

## **AGENDA**

### **Lower Neuse Basin Association, Inc.<sup>®</sup> Neuse River Compliance Association, Inc.<sup>®</sup>**

**September 6, 2018  
City of Wilson, Wilson, N.C.  
10:00 a.m.**

- **Welcome, Roll Call, and Introduction of Guests**
- **Approval of Minutes for May 3, 2018 (AI) Haywood (pages 1-3)**
- **LNBA/NRCA Financials - Haywood**
  - \* **June, July, and August 2018 Treasurer's Reports (AI) (pages 4 – 6)**
  - \* **ModMon Request Recommendation (AI) (page 7)**
- **LNBA Sampling Report, May thru August 2018 – Haywood (page 8)**
  - \* **303(d) Listing Methodology and Integrated Report**
- **NRCA Mid Year Report – Haywood (pages 9 – 10)**
- **Restoration Systems Presentation -Barrett Jenkins**
- **Comments Review – Dan & Haywood**
  - \* **Comments on Buffer Rules**
  - \* **Comments on Trading Rules**
  - \* **Comments on Proposed Water Quality Standards (Chlorophyll-A)**
- **Discussion on Proposed Wastewater Rule and Trading Rule (AI) Dan & Haywood**
- **LNBA/NRCA Annual Training Workshop Report**
- **WEF Nutrient Conference NRCA**
- **Member Reports**
- **Next Meeting and Adjourn – Location/Date: Town of LaGrange, N.C. November 1, 2018**

**(AI) – Action Item**

**Lower Neuse Basin Association®/Neuse River Compliance Association®  
 May 3, 2018 Meeting Minutes  
 Contentnea MSD, Grifton, N.C.**

**Attending:**

Donald Smith	Town of Cary	Jimmy Pridgen	City of Wilson
Timothy Lawrence	MCAS – Cherry Point	Jeff White	Dow Dupont-Kinston
Barry Parks	City of Wilson	Emily Elmore	City of Kinston
Paul Allen	Town of Benson	Erica Bailey	City of Raleigh
John Cratch	Town of Apex	David Hardin	Town of Apex
John Kiviniem	City of Raleigh	Fred Dancy	SGWASA
Elliot Thomas	Craven County	Chuck Smithwick	Contentnea MSD
Dan Wall	Johnston County	Michael McAllister	Town of Kenly
Kenny Stevens, Jr.	City of Kinston	Bonnie Williamson	Town of Kenly
Glenn Dunn	Poyner & Spruill	Miles Galloway	The Wooten Company
Casey Oliver	Environment I	Mike Wagner	City of Goldsboro
David Huffman	DWR Water Science	Mark Vander Borgh	DWR Water Science
Mike Graham	Duke Energy Progress	Haywood Phthisic	LNBA/NRCA

The Chair, Dan McLawhorn, called the meeting to order and welcomed everyone. The roll was called and there were 12 of 18 members present representing the LNBA and 15 of 22 members present representing the NRCA. There was a quorum present for both associations. Guests were introduced and recognized.

**Board Minutes** – The Board Minutes from the January 25, 2018 meeting were presented and approved by the Boards.

**Proposed Rule Comments Update** – Dan reported that the proposed rules for re-adoption will be on the Environmental Management Commission and Water Quality Committee in May. These include the Neuse Wastewater Rule, the new nutrient trading program, and public notice of the buffer rules.

The Neuse Wastewater Rule is under review for the purchase of non-point source credits. The current rule requires a facility to purchase nitrogen credits at a rate of 200% of the current rate (in its hydraulic unit code or HUC) for 30 years. The recommendation to the WQC is 100% of the current rate for 10 years at the time the permit is issued (by way of agreement with a bank or other).

The proposed nutrient offset credit trading program is being proposed for nutrient trading state wide and will be presented along with the proposed wastewater rule. In the proposed rule a different set of values are proposed for offset credit purchase (in addition to the proposed rule above).

The Proposed Buffer Rules as part of the Rules Review Process have been noticed and comments are due July 2<sup>nd</sup>. One item of concern is repair work in riparian buffers to maintain sewer lines will require purchase of mitigation credits (a change from the current rule).

Following discussion, authorization to allow the Executive Committee to prepare comments on the proposed trading rules was presented. Barry Parks made a motion to approve, seconded by Dan Wall, and approved by the Boards. Additionally, a motion was made by Mike Wagner to allow the Executive

Committee to submit comments on the Proposed Buffer Rules, seconded by Dan Wall, and approved by the Boards. The Boards discussed whether legislative action should be considered for the wastewater rule but no action was taken at this time.

**Treasurer's Report** - The Treasurer's Reports for February, March, and April, 2018 were presented by Donald Smith, Treasurer. As of April 25<sup>th</sup>, the LNBA account balances were \$135,165.72 and NRCA account balances are \$177,643.92. Barry Parks made a motion to approve the reports as presented, seconded by Chuck Smithwick, and approved by the Boards.

Haywood reported the contracts with Sauber Water Quality Consulting and MFG Consulting, LLC will expire June 30<sup>th</sup> but have a 1 year automatic renewal with agreement by both parties. Haywood recommended approval of the one year extension on both contracts with \$2,000 carry forward from current year (for both associations, total \$4,000) for Sauber Water Quality Consulting. Chuck Smithwick made a motion to approve, seconded by Barry parks and approved by the Boards.

Dan had to leave due to previous commitment so the Vice Chair Barry Parks took over as Chair for the remainder of the meeting

Executive Director Services Contract expires June 30, 2018 and the Finance Committee (Barry Parks, Donald Smith, and Chuck Smithwick) met via conference call with Haywood and discussed terms for renewing the contract. The Finance Committee recommends a renewal of the contract for three years with the hourly rate for the first year being \$65 and the remaining two years at \$70. The yearly limit for hours work is capped at 1,040 unless approved to exceed. Following discussion, Jeff White made a motion to approve the contract as presented and authorizing the Vice Chair to sign the contract, seconded by Kenny Stevens, and approved by the Boards.

**LNBA Sampling Report** – Work on the Lower Neuse River Monitoring Service Contract No. 5 with Environment 1 continues. All sampling was completed by Environment 1 in January, February, March and April, 2018. Data sets have been received through February, 2018 and loaded on the website. March sampling results are in final review. J5410000 (Mill Creek at Richardson Bridge Road) will return to service in May and site J5420000, temporary site, will be discontinued in May, 2018. All invoices through March, 2018 have been processed and paid. Sampling exceptions for each period are listed below:

**January, 2018 –**

*J6500000* (Moccasin Creek at Antioch Church Road near Conner). No sample collected because the stream was frozen.

*J6680000* (Turkey Creek at Claude Lewis Road near Middlesex). No sample collected because the stream was frozen.

Haywood reported the LNBA annual report has been completed and submitted to the Division as required. A graph was presented to the Board illustrating the annual average total nitrogen concentrations for each monitoring site. Haywood reported the average total nitrogen concentration is 1.23 mg/L (0.65 mg/L TKN and 0.58 mg/L nitrate-nitrite).

**Revised 2018 303(d) Listing Methodology -**

Haywood reported in March the EMC Water Quality Committee and the full EMC approved revisions to the

**2018 303(d) listing methodology** (assessment years 2012 – 2016). The old **2016 303(d) listing methodology** required a >10% exceedance frequency of a water quality standard with at least 90% statistical confidence. **The New 2018 303(d) Methods will make it harder to remove water bodies from an impairment status and make it easier to keep waterbodies listed as impaired. The new methodology is more complicated and more detailed.** The new method includes three different designations: Meeting Criteria, Inconclusive, and Impaired. An “Inconclusive” determination is NOT the same as meeting water quality standards in the new process.

Several 2018 303(d) Method Examples as may be applied to the Neuse Estuary:

- Water Assessment Units with 10 or more observations in the five year window (2012-2016) and have >10% of observations exceeding criteria but < 90% statistical confidence in exceeding criteria but with four observations (regardless of the number of samples) that exceed criteria in the period from 2015-2016 are now considered as exceeding the criteria and are considered “impaired”.
- Water bodies with 10 or more observations in the five year assessment window (2012-2016) and have >70% binomial statistical confidence attaining the standard are considered as meeting the criteria.

**2018 NRCA Annual Report** – Haywood reported the NRCA’s Annual Report for 2017 has been completed and submitted has required. The summary page of the report was presented and Haywood noted a significant drop in average daily flow. The average end of pipe concentration was one of the lowest achieved by the NRCA members.

Haywood reported there was an issue in reporting total nitrogen data (first occurrence in reporting history) and the Town of Kenly did not report nitrogen data in June and July of 2017. The Mayor, Bonnie Williamson and Mike McAllister were present from Kenly to report on this issue. Mike reported the ORC was terminated from employment in June and there were many equipment deficiencies in facility. Haywood reported that failing to report nitrogen data presents issues for the preparing the NRCA annual report. Haywood recommended that the by-laws be reviewed/revised to make such failure by a member grounds for action against the member failing to report permit requirements. Barry referred this to the by-law committee (James Warren, Mike McAllister, and Haywood) and report back to the Board.

Haywood presented a summary of the end of pipe total nitrogen annual discharge concentrations (2006 – 2017) and a summary of total nitrogen delivery to the Neuse River Estuary from 1995 to 2017.

**Neuse River Flood Study** – Haywood reported a flood study by the Dept. of Public Safety has been completed. A map from the study was passed out to the Board.

**LNBA-NRCA Annual Training Workshop** – Haywood reported the annual workshop is scheduled for July 24<sup>th</sup> in Raleigh and July 26<sup>th</sup> in Kinston. The workshop announcement will be emailed in early June. The NRCA is also presenting at the Water Environment Federation Nutrient Conference will be held in Raleigh in June.

The next meeting is scheduled for September 6, 2018 at 10:00 to be hosted by the City of Wilson, in Wilson, N. C. With no further business, the meeting was adjourned.

**Lower Neuse Basin Association, Inc. / Neuse River Compliance Association, Inc.**

**Treasurer's Report**

**9/4/2018**

**LNBA**

<b>Balance Forward: (checking per bank statement - 7/25/18)</b>	Checking	\$	93,698.28
	Savings	\$	70,646.64
<b>Debits:</b>		\$	
Phthisic Consulting Inc (July, 18 Inv)			2,432.21
Environment I, Inc. (July, 18 Inv)			7,654.06
MFG Consulting, LLC (June 18 Inv)			100.00
Sauber Water Quality Consulting (July 18 Inv)			560.00
King's Restaurant			592.36
City of Kinston (Workshop snacks)			288.28
Bank Charges (checks & maintenance fees)			1.00
			<hr/>
	Total Debits	\$	11,627.91
<b>Credits:</b>		\$	
Interest (checking)			18.52
Interest (savings)			31.94
Transfer to NRCA (deposit error)			5,295.63
Membership fees			78,329.74
<b>Checking Account Balance (per bank statement - 8/27/18)</b>		\$	155,123.00
LGCU Share Account Balance (savings account)			70,678.58
			<hr/>
<b>Total LNBA Account Balance</b>		<b>\$</b>	<b>225,801.58</b>
			<hr/> <hr/>

**NRCA**

<b>Balance Forward: (per bank statement -7/25/18)</b>	Checking	\$	70,388.88
	Savings		112,221.41
<b>Debits:</b>		\$	
Phthisic Consulting Inc (July 18 Inv)			2,432.00
Poyner & Spruill (June 18 Inv)			183.15
Sauber Water Quality Consulting (July 18 Inv)			560.00
Red Robin Burgers (Raleigh workshop lunch)			808.97
Bank Charges (checks & maintenance fees)			1.00
	Total:	\$	3,985.12
<b>Credits:</b>		\$	
Transfer to Savings			-
Interest (Savings)			50.74
Interest (Checking)			13.80
Membership Fees			47,939.16
<b>Account Balance (per bank statement -8/27/18)</b>	Checking	\$	114,356.72
LGCU Share Account Balance (savings account)	Savings		112,272.15
			<hr/>
<b>Total NRCA Account Balance</b>		<b>\$</b>	<b>226,628.87</b>
			<hr/> <hr/>

**Lower Neuse Basin Association, Inc. / Neuse River Compliance Association, Inc.**

**Treasurer's Report**

**8/1/2018**

**LNBA**

<b>Balance Forward: (checking per bank statement - 6/26/18)</b>	Checking	\$	44,570.07
	Savings	\$	70,618.58
<b>Debits:</b>			
Phthisic Consulting Inc (June, 18 Inv)		\$	1,459.14
Environment I, Inc. (June, 18 Inv)			7,654.06
MFG Consulting, LLC (June 18 Inv)			50.00
Poyner & Spruill (May 18 inv)			1,664.20
Bank Charges (checks & maintenance fees)			1.00
			<hr/>
	Total Debits	\$	10,828.40
<b>Credits:</b>			
Interest (checking)		\$	6.43
Interest (savings)			28.06
Membership fees			59,950.18
<b>Checking Account Balance (per bank statement - 7/25/18)</b>		\$	93,698.28
LGCU Share Account Balance (savings account)			70,646.64
			<hr/>
	<b>Total LNBA Account Balance</b>	<b>\$</b>	<b>164,344.92</b>
			<hr/> <hr/>

**NRCA**

<b>Balance Forward: (per bank statement - 6/26/18)</b>	Checking	\$	53,566.07
	Savings		112,176.84
<b>Debits:</b>			
Phthisic Consulting Inc (June 18 Inv)		\$	2,709.00
Poyner & Spruill (May 18 Inv)			2,497.00
Raleigh Workshop Snacks			139.92
Bank Charges (checks & maintenance fees)			1.00
	Total:	\$	5,346.92
<b>Credits:</b>			
Transfer to Savings		\$	-
Interest (Savings)			44.57
Interest (Checking)			6.79
Membership Fees			22,162.94
<b>Account Balance (per bank statement -7/25/18)</b>	Checking	\$	70,388.88
LGCU Share Account Balance (savings account)	Savings		112,221.41
			<hr/>
	<b>Total NRCA Account Balance</b>	<b>\$</b>	<b>182,610.29</b>
			<hr/> <hr/>

**Lower Neuse Basin Association, Inc. / Neuse River Compliance Association, Inc.**

**Treasurer's Report**

**7/9/2018**

**LNBA**

<b>Balance Forward: (checking per bank statement - 4/25/18)</b>	Checking	\$	64,607.09
	Savings	\$	70,558.63
<b>Debits:</b>		\$	
Phthisic Consulting Inc (April & May, 18 Inv)			3,344.90
Environment I, Inc. (April & May, 18 Inv)			15,308.12
MFG Consulting, LLC (May 18 Invoice)			175.00
Poyner & Spruill (April 18 inv)			1,221.00
Bank Charges (checks & maintenance fees)			<u>2.00</u>
	<b>Total Debits</b>	\$	<b>20,051.02</b>
<b>Credits:</b>		\$	
Interest (checking)			14.00
Interest (savings)			59.95
Transfer to Savings			-
<b>Checking Account Balance (per bank statement - 6/26/18)</b>		\$	44,570.07
LGCU Share Account Balance (savings account)			<u>70,618.58</u>
<b>Total LNBA Account Balance</b>		<b>\$</b>	<b><u>115,188.65</u></b>

**NRCA**

<b>Balance Forward: (per bank statement - 4/25/18)</b>	Checking	\$	65,562.31
	Savings		112,081.61
<b>Debits:</b>		\$	
Phthisic Consulting Inc (April & May 18 Invs)			5,938.00
Poyner & Spruill (March 18 Inv)			641.03
Sauber Water Quality Consulting (April 18 inv)			280.00
MFG, LLC (April 18 Inv.)			150.00
Univ. of N.C. at CH (ModMon grant)			5,000.00
Bank Charges (checks & maintenance fees)			2.00
	<b>Total:</b>	\$	<b>12,011.03</b>
<b>Credits:</b>		\$	
Transfer to Savings			-
Interest (Savings)			95.23
Interest (Checking)			14.79
Membership Fees			-
<b>Account Balance (per bank statement -6/26/18)</b>	Checking	\$	53,566.07
LGCU Share Account Balance (savings account)	Savings		<u>112,176.84</u>
<b>Total NRCA Account Balance</b>		<b>\$</b>	<b><u>165,742.91</u></b>

Institute of Marine Sciences  
3431 Arendell St.  
Morehead City, NC 28557



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

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August 7, 2018

Haywood Phthisic, Executive Director  
Neuse River Compliance Association  
PO Box 1410  
Apex, NC 27528 - 1410

Dear Mr. Phthisic:

We are requesting funding of \$5,000 for supplies and salaries in support of our current contract **“Request for support data management and synthesis components of the Neuse River Estuary Water Quality Modeling and Monitoring Program, ModMon”** (UNC-CH Account No. 5-47701). The funds will be used to provide graphic reports of water quality conditions on the Neuse River Estuary to NRCA/LNBA members provided via the Internet.

Please send a letter indicating your intentions for providing these funds to Jean Stack and me here at IMS and Jalisa Melton, who is our current Post Award contact.

Her email is: [jalisam@email.unc.edu](mailto:jalisam@email.unc.edu)

In advance, thanks for providing this funding.

With best regards,

Hans Paerl, Principal Investigator, ModMon Project

CC: Jean Stack, Megan Hunter

**Lower Neuse Basin Association ®**

**TO:** Board Members

**FROM:** Water Sampling Contract Coordinator

**SUBJECT:** Sampling/Monitoring Report for September 6, 2018 Board Meeting

**DATE:** September 5, 2018

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Work on the Lower Neuse River Monitoring Service Contract No. 5 with Environment I continues. All sampling was completed by Environment 1 in May, June, July and August, 2018. Data sets have been received through June, 2018 and loaded on the website. July sampling results are in final review.

J5410000 (Mill Creek at Richardson Bridge Road) returned to service in May and site J5420000, the temporary site, was discontinued in May, 2018. All invoices through August, 2018 have been processed and paid. There were no sampling exceptions for each period listed above.

**2018 303(d) Listing Methodology and Integrated Report** – The Integrated Report is part of the 303(d) process however it is not circulated for public comment. In July, Forrest Westall with the UNRBA, Jay Sauber, and myself met with the EMC Chair and the Water Quality Committee Chair and expressed our concerns that the Integrated Report is not made available for public comment (with the results of that report weighing heavily on the final 303(d) listing).

NEUSE RIVER COMPLIANCE ASSOCIATION

Total Nitrogen Mid Year Report (July 1, 2017 thru June 30, 2018) for 2018

August 13, 2018

Page 1 of 5

FACILITY	NPDES Permit #	END OF PIPE					ESTUARY				
		Permit Flow (MGD)	2017-18 Avg. Flow (MGD)	Member TN Allocation (Lbs/Yr.)	Member TN Discharge (Lbs/Yr.)	Transport Zone	Annual Lease Amount	Member Estuary Allocation	Adjusted 2017 Allocation (Lbs/Yr.)	2018 TN Delivery (Lbs/Yr.)	% of Estuary Allocation
SGWASA	NC0026824	5.500	1.635	22,420	8,640	10%	0	5,860	0	864	15
Town of Apex	NC0064050	3.600	1.075	40,547	11,328	50%	0	20,274	0	5,664	28
Town of Benson	NC0020389	1.900	0.822	33,070	8,187	50%	0	16,535	0	4,093	25
Town of Cary ~ North	NC0048879	12.000	5.794	143,246	35,562	50%	0	71,623	0	17,781	25
Town of Cary ~ South	NC0065102	12.800	4.658	180,211	29,795	50%	0	90,105	0	14,898	17
City of Raleigh ~ Smith Creek	NC0030759	3.000	1.557	70,814	24,644	50%	0	35,407	0	12,322	35
City of Raleigh ~ Neuse	NC0029033	60.000	45.555	682,483	295,212	50%	0	341,242	0	147,606	55
Raleigh ~ Ground Water	NA	NA	NA	NA	82,791	50%	0	NA	0	41,396	
City of Raleigh ~ Little Creek	NC0079316	2.200	0.714	26,660	4,068	50%	0	13,330	0	2,034	15
Town of Clayton	NC0025453	2.500	1.601	22,832	20,121	50%	0	11,416	0	10,060	88
Neuse Colony, (Aqua NC)	NC0064564	0.350	0.265	8,447	7,638	50%	0	4,224	0	3,819	90
Johnston County	NC0030716	9.500	3.897	71,476	41,384	50%	0	35,738	0	20,692	58
Town of Kenly	NC0064891	0.630	0.303	7,096	9,424	50%	0	3,548	0	4,712	133
Town of Farmville	NC0029572	3.500	1.861	42,211	5,369	50%	0	21,106	0	2,685	13
City of Wilson	NC0023906	14.000	8.359	157,886	54,547	50%	0	78,943	0	27,274	35
Duke Energy ~ H F Lee Plant	NC0003417	NA	0.180	3,260	188	70%	0	2,282	0	131	6
City of Goldsboro	NC0023949	14.200	8.172	199,822	55,985	70%	0	139,876	0	39,189	28
Town of LaGrange	NC0021644	0.750	0.459	8,447	6,198	70%	0	5,913	0	4,339	73
City of Kingston (Regional)	NC0024236	11.850	4.720	126,711	33,769	70%	0	88,697	0	23,638	27
Contentnea MSD	NC0032077	3.500	1.783	37,100	8,177	70%	0	25,970	0	5,724	22
Dupont-Kinston, Inc.	NC0003760	3.600	0.352	25,493	1,795	70%	0	17,845	0	1,257	7
City of New Bern	NC0025348	6.500	3.325	64,210	23,974	100%	0	64,210	0	23,974	37
MCAS Cherry Point	NC0003816	3.500	1.676	39,421	25,137	100%	0	39,421	0	25,137	64
City of Havelock	NC0021253	2.250	1.423	21,400	24,228	100%	0	21,400	0	24,228	113
Craven County	NC0089460	0.860	0.450	NA	1,805	100%	1,805	NA	1,805	1,805	100
CWS Systems, Inc.	NC0033111	0.600	0.316	11,263	13,903	100%	0	11,263	0	13,903	123
		179,090	100,952					1,163,946		479,224	

This Compliance Report has been compiled from co-permittee members' monthly discharge monitoring reports. I certify that this report is accurate and complete to the best of my knowledge.

Daniel F. McLawhorn, Chairman, Neuse River Compliance Association \_\_\_\_\_ Date

NOTES: 1. Average Total Nitrogen Concentration End of Pipe by NRCA Members during 2018 (midyear): 2.44 MG/L

2. Average Total Nitrogen Concentration with ground water contribution in 2018 (midyear): 2.71 MG/L

3. NRCA's Midyear Report Prepared By: Haywood M. Phthisic, III, Executive Director

## NRCA 2018 Mid Year Report Summary w/ Potential TN Reductions

Date: 8/30/2018

FACILITY	Average EOP Conc (mg/l)	Average Flow MGD		Potential TN Reduction (lbs)
Duke Energy Progress - Lee	0.12	0.180		
Town of Farmville	0.95	1.861		
Contentnea MSD	1.51	1.783		
Craven County	1.32	0.450		
Dupont-Kinston	1.67	0.352		
SGWASA	1.74	1.635		
City of Raleigh - Little Creek	1.87	0.714		
Town of Cary, North	2.02	5.794		
Town of Cary, South	2.10	4.658		
City of Raleigh - Neuse	2.13	45.555		
City of Wilson	2.14	8.359		
City of Goldsboro, Pipes 01&02	2.25	8.172		
City of Kinston (Regional)	2.35	4.720		
City of New Bern	2.37	3.325		
Town of Benson	3.27	0.822	0.27	676
Town of Apex	3.46	1.075	0.46	1,151
Johnston County	3.49	3.897	0.49	5,813
Town of Clayton	4.13	1.601	1.13	5,507
Town of LaGrange	4.44	0.459	1.44	2,012
MCAS Cherry Point	4.93	1.676	1.93	9,847
City of Raleigh - Smith Creek	5.20	1.557	2.20	10,427
City of Havelock	5.59	1.423	2.59	11,219
Neuse Colony (Aqua)	9.48	0.265	6.48	5,227
Town of Kenly	10.21	0.303	7.21	6,650
CWS Systems, Inc.	14.47	0.316	11.47	11,033
<b>Daily Average</b>	2.53	101.510		68,887

Annual Report Values	Average EOP Conc. (mg/L)	Average Estuary Lbs.	Avg. Flow MGD	Avg. Estuary w/o Debit
2003	3.81	722,374	108.379	
2004	3.38	558,777	101.203	
2005	3.25	566,627	101.739	
2006	3.12	542,205	102.970	
2007	3.02	461,325	92.994	
2008	3.41	489,798	91.005	
2009	3.02	497,639	98.570	
2010	2.98	584,398 *	101.909	527,275
2011	2.85	519,199 *	93.384	464,014
2012	2.80	540,892*	97.281	487,794
2013	2.62	514,847*	102.413	463,836
2014	2.71	568,387*	108.359	519,612
2015	3.03	610,915*	108.721	564,277
2016	2.87	593,145*	108.734	548,644
2017	2.53	491,822*	101.510	449,381

\* Includes nitrogen debit for City of Raleigh's land application system