Company: Southern California Gas Company (U 904 G)
Proceeding: 2024 General Rate Case
Application: A.22-05-XXX
Exhibit: (SCG-08-WP-S)

PUBLIC

SUPPLEMENTAL WORKPAPERS TO

PREPARED DIRECT TESTIMONY

OF BILL KOSTELNIK

ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY

(PIPELINE SAFETY ENHANCEMENT PLAN)

VOLUME VII OF VIII

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

MAY 2022

TABLE OF CONTENTS

VOLUME VII

WP-1922 – 1995

SCG Dairy Pilot Project Workpapers (non-PSEP)

WP-1922 – 1995

SCG Dairy Pilot Project Workpapers (non-PSEP)

SOCALGAS DAIRY PILOT PROJECT WORKPAPERS

Project Workpaper Title	Workpaper Page
North Visalia Dairy Pilot Project	WP-1922
South Tulare Dairy Pilot Project	WP-1941
Lakeside Dairy Pilot and Pressure Betterment Project	WP-1959
Buttonwillow Dairy Pilot Project	WP-1979

I. NORTH VISALIA DAIRY PILOT PROJECT

A. Background and Summary

The North Visalia Dairy Pilot Project consists of the installation of a dairy biomethane Facility located in Visalia. Through this Project, SoCalGas installed the necessary equipment and demonstrated the injection of renewable natural gas (RNG) into the natural gas pipeline system, achieving the objectives set forth by Senate Bill (SB) 1383 as described in testimony. The Project estimate at completion (EAC) is $11,919,854.

Final Report for North Visalia Dairy Pilot Project

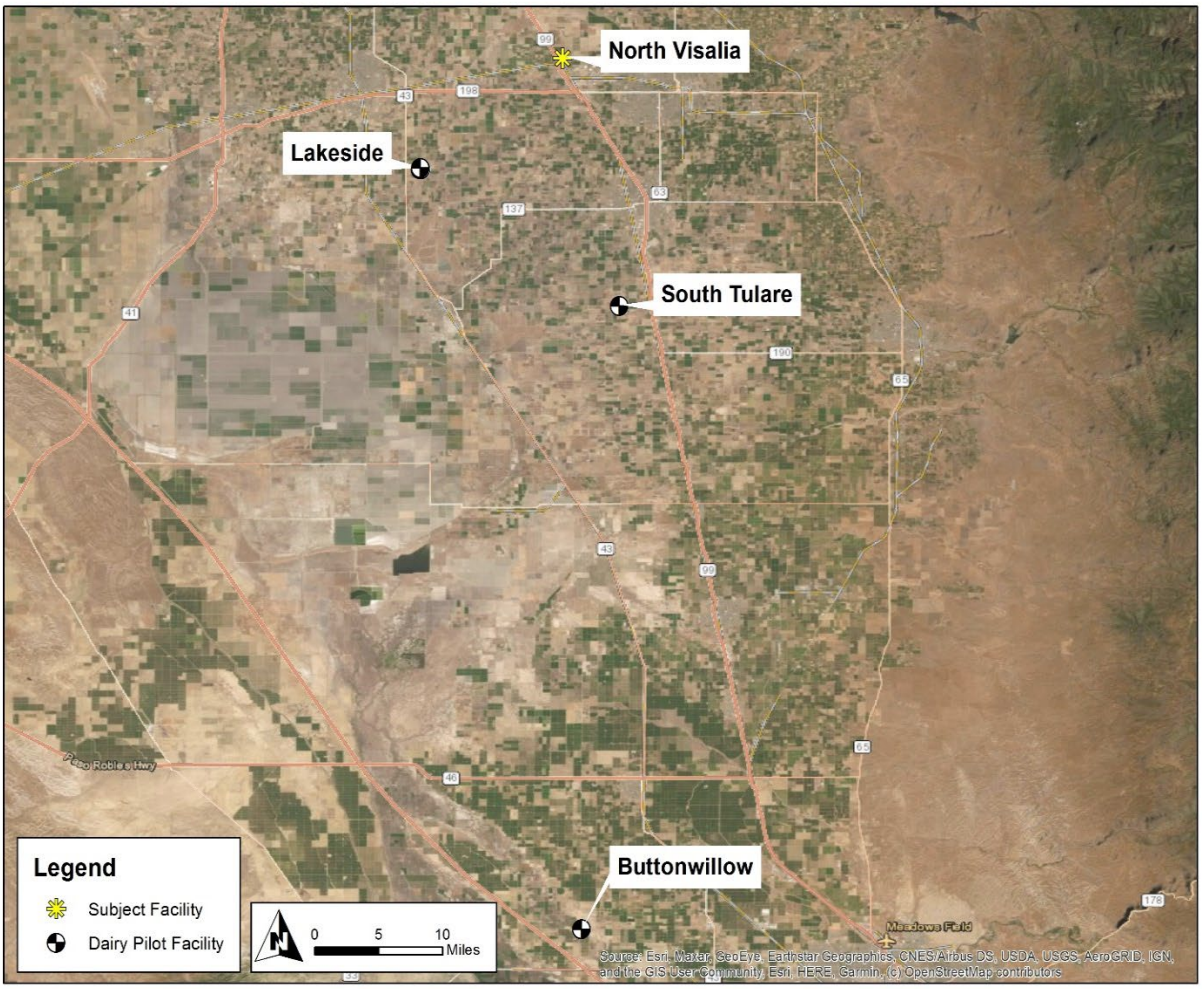
Table 1: General Project Information

North Visalia Dairy Pilot Project			
Location	Tulare County		
Construction Start	08/24/2020		
Construction Finish	06/01/2021		
In-Service Date	02/05/2021		
Facility Requirements			
Pipeline/Lateral Receipt Point	945 feet (Pipeline Extension)		
Meter Assembly (MSA)	Yes		
Compressor	Yes		
Power	Yes		
Communication	Yes		
SCADA Panel	Yes		
Equipment Shelter	Yes		
Project Costs ($)	**Capital**	**O&M**	**Total**
Project EAC	11,919,854	-	11,919,854

Final Report for North Visalia Dairy Pilot Project

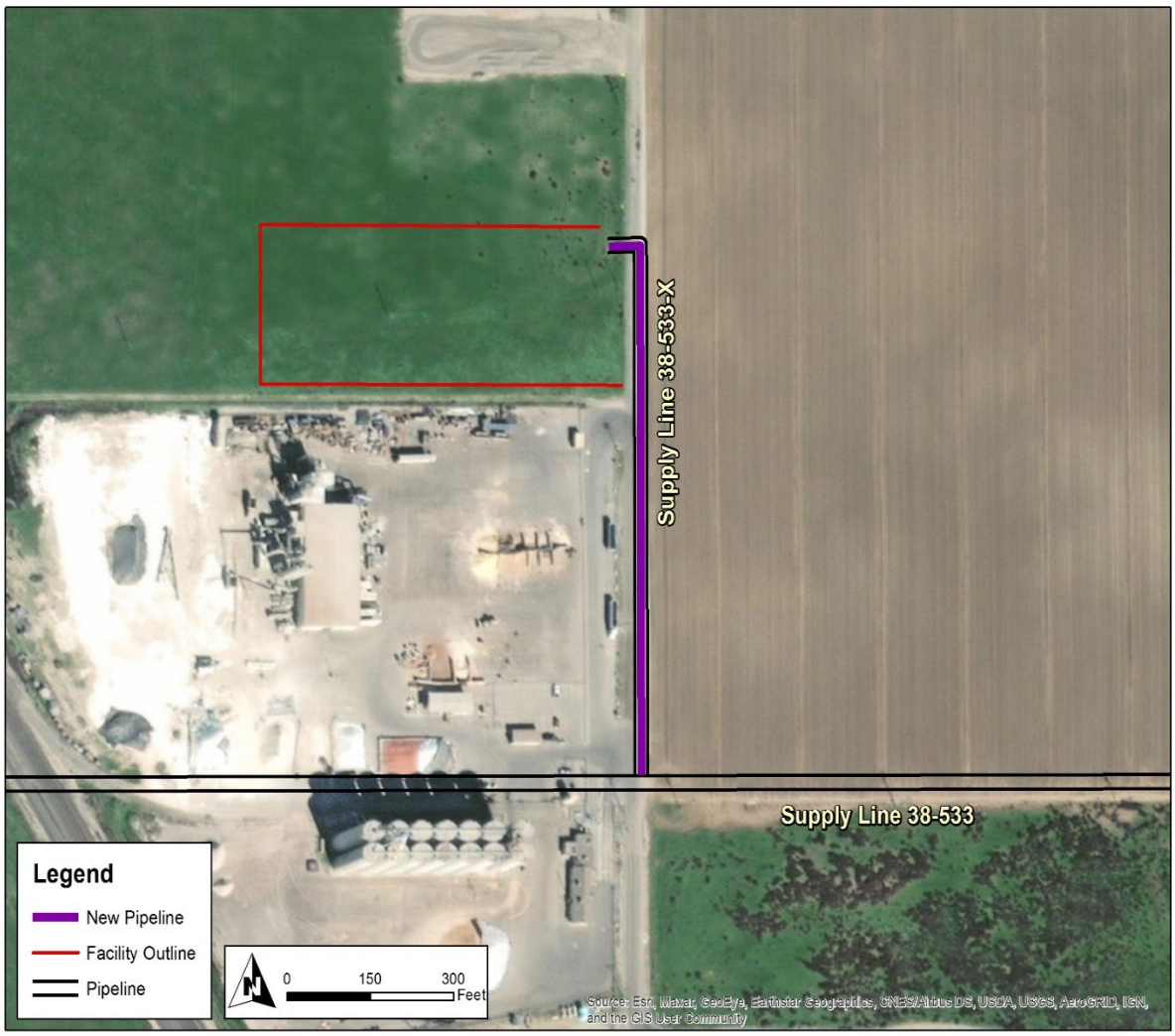
B. Maps and Images

Figure 1: Satellite Image of Dairy Pilot Project Locations



Final Report for North Visalia Dairy Pilot Project

Figure 2: Satellite Image of North Visalia Dairy Pilot Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Following the enactment of SB 1383, SoCalGas coordinated with external stakeholders to initiate the pilot Projects for four gas processing sites with various gas production capacities and pressures. Each of the four sites receive RNG from an upstream processing Facility and will require pipeline lateral piping, compression, a point of receipt, and a pipeline extension to interconnect to SoCalGas' pipeline system. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project.

1. Decision (D.) 17-12-004: As a result of the Decision, SoCalGas coordinated with North Visalia to achieve the objectives set forth by SB 1383.
2. Project Scope: Upon Project initiation, SoCalGas reviewed the conceptual Project scope and determined that this receipt point would achieve the objectives set forth in SB 1383 as described in testimony. SoCalGas determined it was also necessary to install the required facilities to achieve these objectives. The final Project scope consists of the installation of one dairy biomethane Facility and interconnection to Supply Line 38-533.
3. Engineering, Design, and Constructability:
   a. The facility captures the methane produced from approximately 27,000 cows.
   b. The pipeline extension consisted of the installation of approximately 945 feet of [redacted] and [redacted] pipeline from the point of receipt and tie-in to the existing [redacted] Supply Line 38-533.
   c. The Facility components include an inlet and outlet, liquid and solids removal filter, compressor, gas cooling equipment, odorizing equipment, and metering prior to interconnection with the existing pipeline.

d. Additional site components include the installation of an instrument air system, electrical and controls systems, fire protection, lubrication oil system, site lighting and other required utility systems.
e. The Project installed a Meter Set Assembly (MSA) to condition and compress RNG for the Project's unique suction and discharge pressures to meet flow rate requirements.

B. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Site Description: The North Visalia Facility is located in Tulare County adjacent to neighboring agricultural fields.
2. Facility Requirements: This site required the installation of the following:
   a. Digester.
   b. Biogas Treatment Facilities and Collection Lines.
   c. Biogas Conditioning and Upgrading Facility.
   d. Pipeline extension to install approximately 945 feet to interconnect to Supply Line 38-533.
3. Engineering Assessment:
   a. The Project Team assessed the minimum pipeline flow rate to ensure that the Applicant would produce adequate amounts of RNG during start up.
   b. The Project Team installed additional lines on the compressors to accommodate minimum flow rate.
4. Digester Details: SoCalGas coordinated with the Applicant to build and operate the dairy digester facilities.

5. Pipeline Extension Details: Installation of approximately 945 feet of [redacted] and [redacted] pipeline that begins at the point of receipt (MSA) and ties-in to the existing [redacted] Supply Line 38-533 by the way of a pressure control fitting.
6. Customer Impact: The Project Team did not anticipate any potential service disruptions to customers during tie-in activities.
7. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.
8. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
9. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
10. Permit Restrictions: The Project Team obtained an encroachment permit through Tulare County for the pipeline extension.
11. Land Use: The Project Team utilized land owned by the producer as a laydown yard.
12. Traffic Control:
    a. The Project Team closed one roadway lane during the installation of the pipeline extension.
    b. The Project Team closed the entire roadway for one day during the strength test of the Facility.

C. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this Project.

1. SoCalGas Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas preliminary cost estimate for construction was [redacted].
2. Mechanical Construction Contractor's Bid *(confidential)*: The Mechanical Construction Contractor's bid was [redacted], which was [redacted] than SoCalGas preliminary cost estimate for construction.

B. Construction Schedule

Table 2: Construction Timeline

Construction Start Date	08/24/2020
Construction Completion Date	06/01/2021
In-Service Date	02/05/2021

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions are anticipating approximately $525,000 in change orders.

Final Report for North Visalia Dairy Pilot Project

1. Field Design Changes:
   a. The Project Team added rebar to reinforce multiple duct banks at road crossings for heavy traffic loads.
   b. The Project Team installed additional handrail posts for future maintenance activities.
   c. The Project Team installed additional platforms and cast iron pads at both separators and odorant tank panels for future maintenance activities.
   d. The Project Team installed additional above ground instrumentation to install new sensing lines.
   e. The Project Team removed and replaced coating on a delivery of material to achieve proper cathodic protection following installation.
   f. Additional electrical contractor support was required to complete site commissioning activities.
2. Tie-In: Additional work hours and light towers were required to complete tie-in activities.

Final Report for North Visalia Dairy Pilot Project

Figure 3: Installing Conduit inside the Facility

Final Report for North Visalia Dairy Pilot Project

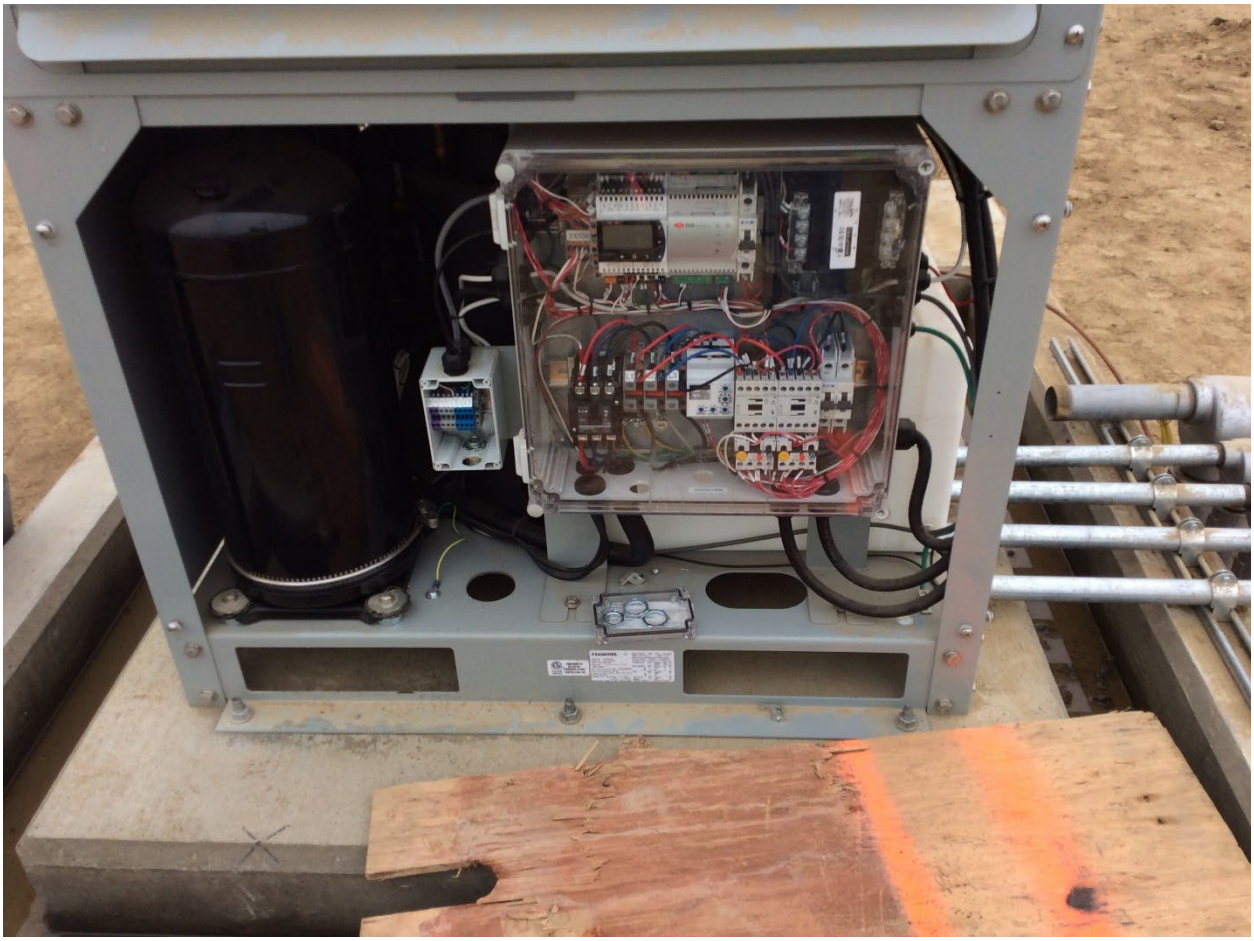
Figure 4: North Visalia Pipeline Extension

Final Report for North Visalia Dairy Pilot Project

Figure 5: North Visalia Facility During Construction

Final Report for North Visalia Dairy Pilot Project

Figure 6: Automation Controller



Final Report for North Visalia Dairy Pilot Project

Figure 7: Power Distribution Center

D. Commissioning and Site Restoration

Commissioning activities include restoration of the site, final inspection, and placement of the Facility into service, transportation, and disposal of hydrotest water and hazardous material, and site demobilization. Closeout activities include development of final drawings, finalization of a reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this Project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the Project plan and design. Specific examples of cost avoidance actions taken on this Project were:

1. Bundling of Projects: This Project was bundled with the South Tulare, Lakeside, and Lakeside Betterment Projects which allowed SoCalGas to save on Project costs.
2. Project Design: The Project Team utilized existing survey data to incorporate into the Facility design.
3. Material Procurement: The Project Team bundled the long lead equipment such as separators and compressors.
4. Construction Execution:
   a. Resources were alternated between the Dairy Project sites to avoid standby costs.
   b. Due to the complexities of the facility piping, The Project Team strength tested the Facility piping in place as opposed to testing in the assembly yard.

B. EAC Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded Project EAC is $11,919,854.

Final Report for North Visalia Dairy Pilot Project

Table 3: Estimated and EAC Costs and Variances[1] [2]

Costs ($000)	Authorized (2019)	EAC	Delta Over/(Under)
Engineering	517	1,079	562
Equipment & Materials	2,908	3,274	366
Construction	1,797	4,352	2,555
Company Labor	668	702	33
Other Construction Management	1,051	1,145	94
Direct Costs	**6,942**	**10,552**	**3,611**
Indirect Costs	**1,377**	**1,367**	**(10)**
Total Loaded Costs	**8,318**	**11,920**	**3,602**

C. Direct Cost Impacts

The Direct EAC is anticipated to exceed SoCalGas' preliminary estimate by approximately $3,611,000. This variance is attributable to:

1. Engineering:
   a. The original cost estimate did not include any preliminary engineering design work.
   b. Specified equipment sizes were greater than anticipated requiring redesign to accommodate for the changes in equipment.
   c. The Project required additional engineering services to design civil, structural, mechanical, electrical, and instrumentation components of the facility.
   d. The Project required additional electrical and instrumentation work.
2. Equipment & Materials:
   a. The Project required additional instrument air compressor packages.
   b. The Project required additional piping material.
   c. The Project required additional instrumentation and controls equipment.
   d. The Project required larger power distribution centers.

[1] Values may not add to total due to rounding.
[2] See Reasonableness Review of Dairy Pilot Projects Testimony Project Cost Variances

3. Construction:
   a. The Project required additional electrical, mechanical, and structural work following the completion of detailed design.
   b. The Project required additional third party inspection.
   c. The construction duration for each Dairy Pilot project was approximately three times longer than the original estimated durations from the estimate.
   d. The conditions encountered during construction and activities to address or mitigate these conditions are anticipating approximately $525,000 in change orders.
4. Company Labor: The Project Team required additional Company Engineering, Project Management, and Construction Management support.
5. Other Construction Management: The Project Team required additional third party field engineering, inspection teams, third party non-destructive examination (NDE), and NDE oversight during construction.

V. CONCLUSION

Through this Project, SoCalGas installed the necessary equipment and demonstrated injection of RNG into the natural gas pipeline system, achieving the goals set forth by SB 1383. The total loaded Project EAC is $11,919,854.

SoCalGas engaged in prudent cost avoidance efforts to complete this Project at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies.

End of North Visalia Dairy Pilot Project Final Report

I. SOUTH TULARE DAIRY PILOT PROJECT

A. Background and Summary

The South Tulare Dairy Pilot Project consists of the installation of a dairy biomethane Facility located in Tulare. Through this project, SoCalGas installed the necessary equipment and demonstrated injection of renewable natural gas (RNG) into the natural gas pipeline system, achieving the objectives set forth by Senate Bill (SB) 1383 as described in testimony. The Project estimate at completion (EAC) is $13,890,399.

Final Report for South Tulare Dairy Pilot Project

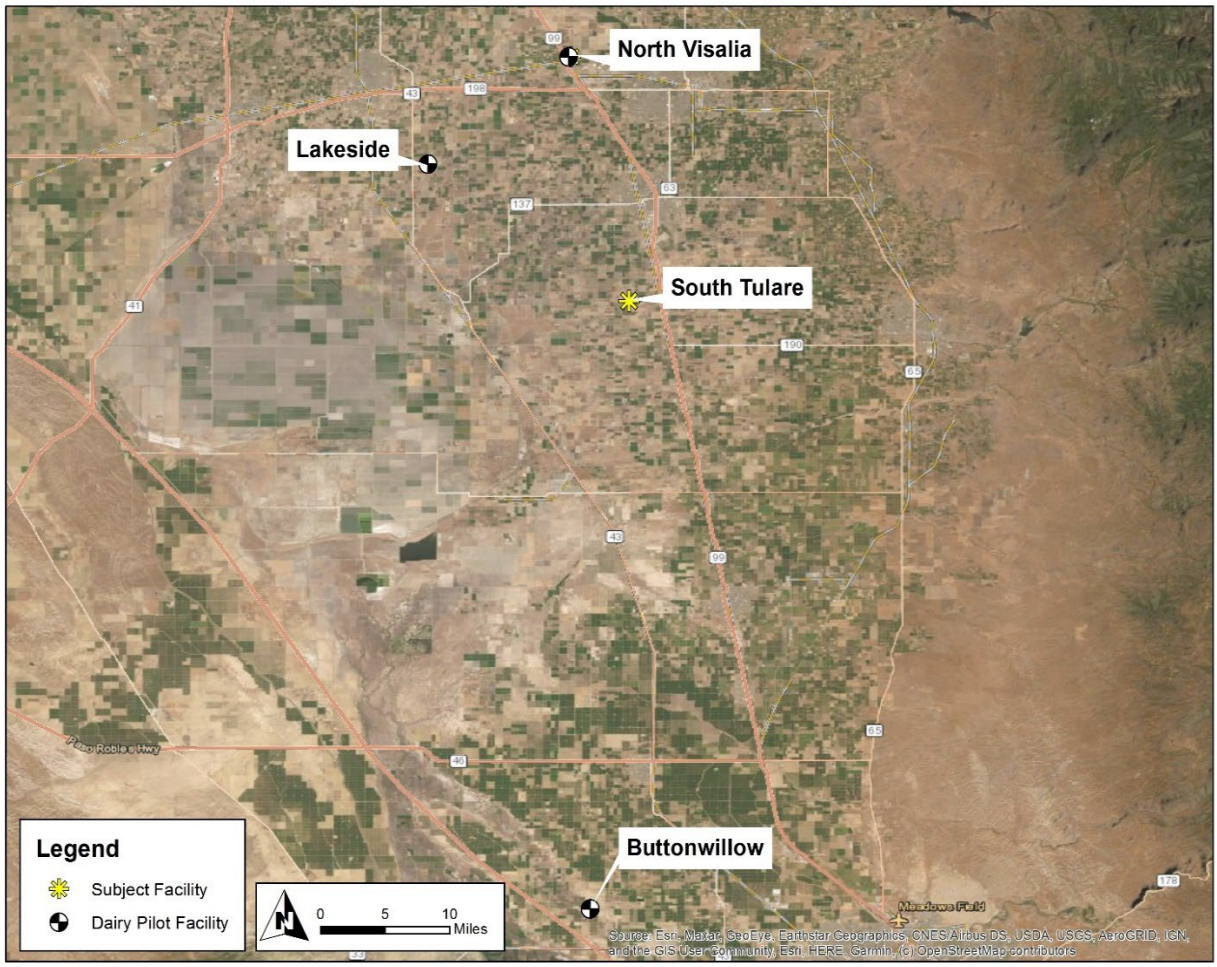
Table 1: General Project Information

South Tulare Dairy Pilot Project			
Location	Tulare County		
Construction Start	08/24/2020		
Construction Finish	09/10/2021		
In-Service Date	03/24/2021		
Facility Requirements			
Pipeline/Lateral Receipt Point	100 feet		
Meter Assembly (MSA)	Yes		
Compressor	Yes		
Power	Yes		
Communication	Yes		
SCADA Panel	Yes		
Equipment Shelter	Yes		
Heat Exchanger	Yes		
Chiller	Yes		
Air Compressor	Yes		
Project Costs ($)	**Capital**	**O&M**	**Total**
Project EAC	13,890,399	-	13,890,399

Final Report for South Tulare Dairy Pilot Project

B. Maps and Images

Figure 1: Satellite Image of Dairy Pilot Project Locations



Final Report for South Tulare Dairy Pilot Project

Figure 2: Satellite Image of South Tulare Dairy Pilot Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Following the enactment of SB 1383, SoCalGas coordinated with external stakeholders to initiate the pilot projects for four gas processing sites with various gas production capacities and pressures. Each of the four sites receive RNG from an upstream processing facility and will require pipeline lateral piping, compression, a point of receipt, and a pipeline extension to interconnect to SoCalGas' pipeline system. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project.

1. Decision (D.) 17-12-004: As a result of the Decision, SoCalGas coordinated with South Tulare to achieve the objectives set forth by SB 1383.
2. Project Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this receipt point would achieve the objectives set forth in SB 1383 as described in testimony. SoCalGas determined it was also necessary to install the required facilities to achieve these objectives. The final project scope consists of the installation of one dairy biomethane Facility and interconnection to Line 7000.
3. Engineering, Design, and Constructability:
   a. The facility captures the methane produced from approximately 47,000 cows.
   b. The pipeline extension consisted of the installation of approximately 100 feet of [redacted] pipeline from the point of receipt and tie-in to the existing [redacted] Line 7000.
   c. The Facility components include an inlet and outlet, liquid and solids removal filter, compressor, gas cooling equipment, odorizing equipment, and metering prior to interconnection with the existing pipeline.
   d. Additional site components include the installation of an instrument air system, electrical and controls systems, fire protection, lubrication oil system, site lighting and other required utility systems.

e. The Project installed a Meter Set Assembly (MSA) to condition and compress RNG for the Project's unique suction and discharge pressures to meet flow rate requirements.

B. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Site Description: The South Tulare Facility is located in Tulare County adjacent to neighboring agricultural fields.
2. Facility Requirements: This site required the installation of the following:
   a. Digester.
   b. Biogas Treatment Facilities and Collection Lines.
   c. Biogas Conditioning and Upgrading Facility.
   d. Pipeline extension to install approximately 100 feet to interconnect to Line 7000.
3. Engineering Assessment:
   a. The Project Team assessed the minimum pipeline flow rate to ensure that the Applicant would produce adequate amounts of RNG during start up.
   b. The Project Team installed additional lines on the compressors to accommodate minimum flow rate.
4. Digester Details: SoCalGas coordinated with the Applicants to build and operate the dairy digester facilities.
5. Pipeline Extension Details: Installation of approximately 100 feet of [redacted] pipeline that begins at the point of receipt (MSA) and ties-in to the existing [redacted] Line 7000.
6. Customer Impact: The Project Team did not anticipate any potential service disruptions to customers during tie-in activities.

7. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.
8. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
9. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
10. Permit Restrictions: The Project Team obtained an encroachment permit from Tulare County for the pipeline extension.
11. Land Use: The Project Team utilized land owned by the Producer as a laydown yard.
12. Traffic Control:
    a. The Project Team closed one roadway lane during the installation of the pipeline extension.
    b. The Project Team closed the entire roadway for one day during the strength test of the Facility.

C. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SoCalGas Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas preliminary cost estimate for construction was [redacted].
2. Mechanical Construction Contractor's Bid *(confidential)*: The Mechanical Construction Contractor's bid was [redacted], which was [redacted] than SoCalGas preliminary cost estimate for construction.

B. Construction Schedule

Table 2: Construction Timeline

Construction Start Date	08/24/2020
Construction Completion Date	09/10/2021
In-Service Date	03/24/2021

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions are anticipating approximately $606,000 in change orders.

1. Constructability Issues: The Project Team identified nine fittings that required replacement, additional fabrication, and pressure testing.
2. Materials Delivery Delays: The Project was delayed for nine days to acquire materials for welding crews.

Final Report for South Tulare Dairy Pilot Project

Figure 3: Crane Preparing to Lift Facility Equipment

Final Report for South Tulare Dairy Pilot Project

Figure 4: Facility Piping

Final Report for South Tulare Dairy Pilot Project

Figure 5: Preparing Piping for Installation

Final Report for South Tulare Dairy Pilot Project

Figure 6: Compressor Equipment

Final Report for South Tulare Dairy Pilot Project

Figure 7: Power Distribution Center

D. Commissioning and Site Restoration

Commissioning activities include restoration of the site, final inspection and placement of the Facility into service, transportation and disposal of hydrotest water and hazardous material, and site demobilization. Closeout activities include development of final drawings, finalization of a reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: This Project was bundled with the North Visalia, Lakeside, and Lakeside Betterment Projects which allowed SoCalGas to save on project costs.
2. Project Design: The Project Team used existing survey data to incorporate into the SoCalGas Facility design.
3. Material Procurement: The Project Team bundled the long lead equipment including separators and compressors.
4. Construction Execution:
   a. Resources were alternated between the Dairy Project sites to avoid standby costs.
   b. Due to the complexities of the facility piping, the Project Team strength tested the Facility piping in place as opposed to testing in the assembly yard.

B. EAC Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded Project EAC is $13,890,399.

Final Report for South Tulare Dairy Pilot Project

Table 3: Estimated and EAC Costs and Variances[1] [2]

Costs ($000)	Authorized (2019)	EAC	Delta Over/(Under)
Engineering	544	1,191	647
Equipment & Materials	4,063	4,689	626
Construction	1,509	4,371	2,861
Company Labor	699	705	6
Other Construction Management	779	1,272	493
Direct Costs	**7,595**	**12,229**	**4,634**
Indirect Costs	**1,500**	**1,662**	**162**
Total Loaded Costs	**9,094**	**13,890**	**4,796**

C. Direct Cost Impacts

The Direct EAC is anticipated to exceed SoCalGas' preliminary estimate by approximately $4,634,000. This variance is attributable to:

1. Engineering:
   a. The original cost estimate did not include any preliminary engineering design work.
   b. Specified equipment sizes were greater than anticipated requiring redesign to accommodate for the changes in equipment.
   c. The Project required additional engineering services to design civil, structural, mechanical, electrical, and instrumentation components of the facility.
   d. The Project required additional electrical and instrumentation work.
2. Equipment & Materials:
   a. The Project required additional instrument air compressor packages.
   b. The Project required additional piping material.
   c. The Project required additional instrumentation and controls equipment.
   d. The Project required larger power distribution centers.
3. Construction:

[1] Values may not add to total due to rounding.
[2] See Reasonableness Review of Dairy Pilot Projects Testimony Project Cost Variances

a. The Project required additional electrical, mechanical, and structural work following the completion of detailed design.
b. The Project required additional third party inspection.
c. The construction duration for each Dairy Pilot project was approximately three times longer than the original estimated durations from the estimate.
d. The conditions encountered during construction and activities to address or mitigate these conditions are anticipating approximately $606,000 in change orders.

4. Company Labor: The Project Team required additional Company Engineering, Project Management, and Construction Management support.
5. Other Construction Management: The Project Team required additional third-party field engineering, inspection teams, third-party non-destructive examination (NDE), and NDE oversight during construction.

V. CONCLUSION

Through this project, SoCalGas installed the necessary equipment and demonstrated injection of RNG into the natural gas pipeline system, achieving the goals set forth by SB 1383. The total loaded Project EAC is $13,890,399.

SoCalGas engaged in prudent cost avoidance efforts to complete this project at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies.

End of South Tulare Dairy Pilot Project Final Report

I. LAKESIDE DAIRY PILOT AND PRESSURE BETTERMENT PROJECT

A. Background and Summary

The Lakeside Dairy Pilot Project consists of the installation of a dairy biomethane facility and the upsizing of approximately 0.947 miles of Supply Line 38-523 from [redacted] to [redacted] to accommodate the increase in capacity. The Lakeside Dairy Pilot and Pressure Betterment Project is located in Hanford. Through this Project, SoCalGas installed the necessary equipment and demonstrated injection of renewable natural gas (RNG) into the natural gas pipeline system, achieving the objectives set forth by Senate Bill (SB) 1383 as described in testimony. The Project estimate at completion (EAC) is $18,503,088.

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

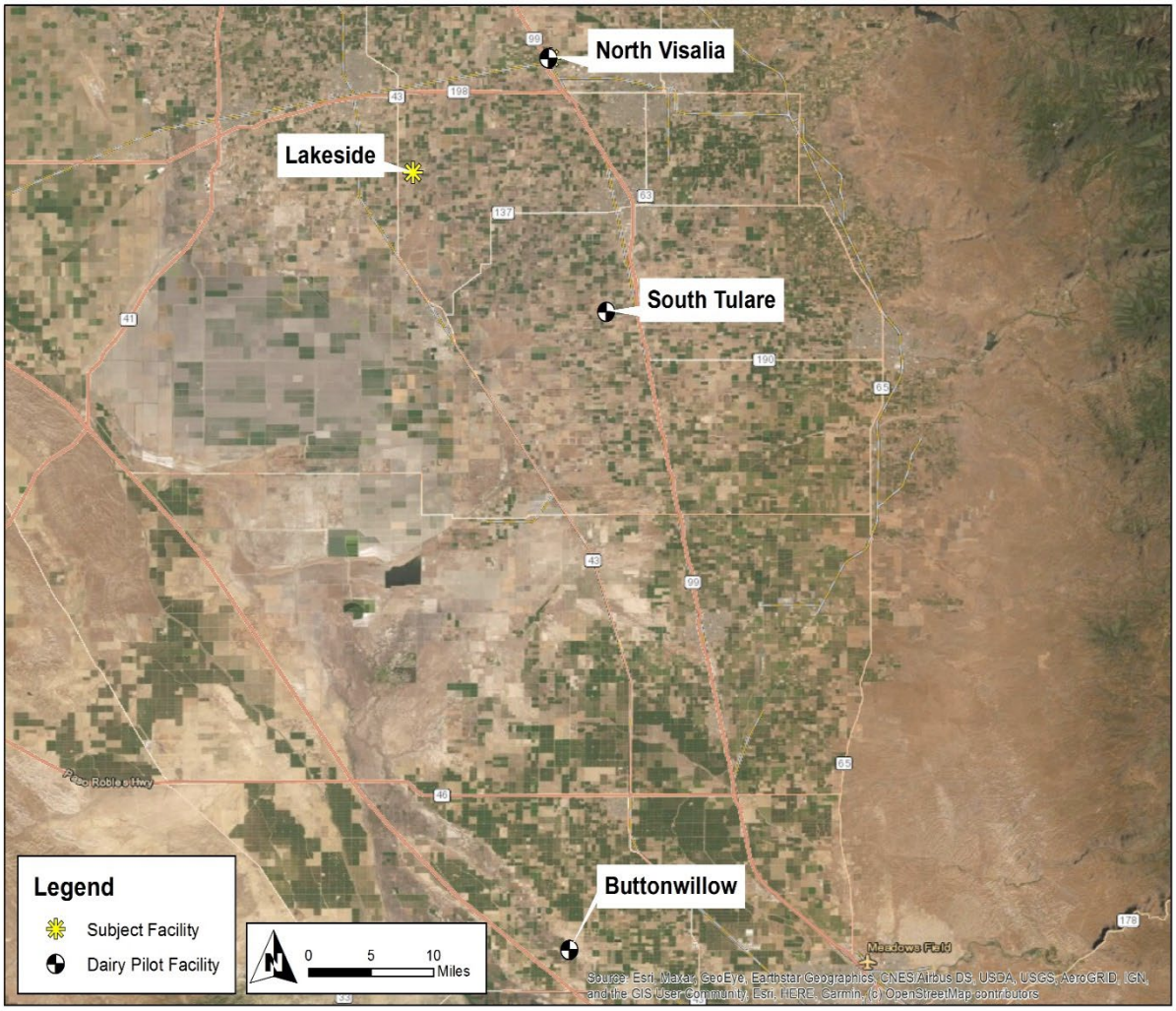
Table 1: General Project Information

Lakeside Dairy Pilot Project			
Location	Kings County		
Construction Start	08/24/2020		
Construction Finish	08/17/2021		
In-Service Date	05/07/2021		
Lakeside Pressure Betterment			
Location	Kings County		
Construction Start	05/10/2021		
Construction Finish	08/27/2021		
In-Service Date	08/09/2021		
Facility Requirements			
Pipeline/Lateral Receipt Point	100 feet		
Meter Assembly (MSA)	Yes		
Compressor	Yes		
Power	Yes		
Communication	Yes		
SCADA Panel	Yes		
Equipment Shelter	Yes		
Project Costs ($)	**Capital**	**O&M**	**Total**
Project EAC	18,503,088	-	18,503,088

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

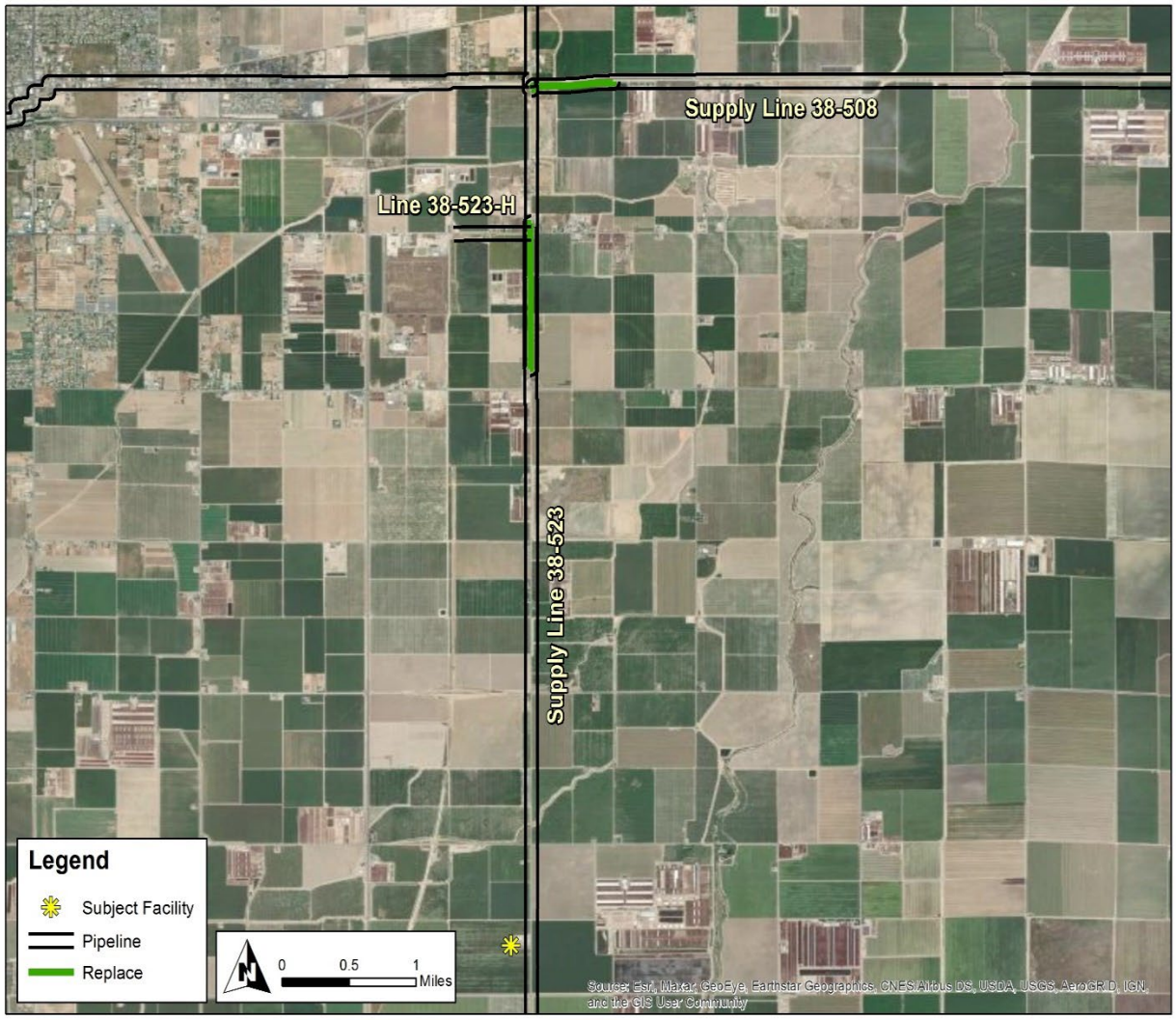
B. Maps and Images

Figure 1: Satellite Image of Dairy Pilot Project Locations



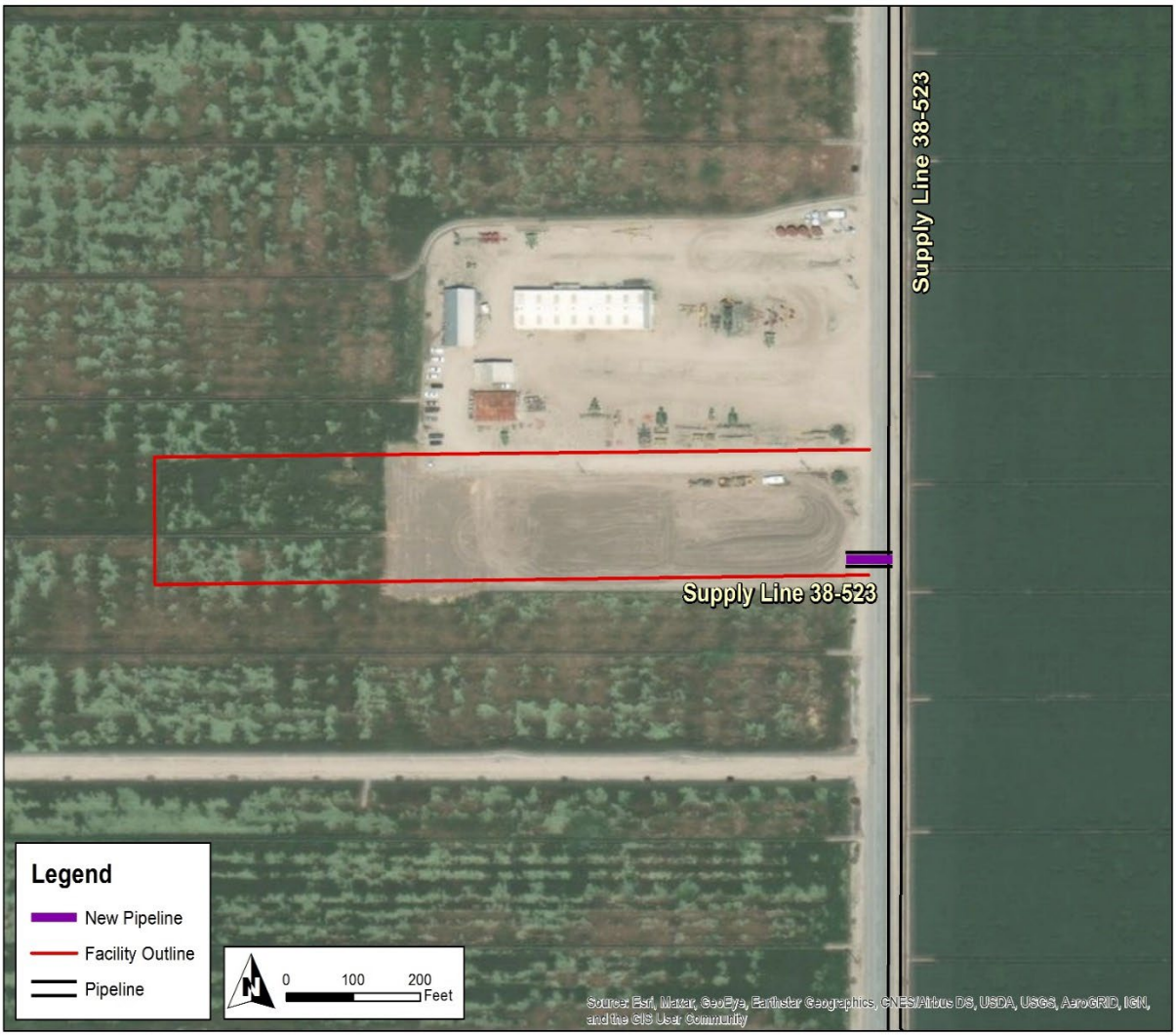
Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Figure 2: Satellite Image of Pressure Betterment Dairy Pilot Project



Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Figure 3: Satellite Image of Lakeside Dairy Pilot Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Following the enactment of SB 1383, SoCalGas coordinated with external stakeholders to initiate the pilot projects for four gas processing sites with various gas production capacities and pressures. Each of the four sites receive RNG from an upstream processing facility and will require pipeline lateral piping, compression, a point of receipt, and a pipeline extension to interconnect to SoCalGas' pipeline system. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project.

1. Decision (D.) 17-12-004: As a result of the Decision, SoCalGas coordinated with Lakeside to achieve the objectives set forth by SB 1383.
2. Project Scope: Upon Project initiation, SoCalGas reviewed the conceptual Project scope and determined that this receipt point would achieve the objectives set forth in SB 1383 as described in testimony. SoCalGas determined it was also necessary to install the required facilities and upsize a portion of Supply Line 38-523 to accommodate for the increase in volume to achieve these objectives. The final project scope consists of the installation of one dairy biomethane Facility and interconnection to Supply Line 38-523. Due to additional volume the Lakeside Pressure Betterment Project was required to replace and upsize Supply Line 38-523 and Supply Line 38-508 from [redacted] to [redacted]
3. Engineering, Design, and Constructability:
   a. The facility captures the methane produced from approximately 62,000 cows.
   b. The pipeline extension consisted of the installation of approximately 100 feet of [redacted] pipeline from the existing [redacted] Supply Line 38-523.

c. The pressure betterment consisted of the replacement of approximately 0.966 miles of existing [redacted] pipeline for Supply Line 38-523 with [redacted] pipeline, and the installation of 0.522 miles of [redacted] pipeline to connect Supply Line 38-523 to Supply Line 38-508 East.
d. The Facility components include an inlet and outlet, liquid and solids removal filter, compressor, gas cooling equipment, odorizing equipment, and metering prior to interconnection with the existing pipeline.
e. Additional site components include the installation of an instrument air system, electrical and controls systems, fire protection, lubrication oil system, site lighting and other required utility systems.

B. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Site Description: The Lakeside Dairy Pilot Project is located in Kings County adjacent to neighboring agricultural fields.
2. Facility Requirements: This site required the installation of the following:
   a. Digester.
   b. Biogas Treatment Facilities and Collection Lines.
   c. Biogas Conditioning and Upgrading Facility.
   d. Pipeline extension to install approximately 100 feet to interconnect to Supply Line 38-523.
3. Engineering Assessment: The Project Team accommodated for the increase in volume by upsizing Supply Line 38-523 and Supply Line 38-508 from [redacted] to [redacted]
4. Digester Details: SoCalGas coordinated with the Applicant to build and operate the dairy digester facilities.

5. Pipeline Extension Details:
   a. Installation of approximately 100 feet of [redacted] pipeline that begins at the point of receipt (MSA) and ties-in to the existing [redacted] Supply Line 38-523.
   b. Installation of approximately 0.522 miles of [redacted] pipeline to connect Supply Line 38-523 with Supply Line 38-508 East
6. Customer Impact: The Project Team did not anticipate any potential service disruptions to customers during tie-in activities.
7. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.
8. Environmental: The Project Team required a daily biological monitor and dust control monitor on site
9. Permit Restrictions:
   a. The Project Team obtained a driveway approach and encroachment permit from Kings County.
   b. The Project Team obtained a Dust Control permit from San Joaquin Valley and a Caltrans permit for the Supply Line 38-508 tie-in locations.
10. Land Use: The Project Team obtained a temporary right of entry (TRE) for a laydown yard.
11. Traffic Control:
   a. The Project Team closed one roadway lane during the installation of the pipeline extension.
   b. The Project Team closed the entire roadway for one day during the strength test of the Facility.

C. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this Project.

1. SoCalGas Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Bid *(confidential)*: The Mechanical Construction Contractor's bid was [redacted], which was [redacted] than SoCalGas preliminary cost estimate for construction.

B. Construction Schedule

Table 2: Construction Timeline

Dairy Pilot Project	
Construction Start Date	08/24/2020
Construction Completion Date	08/17/2021
In-Service Date	05/07/2021
Lakeside Pressure Betterment	
Construction Start Date	05/10/2021
Construction Completion Date	08/27/2021
In-Service Date	08/09/2021

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions are anticipating approximately $1,144,000 in change orders.

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

1. Environmental: The Project required full time dust control monitoring for the duration of construction.
2. Field Design Changes: The Project Team redesigned duct banks within the station to the roadway crossing to safely complete future maintenance activities.
3. Schedule Delay: The Project Team identified a [redacted] valve that would require replacement before installation resulting in a three day delay to receive the replacement valve.
4. Substructures: The Project Team relocated the alignment of Supply Line 38-523 to avoid the existing communication lines.

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Figure 4: Placing Equipment into Lakeside Facility

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

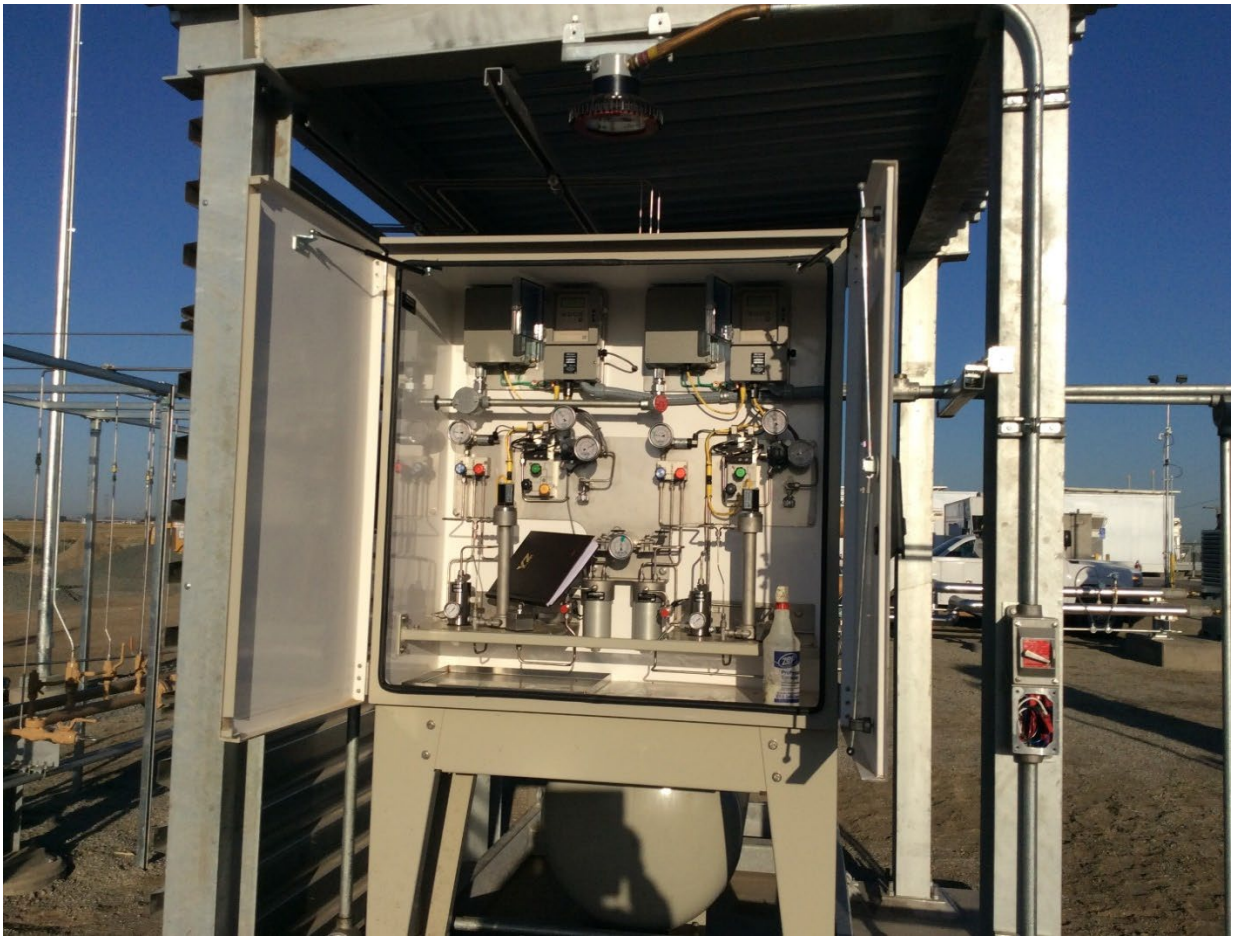
Figure 5: Lakeside Pressure Betterment Piping

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Figure 6: Facility Equipment and Piping

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Figure 7: Facility Automation Controller



Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Figure 8: Installing Support Beams for Equipment

D. Commissioning and Site Restoration

Commissioning activities include restoration of the site, final inspection, and placement of the Facility into service, transportation, and disposal of hydrotest water and hazardous material, and site demobilization. Closeout activities include development of final drawings, finalization of a reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this Project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the Project plan and design. Specific examples of cost avoidance actions taken on this Project were:

1. Bundling of Projects: This Project was bundled with the North Visalia and South Tulare Dairy Projects which allowed SoCalGas to save on project costs.
2. Project Design: The Project Team used existing survey data to incorporate into the SoCal Gas Facility design.
3. Material Procurement: The Project Team bundled the long lead equipment including separators and compressors.
4. Construction Execution:
   a. Resources were alternated between the Dairy Project sites to avoid standby costs.
   b. Due to the complexities of the facility piping, the Project Team strength tested the Facility piping in place as opposed to testing in the assembly yard.

B. EAC Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded Project EAC is $18,503,088.

Final Report for Lakeside Dairy Pilot and Pressure Betterment Project

Table 3: Estimated and EAC Costs and Variances[1] [2]

Costs ($000)	Authorized (2019)	EAC	Delta Over/(Under)
Engineering	683	2,290	1,607
Equipment & Materials	3,127	3,598	471
Construction	2,813	6,204	3,391
Company Labor	704	1,095	391
Other Construction Management	1,284	2,311	1,027
Direct Costs	**8,611**	**15,498**	**6,888**
Indirect Costs	**2,233**	**3,005**	**772**
Total Loaded Costs	**10,843**	**18,503**	**7,660**

C. Direct Cost Impacts

The Direct EAC is anticipated to exceed SoCalGas' preliminary estimate by approximately $6,888,000. This variance is attributable to:

1. Engineering:
   a. The original cost estimate did not include any preliminary engineering design work.
   b. Specified equipment sizes were greater than anticipated requiring redesign to accommodate for the changes in equipment.
   c. The Project required additional engineering services to design civil, structural, mechanical, electrical, and instrumentation components of the facility.
   d. The Project required additional electrical and instrumentation work.
2. Equipment & Materials:
   a. The Project required additional instrument air compressor packages.
   b. The Project required additional piping material.
   c. The Project required additional instrumentation and controls equipment.
   d. The Project required larger power distribution centers.

[1] Values may not add to total due to rounding.
[2] See Reasonableness Review of Dairy Pilot Projects Testimony Project Cost Variances

3. Construction:
   a. The Project required additional electrical, mechanical, and structural work following the completion of detailed design.
   b. The Project required additional third party inspection.
   c. The construction duration for each Dairy Pilot project was approximately three times longer than the original estimated durations from the estimate.
   d. The conditions encountered during construction and activities to address or mitigate these conditions are anticipating approximately $1,144,000 in change orders.
4. Company Labor: The Project Team required additional Company Engineering, Project Management, and Construction Management support.
5. Other Construction Management: The Project Team required additional third-party field engineering, inspection teams, third-party non-destructive examination (NDE), and NDE oversight during construction.

V. CONCLUSION

The Lakeside Dairy Pilot and Pressure Betterment Project consisted of the installation of a dairy biomethane facility and the upsizing of Supply Line 38-523 to accommodate for the increase in capacity. Through this Project, SoCalGas installed the necessary equipment and demonstrated injection of RNG into the natural gas pipeline system, achieving the goals set forth by SB 1383. The total loaded Project EAC is $18,503,088.

SoCalGas engaged in prudent cost avoidance efforts to complete this Project at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies.

End of Lakeside Dairy Pilot and Pressure Betterment Project Final Report

I. BUTTONWILLOW DAIRY PILOT PROJECT

A. Background and Summary

The Buttonwillow Dairy Pilot Project consists of the installation of a dairy biomethane Facility located in Buttonwillow. Through this project, SoCalGas installed the necessary equipment and demonstrated injection of renewable natural gas (RNG) into the natural gas pipeline system, achieving the objectives set forth by Senate Bill (SB) 1383 as described in testimony. The Project estimate at completion (EAC) is $12,507,688.

Final Report for Buttonwillow Dairy Pilot Project

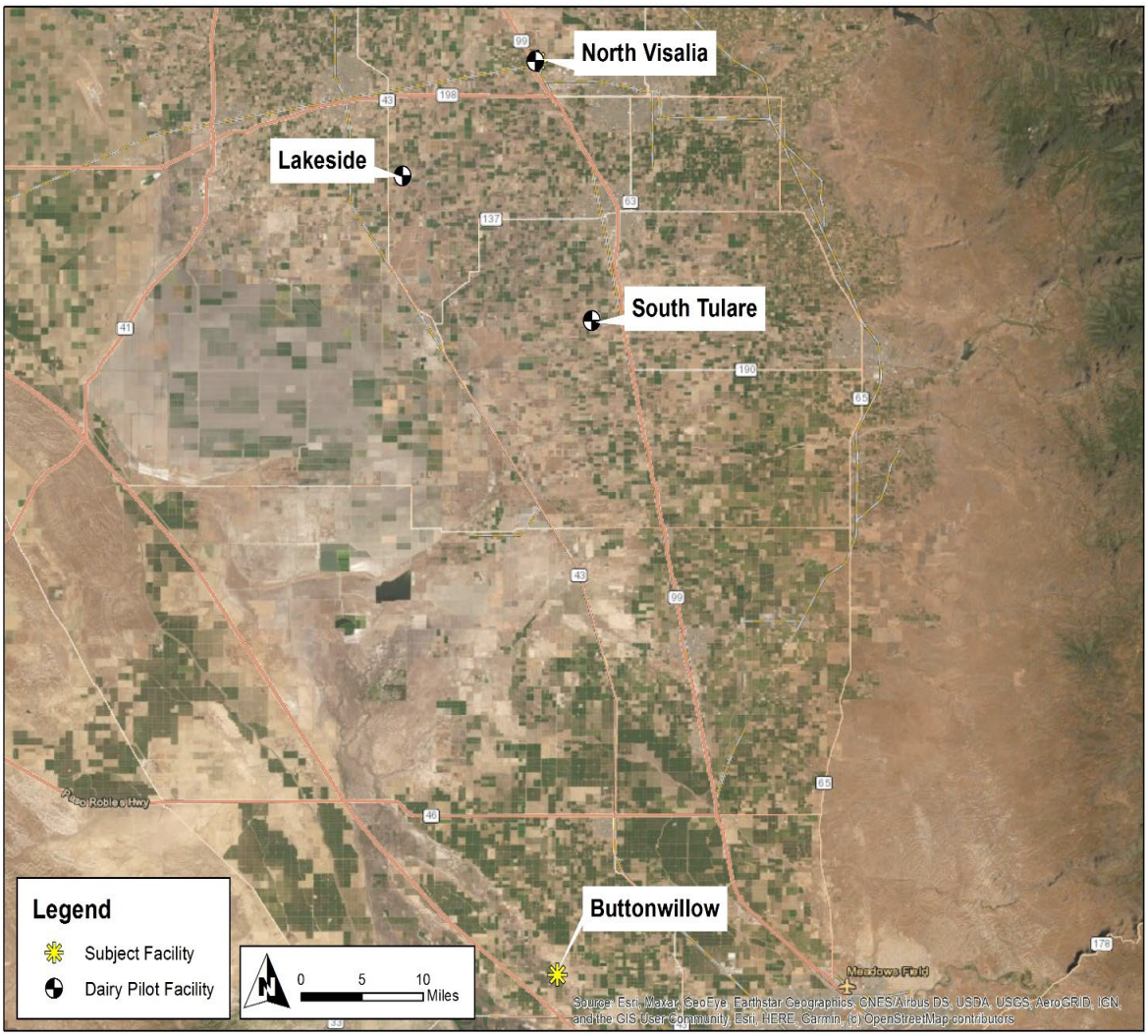
Table 1: General Project Information

Buttonwillow Dairy Pilot Project			
Location	Kern County		
Construction Start	05/24/2021		
Construction Finish	12/10/2021		
In-Service Date	11/11/2021		
Facility Requirements			
Pipeline/Lateral Reciept Point	0.416 miles		
Meter Assembly (MSA)	Yes		
Compressor	Yes		
Power	Yes		
Communication	Yes		
SCADA Panel	Yes		
Equipment Shelter	Yes		
Project Costs ($)	**Capital**	**O&M**	**Total**
Project EAC	12,507,688	-	12,507,688

Final Report for Buttonwillow Dairy Pilot Project

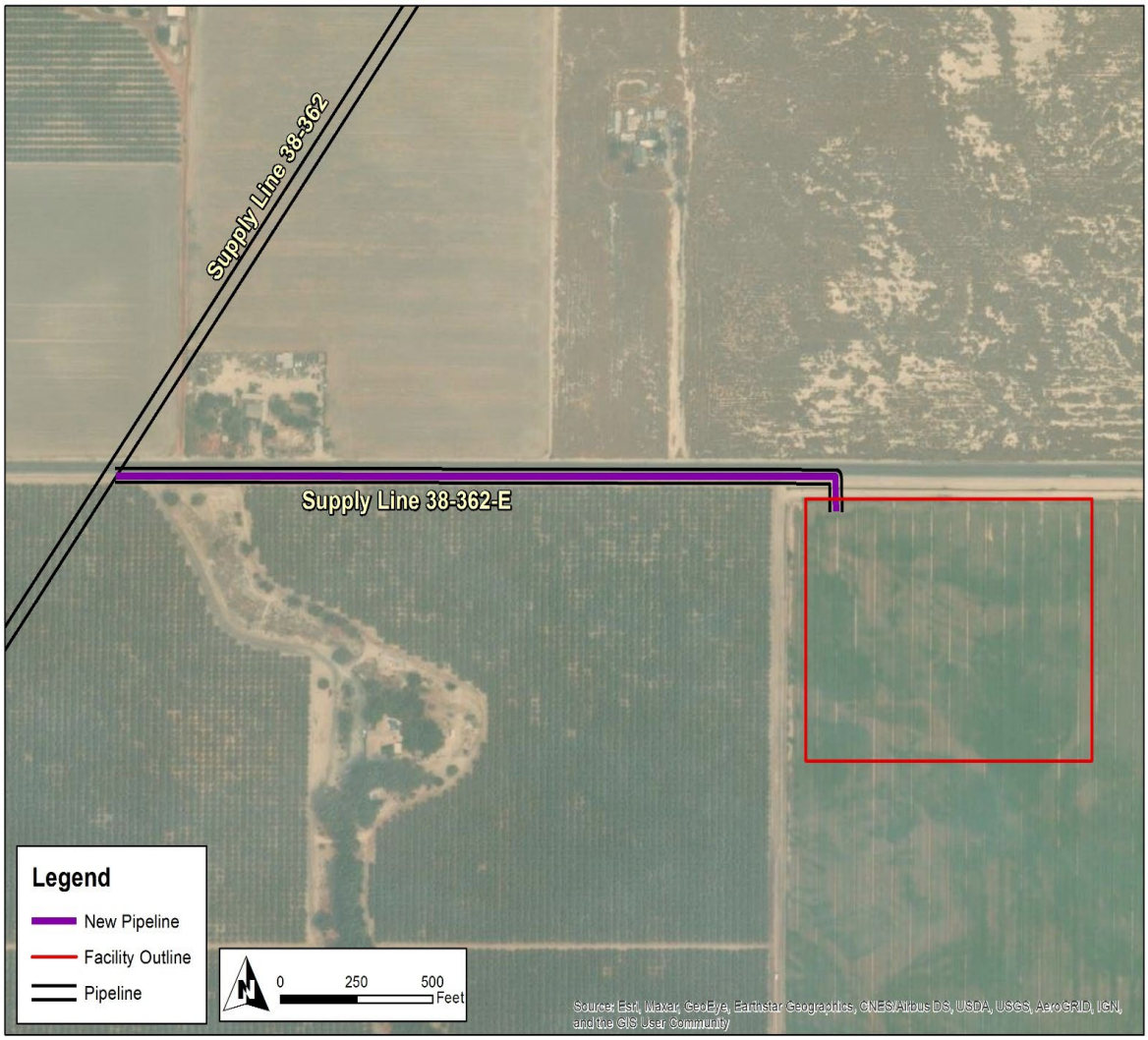
B. Maps and Images

Figure 1: Satellite Image of Dairy Pilot Project Locations



Final Report for Buttonwillow Dairy Pilot Project

Figure 2: Satellite Image of Buttonwillow Dairy Pilot Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

Following the enactment of SB 1383, SoCalGas coordinated with external stakeholders to initiate the pilot projects for four gas processing sites with various gas production capacities and pressures. Each of the four sites receive RNG from an upstream processing facility and will require pipeline lateral piping, compression, a point of receipt, and a pipeline extension to interconnect to SoCalGas' pipeline system. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project.

1. Decision (D.) 17-12-004: As a result of the Decision, SoCalGas coordinated with Buttonwillow to achieve the objectives set forth by SB 1383.
2. Project Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this receipt point would achieve the objectives set forth in SB 1383 as described in testimony. SoCalGas determined it was also necessary to install the required facilities to achieve these objectives. The final project scope consists of the installation of one dairy biomethane Facility and interconnection to the natural gas pipeline system.
3. Engineering, Design, and Constructability:
   a. The facility captures the methane produced from approximately 19,000 cows.
   b. The pipeline extension consisted of the installation of approximately 0.416 miles of [redacted] pipeline from the point of receipt and tie-in to the existing [redacted] Supply Line 38-362.
   c. The Facility components include an inlet and outlet, liquid and solids removal filter, compressor, gas cooling equipment, odorizing equipment, and metering prior to interconnection with the existing pipeline.
   d. Additional site components include the installation of an instrument air system, electrical and controls systems, fire protection, lubrication oil system, site lighting and other required utility systems.

e. The Project installed a Meter Set Assembly (MSA) to condition and compress RNG for the Project's unique suction and discharge pressures to meet flow rate requirements.

B. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Site Description: The Buttonwillow Facility is located in Kern County adjacent to neighboring agricultural fields.
2. Facility Requirements: This site required the installation of the following:
   a. Digester.
   b. Biogas Treatment Facilities and Collection Lines.
   c. Biogas Conditioning and Upgrading Facility.
   d. Pipeline extension to install approximately 0.416 miles to interconnect to Supply Line 38-362.
3. Engineering Assessment:
   a. The Project Team assessed the minimum pipeline flow rate to ensure that the Applicant would produce adequate amounts of RNG during start up.
   b. The Project Team installed additional lines on the compressors to accommodate minimum flow rate.
4. Digester Details: SoCalGas coordinated with the Applicant to build and operate the dairy digester facilities.
5. Pipeline Extension Details: Installation of approximately 0.416 miles of [redacted] pipeline that begins at the point of receipt (MSA) and ties-in to the existing [redacted] Supply Line 38-362.

6. Customer Impact: The Project Team did not anticipate any potential service disruptions to customers during tie-in activities.
7. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.
8. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
9. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
10. Permit Restrictions: The Project Team obtained an encroachment permit from Kern County for the pipeline extension.
11. Land Use: The Project Team utilized land owned by the Producer as a laydown yard.
12. Traffic Control:
    a. The Project Team closed one roadway lane during the installation of the pipeline extension.
    b. The Project Team closed the entire roadway for one day during the strength test of the Facility.

C. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SoCalGas Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Bid *(confidential)*: The Mechanical Construction Contractor's bid was [redacted] which was [redacted] than SoCalGas preliminary cost estimate for construction.

B. Construction Schedule

Table 2: Construction Timeline

Construction Start Date	05/24/2021
Construction Completion Date	12/10/2021
In-Service Date	11/11/2021

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions are anticipating approximately $550,000 in change orders.

1. Schedule Delay: The Project was delayed for two days to acquire environmental clearance.

2. Substructures: The Project Team encountered a storm drain that was not previously identified requiring the Project Team to align under the storm drain.
3. Work Hours: The Project Team required additional hours to complete a nitrogen pressure test.
4. Field Design Changes: Additional instrumentation work was required to complete the facility.

Final Report for Buttonwillow Dairy Pilot Project

Figure 3: Buttonwillow Pipeline Extension

Final Report for Buttonwillow Dairy Pilot Project

Figure 4: Preparing Piping for Installation

Final Report for Buttonwillow Dairy Pilot Project

Figure 5: Installing Conduit at Buttonwillow Facility

D. Commissioning and Site Restoration

Commissioning activities include restoration of the site, final inspection and placement of the facility into service, transportation and disposal of hydrotest water and hazardous material, and site demobilization. Closeout activities include development of final drawings, finalization of a reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Project Design: The Project Team used existing survey data to incorporate into the SoCalGas Facility design.
2. Material Procurement: The Project Team bundled the long lead equipment such as separators and compressors.
3. Construction Execution: Due to the complexities of the facility piping, The Project Team strength tested the Facility piping in place as opposed to testing in the assembly yard.

B. EAC Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded Project EAC is $12,507,688.

Final Report for Buttonwillow Dairy Pilot Project

Table 3: Estimated and EAC Costs and Variances[1] [2]

Costs ($000)	Authorized (2019)	EAC	Delta Over/(Under)
Engineering	524	1,034	510
Equipment & Materials	2,907	2,817	(90)
Construction	1,890	4,301	2,411
Company Labor	652	838	186
Other Construction Management	968	1,745	777
Direct Costs	**6,941**	**10,735**	**3,794**
Indirect Costs	**1,363**	**1,773**	**410**
Total Loaded Costs	**8,304**	**12,508**	**4,204**

C. Direct Cost Impacts

The Direct EAC is anticipated to exceed SoCalGas' preliminary estimate by approximately $3,794,000. This variance is attributable to:

1. Engineering:
   a. The original cost estimate did not include any preliminary engineering design work.
   b. Specified equipment sizes were greater than anticipated requiring redesign to accommodate for the changes in equipment.
   c. The Project required additional engineering services to design civil, structural, mechanical, electrical, and instrumentation components of the facility.
   d. The Project required additional electrical and instrumentation work.
2. Equipment & Materials:
   a. The Project required additional instrument air compressor packages.
   b. The Project required additional piping material.
   c. The Project required additional instrumentation and controls equipment.
   d. The Project required larger power distribution centers.

[1] Values may not add to total due to rounding.
[2] See Reasonableness Review of Dairy Pilot Projects Testimony Project Cost Variances

3. Construction:
   a. The Project required additional electrical, mechanical, and structural work following the completion of detailed design.
   b. The Project required additional third party inspection.
   c. The construction duration for each Dairy Pilot project was approximately three times longer than the original estimated durations from the estimate.
   d. The conditions encountered during construction and activities to address or mitigate these conditions are anticipating approximately $550,000 in change orders.
4. Company Labor: The Project Team required additional Company Engineering, Project Management, and Construction Management support.
5. Other Construction Management: The Project Team required additional third-party field engineering, inspection teams, third-party non-destructive examination (NDE), and NDE oversight during construction.

V. CONCLUSION

Through this project, SoCalGas installed the necessary equipment and demonstrated injection of RNG into the natural gas pipeline system, achieving the goals set forth by SB 1383. The total loaded Project EAC is $12,507,688.

SoCalGas engaged in prudent cost avoidance efforts to complete this project at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies.

End of Buttonwillow Dairy Pilot Project Final Report