Eagle Resources
Advocacy → Sound Science → Innovation → Solutions

Mr. M. Travis Blake
Blake & Associates, Inc.
9668 Hwy 15-501
Chapel Hill, NC 27517

Via email: tblake@blakeassoc.net

June 16, 2006

Subject: Irrigation Capacity Assessment and Wet Weather Storage Requirements for Polk's Centre Development, Chatham Co., NC

This letter responds to your telephone request for an initial assessment of the disposal capacity of dedicated sprayfields and landscape areas for the Polk's Centre development. This preliminary assessment also evaluated the likely required volume of wet weather storage necessary. This assessment relies upon information provided by you, the John R. McAdams Company, and Soil and Environmental Consultants (S&EC) and Dave Meyer, NC LSS. To the extent that the conclusions of this letter report depend upon information provided by others, neither I, nor Eagle Resources P.A. make any representations regarding the completeness, accuracy and reliability of such data and information.

The areas of the two soil series to be irrigated used in this analysis (Wedowee and Helena) were provided by S&EC based upon their field mapping. The Chewacla-Wehadkee soils as mapped by S&EC are not included in our assessment because S&EC considers them unsuitable for irrigation because of shallow water table and wet conditions throughout much of the year. We have also removed the area occupied by the 50-foot stream buffer as provided by the John T. McAdams Company. The landscape spray areas used in this analysis are those provided by The John R. McAdams Company and are shown on the attached Figure 1.

The values of the restrictive layer hydraulic conductivity (Ksat) used in our analysis are those measured by Mr. David Meyer, NC LSS on June 11, 2006. Mr. Meyer conducted tests at five locations (Figure 1), three in soils mapped as Helena by S&EC, at two locations in soils mapped as Wedowee as mapped by S&EC. S&EC has reviewed these test results and has provided us with the attached letter summarizing this assessment. As stated in that letter, the final report on the Ksat tests will be provided by Mr. Meyer. I expect that letter report to be available during the week of June 19, 2006. The average values of Ksat for the Helena soils tested by Mr. Meyer are of the same order of magnitude for Helena soils tested on your Williams corner property, but are higher. The values obtained for the Wedowee soils are approximately ten times greater than tests in Wedowee soils on the Williams Corner property. Permitting by the NC Division of Water Quality of the Polk's Centre sprayfields as an application area for reclaimed water from your treatment plant will require additional Ksat tests because of the variability in Ksat values within the same soil series.

.

To provide you and Chatham County with a conservative assessment of the irrigation capacity, we have averaged the Ksat values measured on the Polk's Centre property with the lower values used for the final water balance for the for the non-discharge permit application to DWQ for Williams Corner. We have also used very conservative (low) values of the Drainage Coefficient applied to these soils. EPA recommends using between 4% and 10% of Ksat in water balance calculations for waste water application. We have used a value of 4% for Helena and 3% for Wedowee soils to assess the potential capacity of the Polk's Centre application areas.

Also, in accordance with the requirements of both DWQ and Chatham County, I have used the precipitation and surface runoff from 80th % wettest year, based upon a 98-year climatic record for the Chapel Hill climatic station. Potential evapotranspiration (PET) used in the water balance was computed using the industry standard Priestly-Taylor method which uses solar radiation values from the Raleigh Durham Airport station and daily maximum and minimum temperature from the Chapel Hill station.

The following table provides the initial average annual loading rates and maximum convergent irrigation capacity based upon this analysis. Please note this is NOT the maximum instantaneous loading rate which will be specified in the non-discharge permit. That rate will be recommended by S&EC in the final Soil Scientist Evaluation Report in support of the permit application.

Combined Polk's Centre and William's Corner Recommended Average Annual Loading Rates and Maximum Convergent Flow Rates														6/16/2006	
Required Wet Weather Storage Volume					6.97	million gallons									
							Average Annual Loading Rate							NET Annual Loading	
Soil Series	Soil Area	Area Ac	Restr-ictive Hori-zon	Ksat in/wk	% of Min. Ksat Used	Drain-age in/wk	in/wk	in/yr	gal/day	ac-ft/yr	% of Total Load-ing	Net Precip on Storage (gal/ day)		gal/day	ac-ft/yr
Helena	SA-1	7.97	C	7.11	4%	0.28	0.29	14.87	8,809	9.87	14.6%	(721)		8,088	9.07
Wedowee	SA-2	24.66	BC	20.55	3%	0.82	0.54	28.11	51,547	57.78	85.4%	(4,217)		47,329	53.06
Total Sprayfield Area		32.63							60,355	67.65	100.0%			Maximum Convergent Flow Rate	
Net Out (In) from Precip on and Evap from Reservoirs		2.12										(4,938)		55,417	62.12

Please also note that the areas of soils have not been assessed for the potential to develop a permanent watertable at depths of less than three feet. That assessment will be completed as part of the Hydrogeologic Report for the development, which has not been completed. It is possible that small areas of the natural sprayfield areas will be removed as part of that process.

We also have not removed areas within 25 feet of defined drains mapped by S&EC that DWQ will likely eliminate from the area to be sprayed. We note that the property boundary provided by The John R. McAdams Company overlaps the location of Polk's Landing Road as mapped by the NC Department of Transportation. Further sprayfield water balance analyses will require the use of a surveyed property boundary.

All these caveats notwithstanding, it appears that the loading rates and available sprayfield area at Polk's Center are adequate to dispose at least 50,000 gallons per day. We have also not yet evaluated the reasonableness or requirements of additional disposal capacity using consumptive use by evaporative cooling or recycled water using 'purple-pipe systems.

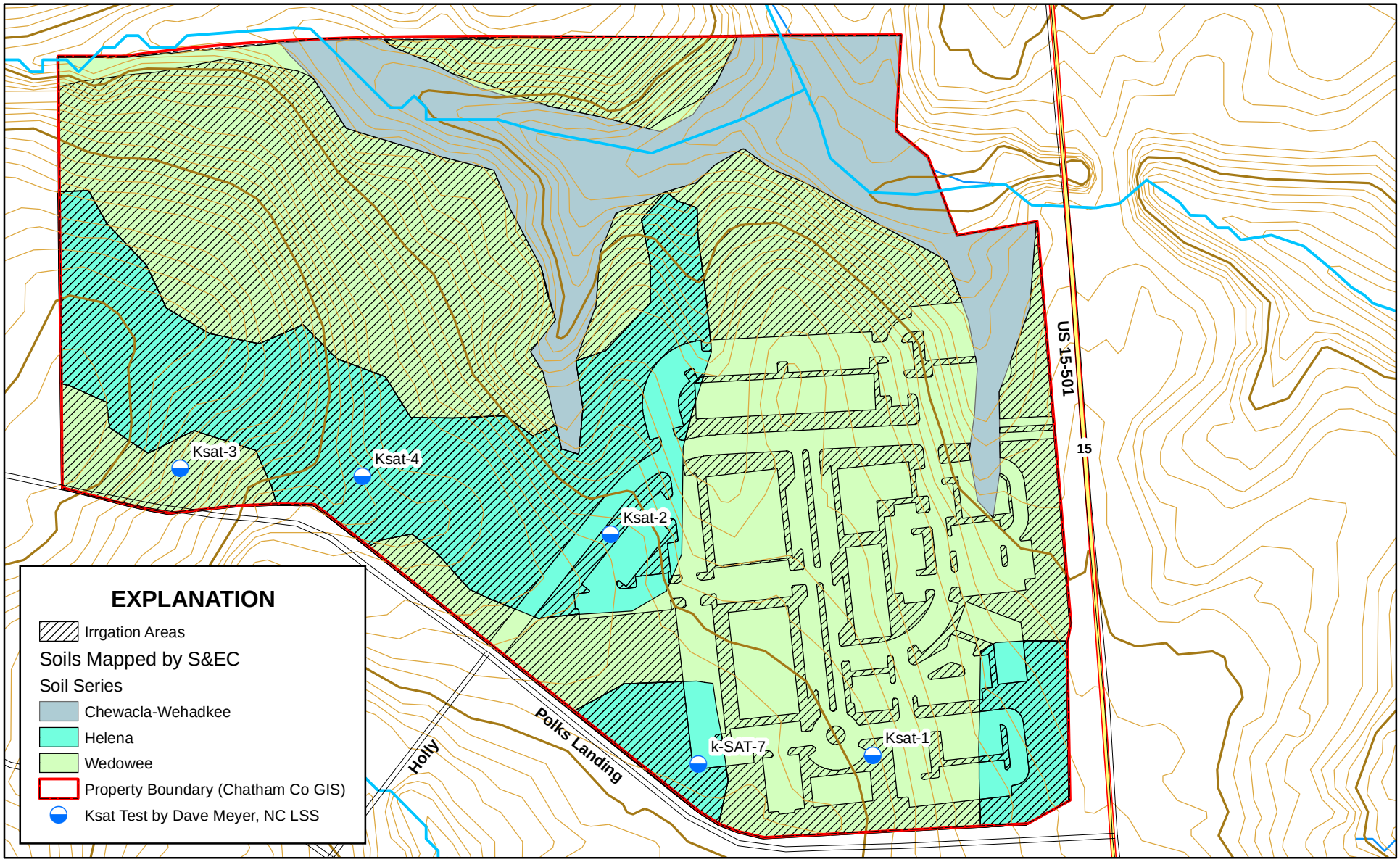
The convergent water balance calculations also resulted in a likely wet weather storage capacity for the Polk's Center fields of approximately 6.97 million gallons using the parameters in the table below and a flow rate of 50,000 gallons per day. We have assumed that the wet weather storage and five-day upset reservoirs for the Polk's Centre sprayfields will have a surface area or 1.06 acres and that your storm water retention pond will remove 0.3 acres of Wedowee soils from the area available for irrigation.

Additional information regarding the irrigation capacity of the Polk's Center property will be required for submittal to NCDWQ for your Non-Discharge Permit, including the completed Hydrogeologic Study, which is in progress. One purpose of that study is to assure that application of irrigation water will not cause the watertable to rise beneath the fields to depths of less than three feet. Some small areas of the areas mapped as Helena and Wedowee that are at the toe of slopes may be eliminated from the application areas as a result of that study.

Let me know if you need any further information on this matter.

Sincerely yours,

Eric Lappala, P.E., P.H.



Basemap:
Topography: NC DOT
(NC Floodplain Mapping LIDAR Survey)
Dranage: Terrain analysis of topography
Roads: NC DOT

0 80 160 320 480 640
Feet

Areas to be Used for Application of Reclaimed Water
Polk's Centre Development Chatham County, NC.

Date	Project Number	Approved:
June 16, 2006	16015.1	E.G.Lappala

Figure 1

Eagle Resources
Advocacy → Sound Science → Innovation → Solutions