

**AQUARION WATER COMPANY OF CONNECTICUT  
CANNONDALE WELL FIELD**

**ATTACHMENT A: Executive Summary**

**1.0 DESCRIPTION OF PROJECT**

Aquarion Water Company (AWC) is requesting authorization under the Individual Permit for Diversion of Water for Consumptive Use (IPDWCU) for their Cannondale Well Field. This well field is currently inactive. AWC's intention is to utilize the Cannondale Well to augment the Greater Bridgeport System (that includes Wilton) which is being relied upon to meet supply deficits in the Southwest Fairfield County service area as well as the Ridgefield service area. Because of its location within the Greater Bridgeport System, the Cannondale Well is ideally located to support the existing permitted Southwest Fairfield County and Ridgefield interconnections. The Cannondale Well will provide resiliency and reduce the strain on the infrastructure currently serving these interconnections in Fairfield, Westport and Wilton. In addition, Cannondale Well production will reduce withdrawals from the Hemlocks Reservoir System, improving drought resiliency and AWC's ability to maintain future reservoir releases in compliance with the Connecticut Department of Energy and Environmental Protection (CT DEEP) Streamflow Standards and Regulations.

AWC's 2006 Water Supply Plan indicates that the Southwest Fairfield County planning region (Greenwich, Stamford, Darien and New Canaan Systems) currently has a margin of safety of less than 15 percent. This margin of safety deficit will be further exacerbated by the loss of safe yield in the Greenwich and Stamford system reservoirs as a result of the CT DEEP's Streamflow Standards and Regulations. AWC's Water Supply Plan indicates that the long-term solution for additional supply in the Southwest Fairfield County region is to increase the capacity to transfer water from the Greater Bridgeport System. This permit is being requested to augment the Greater Bridgeport System, which is utilized to address the margin of safety deficits for the Southwestern Fairfield County Planning Region. Although the water from the Cannondale Well will not increase the margin of safety significantly because of mitigation measures that will be implemented (discussed further in Attachment L), it will provide AWC flexibility to more effectively and reliably move water throughout the Greater Bridgeport System and improve drought resiliency. An added benefit of the permit may be the potential to utilize the Cannondale Well during the fall and winter months to increase the probability of reservoir refilling when increased releases are required from the Greater Bridgeport System reservoirs.

This individual permit application is a request to operate the Cannondale Well at a maximum withdrawal rate of 1.0 million gallons per day (mgd). Proposed construction activities include connecting the Cannondale Well to the existing pump house (via an underground main) and the construction of a small treatment facility to treat the discharge prior to entering the distribution system. The treatment facility will include chemical addition (chlorine, fluoride, corrosion inhibitor and pH adjustment), well controls and standby power. There are no other proposed construction-related activities associated with this diversion permit. All sediment and erosion control, fuel handling and similar best-management practices will be employed during the construction phase. Therefore, there will be no permanent construction-related impact to wetlands or wildlife.

The Cannondale Well Field consists of one overburden production well, PW-1, in addition to a number of observation wells. The production well was installed in 1982 after previous test drilling indicated that the underlying aquifer was capable of yielding over 1 mgd. A 90-day aquifer test conducted between June 19 through September 17, 1984 demonstrated that the well could yield 1,050 gpm (gallons per minute) or 1.5 mgd. During a pre-application meeting with CT DEEP (October 13, 2011) it was determined that the 1984 90-day aquifer test, which included an extensive network of groundwater monitoring locations and stream stage monitoring of the Norwalk River provided sufficient hydrogeologic data. During the 2011 pre-application meeting the CT DEEP expressed concern related to potential impact to the nearby wetlands, the Connecticut Department of Transportation (CT DOT) mitigation wetland and potential impacts to the Whiteriver Crayfish northwest of the well field at Goetzen Brook. As a result, a six-day aquifer test was conducted in July 2013 to observe potential impacts to a nearby wetland system, including the CT DOT mitigation wetland and Goetzen Brook.

The well draws water from the underlying stratified drift deposit. Well logs of the area indicate the stratified drift as deep as 145 feet deep in certain areas, consisting of interbedded sands and gravels. Underlying the stratified drift is a medium grained, interlayered metamorphic schist and granulite formation. The Norwalk River is located east of the well field and there is an extensive forested floodplain wetland that abuts the Norwalk River. A CT DOT mitigation wetland lies southwest of the production well and was created to compensate for offsite wetland impacts associated with the reconstruction of Route 7. Portions of the floodplain wetland and DOT mitigation wetland contain areas of seasonal shallow water (potential vernal pools). West of the well field is Goetzen Brook which flows into the Norwalk River southwest of the well field. A shallow pond/emergent marsh wetland is located at the upstream end of Goetzen Brook. Well logs and pump test data for the Cannondale Well Field are included in Attachment D12.

The 2013 aquifer test results documented impact to groundwater levels in the piezometers that were installed in the Norwalk River and nearby CT DOT mitigation wetlands. No impact was observed in the forested wetland located south of the CT DOT mitigation wetland or to the Goetzen Pond (shallow pond and emergent marsh) located northwest of the well field. The results of the 2013 aquifer test were discussed on March 7, 2017 during a second pre-application meeting with the CTDEEP. During the 2017 meeting the need for conducting an ecological baseline survey of the well field and surrounding area (specifically the Norwalk River, CT DOT mitigation wetland and vernal pools) was discussed. This survey was determined necessary in order to evaluate the potential well field impacts to these sensitive receptors and to develop a mitigation plan. As a result of the meeting, the ecological baseline survey was conducted in 2017.

## **2.0 SYNOPSIS OF DOCUMENTATION**

In 1984 a 90-day aquifer test was conducted by Geraghty and Miller (G&M) at the well field. The test included monitoring 22 groundwater monitoring locations and 4 stream stage monitoring of the Norwalk River. Information from this test documented the pumping conditions and impacts and provides sufficient hydrogeologic data. During a 2011 pre-application meeting, the CT DEEP expressed concern related to potential impact to the nearby wetlands, the CT DOT mitigation wetland and potential impacts to the Whiteriver Crayfish northwest of the well field at Goetzen Brook. As a result, a six-day pumping test was conducted in July 2013. During the test groundwater level measurements in the production well, three nearby overburden monitor wells

and in eight piezometers in wetlands located in the vicinity of the well field (including Goetzen Brook) were collected. Stream flow monitoring at two stream gage locations was also conducted.

During the 1984 test, the production well was pumped for 90 days at a constant rate of 1,050 gpm (1.5 mgd). The drawdown at the end of the 90 days ranged from 18.90 feet (production well) to 1.90 feet at a well located approximately 2,385 feet away. However, because there was a two to three foot regional groundwater decline as a result of dry conditions, the extent of the impact was likely less than 2,000 feet from the production well during the 90 day testing period. During the test, two private potable supply wells completed in the overburden exhibited pumping-related impact. One domestic well, located approximately 530 feet from the production well (Hansen Well) had a drawdown of approximately 11.95 feet after 90 days of continuous pumping and a second private supply well located approximately 1,140 feet from the production well (415 Danbury Road) had a drawdown of approximately 11 feet. The Hansen well was able to operate during the test without incident and thus was not adversely impacted. However, the well at 415 Danbury Road is a shallow dug well that went dry after the 77<sup>th</sup> day of the 90-day pumping test. Based on the 1984 test results, any shallow wells located within 1,000 to 1,500 feet of the Cannondale production well would need to be further evaluated and may require mitigation measures.

The analysis of the stream flow data collected during the last half of the 1984 90-day test indicated that no more than 30 percent of water pumped (1,050 gpm) during the test was derived from induced infiltration from the Norwalk River. Based on a reduced pumping rate of 1.0 mgd, the reduction in stream flow would not be more than 0.5 cfs.

During the subsequent 2013 aquifer test, the production well was pumped for 6 days at a constant rate of 905 gpm (1.3 mgd). The piezometer location in the Norwalk River demonstrated 1.2 to 2.5 feet of impact by the pumping of the nearby production well. Two piezometer locations in the adjacent CT DOT mitigation wetlands demonstrated 1.7 to 2.2 feet impact by the pumping. No other piezometers within 1,500 feet of the well field showed pumping-related impacts. Since no impact was observed in the forested wetland during the 2013 test, and these wetlands are adapted to seasonal variations in hydrology, short-term reductions in the forested wetland groundwater levels during dry periods are not expected to have an impact on the forested wetland flora or fauna. However, the 2013 test documented potential impact to the CT DOT mitigation and nearby vernal pools.

Based on the data collected during the 1984 and 2013 tests from the onsite monitoring wells, piezometers and stream gaging locations, impact was documented within the well field property, as well as extending offsite. In response to the aquifer test results, an ecological baseline survey was conducted between May and October 2017 to further characterize the vernal pools located in proximity to the CT DOT mitigation wetlands as well as completed further evaluation of the seasonal flows in the Norwalk River. The ecological baseline survey was conducted to identify species associated with each receptor listed above, along with critical periods in each species life-cycle to allow for pumping restrictions and/or habitat modifications to minimize potential impacts associated with pumping the Cannondale well field. Based on the data obtained from the ecological baseline survey and the 1984 aquifer test, a mitigation plan has been developed to address the species and critical conditions required by the sensitive receptors. This plan is intended for the first five years after issuance of the permit (to be re-evaluated and modified/discontinued

unless significant impact is noted following the five-year monitoring period). A mitigation plan to minimize impact to flow in the Norwalk River, monitor surface water and groundwater levels in the Floodplain/CT DOT mitigation wetlands and nearby vernal pools and monitoring groundwater levels in a nearby shallow private potable well was developed and is included in this application.

The proposed mitigation plan (Attachment L) includes the installation and monitoring of a permanent stream gaging station in the Norwalk River located upgradient of the Cannondale Well. Data for the proposed Norwalk River gaging station will be used to evaluate and limit pumping-related impact from the Cannondale Well to 10 percent of the calculated seven-day average Norwalk River flow to maintain the aquatic life. In addition, the Cannondale Well would not be pumped during the critical vernal pool breeding period (March – June) in order to allow associated vernal pool species to complete their annual breeding cycle. The plan also includes monitoring established vegetation and seasonal groundwater levels in the DOT mitigation wetland to identify potential short term and long term impacts to the plant community from pumping the Cannondale Well and monitoring groundwater levels during periods of extended pumping to evaluate potential impacts a nearby shallow potable wells.

### **3.0 CHANGES IN PROPOSED REGULATED ACTIVITIES**

The Cannondale Well Field was registered (for 0.0 gpm), but never connected to the system. AWC is currently applying for a new individual permit for a diversion of 1.0 mgd for a period of 25 years. No additional construction or other modifications are required at the Cannondale Well Field with the exception of connecting the well to the existing pump house/water main and the construction of a treatment facility, all located outside of wetland boundaries. Because the water being diverted from the Greater Bridgeport system to the various service areas is augmenting deficits, there will be no increase in the volume of water treated by regional or private wastewater treatment facilities.

### **4.0 TIMEFRAME FOR PROPOSED ACTIVITIES**

The diversion will commence under the authorization of a new diversion permit.