EXHIBIT A
PROJECT DESCRIPTION

Grantee: City of Hopewell
Grant: #440-S-14-02 (HRWTF-Phase 2 NRT Project)

The Hopewell Regional Wastewater Facility (HRWTF) is a 50 MGD secondary wastewater treatment plant that presently treats approximately 27 MGD of combined industrial and domestic wastewater. About 85 percent of the total flow is generated by five local industries: Honeywell, Ashland Aqualon, Evonik Goldschmidt, Rock Tenn, and the Virginia American Water Co. Domestic sources include the City of Hopewell, Prince George County, Fort Lee Military Base, and a federal correction complex. Treated effluent from HRWTF is discharged to Gravelly Run, a tributary of the James River. The HRWTF was retrofitted with "BNR-equivalent" technology under a prior WQIF grant (#440-S-00-01).

As a significant discharger into the Chesapeake Bay watershed, the HRWTF has a nutrient cap and wasteload allocations established for total nitrogen (TN) and total phosphorus (TP) (per Virginia's Water Quality Management Planning Regulation 9 VAC 25-720). The current allocations are 1.83 million lbs/year of TN and 0.075 million lbs/year of TP. Currently, the HRWTF is below its phosphorus requirement but exceeded its TN wasteload allocation in 2009, 2010, and 2012. To comply with its TN requirement HRTWF purchases nitrogen credits under the Nutrient Credit Exchange Program (via a private agreement with Honeywell-Hopewell).

Since the future market for nitrogen credit purchases is uncertain (cost for credits is not established after 2017 and future credit availability may be limited) and future nitrogen influent loads are likely to increase from both domestic and industrial sources, HRWTF must implement nitrogen reduction improvements. These Phase 2 improvements will expand on the Phase 1 improvements completed in May 2012, which achieved partial segregation of domestic and industrial flows in the initial treatment stages of the plant. The Phase 2 improvements will reduce HRTWF's effluent ammonia concentration and enable the plant to meet its TN wasteload allocation requirements.

The Phase 2 improvements further the segregated treatment concept in which biological nutrient removal (BNR) is achieved in only a portion of the influent flow. Since the industrial influent component inhibits nitrification due to high temperatures (37+ degrees C), frequent spike loadings, high concentrations of volatile organic compounds, chemical inhibitors, and other variable influent characteristics, two streams that contain a substantial nitrogen load, domestic and Honeywell, will be segregated from the stream which contains the majority of the heat load from Rock Tenn. The ratio of Honeywell flow to the segregated (domestic) stream will be targeted at 40% of the design average Honeywell flow to avoid excessive nitrification inhibition. However, capability to treat up to 100% of the design average Honeywell flow will be designed into the project to allow for maximum nitrogen removal as conditions vary. This separate treatment approach eliminates the need for cooling prior to BNR treatment and balances the need for BNR on the Honeywell stream with its potential for nitrifier inhibition.

A key component to achieving segregated treatment requires modifications to the existing Gravelly Run Pump Station and the addition of a new force main. This is to allow for the diverting of up to 9.3 MGD of Honeywell flow through a new dedicated force main, separate from other industrial flows, to the proposed segregated treatment processes at HRWTF.

Due to the nitrifier inhibition potential from Honeywell's flow, a moving bed bioreactor (MBBR) system was selected for the BNR design in the segregated treatment stream. This system is resistant to spike loads of inhibitory compounds and offers more protection to the nitrifying biomass versus

suspended growth systems. The segregated treatment approach will set the Limit of Technology effluent quality for HRWTF because only a portion of the flow passes through nutrient removal. The final effluent quality is determined by the dilution of the segregated flow into the remaining industrial streams. The segregated treatment system (domestic and a portion of Honeywell flow) will be designed to fully nitrify and partially denitrify the wastewater. This will be re-combined with industrial flows downstream in the process and further treated resulting in a final effluent total nitrogen of 15.0 mg/l or less on an annual average basis. The Phase 2 improvements are not expected to affect effluent total phosphorus and grant funds are not being used for any modification of the TP removal process.

The Phase 2 project improvements will have a design capacity of 46.4 MGD and will include the following components:

- Gravelly Run Pump Station and Forcemain Improvements (grant eligible)-A new Gravelly Run Pump Station with a firm capacity of 7,500 gpm will be constructed adjacent to the existing pump station. New 12 inch and 24 inch forcemains will be constructed adjacent to the existing North Interceptor to segregate Honeywell flows from other industrial flows and convey 40-100% of the design Honeywell flow to the new segregated MBBR treatment system at HRWTF, where it will be treated along with the domestic primary clarifier effluent.

- Primary Clarifier Modifications (grant eligible)-The primary clarifier effluent channel will be modified to include an MBBR Influent Weir Box to direct domestic flow to the proposed MBBR Influent Pump Station.

- MBBR Influent Pump Station (grant eligible)-Disinfected domestic wastewater will be conveyed from the primary clarifiers to the new MBBR treatment system via a new MBBR Influent Pump Station consisting of four vertical turbine solids handling pumps. Dechlorination facilities will also be constructed adjacent to the new MBBR Influent Pump Station.

- MBBR Screenings Facility (grant eligible)-The industrial (Honeywell) flow must be screened before entering the MBBR to avoid plugging the media retention screens. A proposed MBBR Screenings Facility will be attached to the new MBBR Tanks and will include the MBBR screen influent chamber, two mechanical screens and the Gravelly Run/Domestic mixing chamber.

- MBBR Tanks (grant eligible)-The new MBBR system will include a combined anoxic and aerobic reactor volume of 7.66 million gallons. The treatment volume is divided into six tanks with each tank providing four treatment cells. The first cell is an anoxic cell, provided with four 12-hp submersible mixers per tank. The second cell is for BOD removal and is provided with a diffused aeration grid. The third and fourth cells are for nitrification and are also provided with aeration grids. Each MBBR tank can be drained through a 14-inch drain line with screened opening for media retention located in cell 2 of each tank. MBBR effluent is recycled to the head of the tank using three axial flow pumps. A recycle capacity of 39.4 MGD, which is 2Q, is provided with all pumps operating. This recycle flow will increase denitrification and reduce, but not eliminate, alkalinity addition requirements. Facilities to store and feed caustic (sodium hydroxide) as a source of supplemental alkalinity will be provided. In addition, a supplemental phosphorus feed system including additional metering pumps and small diameter piping will be constructed.

- Blower Building (grant eligible)-To provide air and mixing in the MBBR process, new blowers will be installed with a firm capacity of 40,400 scfm. To span the range of flows anticipated, four blowers are provided, two 800 hp single-stage blowers and two 900 hp multi-stage stage blowers. Each blower will have a capacity of 13,433 scfm. The blowers will be located in the Blower Building adjacent to the MBBR tanks.

- Dissolved Air Flotation (DAF) Building (grant eligible)-Excess biological solids discharged from the MBBR tanks must be captured and sent to the solids handling system. To accomplish this, four DAF units, each with a capacity of 6,500 gpm, will be provided. MBBR effluent will be equally split and will flow by gravity through dedicated lines to the DAF units. The DAF includes an influent flowmeter on each unit, which is used to control polymer dosing. Air bubbles are introduced into the unit using three, 40-horsepower aspirating pumps per DAF. DAF effluent will flow through combined 42-inch DAF effluent header and return to the denitrification basin influent channel Solids are drawn from a 6-inch connection below each unit and returned to the Solids Holding Tanks using progressing cavity pumps. The DAF Building will house a polymer system used to feed polymer to the DAF units. This system will use dry polymer from super sacks and wet, mix and age the polymer for feed into the DAF units. The caustic storage and feed system for the MBBR tanks will also be located in the DAF Building.

- UNOX Aeration Tanks (partially grant eligible)-Since the existing denitrification basin does not have sufficient capacity to treat the increased nitrate load expected under the Phase 2 design basis, the first stage of the existing UNOX aeration tanks will be converted to an anoxic zone to increase denitrification capacity and meet these expected loads. This will entail installation of mixers and baffle walls. Aerators in the existing stages 2 through 4 are at the end of their service life and will be replaced as well.

- Secondary Clarifier No. 9 (ineligible)-An additional secondary clarifier will be constructed and configured similar to the existing units.

- Effluent Re-aeration (ineligible)-The facility currently has four OxyCharger units installed to provide re-aeration for the final effluent. The re-aeration structure includes space for a fifth unit. To meet the increase flows under the Phase 2 design basis, the fifth OxyCharger unit will be installed.

- Solids Handling Improvements (ineligible)-Solids loads will increase under the Phase 2 design basis. To meet these increased loads, a third dewatering centrifuge and additional solids handling capacity are needed. The additional centrifuge will be installed adjacent to the existing centrifuges in the Solids Handling Building. Additional solids disposal capacity will be needed to process the design basis solids production.