



## ORANGE WATER & SEWER AUTHORITY

*Quality Service Since 1977*

January 20, 2009

Mr. Roger Stancil, Town Manager  
Town of Chapel Hill  
405 Martin Luther King Jr. Boulevard  
Chapel Hill, NC 27514

RE: Annual report on odor elimination program at the Mason Farm Wastewater Treatment Plant

Dear Mr. Stancil:

Enclosed is our report on the odor elimination program at the Mason Farm Wastewater Treatment Plant (WWTP) in the 2008 calendar year. This report is submitted in accord with the Special Use permit for the WWTP.

The key points in the attached report include:

- The OWASA Board of Directors awarded a contract in December, 2008 for installation of covers at our three primary settling tanks, and the start of this work is pending. We expect completion in September, 2009.
- Design of covers to be installed on eight of our sixteen biological treatment tanks is almost complete. Covering of the biological treatment tanks is included in our adopted Capital Improvements Program for completion in Fiscal Year 2010-11.
- The above improvements, which have a total budgeted cost of \$4.2 million, are the highest priorities in the odor elimination program based on reviews by our odor consultants.

We would appreciate the opportunity to answer questions and to receive feedback on our odor elimination program at the WWTP.

Sincerely,

A handwritten signature in black ink, appearing to read "Ed Kerwin". The signature is fluid and cursive, with a horizontal line extending from the end.

Ed Kerwin  
Executive Director

Copies: OWASA Board of Directors  
Robert L. Epting, Epting and Hackney  
John Greene, P.E., General Manager of Operations  
Damon Forney, Manager of Wastewater Treatment and Biosolids Recycling

Enclosure

# ODOR ELIMINATION PROGRAM AT OWASA'S MASON FARM WASTEWATER TREATMENT PLANT

2008 ANNUAL REPORT TO THE TOWN OF CHAPEL HILL

January 20, 2009



The Mason Farm Wastewater Treatment Plant (WWTP)



The yellow arrow above indicates a carbon filter installed in 2007 to remove odor from the tanks at a pump station and some other areas inside the WWTP.

## HIGHLIGHTS

- ✓ Based on our consultants' recommendations, the next steps planned in the odor elimination program will be covering our three primary settling tanks and eight biological treatment tanks ("aeration basins").
- ✓ On June 26, 2008, the OWASA Board adopted a 15-year Capital Improvement Program including \$4.2 million for fiscal years 2009 through 2011 to cover the primary settling tanks and eight aeration basins.
- ✓ Following a review of OWASA's financial picture in October, the OWASA Board awarded a contract on December 11, 2008 for covering the primary settling tanks. The work is about to begin and completion is expected in September, 2009.
- ✓ Design work for covering the aeration basins is nearly complete. Due to the significant reductions in water demand during and since the drought of 2007-08 and their effect on our budget, we anticipate the OWASA Board will again review our financial data and projections before making future decisions on seeking bids and awarding a contract. The project to cover the aeration basins is listed in our capital program for completion in Fiscal Year 2010-11.
- ✓ We are continuing to keep the WWTP neighbors and the Town informed about our odor elimination program including key actions, the status of capital projects and our quarterly and annual reports to the Town about the odor monitoring program, etc.

## BACKGROUND

### Odor studies

- ✓ In 2004, the consulting firm of Hazen and Sawyer analyzed odor sources and recommended odor elimination improvements at the Mason Farm WWTP.
- ✓ In May, 2007, the consulting firm of Black & Veatch completed a second odor study at the WWTP. The study included an assessment of odor sources based on improvements then in place, evaluation of options, estimated costs of corrective actions and industry practices and standards for odor elimination.

### Definition of odor elimination

Following a public forum in November, 2006, the Town Council directed OWASA to develop a definition of odor elimination in consultation with WWTP neighbors and to develop a plan and timetable for odor elimination. In June, 2007, we completed our Draft Definition of Odor Elimination (Attachment 1) in consultation with representatives of the Highland Woods neighborhood and the North Carolina Botanical Garden. The definition is marked as a draft because we believe it should be reviewed and improved in the future based on experience and future odor elimination technology.

### Improvements for odor elimination, 2002-2008

Our investments in odor elimination through 2008 included:

1. Covering the tanks that hold treated wastewater solids (biosolids) before they are recycled; and installing an odor scrubber, which treats odor from the biosolids tanks. (2004; \$666,000)
2. Installing fixed covers on our four wastewater solids treatment tanks (“digesters”). (2005; \$1.6 million)
3. Improvements in solids treatment operations to reduce the amount of odorous solids returned to the biological treatment tanks (“aeration basins”). (2005; \$500,000)
4. Installing new aboveground pipes to carry foul air away from the digesters. The previously used underground pipes were an odor source. (2006; \$214,000)
5. Installing equipment to remove foam from the surface of our aeration basins. (2007; \$196,000)
6. Building a new facility to receive septage (solids removed from septic tanks by private contractors). Odor from the new septage structure is captured and treated. (2007; \$47,000)
7. Building a new, enclosed “headworks” structure. The headworks is the area where wastewater enters the plant. Foul air from the headworks is treated in the odor scrubber. (2007; \$2.2 million)
8. Enclosing three facilities:
  - “Splitter boxes” which are involved in carrying wastewater to and from the primary settling tanks,
  - the tanks at a pump station inside the WWTP site and
  - the channel that carries wastewater to the biological treatment basins; with foul air treatment (2007; \$477,000)

9. Connecting the exhaust air pipe from a new pump station at the WWTP to the odor scrubber (2007; \$50,000)
10. Connecting the exhaust air pipe from the solids dewatering building to the odor scrubber (2007; \$127,000)

The operating and maintenance costs for odor elimination totaled \$140,000 for the 2008 calendar year, including \$47,000 for personnel time, \$53,000 for treatment chemicals and \$40,000 for replacing the filter material (wood chips) in an odor removal facility called the biofilter.

## DISCUSSION

### Additional improvements for odor elimination

The highest priorities in our odor elimination program are the capital improvements discussed below.

Based on recent recommendations from Black & Veatch; a review by Bowker and Associates, one of the top odor consultants in the nation; and testing for hydrogen sulfide levels, we are proceeding with covering the primary settling tanks to address what we now know is the highest priority odor source at the WWTP.

The OWASA Board awarded a \$1.0 million construction contract on December 11, 2008 for covering the primary settling tanks. Work will begin early in 2009 and completion is expected in September, 2009.

Design work for covering the aeration basins is almost complete.

### Odor monitoring program at the WWTP

The June, 2007, Definition of Odor Elimination includes the following commitments by OWASA:

- Continuous monitoring of hydrogen sulfide levels with at least four devices in addition to checking every 8 hours for odor at the boundary of the WWTP site.
- Evaluation of portable odor testing equipment. (As previously reported, we have concluded that the “nasal ranger” device is not useful because it requires subjective judgments by the person using the device.)
- Performance requirements
  1. Hydrogen sulfide limit: 0.0
  2. Number of verified off-site odor events per year: three
  3. For other odors, a criterion called the “dilution to threshold” ratio shall be 5 or less (as further discussed in Attachment 1).

Attachments 2 through 4 provide information on the number of odor reports since January, 2002; odor events since January, 2007; and the results of our monitoring program.

### Public communications

As requested in a neighborhood meeting in 2004, we communicate primarily by e-mail to WWTP neighbors. We invited neighbors to meetings of the OWASA Board to discuss odor elimination items on June 12, October 23, and December 11, 2008; gave notices of the expected odor events due to maintenance and construction; gave WWTP neighbors our quarterly and annual reports to the Town; provided periodic updates on the status of capital improvements; and reported on project milestones.

### CONCLUSION

We look forward to the completion of the additional capital improvements at the Mason Farm WWTP as our highest priority in our odor elimination program.

We welcome any questions or comments you may have.

### Attachments:

1. Draft definition of odor elimination
2. Monthly summary of calls and e-mails to OWASA from neighbors reporting odor in the WWTP area; and odor events in 2007 and 2008 as defined in the draft definition of odor elimination
3. Summary of on-site and off-site odor inspections and number of times odor was detected at the various monitoring sites
4. Summary of on-site hydrogen sulfide (H<sub>2</sub>S) odor monitoring

DRAFT

Definition of Odor Elimination – May 2007  
Mason Farm Wastewater Treatment Plant (WWTP)

We are proposing a set of standards and measures pursuant to the commitment OWASA made during the Town of Chapel Hill's Special Use Permitting process for the upgrade and expansion of the Mason Farm Wastewater Treatment Plant (WWTP):

**Operating Measures and Performance Standards Provide Two Benefits:**

- 1) Give WWTP staff a set of alerts to monitor normal operating parameters, identify out of standard conditions in real time and enable corrective action to eliminate off-site odor.
- 2) Determine whether the physical changes made to the plant structures and processes given increased and projected increases in volume are adequate to eliminate off-site odor or whether additional potential improvements should be made.

Based on odor measurements made during the summer of 2006 and software modeling of expected odor following current plant expansion and improvements the following additional odor elimination measure have been found to be necessary. These improvements have been included in the draft Capital Improvements Plan which the OWASA Board expects to consider at their June 14, 2007 Board meeting:

- Covering 8 (of 16) aeration basins in FY 2009
- Covering the 3 primary clarifiers in FY 2010/2011

Odor monitoring and measuring proposed in this standard would continue for at least three years beyond the completion of these projects.

**Impact Performance Standard:**

The goal of odor elimination is fully embraced by OWASA. Ultimately the measure of success of odor elimination is the absence of odor from the experience of OWASA neighbors.

OWASA's goal is zero off-site odor so that the quality of life for those living in close proximity to the WWTP is not adversely impacted.

Like OWASA's goal of zero wastewater spills/overflows, there may be occasions when, despite OWASA's best efforts to prevent or minimize the duration and intensity of any odor releases, there may be occasional odor releases during scheduled (preventive maintenance) and unscheduled (failure of equipment) maintenance events at the WWTP.

**The Performance Standard proposed by OWASA for verified odor events experienced by WWTP neighbors is three (3) or less per year.**

OWASA continues to encourage the WWTP neighbors to immediately contact OWASA by telephone at 537-4376 to report that an objectionable odor has been detected at their home and/or in the vicinity of the WWTP. One or more odor reports timely received during a 24 hour period from WWTP neighbor(s) shall be considered as a single odor event. OWASA will also track the number of odor reports in intervals of four and eight hours. Each odor event shall be considered to be “verified” unless OWASA determines conclusively that an alternative source other than the WWTP created the odor.

OWASA will undertake operating, engineering, structural and funding measures necessary to minimize the frequency, duration and intensity of odor releases associated with instances of scheduled and unscheduled maintenance events. OWASA will provide WWTP neighbors timely notice in advance of scheduled events and as soon as possible for unscheduled off-site odor events.

**Monitoring Standards for Odor Elimination**

1) The “rotten egg” smell associated with hydrogen sulfide is generally accepted as the primary cause of WWTP odors. Hydrogen sulfide is relatively easy to measure and an industry accepted compound for monitoring odor.

OWASA will continuously measure hydrogen sulfide at or near the WWTP property boundary at a minimum of four locations. OWASA staff has consulted with the hydrogen sulfide monitor manufacturer regarding the optimum placement of these monitors. These monitors are solar powered and will transmit the hydrogen sulfide measurements to the WWTP’s process monitoring system which will alarm the on duty operator of any high readings. This hydrogen sulfide monitoring system is projected to be fully operational by May 31, 2007.

**Standard: hydrogen sulfide measured at or near the WWTP property boundary shall be 0.0 parts per million.**

2) Compounds other than hydrogen sulfide can produce odor at the WWTP, but are more difficult to measure. To determine the overall odor level, an air sample is collected in a bag and sent to a specialized laboratory which performs sensory analysis (nose testing) using a dilution apparatus known as a dynamic olfactometer. The dynamic olfactometer delivers odorous air in a range of dilutions to trained panelists who then determine the Dilution-to-Threshold ratio (D/T). The D/T is a measure of the number of dilutions needed to make the odorous ambient air non-detectable.

**Standard: D/T measured at or near the WWTP property boundary shall be 5 or less**

OWASA has purchased a portable olfactometer (Nasal Ranger) which is expected to be delivered by early June 2007. OWASA staff will evaluate the effectiveness of this device as a possible improvement over the current “sniff tests” which are routinely conducted by WWTP

staff. The Nasal Ranger will also be evaluated in an attempt to quantify (measure D/T) at the WWTP boundary and/or at the site of reported odor. The OWASA staff expects to complete its initial evaluation of the Nasal Ranger by October 26, 2007 and will share this information with the WWTP neighbors.



**MONTHLY SUMMARY OF CALLS AND E-MAILS TO OWASA FROM  
NEIGHBORS REPORTING ODOR IN THE MASON FARM WASTEWATER  
TREATMENT PLANT AREA; AND ODOR EVENTS IN 2007 AND 2008 AS  
DEFINED IN THE DRAFT DEFINITION OF ODOR ELIMINATION**

**January, 2002–December, 2008**

|               | 2002      | 2003      | 2004      | 2005      | 2006      | 2007<br>Reports | 2007<br>Events* | 2008<br>Reports | 2008<br>Events* |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------------|-----------------|-----------------|-----------------|
| January       | 11        | 3         | 9         | 0         | 8         | 3               | 3               | 11              | 8               |
| February      | 7         | 5         | 2         | 0         | 8         | 0               | 0               | 6               | 4               |
| March         | 9         | 0         | 7         | 1         | 10        | 6               | 4               | 1               | 1               |
| April         | 9         | 2         | 4         | 0         | 9         | 3               | 3               | 1               | 1               |
| May           | 6         | 0         | 2         | 5         | 8         | 4               | 3               | 2               | 2               |
| June          | 4         | 1         | 1         | 1         | 5         | 1               | 1               | 13              | 8               |
| July          | 1         | 0         | 2         | 0         | 0         | 4               | 2               | 6               | 6               |
| August        | 1         | 0         | 4         | 3         | 11        | 2               | 2               | 12              | 9               |
| September     | 2         | 5         | 2         | 2         | 9         | 3               | 3               | 1               | 1               |
| October       | 2         | 6         | 1         | 1         | 8         | 9               | 8               | 2               | 2               |
| November      | 0         | 0         | 1         | 7         | 2         | 11              | 6               | 7               | 7               |
| December      | 3         | 3         | 2         | 5         | 8         | 16              | 10              | 2               | 2               |
| <b>TOTALS</b> | <b>55</b> | <b>25</b> | <b>37</b> | <b>25</b> | <b>86</b> | <b>62</b>       | <b>45</b>       | <b>64</b>       | <b>51</b>       |

\* An “odor event” is defined as: One or more odor reports received during a 24-hour period from WWTP neighbor(s). Each odor event is considered “verified” unless OWASA determines conclusively that the odor was from a source other than the WWTP.

**SUMMARY OF ON-SITE AND OFF-SITE ODOR INSPECTIONS  
AND NUMBER OF TIMES ODOR WAS DETECTED AT THE VARIOUS MONITORING SITES**

**ON-SITE:**

| <b>Month and year</b> | <b>Total Inspections</b> | <b>Entrance Gate (1)</b> | <b>Generator Bldg. (2)</b> | <b>Old Outfall (3)</b> | <b>UV Complex (4)</b> | <b>Solids Tanks (5)</b> | <b>Odor Scrubber (6)</b> | <b>Head-works (7)</b> | <b>Digesters (8)</b> | <b>UNC Bldg. (9)</b> |
|-----------------------|--------------------------|--------------------------|----------------------------|------------------------|-----------------------|-------------------------|--------------------------|-----------------------|----------------------|----------------------|
| Jan. 2008             | 87                       | 16                       | 15                         | 1                      | 16                    | 18                      | 21                       | 26                    | 28                   | 3                    |
| Feb. 2008             | 85                       | 21                       | 19                         | 0                      | 4                     | 9                       | 12                       | 21                    | 31                   | 8                    |
| Mar. 2008             | 77                       | 2                        | 3                          | 1                      | 3                     | 4                       | 13                       | 17                    | 17                   | 7                    |
| Apr. 2008             | 34                       | 3                        | 3                          | 0                      | 0                     | 3                       | 3                        | 4                     | 5                    | 2                    |
| May 2008              | 75                       | 1                        | 2                          | 0                      | 0                     | 25                      | 33                       | 41                    | 43                   | 30                   |
| Jun. 2008             | 70                       | 13                       | 14                         | 1                      | 0                     | 23                      | 26                       | 39                    | 45                   | 36                   |
| Jul. 2008             | 41                       | 10                       | 7                          | 0                      | 0                     | 8                       | 12                       | 20                    | 22                   | 17                   |
| Aug. 2008             | 59                       | 26                       | 15                         | 0                      | 0                     | 16                      | 20                       | 34                    | 39                   | 35                   |
| Sep. 2008             | 71                       | 16                       | 14                         | 2                      | 2                     | 9                       | 41                       | 44                    | 49                   | 48                   |
| Oct. 2008             | 56                       | 13                       | 13                         | 0                      | 0                     | 6                       | 20                       | 23                    | 28                   | 22                   |
| Nov. 2008             | 52                       | 11                       | 9                          | 0                      | 0                     | 9                       | 8                        | 30                    | 29                   | 18                   |
| Dec. 2008             | 41                       | 13                       | 11                         | 0                      | 0                     | 13                      | 18                       | 22                    | 22                   | 18                   |
| <b>Totals</b>         | <b>748</b>               | <b>145</b>               | <b>125</b>                 | <b>5</b>               | <b>25</b>             | <b>143</b>              | <b>227</b>               | <b>321</b>            | <b>358</b>           | <b>244</b>           |
| <b>%</b>              | <b>----</b>              | <b>9%</b>                | <b>8%</b>                  | <b>1%</b>              | <b>2%</b>             | <b>9%</b>               | <b>14%</b>               | <b>20%</b>            | <b>22%</b>           | <b>15%</b>           |

**Notes:**

- 1) All odor events were characterized by the WWTP Operators as “Mild” with odors that would not be expected to create an off-site problem.
- 2) Exception, May 2, 2008 at 7:30 AM when strong odors were reported at the Headworks (7) and Digesters (8).

**SUMMARY OF ON-SITE AND OFF-SITE ODOR INSPECTIONS  
AND NUMBER OF TIMES ODOR WAS DETECTED AT THE VARIOUS MONITORING SITES**

**OFF-SITE:**

| <b>Month and year</b> | <b>Total Inspections</b> | <b>Mc Donald House (1)</b> | <b>Highland Woods-A (2)</b> | <b>Highland Woods-B (3)</b> | <b>Athletic Assoc. (4)</b> | <b>Finley GC (5)</b> | <b>Silers Fen Ct. (6)</b> | <b>Morgan Cliff Ct. (7)</b> | <b>Kings Mill Rd. (8)</b> | <b>Laurel Hill Rd. (9)</b> | <b>Botanical Garden (10)</b> |
|-----------------------|--------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------|---------------------------|-----------------------------|---------------------------|----------------------------|------------------------------|
| <b>Jan. 2008</b>      | <b>11</b>                | <b>3</b>                   | <b>2</b>                    | <b>2</b>                    | <b>2</b>                   | <b>2</b>             | <b>0</b>                  | <b>0</b>                    | <b>1</b>                  | <b>1</b>                   | <b>1</b>                     |
| <b>Feb. 2008</b>      | <b>3</b>                 | <b>0</b>                   | <b>0</b>                    | <b>1</b>                    | <b>0</b>                   | <b>1</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>Mar. 2008</b>      | <b>1</b>                 | <b>0</b>                   | <b>0</b>                    | <b>0</b>                    | <b>0</b>                   | <b>0</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>Apr. 2008 *</b>    | <b>1</b>                 | <b>0</b>                   | <b>0</b>                    | <b>0</b>                    | <b>0</b>                   | <b>0</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>May 2008</b>       | <b>2</b>                 | <b>1</b>                   | <b>1</b>                    | <b>1</b>                    | <b>2</b>                   | <b>1</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>Jun. 2008</b>      | <b>9</b>                 | <b>4</b>                   | <b>3</b>                    | <b>2</b>                    | <b>1</b>                   | <b>0</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>Jul. 2008</b>      | <b>5</b>                 | <b>1</b>                   | <b>0</b>                    | <b>0</b>                    | <b>1</b>                   | <b>3</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>Aug. 2008</b>      | <b>8</b>                 | <b>1</b>                   | <b>1</b>                    | <b>1</b>                    | <b>1</b>                   | <b>1</b>             | <b>0</b>                  | <b>0</b>                    | <b>0</b>                  | <b>0</b>                   | <b>0</b>                     |
| <b>Sep. 2008</b>      |                          |                            |                             |                             |                            |                      |                           |                             |                           |                            |                              |
| <b>Totals</b>         | <b>16</b>                | <b>10</b>                  | <b>7</b>                    | <b>7</b>                    | <b>7</b>                   | <b>8</b>             | <b>0</b>                  | <b>0</b>                    | <b>1</b>                  | <b>1</b>                   | <b>1</b>                     |
| <b>%</b>              | <b>----</b>              | <b>24%</b>                 | <b>17%</b>                  | <b>17%</b>                  | <b>17%</b>                 | <b>19%</b>           | <b>0%</b>                 | <b>0%</b>                   | <b>2%</b>                 | <b>2%</b>                  | <b>2%</b>                    |

**Notes:**

- 1) All off-site odor events were characterized by the Collections Staff as “Mild” except for the following dates:

January 23, 2008 – odor was characterized as “Strong” at the Athletic Association (4) and Finley Golf Course (5).

February 11, 2008 – “Strong” odors were detected in the off-site investigation near Finley Golf Course Road.

July 20, 2007 – “Strong” odors were detected at 11:00 PM at the Athletic Association (4) and Finley Golf Course (5).

- 2) As reported to our WWTP neighbors, as of September 2008 off-site evaluations were discontinued because of the limited benefit. Under the definition of an off-site odor event, unless OWASA is able to attribute the odor to another source, an odor report is considered to have resulted from the wastewater treatment operation. In the three years of OWASA staff responding to off-site odor reports, staff was not able to find any other explanation for the odor events that have been reported.

**SUMMARY OF ON-SITE HYDROGEN SULFIDE (H<sub>2</sub>S)  
ODOR MONITORING**

| Month and year        | Headworks Monitor                      |  |  | UNC Monitor                            |  |  | Digester Monitor                       |  |  | Switchgear Monitor                     |  |  |
|-----------------------|--|--|--|--|--|--|--|--|--|--|--|--|
|                       | Average H <sub>2</sub> S Reading (ppm) | Minimum H <sub>2</sub> S Reading (ppm) | Maximum H <sub>2</sub> S Reading (ppm) | Average H <sub>2</sub> S Reading (ppm) | Minimum H <sub>2</sub> S Reading (ppm) | Maximum H <sub>2</sub> S Reading (ppm) | Average H <sub>2</sub> S Reading (ppm) | Minimum H <sub>2</sub> S Reading (ppm) | Maximum H <sub>2</sub> S Reading (ppm) | Average H <sub>2</sub> S Reading (ppm) | Minimum H <sub>2</sub> S Reading (ppm) | Maximum H <sub>2</sub> S Reading (ppm) |
| <b>May 2008</b>       | OS                                     | OS                                     | OS                                     | OS                                     | OS                                     | OS                                     | 0.0001                                 | 0.0000                                 | 0.0156                                 | OS                                     | OS                                     | OS                                     |
| <b>June 2008</b>      | 0.0011                                 | 0.0000                                 | 0.8219 <sup>1</sup>                    | 0.0081                                 | 0.0000                                 | 0.2829 <sup>2</sup>                    | 0.0249                                 | 0.0000                                 | 0.0249 <sup>3</sup>                    | 0.0010                                 | 0.0000                                 | 0.0331 <sup>4</sup>                    |
| <b>July 2008</b>      | 0.0104                                 | 0.0000                                 | 0.5762 <sup>5</sup>                    | 0.0113                                 | 0.0000                                 | 0.4013 <sup>6</sup>                    | 0.0002                                 | 0.0000                                 | 0.0132 <sup>7</sup>                    | 0.0003                                 | 0.0000                                 | 0.0241 <sup>8</sup>                    |
| <b>August 2008</b>    | 0.0000                                 | 0.0000                                 | 0.0001 <sup>9</sup>                    | 0.0196                                 | 0.0000                                 | 0.4175 <sup>10</sup>                   | 0.0004                                 | 0.0000                                 | 0.0342 <sup>11</sup>                   | 0.0013                                 | 0.0000                                 | 0.0219 <sup>12</sup>                   |
| <b>September 2008</b> | 0.0000                                 | 0.0000                                 | 0.0000                                 | 0.0027                                 | 0.0000                                 | 0.1223 <sup>13</sup>                   | 0.0004                                 | 0.0000                                 | 0.0425 <sup>14</sup>                   | 0.0002                                 | 0.0000                                 | 0.0501 <sup>15</sup>                   |
| <b>October 2008</b>   | 0.0000                                 | 0.0000                                 | 0.0000                                 | 0.0025                                 | 0.0000                                 | 0.0935 <sup>16</sup>                   | 0.0002                                 | 0.0000                                 | 0.0200 <sup>17</sup>                   | 0.0001                                 | 0.0000                                 | 0.0205 <sup>18</sup>                   |
| <b>November 2008</b>  | 0.0000                                 | 0.0000                                 | 0.0000                                 | 0.0027                                 | 0.0000                                 | 0.1223 <sup>19</sup>                   | 0.0004                                 | 0.0000                                 | 0.0425 <sup>20</sup>                   | 0.0002                                 | 0.0000                                 | 0.0501 <sup>21</sup>                   |
| <b>December 2008</b>  | 0.0000                                 | 0.0000                                 | 0.0000                                 | 0.0025                                 | 0.0000                                 | 0.0935 <sup>22</sup>                   | 0.0002                                 | 0.0000                                 | 0.0200 <sup>23</sup>                   | 0.0001                                 | 0.0000                                 | 0.0205 <sup>24</sup>                   |

**Notes:**

OS – Unit Out of Service (OS). Sent to manufacturer for calibration

<sup>1</sup> Maximum reading occurred on June 14, 2008 at 2:00 AM.

<sup>2</sup> Maximum reading occurred on June 12, 2008 at 12:39 AM.

<sup>3</sup> Maximum reading occurred on June 12, 2008 at 8:20 AM.

<sup>4</sup> Maximum reading occurred on June 11, 2008 at 2:30 AM.

<sup>5</sup> Maximum reading occurred on July 7, 2008 at 9:30 PM.

<sup>6</sup> Maximum reading occurred on July 15, 2008 at 8:09 AM.

<sup>7</sup> Maximum reading occurred on July 4, 2008 at 7:13 AM.

<sup>8</sup> Maximum reading occurred on July 29, 2008 at 3:00 AM.

- <sup>9</sup> Maximum reading occurred on August 25, 2008 at 2:00 AM.
- <sup>10</sup> Maximum reading occurred on August 3, 2008 at 7:50 PM.
- <sup>11</sup> Maximum reading occurred on August 26, 2008 at 11:50 PM.
- <sup>12</sup> Maximum reading occurred on August 11, 2008 at 9:30 PM.
- <sup>13</sup> Maximum reading occurred on September 3, 2008 at 6:36 PM.
- <sup>14</sup> Maximum reading occurred on September 10, 2008 at 8:06 PM.
- <sup>15</sup> Maximum reading occurred on September 12, 2008 at 7:56 PM.
- <sup>16</sup> Maximum reading occurred on October 26, 2008 at 6:42 PM.
- <sup>17</sup> Maximum reading occurred on October 27, 2008 at 9:26 AM.
- <sup>18</sup> Maximum reading occurred on October 26, 2008 at 7:33 PM.
- <sup>19</sup> Maximum reading occurred on November 2, 2008 at 10:00 PM.
- <sup>20</sup> Maximum reading occurred on November 9, 2008 at 7:35 AM.
- <sup>21</sup> Maximum reading occurred on November 2, 2008 at 9:40 PM.
- <sup>22</sup> Maximum reading occurred on December 10, 2008 at 8:50 PM.
- <sup>23</sup> Maximum reading occurred on December 11, 2008 at 1:20 PM.
- <sup>24</sup> Maximum reading occurred on December 4, 2008 at 8:35 PM.

**Monitor Locations (see attached location map):**

Headworks Monitor (#1) – Monitor located between Headworks Facility and Septage Receiving Station on south side of plant property.

Digester Monitor (#2) – Monitor located between Digester #1 and Digester #4 on west side of plant property.

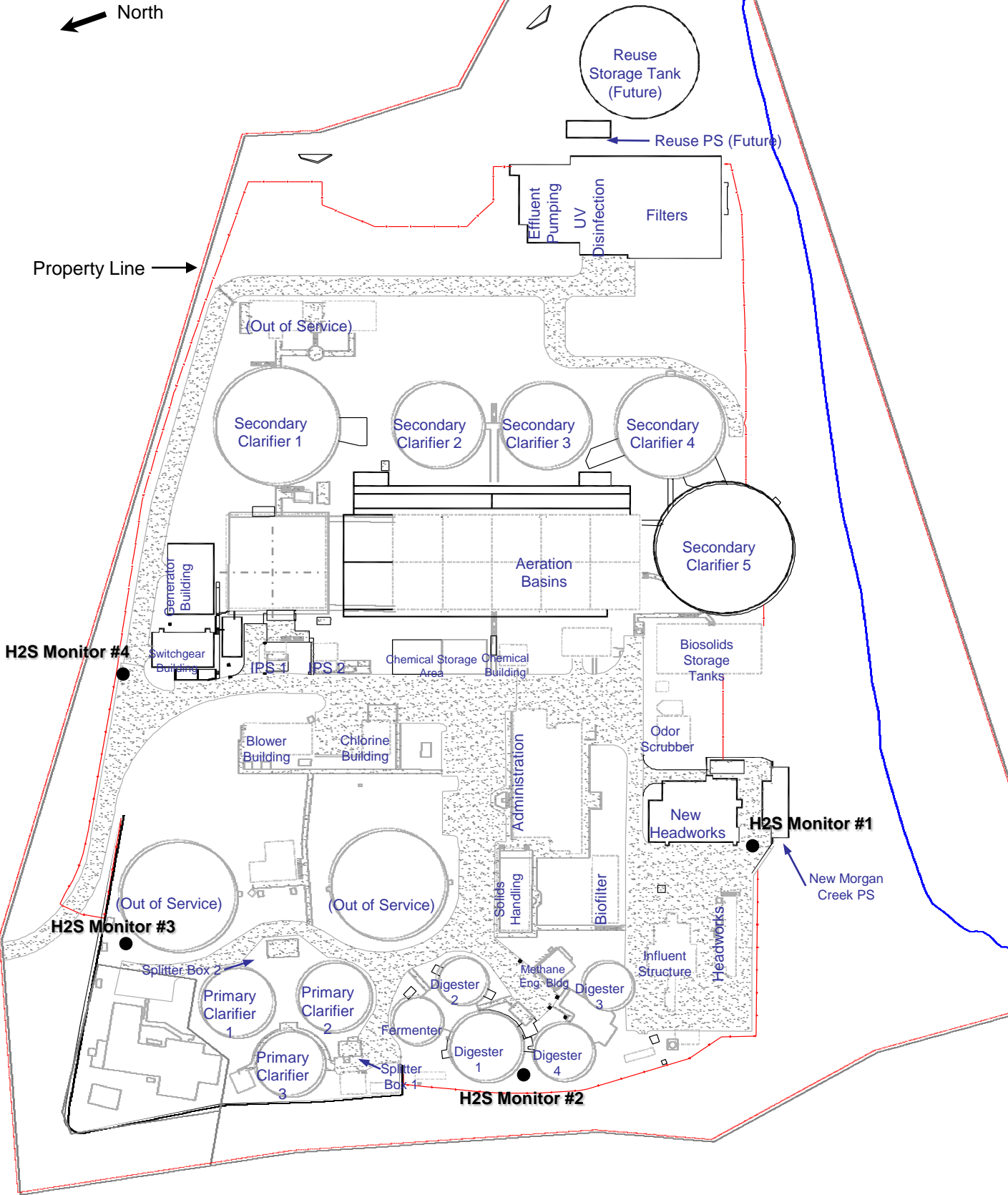
UNC Monitor (#3) – Monitor located between UNC Research Building and Trickling Filter on north side of plant property.

Switchgear Monitor (#4) – Monitor located across from Switchgear building on north side of plant property.

# Mason Farm Wastewater Treatment Plant Hydrogen Sulfide Monitor Locations

North  
←

Property Line →



Reuse  
Storage Tank  
(Future)

Reuse PS (Future)

Effluent  
Pumping  
UV  
Disinfection  
Filters

(Out of Service)

Secondary  
Clarifier 1

Secondary  
Clarifier 2

Secondary  
Clarifier 3

Secondary  
Clarifier 4

Secondary  
Clarifier 5

Aeration  
Basins

Generator  
Building

H2S Monitor #4

Switchgear  
Buildings

IPS 1

IPS 2

Chemical Storage  
Area

Chemical  
Building

Biosolids  
Storage  
Tanks

Blower  
Building

Chlorine  
Building

Administration

Odor  
Scrubber

New  
Headworks

H2S Monitor #1

New Morgan  
Creek PS

(Out of Service)

(Out of Service)

H2S Monitor #3

Splitter Box 2

Primary  
Clarifier  
1

Primary  
Clarifier  
2

Primary  
Clarifier  
3

Digester  
2

Digester  
3

Digester  
1

Digester  
4

Fermenter

Methane  
Eng. Bldg

H2S Monitor #2

Splitter  
Box 1

Solids  
Handling

Biofilter

Influent  
Structure

Headworks