



Date: November 3, 2008

To: Carol Ann Zinn - Cazco, Inc.

From: Charles R. Dixon - Agronomist, B.S., M.S. Soil Science

RE: Aydan Court - Proposed Soil Fertility & Fertilizer Program

Erosion & Soil Considerations – Aydan Court and Army Corps Property

The proposed site for the Aydan Court development is adjacent to the Upper Little Creek Waterfowl Impoundment. The Impoundment is a component of the Jordan Lake reservoir system created as a regional water supply in the 1970's and is a man-made wetlands with periodic planned flooding. Over thirteen thousand acres from Chapel Hill and Carrboro drain into the Impoundment.

After reviewing the National Resource Conservation Service (NRCS) soils survey, it was determined that the Aydan Court site is predominantly White Store sandy loam soil. The adjacent Army Corps property is predominantly Chewacla and Wehadkee soils. As they currently exist, all of these soils have low permeability and are subject to surface erosion typical of the geology and soils of this region. The relocation of soil and intrinsic soil chemicals occurs on these soils naturally. With or without any development, the Aydan Court site has the potential to load soil sediment and associated nutrients to surface water, which results in changes to the adjacent aquatic ecosystems. Although the undisturbed area is called "Natural" it does not mean that Natural Processes do not affect surface water quality or meet current regulations for surface and ground water quality.

The goal of the Aydan Court stormwater and landscape management programs is to improve the quality of water runoff to the adjacent Impoundment. The mechanisms which will create this change are:

- 1) A stormwater collection and management system that collects rainwater for use in irrigation and that releases just 2.5% of total suspended solids from the site.¹
- 2) The use of high quality and specialized organic fertilizers and soil nutrients, so that whatever small amount of total suspended solids is able to reach the Impoundment provides a positive environment without nitrogen and phosphorus damage to the Impoundment

Nutrient Effects – Natural Environment Processes

Phosphorus and nitrogen are primary concerns for runoff from native and developed land. Native stands of forests and understory vegetation, such as the Aydan Court land, rely on nitrogen and phosphorus from decomposition of leaf litter and the microbial activity of the soils. The changes occur in nature along with changes in plant composition and wildlife. Once the sediments are submerged in the wetlands, chemical reduction of phosphorus transforms from immobile unavailable phosphorus to readily available phosphorus that can affect surface and ground water. These natural occurring processes influence wetlands and streams.

¹ Stormwater Impact Statement – Warren Mitchell, PE, Mitchell•Westendorf, PA

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Without any development of the land, the processes can result in eutrophication of surface waters. The site, as it exists, is subject to these processes. While I have not visited this site, the NRCS soils survey and my past experience with similar conditions confirm that these natural runoff conditions most likely exist.

Site Design - Landscape Management

The primary objective for the site design for Aydan Court is to create a soil and water management system that is an improvement upon the existing conditions as described above. The goal is to reduce soil erosion and the relocation of contaminants to surface and ground water, thus reducing the existing impact on the Impoundment.

The use of plants and controlled storm water programs create a bio-filter which sequesters carbon and lowers heat island effects. The site design utilizes storm water detention to provide water for irrigation. The redirection and containment of surface runoff (which is expected to be a reduction to 97.5% of total suspended solids) reduces soil erosion to the Impoundment area. The Aydan Court vegetation, through the collection of solids in runoff and uptake of nutrients, will provide a mechanism to remediate the quality of water reaching the downstream area and reduce soil erosion.

While the management of storm water addresses the control of water on the Aydan Court site, we also address plant health establishment and care on the Aydan Court site. Plant health care inputs must not contribute to runoff. The type of inputs and amounts are critical to creating a bio-filter and not contributing to existing nutrient loading of wetland areas.

Aydan Court will approach all of plant establishment and maintenance with Green and Sustainable Technologies. Synthetic fertilizer sources will not be deployed due to the mobility of their chemistry and negative influence on the soil and plant biological systems on and off site. Our approach will be to use quality organic biofertilizer resources on this site. Not all organic fertilizers are suitable for the surrounding environment. We have stringent selection criteria for plant health care products.

Organic Fertilizer Selection

We will utilize plant health care products in establishment and maintenance that meet the Organic Materials Research Institute (OMRI) ratings. The certification provides food production grade products for use in landscape. Organic fertilizers comprised of biosolids or fortified synthetic nitrogen will not be used. Raw manures or anaerobic digested waste will not be used. Some "organic" fertilizers contain as much water soluble nitrogen as synthetic sources. By avoiding products with high amounts of mobile water soluble chemistry, we avoid surface runoff containing chemicals that will be harmful to the adjacent downstream areas.

The primary biofertilizer to be used in plantings is derived from worm castings. Black Castings™ uses worms to process pure organic resources. No human, animal, or construction wastes are used to produce the product. The product is enhanced with microbial populations. It is OMRI certified. The total nitrogen content has been determined to be 0.92%. The nitrate nitrogen has been determined to be 0.035% (Woods End Laboratories, Inc.) The product when applied does not contain enough available nitrogen to impact water resources more than in the existing conditions when applied at recommend rates. The nitrogen is made available though the action of microbes and is not readily available for relocation to surface or ground water. Combined erosion control and limited availability of water soluble nitrogen reduce the potential migration to the Impoundment area.

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The total phosphorus content of the Black Castings™ is 0.08%. The amount of available phosphorus is very low and is organically bound reducing availability to water resources when combined with erosion control.

NutriCast™ is another biofertilizer that will be used to restore mycorrhizae fungi to the plant systems. NutriCast™ has microbes that acquire water and nitrogen from the atmosphere to provide essential nutrients for the plantings. The NutriCast™ is a state of the art biofertilizer. The nitrogen content is 0.8% with 0.039% of the nitrogen in the nitrate form. Total phosphorus is 0.159%. The rates used are low and the constituents are not readily available.

The product function is enhanced with VermaPlex™. VermaPlex™ is a soil microbial amendment with no intrinsic fertility that works with the cycling of organic matter to sustain healthy plant growth and establish natural occurring microbes to the soil-plant system. The combined function of these products is based on bioregulation. The microbe's function is based on temperature, plant activity and soil conditions. The proposed products working in concert together provide the support for plant growth without the release of surplus fertilizer to off site areas. These fertilizers create healthy plants without a negative impact to the environment.

Summary

Through storm water design and implementation of good planting practices we can achieve a site that improves the existing conditions with regard to erosion and water resources, thereby creating a favorable effect on the adjacent Impoundment.