Infiltration and Filter System Construction Specifications

Infiltration and filter systems either take advantage of existing permeable soils or create a permeable medium such as sand for WQv, and Re v. In some instances where permeability is great, these facilities may be used for Qp as well.

When properly planted, vegetation will thrive and enhance the functioning of these systems. For example, pre-treatment buffers will trap sediments that often are bound with phosphorous and metals. Vegetation planted in the facility will aid in nutrient uptake and water storage. Additionally, plant roots will provide arteries for stormwater to permeate soil for groundwater recharge. Finally, successful plantings provide aesthetic value and wildlife habitat making these facilities more desirable to the public.

Design Constraints:

- > Planting buffer strips of at least 20 feet will cause sediments to settle out before reaching the facility, thereby reducing the possibility of clogging.
 > Determine areas that will be saturated with water and water table depth so that appropriate plants may be selected (hydrology will be similar to bioretention facilities, see figure A.5 and Table A.4 for planting material guidance).
- > Plants known to send down deep taproots should be avoided in systems where filter fabric is used as part of facility design.
- > Test soil conditions to determine if soil amendments are necessary. > Plants shall be located so that access is possible for structure maintenance.
- > Stabilize heavy flow areas with erosion control mats or sod. > Temporarily divert flows from seeded areas until vegetation is established. > See Table A.5 for additional design considerations.

Bio-retention

Soil Bed Characteristics

The characteristics of the soil for the bioretention facility are perhaps as important as the facility location, size, and treatment volume. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through absorption and microbial activity within the soil profile. Therefore, soils must balance their chemical and physical properties to support biotic communities above and below ground.

The planting soil should be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should be less than 25% by volume [Environmental Quality Resources (EQR). 1996; Engineering Technology Inc. and Biohabitats, Inc. (ETAB), 1993). Soils should fall within the SM, ML, SC classifications or the Unified Soil Classification System (USCS). A permeability of at least 1.0 feet per day (0.5"/hr) is required (a conservative value of 0.5 feet per day is used for design). The soil should be free of stones, stumps, roots, or other woody material over 1" in diameter. Brush or seeds from noxious weeds (e.g., Johnson Grass, Mugwort, Nutsedge, and Canada Thistle or other noxious weeds as specified under COMAR 15.08.01.05.) should not be present in the soils. Placement of the planting soil should be in 12 to 10 lifts that are loosely compacted (tamped lightly with a backhoe bucket or traversed by dozer tracks). The specific characteristics are

Table A.3 Planting Soil Characteristics

Parameter	Value
pH range	5.2 to 7.00
Organic matter	1.5 to 4.0% (by weight)
Magnesium	35 lbs. per acre, minimum
Phosphorus (phosphate - P2O5)	75 lbs. per acre, minimum
Potassium (potash -1(K2O)	85 lbs. per acre, minimum
Soluble salts	500 ppm
Clay	10 to 25 %
Silt	30 to 55 %
Sand	35 to 60%

Mulch Layer

The mulch layer plays an important role in the performance of the bioretention system. The mulch layer helps maintain soil moisture and avoids surface sealing, which reduces permeability. Mulch helps prevent erosion, and provides a microenvironment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments, which remain suspended after the primary pretreatment.

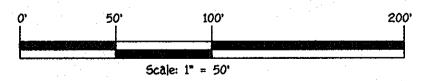
The mulch layer should be standard landscape style, single or double shredded hardwood mulch or chips. The mulch layer should be well aged (stockpiled or stored for at least 12 months), uniform in color, and free of other materials, such as weed seeds, soil, roots, etc. The mulch should be applied to a maximum depth of three inches. Grass clippings should not be used as a mulch material.

Plantina Guidance

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bioretention simulates an upland-species ecosystem. The community should be dominated by trees, but have a distinct community of understory trees, shrubs and herbaceous materials. By creating a diverse, dense plant cover, a bioretention facility will be able to treat stormwater runoff and withstand urban stresses from insects, disease, drought, temperature, wind, and exposure.

The proper selection and installation of plant materials is key to a successful system. There are essentially three zones within a bioretention facility (Figure A.5). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports plants that like drier soil conditions, but can still tolerate occasional inundation by water. The outer edge

is the highest elevation and generally supports plants adapted to dryer conditions. A sample of appropriate plant materials for bioretention facilities are included in Table A.4. The layout of plant material should be flexible, but should follow the general principals described in Table A.5. The objective is to have a system, which resembles a random, and natural plant layout, while maintaining optimal conditions for plant establishment and growth. For a more extensive bioretention plan, consult ETAB, 1993 or Claytor and Schueler, 1997.



(410) 461 - 2855

ENVIRONMENTAL CONCEPT PLAN

BURDETT OXYGEN COMPANY

ZONED: M-2

TAX MAP No. 48 GRID No. 3

PARCEL No. 8

SIXTH ELECTION DISTRICT

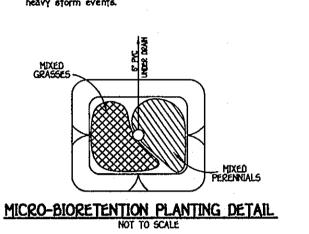
HOWARD COUNTY, MARYLAND

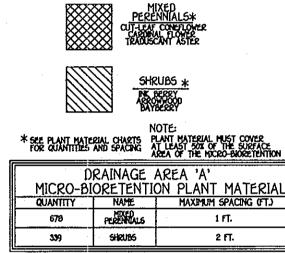
OPERATION AND MAINTENANCE SCHEDULE FOR BIO-RETENTION AREAS

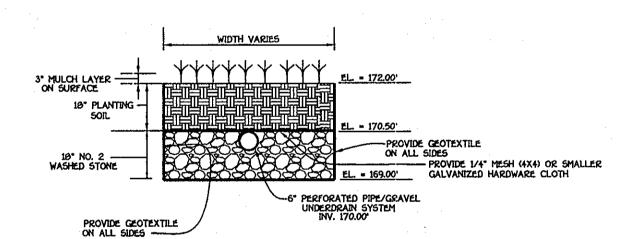
1. Annual maintenance of plant material, mulch layer and soil layer is required. Maintenance of mulch and soil is limited to correcting areas of erosion or wash out. Any much replacement shall be done in the spring. Plant material shall be checked for disease and insect infestation and maintenance will address

2. Schedule of plant inspection will be twice a year in spring and fall. This inspection will include removal of dead and diseased vegetation considered beyond treatment, treatment of all diseased trees and shrubs and replacement of all deficient stakes and wires. 3. Mulch shall be inspected each spring. Remove previous mulch layer before applying new layer once every 2 to 3 years.

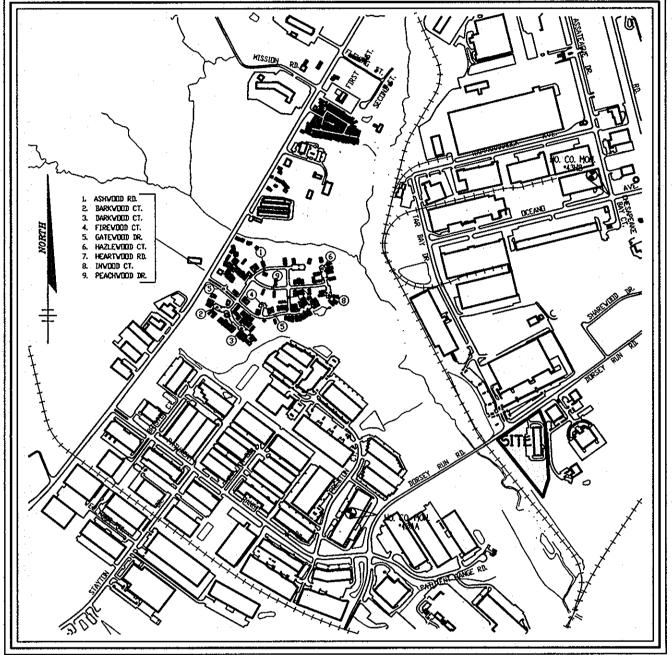
4. Soil erosion to be addressed on an as needed basis, with a minimum of once per month and after







TYPICAL SECTION - BIO-RETENTION FACILITY (M-6)



ADC STREET MAP: MAP 5054 GRID E7 VICINITY MAP

BIO-SWALE

SITE ANALYSIS DATA CHART

- LIMIT OF DISTURBED AREA = 0.97 Ac.+ PRESENT ZONING DESIGNATION = M-2 (PER 02/02/04 COMPREHENSIVE ZONING PLAN AND THE COMP-LITE ZONING AMENDMENTS DATED 07/28/06) D. PROPOSED USE: PARKING LOT EXPANSION
- FLOOR SPACE ON EACH LEVEL OF BUILDING: N/A TOTAL NUMBER OF UNITS ALLOCATED: N/A TOTAL NUMBER OF UNITS PROPOSED: N/A TOTAL NUMBER OF EMPLOYEES, TENANTS ON SITE PER USE: N/A OPEN SPACE ON SITE: N/A
- RECREATIONAL AREA PROVIDED: N/A BUILDING COVERAGE OF SITE: 0.76 AC+ PREVIOUS HOWARD COUNTY FILES: 5DP-79-37 TOTAL AREA OF FLOODPLAIN LOCATED ON SITE 0.00 AC. . TOTAL AREA OF SLOPES IN EXCESS OF 25% = 0.000 AC+
- O. NET TRACT AREA = 7.02 AC. (TOTAL SITE AREA - FLOODPLAIN - STEEP SLOPES AREA) (7.82 Ac - 0.00 Ac = 7.82 Ac)
- . TOTAL AREA OF WETLANDS (INCLUDING BUFFER) = 0.09 AC.* Q. TOTAL AREA OF FOREST =
- EXISTING = 4.16 AC± PROPOSED = 3.69 AC± . TOTAL GREEN OPEN AREA = 5.32 AC+
- 5. TOTAL IMPERVIOUS AREA = 2.5 AC*

BENCH MARKS

HO. CO. MON. 40AA N539314.9079 E1371539.2575 ELEV. 240.102 3/4" REBAR DORSEY RUN RD NORTH OF PATUXENT RANGE RD

HO. CO. MON. 43HA N540761.7140 E1373037.3301 ELEV. 224.213 3/4" REBAR DORSEY RUN RD SOUTH OF SHAREWOOD DRIVE

12. APPROVAL OF THIS ECP DOES NOT CONSTITUTE AN APPROVAL OF ANY SUBSEQUENT AND ASSOCIATED SUBDIVISION AND/OR SITE DEVELOPMENT PLAN. 13. REVIEW OF THIS PROJECT FOR COMPLIANCE WITH THE HOWARD COUNTY SUBDIVISION AND LAND DEVELOPMENT

NARRATIVE

Water Management Regulations, Chapter 5.

EXCAVATION WORK BEING DONE.

FISHER, COLLINS & CARTER, INC. DATED JANUARY, 2010.

6. THIS PROPERTY IS LOCATED WITHIN THE METROPOLITAN DISTRICT.

The purpose of this report is to analyze the drainage areas located within the subject property regarding the new Chapter 5 SWM regulations in an attempt to meet woods in good condition. If woods in good condition is achieved within this project under proposed conditions then Channel Protection Volume is not required. This report is prepared in accordance with the MDE 2000 Maryland Storm

1. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS/BUREAU OF ENGINEERING/CONSTRUCTION

INSPECTION DIVISION AT 410-313-1880 AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE START OF WORK. 2. THE CONTRACTOR SHALL NOTIFY (MISS UTILITY) AT 1-800-257-7777 AT LEAST 48 HOURS PRIOR TO ANY

THE EXISTING TOPOGRAPHY IS TAKEN FROM A FIELD RUN SURVEY WITH 2' CONTOURS INTERVALS PREPARED BY

4. THE COORDINATES SHOWN HEREON ARE BASED UPON THE HOWARD COUNTY GEODETIC CONTROL WHICH IS BASED UPON THE MARYLAND STATE PLANE COORDINATE SYSTEM. HOWARD COUNTY MONUMENT NOS. 48AA AND 43HA WERE

5. STORM WATER MANAGEMENT IS IN ACCORDANCE WITH THE M.D.E. STORM WATER DESIGN MANUAL, VOLUMES I & II,

Ø. THE SUBJECT PROPERTY IS ZONED M-2 (PER 02/02/04 COMPREHENSIVE ZONING PLAN AND THE COMP-LITE ZONING

9. THERE WILL BE NO GRADING, REMOVAL OF VEGETATIVE COVER, OR TREES, ANY NEW PAVING OR NEW STRUCTURES

11. AS FORESTATION DOES NOT APPEAR THAT IT CAN BE REASONABLY ACCOMPLISED, THIS PROJECT WILL BE SEEKING

DEVELOPMENT REGULATIONS OF HOWARD COUNTY AT THE SITE DEVELOPMENT STAGE OF THIS PROJECT.

REGULATIONS AND THE HOWARD COUNTY ZONING REGULATIONS SHALL OCCUR AT THE SITE PLAN STAGES.

(INCLUDING THOSE THAT MAY ALTER OVERALL SITE DESIGN) AS THIS PROJECT PROGRESSES.

THEREFORE, THE APPLICANT AND CONSULTANT SHOULD EXPECT ADDITIONAL AND MORE DETAILED COMMENTS

WITHIN THE WETLANDS, STREAM(S) OR THEIR BUFFERS, FOREST CONSERVATION EASEMENT AREAS OR THE 100 YEAR

AUTHORIZATION TO PROVIDE A FEE IN LIEU PAYMENT OUTLINED IN SECTION 16.1210 OF THE SUBDIVISION AND LAND

7. ANY DAMAGE TO THE COUNTY'S RIGHT-OF-WAY SHALL BE CORRECTED AT THE DEVELOPER'S EXPENSE.

10. LANDSCAPING WILL BE PROVIDED AT THE SITE DEVELOPMENT STAGE OF THIS PROJECT.

REVISED 2009. WE ARE PROVIDING STORM WATER MANAGEMENT BY THE USE OF M-6 MICRO BIO-RETENTION AREAS.

This property is located on Tax Map 40. Parcel No. 0 on the Howard County, Maryland Tax Map Database System. The property consists of 8.19acres of land. The western portion of the property is wooded. The proposed parking lot expansion is within this wooded area and will require the removal of a portion of these woods. The current direction of this project is to address Forest Conservation through a Fee-in-Lieu payment. There is currently a Stormwater Management Facility located ansite which treats the existing improvements.

III. Impervious Cover: Existing condition impervious cover consists of an existing building and parking area.

The MDE Stormwater Management requirements for this project will be met by complying with the new Chapter 5 regulations. We are proposing a Micro Bio-retention facility and a Bio Swale to treat the runoff from the new parking lot expansion. The underdrain from these facilities will direct the drainage towards the boundary line for this parcel of land. The Groundwater Recharge Volumes are provided for this development in an underground stone recharge pit located beneath these facilities.

The following are the responses to the MDE Maryland 2000 Stormwater Manual performance standards:

The site design for this plan will minimize the generation of stormwater runoff and maximize the pervious areas for stormwater treatment by complying with the new revised Chapter 5 regulations and meeting the ESD Œnvironmental Site Design) to the MEP (Maximum Extent Practicable). We are attempting to achieve this through the use of a micro-SWM practices. We have proposed a Micro bio-retention area and a Bio Swale to provide the required ESDV. We are indicating that we can meet woods in good condition and that CPV will not be required for this site.

Standard 2. There are wetlands areas located onsite along the western and southern boundaries. These areas are will not be disturbed

Standard 3. The annual ground water recharge volume will be provided through the use of micro-scale SWM practices. In this case the required REV is provided by use of a proposed underground stone recharge pit located below the Micro bio-retention

Standard 4. Water quality volumes required for this site will be provided by the Micro-bioretention area and the Bio Swale located to the south of the proposed parking lot expansion. Standard 5. The Structural facility proposed within this project (Micro Bio-retention facility and Bio Swale) will remove the required 80%

of Total Suspended Solids (TSS) and 40% of the average annual post development total phosphorous load (TP). These facilities are sized to capture treat the impervious areas for WQV and are designed in accordance with the MDE SWM 2000 Design Manual, Chapter 5 Amended (ESD). In addition, these facilities will be constructed properly and maintained

Standard 6. The subdivision is located on the Western Shore and does not need to provide management of the 10-year storm event. With the implementation of Chapter 5, we no longer need to provide extended detention volumes and indicate a centroic

Standard 8. We are not discharging any water into a defined critical area.

Standard 9. The proposed BMPs for this property will have an enforceable operation and maintenance agreement between the property owner and Howard County, Maryland. The specifics of this information will not be provided until the time of final plan

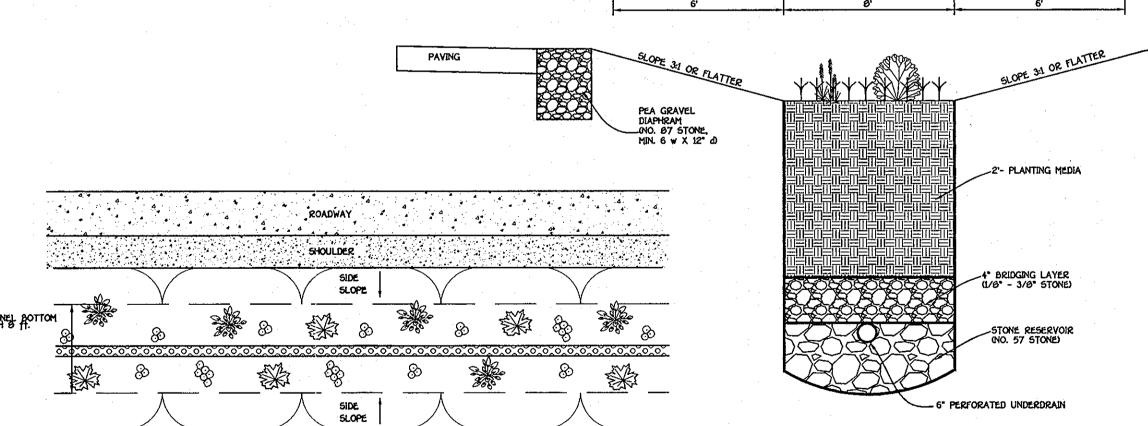
Standard 10. The BMPs proposed for this site have an acceptable form of water quality pretreatment. In this case the proposed Micro bio-retention area will have a perimeter sand layer to act as a pre-treatment system and the runoff entering the Bio Swale will first travel through a pea gravel diaphram.

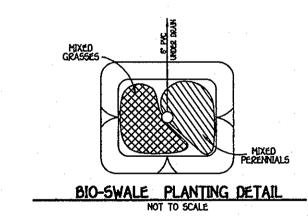
Standard 11. This project is not a redevelopment project and is not subject to the more strict standards for SWM and Water Quality.

Standard 12. This site is not located in an industrial area of zoned industrial uses. A Notice of Intent (NOI) form will be filed at the final Plan stage for this project.

Standard 13. None of the proposed outfalls from this project are located in a defined hotspot as explained in Chapter 2 of the MDE 5WM 2000 Design Manual. Therefore this standard is non-applicable for this subdivision.

Standard 14. The Howard County Office of Planning and Zoning, Development Engineering Division is reviewing the project. They are the local government agency that reviews and approves the design



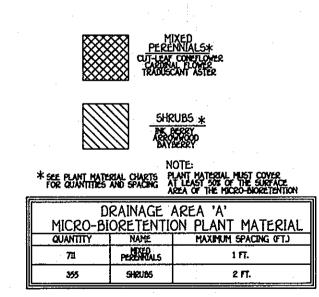


OPERATION AND MAINTENANCE SCHEDULE FOR BIO-SWALE AREAS

1. Annual maintenance of plant material, mulch layer and soil layer is required. Maintenance of mulch and soil is limited to correcting areas of erosion or wash out. Any mulch replacement shall be done in the spring. Plant material shall be checked for disease and insect infestation and maintenance will address 2. Schedule of plant inspection will be twice a year in spring and fall. This inspection will include removal of dead and diseased vegetation considered beyond treatment, treatment of all diseased trees and shrubs and replacement of all deficient stakes and wires.

3. Mulch shall be inspected each spring. Remove previous mulch layer before applying new layer once every 2 to 3 years.

4. Soil erosion to be addressed on an as needed basis, with a minimum of once per month and after



EFISHER, COLLINS & CARTER, INC. entennial square office park – 10272 Baltimore national pike

OFFISIONAL CERTIFICATION OCUMENTS WERE PREPARED OR APPROVED BY TATORIA THE PROFESSIONAL ENGINEER UNDER THE LAW MAGILANIE THE LAW MAGILANIE 2/22/11/3 PROFESSIONAL ENGINEER UNDER THE LAWS

OWNERS GTS-WELCO 8025 DORSEY RUN ROAD JESSUP, MD 20794 410-796-8845

DEVELOPER CPE INCORPORATED CNO JOHN McCONNELL 8131 DORSEY RUN ROAD JESSUP, MD 20794 410-799-1169 EXT. 10

APPROVED: DEPARTMENT OF PLANNING AND ZONING UBDIVISION N/A CENSUS TR. PARCEL NO. ZONE TAX MAP ELEC. DIST.

M-2

ENVIRONMENTAL CONCEPT PLAN TITLE SHEET

BURDETT OXYGEN COMPANY

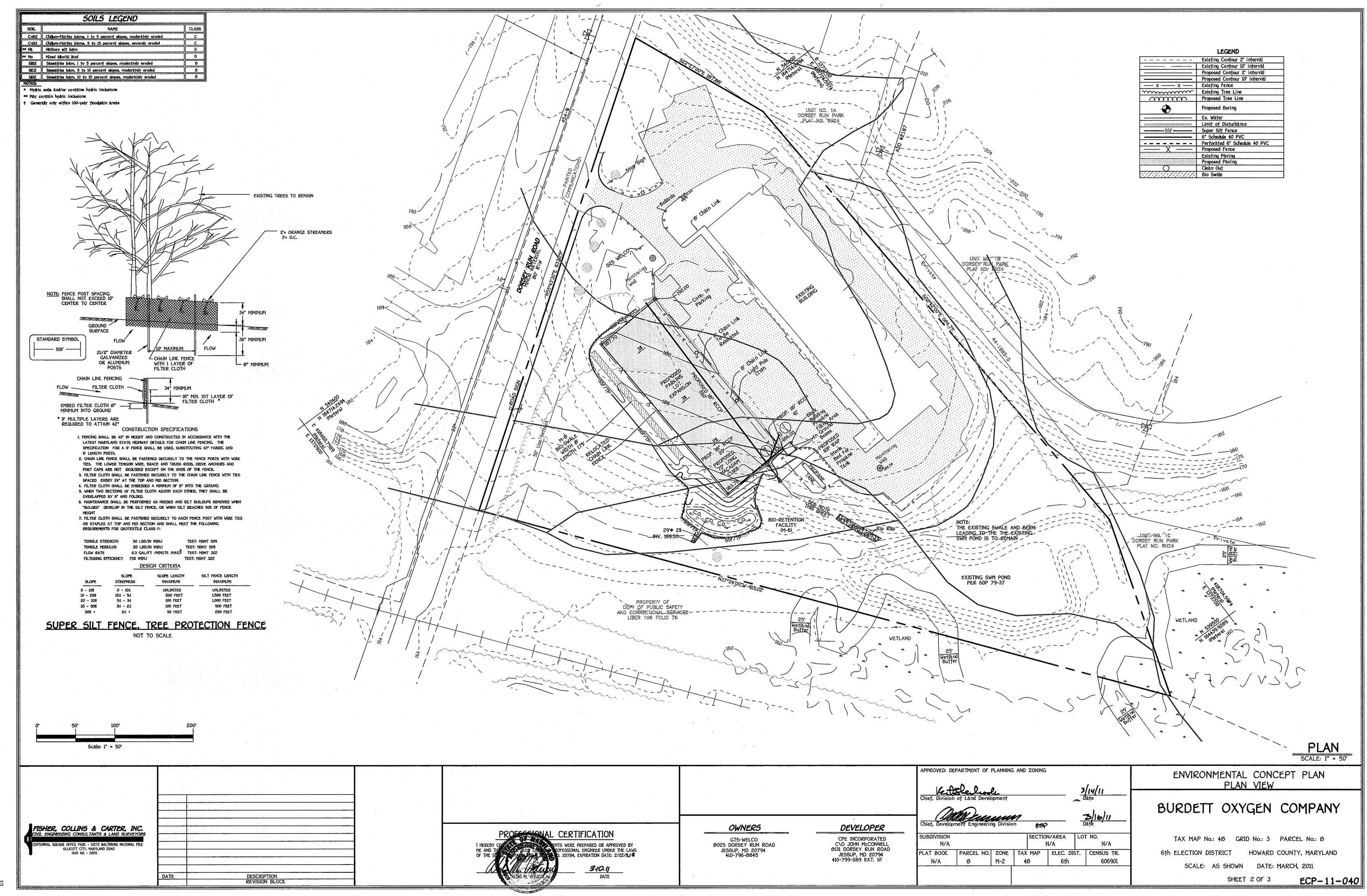
TAX MAP No.: 48 GRID No.: 3 PARCEL No.: 8

HOWARD COUNTY, MARYLAND

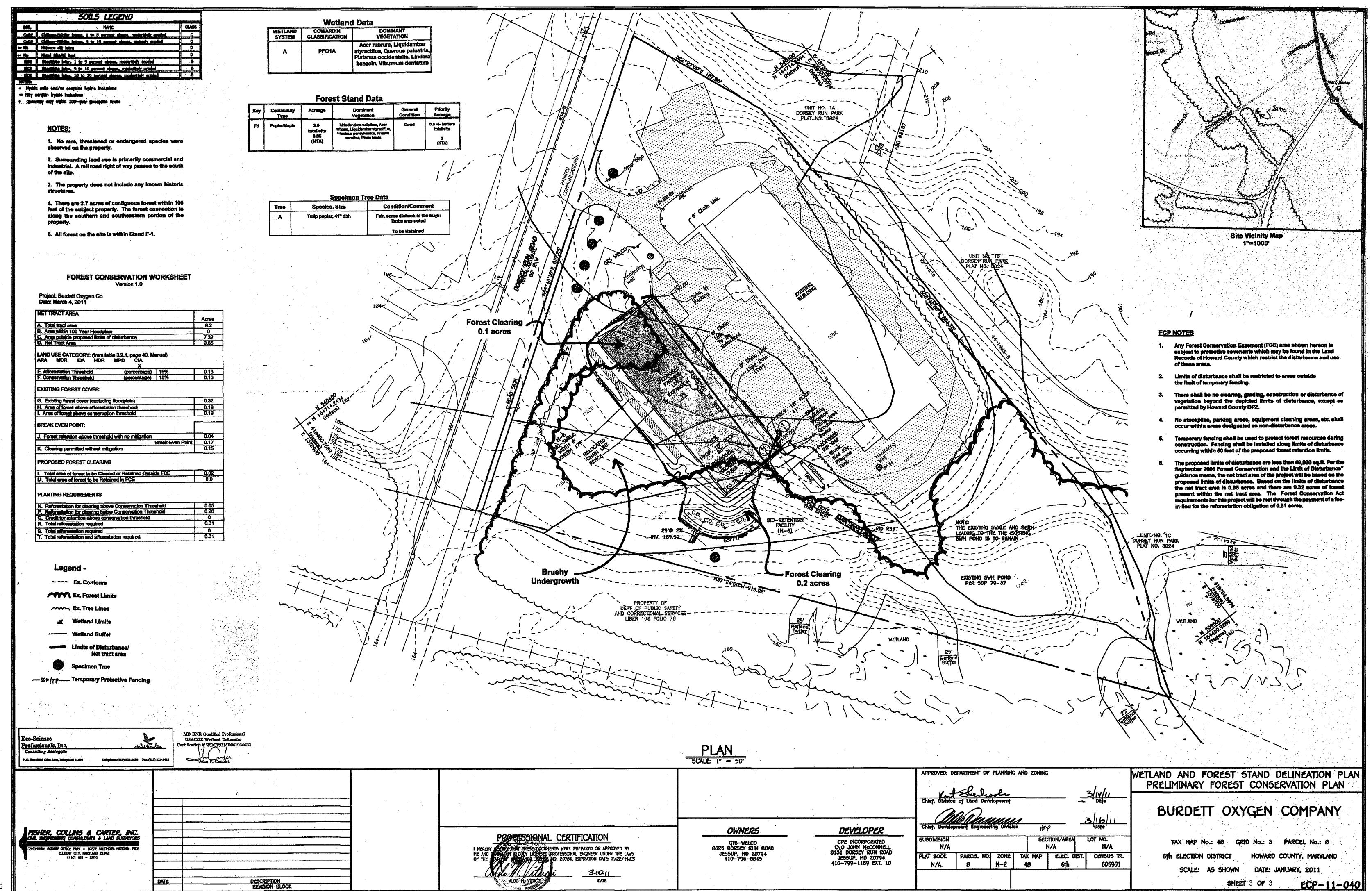
SCALE: AS SHOWN DATE: MARCH, 2011

SHEET 1 OF 3

ECP-11-040



I:\2010\10062\dwg\10062 ECP PLAN.dwg, 3/10/2011 9:24:31 AM, ts



I:\2010\10062\dwg\10062 ECP PLAN.dwg, 3/10/2011 9:24:01 AM, tony,