

3.5 Community Water and Sewer Services

3.5.1 Existing Conditions - Water Supply

Existing Water Supply Sources

The Village of Kiryas Joel water supply is sourced from a series of 16 bedrock groundwater wells and one sand and gravel well. The water supply wells are generally located in two well fields. Ten of the wells are located in the Village boundaries [wells #1, 5, 6, 8A, 9B, 13A, 13B, 14A, 17, and 22 in the NYSDEC water supply permits]. Seven wells are located in the Brenner well field which is located on Larkin Road in the Town of Monroe [21B, 23, 24, 25, 26, 27 and 28]. Well 28 is a high capacity sand and gravel well located near the Ramapo River in the Village of Monroe.

The wells and the allowable amount of water withdrawn are presently permitted by a series of individual permits issued by the New York State Department of Environmental Conservation (NYSDEC) (existing permits WSA# 10,000, 11,344, 10,611 and 10,612). The combined permitted water withdrawal capacity under these permits is 1,928,000 gallons per day (gpd). Copies of the existing permits are provided in Appendix G1.

NYSDEC is presently overseeing the regulatory review process that would consolidate all of the existing wells under a single permit and add capacity with a new well field located on Village-owned property in the Town of Cornwall (the "Mountainville well field"). A draft consolidated water supply permit (WAS No. 11609, revised January 23, 2013) is currently pending in the regulatory review process.

The average allowed water taking from the ten wells within the Village is limited to 1.0 million gallons per day (mgd) by the permit. The current water taking for the Brenner Well field is limited to 928,800 gpd.

The Village is currently permitted to withdraw up to 1.93 mgd from all of the existing wells in the Village system, based upon existing permit conditions. The Village would be authorized to withdraw up to 2.54 mgd once the draft consolidated permit is issued as final by the NYSDEC and Mountainville Well 1 is placed into service. The consolidated permit will contain a special condition for a redundant source to be developed at the Mountainville Well Field.

The Village of Kiryas Joel owns, operates and maintains its water supply infrastructure, including: two pumping stations, five water storage tanks, three water treatment plants and the distribution system. Figure 3.5-3 shows the Kiryas Joel water distribution system. The five water storage tanks have a combined capacity of 4.1 mgd which allow the Village to meet maximum daily demand, water demand fluctuations and to provide fire protection service for the Village.

The supply wells located in the Village draw from bedrock aquifers consisting of shale, limestone and dolomite rock units of the Undifferentiated Hamilton Group, Undifferentiated Lower Devonian and Silurian Rocks and the Wappinger Group¹. Wells drilled into the bedrock intersect fractures in the bedrock which is the source of groundwater. The well yield of any particular bedrock wells in the Village is dependent upon the number, size and interconnectivity of bedrock fractures.

The Village's wells in the Brenner well field primarily draw groundwater from limestone and dolostone rocks in the Wappinger Group. This aquifer is also dependent upon local fractures and faults in the bedrock. According to the Geologic Map of New York (Lower Hudson Sheet²) a normal fault separating older Wappinger Group rocks from younger Undifferentiated Lower Devonian and Silurian Rocks is located in the vicinity of the Brenner well field. Well 28 in the Brenner well field is a sand and gravel well located in the unconsolidated deposits near the Ramapo River. The Ramapo River valley aquifer consists of unconsolidated deposits which run along the river corridor from the Village of Monroe in the north towards the south into New Jersey. Despite the fact that the Ramapo River flows over silty confining layers, the River appears to be hydraulically connected to the aquifer. Therefore, the aquifer has two primary sources of recharge, water induced from the river and direct infiltration from precipitation along the edges of the aquifer where the sand and gravel deposits outcrop³.

The Village bedrock aquifer and the Ramapo River valley aquifer (Brenner well field) are both located in the Ramapo River Basin. The Town of Monroe is at the northern edge of this drainage basin that covers 161 square miles, 70 percent of which is in Orange and Rockland counties, New York, and 30 percent in Bergen and Passaic counties, New Jersey.

Existing Water Usage

As a condition of the NYSDEC Water Supply Permit program (6 NYCRR Part 601) the Village submits an annual water withdrawal reporting form that records the amount of groundwater withdrawal from the Village's permitted sources. The report includes total monthly, annual average and maximum day withdrawal amounts.

The 2014 monthly average water withdrawal for the Village was 1.61 mgd. The maximum peak day water demand in 2014 was approximately 2.2 mgd (see correspondence in Appendix G2).⁴ Peak demand occurs on only a few occasions per year. The reported water usage numbers demonstrate that the Village well system can

¹ Orange County Water Authority, Ground-Water Resources Study, LBG, May 1995.

² Geologic Map of New York, Lower Hudson Sheet, New York State Museum Science Service, 1970.

³ Orange County Water Authority, Ground-Water Resources Study, LBG, May 1995.

⁴ Village of Kiryas Joel – 2014 NYSDEC Water Withdrawal Reporting Form.

³ Ibid.

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currently meet its average daily and maximum peak water demands, but is unable to meet its existing permit limitations on the few occasions per year noted (see further discussion below). The addition of the Mountainville well field would enable the Village to meet this maximum daily demand and serve as an interim supply while the remainder of the pipeline connection to the Aqueduct is constructed.

Currently, the Village can meet the estimated average daily water demand (2014) of 1.61 mgd as well as the reported maximum peak day water demand of approximately 2.22 mgd (2014).⁵ At present, the combined permitted capacity from the wells within the Village is 1,612,800 gpd; however, the present yield capacity is about 1.3 mgd.⁶ This total includes the yields from Wells 1, 5, 6, 8A, 9B, 13A, 13B, 14A, 17 and 22. Since Wells 13A and 13B cannot be pumped simultaneously, the yield from Well 13A has not been included in the total capacity calculated above. The average water withdrawal limit for the wells within the Village is 1.0 mgd. This limit is defined as the monthly average in a calendar year, therefore, the wells within the Village may be pumped as a combined yield capacity exceeding 1.0 mgd to meet peak water demand periods, as long as the monthly average does not exceed 1.0 mgd.

The permitted withdrawal under WSA #'s 10,611 and 10,612 from the seven wells at the Brenner Well Field (Wells 21B, 23, 24, 25, 26, 27 and 28) is limited to a monthly average not to exceed 928,800 gpd. The permitted withdrawal (928,800 gpd) is calculated based on 75% of the combined maximum yield capacity of the wells on the Brenner Property of 1,238,400 gpd. The present combined yield capacity of the wells in service at the Brenner well field is about 1.0 mgd.

The wells currently in service within the Village and at the Brenner well field have a combined capacity of approximately 2.3 mgd.⁷ While the existing wells have capacity to meet peak water demand of 2.22 mgd (2014), the existing water supply permit limits water taking to 1.93 mgd. The draft consolidated permit would allow the Village to withdraw up to 2.54 mgd once the draft permit is finalized and Mountainville Well 1 is placed into service.

A condition of the draft consolidated permit is for the Village to establish an alternative water supply source to meet its maximum day demand and to meet its redundancy requirement. New York State Department of Health (NYSDOH) regulations require that all sources of water meet the peak maximum day demand with the greatest capacity well out of service (Mountainville Well #1). This redundancy requirement of the NYSDOH is being incorporated by the NYSDEC in the draft consolidated permit. The Village is obligated to meet this requirement and will file an application for an alternative water

⁶ Correspondence from Mr. Tom Cusack, CPG, Leggette, Brashears & Graham, Inc. to Mr. Scott Ballard, NYSDEC, April, 26, 2013.

⁷ Ibid.

supply source within one year of the effective date of the permit. See discussion of Planned Water Supply Sources, below.

Planned Water Supply Sources

The Village of Kiryas Joel has made a commitment in planning for the establishment of a long term reliable and safe water supply for the current and future water demands of the Village.

The rate of groundwater withdrawal in the vicinity of the Village will increase with increased community growth and resultant water demands. As the groundwater withdrawal rate approaches and exceeds the natural groundwater recharge rate, it will be increasingly difficult for a local groundwater dependent system to maintain a reliable water supply for the community. Excessive groundwater withdrawals may affect neighbors to the Village who depend on the same groundwater resources.

In order to reduce the demand on groundwater resources, the Village developed a plan that is not reliant on groundwater and involves connection to the New York City Catskill Aqueduct. The plan for the Village to connect to the NYC water supply system has been envisioned for more than a decade. In September 2000, the Village of Kiryas Joel filed an official request with the New York City Department of Environmental Protection (NYCDEP) for conceptual approval to connect to the aqueduct.

According to the NYC Administrative Code (Section 24-360(e)), the amount of water the Village is permitted to withdraw is calculated by multiplying the Village population (as reported in the most recent US Census), by the per capita consumption of New York City residents. NYCDEP conceptually approved the Village request to withdraw up to 2.0 mgd in November 2000, based upon population data at that time. The City of New York must still provide final engineering approval for the proposed Village connection to the Catskill Aqueduct. At that time, the City and Village will execute a water supply agreement that will formalize the terms of the water taking.

The allowable water taking from the aqueduct will be determined by the NYCDEP at a future time when approvals and infrastructure are in place to connect to the aqueduct. For example, the Village would be entitled to approximately 2.56 mgd from the aqueduct, based on the 2010 Census for the Village (20,175 population) and the 2010 NYC per capita water usage estimates (127 gpd)⁸. The Village would be required to maintain 100 percent back-up for the volume of its taking with existing and new groundwater wells. The Village intends to rely on its existing groundwater wells and new wells to be established in the future to meet this backup requirement.

⁸ SEQRA, Negative Declaration by Village of Kiryas Joel for Mountainville Well Field, December 4, 2012.

NYC Aqueduct Connection

The Village of Kiryas Joel proposes to connect to the Catskill Aqueduct near Riley Road in the Vails Gate section of the Town of New Windsor. This location was proposed since it is generally the closest location of the Aqueduct to the Village of Kiryas Joel and allows the most direct routes for transmission lines, and the location is upstream from the point where the Aqueduct descends to cross the Hudson River to the east. The location of the Catskill Aqueduct in relation to the Village of Kiryas Joel is shown in Figure 3.5.1, Catskill Aqueduct Connection.

The Catskill aqueduct is part of the water supply system for the City of New York and provides water to certain municipalities along its route. The aqueduct carries water from the Ashoken Reservoir in Olivebridge, Ulster County to the Hillview Reservoir in Yonkers, Westchester County. The aqueduct traverses Ulster, Orange, Putnam and Westchester counties. The Ashoken Reservoir is supplied by surface water in the reservoir's watershed, approximately 255 square miles in size, including parts of 11 towns.

The Village has entered an inter-municipal agreement with the Town of New Windsor to share the Town's existing connection to the aqueduct. The Village will maintain and operate separate metering, transmission, treatment and distribution facilities and equipment. Water will be withdrawn from the Catskill Aqueduct using a vacuum priming system. The untreated water will be transmitted from the Aqueduct connection point to the Village through a 12 to 13 mile long pipeline following public roadway rights-of-way to a water treatment plant after which it will be delivered through the Village's existing distribution system. Water pipeline routing is shown in Figure 3.5-1.

In planning for the connection to the Catskill Aqueduct, the Village conducted extensive engineering studies of alternative potential technologies, pipeline routing, water treatment plant and pump station locations and pipeline sizing. Environmental studies were conducted in compliance with SEQRA procedures to assess the environmental impacts of Aqueduct connection. The Village commenced the SEQRA coordinated review process for the Catskill Aqueduct Connection project in July, 2002. Amended Findings for the Catskill Aqueduct Connection project were adopted by the lead agency on March 31, 2009, and are attached as Appendix G3. Construction commenced in March 2013. All legal challenges to construction of the pipeline are reported to now be completed.

The project will be constructed in two distinct major phases. Phase 1 includes construction of the first 6 miles of pipeline and other necessary appurtenances between the Village and the Town of Cornwall at the site of the Mountainville pump station and well field. Phase 2 will include the remainder of the route to New Windsor and the water treatment plant/distribution equipment.

According to the project engineer, construction of Phase 1 is nearing completion and is scheduled to be completed in 2015. Phase 2 is scheduled to be completed in 2017.

Mountainville Well Field

A requirement for connection to the Catskill Aqueduct and the New York City water supply will be to have a backup supply source in the event that repairs are needed on the Aqueduct. Currently the City has planned Aqueduct shutdowns scheduled in 2016 and 2018.⁹ As described herein, the Village currently has permitted capacity of 1.93 mgd and expects to expand that capacity with the addition of the Mountainville well field to 2.54 mgd.

The Mountainville well field is located at the midway point of the Catskill Aqueduct connection pipeline on property the Village acquired to locate a pump station to aid the transmission of water to the Village (See Figure 3.5-1 Catskill Aqueduct Connection). In addition to serving as a necessary backup to the City water, the Mountainville well will serve as an interim primary supply for the Village while the remainder of the pipeline is constructed. The groundwater supply from the Mountainville well field will use the same pipeline to the Village as the future Catskill Aqueduct connection. Water from the Aqueduct will flow by gravity from the connection location in the Town of New Windsor to the Mountainville well property. A pump station will be constructed on the Mountainville property, allowing water to be pumped to the Village from either the Aqueduct or from Mountainville Well #1. A second pump station is proposed on Ridge Road.

The well field is located on Route 32 in the Town of Cornwall, in the south west portion of the Town. The well draws from the Woodbury Creek sand and gravel aquifer. The aquifer extends into the Town of Cornwall along Woodbury Creek between Shunnemunk Mountain and Route 32. The aquifer consists of interbeds of well-sorted sand and gravel, silt and clay. The best water-yielding and water-bearing material in the aquifer is the coarse sand and gravel delta deposits. These deposits are overlain by silt and clay lake deposits of low permeability that act as a confining unit and cover the majority of the aquifer.

Because Woodbury Creek flows on bedrock or lake sediments, the amount of water which can be infiltrated from the creek is limited. Therefore, recharge is limited to direct infiltration of precipitation along the western side of the valley where the sand and gravel deposits outcrop. In addition, water is induced from tributaries of Woodbury Creek which flow on the sand and gravel deposits along the western portion of the valley and from base flow into the valley setting.¹⁰

⁹ Correspondence from Mr. Tom Cusack, CPG, Leggette, Brashears & Graham, Inc. to Mr. Scott Ballard, NYSDEC April 26, 2013.

¹⁰ Orange County Water Authority, Ground-Water Resources Study, LBG, May 1995.

The Mountainville well field is located in the Woodbury Creek Basin, which is part of the overall Moodna Creek watershed. Surface water drainage from the Woodbury Creek Basin ultimately flows to Moodna Creek and enters the Hudson River at Cornwall-on-Hudson. The Village retained Leggette, Brashears & Graham, Inc. (LBG) to conduct pumping tests on the Mountainville Well #1 to analyze water well yield as well as, potential environmental impacts of the proposed well on the Woodbury Creek aquifer and to local surrounding wells. A NYSDEC required 72 hour pumping test demonstrated that the Mountainville Well was self-sustaining and its use would not impact local nearby wells or other surface water bodies. The well has the capacity of approximately 425 gpd. The Village also conducted natural resource and cultural resource assessments of the Mountainville site.

The Village served as the lead agency for a coordinated SEQRA review of the potential environmental impacts of the Mountainville well field as part of the water supply permitting process with the NYSDEC and NYSDOH. The NYSDEC and NYSDOH were involved agencies in connection with water supply permits and the NYS Environmental Facilities Corporation (NYSEFC) was an Involved Agency with respect to drinking water supply financing.

Based upon the environmental review, the Village issued a Negative Declaration on December 4, 2012 for the development of the Mountainville well field. A copy of the Negative Declaration is provided as Appendix G4. All legal challenges to the Village's SEQRA review have been dismissed.

Star Mountain Well Field

The Village is also the owner of the rights to the former Star Mountain manufacturing site well field, also located in the Town of Cornwall. In 2009, prior to the discovery of the Mountainville resource, the Village filed an application with NYSDEC to reactivate two existing supply wells that were previously approved by NYSDEC. As with the Mountainville well field, the Star Mountain wells were planned to provide for the Village's required backup for the Aqueduct as well as a viable primary source for the Village until such time as the pipeline came online. Likewise, the Village intended to transport the Star Mountain water via the proposed Aqueduct pipeline. These wells were projected to produce 371 and 674 gpm, respectively, under simultaneous pumping conditions¹¹. With the pipeline project progressing and the subsequent identification and application for the Mountainville well field, the Village determined that it had more than adequate resources for its current and immediate future needs. In consultation with NYSDEC, the Village withdrew its application for the Star Mountain Well Field, reserving its right to re-apply should the need be presented in the future.

The Star Mountain well field consists of two wells and is located near the intersection of Taylor and Otterkill Roads¹² in the Town of Cornwall. The wells draw groundwater from the Moodna Creek sand and gravel aquifer. The aquifer comprises unconsolidated sediments consisting of stratified layers of gravel, sand, silt and clay deposits. It is presumed that these sediments were deposited by glacial and post-glacial streams of variable sizes. Boring data and the surficial geologic map presented in Frimpter (1972) indicate that the portions of the high-permeable sand and gravel north of Orrs Mill Road and near Taylor Road are overlain by low-permeability silt and clay deposits. These deposits act as a confining unit that somewhat limit the amount of direct infiltration from precipitation and creek that recharges the aquifer. However, significant portions of the aquifer to the west are considered to be unconfined. This aquifer has good recharge from direct infiltration from precipitation, base flow into the valley setting, and from the creek where the aquifer is confined. The sand and gravel deposits overlie undifferentiated granite and gneiss bedrock units in the area of the well field¹³.

The Star Mountain well field is located in the Moodna Creek East basin, which is part of the larger Moodna Creek Watershed. Surface water drainage from the Moodna Creek East basin ultimately flows to the Hudson River at Cornwall-on-Hudson.

Woodbury Heights Estates Water Co. Water System

In March 2014, the Village acquired ownership of a private water company, the Woodbury Heights Estates Water Company. The water company's water-supply system provides potable water and fire protection to the Country Crossing community in the Village of Woodbury, consisting of 67 households. The water supply system includes two groundwater wells and a 372,000-gallon aboveground atmospheric storage tank. The water company operates under a NYSDEC water supply permit that allows a taking of 24,500 gpd from the two original wells.

In December 2008 through March 2009, three 8-inch diameter bedrock wells were drilled and tested at the well field. Those tests showed significant excess capacity over and above the current and projected future demands of the Country Crossing community. The testing demonstrated that the potential surplus was between 200 to 220 gallons per minute or approximately 315,800 gpd. In July 2010, the water company entered a contract with the Town of Monroe to extend the company's excess water supply to serve certain properties in Monroe comprising the Forest Edge subdivision, and filed a certificate of extension (January 2011) of its service area to include the Town of Monroe

¹¹ Addendum – Pumping Test Report – Wells 3 and 4, Village of Kiryas Joel, Former Star Expansion Well Field, Taylor Road, Cornwall, New York. LBG, January 15, 2010.

¹² Regional Ground-Water Study, Town of Cornwall, Orange County, NY, McGooley, Hauser and Edsall Consulting Engineers, P.C., 1994.

¹³ Orange County Water Authority, Ground-Water Resources Study, LBG, May 1995.

with the Secretary of State in furtherance of that agreement. The Forest Edge subdivision is included within the proposed annexation territory.

In March 2014, the water company filed a change of ownership for its NYSDEC water supply permit and also applied to NYSDEC for a water supply permit to take the excess supply available through its three 8-inch wells in order to fulfill its water supply contract with the Town of Monroe for the Forest Edge Subdivision. In April, 2014, the water company filed an additional certificate of extension with the Secretary of State to extend its service area into Kiryas Joel, for an eventual interconnection to supplement Kiryas Joel's water distribution system.

The Woodbury Heights Estates Water Company wells are located in County Crossing subdivision near Country Hollow Road in the Town of Woodbury. The wells draw groundwater from the Undifferentiated Hamilton Group rocks Skunnemunk Formation consisting of shale, sandstone and siltstone bedrock units¹⁴. As indicated, the well system has a surplus capacity of approximately 200 to 220 gpm (approximately 315,800 gpd).

The Woodbury Heights Estates Water Company wells are located in the Woodbury Creek basin, which is part of the larger Moodna Creek watershed. Surface water drainage from the Woodbury Creek Basin ultimately flows to Moodna Creek and enters the Hudson River at Cornwall-on-Hudson.

In summary, since 2000 the Village of Kiryas Joel has planned for a connection to the Catskill Aqueduct in order to provide the Village a reliable long-term source of water and reduce the demand on groundwater resources. As described above, the New York City administrative code requires that the Village maintain 100 percent back-up for the volume of its water taking with existing and new groundwater wells. Once the Aqueduct connection is made, it is anticipated that the Village will have groundwater wells with sufficient capacity to maintain the volume allowed to be drawn from the Catskill Aqueduct.

The groundwater sources and wells may include: the existing Village of Kiryas Joel well field, the Brenner well field in the Town of Monroe, the Mountainville well field in the Town of Cornwall, the Star Mountain well field in the Town of Cornwall, and the Woodbury Heights Estates well field in the Village of Woodbury. Some of these wells are currently permitted for use by the Village and some will require further permitting to bring them on-line as part of the Village water supply system. The existing and potential wells yields are summarized below.

¹⁴ Orange County Water Authority, Ground-Water Resources Study, LBG, May 1995.

Table 3.5-1 Existing and Potential Well Yields for the Village of Kiryas Joel	
Well System	Well Yields
Existing Kiryas Joel and Brenner Well field	1,928,800 gpd (permitted capacity)
Mountainville Well Field	612,000 gpd (est.)
Star Mountain Well Field	1,504,800 gpd (est.)
Woodbury Heights Estates Well Field	288,000 to 316,800 gpd (est.)
<i>Total Potential</i>	<i>4.33 to 4.36 mgd</i>

The use of multiple well sites in different geologic formations and aquifers reduces the potential well impact in any one location or aquifer. As described, future connection to the Catskill Aqueduct will reduce the Village’s dependence upon groundwater and wells, thereby reducing potential impacts to groundwater and surface water resources. The use of any existing or future water supply source for the Village is subject to NYSDEC and NYSDOH review and approval, including the requirement of 72-hour pumping tests to document potential impacts to groundwater and surface water resources. NYSDEC permit requirements include, when appropriate, the long term monitoring of off-site wells and surface water resources to minimize potential impacts of groundwater usage.

Existing Water Service for Annexation Lands

The Town of Monroe does not have a centralized public water system in the 507-acre territory and development in this area is currently served by individual private wells, or, as explained below, by the Village of Kiryas Joel water supply system pursuant to contracts with the Town for out of Village service.

Two residential subdivision projects in the annexation territory have approvals to be serviced by the Village of Kiryas Joel public water system through contracts between the Village and the Town on an out of Village user basis. The projects are Vintage Vista, a proposed development of 28 lots (homes and accessory homes) and Forest Edge, a proposed development of 55 lots (homes and accessory homes). The Vintage Vista project is connected to the Village’s central water service on an outside user basis and a new Town water district was formed. The Forest Edge project would also receive water from the Village pursuant to a contract with the Town for out of Village service.

The Town of Monroe has several privately owned community water supply systems, as well as six (6) active Town water districts¹⁵. The Village of Monroe and the Village of Harriman operate and maintain centralized public water systems. None of these systems currently provide service to the annexation lands.

The lands proposed for annexation are not served by any of the private community water systems or the Monroe or Harriman village water systems. The closest public centralized water service to the lands proposed for annexation is available from the Village of Kiryas Joel water system. A map of existing water lines and lands proposed for annexation is provided in Figure 3.5-3.

Water piping and infrastructure for the Village of Monroe is located approximately one-third of a mile from the northwest portion of the annexation lands and water infrastructure from the Village of Harriman lies approximately one mile southeast of the annexation lands.

The Village of Kiryas Joel has the ability to provide water service to annexation lands, subject to Village and Town of Monroe approval, as long as infrastructure such as piping and pumping stations are extended into those lands. Extending water service to land outside the Village is a discretionary action by the Village and serving the Village residents is a necessary priority. Therefore, without annexation, residents in Town of Monroe land are ultimately dependent upon available private wells.

Water supply infrastructure such as piping and water service connections are subject to review and approval by the Orange County Department of Public Health. Such reviews are conducted under the auspices of licensed engineers, effectively assuring that water supply infrastructure is properly designed and installed thereby minimizing adverse impacts associated with such construction.

3.5.2 Future Water Demand

Future Water Demand without Annexation

Anticipated future growth of the Village, with and without annexation is discussed in this DGEIS in Section 3.1 Land Use and Zoning and Section 3.3 Demographics and Fiscal. It should be noted that extending water service to land outside of the Village is a discretionary action by the Village. The Village would necessarily prioritize serving Village residents first and would extend water service to land outside of the Village on a case by case basis. Therefore, without annexation, residents in Town of Monroe land are ultimately dependent upon private wells for water supply.

¹⁵ Town of Monroe Comprehensive Plan Update, May 19, 2008, Town of Monroe.

Discussions of water demand in the Village and annexation lands, without annexation, are presented below.

Village of Kiryas Joel

Water usage by Village residents is well documented, and therefore estimating future water demand can be determined by multiplying per person daily water use by projected population estimates. Estimating water usage by population is considered a more accurate method than using residential units and bedroom counts, since housing stock type, bedrooms and residential occupancy can vary. In addition, water is used by commercial businesses in the Village as well as institutions such as schools, medical and religious facilities that are used almost exclusively by the local residents. Water use based upon population provides an analytical method that accounts for the particular water uses in the Village.

The *Amended FEIS for the Proposed Connection to the New York City Catskill Aqueduct (2009)*¹⁶ provided an estimate of per-capita water usage for the Village based upon 2002 population and monthly water usage data. Average daily water usage in 2002 was 0.98 million gallons per day (mgd) and the Village had an estimated population of 14,904. The average daily water usage in 2002 was 66 gallons per day per person.

Projections from the 2009 Amended FEIS report are updated in this DGEIS. The Village population in 2014 was estimated to be 22,634 persons based upon 2010 US Census data, as well as Village of Kiryas Joel demographic data, including school registration, births, deaths and migration. This analysis was compared to other population studies and projections for the Village (see Section 3.3, Demographics and Fiscal). Table 3.5-2 below shows the projected population growth in the Village between 2010 and 2025 as estimated in this DGEIS.

¹⁶ AKRF, Inc., "Growth Study for Village of Kiryas Joel Amended FEIS for the Proposed Connection to the New York City Catskill Aqueduct", January 2009.

Table 3.5-2 Projected Population for the Study Area	
Year	Population
2010	20,175
2013	21,894
2014	22,634
2015	23,466
2020	30,890
2025	42,297

Source: 2010 population from U.S. Census. Projected population by TMA, as described in DGEIS Section 3.3 – Demographics and Fiscal. Study area includes the Village of Kiryas Joel and the proposed annexation territory.

Average daily water usage in 2014 was 1,488,221 gpd (1.49 mgd), according to the Village water use and budget reporting to the NYS Environmental Facilities Corporation.¹⁷ This usage is consistent with 2012 and 2013 average daily water usage which was 1.51 mgd and 1.48 mgd, respectively.¹⁸ By dividing the 2014 average daily water usage by the estimated 2014 population, the average daily usage was approximately 66.0 gallons per person, per day in the Village.

Note that the average daily water usage accounts for all uses in the Village including domestic, commercial, and other water uses, such as by schools and other institutions in the Village. This overall, per capita usage estimate is higher (more conservative) than the per capita water usage estimate by Orange County Department of Health (OCDOH) at 58.9 gpd but consistent with the 2002 estimate referenced above of 66 gallons per day per person. This rate of water usage reflects the currently reported water usage data and the DGEIS estimate of Village population.

Future water demand for the Village is estimated using the 66.0 gallons per day, per-capita water usage and the projected population. The analysis completed herein indicates that, without annexation, the population in the Village is expected to increase by 12,307 persons by the year 2025 (Table E-1 in DGEIS Appendix E). Thus, daily water usage in the Village will increase by 812,262 gallons per day (gpd) or 0.81 mgd. This Village use estimate does not include the Town of Monroe annexation land, which is discussed separately below.

Adding this estimate to the 2014 average daily water usage of 1.49 mgd provides an estimate of 2.31 mgd of future water usage in the Village in 2025.

¹⁷ Correspondence and supplemental information from Village of Kiryas Joel submitted to NYS Environmental Facilities Corporation, RE: DWSRF Project No. 16906, February 23, 2015.

¹⁸ Ibid.

The Village is permitted to take up to 1.93 mgd from all of the existing wells in the Village system according to the Village's existing water supply permits. The draft consolidated water supply permit, WSA No. 11609, which includes Mountainville Well 1, will authorize a water withdrawal of 2.54 mgd.

As described herein, the connection to the Mountainville well field is anticipated in 2015 and the connection to the Catskill Aqueduct is anticipated in 2017.

Town of Monroe Annexation Lands

The demand for water will increase as land in the Town of Monroe identified for annexation ("annexation lands") is developed over time under existing Monroe zoning provisions. It is assumed that new development in the annexation lands consisting of 507 acres will continue to be served by individual wells or through individual out of Village service agreements, subject to Village and Town approvals.

As described herein, two projects in the annexation lands have obtained Town of Monroe approvals (through subdivision) to connect to community water systems. The Vintage Vista project, a proposed development of 28 lots (56 potential units) is connected to the Village of Kiryas Joel central water service through a contract between the Village and the Town of Monroe. The Forest Edge project, consisting of 55 lots (110 potential units) would also be connected to the Village central water service through a contract with the Town of Monroe. These residential projects are under development, but are not yet occupied for the purpose of this study.

Future developers of small subdivisions or owners electing to build new housing on individual lots would be required to drill individual wells for water supply in Town of Monroe land. Under this scenario, land owners would drill, test and maintain individual water supply wells. Such wells are subject to NYS Department of Health approval under NYCRR Part 5, Subpart 5-1 standards for water wells. These regulations specify well construction, testing, and limitations on proximity to septic systems and other potential sources of contamination. Such wells would not necessarily require Water Withdrawal Permits from the NYSDEC (Article 15, Title 15).

Individual wells are limited to four connections or less by the NYSDOH and withdrawals of less than 100,000 gallons per day (approximately 69 gpm) per NYSDEC 6 NYCRR Part 601 (Water Withdrawal Permitting, Reporting and Registration). Wells with withdrawals over 100,000 gpd are subject to permitting by the NYSDEC and water-supply wells with five or more service connections are considered public water-supply wells and are subject to permitting by the County and State Health Departments.

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New individual wells drilled in the Town of Monroe on lands proposed to be annexed will be subject NYSDOH and Town of Monroe to pumping test guidelines (Town Code Chapter A65-8, Section L) to prove adequate yield and water supply. Any new community water system will be subject to extended 24 to 72 hour pumping tests and monitoring of nearby existing water wells. This testing is done to ensure that new water withdrawals do not negatively impact existing wells and water supply. If new wells are found to impact existing wells, then mitigation, such as limits on water taking, drilling of new wells, and/or deepening of wells may be required (NYCRR Part 5, Subpart 5-1 standards for water wells).

Larger residential subdivisions in the annexation lands in the Town of Monroe may secure agreements to connect to either municipal or private community water systems, but each residential development would need to secure separate approvals. Depending upon the project, required approvals may include any of the following:

- Village of Kiryas Joel Legal agreement to supply water to the individual development.
- Town of Monroe Formation of a District and Approval for installation of water main in Town ROW
- OCDOH Approval for water main extension from Village of Kiryas Joel to individual development.
- NYSDOH Review of subdivision and water supply
- NYSDEC Review of water taking as part of existing NYSDEC Village of Kiryas Joel Water Supply Permit.

Future residential subdivisions or larger development projects in the proposed annexation lands would likely be subject to individual SEQRA review by the Town of Monroe as lead agency. Such review and the approvals, as indicated above, were required for the planned Vintage Vista and the Forest Edge projects. Land owners planning to build individual single family homes would require a building permit from the Town of Monroe.

The Village of Kiryas Joel has offered agreements to extend water service to certain landowners in land proposed for annexation subject to approvals and conditions. As indicated above, the extension of water service to annexation land in Monroe would be considered on an “outside user” basis, subject to approvals by the Village and the Town of Monroe. The agreements anticipate developments rather than individual connections. The agreements anticipate that the outside users (developers) will extend the water main to reach their development, as well as improvements such as sidewalks and fire

hydrants. The outside users would pay for design, engineering, permitting and approvals. Such extension of water service may require the formation of a water district in the Town of Monroe. Finally, the future use of Aqueduct water would be prohibited to outside users, unless special permission is granted by NYCDEP. Outside interconnections may be subject to higher fees paid to NYCDEP. In summary, under the no annexation scenario, connecting to the Village community water service would involve greater cost and uncertainty than under the annexation scenario where community water service is provided to all landowners.

The without annexation projection estimates that up to 7,356 persons could be added to the population of the Town of Monroe by the year 2025 in the lands proposed to be annexed (Table E-1 in DGEIS Appendix E).

Using the estimate of 66.0 gallons per day, the future population in the annexation parcels will require an estimated 485,496 gpd (or 0.49 mgd). This estimate is based on the assumption that water usage for the population in the annexation parcels will be generally similar to water usage in the Village.

Village and Annexation Territory

This without-annexation scenario makes the assumption that population growth in the study area would continue, that an additional demand estimated at 812,262 gpd may be added from development in the Village of Kiryas Joel and an additional demand estimated at 485,496 gpd may be added from development in the Town of Monroe by the year 2025. New projected water demand in the entire study area would total 1,297,758 gpd, or 1.30 mgd.

Without annexation, water supply for new development will be provided with a combination of individual wells and individual agreements to connect to the Village of Kiryas Joel community water system. The practicality of connecting to the Village central water system will depend upon the distance of Village water infrastructure to any proposed development, the size of the development and cost and permitting considerations.

The capacity of these water supply sources to serve new development in the land proposed for annexation will be reviewed on a case-by-case basis by agencies authorizing respective approvals and permits (OCDOH, NYSDEC, and NYSDOH).

Future Water Demand with Annexation

The primary benefit of annexation as it relates to water supply is the ability of landowners to connect to the Village of Kiryas Joel public water system under a more straightforward, consolidated review of utility connections.

Each new development or “user” would be required to obtain approval from the Orange County Department of Health for extension of the water main. Agreements would be required from the Village for connection to the water supply, and for payment of connection and usage fees.

Pursuant to its NYSDEC Water Supply Permit obligations, the Village must report average and maximum day water usage. Water taking for new development in the Village will be limited by the existing NYSDEC Water Supply Permits.

The study area population is expected to grow by 19,663 persons by the year 2025 under either the no annexation or with annexation scenario. This population would be added to an existing estimated 2014 population of 22,634 persons for a total population of 42,297 by the year 2025. This population would result in a total water demand estimated at 2.79 mgd.

Population growth and estimated future water demand are summarized in the table below.

Table 3.5-3 Projected Water Demand for the Projected Population		
Year	Village of Kiryas Joel Population	Estimated Water Demand (average daily use)
2013	21,894	1.48 mgd (actual)
2014	22,634	1.49 mgd (actual)
2015	23,466	1.55 mgd
2020	30,890	2.04 mgd
2025	42,297	2.79 mgd
Source: 2010 population from U.S. Census. Projected population by TMA, as described in DGEIS Section 3.3 – Demographics and Fiscal. 2013 and 2014 water usage is actual reported volume.		

As described, the Village plans to connect to the Catskill Aqueduct water system, which has the capacity to provide water to the Village beyond the study period for this DGEIS, as its population grows. The NYCDEP requires that the Village maintain 100 percent back-up for the volume of its water taking with existing and new groundwater wells. Once the Village is connected to the Catskill Aqueduct, it is intended to serve as the primary water source for the Village and groundwater wells will be in place as temporary back-up water supply during those periods when the Aqueduct water is unavailable due to maintenance. Therefore, after the aqueduct connection, the Village’s wells will only be used on a temporary basis for testing or during those periods when the Aqueduct is

unavailable. Water supply wells controlled by the Village have capacity that exceeds the projected average daily and peak water demand for the Village in 2025.

Fiscal Impacts of Water Service

The Village of Kiryas Joel owns, operates and maintains its water supply system, including wells, piping, storage and treatment facilities. Operation, maintenance and expansion of the water supply system are funded by usage fees paid to the Village.

The properties in the Village have been paying taxes or usage fees for water services for over 30 years to cover the cost of the water infrastructure and services provided. In addition, the Village has instituted water connection fees for new housing construction from developers who must pay \$6,000 for each new housing unit in the existing Village and \$25,000 per unit outside the existing Village limit by agreement, with or without annexation. These fees will be used, in part, to fund the Catskill Aqueduct connection project which is currently under construction. Funding for the repayment of bonds will come from the collection of these user fees with or without annexation.

The mechanisms and formulas for funding the Aqueduct connection is documented in the Aqueduct Connection Project Business Plan (October 2013, Supplement 1, December 2013, Supplement II, January 2014) and was supplemented by additional information in February 2015 submitted to the New York State Environmental Facilities Corporation (NYSEFC) in support of the Village's request for extension of its existing short term financing with NYSEFC.¹⁹

The Village has instituted fees and agreements for existing and future users of Village water to fund the Aqueduct Connection project as well as other water supply infrastructure operation and maintenance. These fees only apply to Village residents and those out of district users who choose to connect to the Village system. The Village water supply system will have no impact on Town of Monroe residents who do not connect to the Village water system.

3.5.3 Mitigation Measures – Water Supply

All of the Village's water supply sources are subject to regulatory control of the NYSDEC and NYSDOH. The NYSDEC water supply permits regulating the Village's existing water supply contain standard provisions requiring water conservation measures and mandatory enforceable conditions to mitigate impacts to other existing nearby supply wells. In addition, each permit was subject to review pursuant to SEQRA. For example, the draft consolidated water supply permit WAS No. 11609 includes water conservation conditions including the following:

¹⁹ Correspondence and supplemental information from Village of Kiryas Joel submitted to NYS Environmental Facilities Corporation, RE: DWSRF Project No. 16906, February 23, 2015.

- 1) A requirement for the maintenance of meters on all water supply sources and all customer service connections,
- 2) A requirement for meter calibration on a periodic basis,
- 3) The maintenance of records for water production and consumption, and an annual audit to determine unaccounted for water,
- 4) The implementation of a leak detection and repair program for the entire distribution system in a systematic fashion. At a minimum this program must cover the entire water system on a three-year cycle,
- 5) The maintenance of all records of production and consumption, water audits, leak detection and repair for a ten year period.

The above water conservation, reporting and maintenance provisions are intended to result in optimizing and minimizing water usage in the Village.

Any new source of groundwater for the Village from wells will likewise be subject to review and approval by NYSDEC and NYSDOH. In addition to SEQRA review, permit review includes technical assessment of the sustainable pumping rate of wells and their potential impact to neighboring wells and nearby surface water features. Water supply permits are subject to conditions to ensure public and environmental health and safety.

Connection to the Catskill Aqueduct will also mitigate potential water supply source impacts. Engineering plans for this connection are subject to review and approval by the New York City Department of Environmental Protection (NYCDEP). The water supply agreement between NYCDEP and the Village requires a City-approved water conservation plan as well as state of the art metering and other technologies to prevent waste and contamination of the water source. In addition, the use of Aqueduct water is strictly limited to the territorial boundaries of the Village, unless otherwise approved by NYCDEP, and the allowance volumes are likewise strictly limited by the previously noted formula based on current certified population figures and per capita usage in NYC. The NYCDEP water supply agreement will also require the Village to demonstrate the ability to sustain Aqueduct connection shutdowns and to maintain such backup sources. While the Village will be required to maintain its existing groundwater well supply sources to serve this backup capacity, it is expected that the connection to the Aqueduct will relieve and reduce pressure on the local groundwater resource.

3.5.4 Existing Conditions - Wastewater

Existing Wastewater Treatment

The Village of Kiryas Joel is located in Orange County Sewer District #1 (OCSD#1). The OCSD#1 serves all properties in the Village of Kiryas Joel, the Village of Monroe, the Village of Harriman and portions of the Town of Monroe, including the majority of the

annexation territory. A map of the OCSD#1 is provided as Figure 3.5-2. The existing sewer lines in the Village are shown in Figure 3.5-4, Kiryas Joel Sewer Line Map.

Based upon a 1978 intermunicipal agreement, OCSD#1 also serves areas outside the boundaries of the District in several municipalities in the Moodna River drainage basin (known as the Moodna municipalities²⁰). Member communities in the Moodna Basin Southern Regional (MBSR) Joint Sewage Board include: the Village and Town of Chester, the Town of Blooming Grove, the Town of Woodbury and portions of the Town of Monroe not within the OCSD#1 mapped boundaries. It has been reported that the Villages of South Blooming Grove and Woodbury are successors to the rights and obligations of the Towns of Blooming Grove and Woodbury, with respect to the inter-municipal agreements.

The OCSD#1 operates a single wastewater treatment plant, the Harriman Wastewater Treatment Plant (WWTP), located at 72 River Road in the Village of Harriman. The Harriman WWTP has a capacity of 6.0 million gallons per day (mgd). The plant was upgraded in 2006 to increase its capacity by 2.0 mgd from its previous capacity of 4.0 mgd. As discussed further below, Orange County has recently retained an engineering consultant to develop plans over the next year to expand the treatment capacity of the District by up to an additional 3 mgd.

In 2000, Kiryas Joel completed its own wastewater treatment plant in the Village in response to a long standing sewer moratorium that had been placed on new connections to the Harriman WWTP. The plant is located on Bakertown Road in the Village. The Kiryas Joel WWTP has a capacity of 0.97 mgd. The OCSD#1 presently uses all of that capacity from the Village.

Harriman Wastewater Treatment Plant

The Harriman WWTP was originally constructed in 1974 concurrent with the establishment of the Orange County Sewer District #1. It was constructed with a 2.0 million gallon per day conventional activated sludge system (CAC). The treatment capacity was expanded in 1987 with a 2.0 mgd oxidation ditch system. Most recently, the plant was upgraded in 2006 and capacity increased by 2.0 mgd with a new CAC system. Therefore, the total capacity of the Harriman plant is currently 6.0 mgd.

The existing wastewater facility includes preliminary, primary and secondary treatment, followed by disinfection, as well as sludge thickening and dewatering. Following

²⁰ Amended Final Environmental Impact Statement for the Enhancements to the Harriman Wastewater Treatment Plant, Orange County Department of Environmental Facilities and Services, January 2010

disinfection and dechlorination, the flow is discharged through two outfalls to the Ramapo River²¹.

The plant has effluent limitations and monitoring requirements that it is required to meet under its existing State Pollution Discharge Elimination System (SPDES) Permit (Permit No. NY 002 7901). The permit also includes recording and reporting requirements typical of wastewater treatment plant SPDES permits.

Harriman WWTP flow rates are reported monthly to the Orange County Division of Environmental Facilities and Services, as well as to all municipalities contributing wastewater flow to the facility. The existing flows to plant for the months of November and December 2013 and April through June 2014 are provided in Appendix G5. The report includes both allowable wastewater allocation and monthly flow rates from the Moodna municipalities and OCSD#1. The 2014 report indicates that the total 12 month average ending in June 2014 was 4,460,333 gpd, which is 74 percent of the permit flow rate of 6,000,000 gpd.

Treatment rates at the Harriman WWTP have remained relatively stable over the past few years. In the 12 month period ending in September 2008 the average flow rate was 4,518,750 mgd which is 75 percent of plant capacity. In the 12 month period ending in October, 2009 the average flow rate was 4,689,013 gpd, which is 78 percent of capacity.

The Harriman WWTP has two permitted outfalls to the Ramapo River. Outfall 001 discharges to a tributary to the Ramapo River with a NYSDEC water classification of C. Outfall 002 discharges to the Ramapo River with a water classification of A(T). The SPDES Permit effluent limits for the Harriman plant are provided in Table 3.5-3, below.

²¹ Harriman Wastewater Treatment Facility Membrane Bioreactor Pilot Study, Camp Dresser & McKee, Inc., October, 2006.

Table 3.5-4 Harriman WWTP Current SPDES Permit Effluent Limits	
Effluent Characteristics	Effluent Limits
Flow, Monthly Average, mgd	0.97
Carbonaceous Biological Oxygen Demand (CBOD) daily max. mg/L	5.0
Total Suspended Solids, daily max, mg/L	10
Solids, Settleable daily max. mL/l	0.1
Ammonia Nitrogen – Monthly Ave. June – October. mg/L	1.5
Ammonia Nitrogen – Monthly Ave. November – May, mg/LI	2.2
Phosphorus Monthly Ave., mg/L	0.5 as P
Temperature – Daily Maximum, C	Monitor
pH (Average Month, Range)	6.0 – 9.0
Fecal Coliform – 30 day Average, No./100 mL	200
Fecal Coliform – 7 day Average, No./100 mL	400
Chlorine, Total Residual, daily max., mg/L	0.1
Source: Amended FEIS for the Proposed Connection to the New York City Catskill Aqueduct, February 2009.	

Kiryas Joel Wastewater Treatment Plant

In the early 1990's, increased growth in Orange County and limitations in the capacity of the Harriman WWTP led to a NYSDEC-imposed moratorium on new connections to the treatment plant. In 1994, in response to the moratorium, the Village of Kiryas Joel decided to build a separate sewage treatment plant in the Village that would serve the Village and allow for future Village growth. The Village remains in OCSD#1 and the Kiryas Joel WWTP is operated by OCSD#1 pursuant to a lease with the Village.

The plant was initially designed to treat up to 500,000 gallons per day and has since been expanded to the current capacity of 970,000 gpd. Construction for the plant commenced in 1997 and was completed in 2000.

The Kiryas Joel treatment plant utilizes rotating biological contactors (RBCs) with secondary settling. The treatment process also includes influent screening, primary settling, tertiary treatment and disinfection.²²

²² Big Solutions for Small Communities, Carolyn Lowe, October 1, 2001, American City and County Magazine, Penton, NY.

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The plant operates under a SPDES permit (NY 025-0520) with effluent limits and typical monitoring and reporting requirements. The Village treatment plant has one permitted outfall to an un-named tributary to the Ramapo River, with a NYSDEC water classification of C. The SPDES Permit effluent limits for the Kiryas Joel treatment plant are provided in Table 3.5-4, below.

Wastewater treatment flow rates and other discharge parameters for the Kiryas Joel plant are reported to Orange County and NYSDEC on a monthly basis by the plant operator as Discharge Monitoring Reports. Daily average flow for the month of November 2014 was 0.721 mgd. This flow rate is approximately 74 percent of the permitted plant flow rate of 0.97 mgd. (Appendix G6.)

The Kiryas Joel wastewater treatment plant treats wastewater exclusively from the Village and another portion of the Village’s wastewater is diverted to the Harriman WWTP. The County operates the Village plant with agreements between the County and the Village for payment, plant operation, maintenance, repairs and improvements.

Table 3.5-5 Kiryas Joel WWTP Current SPDES Permit Effluent Limits	
Effluent Characteristics	Effluent Limits
Flow, Monthly Average, mgd	0.97
Carbonaceous Biological Oxygen Demand (CBOD) daily max. mg/L	5.0
Total Suspended Solids, daily max, mg/L	10
Solids, Settleable daily max. mL/l	0.1
Ammonia Nitrogen – Monthly Ave. June – October. mg/L	1.5
Ammonia Nitrogen – Monthly Ave. November – May, mg/L	2.2
Phosphorus Monthly Ave., mg/L	0.5 as P
Temperature – Daily Maximum, C	Monitor
pH (Average Month, Range)	6.0 – 9.0
Fecal Coliform – 30 day Average, No./100 mL	200
Fecal Coliform – 7 day Average, No./100 mL	400
Chlorine, Total Residual, daily max., mg/L	0.1
Source: Amended FEIS for the Proposed Connection to the New York City Catskill Aqueduct, February 2009.	

Water Quality

The Harriman WWTP and the Village of Kiryas Joel WWTP are both located in the Ramapo River watershed. The Ramapo River and its tributaries begin in Monroe and flow south into western Rockland County then into northern Bergen County, New Jersey.

The Ramapo River watershed is a federally designated, sole source aquifer.²³ Thirty percent of Rockland County and two million residents in New Jersey receive their drinking water from the Ramapo River aquifer.²⁴

The NYSDEC has conducted biological surveys of the Ramapo River to assess water quality. Surveys were conducted in 1987, 1991, 1993, 1998. The surveys provide an assessment of water quality and the potential impact of the Harriman WWTP on the river's water quality.²⁵

The surveys were conducted at five stations on the Ramapo River over a distance of approximately 15 miles; from the Village of Harriman to Hillburn approximately one mile from the New York – New Jersey border. The 1998 report concludes that water quality in the Ramapo River ranges from slightly impacted to moderately impacted. Upstream of the Harriman WWTP, the river was moderately impacted, likely from urban run-off from Monroe. The report states “The Orange County Sewer District #1 discharge has a very minor and short lived impact on the river's water quality.”²⁶ Water quality improved steadily with distance downstream of Harriman to the Hillman sampling station. The report pointed out that improvement in water quality from 1987 conditions was related to the Harriman WWTP operating within capacity after plant upgrades in 1987. Although somewhat dated, these surveys indicate that the Harriman WWTP plant has had minor impacts on water quality when operated within capacity, which is its current operating condition.

Growth in the Demand for Wastewater Treatment

Overall growth in the demand for wastewater treatment in OCSD#1 can be estimated using data from previous studies of wastewater treatment in Orange County. Camp, Dresser and McKee (CDM) completed a study of the Harriman WWTP and OCSD#1 in April, 1988.²⁷ The report provides average monthly flows to the Harriman WWTP for 1987. The monthly flows to the plant averaged 3,064,667 gpd. The average 2013 combined flow rates to both the Harriman WWTP and the Kiryas Joel treatment plant combined are approximately 5,250,750 gpd. Therefore, wastewater treatment for OCSD#1 has increased by approximately 2,186,083 gpd over the 26 year period 1987 through 2013. This is an increase of approximately 71 percent, or an average increase of 2.74 percent per year over the 26 year period.

²³ Amended Final Environmental Impact Statement for the Proposed Connection to the New York City Catskill Aqueduct, February 2009

²⁴ DEIS – Western Ramapo Wastewater Treatment Plant, 2002.

²⁵ Ramapo River Biological Assessment, 1998 Survey, NYSDEC 1998

²⁶ Ibid.

²⁷ Orange County Sewer District No. 1 and Moodna Southern Region Joint Sewerage Board Facilities Expansion Engineering Report and Feasibility Study, Camp Dresser and McKee, April, 1988.

As discussed above, this growth has been accommodated with the construction of the 0.97 mgd Kiryas Joel WWTP in 1987 and the expansion of the Harriman WWTP to 6.0 mgd in 2006.

Litigation and Planning for Future Growth

Following the 2006 expansion of Harriman WWTP capacity to 6.0 mgd, Orange County proposed to offer up to 1.0 mgd of the expanded plant capacity to the Moodna municipalities. The decision to offer capacity was challenged in the Orange County Supreme Court (Environmental Claims Part) by the Village of Kiryas Joel and Village officials, asserting that the County had not adequately considered the treatment capacity requirements of the OCSD #1, before selling capacity outside of OCSD#1.

In August 2008, the Orange County Supreme Court issued a Decision and Order preventing the County from selling any newly created treatment capacity to communities outside of the OCSD#1, until studies were completed that demonstrated such capacity was indeed excess capacity over and above that needed to serve residents in the District, including the Village of Kiryas Joel. The Court held that the “the County must take all necessary steps to ensure that the in-OCSD municipalities are adequately allocated with regard to their wastewater treatment needs.”²⁸

In response to the Court Decision, Orange County completed an Amended Final Environmental Impact Statement (AFEIS) in January 2010, which amended the original FEIS completed in June 2001 in support of the Harriman WWTP enhancements. The January 2010 AFEIS included a detailed growth study completed by the Orange County Department of Planning. The growth study included population and buildout analysis for OCSD#1 to the year 2025 using alternative models. These projections were correlated with average monthly flow data from the Harriman WWTP and the Kiryas Joel WWTP.

The Orange County growth study population projections were conservatively higher than the AKRF demographic forecast made as part of EIS for the Aqueduct connection and pipeline construction, and the projections made for this DGEIS. The projections are reasoned estimations based on various factors and the figures are always subject to variation. See further discussions of demographics in Section 3.2.1 Demographics.

The conclusion of the 2010 study was that sufficient capacity exists to serve both the current and projected needs of OCSD#1 through 2015 even if 1.0 mgd capacity is allocated to the Moodna Basin municipalities. The AFEIS analysis and conclusions are further described in Section 3.5.2.2 Potential Impacts of Wastewater Treatment, below.

²⁸ Amended Final Environmental Impact Statement for the Enhancements to the Harriman Wastewater Treatment Plant, Orange County Department of Environmental Facilities and Services, January 2010.

In addition, Orange County and OCSD#1 have entered into a binding, enforceable agreement to expand the capacity in OCSD#1 when District wastewater treatment facilities reach 85 percent of their treatment capacity. The agreement acknowledges that population and development will continue to grow in the OCSD#1 and in the Moodna communities and that this growth will place demands on the District's wastewater treatment facilities.

The agreement provides for the reporting of treatment plant flow data, and a process and milestones for the enhancement of OCSD#1 treatment capacity, if that capacity "reaches 85% of the total design treatment capacity of the facilities for any three months within a period of six consecutive months". A copy of the Sewer District Agreement is provided in Appendix G7.

Plans for Harriman WWTP Enhancement

In 2006 the Orange County Department of Environmental Facilities and Services and the New York State Energy Research and Development Authority (NYSERDA) engaged Camp Dresser & McKee, Inc. (CDM) to study capacity enhancement options at the Harriman WWTP. This study was titled the *Harriman Wastewater Treatment Facility Membrane Bioreactor Pilot Study* (CDM, October, 2006). The report describes the existing facilities and treatment capacity, as well as the feasibility of incorporating membrane bioreactor (MBR) technology as a means of upgrading the existing treatment facilities. According to the report, conventional expansion of the facility is constrained by limited land for new treatment facilities. The existing oxidation ditch system built in 1987 is outdated and nearing the end of its useful life. The new MBR treatment system could be incorporated into the existing oxidation ditches, thereby reducing the need for the acquisition of additional land.

Based upon a pilot study, modeling and conceptual design, expansion of the existing facility is feasible, by retrofitting the existing oxidation ditches with new MRB equipment. The new technology, combined with other ancillary facility upgrades could increase the overall capacity of the Harriman WWTP by 3.0 mgd, for a total plant capacity of 9.0 mgd.

The MBR technology was compared to a conventional activated sludge expanded facility. The MBR system expansion appears to be most appropriate based upon: superior effluent quality, reduced chemical requirements, lower capital costs and ease of construction. According to the study, the present value 20-year life cycle cost for the MBR facility would be \$29,590,000 while the conventional plant expansion would be \$36,410,000 for the same period. The negative issues for the MBR technology include the fact that it is a relatively new technology, it requires greater maintenance than conventional treatment and annual operating costs, including electricity, are higher.

As part of the NYSERDA study, CDM consulted with the NYSDEC with regard to potential future SPDES permit effluent limits. A key consideration of the study was the ability of the MBR technology to meet current and future effluent quality standards. The NYSDEC provided preliminary proposed effluent limits in a memo from February 2006. The limits are anticipated based on permits being issued in New Jersey watersheds downstream of the Harriman plant, permits issued in other NYS watersheds and based on the classification of the Ramapo River as a Class A waterbody. A computer simulation predicted that, using the new MBR technology, the Harriman WWTP could meet more stringent future permit limits while increasing the treatment capacity to 9.0 mgd.

The Harriman WWTP can be substantially upgraded using existing technology without a major reconstruction of the plant and within its existing footprint, avoiding the need to acquire additional land or relocate the plant. Expansion of the plant's capacity to 9.0 mgd, or by one-third, would allow the plant to service the anticipated growth in the OCSD#1 well into the future (see discussion of future sewer demand and capacity, below) .

In January 2015, the Office of Orange County Executive Steven M. Neuhaus announced that Delaware Engineering, D.P.C. has been selected by the County to prepare a facility plan to study enlarging treatment capacity at Harriman WWTP from 6 to 9 mgd.

3.5.5 Potential Impacts - Wastewater

The population growth in the Village proper and the annexation lands will be the same overall under the two scenarios, but the density of that development will differ by location. The demand for wastewater treatment under either scenario will be generally the same and, therefore, the potential impacts are expected to be generally the same under both the annexation and without annexation scenarios.

The demand for wastewater treatment in the Village of Kiryas Joel will continue to increase based upon the Village's current and projected future growth. With and without annexation, undeveloped land in the Village and Town of Monroe will be developed over time along with the demand for wastewater treatment.

The quality of the wastewater treatment plant effluent is not affected by the level of population growth or its location. Rather, it is more dependent upon the proper operation and maintenance of the facility as it was designed. Therefore, there are no significant impacts to the receiving water body (Ramapo River) as a result of the proposed annexation action.

Anticipated future growth of the Village, with and without annexation is discussed in this DGEIS in Section 3.1 Land Use and Zoning and Section 3.3 Demographics and Fiscal.

Wastewater Treatment Without Annexation

In the scenario without annexation, development will occur; 1) in the Village of Kiryas Joel, and 2) on land in the Town of Monroe within the OCSD#1.

Approximately 392 acres (77 percent) the 507 acres of land in Monroe proposed for annexation are located in the OCSD#1 at the present time. This area includes one-hundred sixty-five (165) of the 177 proposed annexation parcels. (See Figure 3.5-4 Kiryas Joel Sewer Line Map.)²⁹

The remaining land, consisting of 115 acres (23 percent of developable land) is still served by OCSD#1 under the Moodna municipalities' agreement. This land includes 12 proposed annexation parcels. Sewer connections for these parcels, would require individual approvals by the Sewer District. Future development on these lots may utilize private septic systems, but as this portion of the Town of Monroe is developed, the majority of the land will be served by OCSD#1.

Currently, wastewater from the Village is treated at either the Kiryas Joel WWTP and at the Harriman WWTP on River Road in the Village of Harriman. Future development in Kiryas Joel will be connected to the County's wastewater collection system. Connection to the wastewater collection system will require approvals from the Village of Kiryas Joel and the Orange County Department of Facilities and Services, and sewer main extensions will require approvals from NYSDEC.

Without annexation, properties in the Town of Monroe will likely connect to the OCSD#1 as the collection system becomes available to them. Access to the OCSD#1 will vary based upon property distance to County sewers and topography (whether wastewater sewers can be connected by gravity flow or will need to be pumped). The proximity of existing sewer lines to the annexation lands is shown in Figure 3.5-4 Kiryas Joel Sewer Line Map. As shown in the map, properties located northwest of the Village would require the greatest extension of sewer lines to allow connection. Two proposed developments in the annexation lands within the Town of Monroe, Vintage Vista and Forest Edge, will both utilize the OCSD#1 system. Both projects propose to connect to existing sewer lines in Mountain Road.

Under the Town of Monroe Code, Chapter 42 Sewer Use, connection to a public sanitary sewer is required "provided that said sewer is within 150 feet of the property line, and the building for which service is extended is not further than 150 feet of the property line". The construction and use of private septic systems is permitted if public sewers are not available (Section 42-11), and if it complies with the requirements of the Department of

²⁹ OCSD#1 boundary mapping made available for this study.

Health and Town Code. The Code requires that, at the time the public sewer becomes available to a property served by a private sewage disposal system, a direct connection to the public sewer system shall be made, and the private system properly abandoned (Section 42-17).

Consistent with the Town Code, the “Orange County Sewer Use Law of 2008”, requires property owners with occupied buildings in OCSD#1 to connect to the public sewer, at the owners expense, if the property is within 150 feet from the property line. If any building is more than 500 feet from a public sewer, the owner shall not be required to connect to the public sewer. Whenever a public sanitary sewer is not available, the building shall be connected to a private sewage disposal system (septic system) complying with the requirements of Orange County Department of Health and Town of Monroe Code.

Currently, some properties in the annexation land are located within 150 feet from public sewers and some are more distant. As land at the edges of the Village is developed sewer lines will be extended allowing more property to eventually connect to the public sewer system. If the County sewer collection system is not available to property owners in the annexation lands, then individual private septic systems would be required for future development.

All land owners in the District, whether connected to the sewer District, or not, pay a sewer tax based on the assessed value of the land.

Estimates of Future Wastewater Flows without Annexation

Generation of wastewater is generally estimated by the number of residences served, as was done by the Orange County Planning Department in its *Orange County Sewer District #1, Build-out Analysis (January 21, 2010)*. The New York State Department of Health (NYSDOH) uses an estimate of 400 gallons sewage generated per residential unit per day on average. No consideration is made by the NYSDOH standard for housing type or bedroom count since it is used as a general estimate of sewage generation. The 400 gallons per day per residential unit was used in the Orange County planning study as a method to measure development potential by acreage, and then to estimate wastewater generation. According to the study, “The one unit assumption held constant for every form of a single family dwelling unit, and allowed us to measure the existing land uses in the Sewer District based on acreage to sewage units”.³⁰

Residences in the Village of Kiryas Joel have a higher occupancy than a typical home in Orange County according to the US Census and therefore it could be assumed that wastewater generation per residence in the Village may be higher than for a typical

³⁰ Amended Final Environmental Impact Statement for the Enhancements to the Harriman Wastewater Treatment Plant, Orange County Department of Environmental Facilities and Services, January 2010.

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residence in the County. However, per-capita water use in the Village is documented to be lower than for surrounding communities. Water usage by Village residents is well documented since the Village monitors its water usage and reports that usage to the NYSDEC as per the Community Water Supply permit. As described in Section 3.5.1 Water Supply, the average daily usage is approximately 66.0 gallons per person, per day in the Village (2014 estimate). This average daily water usage includes all uses in the Village including domestic water use, commercial use and uses by schools and other institutions in the Village.

In this DGEIS, demographic estimates were made regarding residential units and occupancy using population data and the number of residences in the Village of Kiryas Joel (see Section 3.2 Demographics and Fiscal). The future number of dwelling units needed to accommodate the population was also estimated for the Village.

A conservative estimate of wastewater demand can be made by using the per-capita daily water usage estimate of 66.0 gallons per day per person. Without annexation, population growth in the Village is projected to add 12,307 persons by the year 2025. Using the estimate of 66.0 gallons per day per person sewage generation, future development in the Village will result in 812,262 gpd or 0.81 mgd of additional wastewater treatment demand for the Village, spread over the next decade. This Village demand estimate does not include the Town of Monroe annexation land, which is discussed separately below.

Without annexation, future population growth in the annexation territory under existing Monroe zoning was estimated to result in 7,356 added persons by the year 2025. This added population is estimated to result in 485,496 gallons of new wastewater treatment demand within the annexation territory by the year 2025. Note that 115 acres of the annexation territory (23 percent) are not located in OCSD#1 and therefore, this estimate may be conservatively high. (Some portion of those properties outside of OCSD#1 may be developed with individual septic systems.) However it is assumed that future development in land proposed for annexation will be served by OCSD#1 by the year 2025. As development continues to occur in this portion of the Town of Monroe, sewer lines will be extended and owners will be required to connect to the public system by the Town Code.

In total, future population growth in both the Village Kiryas Joel and in nearby land in the Town of Monroe proposed for annexation will result in an estimated new demand for wastewater treatment of 1,297,858 gallons per day (1.30 mgd) by the year 2025.

Overall Wastewater Treatment Demand

As described in Section 3.5.3, Existing Conditions - Sewer Use, the average rate of increase in the demand for wastewater treatment in OCSD#1 was approximately 2.74

percent annually in the years 1987 through 2013. This period experienced rapid development and growth in Orange County during the 1990's and 2000's prior to the 2008 national economic recession. The rate of increase in wastewater treatment demand in OCSD#1 has slowed since 2008. The combined wastewater demand in the District was 5,049,000 gpd in 2009 and was 5,250,750 gpd in 2013, resulting in a 1.0 percent annual increase over a four year period.

Wastewater demand for OCSD#1 can be projected to 2025 using the known growth rates over a 26 year period. Using a baseline sewer treatment rate of 5,250,750 gpd (2013 average treatment flow rate for OCSD#1, both Harriman WWTP and Kiryas Joel treatment plant) and an annual increase of 2.74 percent, for a 12 year period to 2025, the increase in sewer demand would be up to 2,011,916 gpd. The lower estimate of 1.0 percent annual growth would result in an increase of 257,655 gpd sewer demand over the same period.

The increased demand estimate (2.74 percent per year) would be added to the existing 2013 average flow rate of 5,250,750, resulting in a total treatment demand of up to 7,262,666 gpd (or 7.26 mgd) by the year 2025. The lower growth estimate of 1.0 percent per year would result in total treatment demand of 5,508,405 (or 5.51 mgd) by the year 2025. Overall growth in sewer demand for the District is shown in the table provided in Appendix G5.

It is anticipated that the District will expand its capacity (likely by an additional 3 mgd) well before 2025, since an agreement is in place between OCSD#1 and Orange County that requires upgrades to the plant be made if the flow rate at the HWWTP plant exceeds 85 percent of its capacity. As described herein, Orange County has recently announced that it has retained an engineering consultant to develop plans over the next year to expand the treatment capacity of the District by up to an additional 3 mgd.

The evaluation done by the Orange County Department of Environmental Facilities (January, 2010) determined that the OCSD #1 facilities have sufficient capacity for the anticipated growth in the District, including the Village of Kiryas Joel, until at least 2015. As noted herein, the Harriman WWTP is operating at 75 percent of the permit flow rate of 6.0 mgd as of May, 2014. The County concludes that there will be sufficient capacity beyond 2015 based on its obligation to increase capacity pursuant to the 2010 Expansion Agreement between Orange County and the Sewer District.³¹

Studies completed by Orange County Department of Environmental Facilities and Services and NYSERDA (October, 2006) demonstrate that the Harriman WWTP can be expanded to 9.0 mgd, or by one-third, within the existing facility boundaries using

³¹ County of Orange & Orange County Sewer District No. 1. Agreement with respect to the increase and improvement of wastewater treatment facilities. February 19, 2010.

available technology. Expansion to 9.0 mgd would service the additional demand from the Village of Kiryas Joel, and the overall growth in OCSD#1, well beyond the year 2025.

Water quality will be maintained for tributaries to the Ramapo River and the Ramapo River with the anticipated increase in wastewater discharge from the Harriman WWTP and the Kiryas Joel treatment plant. Planned upgrades for the Harriman WWTP will utilize the latest treatment technologies, including potentially a membrane bioreactor (MBR) treatment system. All improvements and resulting discharges will be approved, regulated and enforced by NYSDEC, ensuring the maintenance of water quality and minimization or mitigation of any potential impacts.

Wastewater Treatment With Annexation

Under the scenario of annexation, residential and mixed use development would be expected to occur on the 507 acres in the annexation lands, in patterns and land use densities comparable to existing development patterns in the Village of Kiryas Joel. Population growth and potential new residential development for the Village is analyzed in this DGEIS in Section 3.3, Demographics and Fiscal, and in Section 3.1, Land Use and Zoning.

Using the estimate of 66.0 gallons per day per person of wastewater generation and a projected new population of 19,663 persons, future development in the expanded Village boundaries will result in 1,297,758 gallons per day (or 1.30 mgd) of additional wastewater treatment demand by 2025.

Average household wastewater demand can be estimated by dividing the current Village water usage by the number of households in the Village. Water usage in the Village is reported at 1,488,221 gpd for the year 2014. The DGEIS demographic estimate of existing residences in the Village is 4,086 units. Dividing the water usage by residences results in an estimated 360 gallons of wastewater per day per household (inclusive of all uses). This number is generally consistent with the NYSDOH estimate of 400 gallons sewage generated per residential unit per day as discussed above, with the higher density per residential unit being offset by the lower per capita water use.

As described in the Land Use and Population projections in this DGEIS, projected population growth and residential development with and without annexation will be similar. Therefore, anticipated demand for wastewater treatment for the study area overall will be similar, with or without annexation.

The Orange County Department of Environmental Facilities Report (January, 2010) concludes that there will be sufficient capacity beyond 2015 based on its obligation to increase capacity pursuant to the 2010 Expansion Agreement between Orange County

and the Sewer District.³² The County has retained an engineering firm to develop plans for plant expansion over the next year, consistent with their obligations.

Studies completed by Orange County Department of Environmental Facilities and Services and NYSEDA (October, 2006) demonstrate that the Harriman WWTP can be expanded to 9.0 mgd, or by one-third, within the existing facility boundaries using available technology. Expansion to 9.0 mgd would service the additional demand from the Village of Kiryas Joel and from Town of Monroe annexation land well beyond the year 2025.

Fiscal Impacts of Sewer Service

Since the Village is located in the OCSD#1, Village residents fund the operation and maintenance of district facilities through benefit assessments and user fees paid to the County, which are based on the assessed value of the property, by all land owners in the sewer district. An operations and maintenance fee is charged to all homes and businesses connected to the County sewer. As shown in Figure 3.5-2, all of the Village and approximately 77 percent of the 507-acre annexation territory is currently paying the OCSD#1 (this includes all annexation land in the sewer district). Following annexation, those properties that connect to the sewer system will also pay appropriate connection, operation and maintenance fees. Given the apportioned assessments/fees, annexation will not result in negative fiscal impacts to OCSD#1.

Potential Impacts to Ramapo River

Water Quality

The Kiryas Joel WWTP and the Harriman WWTP are both currently operating below their treatment capacity. Currently, there are no plans to upgrade the Kiryas Joel treatment plant. The proposed expansion of the Harriman WWTP using Membrane Bioreactor (MBR) treatment technology would enhance water quality. A study completed by Camp Dresser and McKee, Inc. concluded that, using the new MBR technology, the Harriman WWTP could meet more stringent future permit limits while increasing the treatment capacity to 9.0 mgd. It is anticipated that planned upgrades of the Harriman WWTP will increase effluent quality discharged to the Ramapo River and thereby maintain or improve Ramapo River water quality. The water quality of the effluent discharged to the Ramapo River and its tributaries is directly tied to the SPDES permit effluent limits and the designed operation and maintenance of the two wastewater treatment plants. Annexation will not result in negative impacts to Ramapo River water quality.

³² Ibid.

Water Quantity

As early as the mid-1970's, there was concern about the undesirable reduction in the Ramapo River streamflow from groundwater pumping, given downstream water rights in the basin. A study of the New Jersey portion of the Ramapo River Basin completed by the US Geological Survey evaluated the balancing of groundwater withdrawal from stratified glacial drift connected to the Ramapo River and streamflow. The report indicated that "losses from the Ramapo River could be minimized by returning treated sewage effluent directly to the river..."³³

Currently, treated effluent from the Harriman WWTP is largely composed of groundwater drawn from the Ramapo River Basin watershed as well as groundwater from the Moodna Creek watershed. Effluent from the Kiryas Joel WWTP is composed of groundwater from the Ramapo River Basin. Following the Village's connection to the Catskill Aqueduct, surface water from the Ashoken Reservoir watershed will be transferred to the Ramapo River watershed, via treatment and discharge from the Village Plant and the Harriman WWTP. Water from both the Ashoken Reservoir watershed and the Ramapo River watershed eventually flows to the Atlantic Ocean. The water resources of the Ramapo River watershed will be augmented by the inter-basin transfer of water from the Catskill Aqueduct and will increase flow volume without a corresponding withdrawal from the Ramapo basin.³⁴ Rockland County legislators have supported the connection to the Catskill Aqueduct for the positive impacts of the interbasin transfer of water into the Ramapo watershed.³⁵ Copies of those letters are provided in Appendix G9.

3.5.6 Mitigation Measures - Wastewater

Wastewater generation is closely tied to water usage in a community system. The Village and the OCSD #1 are required to monitor and report both daily and monthly wastewater treatment volumes at their respective wastewater treatment plants. These requirements are conditions of the NYSDEC SPDES permit for the treatment plant. Given the practical limits on wastewater treatment capacity at the Kiryas Joel WWTP as well as the Harriman WWTP, the Village has an imperative to minimize its generation of wastewater. The water conservation practices listed in Section 3.5.3, Mitigation Measures – Water Supply, also directly apply to wastewater. The water conservation will result in reduced generation of wastewater in the Village.

³³ Vecchioli and Miller, *Water Resources of the New Jersey Part of the Ramapo River Basin*, U.S. Geological Survey, 1973.

³⁴ Amended Final Environmental Impact Statement for the Proposed Connection to the New York City Catskill Aqueduct, February 2009.

³⁵ Letters from Rockland County Legislators I. Schoenberger, P. Soskin, W. Darden, R. Berliner, and D. Fried to Abraham Wieder, Mayor, Village of Kiryas Joel, March 2005.

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The Village is committed to the proper operation and maintenance of the Village of Kiryas Joel WWTP. The Village has recently implemented facility upgrades of the WWTP that have improved operation of the plant and effluent water quality. These improvements include: Rotating Biological Contactor (RCB) improvements in 2010, trunk sewer, lift station and headworks screening improvements in 2014, and filter backwash storage and handling improvements in 2014. In addition, water use at the privately-owned poultry plant in the Village has been reduced by approximately one-third (2011 to 2012).

Annexation would provide the assurance of connecting new development in the annexation lands to the OCSD#1 public sewer system. Without annexation certain properties in the annexation lands may be required to install individual septic systems for future development if public sewers are not practically available. Annexation would also allow properties with existing individual septic systems to connect to the public sewer system providing for more reliable, regulated wastewater treatment for those properties.

The OCSD#1 has recently selected an engineer to study the expansion of the Harriman WWTP to add up to 3.0 mgd. Planned upgrades for the Harriman WWTP will utilize the latest treatment technologies, including potentially a membrane bioreactor treatment system. All improvements and resulting discharges will be approved, regulated and enforced by NYSDEC, ensuring the maintenance of water quality and minimization or mitigation of any potential impacts.