TOWN OF PERALTA

TOWN OF PERALTA WASTEWATER COLLECTION SYSTEM

PRELIMINARY ENGINEERING REPORT

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The technical material and data contained in the specifications were prepared under the supervision and direction of the undersigned, whose seal as a Professional Engineer, licensed to practice in the State of New Mexico, is affixed below.

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All questions about the meaning or intent of these documents shall be submitted only to the Engineer of Record, stated above, in writing.

TOWN OF PERALTA, NEW MEXICO
WASTEWATER COLLECTION SYSTEM

PRELIMINARY ENGINEERING REPORT

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1.0 PROJECT BACKGROUND AND PLANNING

In 2004, the Model Community Drought Preparedness and Water Conservation Project were undertaken by a group of state agencies. The project identified a priority for regionalizing water and wastewater collection and treatment in several areas in New Mexico that had high densities of domestic wells and septic tanks. The legislature provided funding for a pilot project in Valencia County which culminated with a report written by CDM entitled *Valencia County Regional Integrated Water and Wastewater Master Plan, Phase 3, July 31, 2009* (*2009 Master Plan*). A series of alternatives for water and wastewater systems were identified and evaluated based on a number of criteria and projected costs. This resulted in a top priority for a sewer collection project at Peralta to form a regional system through connection to the existing Bosque Farms sewer and wastewater treatment plant (WWTP).

Currently, Peralta has some 1,400 platted lots served by approximately 1,200 private septic tank systems. Water is provided by private domestic wells, many of which are shallow (35 to less than 200 feet deep) and supplied by the basin-fill aquifer. This shallow groundwater is undoubtedly contaminated by septic tank effluent in many areas. Protection of groundwater quality and the opportunity to form a regional system were the foremost needs identified in the *2009 Master Plan* for the new Peralta sewer system.

In 2012, CDM Smith prepared a Draft Preliminary Engineering Report (*2012 Draft PER*) for the proposed Peralta sewer system. The *2012 Draft PER* discussed and evaluated several alternatives, including conventional gravity sewers, vacuum sewers, a septic tank effluent pumping (STEP) system, and a low pressure grinder (LPG) pump system. Based on a comparison and ranking of the alternatives, the LPG system, which is the system used in neighboring Bosque Farms, was selected as the best alternative. The New Mexico Environment Department (NMED) concurred with this recommendation, and Peralta agreed with the conclusion to pursue the development of the LPG system.

The *2012 Draft PER* was not finalized by CDM Smith. In 2013 Molzen Corbin (MC) was selected to complete the PER for approval by Peralta and NMED as a basis for moving forward

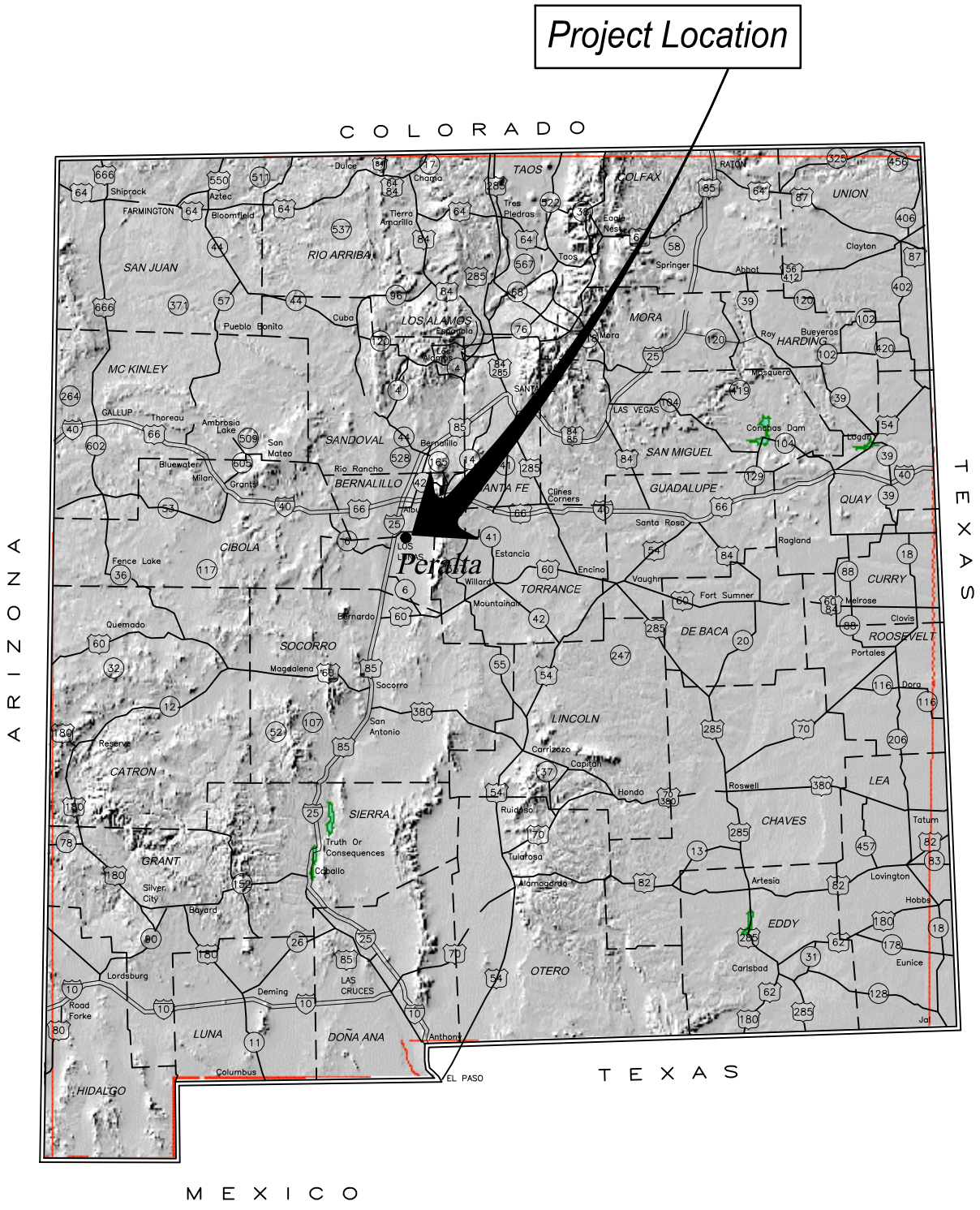
with design and construction of the LPG sewer system. For the purposes of this *2014 PER*, the three non-selected alternatives evaluated in the *2012 Draft PER* are briefly described and discussed, rather than re-evaluated in detail. Further details of the evaluation can be found in the *2012 Draft PER*.

This *2014 PER* is formatted in accordance with the recently published RUS Bulletin 1780-2 guidelines, which are updated from the format used in the *2012 Draft PER*.

1.1 Project Location

Peralta is located in Valencia County, New Mexico as shown in the general map in Figure 1-1. The more detailed map provided in Figure 1-2 shows that Peralta is bounded on the north by the Village of Bosque Farms, Isleta Pueblo to the east, the Village of Los Lunas to the south, and the Rio Grande on the west. State highway NM-47 runs north/south through the Town. Chughole Lane is the main access road connecting NM-47 to the Bosque Farms WWTP, located on the northwestern side of the project area at an elevation of approximately 4,865 feet. As indicated by the spot elevations in Figure 1-2, the majority of Peralta encompasses a flat valley floor that slopes mildly from northeast to southwest. Foothills bound the far eastern side of the Town. Elevations range from about 4,860 to 4,890 feet.

Historically, Peralta has been predominantly an agricultural area served by several irrigation canals, laterals, and drains operated by the Middle Rio Grande Conservancy District (MRGCD). The seasonal nature of irrigation causes the shallow water table to rise and fall by several feet depending on the season and location and proximity to the MRGCD facilities. Over the last several decades, Peralta has become more residential with many residents commuting each day to Albuquerque or other regional businesses for work.



Wastewater Collection System PER - Town of Peralta, New Mexico

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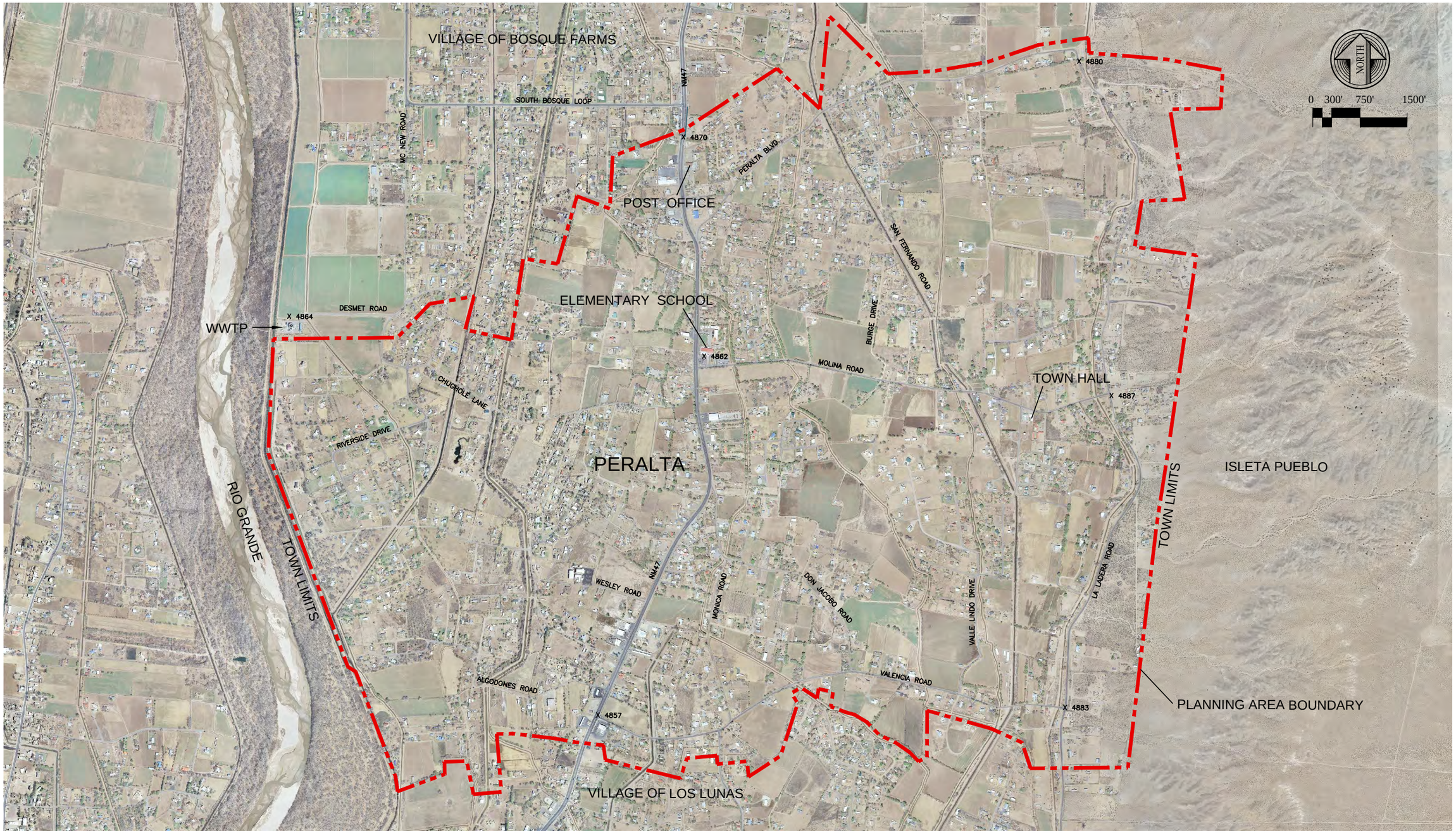
Project Location Map
Figure 1-1



Wastewater Collection System PER - Town of Peralta, New Mexico

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Figure 1-2
Planning Area Map

1.2 Environmental Resources Present

The *2009 Master Plan* identified the major land uses in Peralta as of 2004. These are summarized in Table 1-1. Only minor changes have occurred over the subsequent nine years through 2013.

An Environmental Information Document (EID) has yet to be completed for the project area. There are two designated historic sites in Peralta; however, there are no national landmarks or monuments, Native American lands, or wilderness areas within the Planning Area. Minor areas of potential southwestern willow flycatcher habitat could be affected (*2012 Draft PER*, p. 5-2) which may require mitigation during construction. An EID will be completed and submitted under separate cover. That document will address the flycatcher issue as well as any others.

TABLE 1-1

SUMMARY OF LAND USES IN TOWN OF PERALTA

Land Use	Percentage
Irrigated Agriculture	39
Dry/Range Agriculture	10
Residential	40
Commercial	2
Other Urban Uses	1
Riparian or Natural Drainage	8

1.3 Population Trends

Unlike nearby Los Lunas which has experienced a business and residential building boom, Peralta has not grown substantially in the last decade, and because of policies to limit growth, is not expected to grow significantly in the coming decades. Table 1-2 summarizes the population projections developed in Section 2.3 of the *2012 Draft PER*, updated by MC to reflect the 2010 census results. Peralta was assumed to grow at an average annual rate of 0.7 percent from 2004 to 2030. The growth of Valencia County over that time period was estimated to be 2.4 percent.

TABLE 1-2

POPULATION ESTIMATES AND PROJECTIONS FOR PERALTA

Year	Population
2004	3,537
2010	3,660
2030 (low)	3,886
2030 (high)	4,208
2040 (low)	4,004
2040 (high)	4,511

Source: 2012 Draft PER, Appendix 2-1
Updated by MC to reflect 2010 census

The 2010 census population for Peralta indicated a growth rate of about 0.7 percent between 2004 and 2010. The census identified 1,370 housing units (111 of which were vacant). Average occupancy per residential dwelling was 2.67 (http://www.zip-codes.com/city/nm-peralta-2010-census.asp).

Low and high growth rates (0.3 percent and 0.7 percent) were applied to the 2010 census population to provide an estimated range in the years 2030 and 2040 for the Town. The Town's present development policies suggest that the projected low population of about 4,000 is most likely in the year 2040.

1.4 Community Engagement

The construction of a sewer collection system will affect residents of Peralta in several ways, including short-term construction impacts and longer-term financial impacts. Residents currently utilize private on-site septic systems for disposal of wastewater and obtain potable water from private domestic wells. As such, the Town does not have a system for billing residents, and residents are not accustomed to paying a monthly sewer bill. Costs to residents for the LPG system will be considerably higher than those currently incurred for septic tank operation. The Town plans to undertake public education and involvement activities as soon as

possible during planning and design of the proposed sewer system to address concerns about costs and minimize resistance during hook up and sewer construction.

Public outreach meetings and presentations are planned for early 2014, at which time public comments will be sought. The impacts of septic tanks on the basin-fill aquifer will be highlighted to increase public awareness about groundwater contamination and appeal of the connection to the Bosque Farms WWTP using a LPG system.

1.5 Purpose and Scope

This *2014 PER* summarizes the current Peralta wastewater disposal system (septic tanks and leach fields), the need for a new sewer collection system, and the layout, phasing, and costs for that system. As mentioned previously, the layout, phasing, costs, and financing of the LPG system are the focus of this PER

Besides Section 1, the document includes the following sections:

Section 2 – Existing Facilities: A description of the septic tank systems and the Bosque Farms WWTP facilities.
Section 3 – Need for Project: Discussion on the reasons the project is required and valuable.
Section 4 – Alternatives Considered: A brief overview of the four alternatives evaluated in the 2012 Draft PER and the ranking system proposed by CDM Smith.
Section 5 – Selection of an Alternative: Comparisons of the life cycle cost analysis and non-monetary factors used to select an alternative.
Section 6 – Proposed Project: Presentation of phasing concept for selected alternative. A summary of preliminary design and system layout, schedule, permit requirements, and financing of the project.
Section 7 – Conclusions and Recommendations: An overview of key considerations, additional recommendations, and suggestions for implementing a successful project, including special coordination with NMDOT, development of a Memorandum of Understanding (MOU) with Bosque Farms, and establishment of a sewer ordinance.

2.0 EXISTING FACILITIES

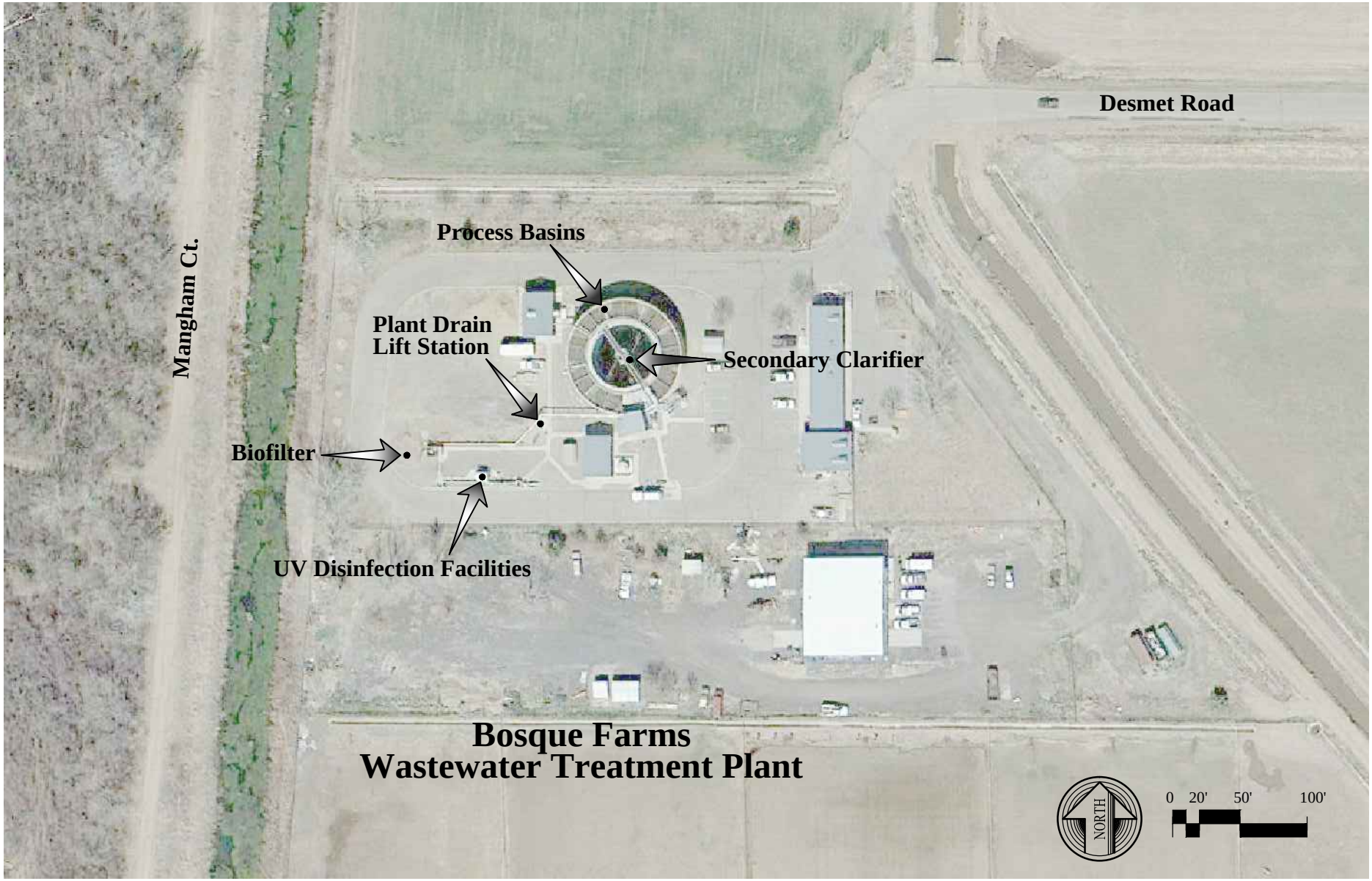
As previously discussed, Peralta is served by individual domestic wells and septic systems and has no centralized water or sewer collection system. The proposed connection of Peralta to the Bosque Farms sewer system and WWTP would establish a regional system in keeping with the overarching *2009 Master Plan* for Valencia County. As explained in the *2012 Draft PER*, the exact number of septic systems in Peralta is unclear, as there are known to be a number of older, undocumented systems not in the NMED database.

2.1 Location Map

No collection system or municipal treatment facilities currently exist in Peralta. However, the Bosque Farms WWTP is located west of Peralta adjacent to the Rio Grande (refer to Figure 1-2), and is illustrated in greater detail in Figure 2-1. The existing Bosque Farms LPG collection system conveys sewage generated by approximately 1,400 residential and business connections to the WWTP. The proposed connection of the Peralta LPG system would occur in phases, but would eventually double the number of connections to the WWTP by about 2040.

2.2 History

State septic tank permits in Peralta date as far back as 1973. These older concrete tanks are subject to cracking and leaking, and leach fields can become clogged and ineffective, particularly with the high groundwater levels prevalent in the area. Presently, approximately 1,200 septic systems are believed to be in operation at Peralta. Although these systems have reasonable separation in most cases, the presence of high groundwater (4 to 10 feet), and the age of some systems, has undoubtedly led to pollution of the local shallow aquifer in many locales. As described in more detail in Section 3, such problems pose a threat to the water quality of domestic wells at Peralta and nearby Los Lunas, and to the deeper municipal supply wells at Bosque Farms – one of which (Well 2) is located on the west side of NM 47 several thousand feet north of the Peralta boundary.



Wastewater Collection System PER - Peralta, New Mexico

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FIGURE 2-1

Bosque Farms WWTP Configuration

The Bosque Farms WWTP was constructed in 1998, and features an Enviroquip package plant, capable of treating up to 0.5 million gallons per day (MGD) wastewater. As seen in Figure 2-1, the concentric packaged plant resembles a “doughnut”, with process basins surrounding the final secondary clarifier.

2.3 Condition of Existing Facilities

Influent from the LPG is detained in an anaerobic basin before entering the activated sludge process, which includes seven aeration basins that use coarse bubble draft tubes. The detention time in the aeration system (all seven basins) is about 24 hours at the design condition of 0.5 MGD. From the aeration basins, wastewater enters a secondary clarifier which is 48 feet in diameter with a side water depth (SWD) of 18.6 feet.

Effluent from the secondary clarifier is disinfected using ultraviolet (UV) technology and discharged to the Rio Grande or used as wash water on site. The Bosque Farms WWTP discharges to the Rio Grande under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Permit Number NM0030279. The Permit authorizes discharge of up to 0.5 MGD. Effluent from the plant has consistently met the Village’s National Pollutant Discharge Elimination System (NPDES) Permit, which contains typical limits for biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform.

The WWTP does not have digestion or solids handling facilities. Waste activated sludge (WAS) is transported by truck about 20 miles to a disposal site, where it is integrated into the soil for natural treatment under the Village’s groundwater discharge permit (DP-1244), issued by the NMED Ground Water Quality Bureau (GWQB). The disposal site comprises approximately 140 acres; the resulting nitrogen loading is low, about 5 lb per acre per year, well below the limit of 200 lb per acre per year. The available land is adequate to receive the additional sludge generated from Peralta’s wastewater.

The WWTP presently treats about 0.2 MGD from the Village of Bosque Farms with approximately 0.3 MGD capacity remaining. Assuming 1,200 initial connections each generating 200 gallons per connection per day (*2012 Draft PER, Section 5*), Peralta's initial contribution would be 0.24 MGD. The WWTP has adequate capacity to accept initial wastewater flows, but will need to expand as Bosque Farms and Peralta continue to gradually grow.

More immediate than the concern of capacity for additional wastewater treatment is the issue of redundancy. The Bosque Farms WWTP does not have a second treatment unit to allow for cleaning, maintenance, and easy repair of the existing unit. The Village intends to install a second "doughnut" that would run parallel to the existing unit, resulting in an ultimate capacity of up to 1.0 MGD, with redundancy for up to 0.5 MGD.

2.4 Financial Status of Existing Facilities

Peralta has no facilities for which to report the financial status. However, the Town will be adopting a sewer ordinance with rate schedules to support the new collection system. This ordinance must address costs associated with both the Peralta LPG sewer system and the costs for maintaining the Bosque Farms WWTP.

The Bosque Farms Sewer Service Ordinance (revised 07/2013) includes monthly user fees, connections charges, and other fees associated with operation and repair of the sewer and treatment facilities. As of December 2013, monthly fees for users not on Village water were $27.06 and connection fees (including grinder pump installation) were $5,200. Under the ordinance, users are responsible for certain other costs, including septic tank abandonment, and electrical modifications. The income from these fees has allowed Bosque Farms to maintain the sewer and treatment systems with a reasonable reserve for replacement and repair of facilities. Bosque Farms may be revisiting the existing rate structure in the near future to equate revenues with expenses.

It is anticipated that Peralta will develop a similar approach through the new sewer ordinance. Furthermore, the Town of Peralta will be developing a Memorandum of Understanding (MOU)

with Bosque Farms that will describe Peralta's role in financing upkeep of the collection system and the Bosque Farms WWTP expansion. Further discussion of these issues is provided in Section 7 of this *2014 PER.*

2.5 Water/Energy/Waste Audits

No water, energy, or waste audits have been conducted in regards to wastewater treatment in Peralta, given that there is no sewer infrastructure. No audits have been conducted at the Bosque Farms WWTP.

3.0 NEED FOR PROJECT

As mentioned in Section 1, the construction of a new sewer collection system and connection of Peralta to the Bosque Farms wastewater system was identified as the highest priority in the *2009 Master Plan* for Valencia County. The protection of the groundwater quality in Peralta and the adjacent Bosque Farms and Los Lunas was the overriding need that resulted in this priority. Thus, besides the opportunity for regionalization identified in the *2009 Master Plan*, the need for a sewer collection system at Peralta is predicated on health, sanitation, and aquifer sustainability issues.

3.1 Health, Sanitation, and Aquifer Sustainability

Contamination of groundwater by septic tank effluent has the potential to seriously affect the health of residents in Peralta, as the population relies on shallow domestic wells for drinking water. The age, deteriorated condition, and questionable compliance with the New Mexico Administrative Code (NM AC 20.7.3.303.B and 20.7.3.303.F) of many of the septic systems is a related issue. Although a permit is required to discharge wastewater to an on-site septic system, only 830 of the estimated 1,200 septic systems at Peralta are permitted. It is believed there are also a number of illicit cesspools which are no longer allowed under New Mexico law.

While the Bosque Farms' domestic water supply is provided by two modern municipal wells that tap the deep basin-fill aquifer, Peralta is served by hundreds of individual domestic wells ranging in depth from 35 to greater than 200 feet. The Peralta wells tap the shallow basin-fill aquifer comprised of inter-bedded gravel, sand, silt and clay having variable permeability. In general the older wells are much shallower than wells constructed since about 1990 (Bart Ferris, NMED, verbal communication, Nov. 2013).

Groundwater levels in Peralta are highest during irrigation season and lowest in winter and early spring. Depths to water are typically 4 to 10 feet on the valley floor, and up to 20 feet on the extreme eastern portion of Town near the foothills. These conditions greatly increase the risk of groundwater contamination at Peralta and adjacent areas.

No systematic or area-wide water quality database is available at Peralta. A water quality study of shallow groundwater was conducted in 1993 by the U.S. Geological Survey in the valley area of Albuquerque (*Anderholm, 1997*). Some of the areas surveyed were similar to Peralta with respect to hydrogeologic conditions and to the density of septic tanks and domestic wells. While large-scale contamination was not documented in this limited study, anoxic (low dissolved oxygen) conditions and relatively high organic carbon and ammonia levels were measured in several areas. These conditions were attributed to septic tank effluent, and as at Peralta, represent the potential for contamination of domestic wells.

Dennis McQuillan (2006) of NMED described how regulatory programs typically focused on protecting groundwater from high nitrate levels. However, he stated that consideration should be given to protection from anaerobic respiration byproducts (ARBs) which can create severe aesthetic and economic problems. ARB issues include reduction of iron and manganese, and sulfate reduction that generates noxious hydrogen sulfide. High levels of manganese can present neurological risks.

In 1995, such concerns led Bosque Farms to implement a project to abandon septic systems and construct a LPG sewer system and new wastewater treatment plant. The municipal water system at Bosque Farms had been constructed previously and the new sewer system ensured the protection of the water supply from the deeper basin-fill aquifer. The LPG system allowed for the gradual improvement of shallow groundwater quality at Bosque Farms and adjacent areas, including Peralta.

The Bosque Farms water and wastewater systems were implemented primarily with Federal and State grants and minimal loans. Grant funding was much more available than at present. In the case of Peralta, the estimated capital and O&M costs of funding, constructing and maintaining both a wastewater and water system has led to the choice of one or the other to protect public health. Consequently, and in view of the opportunity to connect to the existing Bosque Farms wastewater system, a new sewer collection system at Peralta was chosen as the best alternative.

3.2 Aging Infrastructure

As explained in Section 2.2, septic tanks date as far back as 1973, but the Town itself does not have any infrastructure. The WWTP was constructed in 1998 and is not yet at capacity or the end of its useful life.

3.3 Reasonable Growth

As seen in Section 1, Peralta is anticipated to grow over the planning period, to an estimated 1,500 connections. The Town is developing a sewer ordinance that will mandate connection when sewer service is available within a specified distance. With the adoption of this ordinance, customers will be committed when the sewer is approximate to their property. It is suggested that the main trunk lines be sized for full build out capacity, to minimize redundant construction costs. Project phasing is considered in Section 6.

3.4 Summary

In summary, the proposed new sewer collection system is predicated on the following needs:

1. The protection of the health and sanitation of the residents in Peralta as well as at Bosque Farms and a portion of Los Lunas.
2. The long-term sustainability and quality of the shallow and deeper basin-fill aquifer in Valencia County.
3. The need to take advantage of the opportunity to regionalize the sewer system in the Bosque Farms-Peralta area by consolidation of the two systems and use of a common wastewater treatment plant.

3.5 References

- Anderholm, Scott (1993). *Water-Quality Assessment of the Rio Grande Valley, Colorado, New Mexico, and Texas – Shallow Ground-Water Quality and Land Use in the Albuquerque Area, Central New Mexico.* U.S. Geological Survey Water-Resources Investigations Report 97-4067.
- Molzen Corbin (1995). *Bosque Farms Wastewater Facilities Plan and Environmental Information Document*. Prepared for Bosque Farms July 1995.
- McQuillian, Dennis (2006). *Ground-Water Contamination by Septic Tank Effluents.* Presented at 51st Annual NM Water Conference, NMED, Oct. 3-4, Albuquerque.
- CDM (2009). *Valencia County Integrated Water and Wastewater Master Plan -- Phase 3 Final Report*. Prepared for Valencia County July 2009.
- CDM Smith (2012). *Draft Preliminary Engineering Report, Town of Peralta*. Prepared for Town of Peralta, December 2012.

4.0 ALTERNATIVES CONSIDERED

CDM Smith introduced four alternatives to evaluate for Peralta's collection system, described in detail in Section 5 of the *2012 Draft PER*. These included:

- Conventional gravity system,
- Vacuum sewer system,
- Septic tank effluent pumps, and
- Low pressure sewer system with grinder pumps.

The four alternatives will be briefly described in the following section, and a summary of the ranking analysis is provided; however, the in-depth evaluation in the *2012 Draft PER* will not be repeated in this PER. Project maps can be found in the *2012 Draft PER* as well.

4.1 Conventional Gravity System

4.1.1 Description

In a gravity collection system, wastewater flows to a gravity sewer, usually located in the street. Wastewater flows by gravity to a lift station, where the sewage is pumped through a force main to the Bosque Farms WWTP.

The advantages of the gravity sewer system are summarized as follows:

- Mechanical components are minimal.
- The system can be designed with standby facilities so that the system operates under most conditions, including power outages.
- Low operating costs.

The disadvantages of the gravity sewer system are summarized as follows:

- Gravity mains are installed 6 to 15 feet deep.
- Excessive construction costs.
- Most existing pavement would have to be removed and replaced.

- Extensive traffic control and detouring.
- Land acquisition for lift stations.
- Disruption to homeowner property.
- Requires construction of a new entrance works at the Bosque Farms WWTP.
- The Bosque Farms WWTP is not designed to accept sewage in batch quantities which occur in gravity systems.

4.1.2 Design Criteria

The NMED Construction Programs Bureau (CPB) has published a document containing Recommended Standards for Wastewater Facilities, which provides several design standards for gravity sewers. These standards include minimum pipe size, depth of sewers, slopes, flow depths, alignment, and materials. The CPB specify a design flow equivalent to that generated by the estimated ultimate tributary population. In the case of Peralta, the design flow is assumed to be 200 gallons per connection per day. The full buildout design flow is estimated to be 300,000 gallons per day (gpd).

Generally, there is a design constraint that prohibits locating water and sewer lines within a specified proximity. Because Peralta does not have a water system, this concern is not applicable.

The Bosque Farms WWTP is not equipped with an Entrance Works to screen out fibrous material and debris. It would be necessary to add some measure of screening to the Bosque Farms WWTP if a conventional gravity system were selected. Furthermore, the WWTP is not equipped with equalization infrastructure to handle the batched nature of a gravity sewer system.

4.1.3 Map

A map of the Conventional Gravity System is included in Appendix A.

4.1.4 Environmental Impacts

The environmental impacts of the gravity sewer system are not expected to be extensive. Any concerns about floodplains, wetlands, important land resources, endangered species, and historical properties that may arise from the preparation of an Environmental Information Document (EID) are expected to be easily mitigated. Gravity sewers are installed underground; therefore, very little surface topography is changed as a result, although trenching and dewatering will be extensive because the sewer will be deep to meet slope requirements. There is potential for exfiltration, where wastewater "leaks" out of the system at pipe joints and manholes, if the sewer line is not properly constructed. This is particularly of concern in areas with high groundwater, such as the western portion of Peralta.

The gravity system would have a negative impact on treatment operations at the WWTP that may affect the quality of effluent. The lift station conveys large quantities of wastewater to the WWTP in a short time period between long periods of no sewage conveyance. The WWTP receives relatively low and constant flow from the grinder pump system in Bosque Farms, and does not offer the equalization capacity needed to handle peak flows from a gravity system.

4.1.5 Land Requirements

Gravity sewers generally require very little acquisition of private property for the sewer line, because the main trunk lines are located in public streets, although Peralta has several private roads that may require utility easements. Land would need to be obtained for lift stations. Locating lift stations in the public right-of-way may not always be possible, but it would reduce the amount of land the Town would need to lease or purchase if the lift stations were constructed on Town property.

4.1.6 Potential Construction Problems

The topography of Peralta is quite flat, and the sewers would have to be buried deeply to maintain the minimum required slope to ensure solids do not accumulate in the lines.

Dewatering would likely be required in many areas due to the high groundwater table, further causing disruption from construction and increasing the cost of installation. Additionally, gravity sewers are often constructed in streets and roadways, requiring extensive replacement of asphalt throughout the Town. Several areas in Peralta have narrow roads with very little shoulder. Pictures of various roads, including Valencia, La Ladera, Peralta Boulevard, Molina, Algodones, Wesley, Park Lane, Riverside, and Valley Lindo are included in Appendix B to illustrate some of the tight construction circumstances that are expected. Construction in these areas may cause major congestion.

Because the gravity sewer requires deep excavation, it is possible that subsurface rock may be encountered, especially on the eastern side of the Town.

Because a gravity line will be required from the residence to the sewer located in the street, disruption to the homeowner's landscaping will likely be non-trivial. The Town will have to determine standard protocol for access and installation at individual residences (for example, must installations occur with a responsible resident present?) and determine how site impairment (such as landscaping disturbances) will be minimized or avoided.

4.1.7 Sustainability Considerations

4.1.7.1 Water and Energy Efficiency

Other than lift stations, gravity collection systems have few mechanical components, reducing time and money required for operation and maintenance of the system. The systems can also be designed with standby facilities for emergencies, such as a power outage, so that the system continues to operate in such conditions.

4.1.7.2 Green Infrastructure

Green infrastructure is not an applicable sustainability consideration for this project.

4.1.7.3 Operational Simplicity

Gravity collection systems have few mechanical components other than lift stations. This reduces time and money required for operation and maintenance of the system. Furthermore, the system can be designed with standby facilities for emergencies, such as a power outage, so that the system continues to operate in such conditions.

4.1.8 Cost Estimates

CDM Smith prepared a cost estimate that considered on-lot components and collection system components, including lift stations and force main to the WWTP. For the purposes of alternative comparison, the cost estimates have been found to be reasonable, although Molzen Corbin has modified the cost estimates to include a 10 percent construction contingency, per NMED guidelines. The gravity sewer system has been estimated to cost about $46,539,000, including construction costs, a ten percent construction contingency, non-construction costs, and New Mexico Gross Receipts Taxes (NMGRT). An itemized cost breakdown can be found in Appendix C.

The *2012 Draft PER* included estimated annual O&M costs for operating expenses and replacement parts. The estimate considers expenses for routine maintenance, electricity costs, and periodic pump replacement. Molzen Corbin has included costs associated with personnel and administrative tasks. Annual O&M costs for the gravity system are estimated to be about $186,000. Details of the anticipated annual O&M expenses can be found in Appendix D.

4.2 Vacuum System

4.2.1 Description

In a vacuum system, sewage from each residence discharges into a valve pit and is transported via vacuum to a central lift station before being pumped to the WWTP. The valve pit is usually

located near property lines, and the vacuum lines run along a roadway. Electrical service at each residence is not required, and multiple homes can discharge to a common valve pit.

At each connection, wastewater flows by gravity from the house into the valve pit. As sewage rises in the sump basin, a pneumatic signal is sent to a controller, which opens a valve, and sewage is drawn into the vacuum transmission lines. At the main vacuum station, the sewage fills a collection tank. When the depth of wastewater in the tank reaches a predetermined level, sensors activate a pump, and the sewage is pumped through a force main to the WWTP.

Like any technology, the vacuum sewer has its challenges. If a vacuum valve sticks open at a valve pit, all the vacuum mains in that sub-area will lose vacuum. None of the associated vacuum valves on that main vacuum line will operate until the open vacuum valve is located and repaired. Quick response times are important to maintain operation of the system.

Unlike the gravity system, the vacuum system has hundreds of automatic valves and a significant number of mechanical components. The Albuquerque Bernalillo County Water Utility Authority (ABCWUA) operates one of the largest vacuum systems in the United States. The ABCWUA vacuum system demands a significant portion of Operator time and maintenance to keep the system operating correctly.

The advantages of the vacuum sewer system are summarized as follows:

- Elimination of exfiltration, infiltration, and inflow.
- Exclusion of manholes and lift stations.
- Use of small-diameter plastic pipe in narrow, shallow trenches.
- Lower cost of the sewer system.

The disadvantages of the vacuum sewer system are summarized as follows:

- If a vacuum valve sticks open at a home, all the vacuum mains in the sub area will lose vacuum and the vacuum valves on that main will not operate. The system can only become operable after the open valve is located and repaired.
- High operating costs.

- Several of the houses are located far enough from the street that the 4-inch gravity line from the house to the valve pit in the road would require extensive excavation similar to that of a gravity system in the resident's yard.
- Although the trenches are shallow and narrow, the pipe requires a specific grade which will result in additional construction costs.
- Land acquisition for vacuum stations.
- Disruption to homeowner property.
- Requires construction of a new entrance works at the Bosque Farms WWTP.
- The Bosque Farms WWTP is not designed to accept sewage in batch quantities which occur in vacuum systems.

4.2.2 Design Criteria

Vacuum sewers are sized for the ultimate design flow from the tributary described in Section 4.1.2. Generally, lines range from 4 to 10 inches in diameter. The vacuum system requires a 0.2 percent slope in the sewer line, requiring a saw-tooth profile in flat areas. Valve station sizing is based on the number of connections, so the total number of valve stations is dependent on the phasing approach for the collection system.

The Bosque Farms WWTP is not equipped with an Entrance Works to screen out fibrous material and debris. It would be necessary to add some measure of screening to the Bosque Farms WWTP if a vacuum sewer were selected.

4.2.3 Map

A map of the Vacuum System is included in Appendix A.

4.2.4 Environmental Impacts

The environmental impacts of the vacuum sewer system are not expected to be extensive. Any concerns about floodplains, wetlands, important land resources, endangered species and

historical properties that may arise from the preparation of an Environmental Information Document (EID) are expected to be easily mitigated. Vacuum sewers are installed underground below the frost line, generally at a much shallower depth than gravity lines. There is not expected to be any infiltration or exfiltration associated with the vacuum system.

Like the gravity system, the vacuum system would have a negative impact on treatment operations at the WWTP that may affect the quality of effluent. The vacuum station conveys large quantities of wastewater to the WWTP in a short time period between long periods of no sewage conveyance. The WWTP receives relatively low and constant flow from the grinder pump system in Bosque Farms, and does not offer the equalization capacity needed to handle peak flows from a gravity system.

4.2.5 Land Requirements

Vacuum sewers generally require very little acquisition of private property, because the main trunk lines are located in public streets. However, Peralta has several private roads that may require utility easements. The valve pits are another item for consideration; they should be located where the Town will have easy access for maintenance purposes. This may require an easement or acquisition of land. Land will also be needed for the main vacuum station.

4.2.6 Potential Construction Problems

Vacuum sewers are often constructed in streets and roadways, requiring extensive replacement of asphalt throughout the Town; however, because the trenching depth for the vacuum line is only about four to five feet, they could be installed to the side of the road where space permits. Trenching for a vacuum sewer is not terribly deep, so significant subsurface rock is not anticipated.

Similar to the gravity system, a gravity line will be required from the residence to the sewer located in the street. Disruption to the homeowner's landscaping will likely be significant. The Town will have to determine standard protocol for access and installation at individual

residences (for example, must installations occur with a responsible resident present?) and determine how site impairment (such as landscaping disturbances) will be minimized or avoided.

Several areas in Peralta have narrow roads with very little shoulder, as seen in Appendix B. Construction in these areas may cause minor congestion. Dewatering would likely be required in some areas due to the high groundwater table; however, the amount of dewatering is expected to be significantly less than for gravity sewer.

4.2.7 Sustainability Considerations

4.2.7.1 Water and Energy Efficiency

With respect to energy efficiency, the vacuum lift stations are the main source of energy consumption. They run intermittently and are low consumers of electricity.

4.2.7.2 Green Infrastructure

Green infrastructure is not an applicable sustainability consideration for this project.

4.2.7.3 Operational Simplicity

The vacuum system is significantly more complicated than the gravity system. In addition to the main vacuum station, there are hundreds of valve pits with automatic components that may need repair or replacement. As indicated in 4.2.1, the vacuum system may require a significant amount of operator time and attention.

4.2.8 Cost Estimates

CDM Smith prepared a cost estimate that considered on-lot components (including valve pits and service laterals) and collection system components (including vacuum mains, vacuum stations, and force main to the WWTP). For the purposes of alternative comparison, the cost

estimates have been found to be reasonable, although Molzen Corbin has modified the cost estimates to include a 10 percent construction contingency, per NMED guidelines. The vacuum sewer system has been estimated to cost about $32,380,000, including construction costs, a ten percent construction contingency, non-construction costs, and NMGRT. An itemized cost breakdown can be found in Appendix C.

CDM included estimated annual O&M costs for operating expenses and replacement parts. The estimate considers expenses for the vacuum station and piping system, valves, and the cost of electricity. Also included are replacement parts for vacuum pumps, sewage pumps, valves, controllers, and other equipment. Molzen Corbin has included costs associated with personnel and administrative tasks. Annual O&M costs for the vacuum system are estimated to be about $380,000. Details of the anticipated annual O&M expenses can be found in Appendix D.

4.3 Septic Tank Effluent Pump (STEP) System

4.3.1 Description

Septic Tank Effluent Pump (STEP) Systems feature solids collection in individual septic tanks and an effluent sewer to convey effluent to another location for treatment and disposal. Because solids are not transported through the effluent sewer, the line can be sized much smaller than a conventional gravity system. This results in minimal disruption and construction costs for the sewer line compared to a gravity system.

Although septic tanks already exist at most of the residences in Peralta, this alternative suggests abandoning the existing septic systems and replacing them with a new interceptor tank, effluent pump, and effluent filter. Residents would be responsible for solids handling. Interceptor tanks should be pumped to remove accumulated solids on a regular basis (about every 3 to 5 years).

Although an Entrance Works screening facility is not needed with the STEP system, the characteristics of STEP effluent are drastically different from the characteristics of the sewage the Bosque Farms WWTP currently treats. STEP influent contains significantly less organic

matter than ordinary sewage, making nitrogen removal difficult. The plant operations are tailored specifically to the wastewater characteristics of grinder pump sewage, and the addition of STEP effluent may upset the plant or cause disruptions to those operations.

The advantages of the STEP sewer system are summarized as follows:

- Elimination of exfiltration, infiltration, and inflow.
- Exclusion of manholes and lift stations.
- Use of small-diameter plastic pipe in narrow, shallow trenches.
- Lower cost of the sewer system.
- Construction of entrance works at the WWTP is not necessary.

The disadvantages of the STEP sewer system are summarized as follows:

- Septic tanks are not abandoned. The homeowner is responsible for solids disposal. The Town has no means to enforce groundwater protection from poorly managed septic tanks.
- The drastically altered characteristics of the wastewater are unsuited for the Bosque Farms WWTP, ultimately making this alternative inapplicable, as discussed throughout this Section.

4.3.2 Design Criteria

Septic tanks or interceptor tanks are equipped with an effluent filter and effluent pump that are sized based on the design flow from the occupied building or structure. In the case of Peralta, each connection is assumed to generate 200 gpd. Because there are no appreciable solids in the effluent, sewer lines are small in diameter compared to gravity systems. The lines are sized by considering the peak flow that would be conveyed to the WWTP at one time.

4.3.3 Map

The layout of the STEP system would be similar to the LPG system. CDM Smith's LPG map is included in Appendix A to illustrate the conceptual location and the line sizing that would be applicable to the STEP system.

4.3.4 Environmental Impacts

The environmental impacts of the STEP sewer system are not expected to be extensive. Any concerns about floodplains, wetlands, important land resources, endangered species, and historical properties that may arise from the preparation of an Environmental Information Document (EID) are expected to be easily mitigated. STEP sewers are installed underground below the frost line, generally at a much shallower depth than gravity lines. Because the STEP system is under pressure, there is not expected to be any infiltration or exfiltration. Groundwater contamination from improperly maintained septic systems is of potential concern.

4.3.5 Land Requirements

STEP sewers generally require very little acquisition of private property, because the main trunk lines are located in public streets. However, Peralta has several private roads that may require utility easements. The Town will need access to STEP pumps, likely on private property, for maintenance purposes. This will require an access agreement for every property served by the system.

4.3.6 Potential Construction Problems

Dewatering would likely be required in some areas due to the high groundwater table; however, the amount of dewatering is expected to be significantly less than for a gravity sewer. STEP sewers are often constructed to the sides of streets and roadways, to minimize replacement of asphalt throughout the Town. Due to the shallow trenching depth, it is not expected that significant subsurface rock will be encountered.

Several areas in Peralta have narrow roads with very little shoulder, as seen in Appendix B. Canals, trees, utilities, and fencing are present, and may require construction of the sewer line across private property or in the roadway where sufficient shoulder is not available. Construction in these areas may cause minor congestion.

The Town is aware that there are a substantial number of lots that are not equipped with septic tanks, and there are likely many septic tanks that are in poor condition and should be repaired or replaced. Continued use of septic tanks (whose conditions may not be known during design) may present difficulties or unforeseen obstacles during field construction. Installing new interceptor tanks and abandoning existing septic tanks is an option to avoid these challenges.

Disruption to property is significantly less for the STEP sewer compared to the gravity system. The Town will have to determine standard protocol for access and installation at individual residences (for example, must installations occur with a responsible resident present?) and determine how site impairment (such as landscaping disturbances) will be minimized or avoided.

4.3.7 Sustainability Considerations

4.3.7.1 Water and Energy Efficiency

With respect to energy efficiency, the STEP pumps are the main source of energy consumption. They run intermittently and are low consumers of electricity.

4.3.7.2 Green Infrastructure

Green infrastructure is not an applicable sustainability consideration for this project.

4.3.7.3 Operational Simplicity

The STEP system contains more components than the gravity system, but is typically more stable than a vacuum system because one pump failure does not impact the entire collection system. The Town would be responsible for repair and replacement of the STEP pumps. It is noted that the STEP option utilizes the homeowner's existing septic tanks or new interceptor tanks. This is of particular concern because the responsibility of solids disposal (septic tank pumping) falls to the homeowner, potentially compromising groundwater protection.

Operations at the WWTP would be significantly impacted by the STEP system. STEP influent does not contain the organic matter necessary to promote biological treatment. The WWTP could potentially need a supplemental carbon source, which requires chemical feed equipment and ongoing chemical costs. The altered characteristics of the wastewater are incompatible with the Bosque Farms WWTP as it is currently operated. Therefore, this option is determined infeasible and will not be further evaluated in Section 5.

4.3.8 Cost Estimates

CDM Smith prepared a cost estimate that considered on-lot components (including interceptor tanks and STEP pumping equipment) and collection system components (including small diameter force mains to the WWTP). For the purposes of alternative comparison, the cost estimates have been found to be reasonable, although Molzen Corbin has modified the cost estimates to include a 10 percent construction contingency, per NMED guidelines. The STEP system has been estimated to cost about $28,353,000, including construction costs, a ten percent construction contingency, non-construction costs, and NMGRT. An itemized cost breakdown can be found in Appendix C.

CDM included estimated annual O&M costs for operating expenses and replacement parts. The estimate considers expenses for pumping interceptor tanks and maintenance. Also included are replacement parts for STEP pumps and associated equipment. Molzen Corbin has included costs associated with personnel and administrative tasks. Annual O&M costs for the STEP system are estimated to be about $467,000. Details of the anticipated annual O&M expenses can be found in Appendix D.

4.4 LPG System

4.4.1 Description

The LPG system features pressurized sewer lines fed by individual grinder pumps at each connection. Because the system is under pressure, the line does not need to be buried deeply to

maintain a desired certain slope, as in the case of gravity sewers. The sewer can be constructed on the side of existing roadways, reducing the impact of construction and the need for extensive surface restoration.

Each residence will be served by its own grinder pump. Each grinder pump station provides holding capacity, chopping and grinding of solids, and transport of the waste into the collection system. When the depth of sewage in the tank reaches a predetermined "on" level, the pump turns on, discharging sewage to the collection system, until the depth of sewage decreases to a predetermined "off" level. The pump stations are protected against backflow from the collection system by check valves.

The grinder pumps require an electrical power source. Each residence is responsible for providing electricity for the pump. Electrical costs associated with the grinder pumps are expected to be $2 to $3 per month. During power outages, the grinder pumps will not run unless powered by alternative energy source. The volume of storage in the pump station depends on the make and model of the pump; for Peralta, a 60-gallon wet well will be sufficient. The DH-071-57 manufactured by E-One would be an appropriate selection; however, there are other manufacturers that also produce a package pump station like the E-One. Other manufacturers are compared in Section 6.

In Bosque Farms, the grinder pumps are owned and maintained by the Village; users pay a one-time connection fee to have the grinder pump installed and connected to the sewer system. Peralta will need to further develop a Utilities Department to take responsibility for operation and maintenance of the collection system and the grinder pumps.

The advantages of the LPG sewer system are summarized as follows:

- Elimination of exfiltration, infiltration, and inflow.
- Exclusion of manholes and lift stations.
- Use of small-diameter plastic pipe in narrow, shallow trenches.
- Lower cost of the sewer system.
- Construction of entrance works at the WWTP is not necessary.

- Wastewater characteristics are similar to those currently received and treated at the Bosque Farms WWTP.
- The 1.25-inch service line from the pump station to the main in the street can be installed by horizontal boring methods to greatly reduce the disruption on homeowner's property
- Quick replacement of a pump core.

The disadvantages of the LPG sewer system are summarized as follows:

- Requires electrical service at every home or business.
- Down time during a power outage.
- Because a grinder pump will be located at every home or business, long-term maintenance costs (associated with repair time and replacement parts on 1,500 units) will not be insignificant.

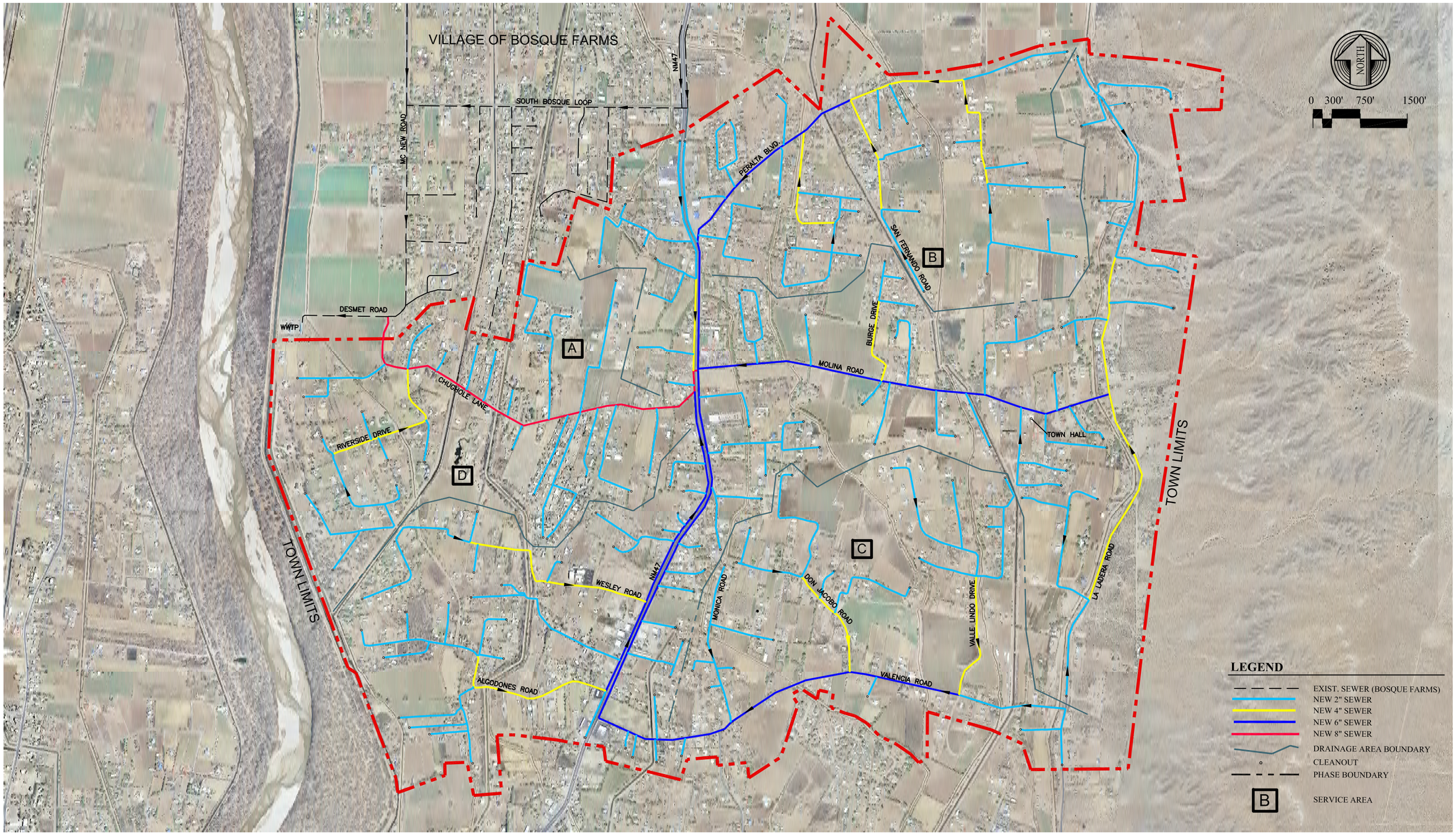
4.4.2 Design Criteria

In the LPG system, all the piping downstream of the pump (including lateral and mains) will normally be under low pressure (60 psi or less). Pipe sizes discharging from the grinder pumps start at 1.25 inches in diameter. Main piping sizes typically range from 2-inch to 8-inch. For planning purposes, the Town has been divided into drainage areas, which will be confirmed and used to determine pipe sizes during design.

Because the grinder pumps chop and grind any solids in the sewage into a fine slurry, the Bosque Farms WWTP is not equipped with an entrance works to screen solids from the wastewater. Selecting the grinder pump technology for Peralta would be convenient, as the WWTP is already acclimated to sewage with such characteristics.

4.4.3 Map

The map provided in the *CDM Smith Draft PER* can be found in Appendix A for reference purposes. A revised map of the LPG system is provided in Figure 4-1 and Plate I (in the back of this Report).



MOLZENCORBIN

Wastewater Collection System PER - Town of Peralta, New Mexico

Figure 4-1

Conceptual Low Pressure Grinder Sewer System Map

4.4.4 Environmental Impacts

As the collection lines will be buried in a developed area, floodplains or wetlands will not be impacted. Historical and archaeological resources are not expected to conflict with the collection system, either. One considerable environmental impact common to all systems is the incremental increase in effluent discharged to the Rio Grande, where suitable habitat for the southern willow flycatcher exists. Construction of the sewer collection system is not expected to impede on this habitat, and it is expected that the Bosque Farms WWTP will be responsible for producing effluent suitable for discharge in the critical habitat areas. An EID will be submitted separately to further describe the effects of the project on the environment.

4.4.5 Land Requirements

Main lines and laterals along roads will be located mostly on property owned by the Town, although Peralta has several private roads that may require utility easements. Access agreements will be needed for each lot, and a suitable location will be needed for installing the grinder pump station.

4.4.6 Potential Construction Problems

Generally in an LPG system, small-diameter pipe mains are laid at minimum trench depths along existing roadways with minimum disruption to streets, yards, and underground utilities. Although surface restoration costs are minimized, they are not nonexistent. Several areas in Peralta have narrow roads with very little shoulder. Photographs in Appendix B illustrate some of the tight construction circumstances that are expected. Canals, trees, utilities, and fencing are present, and may require construction of the sewer line across private property or in the roadway where sufficient shoulder is not available. Construction in these areas may require pavement cuts and cause minor congestion. Fortunately, the trench for a low pressure sewer is not large, as seen in Figure 4-2, and will not require extensive patching. Additionally, little rock is expected to be encountered because of the shallow trench depth.

FIGURE 4-2

TRENCHING FOOTPRINT

High groundwater is expected to be encountered in some areas, suggesting the use of short grinder pump stations. Dewatering may be needed, especially in Phases where construction occurs west of NM-47. The Town will have to determine standard protocol for access and installation at individual residences (for example, must installations occur with a responsible resident present?) and determine how site impairment (such as landscaping disturbances) will be minimized or avoided.

4.4.7 Sustainability Considerations

4.4.7.1 Water and Energy Efficiency

With respect to energy efficiency, the grinder pumps do consume energy, but they run intermittently and are low consumers of electricity. Discontinuation of septic tank effluent discharge will preserve the groundwater quality and minimize health hazards and environmental deterioration.

4.4.7.2 Green Infrastructure

Green infrastructure is not an applicable sustainability consideration for this project.

4.4.7.3 Operational Simplicity

The LPG system contains more components than the gravity system, but is typically more stable than a vacuum system because one pump failure does not impact the entire collection system. The Town would be responsible for repair and replacement of the pumps. It is recommended that the Town select only one technology for its sewer collection system to standardize training and repair procedures.

4.4.8 Cost Estimates

Although the *CDM Smith Draft PER* presented a cost estimate for the construction cost of the LPG sewer option, Molzen Corbin prepared a revised cost estimate, which can be found in Appendix C. Construction costs for the LPG system were estimated to be about $19,748,000, including a construction contingency of 10 percent and NMGRT. Non-construction costs (including preparation of an EID, survey, engineering fees and services, and NMGRT) were estimated in the amount of $1,947,000. The total estimated project costs are about $21,695,000. An itemized cost breakdown can be found in Appendix C.

Molzen Corbin prepared a conceptual cost estimate for annual expenses associated with the LPG system (also included in Appendix D). The estimate includes consideration for field staff and labor, replacement cores, cleaning and spare parts, fuel and maintenance, training, shop upkeep, and administration costs. Electricity for the grinder pumps is paid for by customers. The O&M costs are estimated to be about $294,000.

Personnel costs include salary and benefits for one Level 2 Wastewater Operator and one full-time laborer. Administrative costs include office upkeep, supplies, and shipping costs. An allowance is also granted for billing personnel. The Town does not expect insurance to be affected by establishment of a sewer collection system and supporting personnel; however, the Town has made inquiry regarding insurance rates.

4.5 Summary

Four types of sewer systems were evaluated for Peralta: gravity, vacuum, STEP, and LPG. Gravity sewer is generally buried deeply and would require the addition of an Entrance Works at the WWTP. Vacuum sewer would also require construction of an Entrance Works, but lines would be much shallower. The STEP and LPG systems would not require an Entrance Works, but STEP influent has drastically different characteristics that are incompatible with the Bosque Farms WWTP as it is currently operated. Therefore, this alternative will not be further considered in the selection of an alternative. The Bosque Farms collection system is an LPG system, so operations at the WWTP would be least impacted by use of an LPG system.

Alternatives that will be further evaluated in Section 5 are as follows:

- Gravity system
- Vacuum system
- LPG system

5.0 SELECTION OF AN ALTERNATIVE

Four types of sewer systems were described in Section 4: gravity, vacuum, STEP, and LPG. The STEP system generates wastewater with characteristics that are unsuited for treatment at the Bosque Farms WWTP, so this alternative was screened from further consideration. Gravity, vacuum, and LPG sewers are evaluated and compared in detail. In this Section, the most critical factors in selecting an alternative are as follows:

- Life Cycle Cost Analysis
- Compatibility with Existing Infrastructure
- Groundwater Protection
- Operational Simplicity
- Regionalization

Section 5 discusses the alternatives using these criteria and assigning scores on a scale of 1 to 3, where 3 is a favorable score, 2 is a neutral score, and 1 is an unfavorable score. A summary of scoring is provided at the end of the Section.

5.1 Life Cycle Cost Analysis

Using the estimated capital and annual operation and maintenance costs, a life cycle cost analysis may be performed. The life cycle present worth value for each alternative is determined by relating the estimated expenditures (present and future) in present dollars. For this particular life cycle cost analysis, the net present value will be used to compare alternatives. An interest rate of 1.6 percent (the "real" discount rate taken from Appendix C of OMB Circular A-94, revised in December 2013 and currently in effect; see Appendix E) will be used to calculate the present value for the alternatives being evaluated. The equation for net present value (NPV) is shown below:

$$NPV = C + USPW(O\&M) - SPPW(S),$$

where NPV = Net present value,
C = Capital cost,
USPW(O&M) = Uniform series present worth of O&M costs, and
SPPW(S) = Single payment present worth of the salvage value.

Anticipated capital costs and O&M costs were presented in Section 4 for the gravity, vacuum, and LPG sewer systems. The uniform series present worth factor for an interest rate of 1.6 percent and a life cycle of 20 years is 17.000; this factor is multiplied by the annual O&M cost to present the annual expenses in a present worth dollar amount. Regardless of which sewer technology is selected, the sewer system components will have no salvage value at the end of their useful life; salvage value is zero for all alternatives. The net present value for the alternatives is shown in Table 5-1 and in Appendix F.

TABLE 5-1
LIFE CYCLE COST ANALYSIS*

Alternative	Capital Cost	Annual O&M Cost	USPW(O&M)	Salvage Value	PPW(S)	NPV
Gravity	$46,539,000	$186,000	$3,162,000	$0	$0	$49,700,000
Vacuum	$32,380,000	$380,000	$6,460,000	$0	$0	$38,840,000
LPG	$21,695,000	$294,000	$4,998,000	$0	$0	$26,690,000

*Life cycle cost analysis performed using an interest rate of 1.6 percent and a life cycle of 20 years.

- Despite its low annual O&M costs, the gravity sewer system has the greatest life cycle cost, significantly higher than 10 percent of the lowest alternative, due to the considerable capital cost, and receives a score of 1.
- The vacuum sewer has the second greatest life cycle cost, which similarly to the gravity system, is not within 10 percent of the least expensive alternative. Vacuum sewer also receives an unfavorable score of 1.
- The LPG system has the lowest life cycle present worth, because of its comparatively low capital cost. The LPG system receives a favorable score of 3.

5.2 Non-Monetary Factors

Non-monetary factors are also important to consider, especially in the particular case of Peralta, where the Town's wastewater will be conveyed to a neighboring Village's facilities for

treatment. In this Section, compatibility with existing infrastructure, groundwater protection, operational simplicity, and regionalization are addressed.

5.2.1 Compatibility with Existing Infrastructure

Peralta is fortunate to have the opportunity to develop an agreement with Bosque Farms and use their existing WWTP. The costs of adding redundancy to Bosque Farms' existing plant are far less than the cost of a new independent WWTP, located within and operated by Peralta. A new WWTP begins with the task of preparing an extensive PER to analyze and select treatment processes, obtain a new discharge permit, and find available land, followed by design and construction, which may take several years. The Town would have to secure funding on the order of several million dollars for construction, in addition to the cost for the collection system. The time associated with the PER, design, and construction averages about seven years before a plant is operational.

Furthermore, the Town would be required to hire the personnel to support a WWTP. Certified Wastewater Technicians would be needed to operate the plant. The operators are tasked with producing permit-compliant effluent, following permitting requirements for monitoring and reporting, and seeing that the appropriate laboratory analyses are performed. Bosque Farms already employs the necessary personnel to operate their WWTP. Even if they had to hire more operators to handle the additional flow, it would be significantly less expensive than if Peralta were to construct a new WWTP and hire their own personnel.

This PER assumes Bosque Farms Utilities will not extend its service area to include Peralta, requiring the Town to hire staff for maintenance and repairs of the collection system and grinder pumps, and establishing a Utilities Department. However, because the Bosque Farms Utilities Staff is familiar with the operation of grinder pumps and the low pressure sewer system, they would be able to serve as a resource for and offer assistance to the Town's new staff.

The characteristics of the sewage are an important consideration in selecting Peralta's sewer system because operations at the Bosque Farms WWTP will be affected by the additional

sewage. Because the Bosque Farms WWTP is fed solely by grinder pumps, the plant operations have been tailored to treat this particular sewage. Plant biology would not likely be largely affected by the addition of more sewage from grinder pumps. However, if Peralta selected a different sewer collection system, significant changes may be necessary to maintain a healthy microbial population at the WWTP.

For example, the WWTP is not equipped with an entrance works to screen large solids because the grinder pumps reliably reduce solids to acceptable sizes for the treatment process. Influent from gravity and vacuum sewers would need to be screened to remove solids, rags, and debris prior to entering the treatment basins.

- Because of this, the gravity and vacuum sewer systems will receive an unfavorable score of 1. For the gravity system, it should be noted that the "slug" nature of incoming wastewater would require additional equalization infrastructure, too, as opposed to the gravity and vacuum system, which provide a more constant flow to the WWTP.
- The LPG system receives a score of 3 because it is fully compatible with the Bosque Farms WWTP.

Peralta should be mindful of the service Bosque Farms is providing in promoting regionalized sewer service and treating the Town's wastewater. As such, it would benefit the Town and Bosque Farms alike if the Town selected a sewer system that would operate in accord with Bosque Farms' collection and treatment system.

5.2.2 Groundwater Protection

- All three options will drastically reduce groundwater contamination, thereby improving groundwater protection; therefore, none of the alternatives receive an unfavorable score of 1.
- However, the gravity system is subject to infiltration, exfiltration, and inflow. Exfiltration is of particular concern because groundwater is often high in many areas, so the gravity system receives only a neutral score of 2.

- The LPG and vacuum systems have the advantages of pressure/suction; therefore, infiltration and exfiltration are not of concern. These alternatives receive a score of 3.

5.2.3 Operational Simplicity

- Typically, gravity sewers have few mechanical components and do not require significant time or efforts to maintain; therefore, the gravity sewer receives a score of 3.
- The vacuum system contains a significant number of components, and repairs can be extremely time-intensive. If a valve sticks open, vacuum is lost in an entire sub-area, and operators have to locate the valve before they can repair it and return the sub-area to service. Therefore, the vacuum system receives a score of 1.
- The LPG system also contains a significant number of components, but the amount of time associated with locating malfunctioning equipment is significantly less. Furthermore, failure of one pump core does not affect other users on the system, and replacement of a core is relatively simple and does not require a significant amount of time. The LPG receives a neutral score of 2.

5.2.4 Regionalization

As indicated in Section 1, regionalization of wastewater infrastructure is of high importance is Valencia County. The selected alternative should promote the goal of regionalization.

- The LPG meets the goal of regionalized infrastructure, but also encourages regionalized knowledge base, thereby receiving a favorable score of 3. Although Bosque Farms Utilities is not expected to extend its service area to Peralta, the Bosque Farms Utilities Staff would be able to serve as a resource for the Town, promoting a regionalized network of operators.
- The gravity and vacuum sewer promote the goal of regionalization, but not to the particular extent of the LPG, so they receive a neutral score of 2.

5.3 Selection

The *2012 Draft PER* recommended the LPG collection system (ranking shown in Appendix G). Molzen Corbin concurs with this decision, and as seen in Table 5-2, the LPG system is shown to be the most advantageous for Peralta, with a score of 14. The gravity system has a score of 9, and the vacuum system has a score of 8.

TABLE 5-2
SCORING SUMMARY FOR ALTERNATIVES

CRITERIA	GRAVITY	LPG	VACUUM
Life Cycle Cost	1	3	1
Compatibility with Existing Infrastructure	1	3	1
Groundwater Protection	2	3	3
Operational Simplicity	3	2	1
Regionalization	2	3	2
Total Score	**9**	**14**	**8**

In particular, several reasons for the selection of the LPG system are highlighted below:

- The Bosque Farms WWTP equipment and processes are adapted to sewage from grinder pumps.
- No additional process equipment will be required initially at the WWTP (i.e., entrance works).
- Replacement of pump cores is relatively easy and timely.
- LPG sewer has proven effective in other small towns and villages with characteristics similar to Peralta (Bosque Farms, Logan, Tijeras, Mesilla).
- The system will not be subject to infiltration and inflow (this is particularly an advantage given high groundwater concerns).
- Responsibility for solids is not placed on homeowner (as in the case of septic tanks, which require periodic sludge removal).
- Minimal disruption will occur to homeowner property.

- Construction costs are significantly lower than gravity sewers.
- Phasing is flexible because sewage is conveyed by individual grinder pumps at each home, rather than by central lift stations.
- Bosque Farms Utilities Staff are well-versed with grinder pumps and would be excellent resources for Peralta.

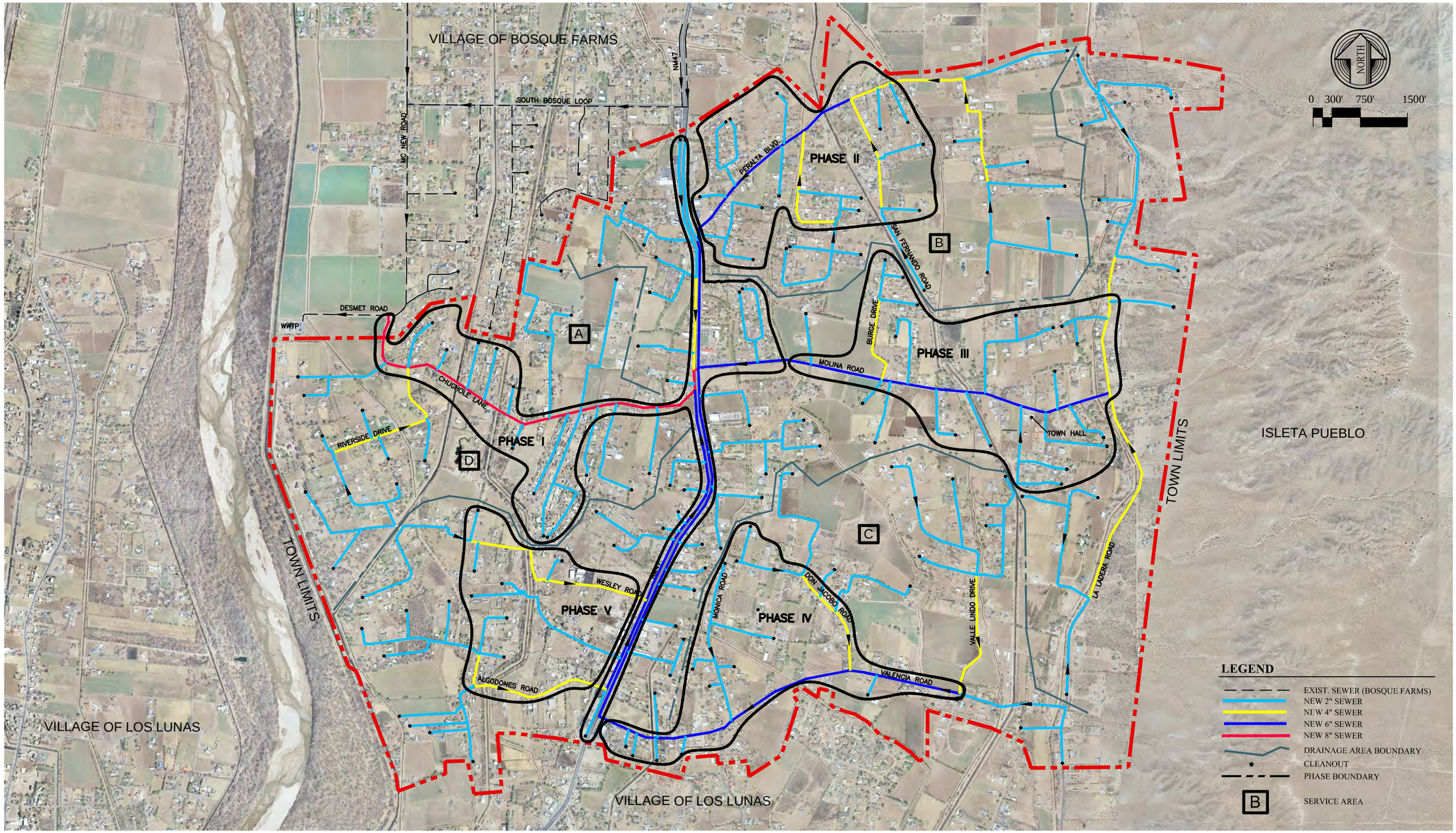
The Town of Peralta is not financially prepared to pursue a project of this magnitude all at once, so it is recommended that the improvements be broken into phases and constructed over a 10- to 15-year time period. Details of the proposed project and suggested phasing are presented in Section 6.

6.0 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

6.1 Preliminary Project Design

As described in Sections 4 and 5, the recommended alternative is a low pressure collection system with grinder pumps on each lot. Constructing a collection system for an estimated 1,500 lots is a considerable undertaking for one construction project. It is suggested that the Town consider phased construction, installing critical trunk lines to form the skeleton of the system, and adding service lines as funding and public cooperation permit. Figure 6-1 illustrates the first five phases that will provide the main transmission lines and extend service to residents along major roads in Peralta. Additional areas will be served by later phases as funding becomes available. Service quadrants are identified as A (northwest), B (northeast), C (southeast), and D (southwest).

The phases are proposed in a manner that provides service to the largest number of users for the infrastructure installed. Critical main trunk lines will be installed in the first five phases, including NM-47 and the connection to the WWTP, Peralta Boulevard, Molina Road, and Valencia Road. The areas of greatest density will be serviced by these lines, imposing a measure of economy of scale. This scheme will generate optimal revenue to support construction and maintenance of the system.



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Wastewater Collection System PER - Town of Peralta, New Mexico

Figure 6-1

Conceptual Phasing Map

6.1.1 Collection System Layout

6.1.1.1 Phase 1: NM-47 and Chughole

As seen in Figure 6-1, Phase 1 consists of approximately 7 miles of sewer line from Desmet Road east to Alecia Circle and along the segment of NM-47 that bisects the planning area. The mains will follow the alignment of existing major roadways, including Chughole Lane, a portion of Molina Road, and NM-47. Parallel lines and one crossing will be constructed on either side of NM-47, eliminating the need for numerous underground crossings of the state highway.

With the completion of Phase 1, the central structure of the main lines will be established, delineating the western service areas and providing the opportunity to connect roughly 250 residences to the collection system immediately, including residences along Guadalupe, Arcadia, and Lawrence Drives. Phase 1 can be seen in greater detail in Plate II, located in the back of this report. Phase 1 will provide service to some residences in Service Quadrants A, B, and D. Critical to the success of this project is the timely installation of the system along NM-47, where designs for a NMDOT improvement project are already underway. Peralta would be wise to install any portion of sewer line along NM-47 or within the NMDOT project area in Phase 1, prior to or concurrent with the roadwork. Typical state policy forbids disturbance of newly paved roads for several years; furthermore, concurrent construction schedules minimize the time and cost associated with redundant construction permits, disruption of the site, and user inconvenience. It is critical to include the NM-47 corridor in the first phase and begin design as soon as possible, so the affected sewer lines can be constructed as part of the NMDOT project.

6.1.1.2 Phase 2: Peralta Boulevard

Phase 2, seen in Figure 6-1, runs from NM-47 along Peralta Boulevard to the canal east of Los Arboles Road, providing a trunk line for the northern residents along the western portion of Peralta Boulevard. Phase 2 also picks up residents on Gurule near the old church. With the completion of this phase, approximately 3.8 miles of new sewer lines servicing will be in place, serving about 175 additional lots in Service Quadrant B. Although several smaller mains will be

needed to provide service to all residences in this quadrant, the majority of lots can be served by small service extensions to the trunk lines on NM-47 and Peralta Boulevard. Phase 2 can be seen in greater detail in Plate II, located in the back of this Report.

6.1.1.3 Phase 3: Molina Road

Phase 3 includes approximately 4.1 miles of sewer lines, running from Molina Road to La Ladera Road and picking up residences along the way (see Figure 6-1). With the completion of this phase, Town Hall will be brought online. Several small mains will be needed to provide service to residences not living on Molina Road; however, about 150 lots in Service Quadrant B can be served by service extensions to the trunk lines. Phase 3 can be seen in greater detail in Plate II, located in the back of this report.

6.1.1.4 Phase 4: Valencia Road

Phase 4 is expected to provide service to about 110 residences on the southern end of Town, east of NM-47, in Service Quadrant C. A main trunk line will run east from NM-47 along Valencia Road. Trunk lines will also run along Monica and Don Jacobo Roads. An estimated 2.5 miles of sewer line will be installed in Phase 4. Refer to Figure 6-1 and Plate II for illustration of Phase 4.

6.1.1.5 Phase 5: Southwest Portion of Town

Phase 5, seen in Figure 6-1, will provide service to the southern portion of Peralta, west of NM-47 in Service Quadrant D. Main streets serviced in this phase include Algodones Road, Wesley Road, and Sunflower Lane. About 90 residences are expected to be served by the 1.9 miles of sewer line installed in Phase 5. Phase 5 can be seen in greater detail in Plate II, located in the back of this Report.

6.1.1.6 Sub-phases and Remaining Connections

Phases 1 through 5, outlined in detail in this PER, establish the backbone of the collection system. However, it is not expected that all the laterals will be constructed concurrently with their respective phases. It is suggested that several "sub-phases" in each service quadrant be delineated for design and construction as appropriate based on available funding, population density, groundwater impact, and public support.

6.1.2 Pumping Stations

At least one individual grinder pump station will be installed on each property that ties into the system. The Town will develop a Sewer Ordinance identifying roles and responsibilities of the Town and Homeowner. The grinder pump will be considered Town property, and will be maintained by Town Personnel. The Ordinance will also define the required number of grinder pumps for commercial users.

As mentioned briefly in Section 4, there are alternative grinder pump stations to the E-One grinder pump. Alternative pump stations include the Mono InviziQ and Barnes EcoTRAN. The E-One and InviziQ feature a progressive cavity pump, whereas the EcoTRAN utilizes a centrifugal vortex pump. Progressive cavity pumps function on the basis of positive displacement; a finite volume is transported with every revolution of the rotor. Centrifugal vortex pumps are able to transfer a larger range of flows, although the flow rate is affected by pressure conditions in the line.

Although both types of pumps have been widely used in the USA for residential sewage, the Bosque Farms collection system contains all E-One progressive cavity type pumps. The Village's Utilities Staff are familiar with the E-One pump and are able to perform most maintenance procedures in-house. Arrangements with Bosque Farms have not yet been finalized regarding maintenance of Peralta's collection system, but it is anticipated that Peralta will establish its own Utilities workforce to perform maintenance on the collection system. While it

may benefit the Town to utilize similar technology, the Town is not held to use of the E-One pumps.

It is anticipated that a progressive cavity type pump with a maximum capacity of 11 gpm will be used.

6.1.3 Storage

No storage will be constructed with this project. The grinder pump stations used by Bosque Farms contain about 60 gallons of storage; similar grinder pumps are recommended for use in Peralta.

6.1.4 Treatment

Wastewater will be treated at the Bosque Farms WWTP. The Town and Bosque Farms are developing a MOU that will identify the responsibilities of the respective parties, and define the cooperative terms of the wastewater treatment agreement. However, compliance with disposal regulations will remain the responsibility of the Village.

As discussed in Section 2.3, the Bosque Farms WWTP is not at capacity; however, the lack of redundant clarifying infrastructure is of particular concern to the Village. They are willing to accept and treat the wastewater generated from Phase 1 connections; however, they intend to stipulate that the second clarifier must be constructed prior to treating any additional wastewater from Peralta's later phases.

6.1.5 Collection System Sizing

The preliminary line sizes shown in Figure 6-1 were selected considering scour velocity, residence times (especially in early phases with low-flow conditions), and planned phases of development. For comparative purposes, Molzen Corbin obtained results for the preliminary hydraulic model compiled by E-One (see Appendix H), prepared for the Town previously in

2009. Although it is recognized that there are variations, these are generally attributed to the revised flow patterns. A comprehensive hydraulic model will be completed during the design process to further confirm line sizes.

6.2 Project Schedule

The NM-47 portion of Phase 1 MUST occur prior to or in conjunction with the planned NMDOT improvements to NM-47. Designs of the highway improvements are underway and are expected to be submitted to NMDOT for approval in late summer 2014. The design of the sewer lines along and crossing under NM-47 must be incorporated into and submitted with the roadway plans. Construction of NM-47 is expected to begin in early spring 2015. It is absolutely critical that Phase 1 be designed and constructed ahead of or in conjunction with the NMDOT project.

Construction schedules of the other phases are largely dependent on funding availability. With regards to Phases 2 through 5, the order of completion is not imperative. However, the main trunk lines must be in before the collection system is extended to the remainder of the service area.

Discussions regarding funding sources indicate the need to construct an operational project, which would include installing sewer along Chughole to the WWTP connection (as opposed to installing only the portion of Phase 1 along NM-47 and leaving an unused sewer pipe in the ground for several years until the Town can afford the entire phase). Phase 1 includes several dense neighborhoods along Chughole, where potential connections are concentrated within a relatively small area, providing a user base that would maximize revenue generation for the amount of pipe installed. The revenue would go toward: 1) paying off construction loans, 2) building a reserve account for providing match money for future phases, and 3) providing salaries for Utilities Staff. Revenue and income are further discussed in Section 6.6.

6.3 Permit Requirements

Utility permits are required to install any utilities, including sewer line, in the NMDOT right-of-way (ROW). The section of sewer along NM-47 will require a Utility Permit.

Additionally, this project must be covered by an NPDES Stormwater Construction Permit. This will likely entail development of a Stormwater Pollution Prevention Plan (SWPPP).

Early phases of the Peralta collection system will not exceed the facilities capacity or require modification of Bosque Farms' permit. Compliance with Code of Federal Regulations (CFR) 503 will continue to be met by subsurface injection of the sludge.

6.4 Sustainability Considerations

6.4.1 Water and Energy Efficiency

This project will not result in water reuse, conservation, or renewable energy. All the alternatives require some power consumption. The LPG system is not expected to radically change the homeowner's electricity bill.

6.4.2 Green Infrastructure

Green infrastructure does not apply to this project.

6.4.3 Other

This project promotes the regionalization of wastewater treatment, which ultimately will protect groundwater from septic system contamination. The NMED Surface Water Quality Bureau (SWQB) and Groundwater Quality Bureau (GWQB) were provided copies of the *Draft PER* for review and comment. The SWQB advised of the potential need for coverage under an NPDES Stormwater Construction Permit and an Antidegradation Review if the Bosque Farms WWTP

exceeds its permit discharge limits within the next permit cycle (see Appendix I). Comments were not received from the GWQB.

6.5 Total Project Cost Estimate

The Total Project Cost is estimated to be about $21,695,000, as seen in Table 6-1. This consists of approximately $19,748,000 for construction costs and $1,947,000 of non-construction costs (including engineering services). This cost estimate assumes that the design and construction of the entire wastewater collection system occur under one design contract and one set of bidding documents. However, funding limitations necessitate phased implementation, which will need multiple contracts. As such, the total project cost should be inflated to account for the costs associated with additional design and construction contracts. Past project experience indicates that constructing multiple phases may increase the total cost as much as 10 to 15 percent. The adjusted cost estimates for Phases 1 through 5 are also shown in Table 6-1. See Appendix J for detailed cost breakdown.

TABLE 6-1
ESTIMATED CAPITAL COSTS

Portion of Project	Construction	Professional Services	Total Capital Cost
Total Project in one contract	$19,748,000	$1,947,000	$21,695,000
Phase 1	$ 3,688,000	$ 395,000	$ 4,083,000
Phase 2	$ 2,231,000	$ 246,000	$ 2,477,000
Phase 3	$ 2,044,000	$ 234,000	$ 2,278,000
Phase 4	$ 1,653,000	$ 173,000	$ 1,826,000
Phase 5	$ 1,299,000	$ 136,000	$ 1,435,000

6.6 Annual Operating Budget

6.6.1 Income

The Town does not currently generate any income from utility bills. Peralta is developing a Sewer Ordinance (see Section 7) that will define user rates, which will go toward treatment costs

at the Bosque Farms WWTP as well as costs associated with Peralta's collection system (maintenance and repairs, salary for staff, etc.). The rate structure and grinder pump installation fee has not yet been defined by Ordinance, but for this PER, rates and charges are suggested for planning purposes.

The assumed sewer rates are summarized in Table 6-2. The fees reflect preliminary discussions with Bosque Farms regarding flat fee sewer rates ranging from $5.50 to $7.50 for residential and business connections. The MOU will identify if annual rate increases are expected.

Additionally, it is expected that the Town itself will impose a fee to generate income for repayment of loans and maintenance and upkeep of the system. For planning purposes, this PER assumes the Town charges an additional $30 per connection per month for residential users and $35 for commercial users. The fees and rates presented in this PER are not binding, however they are meant to provide Peralta with some estimate of what residents may be expected to pay for wastewater treatment.

TABLE 6-2
PROPOSED SEWER RATE STRUCTURE, 2014

Type of Connection	Bosque Farms Sewer User Fee	Peralta Surcharge	Total Monthly Fee
Residential	$ 5.50	$30.00	$35.50
Commercial – one grinder pump	$ 7.50	$35.00	$42.50
Commercial – two grinder pumps	$14.00	$35.00	$49.00

Peralta's estimated income from the surcharge discussed above equates to approximately $360 annually per connection, revenue of $90,000 from Phase 1, as seen in Table 6-3.

TABLE 6-3
REVENUE FROM SEWER BILLS

Phase	Number of Connections	Sewer Collections, Annually	Town Income, Annually
1	250	$107,000	$ 90,000
2	425	$181,000	$153,000
3	575	$245,000	$207,000
4	685	$292,000	$247,000
5	775	$330,000	$279,000
Full Buildout	1,500	$639,000	$540,000

It is suggested that the Town pursue additional avenues to generate income. Other potential sources of income include 1) increase the Town's gross receipts tax (GRT) and dedicate a portion of the revenue to the sewer collection system, 2) impose a mill levy on property taxes, 3) add a fee to new building permits, and 4) issue a groundwater protection fee to non-sewered residents.

In 2013, the Town of Peralta expected revenue of $57,000 per month ($684,000 a year) from GRT (7.4375 percent). While the actual tax collected was slightly lower than budgeted, dedicating even 10 percent of the GRT to the wastewater collection system will reliably provide about $68,000 over a year. This would essentially cover the annual payment of a $1.0 million loan with 3 percent interest rate over 20 years. Loans, annual payments, and funding options are discussed in Section 6.6.3.

Increasing the GRT for the sewer system by 0.25 percent (to 7.6875 percent) would boost income by about $2,000 per month ($24,000 per year). Combining the additional $24,000 with the $68,000 previously discussed would result in about $92,000 annually for the sewer fund.

Historically, the Town has not imposed a mill levy on property taxes. The property taxes collected on Peralta's residential and non-residential properties benefit County and State schools, but Peralta does not receive any of the revenue. The Town may consider assessing such a tax to generate income for the sewer system.

The value of Peralta's residential properties is approximately $182,744,000, and non-residential property value is about $21,046,000, as seen in Table 6-4. The property is taxed based on one-third of its full value; therefore, the taxable values of these properties in Peralta are $60,915,000 and $7,015,000, respectively.

TABLE 6-4
POTENTIAL REVENUE FROM MILL LEVY ON PROPERTIES IN PERALTA

Type of Property	Full Value	Taxable Value*	Mill Levy	Annual Income
Residential	$182,744,000	$60,915,000	2.00	$122,000
Non-residential	$ 21,046,000	$ 7,015,000	1.50	$ 11,000
Total Revenue from Proposed Property Taxes				**$133,000**

*Taxable Value equivalent to one-third (1/3) the total value.

Imposing a mill levy of 2.00 on residential properties would generate $122,000 on a yearly basis; imposing a 1.50 mill levy on non-residential properties would generate $11,000 annually. These mill levies combined would generate about $133,000 that could be used for operations and maintenance or debt repayment of the sewer system.

The Town considered imposing a groundwater protection fee to residents who are not connected to the sewer system. Town residents expressed opposition to this proposed fee. The Town does not further wish to consider this option in this planning document.

6.6.2 Annual O&M Costs

Annual Operation and Maintenance (O&M) costs are presented for the Peralta collection system in Table 6-5. Considerations were given to grinder pump maintenance and repairs, vehicle expenses, and two full-time employees (Level 2 WW Operator and Laborer). This cost of labor includes a 40 percent fringe to account for benefits that the Town must provide its employees. A detailed breakdown of anticipated Phase 1 O&M costs can be found in Appendix J.

TABLE 6-5
ANTICIPATED ANNUAL OPERATION & MAINTENANCE COSTS

Item Description	Phase 1 Costs	Full Buildout Costs
Labor	$ 84,000	$119,000
Repairs, Parts, and Maintenance	$ 45,000	$120,000
Vehicle Expenses	$ 9,000	$ 16,000
Miscellaneous	$ 29,000	$ 39,000
Conceptual Annual Cost	$167,000	$294,000

As of early 2014, Bosque Farms was experiencing high O&M costs, many of which were associated with replacement of pump cores. The life of a grinder pump is about 10 years. Approximately 8 to 10 years after the start of a phase, the Town should expect a significant increase in pump core replacements. However, if the Town plans ahead and builds a reserve (replacement cores and a monetary reserve account), the periods of high expense can be offset to some degree.

Operations at the Bosque Farms WWTP are likely to be somewhat affected by the additional sewage the plant will be treating as the Peralta collection system is constructed. It is recommended that Bosque Farms maintain responsibility of O&M associated with the WWTP. This is ultimately a role that must be defined in the MOU between Peralta and Bosque Farms. The cost of O&M responsibility must also be considered. Although Bosque Farms should maintain operations at the WWTP, it is not unreasonable for Peralta to participate in sharing the costs of O&M at the WWTP and the construction of an additional clarifier. It is suggested that this be incorporated into the MOU with Bosque Farms and possibly the rate structure for Peralta.

6.6.3 Debt Repayments

If the entire project (construction and non-construction costs) was constructed under a single contract and had to be financed by loans, the Town would incur $21.7 M in debt. Assuming Peralta obtained a 3 percent interest loan with a 20-year payback period, the Town's annual repayment would be $1.5 M, and the total cost of the loan over its payback period would be $29.2 M. Interest payments would total $7.5 M over the 20-year loan period. This debt would be

overwhelming to residents of Peralta; the Town is advised to construct the collection system in several phases to reduce the amount of principal borrowed at one time.

It is recommended that the Town approach construction in a phased manner, starting with Phase 1, which is estimated to cost $4.1 M, which includes the cost of engineering design. If Phase 1 had to be financed entirely, annual payments would be $273,500, assuming an interest rate of 3 percent and a payback period of 20 years. The total cost of the loan for Phase 1 would be $5.5 M. The principal, annual payment, total loan cost, and interest payments for Phases 1 through 5 are shown in Table 6-6.

TABLE 6-6

LOAN COSTS PHASES 1 THROUGH 5,
ASSUMING A 3 PERCENT INTEREST LOAN OVER A 20-YEAR PAYBACK PERIOD

Phase	Principal	Annual Payment	Cost of Loan	Interest
1	$ 4.1 M	$ 274,400	$ 5.5 M	$ 1.4 M
2	$ 2.5 M	$ 166,500	$ 3.3 M	$ 0.9 M
3	$ 2.3 M	$ 153,100	$ 3.1 M	$ 0.8 M
4	$ 1.8 M	$ 122,700	$ 2.5 M	$ 0.6 M
5	$ 1.4 M	$ 96,500	$ 1.9 M	$ 0.5 M

As stated in Section 6.5, multiple design and construction contracts will inflate the costs of each phase, so the total amount borrowed will be in excess of $29.2 M; however, the significantly smaller loans will be much easier for the Town to obtain and to pay off.

The potential sources of income discussed in Section 6.6.1 will not cover the annual loan payment for Phase 1, let alone for the annual payments of multiple phases simultaneously. Reducing initial debt is highly recommended to decrease the annual payments to an affordable amount. The Town should pursue grant funding and develop other tactics to minimize loan principal. One recommendation is to require that residents contribute a portion of the cost of their grinder pump.

This PER assumes a one-time grinder pump installation fee of $3,500 per lot. This “hookup fee” goes toward the cost of installing a grinder pump, control panel (and electrical modifications), and connecting to the sewer line. For a similar LPG sewer project in Tijeras, NM, the actual cost of hookup per household was $8,000 to $10,000, largely because many of the lots required electrical upgrades. However, the maximum homeowner contribution was decided to be something considerably less than that, and equal for all homeowners, regardless of the cost to hook up the individual lots. (Peralta will not be responsible for major electrical upgrades to individual lots, however.)

The cost of the grinder pump and installation in the cost estimates provided in Appendix J does not consider the homeowner’s contribution. The contribution made by the homeowner reduces the capital debt. For example, in Phase 1, there are about 250 lots to be connected. Homeowner contributions are expected to generate $875,000. If collected upfront, this would reduce the loan amount from $4.1M to $3.2M; annual repayment would be reduced to $216,000.

Although it is unlikely that all homeowners in Phase 1 will be able to afford $3,500 upfront, any reduction in principal will benefit the Town. If 50 percent (~125) of the Phase 1 connections paid upfront, the principal loan would be about $3.6M, and annual repayments would be about $245,000.

Another option to generate large up-front capital funds from homeowners is offering an incentive to pay their hookup fee ahead of time. For example, if homeowners pay by a certain date (regardless of what phase they may be in), they could pay a lesser hookup fee, perhaps $2,500. When service reaches their area, they will already have paid the hookup fee, at a discounted rate. If 30 percent of the total connections (~400) bought into the prepayment plan, the Town would generate $1.0M, reducing annual payments to $207,000.

Although homeowner contribution reduces loan payments considerably, the estimated income from sewer rates is not sufficient to repay the Town’s debt. Peralta is advised to pursue any available grant funding and no-interest loans. Potential sources include congressional and legislative funds, the Clean Water State Revolving Loan Fund, and USDA loans.

The Town has a $500,000 grant from the NMED Construction Programs Bureau (CPB), which is applicable to design fees and construction costs. Combining potential homeowner contributions (assuming 125 hookup fees are collected up-front), the principal debt may be reduced to $3.14 M, as shown in Table 6-7. Annual payments would be $211,000.

TABLE 6-6
POTENTIAL SOURCES OF GRANT FUNDING

Funding Source	Type	Amount
NMED CPB	Grant	$500 k
Hookup Fee	Homeowner Contribution	$437 k
State Revolving Loan Fund	**Loan**	**$3.14 M**
Total Funding		$4.08 M

The Town should maximize its opportunities to generate income; assessing a monthly non-sewer fee with a reduced hookup fee is another creative funding option that may be used to generate revenue to fund the project.

6.6.4 Reserves

The Town established a fund for the sewer collection system in July 2013. However, as of December 2013, there is no reserve in the account. Funding sources dictate the required reserve. While all funding sources have not yet been identified, it is likely that NMED will oversee at least a portion of the funding. The NMED requires a reserve equivalent to one-tenth (1/10) the annual debt repayment.

In the event the Town incorporates all improvements as a single project and no grant funding is available, a reserve of $145,800 would be required. The reserve for Phase 1 only is $27,500.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary of Recommended Project

The Town of Peralta, New Mexico, is pursuing the development of a sewer system to protect groundwater quality and fulfill the Town's long-term goals of fostering municipal wastewater infrastructure regionalization. The Town's wastewater would be conveyed to the neighboring Village of Bosque Farms wastewater treatment facilities for treatment and discharge to the Rio Grande. This PER was prepared to evaluate several feasible sewer options and identify which is best suited for the purposes of meeting the Town's goals.

Four types of sewer were initially considered: conventional gravity, vacuum, STEP, and LPG. Ultimately, the LPG sewer system was selected as the recommended system, in large part because Bosque Farms has a LPG sewer system and no additional equipment or facilities would be needed at the WWTP to treat the additional wastewater from Peralta. Conventional gravity and the vacuum system would both require construction of an entrance works to screen debris and large solids; furthermore, equalization volume would need to be added for the gravity option. These alternatives were also more costly than the LPG system. The STEP option was screened from detailed analysis because STEP effluent characteristics are drastically different from traditional wastewater that contains solids.

The estimated capital cost of the project is about $21,695,000. It is unlikely that the Town can or wants to embark on a project of such magnitude at one time. It is recommended that the project be broken up into many phases that are constructed as funding becomes available. For purposes of this planning document, the first five phases are outlined. With the completion of these phases, the main trunk lines will be installed, allowing the Town to extend service to residents in any part of Peralta in later phases. The first five phases range in cost from $1.4 M to $4.1 M.

Phase 1 is the most expensive and time-sensitive phase. This phase includes the main trunk line along both sides of the NM 47 corridor and the main trunk to the WWTP. It is critical that this particular phase be designed and completed as quickly as possible, because NMDOT is

scheduled to begin road improvements along this segment of NM 47 as early as January or February 2015. After the improvements are finished, the road will be placed in a moratorium, and no pavement cuts will be allowed within NMDOT right-of-way for at least five years. Due to funding constraints, the Town does not have the freedom of simply installing the trunk line in the ground along and under NM 47 and connecting to the WWTP at a later date. The project must be operational to receive any funding assistance.

7.2 Memorandum of Understanding with Bosque Farms

To ensure that the Town of Peralta and the Village of Bosque Farms foster a long-lasting, courteous, symbiotic relationship through regionalized wastewater treatment, the two parties are advised to develop a cooperative agreement that is acceptable to both parties, defining their respective roles and responsibilities. This MOU is necessary to prevent dissatisfaction and contention between the Town and Village. Both parties sign the MOU to indicate that they consider the agreement fair, and rely on its precepts to delineate accountability when disagreements arise.

The MOU is under development (see Appendix K), but it is expected to address responsibility issues such as:

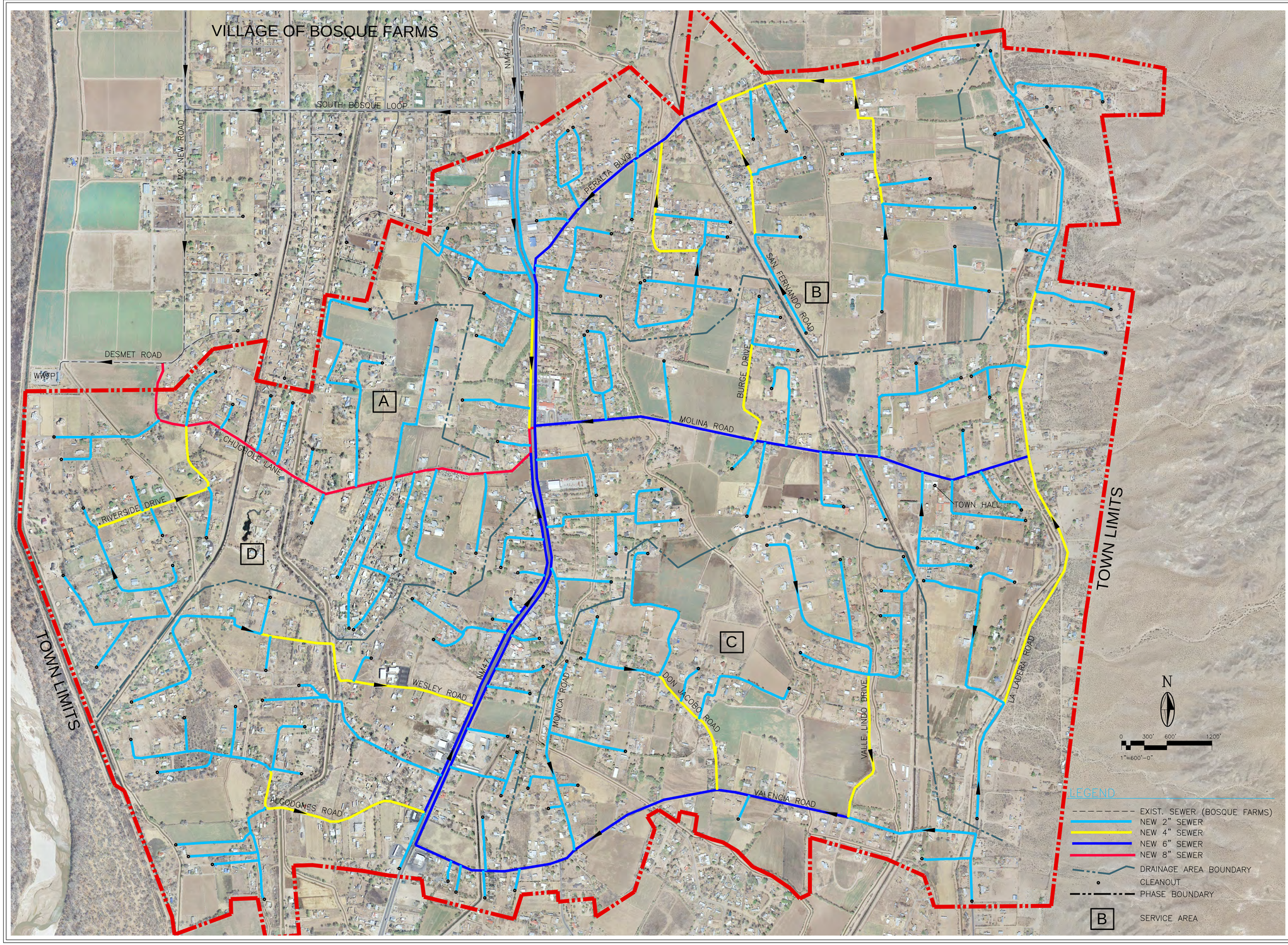
- Cost to Peralta of using Bosque Farms' WWTP
- Responsibility for Upgrading the WWTP
- Paying for costs associated with additional concentric package plant
- Impact to user fees related to upgrades/expansions
- Rates
- Responsibility of maintaining compliance with discharge permits

7.3 Sewer Ordinance

Prior to construction of a sewer collection system, the Town will adopt a Sewer Ordinance, defining the Town's sewer regulations. Molzen Corbin is assisting the Town with developing the

Ordinance. A draft version of the Ordinance is included in Appendix L. In particular, the Sewer Ordinance addresses and specifies the following:

- Establishment of a Utilities Department: The Ordinance establishes a Utilities Department and creates positions for personnel to manage the sewer collection system.
- Mandatory Nature of Connection: When service is available within a certain distance, homeowners will be required to connect to the system.
- Application, Installation, and Connection: The Ordinance describes the procedure for applying for service and coordinating installation of the grinder pump and connection to the sewer system.
- Responsibilities: The continuing responsibilities of the homeowner and the Town are outlined in the Ordinance.
- Connection Fees, Sewer Use Fees, and Special Charges: The application of such fees and charges is explained. The Ordinance will include provisions for automatic annual adjustment of rates for cost of living increases.
- Payment Options: Financing will be available for homeowners who are unable to pay the maximum homeowner contribution upfront.



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NOTICE OF EXTENDED PAYMENT PROVISION: THIS CONTRACT ALLOWS THE OWNER TO MAKE PAYMENT WITHIN 45 DAYS AFTER SUBMISSION OF AN UNDISPUTED REQUEST FOR PAYMENT

PRELIMINARY NOT FOR CONSTRUCTION

REV NO.	REV DATE	DESCRIPTION

PROJECT NUMBER: PER13-11
DESIGNED BY: DWA
DRAWN BY: DWA
CHECKED BY: CHT
PROJ ENG: CHT
PROJECT DATE: DECEMBER 2013

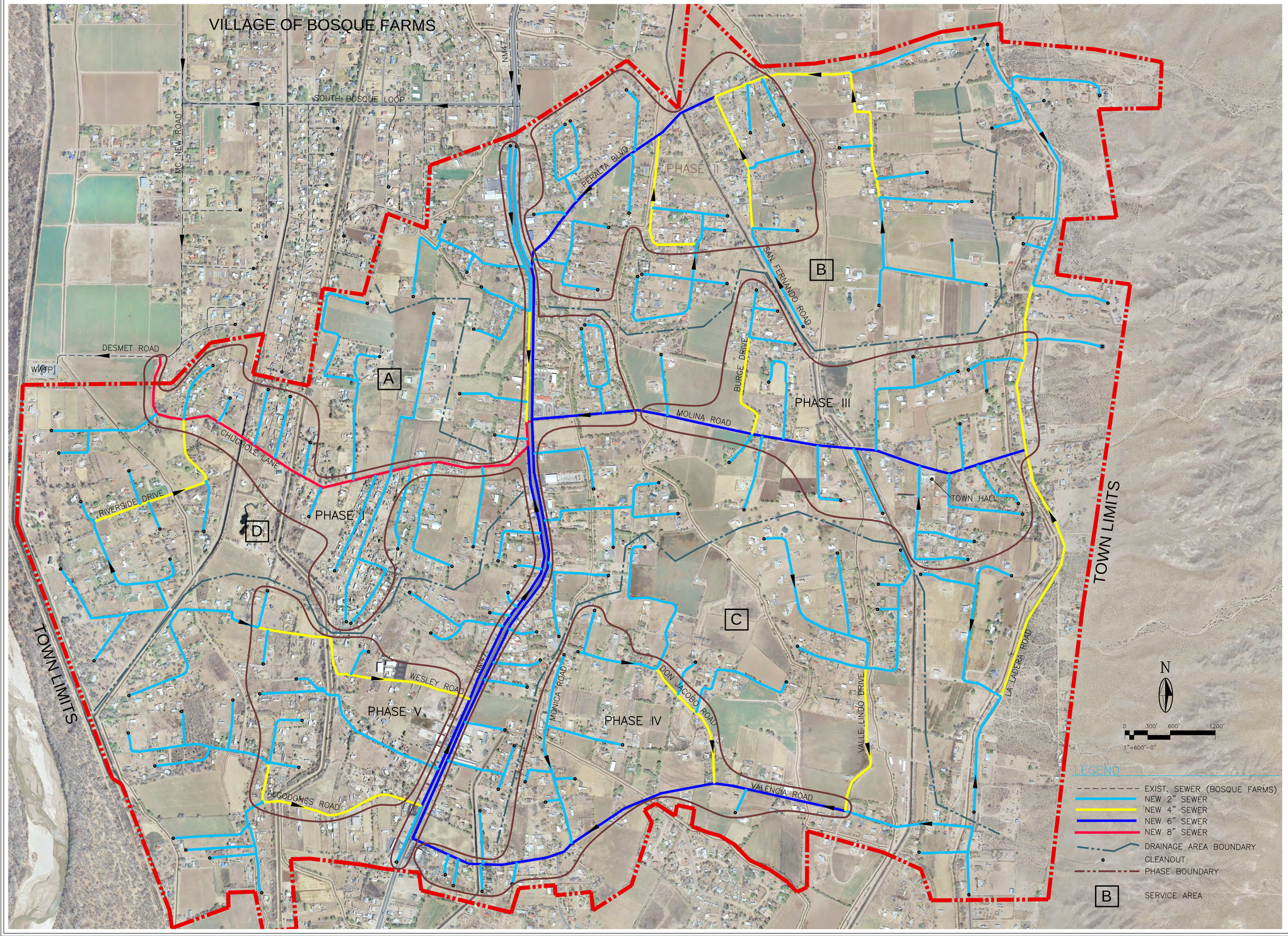
CONCEPTUAL SEWER SYSTEM MAP

SANITARY SEWER PRELIMINARY ENGINEERING REPORT
TOWN OF PERALTA
PERALTA, NEW MEXICO

PLATE I

SHEET

PLATE I 12/30/13 1:2



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REV NO.	REV DATE	DESCRIPTION

PROJECT NUMBER: PER131-11
DESIGNED BY: DWA
DRAWN BY: DWA
CHECKED BY: CHT
PROJ ENG: CHT
PROJECT DATE: DECEMBER 2013

CONCEPTUAL PHASING MAP

SANITARY SEWER PRELIMINARY ENGINEERING REPORT
TOWN OF PERALTA
PERALTA, NEW MEXICO

PLATE II

SHEET

PLATE II 12/30/13 1:2