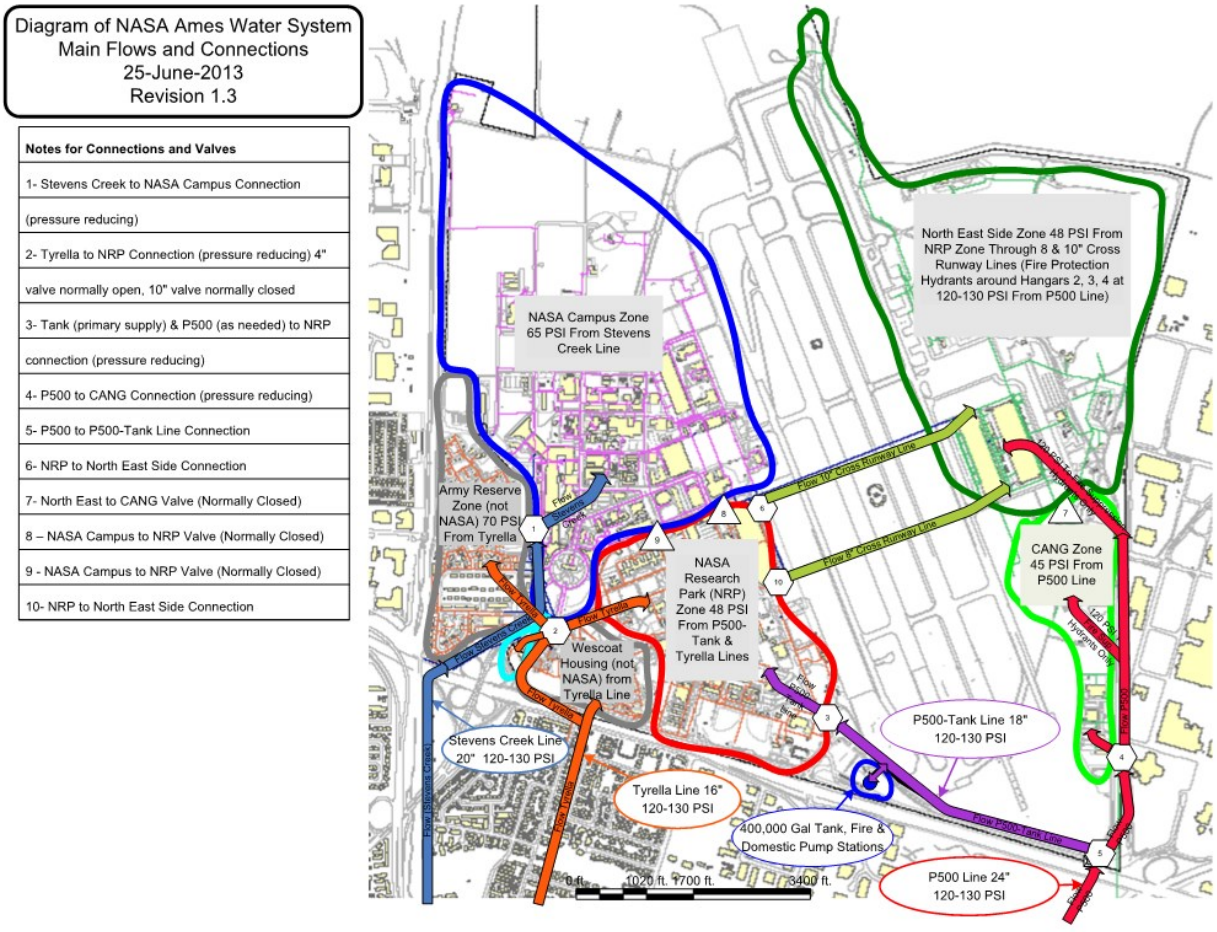

Figure 17-1. Baseline Conditions Water System

(Source: Environmental Management Division)

17.4.3.1.1 NASA Research Park Area

The Tyrella line, one of three water supply lines to ARC from the Hetch Hetchy line, comes into the NRP area from an SFWD meter at Tyrella Street, where SFWD provides service to a 460-millimeter (18-inch) branch from a multiple-metered vault served by a 4600-millimeter (180-inch) aqueduct. Pressure is reduced from 830 kilopascals (kPa) (120 pounds per square inch [psi]) to 310 kPa (45 psi) at the main meter vault for distribution. Flow is then regulated through two 150-millimeter (6-inch) meters that have a maximum total capacity of 19,000 liters per minute (5,000 gallons per minute [gpm]). The water supply for the Wescoat Village housing area is drawn via a tie-in on the Tyrella line upstream from the ARC system. The Wescoat Village system has no connections to the ARC/NRP system and is owned by the Army and operated by the Army's Residential Communities Initiative partner, Clark/Pinnacle. The Tyrella line also serves the Army Reserve Center.

After the addition of the 1.5-megaliter (400,000-gallon) potable water storage tank at the southwest corner of the airfield, the NRP is also fed through a new connection from this water storage tank.

The water distribution system in the NRP area is in worse condition than that serving the other parts of ARC. To minimize leaks and localized failures in this part of the system, the operating pressure in this area has been reduced to 331 kPa (48 psi), requiring that inter-ties to other parts of the ARC campus be closed off, as discussed in more detail below. Nonetheless, ongoing maintenance and repair has kept the NRP system operational and has eliminated the most serious deficiencies. The main line that runs along South Akron Road was replaced with 300-millimeter (12-inch) ductile iron pipe (1999). A parallel line located in North Akron Road was also replaced with a 250 mm (10-inch) PVC pipe. This has increased the overall capacity of the system substantially, but the operating pressure is still limited by the weaker portion of the system.

The NRP water system is connected to both the Ames campus area and Eastside/Airfield water systems. The Ames campus water system connects to the NRP system via two 200-millimeter (8-inch) valves located along Bushnell Street at McCord and Cummins Avenues. To avoid damage to the NRP system because of the Ames campus system's higher operating pressure, the valves are normally closed. The Eastside/Airfield water system connects to the NRP system via two lines that cross under the runway. One line is 200 millimeters (8 inches) in diameter and the other is 250 millimeters (10 inches). The valves on these lines are located in the middle of the runway infield, and were normally kept closed because of the large difference in operating pressure between the two systems; however, rebalancing the systems has resulted in thee valves being open with the northern section of the Eastside/ airfield being fed through these lines.

Fire flow is provided through the potable water distribution system. Hydrants are flushed annually and flow checks are performed every five years. Fire hydrants are also periodically used to irrigate landscaped areas. The fire capacity design for ARC is not based on the largest building size because the larger buildings have sprinkler systems. Instead, the ARC fire marshal has set the minimum fire capacity for new systems at 5,700 liters per minute (1,500 gpm) at 140 kPa (20 psi) residual as required by the Uniform Fire Code. The April 2000 fire hydrant report shows a range of flows, with many hydrants providing less than 3,800 liters per minute (1,000 gpm) and the lowest providing less than 2,300 liters per minute (600 gpm).

An unused 740,000-liter (200,000-gallon) elevated tank is located within the NRP area east of Shenandoah Plaza. The tank presently may contain a small amount of stagnant water, and there is some concern that this water could leak into the main system and contaminate potable supply. This has been cited as an issue by the Division of Drinking Water, SWRCB. The tank could not be brought back into service without being drained, cleaned, and seismically retrofitted. A pump station would also have to be installed adjacent to the tank both to fill the tank and to boost the pressure of water drawn from the tank to supply the distribution system. At present, there is no plan to restore the tank to service.

An Emergency Fire Storage Tank has been built in the NRP area south of the Ellis Street gate. This is fed by a tie-in of the P-500 Hetch Hetchy tie-in on the south-east side of the

installation. This tank has a capacity of 400,000 gallons and is operated at 300,000 to 350,000 gallons, dependent on season to minimize loss of chlorine residual. This tank services the NRP area and the northern section of the Eastside/ airfield.

17.4.3.1.2 Ames Campus and Bay View Areas

The Stevens Creek Line is the western most line that serves ARC. It parallels Stevens Creek south of US-101. North of US-101 it heads northeast until it heads north again along R. T. Jones Road until it reaches a pressure reducing station before entering the main Ames Campus to the east. It is this line that is being extended as a part of the Bay View project to provide water to Ames Campus and Bay View through the two new 1.1 million gallon tanks to be built. The Stevens Creek Line is a 510-millimeter (20-inch) asbestos cement pipe and its pressure is reduced to an operating pressure of 410 - 450 kPa (60 - 65 psi) currently serving the Ames campus area.

Fire flow is provided through the potable water distribution system, with a hydrant maintenance program similar to that employed in the NRP area. The fire protection capacity of the Ames campus system is greater than that of the NRP system because of the better condition of the pipes, which enables higher operating pressures. The Ames campus system is fed from a single source with no open connections to the NRP area or the Eastside/Airfield loop. The Ames campus water system is connected to the NRP system by two 200-millimeter (8-inch) valves that are normally closed to protect the NRP system. These closed valves limit the redundancy of the fire protection system.

Two storage tanks located near the ARC wind tunnels have a combined capacity of approximately 3.6 megaliters (950,000 gallons). The larger tank (2.8 megaliters or 750,000 gallons) is situated at grade and provides water for the foam fire protection system that protects Buildings N-211 and N-248. The smaller tank (0.8 mega-liters or 200,000 gallons) is elevated and is kept partially filled because of seismic safety concerns. Two 1.1 million gallon tanks are planned for construction in the Bay View area.

17.4.3.1.3 Eastside/Airfield Area

The P-500 Line is the eastern most line entering ARC. The Eastside/Airfield area is served by a 610-millimeter (24-inch) feed from SFWD's 4,600-millimeter (180-inch) aqueduct (Hetch Hetchy Line) near the intersection of US-101 and SR-237. The feed enters ARC east of the runway and runs parallel to Macon Road. The pressure in the feed is maintained at the aqueduct's 830-kPa (120-psi) operating pressure, and there are no pressure-reducing stations in the main loop within the Eastside/Airfield area. Substantially higher water pressure is required in this area to support fire protection at Hangars 2 and 3 east of the runways, where a minimum fire flow of 38,000 liters per minute (10,000 gpm) is needed.

The Eastside/Airfield distribution system contains lines ranging from 200 millimeters (8 inches) to 250 millimeters (10 inches) in diameter with several smaller-diameter dead ends. The only significant looping in this system is found surrounding the hangars. The Eastside/Airfield water system is connected to the NRP system via one 200-millimeter (8-inch) line and one 250-millimeter (10-inch) line, as discussed above.

At the southwest edge of the Eastside/Airfield area a 1.5-megaliter (400,000-gallon) potable water storage tank was constructed. This tank is fed from a new 460-millimeter (18-inch) pipeline from the Eastside/Airfield 610-millimeter (24-inch) feed (P-500 Line). The NRP is fed through a new connection from this water storage tank as well. The water flow through the tank feeds the NRP, which in turn feeds the northern section of the Eastside/Airfield area to manage residence time for the stored water.

17.4.4 **Reclaimed Water**

Four potential sources of reclaimed water are available at ARC: the Navy source, the MEW/NASA source, an existing City of Sunnyvale source, and a potential City of Mountain View source. The Navy and MEW/NASA collect and treat groundwater onsite as part of ongoing environmental remediation programs. Additional water reclamation programs are in place or planned by the Cities of Mountain View and Sunnyvale. NASA's recently renovated IWWTF at N-271, now named the GROF takes treated groundwater from the MEW and NASA systems, treats it by reverse osmosis, and uses the product water for the Arc Jet Facility. The following sections provide additional information on reclaimed water. Figure 17-2 shows the reclaimed water system infrastructure. The Moffett field Golf Course has been retrofitted to include reclaimed water for irrigation.

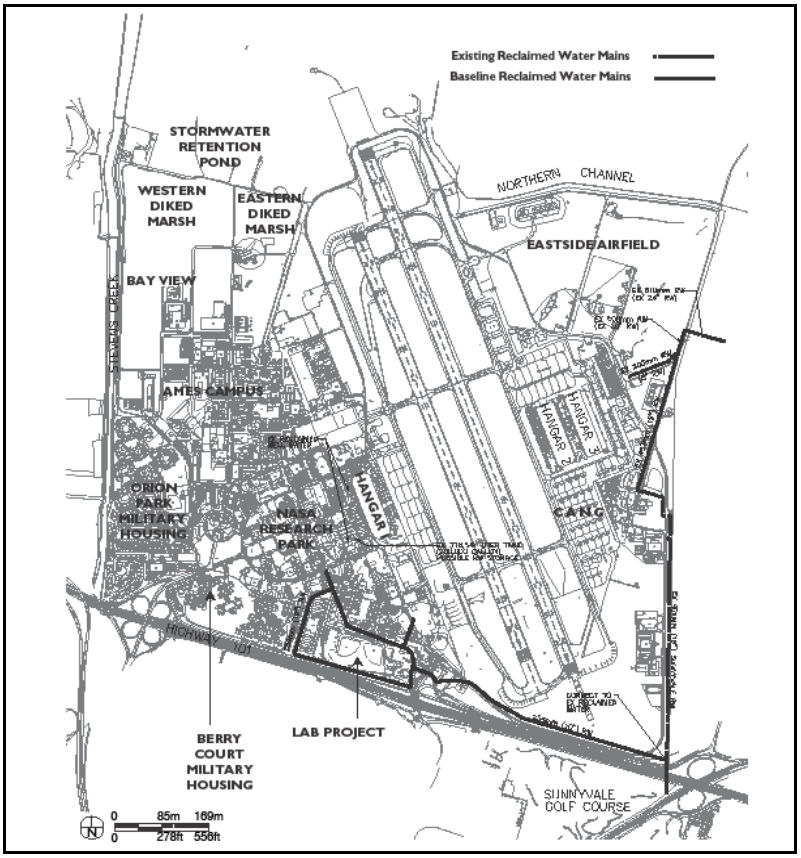

Figure 17-2. Baseline Conditions Reclaimed Water System

(Source: NASA 2009)

17.4.4.1 *Navy Treated Groundwater*

The Navy treats groundwater on site as part of an ongoing environmental remediation program. It is extracted from aquifers that are contaminated with trichloroethylene, perchloroethylene, and fuel (see additional discussion in Chapter 10, *Hydrology and Water Quality*, and Chapter 17, *Hazardous Materials*). The treated water meets current NPDES discharge standards. It is planned to use this water for irrigation in the NRP area to reduce demand for potable supply.

17.4.4.2 *Middlefield-Ellis-Whisman Reclaimed Water*

The MEW companies are conducting groundwater remediation under EPA supervision. The MEW reclaimed water is collected and treated on site as part of an ongoing environmental remediation program. It is collected from the same aquifer as the Navy reclaimed water but from a separate allocated area, the MEW treatment area is primarily contaminated with TCE and PCE (see additional discussion in Chapter 10, Hydrology and Water Quality and Chapter 17, Hazardous Materials). The treated water meets current NPDES discharge standards. NASA further treats some of this water at N-271 and then reuses it in the ARC Jet boiler to reduce demand for potable supply.

17.4.4.3 *Sunnyvale Reclaimed Water*

The Eastside/Airfield area is currently served by a 610-millimeter (24-inch) feed from the City of Sunnyvale's reclaimed water system, which enters ARC at the Lockheed Gate north of First Avenue. The line "Ts" and is reduced to 510 millimeters (20 inches) to continue south along East Patrol Road. The main line is reduced again to 460 millimeters (18 inches) where a 200-millimeter (8-inch) service line Ts off toward the Airfield Substation (Building 591). The main line is further reduced to 410 millimeters (16 inches) as it parallels Macon Road. The line leaves ARC at the southeast corner of the site, near the intersection of US-101 and SR-237.

The City of Sunnyvale has indicated that there may be adequate supply available to serve all of ARC with reclaimed water. This water is suitable for use as irrigation water, and is used for irrigation at the Moffett Field Golf Course.

17.4.4.4 *Mountain View Reclaimed Water*

The City of Mountain View does not have reclaimed water available at ARC at this time. However, Mountain View is encouraging the use of reclaimed water for new projects within its service area and has joined with the Palo Alto Regional Water Quality Control Plant to apply for federal funding to construct a reclaimed water line between the treatment plant and ARC. This source could be available to serve future phases of development at ARC.

17.4.4.5 *Treatment of Reclaimed Water for Industrial Use*

NASA has recently renovated the IWWTF to create the GROF to further treat treated groundwater. The water produced by the GROF is used as makeup water in the boiler for the Arc Jet. The GROF provides 38.2 million liters (10.1 million gallons) of makeup water

per year to the Arc Jet boiler, which will reduce by that amount demand for SFWD potable water.

17.4.5 Sanitary Sewer Service

Installation of the sewer system at what is now ARC began in the 1930s, and the oldest portions of the existing system date from this period. The majority of the pipe is vitrified clay and is in need of either rehabilitation or replacement.

ARC's sanitary sewer infrastructure includes approximately 27,700 meters (90,900 linear feet) of collection lines in two separate systems (Figure 17-3). One system serves the NRP area, including Shenandoah Plaza; the Eastside/Airfield area; the CANG area; and the southern and eastern portions of the Ames Campus and Wescoat Village. This system discharges into the City of Sunnyvale sewer system and is referred to as the eastern sanitary sewer system. The other system serves the Army Reserve property, the remainder of the Ames campus, and the Bay View area. This system discharges into the City of Mountain View sewer system and is referred to as the western sanitary sewer system. The following sections provide additional detail on the eastern and western sanitary sewer systems.

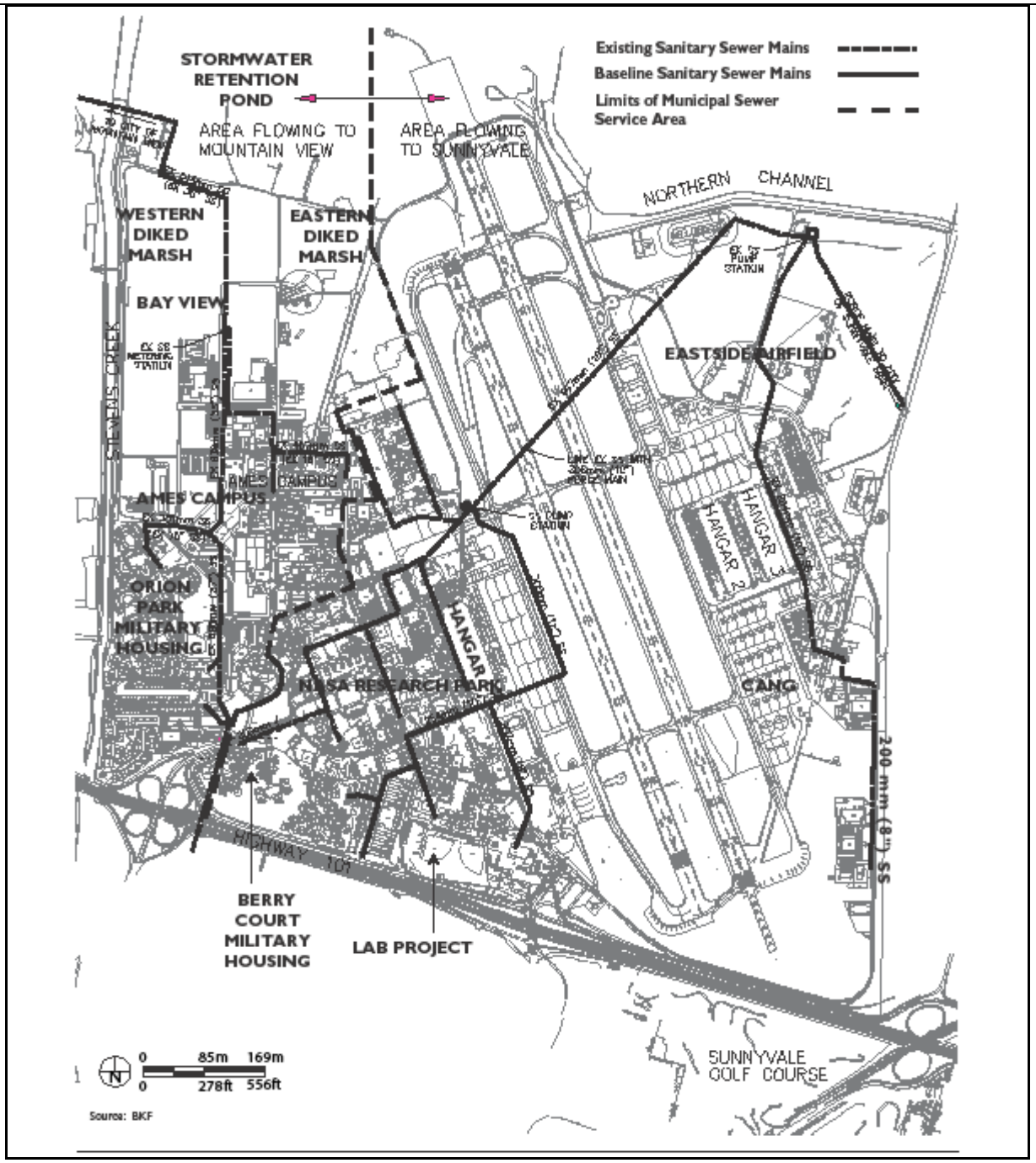

Figure 17-3. Baseline Conditions Sanitary Sewer System

(Source: NASA 2009)

17.4.5.1 *Eastern Sanitary Sewer System*

The eastern sanitary sewer system's main trunk line extends from the southwestern portion of the NRP area to the northeast portion of the Eastside/Airfield area. Collector lines from NRP, Wescoat Village, Shenandoah Plaza, and the southern and eastern portions

of the Ames campus feed into this trunk line. The Eastside/Airfield and CANG areas discharge directly into the existing pump station.

From Wescoat Village and NRP, three main lines flow north through Shenandoah Plaza toward the main trunk line. Several smaller lines flow south and east toward the main trunk line from the southern and eastern portion of the Ames campus.

The main trunk line flows northeast beneath the existing airfield. It has a diameter of 460 millimeters (18 inches) and a capacity of 7,600 liters per minute (2,000 gpm). Currently, the peak wet-weather flow through this line is estimated at 4,160 liters per minute (1,100 gpm). Video logging of the sewer pipe conducted in 1995 showed that the line was in good condition at that time. Two manholes within the runway infield contain 300-millimeter (12-inch) storm drain lines. These lines are sound, and the potential for cross-contamination appears to be minimal.

From the airfield, the main sewer line continues northeast to a pump station located in the northeastern portion of the Eastside/Airfield area. Although still functional, the pump station is nearing the end of its useful life and will eventually be replaced rather than refurbished because its design is outdated. The pump station has a capacity of 7,600 liters per minute (2,000 gpm), and receives a peak wet-weather flow of approximately 4,900 liters per minute (1,320 gpm). From the pump station, sewage is conveyed east through a 250-millimeter (10-inch) force main to an offsite gravity main that continues on to the Sunnyvale Water Pollution Control Plant (SWPCP), located about 3 kilometers (2 miles) east of the ARC campus. The force main and gravity line that convey effluent from the pump station to the SWPCP are reported to be in good condition.

The SWPCP has the capacity to treat 112 megaliters per day (29.5 million gallons per day [MGD]). It currently receives about 62.5 megaliters (16.5 MGD), and the City of Sunnyvale has no plans to expand it.

NASA's contract with the SWPCP is based on effluent quantity and content. Currently NASA Ames is classified as a Significant Industrial User (SIU), subject to the Local Limits for Wastewater. Due to the large volume of wastewater being discharged from the facility, the City has designated NASA Ames as a SIU, because of the potential to violate the Local Limits and adversely affect the POTW's operation. To ensure that applicable discharge standards are met, the quantity of flow is monitored and SWPCP takes monthly samples at the outflow to monitor effluent content. Samples are tested for pH and heavy metals, including cadmium, chromium, lead, arsenic, and selenium.

17.4.5.2 *Western Sanitary Sewer System*

The western sanitary sewer system's main trunk line enters ARC immediately east of the Moffett Boulevard interchange as a 690-millimeter (27-inch) line running under US-101. The line extends from the freeway, north along RT Jones Road and Parson's Avenue through ARC to a location north of the North Perimeter Road, where it leaves the site. This gravity line is operated by the City of Mountain View and is referred to as the East Trunk in their documents. The Mountain View East Trunk originally served a large industrial complex south of US-101, which discharged a large volume of sewage. Since then, recent

high-tech development has replaced the large industrial sites, and sewage flow at the point where the line enters ARC has decreased.

The East Trunk collects wastewater from an area south of US-101 before entering ARC, where it receives unmetered domestic flow from the Army Reserve property and metered industrial flow from the Ames campus area. Ames campus flow enters the line at a metering station north of Building N255. The collection system within the Ames Campus consists of lines with diameters ranging from 200 millimeters (8 inches) to 460 millimeters (18 inches). The metering station discharges to a 760-millimeter (30-inch) main, which in turn transitions to a 910-millimeter (36-inch) main as the line continues north and connects to the City of Mountain View sanitary sewer system.

The East Trunk collects wastewater from the Army Reserve and metered industrial flow from the Ames campus area. Ames campus flow enters the line at a metering station north of Building N-255. The collection system within the Ames campus consists of lines with diameters ranging from 200 millimeters (8 inches) to 460 millimeters (18 inches). The metering station discharges to a 760-millimeter (30-inch) main, which in turn transitions to a 910-millimeter (36-inch) main as the line continues north and connects to the City of Mountain View sanitary sewer system.

The East Trunk flows to a lift station located near the Mountain View Golf Course. The lift station is already at its design capacity of 40 megaliters per day (10 MGD), and wet-weather flows exceed the station capacity two or three times a year. When that occurs, the Supervisory Control and Data Acquisition sensing system automatically shuts down the pumps and closes a slide gate in the lift station. This is referred to as *bypass mode*. Under bypass mode operations, sewage flows by gravity to the Palo Alto Regional Water Quality Control Plant. The City of Mountain View is required to notify ARC when this occurs, because flow can back up into the East Trunk line at least as far as the metering station. The City prepared a study of the lift station that recommended continuing to utilize bypass mode and expanding the downstream pipe rather than expanding the station's capacity.

The Mountain View sewer system conveys flow to the Palo Alto Regional Water Quality Control Plant, which is jointly owned by the Cities of Palo Alto, Mountain View, and Los Altos and is operated by the City of Palo Alto. Mountain View currently has approximately 38% ownership and is entitled to 38% of the plant's capacity of approximately 144 megaliters per day (38 MGD) of dry-weather flow and 303 megaliters per day (80 MGD) of peak wet-weather flow. Current peak wet-weather flow into the plant is 227 megaliters per day (60 MGD). Mountain View's allocation of plant capacity is thus 55 megaliters per day (14.4 MGD) dry-weather flow and 114 megaliters per day (30 MGD) peak wet-weather flow, of which it currently uses approximately 37 megaliters per day (9.8 MGD) dry-weather flow and 83 megaliters per day (22 MGD) peak wet-weather flow.

Since 1993, ARC has had a separate permit with the Palo Alto Regional Water Quality Control Plant that provides for treatment of up to 1.14 megaliters per day (0.3 MGD) peak flow. Current dry-weather flow is approximately 0.4 megaliters per day (0.11 MGD). Wet-weather flow readings are unreliable, indicating a much higher peak flow than actually occurs, because the flow meter is inundated during large rainfall events; however, existing wet-weather flow is probably almost 2.3 megaliters per day (0.6 MGD).

Under the waste water permit with Palo Alto ARC is under obligation to continue to work toward finding an environmental discharge for the reverse osmosis concentrate from the GROF, as Palo Alto would prefer not to take this waste.

17.4.6 Solid Waste Disposal

NASA contracts for solid waste disposal and recycling at ARC. ARC has no active landfill, so solid waste is taken to the Newby Island Landfill in San Jose. Newby Island has a total capacity of 38.8 million cubic meters (50.8 million cubic yards). As of 2006, it had a remaining capacity of 12 million cubic meters (18.3 million cubic yards) and was expected to reach capacity in 2025, its anticipated closure date (CalRecycle 2014a). The City of San Jose is currently reviewing an application from Newby Island to revise their operating permit. If approved, the revised permit would increase the capacity of the landfill by approx. 15.1 million cubic yards and extend the estimated closure date until January 2041 (CalRecycle 2014b).

In 2013, approximately 760 tonnes (838 tons) of non-construction solid waste were generated at ARC. As discussed in Chapter 19, Sustainability, recycling and composting programs have been implemented at ARC with the goal of reducing offsite waste disposal at landfills by 50%. Approximately 1,293 tonnes (1,425 tons) of the total solid waste generated at ARC were recycled on- or offsite in 2013, including 328 tonnes (361 tons) of green waste mulched onsite. The 2013 data reflect a 69% diversion rate for non-construction and demolition waste.

17.4.7 Energy

17.4.7.1 *Electrical Service*

NASA buys electrical power to serve ARC from two sources, the U.S. Department of Energy's Western Area Power Administration (WAPA) and PG&E.

WAPA is contracted to provide NASA with firm power up to 80 megawatts (MW), which represents approximately 80% of the energy consumed at ARC. If this demand is exceeded, NASA buys the balance from PG&E, up to a maximum combined peak demand of 240 MW. NASA's agreement with PG&E is based on a real-time pricing rate schedule; the real-time price of power varies every hour as a function of overall system demand, which allows NASA to control its energy costs by scheduling high-demand testing during non-peak periods when electricity is less costly. Because of this arrangement, NASA is able to obtain power below the commercial rate for electricity.

Energy usage by resident agencies at ARC is managed by the resident agencies without NASA oversight. Since most of the resident agencies are federal agencies, however, they abide by the same energy regulations as NASA.

ARC's electrical distribution system is shown in Figure 17-4.

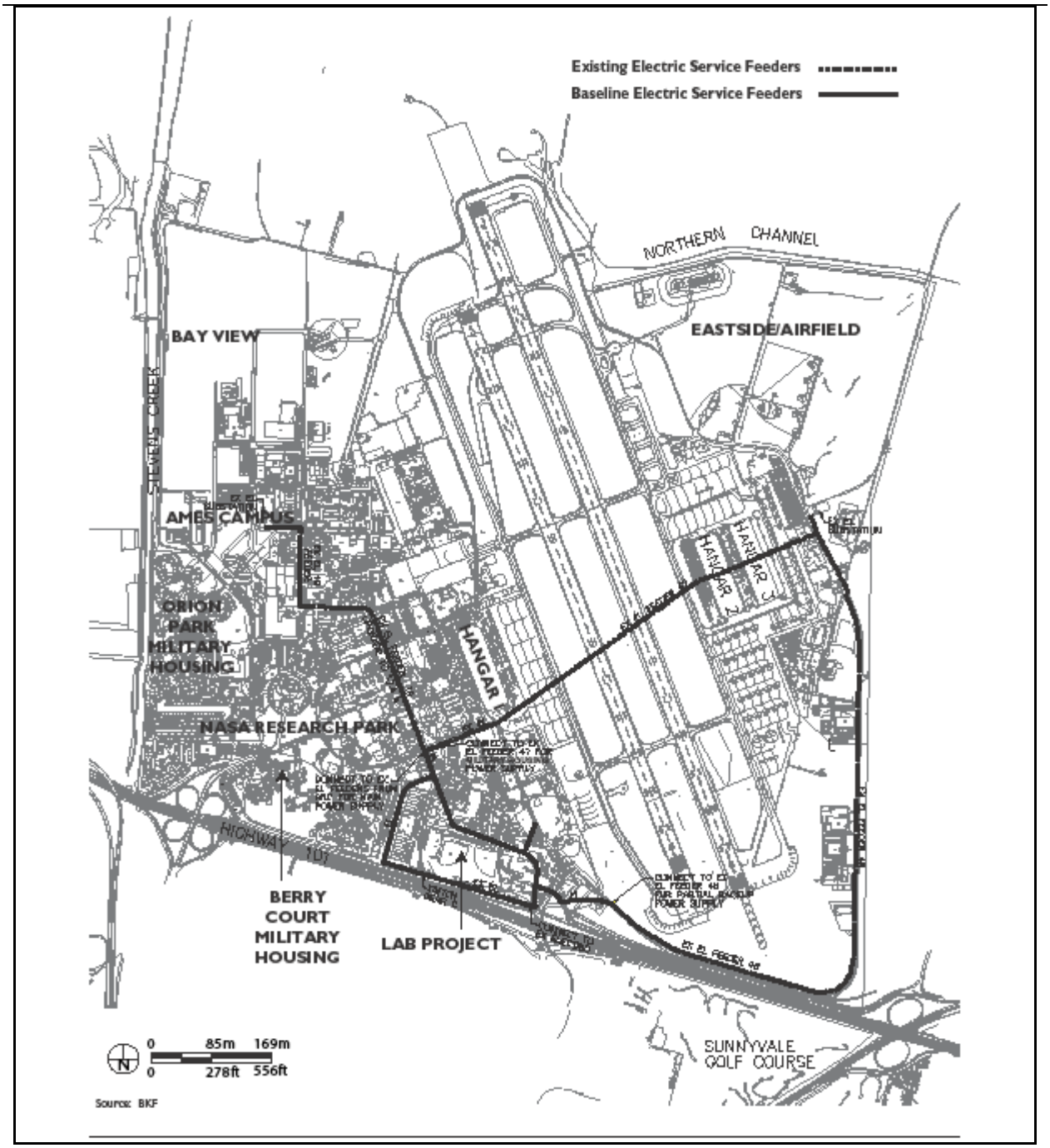

Figure 17-4. Baseline Conditions Electric System

(Source: NASA 2009)

17.4.7.1.1 Overview of the Existing System

The ARC substation was constructed in the 1940s and is centrally located in the Ames campus area. It receives power from two PG&E 115kV overhead transmission lines terminating at bus structures A and B that are dedicated exclusively to ARC. The bus

structures serve as the main distribution point to 17 outdoor transformers that step down from 115kV to various secondary voltages (13.8kV to ARC, 12kV to the NRP area, and 6.9kV and other special voltages specific to lab testing). The 17 outdoor substation-type transformers have a total rating capacity of approximately 650 megavolt amperes (MVA). Of this total, substation-type transformers, dedicated to serve specific lab buildings and their large motor loads, provide 600 MVA (92%). The remaining 50 MVA provides typical electrical service for lighting, HVAC, and other such functions at buildings throughout the Ames campus. In addition to serving the Ames campus, the ARC substation provides emergency backup 12kV power to the switchgear located in the NRP area (Switchgear C) via Feeder 19, which has an estimated capacity of 6.5 MVA and runs through Shenandoah Plaza along McCord Avenue.

NASA's contract with WAPA limits the maximum rate of delivery to the ARC substation to 80 MW at a power factor of $\geq$0.95. Full utilization of the existing buildings served by the ARC substation would create a demand of nearly 36 MW for general (non-lab) applications. However, reduced occupancy and the implementation of energy conservation measures have dropped the demand to about 20 MW.

A second electrical substation was constructed in the early 1980s and is located in the Eastside/Airfield area, northeast of the hangars. The Airfield substation receives power from a single PG&E 115kV overhead transmission line that also provides power to the Lockheed property to the east. This 115kV line terminates at a 115-12kV substation at a dead-end structure and one 115kV oil circuit breaker that serves two step-down transformers, each rated at 7.5/9.9 MVA. The secondary sides (12kV) of both transformers terminate at a main breaker rated at 15kV, 500 MVA, 1200 amperes. The two mains, one tie, and seven feeder breakers are housed in an outdoor walk-in enclosure designated Switchgear A. The total transformer capacity is approximately 20 MVA.

This substation was originally dedicated to serve the Naval Air Station, which included the airfield; the NRP area, including the Shenandoah Plaza Historic District; and military housing to the south and west of ARC. At present, in addition to serving the Eastside/Airfield area, this substation provides power to Switchgear C through Feeder 47 (estimated capacity 6.7 MVA), which crosses the runways near the hangars, and Feeder 48 (estimated capacity 5.2 MVA), which runs south from the substation along Macon Road, around the southern end of the runways, and west to Switchgear C. If maintenance is necessary on any of the 115kV equipment, power must be cut to all facilities served by this substation.

NASA's contract with WAPA limits the maximum rate of delivery to the Eastside/Airfield substation to 5,009 kW at a power factor of 1.0, which translates to 5.01 MVA. Full utilization of the existing buildings served by the Airfield substation could create a demand of as much as 5 MW. Existing demand is about 3.5 MW.

17.4.7.1.2 NASA Research Park Area

Three major 12-kV incoming feeders serve Switchgear C, which is located in the NRP area at the northwest corner of the intersection of Bailey Road and South Perimeter Road. Switchgear C was installed in the mid-1980s and is in relatively good condition. Due to the

feeder sizes, operation requires both Feeders 47 and 48 to be energized at Switchgear C in order to provide 11.2 MVA of load capacity. Feeder 19 is a backup and can only provide power to Switchgear C if the other two feeders' circuit breakers are locked out and in the open position.

The existing underground electrical distribution system in the NRP area consists of a mixture of terra cotta conduits (maximum size 89 millimeters or 3.5 inches), transite conduits, and PVC conduits (maximum size 127 millimeters or 5 inches, with the majority at 100 millimeters or 4 inches). Most new construction uses PVC conduits. Upgrading to a larger cable size in existing conduits is limited to the existing diameter size of the conduit. From a safety standpoint, many of the manholes are overcrowded with cables and are too small to accommodate the existing cabling system. In addition, the 12-kV system is incompatible with the 13.8-kV system in ARC, discussed below. In general, performing any maintenance on the distribution feeders in the NRP area interrupts service to many buildings because the existing distribution feeders are radial-feed.

Switchgear C provides power to the Army Reserve property and Wescoat Village military housing area, the runway lighting, and an antiquated low-voltage system that serves about 25 buildings in the NRP area. Voltage for this system is stepped down from 12 to 2.4kV at Switchgear E, located at the corner of Wescoat Road and McCord Avenue. Most of the transformers, switchgears, cables, and related components that make up the 2.4-kV system are reaching or have exceeded their life expectancy. Many of the 2.4-kV system feeders incorporate paper-insulated lead cables; lead is considered a hazardous material and must be handled and disposed in accordance with EPA regulations. In some cases, oil fuse cutouts or switches and cable-link boxes are still in service; these are also considered a safety hazard by today's standards. It had long been the intention of the Navy and NASA to phase out the 2.4-kV system. In 1992, NASA completed a construction project that installed eleven 15-kV pad-mounted distribution switches throughout the site. These distribution switches will be the points of connection for the existing building transformers when the 2.4-kV system is upgraded.

17.4.7.1.3 Ames Campus and Bay View Areas

The distribution system for the Ames campus area operates at 13.8kV and 7.2kV, and consists of an underground duct-bank system made up of cables, conduits, and manhole vaults. More than 100 distribution-type transformers located in or near buildings step the distribution voltage down to utilization level (480/277 V, 208/120 V). Distribution transformers include oil and dry types.

The ARC substation equipment and distribution system is more than 40 years old; the typical service life for medium- and high-voltage equipment is 20-30 years, and the cost to maintain this system will increase steadily as the system ages. The Electric Power Office was formed in the late 1990s in order to improve safety and prevent catastrophic failures of aging electrical infrastructure. Recent improvements to the system include replacing antiquated 115-kV oil circuit breakers, replacing transformer T-44 and repairing transformers T-45 and T-46, and replacing the power monitoring system. In addition, a program of maintenance and regularly scheduled replacement has been instituted for the

protective relays on high- and medium-voltage systems. As of 2004, almost all of the 115-kV protective relays have been replaced with modern microprocessor components, with the remainder of the systems slated for replacement as needed. Additional planned improvements include replacing the recently retrofitted 15-kV-class air circuit breakers (SF6); 70% of the remaining lead cable; all building service transformers, primary switchgear, and secondary switchboards; and all underground distribution switches in manholes with aboveground distribution switches. The 7.2-kV distribution system will also be converted to 13.8kV. Once these improvements are complete, the only major remaining deficiency in the ARC campus area will be the underground duct-bank system, which is undersized and in poor condition.

A new dedicated 3 MW line for the N-258 has been installed, along with stand by generators.

17.4.7.1.4 Eastside/Airfield

The distribution system for the Eastside/Airfield area operates primarily at 12kV, with some remaining 2.4-kV portions. Switchgears B and D are located on Feeder 47 near the hangars and provide power to the buildings in this area. A 12-kV distribution system extends south, eventually running parallel to Feeder 48 along Macon Road, and provides power to the CANG facilities.

17.4.7.2 *Natural Gas, Fuel Oil, and Propane*

Space heating at ARC relies on natural gas. Fuel oil was used in the past, but all fuel tanks for space heating boilers were removed in the 1980s to reduce potential sources of subsurface contamination. Propane was used until the late 1980s but is no longer in use; the onsite propane facility was deactivated in 1990.

17.4.7.2.1 Overview of the Existing Natural Gas System

Natural gas supply for ARC is purchased directly from the producers through the Defense Energy Support Center. NASA pays PG&E a transmission fee to convey natural gas from the producers to the ARC campus via PG&E infrastructure. The main PG&E piping is considered a high-pressure natural gas piping system.

Natural gas is delivered to ARC via two main service lines (Figure 17-5).

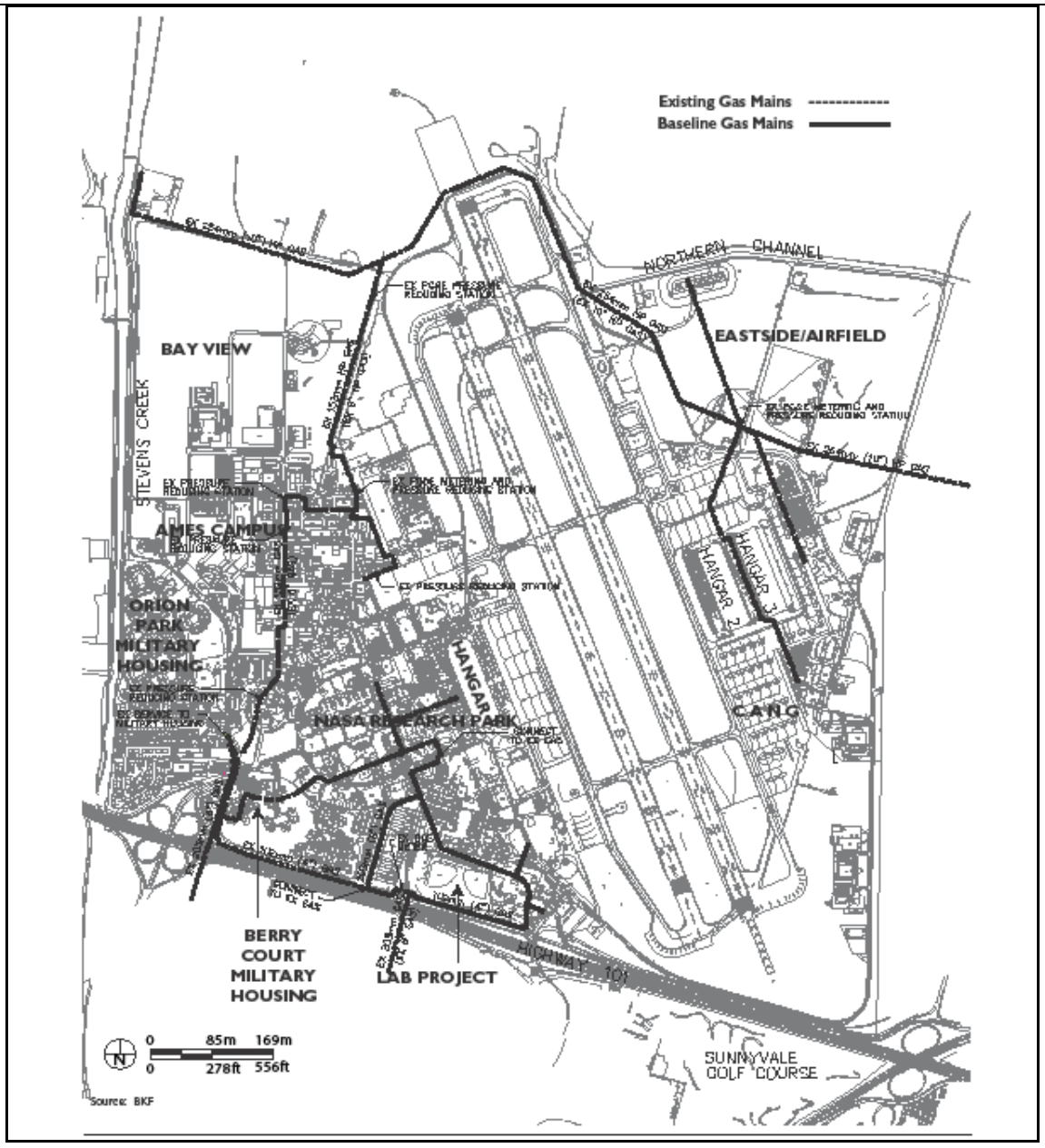

Figure 17-5. Baseline Conditions Gas System

(Source: NASA 2009)

The first is a 250-millimeter (10-inch) high-pressure 2,070 kPa (300 psig[14]) east-west line that enters ARC north of the Bay View area and branches off to a 150-millimeter (6-inch) 97- kPa (140-psig) north-south line. The 250-millimeter (10-inch) line extends east around the north portion of the Eastside/Airfield area, through the golf course, and off the site. The capacity of this line is roughly 552,000 cubic meters per hour (19.5 million cubic feet per hour), provided that adequate supply is available. The north-south line extends south to a

[14] psig is an abbreviation for pounds per square inch gauge, which describes the diameter of the pipeline.

PG&E pressure-reducing station near the intersection of Lindbergh Avenue and North Perimeter Road, where pressure is lowered from 2,070 kPa (300 psig) to 970 kPa (140 psig). The line then continues south through the Bay View area to another PG&E pressure-reducing and metering station in the Ames campus area. From the Ames campus area, the line extends through the Wescoat Village military housing area, exiting ARC under US-101.

A second service line enters ARC via a separate crossing under US-101. The metering station (G-27) for this service is located at the northwest corner of Bailey Road and South Perimeter Road, and it serves the NRP area and Wescoat Village military housing.

A third line crosses under US-101 and onto Front Street. It serves the Army Reserve property, which is not part of ARC.

The following sections provide additional detail on natural gas service in each of the four planning areas.

17.4.7.2.2 NASA Research Park Area

The natural gas distribution system in the NRP area is considered a medium-pressure system. The NRP area receives natural gas supply through a 100-millimeter (4-inch) steel pipe that has a capacity of roughly 150,000 cubic meters per hour (5.3 million cubic feet per hour), provided that adequate supply is available. The incoming nominal pressure to the metering station at Bailey Road and South Perimeter Road is 450 kPa (65 psig), which is reduced to a nominal pressure of 117 kPa (17 psig) at the downstream portion of the metering station. From the metering station, natural gas is supplied to various buildings via a network of distribution pipelines.

The NRP area's natural gas distribution system appears to be in fair condition. Some of the existing steel pipes, primarily in the area west of Bailey Road, have been replaced with polyethylene pipes due to corrosion and gas leakage problems. Pipe corrosion resulted from the effects of a shallow water table on aging pipes. Gas valves found to be inoperable also posed a leakage hazard and have been replaced. Other valves are planned for replacement in the future.

The main natural gas meters in the NRP area appear to be in good condition. Some buildings in the area have sub-meters, which also appear to be in good condition. Other buildings have pressure regulators without gas meters on the supply piping.

The primary use of natural gas in the NRP area is for space heating in offices, lodging shops, and training centers. Additional gas consumers include cooking equipment, water heaters, and a boiler plant, which provides heat to most of the Shenandoah Plaza buildings.

17.4.7.2.3 Ames Campus and Bay View Areas

The Ames campus and Bay View areas receive natural gas through a 200-millimeter (8-inch) steel pipe, which is reduced to 150-millimeter (6-inch) and 100-millimeter (4-inch) steel piping loops elsewhere in the area.

The Ames campus/Bay View natural gas distribution system is considered a medium-pressure system. As described above, PG&E has a pressure-reducing station near the

intersection of Lindbergh Avenue and North Perimeter Road, where the nominal pressure is reduced from the 2,070 kPa (300 psig) carried by the main line to 970 kPa (140 psig). The main pressure-reducing station in this area, located at the intersection of Mark Avenue and Hunsaker Avenue, reduces the nominal pressure from 970 kPa (140 psig) to 410 kPa (60 psig) and then to 140 kPa (20 psig) at the downstream portion of the metering station. Several other stations regulate the pressure down further to operating pressures in the range of 48-100 kPa (7-15 psig).

The natural gas distribution system in the Ames campus and Bay View areas appear to be in fair condition. Ongoing maintenance has kept the system in good working order. Some of the existing steel pipes have been replaced with polyethylene pipes because of corrosion and gas leakage. Gas valves have been removed and replaced, and some pipes have been abandoned and rerouted.

In the Ames campus and Bay View areas, natural gas is primarily used to heat offices and research facilities and to power domestic water heaters. It also powers a boiler plant in one of the research facilities.

17.4.7.2.4 Eastside/Airfield Area

The Eastside/Airfield area receives natural gas through PG&E's 250-millimeter (10-inch) trunk line, which crosses beneath the north end of the airfield. As discussed above, the pressure in the main line is 2,070 kPa (300 psig). A branch line with a capacity of about 221,000 cubic meters (7.8 million cubic feet) per hour extends from the main line to a pressure-reducing station where the pressure is reduced to 970 kPa (140 psig). After metering, the pressure is further reduced from 410 kPa (60 psig) at the downstream portion of the station. Several other pressure-reducing stations regulate the pressure down further to operating pressures in the range of 48-100 kPa) 7-15 psig).

The primary use of natural gas in the Eastside/Airfield area is space heating and domestic hot water.

17.4.7.3 *Alternative Energy Sources*

NASA has considered using solar water heating, buying energy from renewable energy sources, and buying electric vehicles. Currently, photovoltaiac arrays are positioned on buildings N232, N235 and N245, and ARC is meeting requirements to purchase renewable energy. Electric carts have been extensively utilized on site.

17.5 Environmental Requirements

NASA has identified the following environmental policies, practices, and measures that address potential effects on public and emergency services as a result of operations and future development at ARC.

17.5.1 NASA Procedural Directive 8500.1, NASA Environmental Management

Per NPD 8500.1, it is NASA policy to: maintain compliance with all applicable federal, state, and local environmental requirements; to incorporate environmental risk reduction and

sustainable practices to the extent practicable throughout NASA's programs, projects, and activities; and to consider environmental factors throughout the life cycle of programs, projects, and activities (as defined in NPD 7120.4, *NASA Engineering and Program/Project Management Policy*, and related documents), including planning, development, execution, and disposition activities. Examples of environmental factors include consideration of environmental impacts as required by the NEPA and NHPA; the proposed use of hazardous materials; the potential for waste generation; the need to acquire necessary permits, waivers, and authorizations; and the use of environmentally-preferable materials and processes wherever practicable.

17.5.2 NASA Procedural Requirements 8553.1, NASA Environmental Management System

NPR 8553.1 sets forth requirements for the NASA EMS, which functions primarily to: (1) incorporate people, procedures, and work practices into a formal structure to ensure that the important environmental impacts of the organization are identified and addressed; (2) promote continual improvement, including periodically evaluating environmental performance; (3) involve all members of the organization, as appropriate; and (4) actively involve senior management in support of the EMS.

Agencywide, the EMS employs a standardized approach to managing environmental activities that allows for efficient, prioritized system execution, while at the same time helping to improve environmental performance and to maintain compliance with applicable environmental regulations and requirements. NASA's EMS approach involves identifying all activities, products, and services under each NASA center's control, and the environmental aspects associated with each centers' continued engagement in those activities, products, and services. Once identified, priority environmental aspects are assigned a risk ranking (from 1 to 4, based on its severity and frequency of occurrence) and are evaluated on a continual basis as means of highlighting associated positive or negative impacts and setting objectives and targets to reduce environmental risk. Each center's EMS also identifies methods for ensuring compliance by keeping abreast of environmental requirements. This includes requirements by law (EOs, federal regulations, state and local laws) and voluntary commitments made by the center or NASA.

17.5.3 Ames Procedural Requirements 8500.1, Ames Environmental Procedural Requirements

APR 8500.1 sets forth general procedural requirements to ensure compliance with applicable federal, state, and local environmental laws; regulations and EOs; and NASA policies and procedures. Organizational directors, division chiefs, branch chiefs, section heads, supervisors, managers, and CORs are responsible for planning, designing, constructing, managing, operating, and maintaining facilities in conformance with applicable regulatory directives, and should obtain environmental review from the Environmental Management Division early in project planning consistent with NASA's NEPA implementing procedures (NPR 8580.1 and EO 12114), NASA policies and procedures for programs and projects (NPR 7120), and NASA regulations related to environmental quality (14 CFR 1216). Program and project managers should coordinate

with the Environmental Management Division in a timely manner to ensure that any new or modified programs, projects, and activities comply with regulatory requirements.

17.5.4 Ames Procedural Requirements 8553.1, Ames Environmental Management System

APR 8553.1 sets forth requirements for the Center-level EMS in accordance with NPR 8553.1B, *NASA Environmental Management Systems*. The ARC EMS also includes consideration of the findings of NASA Headquarters' triennial (3-year) Environmental Functional Review and other external EMS audits, as required.

Under the ARC EMS, the Center conducts an annual risk analysis across Center activities to determine which of 16 environmental aspects are of high or medium priority. The Center then identifies objectives (goals) and targets and develops action plans known as Environmental Management Plans to reduce identified risks. Currently, the high- and medium-priority environmental aspects of Center business activities are *Air Emissions*, *Hazardous Material Management*, *Water and Energy Conservation*, and *Other Sustainability Practices*. Objectives associated with these high- and medium-priority environmental aspects include:

- Reducing air (including GHG) emissions through energy efficiency
- Improving hazardous material management
- Improving energy and water efficiency
- Providing for the integration of other sustainability practices into Center activities

17.5.5 Ames Environmental Work Instructions

Ames's EWIs, which replace the previous Ames Environmental Handbook (APR 8800.3), set forth requirements to ensure that programs, projects, and activities at ARC comply with applicable federal, state, and local laws; regulations and EOs; and NASA policies and procedures. Each EWI lists relevant regulatory authorities and documents, assigns individual and organizational responsibilities within ARC, and identifies specific requirements applicable to the work being performed.

The following EWIs are relevant to operations and future development at ARC with the potential to impact public and emergency services.

- EWI 2-1, Drinking Water Management
- EWI 2-2, Industrial Waste Water
- EWI 4, Solid Waste and Recycling
- EWI 2.3, Storm Water
- EWI 12, Public Involvement
- EWI 14, NEPA and Environmental Justice
- EWI 18, Environmental Requirements for Construction Projects (Under review)

17.5.6 NASA Ames Energy Conservation Policies and Practices

ARC has designated Plant Engineering as responsible for implementing an Energy Conservation Plan. Within the directorate, the Plant Engineering Branch is responsible for managing the program and reporting to NASA Headquarters. The Plant Engineering Branch also has the authority to require that some types of projects include energy conservation measures such as energy-efficient lighting, as appropriate.

Below are examples of current operations and maintenance practices at ARC that promote energy conservation.

- All space-heating boilers have been replaced with water heaters to improve energy efficiency and minimize harmful exhaust emissions.
- Most outdoor lighting has been retrofitted with more efficient light sources such as light-emitting diode or inductive fluorescent.
- All chilled water plants and heat exchangers are tested and cleaned annually to remove scale[15] build-up.
- Existing heating and cooling systems are reviewed and replaced as appropriate with increasingly efficient systems. Replacement equipment is required to meet the State's Title 24 energy standards. Smaller units are specified where new building load calculations warrant, and multiple smaller cooling units have replaced large single plants in some cases. These smaller units are doing a better job of matching the cooling load, thus increasing energy efficiency.
- Roof replacements are designed to meet Title 24 insulation standards, and roof materials are designed to protect the insulation from moisture damage.

ARC has funded many energy conservation measures with a large Utility Energy Savings Contract, general funds and Construction of Facilities funds. Examples include installation of energy-efficient lighting and replacement of HVAC equipment with newer, more efficient, non-chlorofluorocarbon units.

17.5.7 NASA Ames Development Plan Final Programmatic Environmental Impact Statement

The NADP EIS identified the following mitigation measures to address potential impacts to public services from build out of NADP Mitigated Alternative 5.

17.5.7.1 *Mitigation Measure INFRA-1*

NASA would cooperate with the City of Sunnyvale in determining the cumulative impact of existing and proposed development on the sanitary sewer conveyance system between Ames Research Center and the SWPCP.

[15] *Scale* is a coating or encrustation formed inside boilers and pipes after extensive use. It forms because of dissolved mineral substances precipitating out of solution, and can lessen conveyance capacity of pipes and interfere with heat transfer in boiler systems, wasting energy.

NASA and its partners would contribute their fair share toward construction of conveyance pipes and supporting infrastructure which are determined to be necessary to mitigate the cumulative impact of existing and proposed development. NASA's fair share will be based on its pro rata share of the total flow of all existing and proposed development contributing to either the existing sewer conveyance system between ARC and SWPCP or the new system designed to replace or augment the existing system.

17.5.7.2 *Mitigation Measure INFRA-2*

NASA will cooperate with the City of Mountain View in determining the cumulative impact of existing and proposed development on the sanitary sewer conveyance system between Ames Research Center and the PARWQCP. New conveyance piping would be installed between the area served by the existing lift station at the Mountain View Golf Course and the Palo Alto Regional Water Quality Control Plant (PARWQCP), with sufficient capacity to accommodate the total expected flow. This would require the installation of roughly 5486 meters (18000 lineal feet) of pipe. NASA will contribute its fair share toward construction of the conveyance pipes and supporting infrastructure that are determined to be regional to mitigate the cumulative impact of existing and proposed development. NASA's fair share will be based on its pro rata share of the total flow of all existing and proposed development contributing to the new sewer conveyance system between ARC and PARWQCP.

17.5.7.3 *Mitigation Measure INFRA-2*

The 1993 agreement between the PARWQCP and Ames Research Center would be amended to address the capacity issues. NASA would also enter into an agreement with the city of MV that stipulates the amount of flow NASA would be permitted in the MV conveyance system.

17.5.7.4 *Mitigation Measure SOCIO-3*

NASA and the Mountain View-Los Altos Union High School District will negotiate an agreement whereby in any given year, should the Mountain View-Los Altos Union High School District's per student operating revenues decrease below a pre-determined baseline as a direct result of enrollment generated by the NADP, NASA or its partners will compensate the District for the shortfall associated with these students. The baseline would be set to the District's per student operating revenues in the year prior to when students residing at ARC first begin attending classes in the District, and would be adjusted for cost of living and inflationary changes over time.