North Carolina Department of Environment and Natural Resources
Division of Environmental Health

Beverly Eaves Perdue
Governor

Terry L. Pierce
Director

Dee Freeman
Secretary

November 4, 2010

Bryan McSwain, REHS
Harnett County Health Department
307 Cornelius Harnett Blvd.
Lillington NC 27546

Subject: Review of Request for Adjusted Daily Design Flow
Antioch Baptist Church
6670 Old US 421, Mamers, NC
Project Number: 2010-53

Dear Mr. McSwain:

I received an email on June 8, 2010 from Oliver Tolksdorf, LSS indicating that a church in Harnett County wanted to expand their facility and had collected data for a flow reduction request. It is my understanding that the expansion is to be a multipurpose building with a gymnasium, classrooms, a kitchen area, two family bathrooms, and a laundry area. On August 27, 2010 I received another email from Mr. Tolksdorf with an attached TIF file. Unfortunately, some of the information was illegible and I informed Mr. Tolksdorf on September 27, 2010 that I had not yet received hard copies of the same information. A hard copy of the information for the requested flow reduction was received by the On-Site Water Protection (OSWP) Central office on September 29, 2010. After a cursory review of the information, I requested additional information about the comparable facility (First Baptist Church and Family Life Center in Sanford, North Carolina). A hard copy of the requested additional information was received by the OSWP office on October 27, 2010.

After reviewing the information and evaluating the data provided, the following observations have been made:

1. Water usage has increased each year from 2005 through 2009 at the comparable facility.
2. The highest water usage monthly period appears to be February.
3. The daily water usage information provided was for the time period of April 15, 2010 to May 15, 2010.
4. The percent difference values between February and the months of April and May for the 2009 data period are 24.9% and 43.8%, respectively. Averaging these percent difference values results in an average percent difference of approximately 34.4%.
5. Each of the two family bathrooms in the proposed multipurpose building will contain four (4) water closets and one (1) shower.
6. The maximum occupancies of the proposed 60'x 75' multipurpose room and the 75'x100' gymnasium are 300 and 500 persons, respectively.

Based on the information provided, the design daily flow of 4,000 gallons per day (gpd) is adjusted to a design daily flow of 3,000 gpd for the Antioch Baptist Church proposed multipurpose building. The unadjusted daily

design flow requires that plans and specifications shall be prepared by a North Carolina registered professional engineer as well as reviewed and approved by the State as per 15A NCAC 18A .1938. Any change in proposed facility size, proposed use of the facility, number of water-using fixtures or maximum occupancy may require further adjustments to the design daily flow. Plans and specifications shall be project–specific and therefore the proposed uses, availability times, and floor plans for the multipurpose facility should be included with the project package submitted for review.

The Department or its authorized agent will provide a written response after receipt of a complete proposal. Before a definitive regulatory decision may be made, additional information may be required based on site-specific conditions. Furthermore, the local health department (LHD) or the State may request review assistance on a case-by-case basis, which will have an impact on the final regulatory decision timeframe. State review should only be requested after the LHD has received and reviewed the consultant's submittal for completeness in accordance with these requirements.

The applicant's consultant shall send all copies of project revisions and correspondence regarding this project to the Harnett County Health Department (HCHD) On-Site personnel. Once the HCHD On-Site personnel have checked the project submittal for completeness, the appropriate number of copies of the submittal along with the signed and dated transmittal checklists, shall be forwarded to the OSWP Central offices for further review. The OSWP review shall be completed prior to site approval and issuance of an Improvement Permit and Authorization to Construct.

After receipt of the hard copies, the project specifications and plans will be reviewed and their completeness and correctness verified so that the review process may proceed. The large system and consultants' guidance documents and copies of approvals may be found on the OSWP website:

http://www.deh.enr.state.nc.us/osww_new/new1//index.htm

If you have any questions concerning these comments, please feel free to contact me by phone at (919) 715-3270, by fax at (919) 715-3227, or by e-mail at Lorna.Withrow@ncdenr.gov.

Sincerely,

Lorna Withrow, PE
On-Site Water Protection

cc: David McCloy, PhD – Regional Soil Specialist
Oliver Tolksdorf, LSS – Harnett County Health Department

Oliver Tolksdorf

From: Withrow, Lorna [lorna.withrow@ncdenr.gov]
Sent: Monday, December 06, 2010 3:05 PM
To: Oliver Tolksdorf
Cc: Mccloy, David; alhogue@prodigy.net; Bryan McSwain
Subject: RE: Meeting 12/7/2010

Mr. Tolksdorf,

I am confirming the meeting with you and Mr. Hogue Tuesday December 7, 2010 in the Harnett County Health Department offices located at 307 West Cornelius Harnett Boulevard, Lillington, North Carolina.

Below I have included excerpts from the rules that we wil be primary referring to in our meeting along with an excerpt from an email I sent to Mr. Tolksdorf on November 18, 2010. Note that adjusted daily flow rates shall apply only to design capacity requirements of dosing and distribution systems and nitrification fields.

Excerpts from .1900 Rules

15A NCAC 18A .1937(a) Any person owning or controlling a residence, place of business, or place of public assembly containing water-using fixtures connected to a water supply source shall discharge all wastewater directly to an approved wastewater system permitted for that specific use.

15A NCAC 18A .1949(b) Table No. I shall be used to determine the minimum design daily flow of sewage required in calculating the design volume of sanitary sewage systems to serve selected types of establishments. The minimum design volume of sewage from any establishment shall be 100 gallons per day. Design of sewage treatment and disposal systems for establishments not identified in this Rule shall be determined using available flow data, water-using fixtures, occupancy or operation patterns, and other measured data.

Table No. I - Stadium, Auditorium, Theater, Drive-in 5 gal/seat or space

15A NCAC 18A .1949(c) An adjusted design daily sewage flow may be granted by the local health department upon a showing as specified in Subparagraphs (c)(1) through (c)(2) that a sewage system is adequate to meet actual daily water consumption from a facility included in Paragraph (b) of this Rule.

(1) Documented data from that facility or a comparable facility justifying a flow rate reduction shall be submitted to the local health department and the State. The submitted data shall consist of at least 12 previous consecutive monthly total water consumption readings and at least 30 consecutive daily water consumption readings. The daily readings shall be taken during a projected normal or above normal sewage flow month. A peaking factor shall be derived by dividing the highest monthly flow as indicated from the 12 monthly readings by the sum of the 30 consecutive daily water consumption readings. The adjusted design daily sewage flow shall be determined by taking the numerical average of the greatest ten

percent of the daily readings and multiplying by the peaking factor. Further adjustments shall be made in design sewage flow rate used for sizing nitrification fields and pretreatment systems when the sampled or
projected wastewater characteristics exceed those of domestic sewage, such as wastewater from restaurants
or meat markets.

Excerpt from 11/18/2010 email to Oliver Tolsdorf

The unadjusted daily design flow for the proposed building was calculated two different ways and both calculations yielded design flows of 4,000 gpd.

Calculation I

			15	sf/person
multipurpose room w/				
classrooms and kitchen	4,500	sq ft	300	persons
gymnasium	7,500	sq ft	500	persons
			800	persons

daily design flow per .1949	5	gpd/person
	800	persons
	4,000	gpd

Calculation II

8	water closets
2,000	@ 250 gpd/wc
2	showers
500	@ 250 gpd/wc
1	kitchen
300	meals served
1,500	@ 5 gpd/meal served

2,000	gpd
500	gpd
1,500	gpd
4,000	gpd

A twenty-five percent (25%) reduction based on the above calculations would be equal to an adjusted daily design flow of 3,000 gpd. As you are aware, Rule .1949(c) states, "the daily readings shall be taken during a projected normal or above normal sewage flow month." The data submitted indicates that the above average usage months were as follows:

Year	Above Average Usage Months
2005	Jan, Feb, Mar, Nov
2006	Jan, Feb, Mar, Jun, Oct, Nov
2007	Jan, Feb, Mar, Sep, Oct, Dec
2008	Jan, Feb, Sep, Oct, Nov, Dec
2009	Jan, Feb, Mar, Oct, Nov, Dec

The daily water usage amounts provided were for the time period of April 15 – May 14, 2010. The percent difference range between February and the months of April and May is as low as 12.1% and as high as 64.3 %. To more accurately reflect water usage during a normal to above normal month a % difference factor was applied to the daily usage amounts provided.

Ending Month	2005	2006	2007	2008	2009	2010
February	16,682	18,327	22,741	24,611	24,985	24,686
March	16,083	18,851	19,225	20,871	24,611	25,658
April	14,512	16,233	16,981	15,784	19,449	13,315
May	12,268	10,772	12,792	12,642	16,008	
June	8,902	9,575	11,894	11,819	16,457	
July	11,670	19,300	10,922	11,819	10,473	
August	8,902	8,303	10,248	9,799	11,744	
September	10,922	9,351	10,922	14,512	11,071	
October	10,174	11,520	16,756	18,028	16,831	
November	11,221	15,559	16,756	17,953	21,394	
December	13,989	13,764	14,737	17,804	22,516	
January	12,268	11,595	20,871	17,355	19,599	
Max Vol, gals	16,682	19,300	22,741	24,611	24,985	25,658

Percent Difference

between Feb and May	30.5%	51.9%	56.0%	64.3%	43.8%	
between Feb and Apr	13.9%	12.1%	29.0%	43.7%	24.9%	59.8%
average	22.2%	32.0%	42.5%	54.0%	34.4%	

The numerical average of the greatest ten percent of the daily readings provided (160, 110, and 90 cubic feet) was 120 cubic feet, which equates to approximately 898 gallons for a less than typical flow month.

Highest 10% = 160, 110, 90 cu ft

highest monthly flow	25,658	gallons
30 consecutive daily sum	12,941	gallons
peaking factor	1.98	
average greatest 10% daily	898	gpd
% difference factor	1.34	
	1,206	
adjusted flow	2,391	gpd

In addition, since the beginning of 2006, 50% of the monthly water usage volumes exceed the respective yearly average. It appears that higher water usage occurs in the first and last quarters of each year, with the highest usage occurring around February. It was also noted that the usage increases each year, possibly due to increases in congregation size or the number of activities and/or participants.

Please let Dr. McCloy and I know if you have any other points you would like to discuss during the meeting.

Sincerely,

Lorna Withrow, PE
On-Site Water Protection

From: Oliver Tolksdorf [mailto:otolksdorf@harnett.org]
Sent: Monday, December 06, 2010 8:51 AM
To: Withrow, Lorna
Cc: Mccloy, David; alhogue@prodigy.net
Subject: Meeting 12/7/2010

Good morning, this is to confirm our meeting for tomorrow morning at 10:00 at the Harnett County Health Department. I look forward to seeing you all there.

Oliver Tolksdorf
Soil Scientist
Harnett County Health Department

otolksdorf@harnett.org
910-893-7547 ext.6288

Oliver Tolksdorf

From: Withrow, Lorna [lorna.withrow@ncdenr.gov]
Sent: Thursday, November 18, 2010 2:26 PM
To: Oliver Tolksdorf
Cc: Mccloy, David; Bryan McSwain
Subject: RE: Antioch Church Project Number 2010-53

We can arrange a time and date for you, Mr. Hogue, myself and possibly Dr. David McCloy to meet at the Harnett County offices to discuss this matter. If there are issues with the amount of land required for the active and repair disposal areas, then flow equalization may be an option. Justification for the utilization of flow equalization, along with supporting information and calculations, would need to be prepared a NC registered professional engineer (PE) and submitted to OSWP for review.

The unadjusted daily design flow for the proposed building was calculated two different ways and both calculations yielded design flows of 4,000 gpd.

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			15	sf/person
multipurpose room w/ classrooms and kitchen	4,500	sq ft	300	persons
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Oliver Tolksdorf

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Max Vol, gals	16,682	19,300	22,741	24,611	24,985	25,658

Percent Difference

Percent Difference

Region	2010	2009	2008	2007	2006	2005	2004
Eastern Europe	34.85	31.25	25.74	24.77	24.11	25.84	28.36
Western	28.52	28.79	27.55	26.58	25.84	27.12	29.45
Rural	27.12	25.84	26.58	27.55	28.79	29.45	28.52
Urban	29.45	28.52	27.55	26.58	25.84	27.12	28.79
Suburban	28.79	27.12	25.84	26.58	27.55	28.52	29.45
Downtown	27.55	28.52	29.45	28.79	27.12	25.84	26.58
Uptown	26.58	25.84	27.12	28.79	29.45	28.52	27.55
Midtown	29.45	28.52	27.55	26.58	25.84	27.12	28.79
Industrial	25.84	26.58	27.55	28.52	29.45	28.79	27.12
Residential	27.12	28.79	29.45	28.52	27.55	26.58	25.84
Commercial	28.52	27.55	26.58	25.84	27.12	28.79	29.45
Agricultural	29.45	28.79	28.52	27.55	26.58	25.84	27.12
Mixed Use	27.55	26.58	25.84	27.12	28.79	29.45	28.52
Waterfront	28.79	27.12	26.58	25.84	27.55	28.52	29.45
Historic	26.58	25.84	27.12	28.79	29.45	28.52	27.55
Suburban	25.84	27.12	28.79	29.45	28.52	27.55	26.58
Rural	27.12	28.79	29.45	28.52	27.55	26.58	25.84
Urban	29.45	28.52	27.55	26.58	25.84	27.12	28.79
Industrial	28.52	27.55	26.58	25.84	27.12	28.79	29.45
Residential	27.55	26.58	25.84	27.12	28.79	29.45	28.52
Commercial	26.58	25.84	27.12	28.79	29.45	28.52	27.55
Agricultural	25.84	27.12	28.79	29.45	28.52	27.55	26.58
Mixed Use	27.12	28.79	29.45	28.52	27.55	26.58	25.84
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Urban	28.79	27.12	25.84	26.58	27.55	28.52	29.45
Suburban	29.45	28.52	27.55	26.58	25.84	27.12	28.79
Downtown	26.58	27.55	28.79	29.45	28.52	27.55	26.58
Uptown	27.55	28.79	29.45	28.52	27.55	26.58	25.84
Midtown	28.79	29.45	28.52	27.55	26.58	25.84	27.12
Industrial	25.84	26.58	27.55	28.52	29.45	28.79	27.12
Residential	27.12	28.79	29.45	28.52	27.55	26.58	25.84
Commercial	28.52	27.55	26.58	25.84	27.12	28.79	29.45
Agricultural	29.45	28.79	28.52	27.55	26.58	25.84	27.12
Mixed Use	27.55	26.58	25.84	27.12	28.79	29.45	28.52
Waterfront	28.79	27.12	26.58	25.84	27.55	28.52	29.45
Historic	26.58	25.84	27.12	28.79	29.45	28.52	27.55

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Lorna Withrow, PE
On-Site Water Protection

From: Oliver Tolksdorf [mailto:otolksdorf@harnett.org]
Sent: Thursday, November 18, 2010 9:00 AM
To: Withrow, Lorna
Cc: Mccloy, David
Subject: Antioch Church Project Number 2010-53
Importance: High

Ms. Withrow,

I have spoken with Mr. Lyle Hogue about his flow rate and how it is determined. Even after my explanation Mr. Hogue is still of the opinion that the design daily flow is extremely high and feels that the facility does not warrant such a large system. He wanted to know if he could set up a meeting with you or at least speak to you directly you regarding your decision. Please let me know how I should direct him. Thank you for your help.

Oliver Tolksdorf
Soil Scientist
Harnett County Health Department

otolksdorf@harnett.org
910-893-7547 ext.6288