

Technical Memorandum

To: Municipal Forecasting Ad Hoc Subcommittee Members and Regional Council Members

From: CDM Planning Team

Date: March 10, 2010

Subject: Refining Municipal and Industrial Water and Wastewater Use Forecasting

The purpose of this document is to develop concurrence by the Regional Councils on the data inputs, including water use, that are being used to develop current and future water and wastewater forecasts for the regional water plan. Forecasting water demand involves two critical components: rate of water use and the number of water users. For municipal water, the average per capita use is multiplied by the number of people. For industrial water, the average water demand per employee is multiplied by the number of employees. In both cases, determining the appropriate water use rate and estimating the number of users are fundamental elements.

This memorandum outlines the process used to determine these elements beginning with the existing data sets and the methods used to refine and modify this information to produce more credible results. Finally, it is important to emphasize and acknowledge that our goal is to have a consistent and comparable set of data for statewide and regional planning. This means we need to rely on select data sets (common year for data inputs and comprehensive coverage of the state) that in many cases have broader coverage of the state but may not be as precise as local provider level data. This effort is intended to strike a balance between broad coverage and local data by using consistent data collection on a regional basis modified as appropriate with local provider input.

Municipal Water Approach

Municipal water use is broken down into two broad categories: publicly-supplied municipal and self-supplied residential. Water demand forecasts for both categories are developed first on a county-wide basis. The county demand estimates are then distributed geographically to watersheds and aquifers.

For this state planning effort, publicly supplied municipal water includes residential, commercial, and some industrial water use. This rate is expressed as gallons per capita per

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day or GPCD and is determined by dividing the water supplier's daily average water withdrawal rate by the population served by that provider:

- $GPCD = \frac{\text{Publicly Supplied Water Withdrawal (gallons per day)}}{\text{Population Served by Public Supplier}}$

The self-supplied residential per capita water use rate of 75 GPCD was derived by the USGS and is used to forecast future self-supplied residential water demand.

Tables 1, 2, and 3 show the division between the publicly-supplied municipal population and self-supplied population by county for each of CDM's three planning regions.

The demand forecast model uses county population projections developed by the Georgia Office of Planning and Budget (OPB) to drive future publicly-supplied and self-supplied water needs. The formulas used to calculate future publicly-supplied and self-supplied residential water demand are shown below:

- $\text{Future Publicly-Supplied Municipal Demand} = 2005 \text{ Per Capita Municipal Water Use} * (\text{Projected County Population} * \text{Percent of Population Served by Public Supply})$
- $\text{Future Self-Supplied Demand} = 75 \text{ GPCD} * [\text{Projected County Population} * (1 - \text{Percent of Population Served by Public Supply})]$

Table 1
ALTAMAHA - Division of Population by Water Supply Category in 2005

County	2005 County Population¹	Population Served by Public Supply^{1,2}	Percent of County Population Publicly-Supplied³	Percent of County Population Self-Supplied³
Appling	17,954	6,660	37%	63%
Bleckley	12,141	5,380	44%	56%
Candler	10,321	4,380	42%	58%
Dodge	19,574	7,330	37%	63%
Emanuel	22,108	11,990	54%	46%
Evans	11,443	5,880	51%	49%
Jeff Davis	13,083	6,240	48%	52%
Johnson	9,538	2,930	31%	69%
Montgomery	8,909	5,430	61%	39%
Tattnall ⁴	23,211	9,270	40%	60%
Telfair	13,205	9,070	69%	31%
Toombs	27,274	18,190	67%	33%
Treutlen	6,753	3,130	46%	54%
Wayne	28,390	12,200	43%	57%
Wheeler	6,706	2,200	33%	67%
Wilcox	8,721	4,950	57%	43%
REGIONAL TOTALS	239,331	115,230	48%	52%

Notes:

¹ Data for 2005 from USGS 2009 report called *Water Use in Georgia by County for 2005*

² USGS defines public supply as any public or private water system that provides water to at least 25 people or if there are a minimum of 15 hookups or water connections.

³ Calculated values. Population data is used only to derive percent publically-supplied and self-supplied. Population data is not used for defining existing conditions.

⁴ Revised county population based upon US Census data, USGS value was incorrect

Table 2
COASTAL GEORGIA - Division of Population by Water Supply Category in 2005

COUNTY	2005 County Population¹	Population Served by Public Supply^{1,2}	Percent of County Population Publicly-Supplied³	Percent of County Population Self-Supplied³
Bryan	28,549	18,280	64%	36%
Bulloch	61,454	48,470	79%	21%
Camden	45,759	31,170	68%	32%
Chatham	238,410	208,610	88%	12%
Effingham	46,924	25,840	55%	45%
Glynn	71,874	62,600	87%	13%
Liberty	57,544	48,340	84%	16%
Long	11,083	3,350	30%	70%
McIntosh	11,068	5,380	49%	51%
REGIONAL TOTALS	572,665	452,040	79%	21%

Notes:

¹ Data for 2005 from USGS 2009 report called *Water Use in Georgia by County for 2005*

² USGS defines public supply as any public or private water system that provides water to at least 25 people or if there are a minimum of 15 hookups or water connections.

³ Calculated values. Population data is used only to derive percent publically-supplied and self-supplied. Population data is not used for defining existing conditions.

Table 3
SUWANNEE-SATILLA - Division of Population by Water Supply Category in 2005

COUNTY	2005 County Population¹	Population Served by Public Supply^{1,2}	Percent of County Population Publicly-Supplied³	Percent of County Population Self-Supplied³
Atkinson	8,030	3,750	47%	53%
Bacon	10,379	3,380	33%	67%
Ben Hill	17,316	13,670	79%	21%
Berrien	16,708	7,540	45%	55%
Brantley	15,491	2,160	14%	86%
Brooks	16,327	6,990	43%	57%
Charlton	10,790	4,460	41%	59%
Clinch	6,996	3,310	47%	53%
Coffee	39,674	17,900	45%	55%
Cook	16,366	9,110	56%	44%
Echols	4,253	710	17%	83%
Irwin	10,093	3,760	37%	63%
Lanier	7,553	2,940	39%	61%
Lowndes	96,705	79,830	83%	17%
Pierce	17,119	4,790	28%	72%
Tift	40,793	29,180	72%	28%
Turner	9,474	6,280	66%	34%
Ware	34,492	29,320	85%	15%
REGIONAL TOTALS	378,559	229,080	61%	39%

Notes:

¹ Data for 2005 from USGS 2009 report called *Water Use in Georgia by County for 2005*

² USGS defines public supply as any public or private water system that provides water to at least 25 people or if there are a minimum of 15 hookups or water connections.

³ Calculated values. Population data is used only to derive percent publically-supplied and self-supplied. Population data is not used for defining existing conditions.

Data Sources

In calculating initial county publicly-supplied per capita water demand rates, CDM relied on three primary sources of data:

- The U.S. Geological Survey (USGS) 2009 report entitled *Water Use in Georgia by County for 2005 and Water-Use Trends for 1980-2005* by Fanning and Trent. For each county in the state, this document shows the 2005 county population, public supply water demand, and population served by all public suppliers in the county. This report was the sole data set used to calculate the initial estimates for county publicly-supplied per capita demand rates. Please note that the USGS data include all public-supply water for each county, not just the major suppliers they list by name. USGS defines public supply as any public or private system that provides water to at least 25 people or a minimum of 15 hookups or water connections.
- The Georgia Environmental Protection Division (EPD) water withdrawal permit database 1997-2007. This database contains withdrawal totals for each surface water and groundwater withdrawal permit in the state. Municipal withdrawal permits in the database were used to cross-reference and confirm or identify discrepancies with USGS withdrawal estimates for major public suppliers. Discrepancies among the two data sources were noted as issues for follow up with major public suppliers.
- The EPD Drinking Water System Survey 2006-2009 (DWSS) is a database of self-reported public water supplier data including population served estimates. Population served totals for major public suppliers in this database were used along with USGS data to calculate GPCD values for major public suppliers. It is important to note that this data set is more likely to have subjective estimates of population and therefore the results should be used with caution.

Refinement Methodology

The initial calculation of county per capita municipal demand rates using USGS data revealed which counties had data that produced unusually high or low GPCD values. CDM initially used 75 to 175 GPCD as the “normal” range (most water use across the state fits into this range) and counties falling outside of this range were identified for potential follow up and outreach. The first adjustment made to the USGS GPCD rates was based upon feedback received by EPD following their information and outreach efforts in September and October of 2009 (Municipal Ad Hoc meetings in Columbus and Augusta).

The next step involved comparing GPCD values derived from the USGS 2005 water use data to weighted county GPCD values. The weighted county GPCD estimates were calculated from the EPD Drinking Water System Survey population served data and the USGS public supply withdrawal data for major public suppliers. The resulting GPCD values for major suppliers were then weighted by population served to derive the weighted county GPCD

estimates. In some cases, the two GPCD values were close while some were quite different. When the differences were more than 20 percent, these public suppliers were flagged for follow up.

As an added element of the analysis, CDM also estimated the percent of the total county population served by each of the county's major public suppliers by dividing DWSS supplier population served numbers by the USGS total county population value. A county-wide percent of population served was calculated for each county. For many of the rural counties, the USGS-identified 'major suppliers' only supply a small portion of the overall county population. This analysis allowed CDM to determine whether the population served by 'major suppliers' represented a significant portion of the overall county population and, thus the degree to which a weighted county GPCD may accurately represent the overall county publicly-supplied per capita water use.

The initial calculations of county GPCDs were shared with members of each Water and Wastewater Forecasting Ad hoc subcommittee. CDM asked for their review of the data, concurrence with those counties where additional follow up was recommended, any recommendations based upon verifiable local information, and lists of other water suppliers that CDM should contact.

Based on this input, CDM ultimately developed three criteria to serve as guidance in determining which individual water supplier would be contacted:

1. Large water suppliers in each region in terms of population served.
2. GPCD value derived from USGS 2005 data was not within 20 percent of the GPCD value derived with population from the EPD Drinking Water System Survey Database.
3. County water use values were outside the "normal" range of 75 to 175 GPCD.

CDM developed a questionnaire and conducted outreach phone calls. The questionnaire was designed to gather information pertaining to the verification of population served estimates, water withdrawal rates, water sold and/or purchased wholesale, and identification of large industrial or agricultural uses of publicly-supplied water.

Overall, the outreach effort was successful. Critical information provided by suppliers resulted in adjustments to the calculated GPCD water use rates. Some municipal systems were called, but contact with appropriate personnel was not accomplished. Within our three Planning Regions, CDM attempted to contact twenty-eight municipal water suppliers by phone and received feedback data from twenty-one. Table 4 below shows the statistical breakdown by region and county.

Table 4: Municipal Outreach Summary Statistics

Region	Number of Counties Identified for Followup	Number of Municipalities Contacted	Number of Municipalities Providing Feedback to Date	Response Percentage
Suwannee-Satilla	9	9	8	89%
Altamaha	6	6	3	50%
Coastal	7	13	12	92%
Totals	22	28	23	82%

Date: February 25, 2010

The feedback received as a result of the outreach effort was documented and tracked in an Excel spreadsheet. Data received allowed for adjustments to the GPCD for individual municipalities. Adjustments to individual municipal water system GPCDs, in turn, had an effect on the respective weighted county GPCDs. The adjusted county GPCDs are recommended by CDM for use as inputs in the municipal water demand forecast spreadsheet which is used to estimate future municipal water and wastewater needs for each region.

Note that total county population numbers and percent of county population publicly-served were not revised based upon information gathered from individual municipal water systems.

Publicly-Supplied Water Use Results

The publicly-supplied water use for each county within the three Planning Regions are presented in Tables 5, 6, and 7, respectively. The major public suppliers identified by the USGS 2009 report are listed for each county. Column C shows the original USGS County GPCD calculated from base year 2005 data listed in the USGS report. After the Municipal Ad Hoc Committee meetings in Augusta and Columbus, adjustments were made to the USGS GPCD based upon information provided by EPD and feedback they received from individual suppliers. Column D shows the USGS County GPCD after these initial adjustments were made.

Column E shows the major public supplier GPCD calculated using population served from the EPD Drinking Water System Survey (2006-2009). Column F shows the population-weighted County GPCD. Column G shows the adjusted major supplier GPCD after incorporating feedback from CDM outreach to individual suppliers. These adjusted individual supplier data were then used to recalculate the population-weighted county GPCD as shown in Column H. Finally, the recommended County GPCD is listed in Column I. The

recommended county GPCD is based upon a review and rounding of prior calculations and adjustments.

For more details regarding the publicly-supplied municipal GPCD calculations including population served data and specific feedback data received from each provider, refer to the detailed tables organized by region in Appendix A.

Figure 1 shows the recommended municipal water use rates by county geographically.

Table 5 Altamaha Regional Water Planning Council Municipal GPCD Development By County								
A County	B Major Public Suppliers Listed by USGS ¹	C Original USGS County GPCD ¹	D USGS County GPCD After First Adjustment ²	E Major Public Supplier GPCD ³	F Population- Weighted County GPCD ³	G Adjusted Major Public Supplier GPCD ⁴	H Adjusted Population- Weighted County GPCD ⁴	I Recommended County GPCD
Appling	City of Baxley City of Surrency	139.6	139.6	165 52	150.5			140
Bleckley	City of Cochran	39.0	115.0	139	139.1			115
Candler	City of Metter Town of Pulaski	105.0	105.0	92 71	91.0			105
Dodge	Town of Chauncey Town of Chester City of Eastman Town of Rhine	98.2	98.2	75 75 107 59	97.0	211.4	173.5	173
Emanuel	City of Adrian Town of Garfield Town of Nunez Town of Oak Park Town of Stillmore Town of Summertown City of Swainsboro City of Twin City	169.3	169.3	74 77 52 86 81 73 205 148	169.2			169
Evans	City of Bellville City of Claxton City of Daisy City of Hagan	95.2	95.2	38 103 60 57	83.1			95
Jeff Davis	City of Denton City of Hazlehurst	70.5	70.5	93 36	38.0	203.8	195.1	195
Johnson	Town of Kite Scott Water and Sewer City of Wrightsville	177.5	177.5	80 126 198	183.8	123.3	120.9	121
Montgomery	Town of Ailey Town of Alston City of Mt. Vernon Village of Tarrytown Town of Uvalda	88.4	88.4	48 59 97 77 78	84.6	157.3	112.2	112
Tattnell	City of Cobbtown City of Collins City of Glennville City of Manassas City of Reidsville	120.8	120.8	88 49 155 68 88	118.0			121
Telfair	City of Helena Town of Jacksonville City of Lumber City City of McRae Town of Milan City of Scotland	140.0	140.0	137 103 137 143 73 69	129.9			140
Toombs	City of Lyons City of Santa Claus City of Vidalia	146.8	146.8	166 150 130	140.7			147
Treutlen	City of Soperton	127.8	127.8	115	115.5			128
Wayne	City of Jesup Town of Odum City of Screven	171.3	171.3	200 144 89	186.7			171
Wheeler	City of Alamo City of Glenwood	140.9	140.9	144 138	140.8			141
Wilcox	City of Abbeville Town of Pineview City of Pitts City of Rochelle Town of Seville	139.4	139.4	138 139 117 142 128	137.0			139

Sources:

Maximum Altamaha Region County GPCD	195
Minimum Altamaha Region County GPCD	95
Population-Weighted Altamaha Regional GPCD	140

1. USGS Water Use in Georgia by County for 2005

2. First Adjustments to USGS County GPCD :

Bleckley County - From EPD questionnaire completed by Jody Sapp, City of Cochran population served was 5,680 and average withdrawal rate was 0.79 MGD in FY 2009. From EPD withdrawal database, Middle Georgia College average withdrawal rate in 2005 was 0.07 MGD. From EPD DWSS, Middle Georgia College population served was 1,800. Adjusted USGS County GPCD includes revised City of Cochran data plus additional Middle Georgia College data.

3. Georgia EPD Drinking Water System Survey

4. Feedback from outreach to public suppliers

	Contacted for more information due to discrepancy between USGS and EPD Survey values OR abnormally high or low values
	One of top suppliers in region based upon population served
	One of top suppliers flagged for followup due to data discrepancies or anomalies

Table 6
Coastal Georgia Regional Water Planning Council
Municipal GPCD Development By County

A County	B Major Public Suppliers Listed by USGS ¹	C Original USGS County GPCD ¹	D USGS County GPCD After First Adjustment ²	E Major Public Supplier GPCD ³	F Population-Weighted County GPCD ³	G Adjusted Major Public Supplier GPCD ⁴	H Adjusted Population-Weighted County GPCD ⁴	I Recommended County GPCD
Bryan	City of Pembroke City of Richmond Hill	94.6	94.6	89 119	112.4	115.4	109.7	110
Bulloch	Town of Brooklet Nevils Water Association Town of Portal Register Water System City of Statesboro	82.7	82.7	82 241 73 95 114	111.9	109.6	107.6	108
Camden	City of Kingsland City of St. Marys City of Woodbine USN Base Support	130.3	130.3	89 87 93 452	108.9			130
Chatham	City of Garden City	160.7	160.7	212	135.1	228.3	135.8	136
	Hunter Army Airfield			130				
	Town of Pooler			42		107.9		
	City of Port Wentworth			36				
	City of Savannah			146		124.0		
	Skidaway Island Util			unknown				
	City of Tybee Island Savannah - Glen Robin			130 128				
Savannah I & D			435.9					
Effingham	Coastal Water & Sewer	1404.4	78.1	unknown	154.4		118.7	119
	City of Guyton			92		82.9		
	Town of Rincon			203		116.5		
	City of Springfield			137		165.0		
	Savannah I & D							
Facility supplies mainly industry in Chatham County, raw water intake physically located in Effingham County								
Glynn	City of Brunswick	157.3	157.3	152	146.4			157
	Jekyll Island Water Authority			509				
	Glynn Co - St. Simons			94				
	Sea Island Services			478				
Liberty	City of Hinesville	100.1	95.6	125	134.8	83.4	108.6	109
	City of Midway			89				
	City of Waltherville			107				
	City of Riceboro			548		255.4		
	Fort Stewart					173.1		
Long	City of Ludowici	444.8	444.8	812	811.6	116.4	116.4	116
McIntosh	City of Darien	135.7	135.7	99	97.8	166.2	161.4	136
	Hog Hammock Commission			67				

Sources:

Maximum Coastal Georgia Region GPCD 157
 Minimum Coastal Georgia Region GPCD 108
 Population-Weighted Coastal Georgia Regional GPCD 129

1. USGS Water Use in Georgia by County for 2005

2. First Adjustments to USGS County GPCD :

Effingham County Subtracted 34.33 mgd provided by Savannah Industrial and Domestic water provider from the total public supply withdrawals. Subtracted 750 people served by the Savannah Industrial and Domestic provider. It is assumed that not all water supplied by Savannah Industrial and Domestic is for industrial use; Additional data to account for water supplied to industrial vs. domestic users is pending.

Liberty County - Adjustment based on water withdrawal permit data for the Fort Stewart - Department of the Army facility (1.99 MGD) (GA EPD Permit Database). Adjusted GPCD calculation includes additional water use and additional population served (23,000) by the Fort Stewart drinking water system

3. Georgia EPD Drinking Water System Survey (2006-2009)

4. Feedback from outreach to public suppliers

5. Fort Stewart was not listed as a major supplier in the USGS report, but was added to this table based upon feedback from Ad Hoc Committee members. Supplier GPCD is based upon Ft Stewart's 2005 average withdrawal rate (1.99 MGD) and base force population of 11,384 (interpolated for 2005 based upon US Census data).

- Contacted for more information due to discrepancy between USGS and EPD Survey values OR abnormally high or low values
- One of top suppliers in region based upon population served
- One of top suppliers flagged for followup due to data discrepancies or anomalies

Table 7 Suwannee-Satilla Regional Water Planning Council Municipal GPCD Development By County								
A	B	C	D	E	F	G	H	I
County	Major Public Suppliers Listed by USGS ¹	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Major Public Supplier GPCD ³	Population-Weighted County GPCD ³	Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
Atkinson	City of Pearson Town of Willacoochee	112.0	112.0	97 115	104.4			112
Bacon	City of Alma	224.9	177.4	151	151.1	170.5	170.5	170
Ben Hill	Fitzgerald Water/Light	223.8	180.2	203	203.4	180.3	180.3	180
Berrien	Town of Alapaha Town of Enigma City of Nashville City of Ray City	131.3	131.3	77 74 163 69	130.2			131
Brantley	City of Hoboken City of Nahunta	92.6	92.6	86 94	91.8			93
Brooks	Town of Barwick City of Morven City of Quitman	137.3	137.3	67 69 140	127.6			137
Charlton	City of Folkston	163.7	163.7	130	130.4	123.0	123.0	123
Clinch	Town of DuPont City of Homerville	148.0	148.0	92 132	131.3			148
Coffee	City of Ambrose City of Broxton City of Douglas City of Nicholls	261.5	85.9	49 0 300 117	236.8	193.7	152.8	153
Cook	City of Adel Town of Cecil Town of Lenox Town of Sparks	229.4	135.9	141 77 75 217	145.7	135.8	142.1	142
Echols	Echols County Water	70.4	95.6	156	155.6			96
Irwin	Irwinville Waterworks, Inc. City of Mystic City of Ocilla	151.6	151.6	87 63 166	154.2			152
Lanier	City of Lakeland	153.1	153.1	148	147.5			153
Lowndes	Town of Clyattville City of Hahira Town of Lake Park Lowndes Co. Water System City of Remerton City of Valdosta	132.7	132.7	- 77 30 162 32 152	144.8			133
Pierce	City of Blackshear City of Patterson	123.2	123.2	75 56	73.0	146.7	127.2	127
Tift	City of Omega City of Tifton City of Ty Ty	171.0	155.6	97 167 140	163.2			156
Turner	City of Ashburn Town of Rebecca City of Sycamore	140.1	140.1	148 161 103	142.6			140
Ware	City of Manor City of Waycross Satilla Regional W&S	117.3	117.3	67 107 90	98.7	138.3	113.7	114

Sources:

Maximum Suwannee-Satilla Region County GPCD	180
Minimum Suwannee -Satilla Region County GPCD	93
Population-Weighted Suwannee -Satilla Regional GPCD	144

1. USGS Water Use in Georgia by County for 2005

2. First Adjustments to USGS County GPCD:

Bacon County - City of Alma reported 2005 water use of 0.68 MGD, with 0.09 MGD supplied to industrial water users. Adjusted water use for Alma is 0.59 MGD; adjusted water use for Bacon County is 0.60 MGD

Ben Hill County - According to a questionnaire from Mary Sheffield at Georgia DNR, 2005 City of Fitzgerald water use is 2.78 MGD which includes about 0.32 MGD supplied to industrial users. Therefore, preliminary adjusted GPCD is based on total county water use of 2.46 MGD.

Coffee County - From questionnaire CDM received from EPD, total reported public supply withdrawals 3.6 MGD, with 2.2 MGD being supplied to two major industries, Pilgrim's Pride and Wayne Farms. The City of Douglas stopped providing water to these industries within the last year. Questionnaire lists 4 public supply systems: Douglas 10,600 served, Nicholls 2,024 served, Bay Meadow 1,820 served, and Oak Park 2,044 served. Population served was adjusted to reflect these numbers.

Cook County - City of Adel withdrawals were confirmed to be 1.045 MGD in 2005 by City Manager Jerry Permenter; Industrial water use accounted for 0.3269 MGD of the City total. Therefore the City of Adel Public Supply total was changed to 0.72 MGD. City of Adel population served adjusted to 5,300 (personal communication with City Manager). An EPD questionnaire reported that the City of Lenox supplied 0.004 MGD to industrial users.

Echols County - Questionnaire from EPD shows that the withdrawals for Echols County Water Authority in 2005 were 0.07 MGD and withdrawals from J.G.B. Water System were 0.016 MGD for a total county public supply withdrawal of 0.86 MGD. Therefore, the preliminary adjustment to the GPCD was calculated as (0.086 mgd / 900) * 1,000,000. Questionnaire from EPD states that Echols County Water population served is 700 and J.G.B. Water System population is 900. Population served was adjusted accordingly

Tift County - Adjustment based on water withdrawal permit data for Abraham Baldwin Agricultural College (0.1249 MGD) (GA EPD Permit Database). Adjusted GPCD calculation includes additional water use and additional population served by the College drinking water system. Abraham Baldwin Agricultural College population served is 3,665 according to EPD Drinking Water System Survey

3. Georgia EPD Drinking Water System Survey (2006-2009)

4. Feedback from outreach to public suppliers

	Contacted for more information due to discrepancy between USGS and EPD Survey values OR abnormally high or low values
	One of top suppliers in region based upon population served
	One of top suppliers flagged for followup due to data discrepancies or anomalies

In many counties, additional follow up was not necessary because the USGS County GPCD and population-weighted GPCD values were within 20 percent of each other, and individual major supplier water use rates were within expected ranges. For example in the Altamaha region, Telfair County's USGS water use rate was calculated as 140.0 GPCD. The population-weighted county water use rate was found to be 129.9 GPCD. These two county GPCD values are within 8 percent of each other. The six individual major suppliers for Telfair County have water use rates ranging from 69 to 143 GPCD. These individual supplier numbers are within reasonable per capita values. Therefore, no additional information was needed and the USGS County GPCD value is recommended as the County GPCD in the forecast model.

When choosing between USGS and population-weighted GPCD without additional supplier feedback, the USGS value is chosen because the population-weighted GPCD value is calculated using the EPD Drinking Water System Survey population served data for years 2006-2009 rather than the 2005 base year. Also, as previously mentioned, the EPD DWSS data appears to have a higher degree of uncertainty.

In several counties, the population-weighted GPCD was notably different from the USGS GPCD and feedback obtained through outreach produced a more credible water use rate. For example in Bulloch County in the Coastal Georgia Region, the USGS County GPCD is 82.7 while the population-weighted County GPCD is 111.9. These values are slightly more than 35 percent different. Hence, the water use rates for the individual major suppliers in this county were evaluated. These individual GPCD values ranged from 82.4 to 241 GPCD. However, the water use rate of 241 GPCD was calculated for a very small supplier serving only 166 people, representing less than 1 percent of the entire county population.

The largest water supplier for the county is the City of Statesboro who serves approximately 25,000 people or 42 percent of the total county population. Their water use rate was estimated to be 114 GPCD based upon EPD DWSS data. As a result, Statesboro was selected for outreach. The Statesboro Water and Sewer Superintendent provided additional information for calendar year 2005 including actual population served numbers, average daily water withdrawal rate and average daily industrial water use. Using these updated numbers, the adjusted municipal water use rate was calculated to be 109.6 GPCD for Statesboro during 2005. Next, the population-weighted county GPCD was recalculated using Statesboro's revised number. This reduced the population-weighted county GPCD from 111.9 to 107.6. CDM recommends using 108 GPCD as the Bulloch County municipal water rate because the numbers are based upon actual data from the largest major supplier in the County.

In a few cases, the population-weighted GPCD was drastically different from the USGS GPCD and the values were outside reasonable ranges. In all of these cases, feedback obtained through outreach produced a more credible water rate. For example in Long County in the Coastal Georgia region, the USGS County GPCD was calculated as 444.8 while the population-weighted county GPCD was calculated as 811.6. Both of these values appear unusually high, so the major water supplier for the County, the City of Ludowici, was

contacted to obtain additional information. Based upon this contact, the estimated population was increased from 1,651 to 1,976 and the average daily water withdrawal rate was reduced from 1.34 MGD to 0.23 MGD. These changes resulted in the adjusted supplier rate of 116 GPCD, a more reasonable value based upon local data.

Municipal Wastewater Approach

Municipal and self-supplied domestic water use estimates are the basis for estimating municipal wastewater flows. A percent of water use that is indoor water use is multiplied by the estimated publically-supplied and self-supplied water use to derive estimates of wastewater generated. The percent indoor water use was obtained from the Georgia Water Use and Conservation Profiles (CH2M-Hill, March 2008).

Estimates of wastewater generated from publically-supplied and self-supplied water use are then translated into septic and centralized wastewater flows. U.S. Census data on the percent of households with septic systems were obtained by county. CDM assumed that all self-supplied residential water use is disposed through septic systems. Therefore, the percent septic value for wastewater generated from self-supplied domestic water use is assumed to be 100 percent. The formula for estimating county septic flow from both publically-supplied municipal water use (PS) and self-supplied residential (SS) water use is as follows:

- $Septic\ MGD = [(PS\ MGD) \times (\% \text{ indoor}) \times (\% \text{ septic})] + [(SS\ MGD) \times (\% \text{ indoor}) \times (\% \text{ septic})]$

Estimates of wastewater flows to centralized wastewater treatment facilities are derived from the portion of wastewater flow that is not septic. In addition, a percent of flow is added to account for infiltration and inflow (I/I) that occurs in the wastewater collection system before reaching the treatment facility. CDM assumed 20 percent I/I as a reasonable generalization after consultation with EPD and other contractors. Thus, the formula for estimating the centralized wastewater flow is as follows:

- $Centralized\ MGD = [((PS\ MGD) \times (\% \text{ indoor}) \times (1 - \% \text{ septic})) + ((SS\ MGD) \times (\% \text{ indoor}) \times (1 - \% \text{ septic}))] \times (1 + \% \text{ I/I})$

Wastewater effluent flow from centralized treatment facilities is either discharged as a point source to a receiving water body or delivered to a land application system (LAS). Information obtained from existing EPD permit data as well as feedback from municipal suppliers was used to determine the ratio of point discharge to LAS for each county. Figure 2 shows the simplified progression from municipal wastewater generation to ultimate discharge. Municipal wastewater parameters by county are shown in Tables 8, 9, and 10 for each planning region.

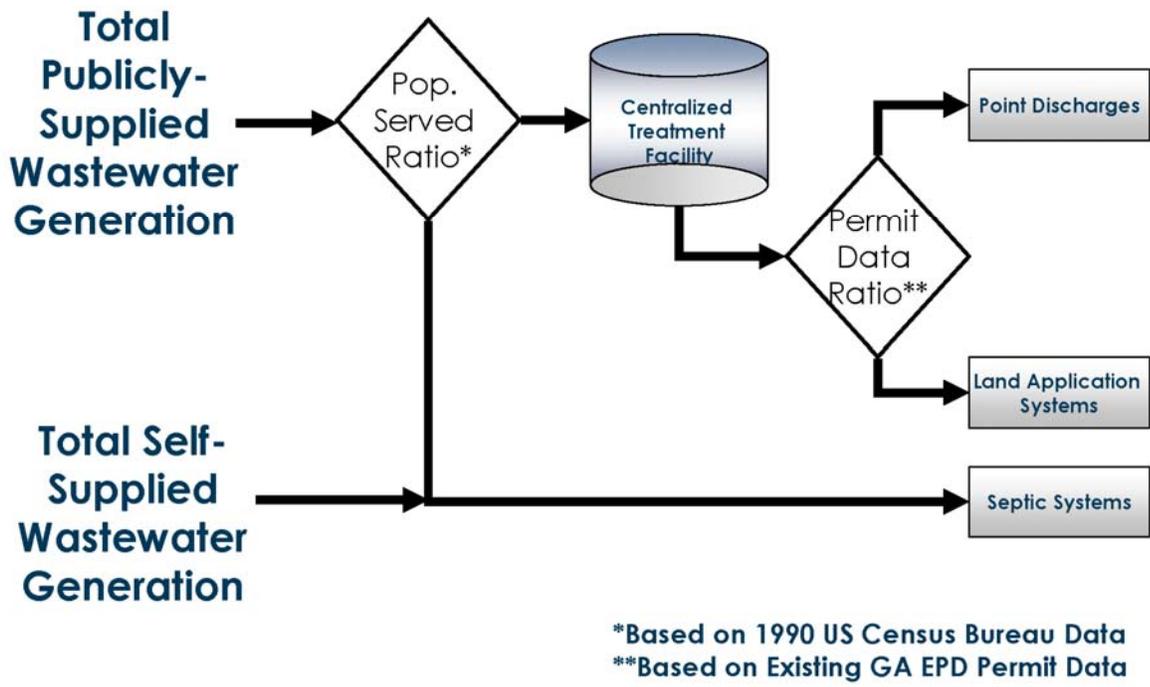


Figure 2: Municipal Wastewater Forecasting Flow Diagram

**Table 8
ALTAMAHA - Wastewater Forecast Parameters**

County	Publicly - Supplied Water						Self - Supplied Water	
	Percent Average Indoor Water Use ¹	Percent Inflow and Infiltration	Percent Septic ²	Percent Centralized WW	Centralized WW		Percent Average Indoor Water Use ¹	Percent Septic
					Percent Point Source Discharge ³	Percent LAS		
Appling	82%	20%	37%	63%	0%	100%	82%	100%
Bleckley	77%	20%	22%	78%	100%	0%	77%	100%
Candler	82%	20%	50%	50%	0%	100%	82%	100%
Dodge	88%	20%	44%	56%	83%	17%	88%	100%
Emanuel	82%	20%	47%	53%	96%	4%	82%	100%
Evans	77%	20%	35%	65%	100%	0%	77%	100%
Jeff Davis	77%	20%	40%	60%	100%	0%	77%	100%
Johnson	82%	20%	70%	30%	100%	0%	82%	100%
Montgomery	84%	20%	52%	48%	90%	10%	84%	100%
Tattnall	88%	20%	23%	77%	100%	0%	88%	100%
Telfair	87%	20%	40%	60%	49%	51%	87%	100%
Toombs ⁴	82%	20%	27%	73%	49%	51%	82%	100%
Treutlen	88%	20%	37%	63%	100%	0%	88%	100%
Wayne ⁴	82%	20%	53%	47%	95%	5%	82%	100%
Wheeler	85%	20%	58%	42%	100%	0%	85%	100%
Wilcox	87%	20%	42%	58%	100%	0%	87%	100%

Notes:

¹ Data from Georgia Water Use and Conservation Profiles (2008).

² Estimate derived from a combination of 1990 U.S. Census data, 2002 and 2007 GA Health Department estimates of septic systems, USGS estimate of self-supplied population, U.S. Census population estimates, and U.S. Census housing unit estimates

³ Data from Georgia EPD Returns Permit Database (1990 - 2007) for base year 2005.

⁴ Percent point source discharge and percent LAS values were derived from additional Discharge Monitoring Reports provided by EPD for base year 2005.

**Table 9
COASTAL GEORGIA - Wastewater Forecast Parameters**

County	Publicly - Supplied Water					Self - Supplied Water		
	Percent Average Indoor Water Use ¹	Percent Inflow and Infiltration	Percent Septic ²	Percent Centralized WW	Centralized WW		Percent Average Indoor Water Use ¹	Percent Septic
					Percent Point Source Discharge ³	Percent LAS		
Bryan	77%	20%	67%	33%	100%	0%	77%	100%
Bulloch	77%	20%	63%	37%	100%	0%	77%	100%
Camden	85%	20%	8%	92%	100%	0%	85%	100%
Chatham ⁴	82%	20%	1%	99%	98%	2%	82%	100%
Effingham ⁴	77%	20%	82%	18%	90%	10%	77%	100%
Glynn ⁴	82%	20%	33%	67%	99%	1%	82%	100%
Liberty ⁴	88%	20%	22%	78%	95%	5%	88%	100%
Long	85%	20%	67%	33%	100%	0%	85%	100%
McIntosh	87%	20%	87%	13%	100%	0%	87%	100%

Notes:

¹ Data from Georgia Water Use and Conservation Profiles (2008).

² Estimate derived from a combination of 1990 U.S. Census data, 2002 and 2007 GA Health Department estimates of septic systems, USGS estimate of self-supplied population, U.S. Census population estimates, and U.S. Census housing unit estimates

³ Data from Georgia EPD Returns Permit Database (1990 - 2007) for base year 2005.

⁴ Percent point source discharge and percent LAS values were derived from additional Discharge Monitoring Reports provided by EPD for base year 2005.

**Table 10
SUWANNEE-SATILLA - Wastewater Forecast Parameters**

County	Publicly - Supplied Water						Self - Supplied Water	
	Percent Average Indoor Water Use ¹	Percent Inflow and Infiltration	Percent Septic ²	Percent Centralized WW	Centralized WW		Percent Average Indoor Water Use ¹	Percent Septic
					Percent Point Source Discharge ³	Percent LAS		
Atkinson ⁷	83%	20%	49%	51%	69%	31%	83%	100%
Bacon	85%	20%	4%	96%	100%	0%	85%	100%
Ben Hill	82%	20%	47%	53%	95%	5%	82%	100%
Berrien ⁷	88%	20%	24%	76%	12%	88%	88%	100%
Brantley	77%	20%	92%	8%	0%	100%	77%	100%
Brooks	85%	20%	38%	62%	0%	100%	85%	100%
Charlton	85%	20%	64%	36%	100%	0%	85%	100%
Clinch	85%	20%	1%	99%	100%	0%	85%	100%
Coffee ⁷	77%	20%	38%	62%	91%	9%	77%	100%
Cook	85%	20%	23%	77%	100%	0%	85%	100%
Echols ⁵	82%	20%	100%	0%	-	-	82%	100%
Irwin	87%	20%	9%	91%	0%	100%	87%	100%
Lanier	85%	20%	62%	38%	100%	0%	85%	100%
Lowndes ⁷	87%	20%	27%	73%	83%	17%	87%	100%
Pierce ⁷	88%	20%	58%	42%	12%	88%	88%	100%
Tift ⁷	82%	20%	32%	68%	98%	2%	82%	100%
Turner ⁷	87%	20%	24%	76%	96%	4%	87%	100%
Ware ^{4,6}	83%	20%	38%	62%	100%	0%	83%	100%

Notes:

¹ Data from Georgia Water Use and Conservation Profiles (2008).

² Estimate derived from a combination of 1990 U.S. Census data, 2002 and 2007 GA Health Department estimates of septic systems, USGS estimate of self-supplied population, U.S. Census population estimates, and U.S. Census housing unit estimates

³ Data from Georgia EPD Returns Permit Database (1990 - 2007) for base year 2005.

⁴ No municipal discharge permits identified within the EPD Returns Permit Database (1990 - 2007).

⁵ County does not have centralized wastewater treatment facilities

⁶ Ware County WWTP NPDES at Satilla River physically located in Pierce County, but assigned to Ware.

⁷ Percent point source discharge and percent LAS values were derived from additional Discharge Monitoring Reports provided by EPD for base year 2005.

Industrial Water Approach

As discussed in Council meetings 3 and 4, industrial water demands are determined for each planning region by industrial category. These categories represent the top fifteen water using industries in Georgia: mining, food (two categories), textiles (two categories), apparel, automotive manufacturing, paper, chemicals, petroleum, rubber, stone and clay, primary metal, fabricated metal products, and electric machinery. For each category, CDM used actual water withdrawal data for 2005 from EPD's database rather than permitted values.

Rate of industrial water use can be determined by dividing the industry's water withdrawal by the number of employees. Future water need can be estimated by multiplying this water rate by the projected future number of employees for that industry. Since the future number of employees is the current number of employees multiplied by an employment growth rate, this approach is simplified to the following equation:

- $Future\ Water\ Need\ by\ Industry = Current\ Water\ Need \times Employment\ Growth\ Rate$

Employment growth rates were prepared by EPD with assistance from the University of Georgia. These rates were determined by planning region for the major industrial sectors. Employment projections for the largest industrial water users in CDM's three planning regions show declining trends or minor growth. In these cases, the forecast model shows minimal growth. Therefore, the current water need remains roughly the same in future years. In situations where there was a projected decline in industrial employment, the water use was not decreased, but instead held constant over the planning horizon.

Using employment to forecast future water demand does not account for improvements in water efficiency in any industry over time or reduction in number of employees per unit produced. A preferred method would be to base the industrial water forecast upon productivity and water use per unit of production. However, the data to support this approach are difficult to obtain due to proprietary constraints and such an approach was not fully supported based upon input from the industrial stakeholders. For example, in paper manufacturing, the water use per ton of paper stock produced can be determined by dividing the total water withdrawn in 2005 by the tons of paper stock produced that year.

EPD conducted outreach meetings with industry stakeholders. Due to proprietary constraints and the complexities of manufacturing processes (e.g., different water requirements for different types of products), industries were unable to provide either water use per product or projections of future product production. Production related water use information was obtained from the Georgia carpet industry and is being incorporated into the water demand forecast for this industry.

EPD's industrial water withdrawal data covers industries that are self-supplied and have permits allowing them to withdraw over 100,000 gallons per day. Industries that are self-supplied, but withdraw less than 100,000 gallons per day are not required to have EPD

permits and their actual withdrawals are not tracked by EPD. At this time, CDM does not think this category will be result in major water use, but Council members should provide input if they feel differently.

Industries that are supplied by municipal water systems are also not directly tracked by EPD. However, CDM attempted to capture water use for these industries during outreach to municipal systems as part of the refinement process used to develop municipal water rates. If a municipal system reported large industrial water use customers, the average daily industrial water rate was subtracted from municipal calculations and added to the industrial forecast. In some cases, the industry category was known and the industrial water use was added to the base year water use in the industrial model for that specific category. In other cases, the type of industry was unknown so the water use was added to an "All other or unidentified" industrial use category for that region.

The intent of the industrial water forecast is to capture water demands and trends among major water users. As noted in the description of the municipal publically-supplied water demand, there is some publicly-supplied industrial water use represented within the municipal GPCD water use. The industrial water use model reflects large (greater than 100,000 gallons per day) self-supplied industrial water users, plus any indentified municipally supplied industrial large water users that are removed from the municipal GPCD calculations. This method avoids any double counting of industrial water use. However, small (less than 100,000 gallons per day) self-supplied industrial water use may be under-represented.

Industrial Wastewater Approach

As with the industrial water demand estimates, the industrial wastewater flow estimates are calculated on a regional basis by industry. Industrial wastewater flow is estimated from wastewater to water ratio for each industrial category. For example in the apparel category, for every gallon of water used, there will be 0.6 gallons of wastewater produced. For the paper category, for every gallon of water used, there will be 0.79 gallons of wastewater produced. In some categories, this approach estimates that more wastewater will be produced than the gallons of water used. This occurs when wastewater treatment tanks and ponds are located outside and collect precipitation. This rainwater adds to the total wastewater effluent discharged or land-applied. Stone and gravel quarries also have to discharge rainwater that accumulates in the operational pits, and thus adds to the permitted discharge. Thus, some industries have a wastewater to water use ratio greater than 1.0.

Data on the ratio of wastewater to water use are limited. Data had to be matched by industry type by permit holder between discharge information and water use information. Few industrial discharge permit holders could be identified by industry type *and* matched with water use data at the facility level. Thus, the wastewater to water ratios were determined from a limited number of matches between actual water use and actual wastewater discharge

identified by an industrial permit holder for the state. These ratios can be adjusted to reflect more localized data by region.

Once the industrial wastewater flows are estimated, the flows are separated between point discharges and land application. The percent of permitted point discharges to total discharges for each industry was determined statewide from the EPD's wastewater discharge database. Again, the data was limited because not all industrial discharge permits are identified by industry type. Furthermore, within a particular industry, the number of permits with land application systems is limited. Therefore, the proportion of land application to point discharge (i.e., the percent discharge) can be revised based upon Council input for a specific industry or region. The formulas for estimating point discharge and land application flows by industry and region are as follows:

- $Point\ Discharge\ MGD = (Ind\ MGD) \times (ww/w) \times (\%discharge)$
- $Land\ Application\ MGD = (Ind\ MGD) \times (ww/w) \times (1 - \%discharge)$

Recommended Path Forward

In order to proceed with completing the water and wastewater forecasts, Councils will need to make several decisions. The following section summarizes those key decision points and the recommended path forward. This summary and recommendation are intended to assist Councils in moving forward, however it is emphasized that additional Council input is sought and greatly appreciated.

Based on Council input received to date, CDM is recommending that Councils develop a 'base scenario' which would be our estimate of the **most likely** future scenario. Councils may consider whether alternate forecasting scenario(s) are needed to address uncertainty in forecasts and/or Council specific concerns. We advise caution in developing further additional scenarios which could result in confusion and complication of the planning process. This would especially be the case when we begin to develop management practices to meet the different scenarios.

Municipal Water and Wastewater Forecast Base Scenario – 'Most Likely' Future Scenario

The *municipal* water demand forecast is essentially made up of the following:

- $(Publicly-supplied\ population\ served) \times (Publicly-supplied\ GPCD) + (Self-supplied\ population) \times (Self-supplied\ GPCD)$

The resulting estimates of municipal water demand are then tracked by groundwater (GW) and surface water (SW) sources (nodes and aquifers), and then fed into the municipal wastewater model where it is allocated to septic, land application and surface discharges. As discussed in Council meetings 3 and 4, Councils have flexibility to alter these parameters.

Key Elements of the Municipal Model

For the *municipal* water demand and wastewater forecast, the primary parameters that can be modified to create alternative scenarios are:

- Population
- Population served by publically-supplied water
- GPCD of publically-supplied population
- GPCD of self-supplied population

In addition, scenarios could be created by setting alternative values for percent septic, I/I ratios, percent land application, and all other assumptions within the water or wastewater models. However, the alternatives to the base scenario will most likely be created by changing the primary parameters. Possibilities for the municipal forecast include:

- Increase population projections by some percentage
- Increase population served, as ratio to population
- Increase the GPCD of either population publically-supplied, population self-supplied, or both

It is not likely that an alternative scenario would be created that lowers either population or a GPCD. For regional planning purposes, it is typically the higher case demand scenarios that are “tested” against supply and BMP scenarios, not lower demand scenarios.

Recommendations for the Municipal Model

Base Scenario ('Most Likely' Future)

CDM recommends that Councils adopt the data and assumptions that have been developed to represent the existing underlying conditions as the base scenario for the municipal water and wastewater forecast. The forecast of the ‘most likely’ scenario would be to maintain these assumptions and underlying conditions into the future. This scenario represents the assumption that the most likely definition of future water use is based upon the continuation of current water and wastewater practices and characteristics.

1. Use **one** most likely population projection per county as developed by OPB.
2. Adopt the recommended GPCD values shown in the attached tables.
3. Utilize the percent indoor water use versus outdoor water use developed in the Georgia Water Use and Conservation Profiles.

4. Use percent septic versus community treatment system values shown in the attached tables.
5. Assume self-supplied water users will utilize septic for wastewater disposal and keep percentage at 100 percent through the planning horizon.
6. Assume that the percentage of publically-supplied water users on septic will be held constant through the planning horizon.
7. Use 20 percent Infiltration and Inflow value for wastewater generation forecast.
8. Use the percentage of point source discharges as derived from the EPD permit data base (Note this factor does not include land application of wastewater sludges).

Note: As we develop management practices, we will also need to make decisions regarding the percentage of future demand met from groundwater and surface water supplies.

Municipal Water and Wastewater Forecast Alternative Scenario

Councils are at liberty to develop alternatives to the base scenario for planning purposes. Since population is multiplied by GPCD, it is not necessary to change both parameters but to simply adjust one parameter to sufficiently address uncertainties in the forecast. For example, each region could decide to use a population-weighted regional GPCD to forecast municipal water demands for all the counties within the region. Councils may also decide not to develop alternatives to the base scenario.

These alternatives were discussed with each Council's Ad Hoc Committee during meetings held in late February. Recommendations from those meetings for each Council are presented at the end of this memorandum.

Industrial Water Use and Forecasts Base Scenario

The *industrial* water demand forecast is essentially made up of the following:

- *(Base year water use by industry) x (rate of growth of employment by industry)*

The resulting estimates of water demand by industry are tracked by groundwater and surface water sources (nodes and aquifers), and then fed into the industrial wastewater model where the flow is allocated to land application and surface discharges.

Key Elements of the Industrial Models

For the *industrial* water demand forecast, the primary parameters that can be modified to create alternative scenarios are:

- Base water use for an industry

- Employment projections (i.e., change the rate of growth) for an industry

As with the municipal forecast, scenarios for the industrial forecast could be created by setting alternative values for industrial wastewater to water ratios and percent point source versus land applications. However, the alternatives to the base scenario will most likely be created by changing the primary parameters. The 'base water use for an industry' is derived from data for the region, and therefore is not likely to be modified. However, it is possible to *add a new industry* to the regional forecast. Thus, the possibilities for the industrial forecast include:

- Change the growth rate of a given industry
- Add a new industry

Adding a new industry to a region can be a hypothetical exercise, but must be 'reasonable'. Information needed to add a new industry includes:

- When: what year to start the new industry
- Starting volume of water use
- Growth rate for employment
- Location: assignment to node/aquifer

Because the industrial water use model multiplies a base year water use by industry times a rate of growth derived from employment data, an average water use for the new industry is needed. The region-wide employment growth rate can be applied to the new industry. Thus, Councils would need to select a reasonable water withdrawal amount.

Thus, the only remaining questions are When and Where. The timing should be a year relatively early in the planning horizon, but beyond the 'planned for future', such as 2020 or 2025. That is, we would expect that local planners would know if a new facility were to come on-line within the next few years and we sought that information during the 'mining for local knowledge' outreach conducted last year. Therefore, we are attempting to identify new industrial uses that may occur in the more distant future; a significant challenge.

Deciding the location of a new facility is a decision for the Council to make. The location could be the largest aquifer, or node in the region. If water requirements are criteria for site location, one would expect that the new facility would draw from the most abundant source.

Recommendations for the Industrial Model

CDM recommends that Councils adopt the data and assumptions that have been developed to represent the existing underlying conditions as the base scenario for the industrial water

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and wastewater forecast. The forecast of the 'most likely' scenario would be to maintain these assumptions and underlying conditions into the future. This scenario represents the assumption that the most likely definition of future water use is based upon the continuation of current water and wastewater practices and characteristics.

Based on Council input, there appears to be strong support to plan for additional industrial growth. This approach would involve developing a reasonable high industrial demand scenario. Such a scenario would likely include the addition of a new industry within the region. Absent site specific information on potential future industrial growth, it is difficult to determine when and where such a new industry would locate. However, for alternative planning purposes, Councils could assume that a facility requiring X MGD will locate in a given node or aquifer. Future growth of the water requirements can be developed by utilizing a growth factor possibly related to employment. This approach would allow Council and water resource planners to determine if such an increase in industrial water demand and wastewater generation affects the resources conditions of the region.

These alternatives were discussed with each Council's Ad Hoc Committee during meetings held in late February. Recommendations from those meetings for each Council are presented at the end of this memorandum.

Water and Wastewater Ad Hoc Committee Meetings

Coastal Georgia Regional Water Council

On February 25, 2010, members of the Coastal Georgia Water and Wastewater Ad Hoc Committee met and reviewed the February 24, 2010 Memorandum from CDM. The following members participated in person or via telephone unless otherwise indicated:

Ben Thompson, Chair
Tom Ratcliffe Vice-Chair
Mark Smith, Council Member
Tony Sammons, Council Member
John Sawyer, City of Savannah
Bob Scanlon, City of Savannah
Bill Edwards, City of Hinesville was not able to participate

Also participating:
Brian Baker, Georgia EPD
Rick Brown, CDM
Denise Funk, CDM
Mitch Horrie, CDM

Coastal Georgia Recommendations

The Ad Hoc Committee discussed the memorandum and provided the following recommendations which will be forwarded to the full Council for discussion/adoption at Council Meeting 5.

1. Self-supplied water use rate should be increased from 75 GPCD to 100 GPCD. The 100 GPCD value is the Equivalent Residential Unit (ERU) used by many municipal providers to determine individual water use.
2. Publically-supplied water use rates:
 - a) "Most Likely" scenario - Use Recommended County GPCDs with one revision to McIntosh County (select USGS 136 GPCD rather than 161).
 - b) "Alternate" scenario (this could be used to develop a reasonable high scenario - The Ad Hoc Committee had a detailed discussion of how to best address an alternate scenario and decided if an alternate scenario is developed, it is recommended that the Chatham County water use rate (136 GPCD) be applied to all counties.
3. Industrial water - A final decision was not reached on including a factor that would accommodate greater industrial growth than projected based on industrial employment. This factor could be a safety factor which could be a set and/or an anticipated new industry. The Ad Hoc Committee generally agreed that the factor should be placed in the general category of "other industrial". The Subcommittee

leaned slightly toward including the past industrial water use associated with the Durango Mill since it closed just a couple years prior to the base forecast year. However, no final recommendation was made on whether to include Durango's previous water use for future industry, except that they know a paper industry will not be located in Camden County at the old Durango location since the land has been rezoned. The Ad Hoc Committee recommended getting additional 'expert' advice on future industry from Doug Marchand (Georgia Ports Authority) and an expert familiar with biofuels and representatives from Georgia Power (organized through Tony Sammons).

4. The Ad Hoc Committee supported other forecasting assumptions for wastewater including: percent indoor water use; percent infiltration and inflow; percent septic; percent centralized wastewater; percent point source; percent land applied (subject to final quality check by CDM).

Suwannee-Satilla Regional Water Council

On February 26, 2010, members of the Suwannee-Satilla Water and Wastewater Ad Hoc Committee met and reviewed the February 24, 2010 Memorandum from CDM. The following members participated in person or via telephone unless otherwise indicated:

Darvin Eason, Chair
Grady Thompson, Vice-Chair was not able to participate
Greg Evans, Council Member
Scott Downing, Council Member
Bryan Tolar, GA Agribusiness Council was not able to participate
Jason Scarpate, City of Valdosta was not able to participate
Gordon Rogers, Council Member was not able to participate
Ernest Crussel, City of Douglas was not able to participate

Also participating:
Rick Brown, CDM
Brian Keel, CDM
Denise Funk, CDM
Mitch Horrie, CDM

Suwannee-Satilla Recommendations

The Ad Hoc Committee discussed the memorandum and provided the following recommendations which will be forwarded to the full Council for discussion/adoption at Council Meeting 5.

1. Self-supplied water use rate should be increased from 75 GPCD to 100 GPCD.
2. Publically-supplied water use rates:
 - a) "Most Likely" scenario - Use Recommended County GPCDs.

- b) "Alternate" scenario (this could be used to develop a reasonable high scenario – The Ad Hoc committee had a detailed discussion of how to best address an alternate scenario and decided that the development of an alternate scenario should be discussed by the full Council after the Council is able to review the preliminary forecasts (at Council Meeting 5). One possible option discussed is to use the regional population-weighted water use rate (144 GPCD) for all counties.
3. Industrial water – Include the "most likely" scenario based on employment and an "Alternate" scenario that provides for an additional 5 mgd of industrial water use growth (reasonable high industrial forecast) to bring the forecast from 17 mgd to 22 mgd by 2050. The Ad Hoc committee did not reach agreement on the type of industry, when, and where the additional growth would occur.
4. The Ad Hoc Committee supported other forecasting assumptions for wastewater including: percent indoor water use; percent infiltration and inflow; percent septic; percent centralized wastewater; percent point source; percent land applied (subject to final quality check by CDM).

Altamaha Regional Water Council

On February 26, 2010, members of the Altamaha Water and Wastewater Ad Hoc Committee met and reviewed the February 24, 2010 Memorandum from CDM. The following members participated in person or via telephone unless otherwise indicated:

Brinson Lanier, Chair

Mike Polsky, Vice-Chair was not able to participate

Ed Jeffords, Council Member

John Roller, Council Member

Gerald DeWitt, Council Member was not able to participate

Jim Free, Council Member was not able to participate

Also participating:

Kevin Farrell, EPD

Rick Brown, CDM

Brian Keel, CDM

Mitch Horrie, CDM

Altamaha Recommendations

The Ad Hoc Committee discussed the memorandum and provided the following recommendations which will be forwarded to the full Council for discussion/adoption at Council Meeting 5.

1. Self-supplied water use rate should remain 75 GPCD.

2. Publically-supplied water use rates – The Ad Hoc Committee discussed several options and decided that it would be best to present two possible approaches to the Council at Council Meeting 5:
 - a) “Most Likely” scenario – Use Recommended County GPCDs.
 - b) “Alternate” scenario – A review of the data for the region indicates that the water use seems to fall into three general ranges. The Ad Hoc Committee requested that CDM calculate a weighted average for the three general ranges of water use – high, middle, and low GPCD.
3. Industrial water – Utilize the industrial growth rate based on employment as the “most likely” scenario.
4. The Ad Hoc Committee supported other forecasting assumptions for wastewater including: percent indoor water use; percent infiltration and inflow; percent septic; percent centralized wastewater; percent point source; percent land applied (subject to final quality check by CDM).

Appendix A

Detailed Municipal Water Use Tables by Planning Region and County

Altamaha Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³				Population-Weighted County GPCD	Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD					
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD					Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)								
Appling	City of Baxley	139.6	139.6	5,283	29%	0.87	165	150.5	7.8%	no								140						
	City of Surrency			762	4%	0.04	52			no														
Bleckley	City of Cochran	39	115.0	5,680	47%	0.79	139	139	20.9%	no	One of the largest public suppliers in the region, feedback gathered prior before initial USGS adjustment							115						
Candler	City of Metter	105.0	105.0	4,776	46%	0.44	92	91.0	-13.4%	no								105						
	Town of Pulaski			280	3%	0.02	71			no														
Dodge	Town of Chauncey	98.2	98.2	400	2%	0.03	75	97.0	-1.2%	no	Inconsistencies in data between USGS and EPD withdrawal database							173.5						
	Town of Chester			1,072	5%	0.08	75			no														
	City of Eastman			5,440	28%	0.58	107			yes									-	1.15	-	-	-	211.4
	Town of Rhine			512	3%	0.03	59			no														

Altamaha Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³				Population-Weighted County GPCD	Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD					Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Emanuel	City of Adrian	169.3	169.3	675	3%	0.05	74	169.2	-0.1%	no	One of the largest public suppliers in the region and calculated GPCD above expected range, information pending							169	
	Town of Garfield			390	2%	0.03	77			no									
	Town of Nunez			192	1%	0.01	52			no									
	Town of Oak Park			348	2%	0.03	86			no									
	Town of Stillmore			615	3%	0.05	81			no									
	Town of Summertown			275	1%	0.02	73			no									
	City of Swainsboro			7,500	34%	1.54	205			yes									
City of Twin City	1,825	8%	0.27	148	no														
Evans	City of Bellville	95.2	95.2	800	7%	0.03	38	83.1	-12.8%	no								95	
	City of Claxton			4,082	36%	0.42	103			no									
	City of Daisy			336	3%	0.02	60			no									
	City of Hagan			1,404	12%	0.08	57			no									
Jeff Davis	City of Denton	70.5	70.5	323	2%	0.03	93	38.0	-46.1%	no	Calculated GPCD value well below expected range and not consistent with USGS value							195.1	195
	City of Hazlehurst			10,999	84%	0.40	36			yes									

Altamaha Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted County GPCD	Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Revised Population Served					Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)				
Johnson	Town of Kite	177.5	177.5	250	3%	0.02	80	183.8	3.5%	no	Calculated GPCD value well above expected range	3,975				123.3	120.9	121		
	Scott Water and Sewer			159	2%	0.02	126			no										
	City of Wrightsville			2,475	26%	0.49	198			yes										
Montgomery	Town of Ailey	88.4	88.4	825	9%	0.04	48	84.6	-4.3%	no	Member of municipal forecasting subcommittee	2,162				157.3	112.2	112		
	Town of Alston			169	2%	0.01	59			no										
	City of Mt. Vernon			3,500	39%	0.34	97			yes										
	Village of Tarrytown			130	1%	0.01	77			no										
	Town of Uvalda			765	9%	0.06	78			no										
Tattnell	City of Cobbtown	120.8	120.8	567	0%	0.05	88	118.0	-2.3%	no								121		
	City of Collins			814	1%	0.04	49			no										
	City of Glennville			4,698	4%	0.73	155			no										
	City of Manassas			146	0%	0.01	68			no										
	City of Reidsville			3,183	2%	0.28	88			no										

Altamaha Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³				Population-Weighted County GPCD	Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD					Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Telfair	City of Helena	140.0	140.0	2,256	17%	0.31	137	129.9	-7.2%	no							140		
	Town of Jacksonville			195	1%	0.02	103											no	
	City of Lumber City			1,385	10%	0.19	137											no	
	City of McRae			4,550	34%	0.65	143											no	
	Town of Milan			1,100	8%	0.08	73											no	
	City of Scotland			291	2%	0.02	69											no	
Toombs	City of Lyons	146.8	146.8	5,300	19%	0.88	166	140.7	-4.2%	no							147		
	City of Santa Claus			200	1%	0.03	150											no	
	City of Vidalia			13,050	48%	1.70	130											yes	One of the largest public suppliers in the region, information pending
Treutlen	City of Soperton	127.8	127.8	3,378	50%	0.39	115	115	-9.7%	no								128	
Wayne	City of Jesup	171.3	171.3	8,958	32%	1.79	200	186.7	9.0%	yes	One of the largest public suppliers in the region and calculated GPCD above expected range, information pending						171		
	Town of Odum			417	1%	0.06	144											no	
	City of Screven			1,015	4%	0.09	89											no	

Altamaha Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³				Population-Weighted County GPCD	Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD					Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Wheeler	City of Alamo	140.9	140.9	1,040	16%	0.15	144	140.8	-0.1%	no								141	
	City of Glenwood			1,162	17%	0.16	138			no									
Wilcox	City of Abbeville	139.4	139.4	2,029	23%	0.28	138	137.0	-1.7%	no								139	
	Town of Pineview			576	7%	0.08	139			no									
	City of Pitts			515	6%	0.06	117			no									
	City of Rochelle			1,760	20%	0.25	142			no									
	Town of Seville			156	2%	0.02	128			no									

Sources:

1. USGS Water Use in Georgia by County for 2005

2. First Adjustments to USGS County GPCD :

Bleckley County - From EPD questionnaire completed by Jody Sapp, City of Cochran population served was 5,680 and average withdrawal rate was 0.79 MGD in FY 2009. From EPD withdrawal database, Middle Georgia College average withdrawal rate in 2005 was 0.07 MGD. From EPD DWSS, Middle Georgia College population served was 1,800. Adjusted USGS County GPCD includes revised City of Cochran data plus additional Middle Georgia College data.

3. Georgia EPD Drinking Water System Survey

4. Feedback from outreach to public suppliers



Contact for more information due to discrepancy between USGS and EPD Survey values OR abnormally high or low values



One of top suppliers in region based upon population served



One of top suppliers flagged for followup due to data discrepancies or anomalies

Maximum Altamaha Region County GPCD	195
Minimum Altamaha Region County GPCD	95
Population-Weighted Altamaha Regional GPCD	140

Coastal Georgia Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁵	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Population-Weighted County GPCD				Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Bryan	City of Pembroke	94.6	94.6	2,571	9%	0.23	89.5	112.4	18.8%	no	Member of municipal forecasting subcommittee	9,187	-	-	-	-	115.4	109.7	110
	City of Richmond Hill			8,905	31%	1.06	119.0			yes									
Bulloch	Town of Brooklet	82.7	82.7	1,456	2%	0.12	82.4	111.9	35.3%	no	One of top suppliers in region and calculated GPCD value not consistent with USGS value	24,612	2.89			0.19	109.6	107.6	108
	Nevils Water Association			166	0%	0.04	241.0			no									
	Town of Portal			954	2%	0.07	73.4			no									
	Register Water System			211	0%	0.02	94.8			no									
	City of Statesboro			25,641	42%	2.93	114.3		yes										
Camden	City of Kingsland	130.3	130.3	16,284	36%	1.45	89.0	108.9	-16.4%	no	Higher GPCD explained by water use functions at the Navy Base.								
	City of St. Marys			17,090	37%	1.48	86.6			no									
	City of Woodbine			1,508	3%	0.14	92.8			no									
	USN Base Support			2,124	5%	0.96	452.0			no									

Coastal Georgia Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁵	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Population-Weighted County GPCD				Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Chatham	City of Garden City	160.7	160.7	5,460	2%	1.16	212.5	135.1	-16.0%	yes	Calculated GPCD above expected range	5,080	-	-	-	-	228.3	135.8	136
	Hunter Army Airfield			6,000	3%	0.78	130.0			no									
	Town of Pooler			15,080	6%	0.63	41.8			yes	Calculated GPCD below expected range	10,437	0.63	0.50	-	-	107.9		
	City of Port Wentworth			7,985	3%	0.29	36.3			yes	Calculated GPCD below expected range, information pending								
	City of Savannah			163,688	69%	23.98	146.5			yes	One of top suppliers in region - ground water	193,394	23.99				124.0		
	Skidaway Island Utilities			unknown		1.60	-				Private Utility not listed in EPD Drinking Water System Survey								
	City of Tybee Island			6,627	3%	0.86	129.8			no									
	Savannah - Glen Robin			5,000	2%	0.64	128.0			no									
Savannah Industrial & Domestic							yes	Surface water municipal plant serving both industry and municipal	10,000	34.33	0.00	2.06	27.91	435.9					
Effingham	Coastal Water & Sewer	1,404.4	78.1	unknown		0.13	-	154.4	97.7%		Private Utility not listed in EPD Drinking Water System Survey						119		
	City of Guyton			2,165	5%	0.20	92.4			yes	Calculated GPCD value not consistent with USGS value	2,444	0.20	0.00	-	-			82.9
	Town of Rincon			3,600	8%	0.73	202.8			yes	Calculated GPCD value not consistent with USGS value	6,267	-	-	-	-			116.5
	City of Springfield			2,330	5%	0.32	137.3			yes	Calculated GPCD value not consistent with USGS value	2,187	0.37	-	-	0.01			165.0
Savannah Industrial & Domestic			10,500	22%	34.33	-		yes	Intake located in Effingham County, but WTP and water use occurs in Chatham County. Water use is primarily industrial. See Chatham County above.										
Glynn	City of Brunswick	157.3	157.3	30,000	42%	4.57	152.3	146.4	-6.9%	no	One of top suppliers in region, but data appears reasonable						157		
	Jekyll Island Water Authority			2,083	3%	1.06	508.9			no	Higher GPCD explained by tourism								
	Glynn County Board of Commissioners St. Simons Island W&S			29,402	41%	2.76	93.9			no	One of top suppliers in region, but data appears reasonable								
	Sea Island Services			1,841	3%	0.88	478.0			no	Higher GPCD explained by tourism								

Coastal Georgia Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ²	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁵	Recommended County GPCD		
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Population-Weighted County GPCD				Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)					
Liberty	City of Hinesville	100.1	95.6	23,400	41%	2.92	124.8	134.8	41.0%	yes	Calculated GPCD value not consistent with USGS value, one of top suppliers in region and member of municipal forecasting subcommittee	35,000				83.4	108.6	109			
	City of Midway			2,595	5%	0.23	88.6			no											
	City of Walthourville			4,030	7%	0.43	106.7			no											
	City of Riceboro			1,131	2%	0.62	548.2			yes		Calculated GPCD value well above expected range and not consistent with USGS value.	1,363	0.69					-	0.35	255.4
	Fort Stewart											Supplier not listed in USGS 2005 report. Base population served for 2005 interpolated from US Census Group Quarters Data for Liberty County.	11,494	1.99							173.1
Long	City of Ludowici	444.8	444.8	1,651	15%	1.34	811.6	811.6	82.5%	yes	Calculated GPCD value well above expected range and not consistent with USGS value	1,976	0.23				116.4	116.4	116		
McIntosh	City of Darien	135.7	135.7	3,224	29%	0.32	99.3	97.8	-27.9%	yes	Calculated GPCD value not consistent with USGS value	2,948	0.49		-	-	-	166.2	161.4	136	
	Hog Hammock Commission			150	1%	0.01	66.7			no											

Sources:

1. USGS Water Use in Georgia by County for 2005

2. First Adjustments to USGS County GPCD :

Effingham County - S ubtracted 34.33 mgd provided by the Savannah Industrial and Domestic water provider from the total public supply withdrawals. Subtracted 750 people served by the Savannah Industrial and Domestic provider. It is assumed that not all water supplied by Savannah Industrial and Domestic is for industrial use; Additional data to account for water supplied to industrial vs. domestic users is pending.

Liberty County - Adjustment based on water withdrawal permit data for the Fort Stewart - Department of the Army facility (1.99 MGD) (GaEPD Permit Database). Adjusted GPCD calculation includes additional water use and additional population served (23,000) by the Fort Stewart drinking water system

3. Georgia EPD Drinking Water System Survey (2006-2009)

4. Feedback from outreach to public suppliers



Contact for more information due to discrepancy between USGS and EPD Survey values OR abnormally high or low values



One of top suppliers in region based upon population served



One of top suppliers flagged for followup due to data discrepancies or anomalies

Maximum Coastal Georgia Region GPCD 157
 Minimum Coastal Georgia Region GPCD 108
 Population-Weighted Coastal Georgia Regional GPCD 129

Suwannee Satilla Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ¹	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁵	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Population-Weighted County GPCD				Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Atkinson	City of Pearson	112.0	112.0	2,279	28%	0.22	96.5	104.4	-6.8%	no								112	
	Town of Willacoochee			1,650	21%	0.19	115.2												
Bacon	City of Alma	224.9	177.4	3,903	38%	0.59	151.1	151.1	-14.8%	yes	Ad Hoc committee member	4,400	0.75				170.5	170.5	170
Ben Hill	Fitzgerald Water/Light	223.8	180.2	13,671	79%	2.78	203.4	203.4	12.8%	yes	Calculated GPCD well above expected range; One of the largest public suppliers in the region		2.78			0.32	180.3	180.3	180
Berrien	Town of Alapaha	131.3	131.3	780	5%	0.06	76.9	130.2	-0.8%	no								131	
	Town of Enigma			1,074	6%	0.08	74.5												
	City of Nashville			4,800	29%	0.78	162.5												
	City of Ray City			871	5%	0.06	68.9												
Brantley	City of Hoboken	92.6	92.6	463	3%	0.04	86.4	91.8	-0.9%	no								93	
	City of Nahunta			1,280	8%	0.12	93.8												
Brooks	Town of Barwick	137.3	137.3	450	3%	0.03	66.7	127.6	-7.1%	no								137	
	City of Morven			722	4%	0.05	69.3												
	City of Quitman			5,570	34%	0.78	140.0												
Charlton	City of Folkston	163.7	163.7	5,521	51%	0.72	130.4	130.4	-20.3%	yes	Calculated GPCD value not consistent with USGS value	5,636	0.72		0.003	0.02	123.0	123.0	123
Clinch	Town of DuPont	148.0	148.0	109	2%	0.01	91.7	131.3	-11.3%	no								148	
	City of Homerville			3,624	52%	0.48	132.5												

Suwannee Satilla Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ¹	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Population-Weighted County GPCD				Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Lowndes	Town of Clyattville	132.7	132.7	n/a		0.02	-			no	One of the largest public suppliers in the region						133		
	City of Hahira			3,380	3%	0.26	76.9			no									
	Town of Lake Park			1,350	1%	0.04	29.6			no									
	Lowndes Co. Water System			11,016	11%	1.79	162.5	144.8	9.1%	no									
	City of Remerton			1,545	2%	0.05	32.4			no									
	City of Valdosta			49,500	51%	7.53	152.1		yes										
Pierce	City of Blackshear	123.2	123.2	6,360	37%	0.48	75.5	73.0	-40.7%	yes	Calculated GPCD value not consistent with USGS value	3,283	0.52			0.04	146.7	127	
	City of Patterson			898	5%	0.05	55.7			no									
Tift	City of Omega	171.0	155.6	1,340	3%	0.13	97.0			no	One of the largest public suppliers in the region						156		
	City of Tifton			28,025	69%	4.68	167.0	163.2	4.9%	yes									
	City of Ty Ty			716	2%	0.10	139.7			no									

Suwannee Satilla Municipal GPCD Development by County

County	Major Public Suppliers Listed by USGS ¹	Original USGS County GPCD ¹	USGS County GPCD After First Adjustment ²	Alternate GPCD Derived from EPD Drinking Water System Survey Data ³					Population-Weighted GPCD percent above or below adjusted USGS value	Follow Up with Public Supplier?	Reason for Follow Up or Comments	Information Gathered during Follow Up					Adjusted Major Public Supplier GPCD ⁴	Adjusted Population-Weighted County GPCD ⁴	Recommended County GPCD
				Population Served By Supplier ³	Percent of County Population Served by Supplier ^{1,3}	Public Supply Withdrawals by Supplier ³ (MGD)	Major Public Supplier GPCD	Population-Weighted County GPCD				Revised Population Served	Revised Water Withdrawal (MGD)	Wholesale Water Purchase (MGD)	Wholesale Water Sale (MGD)	Major Industrial Water Use (MGD)			
Turner	City of Ashburn	140.1	140.1	5,000	53%	0.74	148.0			no									
	Town of Rebecca			249	3%	0.04	160.6	142.6	1.8%		no								
	City of Sycamore			780	8%	0.08	102.6				no								
Ware	City of Manor	117.3	117.3	1,196	3%	0.08	66.9			no	One of the largest public suppliers in the region								
	City of Waycross			19,900	58%	2.12	106.5	98.7	-15.9%	yes		15,333					138.3	113.7	
	Satilla Regional W&S Authority			13,456	39%	1.21	89.9			no									

Sources:

1. USGS Water Use in Georgia by County for 2005

2. First Adjustments to USGS County GPCD :

Bacon County - City of Alma reported 2005 water use of 0.68 MGD, with 0.09 MGD supplied to industrial and commercial water users. Adjusted water use for Alma is 0.59 MGD; adjusted water use for Bacon County is 0.60 MGD.

Ben Hill County - According to a questionnaire from Mary Sheffield at Georgia DNR, 2005 City of Fitzgerald water use is 2.78 MGD which includes about 0.32 MGD supplied to industrial users. Therefore, preliminary adjusted GPCD is based on total county water use of 2.46 MGD.

Coffee County - From the questionnaire CDM received from EPD, the total reported public supply withdrawals are 3.6 MGD, with 2.2 MGD being supplied to two major industries, Pilgrim's Pride and Wayne Farms. The City of Douglas has ceased providing water to these industries within the last year. The Questionnaire lists 4 public supply systems: Douglas 10,600 served, Nicholls 2,024 served, Bay Meadow 1,820 served, and Oak Park 2,044 served. Population served was adjusted to reflect these number.

Cook County - City of Adel withdrawals were confirmed to be 1.045 MGD in 2005 by City Manager Jerry Permenter; Industrial water use accounted for 0.3269 MGD of the City total. Therefore the City of Adel Public Supply total was changed to 0.72 MGD. An EPD questionnaire reported that the City of Lenox supplied 0.004 MGD to industrial users. City of Adel population served adjusted to 5,300 (personal communication with City Manager).

Echols County - Questionnaire from EPD shows that the withdrawals for Echols County Water Authority in 2005 were 0.07 MGD and withdrawals from J.G.B. Water System were 0.016 MGD for a total county public supply withdrawal of 0.86 MGD. Therefore, the preliminary adjustment to the GPCD was calculated as (0.086 mgd / 900) * 1,000,000. Questionnaire from EPD states that Echols County Water population served is 700 and J.G.B. Water System population is 900. Population served was adjusted accordingly.

Tift County - Adjustment based on water withdrawal permit data for Abraham Baldwin Agricultural College (0.1249 MGD) (GA EPD Permit Database). Adjusted GPCD calculation includes additional water use and additional population served by the College drinking water system. Abraham Baldwin Agricultural College population served is 3,665 according to EPD Drinking Water System Survey.

3. Georgia EPD Drinking Water System Survey (2006-2009)

4. Feedback from outreach to public suppliers

- Contact for more information due to discrepancy between USGS and EPD Survey values OR abnormally high or low values
- One of top suppliers in region based upon population served
- One of top suppliers flagged for followup due to data discrepancies or anomalies

Maximum Suwannee-Satilla Region County GPCD	180
Minimum Suwannee -Satilla Region County GPCD	93
Population-Weighted Suwannee -Satilla Regional GPCD	144

Appendix B
Responses to Questions and Comments

Water Use Forecasting Comments and Questions from Council Meeting 4 and Follow-Up Coordination

Altamaha

The following comments/questions come from the Altamaha CM4 meeting summary and correspondence following CM4.

- Council Member: Council would like more information on water use and consumption for the different power generation methods and technologies. *Response: This information will be presented with the energy forecast, which is currently being produced. Preliminary data should be available for presentation at CM5.*
- Council Member: The Infiltration & Inflow (I&I) ratio of 20% is too low for Altamaha. Do we have any way of looking at this more objectively? For example, do diversions to return ratios vary significantly between regions, from northern Georgia (low groundwater levels) to southern Georgia (high groundwater levels) or does precipitation make this difficult to assess? *Response: The forecasts will allow Council to choose alternate scenarios to examine for comparison to the base scenario proposed by the forecasting team. I&I is one variable that can be changed for representation in an alternate scenario.*
- Council Member: Each community has an Industrial Development Authority (IDA) and we ought to outreach to those authorities. Many times elected officials do not know all that is going on. *Response: The forecasting team is working with an industrial ad hoc group comprised of representatives from each of the major industrial categories identified in the industrial forecast. Outreach is being performed in this manner as a more efficient and cost-effective alternative to contacting individual IDAs.*
- Council Member: Significant leaks might affect the per capita water use. It's possible some of the higher GPCD numbers in our region are from systems that do not actively manage their leaks. It was further noted that Johnson County includes a prison. *Response: A high GPCD for a community resulting from system leaks will be propagated in the forecasts. However, this high number will partially be averaged out when combined with other provider GPCDs in the county to develop one number for the county. In regards to the prison in Johnson County, our outreach effort involved a conversation with a representative from the City of Wrightsville. This conversation revealed that the City of Wrightsville supplies water to 900 meters within the city as well as a prison population of 1,500. The representative from the City of Wrightsville confirmed that the Georgia EPD Drinking Water System Survey population served estimate of 2,475 was reasonably accurate for the residential population served (equal to 2.75 persons per meter), and that an additional population of 1,500 was supplied at the prison. Therefore, our final determined population served for the City of Wrightsville is 3,975, which is the sum of the residential and prison populations served. This adjustment to the utility population served resulted in a lower overall GPCD for Johnson County, decreasing from 178 GPCD to 121 GPCD.*

- Council Member: Montgomery County data are flawed because Mt. Vernon has 40 percent of the population and the GPCD values are off. Based on the GPCD table the other five cities would only use 24 gallons per capita per day. Montgomery County needs to be more like 160 GPCD. *Response: We have received water and sewer records from the City of Mt. Vernon for calendar year 2005. These data show the gallons pumped by month as well as the monthly per capita per day calculation. The records indicate 2,162 as the population served in 2005, which produces a GPCD of 157 for Mount Vernon. This change has been made to the forecast model.*
- Council Member: The numbers show total water withdrawals/pumped per capita and generally 85 percent is a good figure for actual usage – there are 15 percent unmetered uses/losses.
- A Council member noted that population served is the key component here, and it should be considered how the percent of population served versus non-publically supplied will change moving forward. *Response: The base scenario proposed by the forecasting team maintains the same existing ratio of publically-supplied to self-supplied population in the future. This ratio can be adjusted for an alternate scenario if Council has reason to believe it will change in the future.*
- Council Member: Regarding the region-specific factors that will be fine tuning these projections, if you are aware of some new industrial demand or residential demand in your county, you need to bring that kind of information to the Council so that we can get it out and include it in this process.
- Council Member: Metropolitan Atlanta should send industry southward. As we are planning this process, we may not be able to note which county industry will land in, but the Altamaha region will experience/should plan for 10-20 percent growth.
- The Planning Contractor (PC) asked if Appling County has land application. A Council member said no, so the PC noted that we need to review this information in the database. *Follow-up Response: In the EPD Returns database there are 2 records for LAS permits in Baxley (Appling County): Permit # GA02-182-MechPond, 2005 Returns = 1.16 MGD; and Permit # GA02-182-StorPond, 2005 Returns = 1.07 MGD.*
- Council Member: The I&I rate for Wayne County is more than 40 percent. They have much higher I&I in the coastal plain and so we need to revisit this factor because of soil types and topography (high water table, old infrastructure, very flat slope). EPD commented that 40 percent seems very high and that issue should be addressed rather than planning for high I&I. The County would not need additional treatment capacity if they fix I&I. The Council member noted they are working on it.
- Council Member: Flows also depend on where and how a system is metering outflow. When there are heavy rains for 3-4 days and they are using a retention pond system, the system is going to exceed its permit, but not necessarily with wastewater.

- Council Member: How will this approach change over next 40 years – are there large industries we know are coming? Absent of that, the limitation of this approach is that what we see in the past is what we see in future. Do we need to be thoughtful qualitatively that there may be additional mix of industries that would come into region that would not come in today? EPD responded that something like that in plan would not dictate how EPD permits future facilities. *Response: Council can choose to examine an alternate industrial forecast scenario that includes additional growth in certain industries that they expect to come to the region in the future.*

Coastal Georgia

The following comments/questions come from the Coastal Georgia CM4 meeting summary and correspondence following CM4.

- Council Member: We need to develop list of all military, law enforcement, large federal water users and group quarter facilities (colleges, prisons, etc.) and do follow up. *Response: Outreach has been conducted to certain water providers and users as described in the Refining Forecasting white paper.*
- Council Member: We need to resolve who is captured by census and who is not captured by census. *Response: In the census, the institutionalized and non-institutionalized populations are counted as part of Group Quarters. They are included in the resident population.*
- A Council member suggested that the PC should look into the Thomas and Hutton report to see if relevant information is in there. *Response: We do plan to incorporate information from the Thomas and Hutton report. We have been coordinating with the Coastal Regional Commission and as information becomes available we will incorporate relevant information. We anticipate that information from the report will be especially useful in identifying challenges and opportunities related to water and wastewater infrastructure. In terms of water use we believe our follow up work with providers and other data sources provides us with a good representation of county and regional water use.*
- A discussion was held regarding the future industrial water demand projections and the fact that they are currently flat. The Council suggested this gets revisited and the PC further look into the reasons. A Council member suggested that someone needs to talk to economic development staff in the region and understand what they are seeing. Do we see large industrial growth and large water using industrial growth? *Response: Water use is flat in the model because employment projections for the largest water users in the region (Chemicals, Food Manufacturing, Paper, and Petroleum) show declining trends (represented in the model as zero growth) resulting in negligible overall growth in industrial water demand for the region.*
- Council Member: In 2014, the Panama Canal expansion will be completed. We do not know what is coming with that, but we do not think we are going to be relatively flat in industrial growth. *Response: If Council feels this expansion will increase certain industries in the region in the future, Council can choose to examine an alternate industrial forecast scenario that includes additional growth in these industries.*

- Council Member: We should plan for industrial growth, plan for the best. To plan for no growth is not a good policy. We need to plan for some level of growth in this water use sector so we can make decisions about what road we will go down if that happens.
Response: Council can choose to examine an alternate industrial forecast scenario that includes additional growth in certain industries that they expect to come to the region in the future.
- Council Member: On this industrial issue – unless we predict with some level of accuracy then we need to look at what ifs. What is the impact of those kinds of numbers on planning we are doing? It may not happen, but at least then we will know what items need to be decided in the bigger picture. *Response: Council can cover this contingency with an alternate forecast scenario.*
- Council Member: With the Durango plant closing down, it was permitted for 35 MGD. Is that available? *Response: Their permit went back to the State.* Council Member: Would the state re-permit? *Response: We do not know.* Council Member: The PC should double check whether Durango is included in the numbers. *Response: The EPD database shows two permits for Durango Paper Company (020-0803-01 & 020-0803-02) in Camden County. The last record of a withdrawal under either of those permits was in December of 2001. Therefore Durango is not included in the 2005 water use numbers. The two permits combined have a daily permit limit of 20.7 MGD according to the GA EPD Surface Water Withdrawal Database. From 1997 to 2007, there were three years within the database (1999 – 2001) that show actual withdrawal rates that average 7.51 MGD. A USGS Report (SIR 2004-5295) states that the Durango shutdown in October 2002 reduced groundwater withdrawals by 35.6 MGD. The Coastal Council should consider whether they have a recommendation regarding this situation. However, we also acknowledge Council’s desire to incorporate an industrial growth “safety factor” for planning purposes (preliminary industrial growth forecasts show a flat trend over the planning horizon).*
- For Military bases, there seems to be concern over what the total troop levels should be during deployments. Perhaps we should try to obtain a “standard/average” troop level at the facility and maximum, minimum level. Confirm if we have both full time residents at facilities and transient and try to characterize these numbers. See Council comment below.
- A Council member brought up a concern about population forecasting: we are up against an issue in the State of Georgia with troops being deployed. Since the census is going to look at home state for Ft. Stewart, etc., we stand not to have those troops counted for that community. Ft. Stewart could be down 15,000. We’re not sure how the Carl Vinson Institute will look at our number when the census is taken, because if they use the 2010 census, the Hinesville count will be down. We do not want our number to be low because of how the census is looking at it because we know those troops will be coming back.
Response: The Forecasting Team has added Ft. Stewart as a major municipal supplier for Liberty County. We calculated Ft Stewart’s water use rate as 173 GPCD based upon the actual 2005 water withdrawal rate of 1.99 MGD and an interpolated 2005 census population for Ft Stewart of 11,494. The census population captures the base force, but not the transient population. Using this approach allows the calculated baseline GPCD to be higher than if we include the transient

population. Therefore this approach allows for both base and transient population growth, but assumes that the transient to base population ratio remains the same in the future.

- Council Member: Comparing GPCD between communities can be misleading if one community is primarily residential and another is primarily commercial or industrial. *Response: This is true, and the intent is not to compare GPCD values between communities and try to make them match. Rather, we are trying to develop the most reasonably accurate GPCD for each community possible given available information.*
- Council Member: The “Population Served by Supplier” number for Hinesville is not correct. The population of Hinesville alone in 2005 was close to 35,000, and this supplier serves not only Hinesville but also most of Flemington, part of Allenhurst, and a small portion of unincorporated Liberty County. *Response: The population served for the City of Hinesville was increased to 35,000. This change resulted in decreasing Hinesville’s municipal water rate to 83.4 GPCD which reduced Liberty County’s population weighted GPCD as well. CDM is recommending that the adjusted population-weighted GPCD be used for Liberty County in the municipal forecast model.*
- Council Member: Riceboro numbers probably include the water they provide to SNF, Inc., which is a large industry producing polymers that currently employs 1,000 people. This almost equals the population served of 1,131 for Riceboro. If this industrial use is not accounted for, it can significantly skew the GPCD for this provider. *Response: CDM conducted follow-up with the City of Riceboro by phone. The City Clerk stated that their largest water customer is Chemtall, Inc. Quantitative data for water purchased by Chemtall is pending.*
- Council Member: It might be useful to have each supplier separate their customers by categories (i.e., residential, commercial, industrial, etc.). *Response: For the purpose of the forecasts, we only need to separate out municipally-supplied industrial uses from other municipal supply (including residential and commercial) so that industrial uses can be removed from the municipal forecast and added to the industrial forecast. We have identified such industries through our outreach to suppliers and analysis of industrial pretreatment permits.*
- Council Member: The 2005 population number shown for Richmond Hill is incorrect. It should be 9,187 instead of 8,905. *Response: The population served by Richmond Hill was corrected to 9,187. This adjustment reduced Richmond Hill’s municipal supplier rate from 119 to 115.4. Revising Richmond Hill’s rate reduced the overall population-weighted county GPCD from 112.4 to 110.*
- Council Member: Is it appropriate to use 2005 data as our baseline? A lot has changed in some of our communities in the past five years and I think it may be counterproductive to use 5-year-old data. *Response: The permit database from which the Forecasting Team is working includes data from 1997 through 2007. From this period of record, 2005 was identified as the most current average year in terms of rainfall, and therefore the most appropriate baseline year for use in forecasting.*
- Council Member: I’m not sure USGS data are the most accurate source for water usage. EPD is supposed to have withdrawal records so I think they would be a better source.

Response: The USGS data come primarily from the EPD records. The Forecasting Team has conducted a comparison of USGS data and EPD data for communities in our region. In the few instances where these data do not match, the Forecasting Team conducted outreach to providers to clarify the data or defaulted to the EPD data where verification information was not available.

Suwannee-Satilla

The following comments/questions come from the Suwannee-Satilla CM4 meeting summary and correspondence following CM4.

- PC: There is probably a need to have the Municipal Ad Hoc group perform additional micro-scale outreach to water suppliers. We should focus our follow-up with major water providers. We need to decide when we have sufficient data to call it “good enough”.
- Council Member: Irwin County has 1 treatment plant and it is land application. *Response: This is accounted for in the Suwannee-Satilla Municipal Wastewater Demand Model. The one treatment plant in Irwin County is a municipal treatment facility not an industrial treatment facility. In the Municipal Wastewater Demand Model Irwin County, the % Point Source Discharge is 0%, indicating that 100% of discharge is LAS.*
- Council Member: There is no wastewater treatment plant in Brantley County so it can't have 98% point source discharge. *Response: That is correct; there is no wastewater treatment plant in Brantley County. In the model Brantley County shows 100% septic for municipal water users according to most recent data. The model is set up so that the remainder of a county's wastewater that is not going to septic will be discharged to a stream or applied to land based on the % point source discharge that is input. In the case of Brantley County, since 100% of the municipal water use is going to septic no wastewater is being discharged to a stream.*
- Council Member: The Pierce County % septic seems too low. *Response: Percent septic for each county has been reviewed and updated based on more current available census data. The Pierce County % Septic is now 58% (4th highest in the Region).*
- Council Member: The suppliers I talked to in my county (Ben Hill) said the numbers we have are good.
- Public Attendee: Would it be prudent to provide a low, medium, and high water use forecast for each region based on available data? *Response: The Forecasting Team is providing a base scenario that we consider “most likely”. If Council would like to evaluate alternate scenarios to examine potential low and high water use results they can request this.*
- Public Attendee: There are some GPCD numbers that are clearly too low or high (e.g., Ludowici). *Response: These numbers have been revised as a result of outreach to suppliers. Revisions include adjusting populations served and withdrawals by providers, and moving municipally-supplied industrial uses out of the municipal forecast so that they do not skew GPCD.*
- Council Member: Water withdrawal quantities were provided to EPD via a “survey” and I don't see why a survey was necessary. EPD has records of public water supplier withdrawals. *Response: Withdrawals used in the forecast do come from the EPD database of*

municipal supplier withdrawals. The Drinking Water System Survey was used as a source of supplemental information to verify populations served by suppliers, but withdrawal amounts were not taken from this survey.

- Council Member: What adjustments to GPCD have been made for industrial and commercial demands? Are we attempting to determine a true “residential” demand? The same principal applies to landscape irrigation demands. Most residences have a second water meter to record water usage for irrigation. *Response: For the purpose of the forecasts, we only need to separate out municipally-supplied industrial uses from other municipal supply (including residential and commercial) so that industrial uses can be removed from the municipal forecast and added to the industrial forecast. We have identified such industries through our outreach to suppliers and analysis of industrial pretreatment permits. Residential demand is included in municipal demand and we do not need to separate it out for the forecast.*
- Council Member: Are we concerned with privately owned water systems? There are hundreds of privately owned systems in our region primarily serving residential subdivisions. *Response: The forecast includes privately owned systems that serve at least 25 people or at least 15 individual hook-ups.*
- Public Attendee: The numbers presented seem to match City of Douglas numbers within reason.
- Public Attendee: Is base year (2005) water usage actual (metered) or permitted, and what is the source of data and period of use? *Response: Water usage is primarily from the EPD databases of groundwater and surface water permits, which also contain actual water use data. The recorded actual water use from the permit databases is the starting source of water use information. In some instances, additional information is available from providers or the ad-hoc industry groups. The EPD database information is available from 2002 – 2007. However, the focus is on using data for the year 2005 whenever possible.*
- Public Attendee: Don’t double-count water sold to industry by municipalities. *Response: As part of the outreach effort, the Forecasting Team has identified industries that are supplied water by municipalities. In such cases these water demands are taken out of the municipal forecasts and included in the industrial forecasts so they are not double-counted.*
- Council Member: We need numbers for both what’s permitted by source & what’s actually used. *Response: The water use forecast is based upon actual water use. A report can be generated to show both permitted and actual base year (i.e., 2005) water use by source (GW/SW). It would need to be determined how such information should be reported (for example, by county, by basin, by region, by industry) without disclosing individual permittee information. Developing the report would be outside of the current scope of work of the Contractors.*

The water demand forecasts are projections of actual use, and not projections of permitted use. The forecasts are for planning purposes, and are not intended to be used for permitting or allocation purposes. For the purpose of assessing future resource availability, total permitted withdrawals will be input to the future condition resource assessment models.

- Public Attendee: Industries are doing more with less people, so water use may increase without employment increasing. There is a plant in Valdosta that has low employment and a high water use rate. The chemical industry is doing more with fewer employees. *Response: Unfortunately this is one of the shortcomings of this forecasting approach. There is no way to account for changes in efficiency or technology in any industry.*
- Council Member: Is employment an acceptable basis for forecasting water use? *Response: A preferred method would be to base the industrial water forecast upon productivity and water use per unit of production. However, the data to support this approach are difficult to obtain due to proprietary constraints. Thus, the closest surrogate method for which adequate data are available is to base the forecast on employment projections.*
- Public Attendee: How do we address industries that are producing/using more water with fewer employees? *Response: One draw-back of the employment based forecast is that improved technology can provide more productivity per employee and less water use per product. The simple resolution to this issue is to place a restriction on the forecast methodology that does not allow water use in a given industry to decline over time. Thus, water use may increase, but not decrease in our forecast for a given industry.*
- Council Member: Some industries could be planning to expand under existing permits. *Response: For this reason, the resource assessment models will represent future withdrawals up to existing permit limits to determine future resource capacities.*
- Council Member: What is the period of record of employment data used in the employment projections? *Response: Dr. Dorfman's trend analyses are based upon quarterly data from the first quarter of 1990 to the first quarter of 2008.*
- Council Member: Some employment projections display strange patterns, with employment rates bottoming out at zero for several years and then slowly picking up again, such as the stone and clay category. How does the model come up with these projections? *Response: These patterns are predicted by the model based on cyclical growth patterns seen in the period of record of data for that industry.*
- Council Member: Was the recent economic recession factored into the projections? *Response: Yes, the industrial growth rate was restricted for the construction, finance, and retail categories.*
- Council Member: There will likely be 5 or 6 new energy plants in our region in the future. *Response: These will be captured in the energy forecasts.*
- Council Member: These industrial forecasts don't feel right to me. They seem too low, and also don't account for returns. *Response: Council can choose to examine an alternate industrial forecast scenario that includes additional growth in certain industries that they expect to come to the region in the future. Returns are captured in the industrial wastewater forecast.*

- Council Member: Industries in our region pump out groundwater but return flows to surface waters that go to Florida. We are not returning water to the aquifers in Suwannee-Satilla. *Response: This is true.*
- Council Member: How are wastewater plants incorporated? *Response: The existing water use data is for total withdrawals and wastewater is calculated based on industry water-to-wastewater ratios.*
- Council Member: In some cases can wastewater exceed water? *Response: Yes, for example in the case where an industry has on-site ponds for storing wastewater prior to discharge and these ponds catch rainwater.*
- Public Attendee: There are industrial discharges to Publicly Owned Treatment Works (POTWs) in southeast Georgia. How are source and withdrawal data linked to discharge data to track and reconcile industrial discharges that go to POTWs? *Response: Discharges for industrial forecasts are currently calculated. At this point in time, there is no linkage between water sources and discharges. All industrial water use, regardless of source (GW, SW, or municipal), is then allocated to either a surface body point discharge or land application. The models do not assume that municipally-supplied industries discharge to municipal wastewater systems. We have analyzed records of industrial pretreatment permits and identified known industries that are permitted to send effluent to POTWs and where they are sending that effluent. These pretreatment permits do not contain data regarding the actual volume of wastewater the industries are sending. To estimate volumes of industrial discharges, the Forecasting Team has applied the industry-specific wastewater-to-water ratios to these identified industries. Furthermore, by identifying industrial water use supplied by municipal suppliers as a result of our outreach efforts, we are able to more accurately estimate the quantity of industrial water demand and, consequently, the wastewater generated by industries as separate from municipal wastewater generated.*
- Council would like more information on Metro Atlanta planning process background and requirements, and they mentioned it would be good to invite someone from the district to the next meeting. This can be combined with the legal presentation on Georgia Water Law. *Response: We will coordinate with the Chair and Vice Chair to determine when and how to best incorporate information from the Metro District. At this point, based on Council input, we will make sure that we do include/obtain information from the Metro District and we will work with Council to see how it best fits into our future agendas.*
- What is the source of land application data and period of record of data? *Response: Land application data were obtained from permitted returns from 1997 – 2007. Information by permit holder was matched between withdrawal data and returns data in order to identify returns by industry group. Because the returns database does not identify the type of industry of the permit holder, the resulting information of returns by industry type was limited to a small sample of industries state-wide. Of these industries, only a few had land application permits. Thus, there is very limited information on land application returns among industries (less than 1% of industrial returns are identified as land application in the returns permit database). It is recommended that regional councils report known industrial land application discharges to the Contractors so that such information can be incorporated into the forecast models for each region.*

- Can the Contractors provide other regions' employment projections to the Suwannee-Satilla Council? *Response: Yes, employment projections for all regions will be distributed.*
- There might be some 'sub-permit-threshold' industrial water users in their region (i.e., self-supplied users that are less than the 100,000 GPD limit for reporting to the EPD). Water use for these facilities will not be included in the industrial forecast unless Council provides specific water use information for these facilities to the Contractors.
- Some industries might show a high growth rate in a category with very few employees. For example, an industry that has 5 employees in a region in 2005 might be projected to have 10 employees in 2010, which reflects 100% growth over 5 years, or an annualized growth rate of 14.9%. Looking only at growth rates does not give a true indication of the size of an industry in a region.
- Council Member: Are Egg forecasts captured under food? Egglard's Best is in Blackshear and they are municipally supplied. *Response: Yes, the egg processing industry (NAICS 31199) is included in the Food (NAICS 311) category. No water use is identified for this industry from reported actual use in the permit database. Water use may be 'sub-threshold' or municipally-supplied. However, CDM followed up by phone with the City of Blackshear. The City Manager stated that they do supply American Egg, an egg cracking facility. The average 2005 supply rate from the City of Blackshear to American Egg was 0.04 MGD. This industrial rate was subtracted from the municipal forecast and added to the industrial forecast under "Other and Unidentified Industrial" because American Egg is classified under NAICS 424440, Poultry Products Merchant Wholesaler which is not one of the top 15 industrial water use categories.*
- Council Member: There is a poultry plant in Fitzgerald that uses 1.5 MGD, but we don't know if it's self-supplied or municipally-supplied. How and where is this included? Does the forecast capture only farms but not processing? *Response: Poultry processing is NAICS 311. No actual water use in the permit database was found for industries in Ben Hill County. Our outreach efforts with the City of Fitzgerald indicated that the City supplies one poultry processor which used 0.05 MGD in 2005. This volume is included in the industrial water demand forecast. No other poultry plant supplied water by the City of Fitzgerald was identified as a result of our outreach effort.*
- Council Member: The petroleum industry shows a 12.3% growth from 2005 - 2010 with no water use. How can that be accurate? *Response: Even though this is a large increase percentage-wise, there are very few actual employees in this industry and the water use is not large enough to be captured in the permit database. This industry is projected to increase from 8 employees in 2005 up to 14 employees in 2010 for the region. The annual growth rate of this increase is relatively large even though it is a small industry. No actual water use in the permit database was found for this industry in region.*

Council Member: The chemical industry shows 1.8% growth from 2005 - 2010. Is that 1.8% total over the 5 years or 1.8% per year for each of the 5 years? *Response: 1.8% is the average annual growth rate for this period. Therefore the chemical industry is growing by 1.8% per year on average from 2005 to 2010.*

- Council Member: Brantley was mining titanium through 2006 using a surface water permit, but they haven't been in operation since then. *Response: The surface water withdrawal permit database shows a mining withdrawal in Brantley County of just over 1 MGD in 2005. This volume is included in the industrial water demand forecast.*
- Council Member: Is the beverage industry included in the Food category? There is a large water bottling plant in Douglas, and maybe plants in Fitzgerald and Pierce. Is the drinking water that is put in the bottles captured in the forecast? *Response: The beverage industry is NAICS 312. No actual water use in the permit database was found for industries in Coffee County, Ben Hill County, or Pierce County. The water put into products should be included in the industry water needs. If their use is under 100,000 GPD then there is no permit and this will not be captured in the forecast. Our outreach efforts to the cities of Douglas in Coffee County, Fitzgerald in Ben Hill County, and Blackshear in Pierce County did not result in any identified water bottling facilities supplied by the aforementioned municipal water suppliers..*
- Council Member: For stone and clay, why is the projected growth 13% from 2005-2010, then zero for the next 3 periods, then slowly increasing again? *Response: This industry is projected to increase from 294 employees in 2005 up to 549 employees in 2010 for the region. Then there are slight dips in the employment numbers, but the industry eventually grows to 559 employees by 2050. The annual growth rate by decade shows a large increase from 2005 to 2010, then negative growth (which is replaced by 0% growth), and then very modest growth out to 2050. This trend is based on the cyclical growth pattern seen in the employment data period of record for this industry.*
- Public Attendee: There is a major land application system for the paper industry (Rayonier) in Suwannee-Satilla but we show zero land application in the wastewater forecast. This has already been mentioned to the industrial stakeholder group. *Response: The statewide sample of industrial land application data showed that less than 1 percent of identified industries used land application systems. This sample was very limited. A follow up with Rayonier and re-review of the EPD data base indicates that Rayonier does not land apply effluent.*
- Please confirm the process for aggregating discharge data; is this from DMRs, or other source? *Response: Discharge data available to CDM was from the Georgia EPD returns database. This database contains discharge permit information for all permitted dischargers from 1997 to 2007 including actual and permitted return flows. This database was used to determine the geographic distribution of municipal wastewater by county, the industry wastewater to water ratio, and the geographic distribution of industrial wastewater by watershed and node.*
- Is there value in looking at Pretreatment discharge permits to determine what industries discharge to POTW? *Response: We are able to identify individual industries that discharge to POTWs through a Pretreatment discharge permit. Limitations in the database, however, do not allow us to identify the industry category of the facility, the county where the facility is located, the volume of effluent sent, and in some cases the receiving POTW. Consequently, the data does not allow for sufficient analysis required to accurately determine industrial discharge to POTWs permitted by Pretreatment discharge permits. Thus, we have no basis upon which to make generalizations in our models about the percent of wastewater by industry that is sent to POTWs.*

For example, we may know that a poultry processing facility in County A sends effluent to a POTW, however we do not have sufficient information to say that X percent of effluent from food processors in the region goes to POTWs.

In some cases, our outreach efforts allowed us to identify large industrial water use supplied by municipal water provider. That industrial water demand was transferred from the municipal water demand model to the industrial water demand model and, subsequently, to the industrial wastewater demand model where demand is translated into wastewater generated. As a result, we have been able to separate a portion of the wastewater flows that would have otherwise been classified as municipal into industrial wastewater generated. Some have suggested that we assume that if an industrial facility receives water from a municipal water system, then we assume that the wastewater generated from that facility goes to a POTW. However, there is insufficient information to support this type of an assumption.

Ultimately, the municipal wastewater that originates from municipal water systems gets distributed between septic systems, point discharges and land applications. Similarly, industrial wastewater, regardless of water source, gets distributed between point discharges and land applications. Thus, whether the industrial wastewater realistically passes through a POTW system or not, its final destination is either a point discharge or a land application. For the purpose of the regional planning process, it is the estimated volumes of point discharge by node that is the critical element of the wastewater modeling effort, regardless of whether it comes from municipal or industrial users.

- *What is the status of Land Use modeling and is there a need to follow up on Dr. Kramer's work? Response: Land use modeling is not being conducted at this time.*