

**2012**

**City of Daphne**

**Annual Report**

**MCM 5**

**Post Construction**

**Stormwater**

**Management in New**

**and Re-Development**

**Sites**

## **MCM 5**

# **Post Construction Stormwater Management in New and Re- Development Sites**

### **3.5.1A**

## **Review and Update Current Guidance for Plan Reviews**



# CBMPP Review



## CBMPP Details or Includes:

Site Name: \_\_\_\_\_

- CBMPP designed by a QCP
- CBMPP includes a topo map, 1 foot increments, showing the proposed construction area along with any natural features such as watercourses, waterways, wetlands and any other sensitive (critical) areas
- Wetlands delineation recommended
- 30 ft wetland buffers recommended
- 50 ft stream buffers recommended
- CBMPP designates storm water discharge point(s) and whether the site discharges to a ADEM 303d Listed stream
- Enhanced CBMP plan recommended
- Water quality treatment recommended
- Site disturbance greater than 10 acres, turbidity sampling required
- Acres to be disturbed noted in CBMP plan
- Phasing required; site land disturbance exceeds 17.5 acres
- Construction exit located and detailed in CBMP plan
- Phased erosion and sediment control measures detailed in CBMP plan throughout construction
- CBMP plan has provisions for contractor inspection and maintenance of BMPs detailed in CBMP plan
- ADEM 13-day rule detailed in CBMP plan
- Dust Control requirements detailed in CBMP plan
- Concrete washout area located and detailed in CBMP plan
- Spill Prevention Control Countermeasures Plan (SPCCP) requirements detailed in plan
- Onsite burning requirements detailed CBMP plan
- Dumpster requirements detailed in CBMP plan
- Sanitary Waste requirements detailed in CBMP plan
- Permanent stabilization measures detailed in CBMP plan
- Other comments:

\_\_\_\_\_  
\_\_\_\_\_

**Comments:**

1. D'Olive Creek, the un-named tributary to D'Olive Creek, Tiawasee Creek, the un-named tributary to Tiawasee Creek, and Joe's Branch, which are all part of the D'Olive Creek Watershed, are listed on the Alabama Department of Environmental Management's (ADEM) 303d List for siltation (habitat alteration).

2. In the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, hay bales are no longer detailed as an acceptable form of storm water inlet protection.

3. Any offsite impacts, including impacts to streams or wetlands shall be mitigated. All Federal, State and City regulations shall be complied with during restoration.

4. A copy of the site's ADEM NPDES General Permit Authorization will need to be submitted to the City prior to the City's Community Development Department issuing its land disturbance permit for the site.

**Disclaimer:** An approved CBMP Plan does not guarantee site compliance. When warranted, additional BMPs should be added throughout the construction process to assure site compliance and to prevent off site impacts.

**Date** \_\_\_\_\_

**Reviewed by Initials** \_\_\_\_\_

**Final Inspection Check List:**

**Letters of Acceptance from:**

Environmental Programs Manager/Site Containment Inspector-

- Permanent vegetation must be established prior to final inspection; seed and mulch will not be accepted
- All construction debris removed form site

Director of Public Works

Fire Marshall

Daphne Utilities

**Letter of completion from:**

Letter of completion from project engineer

Letter of completion from landscape architect

**Other Submittals**

Copy of all applicable bonds

1 set of paper As-built drawings and a copy in a .dwg file which is compatible with Arc Info 9.3: Projected Coordinate System: NAD\_1983\_State Plane\_Alabama\_West\_FIPS\_0102\_Feet submitted to City. If something must be submitted as an image it should be jpeg or tif format.

## **MCM 5**

# **Post Construction Stormwater Management in New and Re- Development Sites**

### **3.5.1B**

**Review 100% of Site Plan**

**CBMPP**

MCM 5 Post Construction Stormwater Management for New Re-development Sites  
3.5.1B New Re-development Erosion Control Site Plan Reviews

	Site Name	Address	Watershed	Site Acreage	LID/GI
1	Waffle House	Timber Creek	D'Olive Creek	0.497	
2	Daphne UT Central Water Treatment Plant	North Main Street	D'Olive Creek	0.74	
3	Old Field Community Pool	State Road 181	Rock Creek	1.59	
4	Trione Street Office Complex	805 Trione Street	UT Rock Creek	0.31	
5	Bellator Office	Daphne Square	Yancey Branch	0.46	
6	French Settlement Pool	County Road 13	Tiawasee Creek	3.3	
7	Macedonia Missionary Baptist Church	902 Daphne Avenue	Rock Creek	2.2	
8	Jubilee Ridge Condo Phase II	County Road 64	Rock Creek	15.35	x
9	Stone Granade & Crosby	Hwy 90	D'Olive Creek	1.13	
10	DR Horton Office	Stanton Road	Rock Creek	3.65	
11	Firestone Complete Auto Care	27320 US Hwy 98	Yancey Branch	5.13	x
12	U Sale It Daphne	2512 US Hwy 98	Yancey Branch	1	
13	Mattress Firm	Timber Creek Commercial	D'Olive Creek		
14	Rettig's Autobody & Towing	Renissance	D'Olive Creek		
15	Popeyes	US Hwy 98	Rock Creek		x
16	Summer Oaks Townhomes XIV	US Hwy 98	Yancey Branch	4.68	x
17	St. Augustine Phase 3	Rigsby Road	Fish River	14.37	
18	Dunmore Phase 2 Part C Phase 1	State Road 181	Fish River	25.09	

## **MCM 5**

# **Post Construction Stormwater Management in New and Re- Development Sites**

### **3.5.1C**

**Review and Update As-Needed  
Current City SW Ordinances**

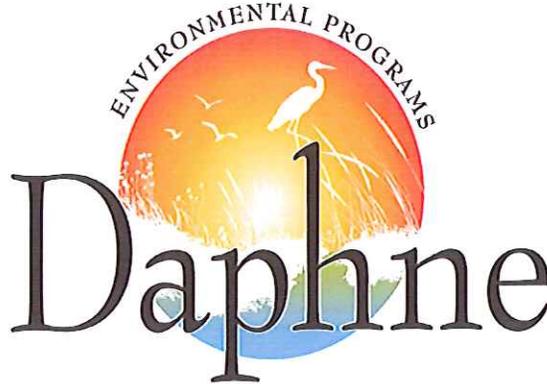
BAILEY YELDING, JR.  
MAYOR

DAVID L. COHEN, MMC  
CITY CLERK

KIMBERLY M. BRILEY  
FINANCE DIRECTOR/TREASURER

DAVID CARPENTER II  
CHIEF OF POLICE

JAMES "BO" WHITE  
FIRE CHIEF



COUNCIL MEMBERS  
TOMMIE CONAWAY  
DISTRICT 1

CATHY BARNETTE  
DISTRICT 2

JOHN L. LAKE  
DISTRICT 3

KELLY REESE  
DISTRICT 4

RON SCOTT  
DISTRICT 5

DEREK BOULWARE  
DISTRICT 6

AUGUST A. PALUMBO  
DISTRICT 7

August 15, 2012

To: Adrienne Jones

Re: Land Use Changes

**10-7 WATER POLLUTION**  
See attached track changes

**Change:** Development to development and redevelopment throughout the entire chapter 18 see below..... We need to do this because.....as a smaller, Phase II community we are covered by a General Permit. Six Phase II measures are required in Phase II permits. One addresses post-construction stormwater management in new development and redevelopment, including developing, implementing, and enforcing a program to address discharges of stormwater runoff from new and redevelopment areas.

**18-3 Drainage and Storm Water Management (A-9)**

In a **development or re-development** site plan review, the Planning Commission may require water quality enhancement.....

**18-3 Drainage and Storm Water Management (D-1)**

For any onsite or offsite flowing or ephemeral water body, a fifty foot wide vegetated non-disturbed buffer (replace: with non-disturbed vegetated buffer) zone shall be provided on both sides of the stream from bank. If the water body is offsite, permissions may need to be acquired from adjacent property owners to survey and delineate the areas... if a survey cannot be acquired, then the assumption will be made that the stream is at the property line.

### 18-3 Drainage and Storm Water Management (D-2)

For any onsite or off site wetland area, a thirty foot wide vegetated non-disturbed buffer (replace with non-disturbed vegetated buffer) zone (remove of) shall be provided around the wetlands.. Permissions may need to be acquired from adjacent property owners to delineate the areas... if a survey cannot be acquired, then the assumption will be made that wetlands are at the property line.

### 18-4 Stormwater Management Facility Design (A-1)

NEW (X) All stormwater points of discharge shall be located at least 25ft from the property line unless a level spreader outfall device or a similar engineered practice is implemented.

18-4 (B) Stormwater Drainage Detention/Retention Facilities (this will remove the inconsistency with our ordinance-see Richard's attached comments)

#### (1) General Requirements

**Current** (i) Developments which produce an increase in the amount of storm water runoff will be required to construct storm water detention ponds or other approved types of detention devices.

#### (2) Minimum Requirements for Stormwater Management Detention/Retention Facilities:

i. Differential runoff is the difference in rate and volume of stormwater runoff from a parcel or project in its undeveloped natural condition and its developed condition. Post-development release rates shall not exceed pre-development rates. Where practical, the differential runoff should be less.

#### (1) General Requirements

**Proposed** (i) Developments and re-developments which produce an increase in the amount of storm water runoff will be required to construct storm water detention ponds or other approved types of detention devices. This section shall not apply to redevelopments with no change in stormwater runoff.

#### (2) Minimum Requirements for Stormwater Management Detention/Retention Facilities:

i. Differential runoff is the difference in rate and volume of stormwater runoff from a parcel or project in its undeveloped and/or existing condition and its post-developed condition. Post-development release rates shall not exceed pre-development rates. Where practical, the differential runoff should be less.

### 18-4 (B-2)

**Remove xiv:** Wetland areas shall not be used for the purpose of stormwater detention.

### 18-4 (B-4)

**Remove xi:** If pond daylights to a channel with dry weather flow, care should be taken to minimize tree clearing....

18-6 (C)

Add (3): Discharges from construction activities that result in a total land disturbance of one acre or greater and sites less than one acre but are part of a common plan of development or sale are required to present coverage under ADEM's NPDES General Permit ALR 100000 prior to the City issuing the site a site disturbance permit and or a building permit.

18-6 (F-4)

Addition: Soil stockpiles are considered part of the site disturbance and therefore must be temporarily stabilized within thirteen days of clearing or inactivity in construction and permanently stabilized prior to final inspection.

18-6(m-4-iv-f)

Addition: Ad by to the last sentence...one year period by the owner.

18-7 (B)

Remove: Common areas, such as detention basins add All areas disturbed during construction shall be stabilized with permanent vegetation prior to final inspection. Seed and mulch will not be accepted.

New definitions....

LEVEL SPREADER: A device for distributing stormwater uniformly over the ground surface as sheet flow to prevent concentrated, erosive flows and promote infiltration.

Pre-Development: A term that describes a site's pre-development conditions; meaning: either the state of the site before a particular project is built, or the pre-human development condition of the site. The user provides the percent area of the site covered by different possible land uses, e.g. lawn, trees, impervious, etc.

Post-Development: A term that describes a site's conditions after it is developed or re-developed; meaning: either the state of the site after a particular project is built (i.e. – completed). The user provides the percent area of the site covered by different proposed land uses, e.g. lawn, trees, impervious, etc.

Re-development - the act of improving by renewing and restoring; or To develop (something) again, or To restore (buildings or neighborhoods, for example) to a better condition: redeveloped the waterfront.

**ARTICLE X  
GENERAL PROVISIONS**

Except as hereinafter provided the following shall generally apply:

**10-1 SCREENING, LIGHTING, AND SPACE**

(a) Protection Buffer:

In any business or commercial/industrial district, an operation not conducted within a building such as drive-in business, outdoor recreation, outdoor storage of materials, and outdoor servicing activities occurs shall be enclosed by a wall or fence as a protection buffer or adequate screening. In any district where reference is made requiring a protection buffer for a specified operation, said screening shall be a wall or fence of a solid appearance, shall be at least six (6) feet in height, and of a construction and design approved by the Planning Commission and/or a staggered double row of Evergreen plantings at least ten (10) feet in width which shall grow to at least ten (10) feet in height and spaced in a manner which after three (3) years will provide an impervious visual barrier. Said protection buffer shall be maintained by the owner of the property in order to conceal such areas or facilities from a residential district adjoining, facing, across a street, in the rear, or on the side of the principal building or use. *See also "Dumpsters, Trash Refuse and Recycling Containers,"* herein.

Every use in any district shall be conducted entirely within a completely enclosed structure, unless expressly exempted from the enclosure requirements of this Ordinance.

(b) Lighting:

Outdoor lighting, of all types, shall be directed as to reflect away from all residential dwellings and public rights-of-way.

(c) Administration and Enforcement:

The Code Enforcement Officer may cause the removal, replacement, repair, and/or correction at the owner's expense, any screening, lighting, and space improperly maintained.

**10-2 USE**

No building or land shall hereafter be used or occupied, no building or a part thereof be erected, constructed, moved, or altered, except in conformity with the regulations for the zoning district in which the development is to occur, except as otherwise provided herein.

It shall be the responsibility of the owner/developer to show proof of compliance with the requirements of this Ordinance.

**10-3 BUILDING HEIGHT**

No building shall hereafter be erected, constructed, or altered so as to exceed the height requirement specified in the regulations for the zoning district in which the development is to occur, except as otherwise provided herein.

**10-4 HEIGHT EXCEPTIONS**

The height requirement for the various districts shall not apply to church spires, belfries, cupolas, penthouses, or domes not used for human habitation, to chimneys, ventilators, skylights, water tanks, parapet walls, cornices, radio and television antennas, or necessary mechanical appurtenances usually carried above the level thereof, provided such features are limited to the height necessary for their proper functioning.

Mechanical equipment, chimneys, air conditioners, elevator penthouses, church spires and steeples, water towers, parapet walls and similar appurtenances are excluded from height restrictions. However, the exclusions apply only to those elements that are appurtenant to the structure. The excluded element shall not exceed the maximum height by more than fifteen (15) feet.

**10-5 FIRE HAZARDS**

Outside above ground tanks for the storage of gasoline, liquefied petroleum gas, oil, flammable liquids, or gases shall be restricted to the requirements set forth in this Ordinance and state regulations.

The storage, utilization, manufacture of solid materials, or products ranging from incombustible to moderate burning is permitted. The storage, utilization or manufacture of solid materials of products ranging from free or active burning to intense burning is permitted, provided the following condition is met:

- (a) Said materials or products shall be stored, utilized, or manufactured within completely enclosed buildings having incombustible exterior walls and protected throughout by an automatic fire extinguishing system. The storage, utilization, or manufacture of flammable liquids or gases which produce flammable or explosive vapors shall be permitted in accordance with the following table for the exclusive of storage of finished products in original sealed containers.

**10-6 TOTAL CAPACITY OF FLAMMABLE MATERIALS PERMITTED GALLONS\***

Industries Engaged in Storage and Distribution of Such Materials	Above Ground	Below Ground
(a) Materials having a flash point above 190 degrees Fahrenheit (87.7878 Centigrade)	Prohibited	100,000
(b) Materials having a flash point from and including 105 degrees Fahrenheit (40.5556 Centigrade) to and including 190 degrees Fahrenheit (87.7878 Centigrade)	Prohibited	40,000
(c) Materials having a flash point below 105 degrees Fahrenheit (40.5556 Centigrade)	Prohibited	20,000
Industries Engaged in Utilization and Manufacture of Such Materials		
(d) Materials having a flash point above 190 degrees Fahrenheit (87.7878 Centigrade)	10,000	50,000
(e) Materials having a flash point from and including 105 degrees Fahrenheit (40.5556 Centigrade) to and including 190 degrees Fahrenheit (87.7878 Centigrade)	1,000	20,000
(f) Materials having a flash point below 105 degrees Fahrenheit (40.5556 Centigrade)	500	10,000

\* When flammable gases are stored, utilized or manufactured and measured in cubic feet, the quantity in cubic feet, at S.T.P., permitted shall not exceed three hundred (300) times the quantities listed above.

**10-7 WATER POLLUTION**

The following shall apply:

- (a) No development or operation shall discharge, cause to be discharged, liquid or solid waste into public waters unless it is in conformance with the provisions of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II Permit of the City of Daphne, the Alabama Department of Environmental Management (ADEM), the Alabama State Board of Health Statutes and any regulations promulgated there under.
- (b) The developer or operator shall be responsible for meeting established standards and upon request shall supply the City, County, State, Federal, and/or other permitting authority with the information necessary to determine compliance with these standards within ten (10) business days.
- (c) Plans and specifications for proposed sewerage, industrial waste treatment, and disposal facilities shall be submitted to and approval obtained from the Baldwin County Health Department, Daphne Utilities or the appropriate permitting agency.
- (d) The City of Daphne's Small Municipal Separate Storm Sewer System (MS4) General National Pollutant Discharge Elimination System (NPDES) Phase II Permit-Number ALR 040039 00000002, and the MS4 Municipal Separate Storm Sewer System permit shall be adopted as a reference to address storm water discharge within the city limits.
  - ~~(1) Discharge into the Daphne MS4 (Municipal Separate Storm Sewer System) shall be in compliance with authorized discharges of the National Pollutant Discharge Elimination System (NPDES) permit as provided in part I, Authorized Discharges.~~
  - (2)(1) ~~All ADEM state~~ NPDES permitted discharges within the City limits of Daphne shall may be required to connect to the sanitary sewer for additional treatment to minimize the potential for pollutants entering the City of Daphne's MS4.
  - (3)(2) No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.
  - (4)(3) The connection, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited. This prohibition expressly includes, without limitation, illicit

connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection. A person, firm, corporation, entity or agent is considered to be in violation of the MS4 the Land Use Ordinance -Ordinanee if the person, firm, corporation, entity or agent connects a line conveying sewage or sewerage to the MS4, or allows such a connection to continue.

(5)(4) The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as prescribed as follows:

- (a) Water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wetland flows, swimming pools (if dechlorinated-typically less than one PPM chlorine), fire fighting activities, and any other water source not containing pollutants.
- (b) Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety.
- (c) Dye testing is an allowable discharge, but requires a verbal notification to the authorized enforcement agency prior to the time of testing.

## 10-8 COMPLIANCE

The review of oil and gas exploration and production activities under the requirements of this Ordinance shall not duplicate the regulatory activities of the Alabama Department of Environmental Management, the U.S. Army Corps of Engineers, Alabama Department of Conservation and Natural Resources, State Lands Division or the Alabama State Oil and Gas Board.

The Planning Commission shall permit oil or gas exploration and production in any zoning district following administrative review and assurance that all required federal and state permits have been obtained and that adequate environmental safeguards and guarantees required under the permits have been addressed.

**10-9 TRAFFIC IMPACT ANALYSIS**

A traffic impact analysis shall be required for proposed high density and high intensity developments. Said analysis shall be performed by a credentialed professional licensed to perform such service. The results and any corrective measures necessary shall be included as part of, and in addition to, the requirements for preliminary subdivision plat and/or site plan review and approval.

**10-10 WELL HEAD PROTECTION AREA (WHPA)**

The water supply protection district or the Well Head Protection Area (WHPA) District is created for the purpose of promoting the public health, safety, and welfare through the protection of public water supplies from the danger of water pollution and contamination in compliance with the Safe Drinking Water Act of 1974. Regulations within these areas are established to prevent water quality degradation due to pollutant loadings within aquifer recharge areas and within the watersheds of surface public water supplies.

**(a) Boundaries:**

The Well Head Protection Area (WHPA) is hereby established. The boundaries shall be amended in the same manner as any other zoning district permitted by the Land Use & Development Ordinance, and may be amended in accordance with the provisions of *Article 3, Amendments to the Zoning District Map*.

The boundaries of the WHPA are determined by the individual public utilities owning and operating public water wells and are based on their individual Source Water Assessment Plans and Well Head Protection Plans. The public water utilities include Daphne Utilities, Park City Water Authority, and Belforest Water Authority.

This district shall be in addition to and shall overlay all other zoning districts where it is applied, so that any parcel of land lying in such an overlay district shall lie in one or more other zoning districts provided for by the Land Use & Development Ordinance. The effect is to create a new district that has the characteristics and limitations of the underlying district, together with the characteristics and limitations of the overlying district.

**(b) Prohibitions:**

No use shall be hereafter established except in conformity with these regulations, except as otherwise provided herein. It is the responsibility of the developer/owner to show proof of compliance with the requirements.

The following uses are prohibited: manure spreading, animal processing facilities, junk yards, auto salvage yards, graveyards, cemeteries, wood preserving facilities, fertilizer and/or pesticide storage and/or production; any establishment for warehousing, production, processing, assembly, manufacture, preparation, compounding, cleaning, servicing, testing, or repair of materials, goods or products which generates, stores, treats, utilizes and/or disposes of a hazardous or toxic material or waste, as set forth in Title 40, Code of Federal Regulations, Parts 116.4 and 261.30 et seq., shall submit the following information with any application for a proposed development or use.

(c) Exceptions:

- (1) Written requests for uses not herein defined or not listed as either a permitted use or a prohibited use may be submitted to the Planning Commission. The Planning Commission shall review said request as per *Article 15, Site Plan Review*.
- (2) All requests shall be accompanied by an environmental assessment report that is prepared by a licensed, qualified engineer. Said report shall be forwarded to the applicable water utility for recommendation. Such recommendations shall be considered in the final decision of the Planning Commission.
- (3) Any exceptions granted shall be conditional and may include a requirement for environmental and safety monitoring consistent with local, state and federal requirements.

(d) Permitted Uses:

The following are considered permitted uses within the WHPA. Uses not listed below may or may not be permissible, depending upon the determination of Planning Commission as provided in *Section 10-10(b), Well Head Protection Area, Prohibitions*. Uses listed as prohibited, shall not be permitted.

- (1) Parks, provided there is a no on-site waste disposal or fuel storage tank facilities associated therewith;
- (2) Wildlife areas;
- (3) Non-motorized trails, such as biking, nature and fitness walks;

- (4) Municipally-sewered residential developments, free of flammable and combustible liquid underground storage tanks;
- (5) Agricultural uses in accordance with the Baldwin County Soil Conservation Department's Best Management Practices Guidelines;
- (6) Municipally-sewered business developments, except the following. The following uses may be considered by the Planning Commission through the exception process as outlined in Exceptions provided above.
  - (a) above-ground storage tanks;
  - (b) asphalt products manufacturing;
  - (c) automotive service and repair garages, body shops and painting;
  - (d) chemical storage, sale, processing and manufacturing plants;
  - (e) dry cleaning establishments;
  - (f) electronic circuit assembly plants;
  - (g) electroplating plants;
  - (h) exterminating shops;
  - (i) foundries and forge plants;
  - (j) industrial liquid waste storage areas;
  - (k) infiltration ponds;
  - (l) metal reduction and refinement plants;
  - (m) motor and machinery service and assembly shops;
  - (n) paint products manufacturing;
  - (o) petroleum products manufacturing;
  - (p) photographic studies including the development of film and pictures;
  - (q) plastics manufacturing;
  - (r) pulp and paper manufacturing;
  - (s) storage, manufacture, or disposal of toxic or hazardous materials;

- (t) underground petroleum, products storage tanks for industrial, commercial, residential or other uses;
  - (u) woodworking and wood products manufacturing.
- (e) Regulations Applying to WHPA:

In addition to the regulations applicable to the underlying zoning district or districts, the following regulations shall apply to all parcels located within the WHPA and shall be provided to supplement each applicable site development application. Such information shall be referred to the Community Development staff and the appropriate community water utility staff for review in accordance with the provisions of applicable laws and ordinances. When deemed appropriate, Environmental Programs Manager or the appropriate community water utility staff may furnish a copy of the application and supporting information to the Directors of the Alabama Department of Environmental Management, the Alabama State Department of Health, and other appropriate agencies for further review.

- (1) A listing of all toxic and hazardous materials and wastes that will be generated, utilized, stored, treated, and/or disposed on site;
- (2) A soils report describing the nature and characteristics of the soils covering the site;
- (3) A description of surface and groundwater characteristics of the site and the surrounding area within three hundred (300) feet of site boundaries;
- (4) A description of all spill prevention, containment, and leakage control measures proposed by the applicant, for all toxic and hazardous materials and wastes generated, utilized, stored, treated, and/or disposed of on the site, including an emergency spill response plan;
- (5) A letter from the Environmental Programs Manager of the City of Daphne, concurred with by the applicable water utility authority, that the proposed use complies with all applicable adopted laws, ordinance and regulations;
- (6) An inventory of all existing and proposed wells, septic tanks, injection wells, and similar facilities on the site, whether in use or not;
- (7) Any other proposed or existing activities on the site that might impact groundwater quality;

- (8) A copy of any applicable permits under the National Pollutant Discharge Elimination System, Federal Wetlands regulations, or other provision of the Clean Water Act, or pursuant to the Endangered Species Act, National Environmental Policy Act, or similar legislation intended to address water pollution.

(f) Separation Distances:

The following setbacks shall be maintained and shall not be modified except by the Board of Zoning Adjustment.

**MINIMUM SEPARATION FROM A PUBLIC WELL**

<b>Proposed Structure</b>	<b>Setback from Public Well</b>
▪ Storm sewer drain	50'
▪ Sanitary sewer manhole, main, and/ connection	100'
▪ Sanitary sewer lift station or related equipment for transport and disposal of sanitary sewage	200'
▪ Septic system, tank or drain field receiving less than 8,000 gallons per day	500'
▪ Cemetery or stormwater drainage pond	500'
▪ Land application of municipal, commercial, or industrial waste; industrial, commercial, or municipal wastewater, lagoons or storage structures; manure stacks or storage structures; and septic tanks or soil absorption units receiving 8,000 gallons or more per day	1,000'
▪ Any solid waste storage, transportation, transfer, incineration, processing, one-time disposal, or small demolition facility; gasoline or fuel oil storage tanks; bulk fuel storage facilities and pesticide or fertilizer handling and storage facilities	1,200'
▪ Private Well	See "h" below

In the event that stormwater runoff is directed toward, or may enter, an opening in the ground that provides access to the groundwater table (e.g., well, sinkhole, etc.), the developer shall present a mitigation plan to ensure that no pollutants enter the groundwater table during construction. Additionally, the developer shall, in concert with the applicable community water utility and the Environmental Programs Manager, take steps to ensure that any such openings are protected from any future surface water infiltration. This may be accomplished by permanently closing such openings, or by taking other steps acceptable to the Planning Commission.

(g) Requirements for Existing Facilities:

Existing facilities are defined as those which may cause or threaten to cause environmental pollution within a well field's recharge area which include, but are not limited to facilities with underground storage tanks (U.S.T) facilities with hazardous waste permits granted by ADEM.

Existing facilities shall provide the following:

- (1) Copies of all federal, state and local facility operation approvals or certificates and ongoing environmental monitoring results to the Department of Community Development, Environmental Programs Manager and the public community water utility.
- (2) Additional environmental or safety structures / monitoring as deemed necessary by the Environmental Programs Manager, Department of Community Development, and the public community water utility which may include but is not limited to stormwater management and monitoring.
- (3) Replace equipment or expand in a manner that improves the existing environmental and safety technologies already in existence.
- (4) Shall have the responsibility of devising and filing with the Department of Community Development and the public community water utility a Contingency Plan satisfactory to the Environmental Programs Manager and utility for the immediate notification of City of Daphne and utility personnel in the event of an emergency or possible groundwater contamination.

(h) Private Wells:

- (1) It is the intent of this Ordinance to eliminate by attrition all private water wells located within the WHPA of the City and where a public community water system is available.
- (2) No private water well may be created for human consumption if a public community water system is available and has the capacity to serve the development.
- (3) No new private water wells for human consumption may be constructed within the WHPA. Private water wells for any purpose other than human consumption, including irrigation wells, must apply for a Private Well Construction Permit.
- (4) Any individual or entity proposing to construct a private water well outside of the WHPA but within the planning jurisdiction of the City,

must apply for and obtain a Private Well Construction permit from the Building Official. The community water utility will review the application and make a determination of the health or contamination hazard posed to the public water supply by the private water well and will provide written recommendation for approval or disapproval to the Building Official.

- (5) Determination of health or contamination hazards by Utility may be based on, but not limited to:
  - (a) Depth and size of proposed private well;
  - (b) Water production design of proposed private well;
  - (c) Proximity to public water well;
  - (d) Quality of existing water supplies;
  
- (i) Enforcement:
  - (1) In the event that an individual and/or facility causes the release of any contaminants which endanger the WHPA, the individual and/or entity responsible shall immediately stop the release and clean up the release to the satisfaction of the City, Utilities, State and Federal Regulatory Agencies.
  - (2) The individual/facility responsible for the contamination shall be responsible for all cleanup, and may include all of the following:
    - (a) City and/or Utility consultant fees for the oversight, review and documentation.
    - (b) The cost of City or Utility equipment employed.
  - (3) Following such release or discharge, the City may require additional testing, monitoring and/or bonds/securities.

**10-11 DUMPSTERS, TRASH REFUSE & RECYCLING CONTAINERS**

For any commercial, institutional, industrial or multi-family development there shall be provided and maintained properly enclosed trash/garbage disposal and recycle containers. All nonresidential uses utilizing city garbage containers shall enclose all refuse collection and storage areas in accordance with this subsection.

- (a) Such containers shall be located behind the front building line; and other such considerations shall be given to a location where the containers can be adequately screened from public view.
- (b) Trash/garbage disposal shall be set on concrete pads sized as recommended by the disposal company and screened on three (3) sides to fully screen all refuse containers from public view.
- (c) Walls shall be constructed of masonry materials that match the main colors and materials of the associated building they serve. Opaque gates, designed to complement the screen, shall be installed for access.
- (d) Any enclosure intended for screening dumpsters, refuse areas, or recycling containers that contains a compaction unit shall include a floor drain within the containment pad that is tied directly to the sanitary sewer system in accordance with the standard specifications for sanitary sewers.
- (e) Any enclosures provided for restaurants or other eating establishments shall be sized to accommodate the storage of grease barrels in addition to dumpsters and recycling containers.
- (f) To allow for dumpster gates to remain closed as often as possible, either a pedestrian door or a wall offset for pedestrian access shall be provided.
- (g) Screening shall not compromise safety by obstructing any required clear sight triangle, by blocking access to any above-ground, pad-mounted transformer (minimum clear distance required by the utility company shall be provided), nor by impeding or diverting the flow of water in any drainage way.

- (h) The minimum height for screening shall be that which is sufficient to visually separate the uses and shall also meet the following standards:
  - (1) Fences used to screen dumpsters shall be at least two (2) feet higher than the container.
  - (2) Berms used for required screening shall be a minimum height of four (4) feet with a maximum slope of three to one (3:1). Berms in excess of four (4) feet shall have a maximum slope of four to one (4:1) measured from the lot line. Berms shall be landscaped and stabilized to prevent erosion.
  - (3) Shrubs used for required screening shall be evergreen; at least thirty (30) inches high when installed; spaced closely together so as to create a hedge, but not farther than five (5) feet on center; and be shrub species that shall attain an average normal growth height of five (5) feet to six (6) feet within four (4) years.
  - (4) Trees used for required screening shall be evergreen and at least six (6) feet in height at installation.

# **MCM 5**

## **Post Construction Stormwater Management in New and Re- Development Sites**

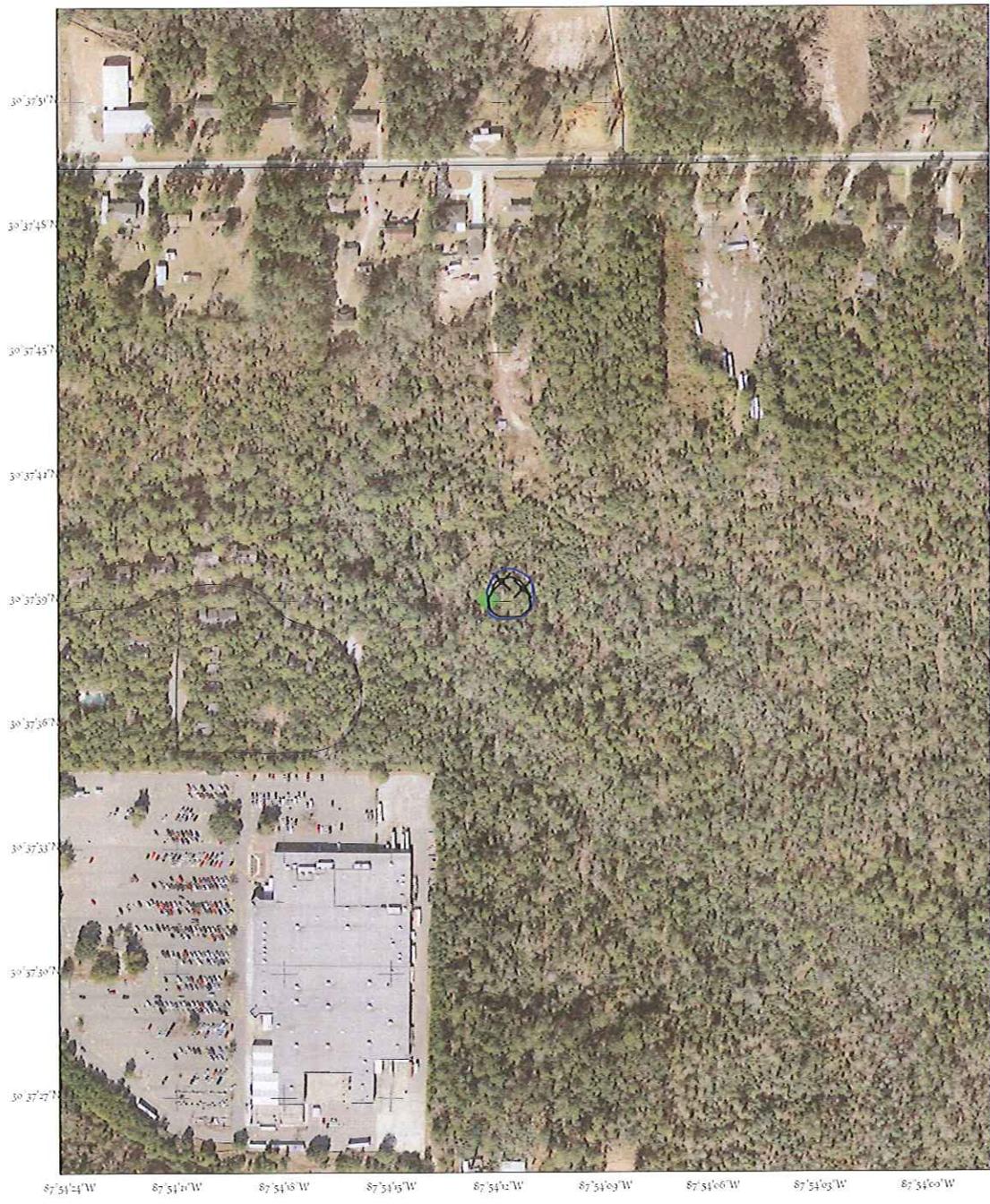
### **3.5.2A**

#### **City Owned BMPs**

**MCM 5 Post Construction Stormwater Management on New Construction Re-development**  
**3.5.2A-Inventory of City Owned BMPs**

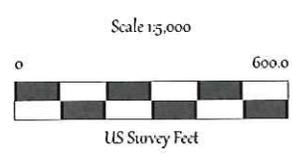
<b>Site Name</b>	<b>Location</b>	<b>Type BMP</b>	<b>Watershed</b>
Daphne Sports Complex	Park Drive	Detention Basin	Yancey Branch
Public Works Facility	Public Works Drive	Detention Basin	Tiawasee Creek
Trione Sports Complex	Whispering Pines Road	Detention Basin	Tiawasee Creek
Daphne City Hall	Main Street	Underground Detention	Mobile Bay
Fire Station	Profit Drive	Detention Basin	Rock Creek
Library/Recreation Center	Main Street	Detention Basin	Yancey Branch





Stormwater Basin NSC

US State Plane 1983  
 Alabama West 0102  
 NAD 1983 (Conus)



NSC1030709A.SSF  
 3/7/2013  
 GPS Pathfinder<sup>®</sup>Office

City of Daphne, Stormwater Infrastructure Inventory

Facility NEW SPORTS COMPLEX  
 Type DETENTION BASIN

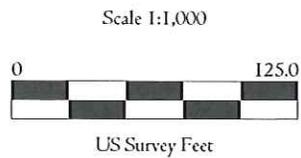
Date of Inspection 3/7/2013

Attribute	Value
Last Rain Fall	OVER 72 HOURS
Last Rainfall in inches	N/A
Pipe Shape	WEIR
Number of Pipes	SINGLE
Pipe Size, Inches	N/A
Pipe Material	N/A
Pipe Damage	N/A
Damage Comment	
Is Pipe In Creek	NO
Is Pipe Submerged in the Water	NO
Erosion Noted Around Pipe	NO
Debris Impact Comments	NONE
Pipe Sediment Impact	NONE
Pipe Stains	NONE
Pipe Stains Comment	
Flow Present at Inspection	TRICKLE
Flow Pool Water Quality	CLEAR
Flow Pool Water Qual Comments	
Pipe Maintenance Priority	LOW



### Stormwater Basin PW

US State Plane 1983  
Alabama West 0102  
NAD 1983 (Conus)



PWA1021813A.cor  
3/6/2013



City of Daphne, Stormwater Infrastructure Inventory

Facility	<u>Daphne Public Works</u>
Type	<u>Stormwater Detention Basin</u>
Date of Inspection	2/18/2013
Attribute	Value
Last Rain Fall	Over 72 Hours
Last Rainfall in inches	na
Pipe Shape	Circular
Number of Pipes	Single
Pipe Size, Inches	24
Pipe Material	HDPE Corrigated Plastic
Pipe Damage	Other
	Hole from mowers
Damage Comment	near drain box in pond
Is Pipe In Creek	Partially
Is Pipe Submerged in the Water	Not Normally, see below
Erosion Noted Around Pipe	None
Debris Impact Comment	
Pipe Sediment Impact	None
Pipe Stains	No
Pipe Stains Comment	
Flow Present at Inspection	No noticed
Flow Pool Water Quality	Clear
Flow Pool Water Qual Comment	Standing, beaver Impact
Pipe Maintenance Priority	Low



### Stormwater Basin Trione

US State Plane 1983  
 Alabama West 0102  
 NAD 1983 (Conus)

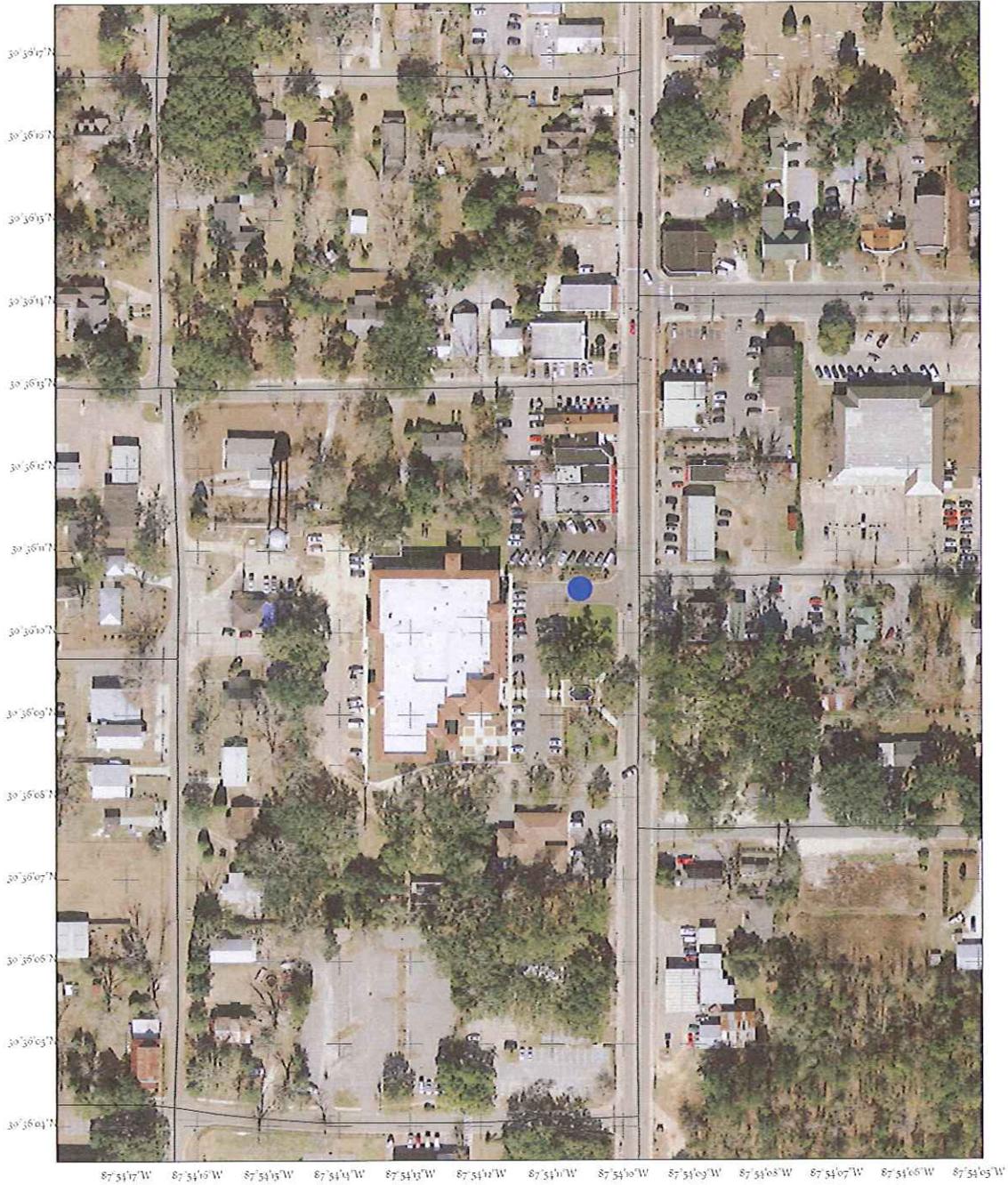


TR1021814A.cor  
 3/7/2013



City of Daphne, Stormwater Infrastructure Inventory

Facility	Fire Station 5 & Training Grounds	
Type	Stormwater Detention Basin	
Date of Inspection	2/18/2013	
	Attribute	Value
	Last Rain Fall	Over 72 Hours
	Last Rainfall in inches	na
	Pipe Shape	ARCH
	Number of Pipes	SINGLE
	Pipe Size, Inches	36
	Pipe Material	RCP CONCRETE
	Pipe Damage	NO DAMAGE
	Damage Comment	
	Is Pipe In Creek	NO
	Is Pipe Submerged in the Water	NO
	Erosion Noted Around Pipe	NO
	Debris Impact Comments	
	Pipe Sediment Impact	NO
	Pipe Stains	LIGHT CLAY
	Pipe Stains Comment	
	Flow Present at Inspection	TRICKLE
	Flow Pool Water Quality	CLEAR
	Flow Pool Water Qual Comments	
	Pipe Maintenance Priority	LOW



### Underground Detention CH

US State Plane 1983  
 Alabama West 0102  
 NAD 1983 (Conus)



DCH1030710A.cor

3/7/2013



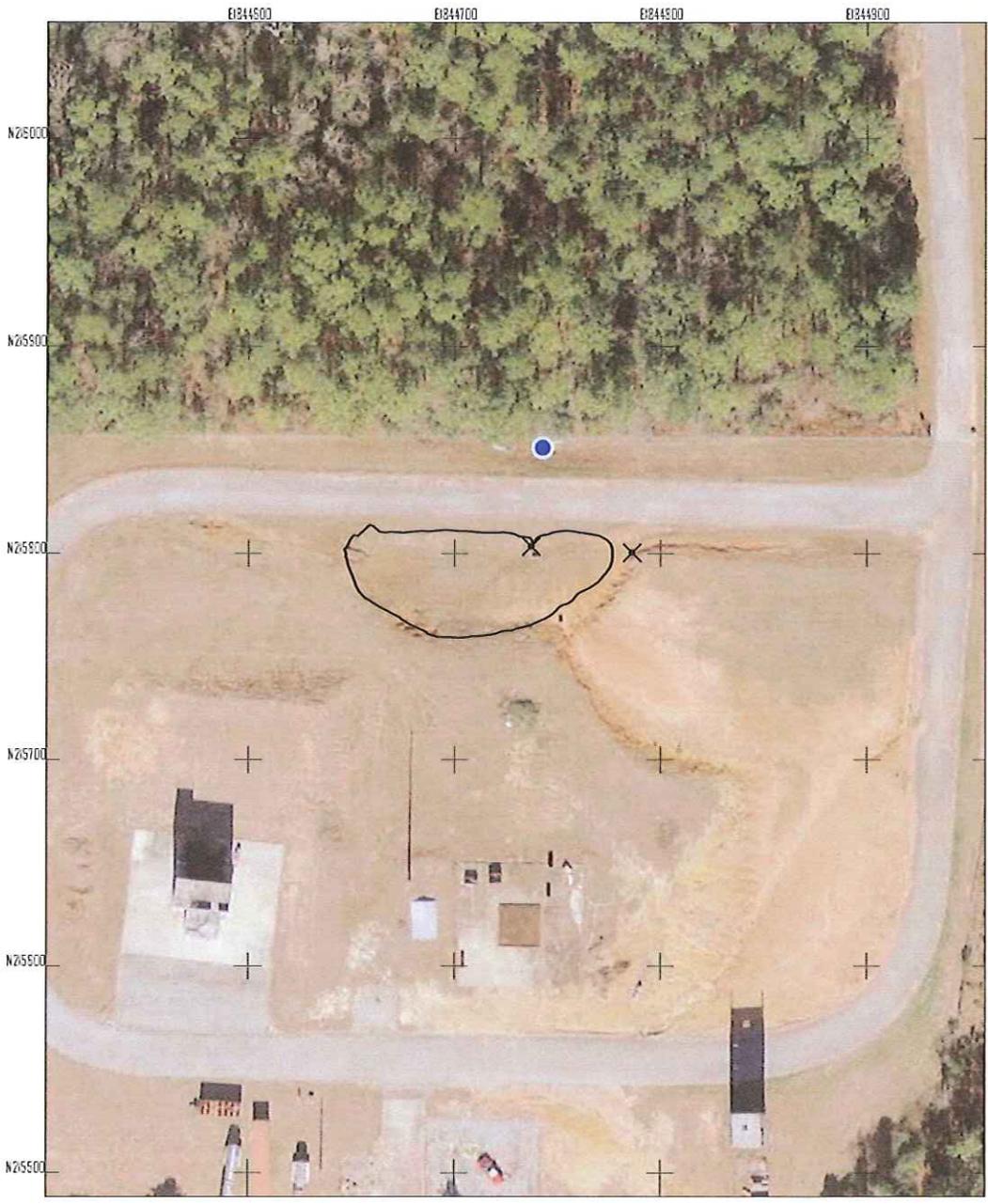
City of Daphne, Stormwater Infrastructure Inventory

Facility	City Hall	
Type	Underground Detention	
Date of Inspection	3/7/2013	
	Attribute	Value
	Last Rain Fall	Over 72 Hours
	Last Rainfall in inches	N/A
	Pipe Shape	Other
	Number of Pipes	Single
	Pipe Size, Inches	0
	Pipe Material	unk
	Pipe Damage	NONE
	Damage Comment	
	Is Pipe In Creek	NO
	Is Pipe Submerged in the Water	NO
	Erosion Noted Around Pipe	NONE
	Debris Impact Comments	NONE
	Pipe Sediment Impact	NONE
	Pipe Stains	NONE
	Pipe Stains Comment	N/A
	Flow Present at Inspection	NONE
	Flow Pool Water Quality	NONE
	Flow Pool Water Qual Comments	
	Pipe Maintenance Priority	LOW

City of Daphne, Stormwater Infrastructure Inventory

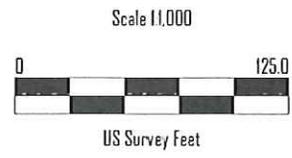
Facility DAPHNE CITY HALL  
 Type UNDERGROUND DETENTION  
 Date of Inspection 3/7/2013

Attribute	Value
Last Rain Fall	OVER 72 HOURS
Last Rainfall in inches	N/A
Pipe Shape	OTHER
Number of Pipes	SINGLE
Pipe Size, Inches	??
Pipe Material	??
Pipe Damage	NONE
Damage Comment	
Is Pipe In Creek	NO
Is Pipe Submerged in the Water	NO
Erosion Noted Around Pipe	NO
Debris Impact Comments	
Pipe Sediment Impact	NONE
Pipe Stains	NONE
Pipe Stains Comment	
Flow Present at Inspection	NONE
Flow Pool Water Quality	NONE
Flow Pool Water Qual Comments	
Pipe Maintenance Priority	LOW



STORMWATER BASIN FS5

US State Plane 1983  
 Alabama West G102  
 NAD 1983 (Conus)



FS51022108A.cor  
 3/7/2013



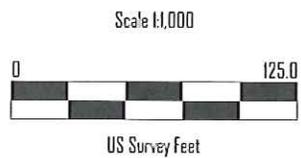
City of Daphne, Stormwater Infrastructure Inventory

Facility	Fire Station 5 and Train Grounds	
Type	Stormwater Detention Basin	
Date of Inspection	2/18/2013	
	Attribute	Value
	Last Rain Fall	Over 72 Hours
	Last Rainfall in inches	na
	Pipe Shape	oval
	Number of Pipes	1
	Pipe Size, Inches	24
	Pipe Material	RCP CONCRETE
	Pipe Damage	CRACKING CHIPPING SMALL CHUNK OUT
	Damage Comment	OF TOP
	Is Pipe In Creek	NO
	Is Pipe Submerged in the Water	NO
	Erosion Noted Around Pipe	RIP RAP
	Debris Impact Comments	NONE
	Pipe Sediment Impact	NONE
	Pipe Stains	SLIGHT CLAY RED
	Pipe Stains Comment	
	Flow Present at Inspection	NONE
	Flow Pool Water Quality	N/A
	Flow Pool Water Qual Comments	
	Pipe Maintenance Priority	LOW



### Stormwater Basin LIB

US State Plane 1983  
 Alabama West 0102  
 NAD 1983 (Conus)



LIBRARY21809A.SSF  
 3/7/2013



City of Daphne, Stormwater Infrastructure Inventory

Facility LIBRARY, RECREATION, CIVIC CTR  
 Type STORMWATER DETENTION BASIN

Date of Inspection 2/18/2013

Attribute	Value
Last Rain Fall	Over 72 Hours
Last Rainfall in inches	na
Pipe Shape	Oval
Number of Pipes	1
Pipe Size, Inches	24
Pipe Material	RCP CONCRETE
Pipe Damage	NONE
Damage Comment	
Is Pipe In Creek	NO
Is Pipe Submerged in the Water	NO
Erosion Noted Around Pipe	NO
Debris Impact Comments	NONE
Pipe Sediment Impact	NONE
Pipe Stains	NONE
Pipe Stains Comment	
Flow Present at Inspection	NO
Flow Pool Water Quality	N/A
Flow Pool Water Qual Comments	
Pipe Maintenance Priority	LOW

## **MCM 5**

# **Post Construction Stormwater Management in New and Re- Development Sites**

### **3.5.3A**

## **Survey of Local Consultants Regarding LID/GI Guidance**

# Daphne LID/GI Ordinance Questionnaire

## PART 1 – LOW IMPACT DEVELOPMENT/GREEN INFRASTRUCTURE TECHNIQUES

1) PLEASE RATE ON A SCALE OF 1 TO 10, WITH 10 BEING BEST AND 1 BEING WORST, THE MOST ATTRACTIVE/DESIRABLE *LID/GI* TECHNIQUES IN THE LIST BELOW:

ITEM	HYPERLINK(S)	PAGE(S)	RATING (SCALE OF 1 TO 10)
Riparian Buffers	<a href="#">LID Manual - Michigan</a>	89-95; 267-280	
Level Spreaders & Vegetated Filter Strips	<a href="#">LID Manual - Michigan</a>	221-228; 289-300	
Sand Filter / Oil and Grit Separators	<a href="#">LID Manual - Michigan</a>	157-168	
Constructed Stormwater Wetlands	<a href="#">LID Manual - Oregon</a>	51-54	
Bio-retention / Curb Extensions	<a href="#">Portland Green Streets Tour</a>	6-9	
Swales / Dry Swales	<a href="#">LID Manual - Oregon</a>	35-38; 43-46	
Permeable / Porous Pavement	<a href="#">LID Manual - Oregon</a>	19-22	
Rainwater Harvesting / Reduced Potable Irrigation Requirement	<a href="#">LID Manual - Michigan</a>	147-156	
Green Roofs	<a href="#">LID Manual - Oregon</a>	23-26	
Rain Garden	<a href="#">LID Manual - Michigan</a>	131-146	
Tree Box	<a href="#">University of New Hampshire Stormwater Center</a>	n/a	
Infiltration Practices	<a href="#">LID Manual - Michigan</a>	193-219	
Vegetated Wall	<a href="#">Urban Habitat Chicago</a>	n/a	
Surface Sand Filter	<a href="#">Stormwater Management</a>	n/a	
Native Plants Maximization / Sod Minimization	<a href="#">LID Manual - Michigan</a>	229-240	
Soil Compaction Minimization / Mitigation	<a href="#">LID Manual - Michigan</a>	69-74;	

# Daphne LID/GI Ordinance Questionnaire

2) CONSIDERING THE *LID/GI* TECHNIQUES YOU FIND THE MOST ATTRACTIVE, PLEASE EXPLAIN YOUR REASONING BELOW:

---



---



---



---



---

## PART 2 – INCENTIVE TECHNIQUES

3) PLEASE RATE ON A SCALE OF 1 TO 10, WITH 10 BEING BEST AND 1 BEING WORST, THE MOST ATTRACTIVE/DESIRABLE *INCENTIVE* TECHNIQUES IN THE LIST BELOW:

ITEM	HYPERLINK	PAGE	RATING (SCALE OF 1 TO 10)
Fast-track review process	<a href="#">Water Environment Research Foundation</a>	2	
Priority in review process	<a href="#">Puget Sound Partnership</a>		
Property tax break period			
Reduced or waived permit fees	<a href="#">Puget Sound</a>		
Bonus density (units or gsf)	<a href="#">Water Environment Research Foundation</a>	2-3	
Height restriction relaxation	<a href="#">Puget Sound Partnership</a>		
Reduced setbacks			
Reduced parking requirements	<a href="#">Puget Sound Partnership</a>	n/a	

# Daphne LID/GI Ordinance Questionnaire

4) CONSIDERING THE *INCENTIVE* TECHNIQUES YOU FIND MOST *UNATTRACTIVE*, PLEASE EXPLAIN YOUR CONCERNS BELOW

---

---

---

---

5) CONSIDERING THE *INCENTIVE* TECHNIQUES YOU FIND MOST *ATTRACTIVE*, PLEASE EXPLAIN YOUR OPINION BELOW:

---

---

---

---

6) WHAT OTHER *INCENTIVE* IDEAS SHOULD BE CONSIDERED FOR ENCOURAGING THE USE OF THESE TECHNIQUES?

---

---

---

---

## PART 3 – REGULATION

7) SHOULD THESE *LID/GI* TECHNIQUES AND/OR HIGHER REGULATORY REQUIREMENTS BE REQUIRED IN SENSITIVE WATERSHED AREAS TO INCREASE PROTECTION OF OUR ENVIRONMENTAL RESOURCES? WHY OR WHY NOT?

---

---

---

IF INTERESTED IN UPCOMING MEETINGS REGARDING LID/GI PLEASE PROVIDE YOUR NAME & CONTACT INFORMATION: \_\_\_\_\_

**Daphne LID/GI Ordinance  
Questionnaire**

PLEASE RETURN FORM TO COMMUNITY DEVELOPMENT VIA:

E-MAIL [CDDIRECTOR@DAPHNEAL.COM](mailto:CDDIRECTOR@DAPHNEAL.COM) OR  
[CDCOORDINATOR@DAPHNEAL.COM](mailto:CDCOORDINATOR@DAPHNEAL.COM) OR

FAX (251)621-3185 OR

MAIL P.O. BOX 400 DAPHNE, ALABAMA 36526

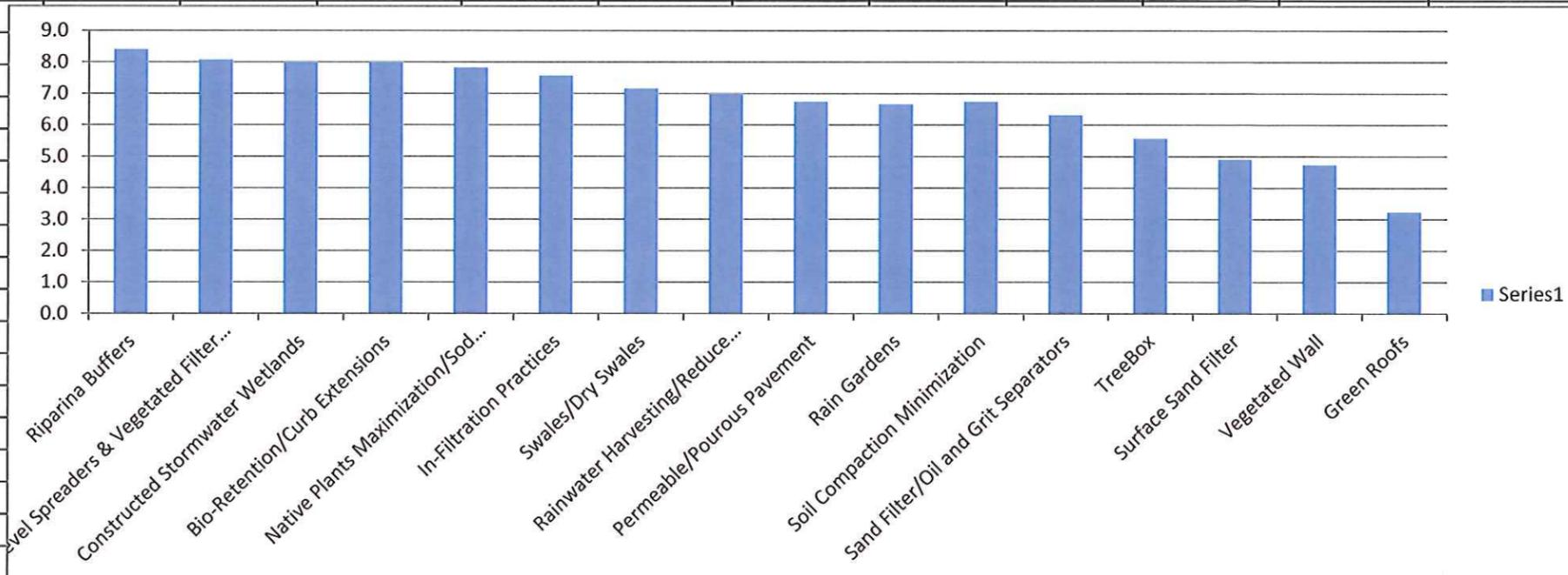
C/O COMMUNITY DEVELOPMENT

THANK YOU FOR YOUR PARTICIPATION

MCM 5 Post Construction Stormwater Management

3.5.3A LID/GI Survey

LID/GI Technique	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6	Response 7	Response 8	Response 9	Response 10	Response 11	Response 12	Total	Average
Riparina Buffers	2	8	10	8	8	7	10	10	10	10	8	10	101	8.4
Level Spreaders & Vegetated Filter Strips	9	9	5	7	9	10	8	9	10	7	4	10	97	8.1
Constructed Stormwater Wetlands	2	9	10	5	8	10	8	10	10	8	6	10	96	8.0
Bio-Retention/Curb Extensions	6	9	8	7	5	7	8	8	10	9	9	10	96	8.0
Native Plants Maximization/Sod Minimization	8	8	10	2	8	10	8	10	10	10	0	10	94	7.8
In-Filtration Practices	7	5	10	6	8	5	7	9	10	9	10	5	91	7.6
Swales/Dry Swales	9	3	8	7	8	10	7	9	10	5	0	10	86	7.2
Rainwater Harvesting/Reduce Irrigation	3	8	10	1	9	5	9	8	10	9	2	10	84	7.0
Permeable/Porous Pavement	7	5	7	5	7	10	10	7	7	10	1	5	81	6.8
Rain Gardens	4	3	8	1	9	5	8	9	10	10	7	6	80	6.7
Soil Compaction Minimization	8	10	0	5	7	10	10	9	10	7	0	5	81	6.8
Sand Filter/Oil and Grit Separators	5	5	10	8	5	7	6	9	7	6	3	5	76	6.3
TreeBox	3	5	10	1	8	10	6	5	5	8	0	6	67	5.6
Surface Sand Filter	7	5	1	1	7	7	6	3	7	5	5	5	59	4.9
Vegetated Wall	7	3	2	6	4	10	5	2	7	6	0	5	57	4.8
Green Roofs	0	3	0	1	4	5	6	3	5	2	0	10	39	3.3



# **MCM 5**

## **Post Construction Stormwater Management in New and Re-Development Sites**

**3.5.3C**

**LID/GI Ordinance**

**Reviewed and Adopted by  
Council**

**CITY OF DAPHNE, ALABAMA  
ORDINANCE NO. 2013-12**

---

**Ordinance to Amend the City of Daphne  
Land Use and Development Ordinance  
Appendix O, Low Impact Development & Green Infrastructure**

---

**WHEREAS**, the Planning Commission of the City of Daphne, Alabama at its regular meeting held on December 20, 2012, considered certain proposed amendments to the City of Daphne Land Use and Development Ordinance, Ordinance No. 2011-54, and any amendments to the same; and,

**WHEREAS**, after such consideration the Planning Commission sent a favorable recommendation to the City Council of the City of Daphne for the approval of said amendments to the City of Daphne Land Use and Development Ordinance; and,

**WHEREAS**, due notice of said proposed amendment has been provided to the public as required by law through publication and open display at the Daphne Public Library and City Hall, a public hearing was held before the City Council on February 18, 2013; and,

**WHEREAS**, the City Council of the City of Daphne after due consideration and upon recommendation of the Planning Commission, deemed that said amendments to the City of Daphne Land Use and Development Ordinance are proper and in the best interest of the health, safety and welfare of the citizens of the City of Daphne, Alabama; and,

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF DAPHNE, ALABAMA, as follows:**

**SECTION I. AMENDMENT**

- a. Table of Contents to said Ordinance shall be amended to include **Appendix O: Low Impact Development/Green Infrastructure (LID/GI) Project Application**;
- b. Article 18-1(A) shall be amended to read in its entirety as follows:

**18-1 GENERAL**

**A. Purpose:**

The purpose of this section is to provide a guide for development wherein the ecological impacts to the environment are minimized through appropriate design, landscaping, erosion control, stormwater management, and proper planning. The intent of the City of Daphne is to protect valuable natural resources, the natural environment and the quality of life for all its citizens. In order to preserve the integrity, stability and the value of land, the City encourages the use of innovative, LEED-certified (Leadership in Energy and Environmental Design) and/or other "green" practices in development design. Where such methods/practices are proposed for a development said practices shall be designed in accordance with

Appendix O, The Low Impact Development and Green Infrastructure Project application and certified by a credentialed professional in his/her design field.

- c. Appendix O: Low Impact Development/Green Infrastructure (LID/GI) Project Application as attached to this Ordinance, shall be added to the Land Use Ordinance in its entirety.

All other sections, articles, and/or content of the City of Daphne Land Use and Development Ordinance shall remain the same and shall be unchanged by this Ordinance.

**SECTION II: REPEALER.**

All other City Ordinances or parts thereof in conflict with the provisions of this Ordinance, in so far as they conflict, are hereby repealed.

**SECTION III: SEVERABILITY.**

The provisions of this Ordinance are severable. If any provision, section, paragraph, sentence, or part thereof shall be held unconstitutional or invalid, such decision shall not affect or impair the remainder of said Ordinance, it being the legislative intent to ordain and enact each provision, section, paragraph, sentence, and part thereof separately and independently of each other.

**SECTION IV: EFFECTIVE DATE.**

This Ordinance shall take effect and be in force from and after the date of its approval by the City Council of the City of Daphne and after publication as required by law.

**ADOPTED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF DAPHNE, ALABAMA, THIS 18<sup>th</sup> day of March, 2013.**

**THE CITY OF DAPHNE,  
AN ALABAMA MUNICIPAL CORPORATION**

  
\_\_\_\_\_  
**DANE HAYGOOD, MAYOR**

**ATTEST:**

  
\_\_\_\_\_  
**REBECCA A. HAYES,  
CITY CLERK**

Low Impact Development / Green Infrastructure (LID/GI)  
Project Application

APPENDIX O

Table of Contents

1.	Bioretention .....	2
2.	Rainwater Harvesting .....	2
3.	Constructed Stormwater Wetlands.....	2
4.	Permeable / Porous Pavement .....	2
5.	Riparian Buffers .....	3
5.1	Overview.....	3
5.2	Application and Limitations.....	3
5.3	Design Considerations.....	3
5.4	Maintenance.....	4
6.	Level Spreaders .....	6
6.1	Overview.....	5
6.2	Application and Limitations.....	5
6.3	Design Considerations.....	6
6.4	Maintenance.....	7
7.	Maximize Native Plants / Minimize Sod.....	8
7.1	Overview.....	8
7.2	Application and Limitations.....	8
7.3	Design Considerations.....	8
7.4	Maintenance.....	9
8.	Swales / Dry Swales.....	10
8.1	Overview.....	10
8.2	Application and Limitations.....	10
8.3	Design Considerations.....	10
8.4	Maintenance.....	12
9.	Sand Filter/Oil and Grit Separation .....	13
9.1	Overview.....	13
9.2	Application and Limitations.....	13
9.3	Design Considerations.....	13
9.4	Maintenance.....	15
10.	Green Roofs.....	16
10.1	Overview.....	16
10.2	Application and Limitations.....	16
10.3	Design Considerations.....	16
10.4	Maintenance.....	18
	References:.....	19

## **1. Bioretention**

Refer to Chapter 1 of *Low Impact Development Guidebook, Phase I Edition V1.0, September 30, 2010*.

## **2. Rainwater Harvesting**

Refer to Chapter 2 of *Low Impact Development Guidebook, Phase I Edition V1.0, September 30, 2010*.

## **3. Constructed Stormwater Wetlands**

Refer to Chapter 3 of *Low Impact Development Guidebook, Phase I Edition V1.0, September 30, 2010*.

## **4. Permeable / Porous Pavement**

Refer to Chapter 4 of *Low Impact Development Guidebook, Phase I Edition V1.0, September 30, 2010*.

## 5. Riparian Buffers

### 5.1 Overview

Riparian buffer areas protect water quality by cooling water, stabilizing banks, mitigating flow rates, and providing for pollution and sediment removal by filtering overland sheet runoff before it enters the water. The Environmental Protection Agency defines buffer areas as, "areas of planted or preserved vegetation between developed land and surface water, [which] are effective at reducing sediment and nutrient loads." (SEMCOG, 2008)

### 5.2 Application and Limitations

Application		Considerations		Benefits	Limitations
Residential	Yes	Construction Cost	Low/Med	<ul style="list-style-type: none"> <li>• Improves water quality;</li> <li>• Reduces runoff velocity and flow;</li> <li>• Enhances aesthetics, habitat;</li> <li>• Reduces shore/bank erosion;</li> <li>• Improves flood control; and</li> <li>• Reduces water temperature.</li> </ul>	<ul style="list-style-type: none"> <li>• Limited in reducing total runoff volumes; and</li> <li>• Size of lot and/or project may reduce ability to protect riparian buffers.</li> </ul>
Commercial	Yes	Maintenance	Low		
Industrial	Yes	Soils	All		
Retrofit	Yes	Sun/Shade	Sun/p. shade		
Highway/Road	Limited	Stormwater Quantity Function	Low/ Med		
Recreational	Yes	Stormwater Quality Function	High/Med High		
Steep slopes	No	Habitat	Med/high		
Shallow Water Table	Yes	Drainage area	Small/med		
Poorly Drained Soils	Yes	Space required	med		

Source: SEMCOG, 2008.

### 5.3 Design Considerations

Applicant shall consider the following when protecting the proper riparian buffer area width and related specifications:

- Existing or potential value of the resource to be protected,
- Site, watershed, and buffer characteristics,
- Intensity of adjacent land use, and
- Specific water quality and/or habitat functions desired.

Riparian buffers shall be divided into different zones that include vegetation to enhance the quality of the body of water.

#### Zone 1

Also termed the "streamside zone," shall begin at the edge of the stream bank of the active channel and extend a minimum distance of 50 feet (*City of Daphne Land Use & Development Ordinance Article 10-3 C(3)*), measured horizontally on a line perpendicular to the water body. Undisturbed vegetated area shall protect the physical and ecological integrity of the stream ecosystem. The vegetative target for the streamside zone is undisturbed native woody species with native plants forming canopy, understory, and duff layer. Where such forest does not grow naturally, native vegetative cover appropriate for the area (such as grasses, forbs, or shrubs) shall be installed.

## Zone 2

Also termed the "middle zone," shall extend immediately from the outer edge of Zone 1 for a minimum distance of 55 feet (ADEM 20-100). This managed area of native vegetation shall protect key components of the stream ecosystem and provide distance between upland development and the streamside zone. The vegetative target for the middle zone is either undisturbed or managed native woody species or, in its absence, native vegetative cover of shrubs, grasses, or forbs. Undisturbed forest, as in Zone 1, is encouraged strongly to protect future water quality and the stream ecosystem. Otherwise, native vegetative cover appropriate for the area (such as grasses, forbs, or shrubs) shall be installed.

## Zone 3

Also termed the "outer zone," shall extend a minimum of 20 feet immediately from the outer edge of Zone 2. This zone prevents encroachment into the riparian buffer area, filters runoff from adjacent land, and encourages sheet flow of runoff into the buffer. The vegetative target for the outer zone shall consist of native woody and herbaceous vegetation to increase the total width of the buffer; native grasses and forbs are acceptable.

## 5.4 Maintenance

The following maintenance activities are required with riparian buffers:

Task	Frequency/Notes
Irrigation	Twice per week for 6 weeks after planting; continued as needed during severe drought.
Dead vegetation removal and replacement	Annual.
Check for streambank erosion or gulches	Annual, repair as needed.
Mowing of turfgrass	As needed, more often in summer months. Minimum 3-5", max 12".
Check for invasive / nonnative plants	Annual, remove as needed.
Mowing of native grasses	Annual, before new growth in spring.
Correction of wildlife damage	As needed.
Repair damaged fencing	As needed (as applicable).
Tree thinning	As needed. Those with >2" diameter should not be removed. Thinning shall not occur until proper tree density or cover is present.

## 6. Level Spreaders

### 6.1 Overview

Level spreaders promote infiltration and improve water quality by evenly distributing flows over a stabilized, vegetated surface. This allows for better infiltration and treatment. There are two types of level spreaders:

#### Inflow

Inflow level spreaders are meant to evenly distribute flow entering into another structural BMP, such as a filter strip, infiltration basin, or vegetated swale. Examples of this type of level spreader include concrete sills and earthen berms.

#### Outflow

Outflow level spreaders are intended to reduce the erosive force of high flows while at the same time enhancing natural infiltration opportunities. Examples of this second type include earthen berms and a level, perforated pipe in a shallow aggregate trench and flow reaches the spreader via the solid pipe. (SEMCOG, 2008).

### 6.2 Application and Limitations

Application		Considerations		Benefits	Limitations
Residential	Yes	Construction Cost	Low	<ul style="list-style-type: none"> <li>• Low cost;</li> <li>• Wide applicability;</li> <li>• Ability to work with other BMPs in a treatment train; and</li> <li>• Avoids concentrated discharges and their associated potential erosion.</li> </ul>	<ul style="list-style-type: none"> <li>• Low stormwater benefits by itself; and</li> <li>• Careful construction and design required to function properly.</li> </ul>
Commercial	Yes	Maintenance	Low		
Industrial	Yes	Soils	sandy		
Retroll	Yes	Sun/Shade	Either		
Highway/Road	Yes	Stormwater Quantity Function	Low		
Recreational	Yes	Stormwater Quality Function	Low		
Steep slopes	No	Habitat	Med		
Shallow Water Table	No	Drainage area	Small		
Poorly Drained Soils	No	Space required	Large		

Source: SEMCOG, 2008.

### 6.3 Design Considerations

Level spreaders are considered a permanent part of a site's stormwater management system. Therefore, uphill development should be stabilized before any dispersing flow techniques are installed. If the level spreader is used as an erosion and sedimentation control measure, it must be reconfigured (flush perforated pipe, clean out all sediment) to its original state before use as a permanent stormwater feature. All contributing stormwater elements (infiltration beds, inlets, outlet control structures, pipes, etc) should be installed first. In addition, the following shall be implemented:

1. Provide as many outfalls as possible and avoid concentrating stormwater. This can reduce or eliminate the need for engineered devices to provide even distribution of flow.
2. Level spreaders are not applicable in areas with easily erodible soils and/or little vegetation. The slope below the level spreader shall be at a maximum eight percent in the direction of flow to discourage channelization. More gentle slopes (e.g., as low as one percent) are also acceptable.
3. The minimum length of flow after the level spreader (of the receiving area) shall be 15 feet.

4. Level spreaders shall not be constructed in uncompacted fill. Undisturbed virgin soil and compacted fill is much more resistant to erosion and settlement than uncompacted fill.
5. Most variations of level spreaders should not be used alone for sediment removal. Significant sediment deposits in a level spreader will render it ineffective. A level spreader may be protected by adding a forebay to remove sediment from the influent. This can also make sediment cleanout easier.
6. Perforated pipe used in a level spreader may range in size from 4-12 inches in diameter. The pipe is typically laid in an aggregate envelope, the thickness of which is left to the discretion of the engineer. A deeper trench will provide additional volume reduction and shall be included in such calculations. A layer of nonwoven geotextile filter fabric shall separate the aggregate from the adjacent soil layers, preventing migration of fines into the trench.
7. The length of level spreaders is primarily a function of the calculated influent flow rate. The level spreader shall be long enough to freely discharge the desired flow rate. At a minimum, the desired flow rate shall be that resulting from a 10-year design storm. This flow rate shall be safely diffused without the threat of failure (i.e., creation of erosion, gullies, or rills). Diffusion of the storm is greater than the 10-year storm is possible only if space permits. Generally, level spreaders should have a minimum length of 10 feet and a maximum length of 200 feet.
8. Conventional level spreaders designed to diffuse all flow rates shall be sized based on the following:
  - o For grass or thick ground cover vegetation:
    - o 13 linear feet of level spreader for every one cubic foot per second (cfs)
    - o Slopes of eight percent or less from level spreader to toe of slope
  - o For forested areas with little or no ground cover vegetation:
    - o 100 linear feet of level spreader for every one cfs flow
    - o Slopes of six percent or less from level spreader to toe of slope

For slopes up to 16 percent for forested areas and grass or thick ground cover, level spreaders may be installed in series. The above recommended lengths should be followed.
9. The length of a perforated pipe level spreader may be further refined by determining the discharge per linear foot of pipe. A level spreader pipe should safely discharge in a distributed manner at the same rate of inflow, or less. If the number of perforations per linear foot (based on pipe diameter) and average head above the perforations are known, then the flow can be determined by the following equation:

Where:  $L = QP/Q_L$

L = length of level spreader pipe (ft.)

QP = design inflow for level spreader (cfs)

Q<sub>L</sub> = level spreader discharge per length (cfs/ft.)

AND  $Q_L = Q_o \times N$

Where:

Q<sub>L</sub> = level spreader discharge per length (cfs/ft.)

Q<sub>o</sub> = perforation discharge rate (cfs.)

N = number of perforations per length of pipe, provided by manufacturer based on pipe diameter (1/ft)

AND  $Q_o = C \times A \times \sqrt{2gH}$

Where:

Q<sub>o</sub> = perforation discharge rate (cfs)

C = Coefficient of discharge (typically 0.60)

A = Cross sectional area of one perforation (ft<sup>2</sup>)

g = acceleration due to gravity, 32.2 ft./sec<sup>2</sup>

H = head, average height of water above perforation (ft.) (provided by manufacturer)

10. Flows may bypass a level spreader in a variety of ways, including an overflow structure or upturned ends of pipe. Cleanouts/overflow structures with open grates can also be installed along longer lengths of perforated pipe. Bypass may be used to protect the level spreader from flows above a particular design storm.
11. Erosion control matting, compost blanketing, or riprap on top of filter fabric shall be implemented immediately downhill and along the entire length of the level spreader, particularly in areas that are unstable or have been recently disturbed by construction activities. Generally, low flows that are diffused by a level spreader do not require additional stabilization on an already stabilized and vegetated slope.

#### 6.4 Maintenance

The following maintenance activities are required with level spreaders:

Task	Frequency/Notes
Inspect diverter box, clean and make repairs	Monthly and after rainfall >2". Look for clogged inlet/outlet pipes and trash/debris in box.
Inspect forebay and level spreader, clean and make repairs	Monthly and after rainfall >2". Look for: <ul style="list-style-type: none"> <li>o Sediment in forebay and along level spreader lip;</li> <li>o Trash and/or leaf buildup;</li> <li>o Scour, undercutting;</li> <li>o Settlement of structure (see silt downhill below spreader)</li> <li>o Fallen trees; and</li> <li>o Stone from below the spreader lip washing downhill.</li> </ul>
Inspect the filter strip and the bypass swale and make repairs as needed	Monthly and after rainfall >2". Look for: <ul style="list-style-type: none"> <li>o Damaged turf reinforcement or riprap rolling downhill;</li> <li>o Erosion within the buffer or swale; and</li> <li>o Gullies or sediment flows from concentrated flows downhill of level spreader.</li> </ul>
Remove any weeds or shrubs growing on level spreader or in swale	Annual.

## 7. Maximize Native Plants / Minimize Sod

### 7.1 Overview

The goal of utilizing and maximizing native plants while minimizing sod area in the landscape is set forth to:

- Improve developed green space as habitat
- Improve water quality
- Lessen water consumption, and
- Reduce long-term maintenance costs.

This goal is applicable to all landscape/green space requirements set forth currently by the Zoning Ordinance of the City of Daphne. This allows for space that is already allocated as green space to achieve additional performance benefits through the use of LID techniques.

### 7.2 Application and Limitations

Application		Considerations		Benefits	Limitations
Residential	Yes	Construction Cost	Low/Med	<ul style="list-style-type: none"> <li>• Improves water quality;</li> <li>• Reduces runoff velocity and flow;</li> <li>• Enhances aesthetics, habitat;</li> <li>• Lessens fertilizer usage and subsequent runoff; and</li> <li>• Reduces maintenance requirements over time, thereby reducing pollution, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Limited where open field recreation and/or land uses are required; and</li> <li>• Projects with phased construction or large lots that would normally employ turfgrass will incur higher front end costs.</li> </ul>
Commercial	Yes	Maintenance	Low		
Industrial	Yes	Soils	All		
Retrofit	Yes	Sun/Shadow	All		
Highway/Road	Yes	Stormwater Quantity Function	Med/High		
Recreational	Yes	Stormwater Quality Function	Med/High		
Slope slopes	Yes	Habitat	High		
Shallow Water Table	Yes	Drainage area	All		
Poorly Drained Soils	Yes	Space required	N/A		

### 7.3 Design Considerations

When utilizing this method, a sequence of performance criteria shall be met as follows:

- First, the required landscape/green space area for the project shall be a maximum of 20% turfgrass. This satisfies the "Minimize Sod" goal of the credit.
- Second, the 80% balance of the landscape/green space area for the project shall be planting area. Planting area is defined as a planting space that has trees, shrubs, groundcover, and other plants that are located within a bed area that has a reasonable continuous organic mulch layer throughout.
- Finally, within the planting area, 70% of the area shall utilize native plant species. The native species shall be designated as such in the plant schedule on the required landscape planting plan for the project. The City reserves the right to reject a species submitted as "native" at its discretion.

A landscape plan implementing this method shall include a landscape area diagram that shows sod area vs. native species planting area vs. ornamental species planting area for the site with percentage calculations included. Note: Include prohibition on invasive species? References list source.

#### 7.4 Maintenance

The following maintenance activities are required when this technique is employed:

Task	Frequency/Notes
Irrigation	Deep, frequent irrigation to supplement inadequate rainfall is needed in the first year of planting. After this, irrigation should only be needed during extended drought periods if at all.
Dead vegetation removal and replacement	Periodic, as needed for aesthetics.
Mowing of turfgrass	As needed, more often in summer months.
Check for invasive / nonnative plants	Remove as needed.
Correction of wildlife damage	As needed.

## 8. Swales/ Dry Swales

### 8.1 Overview

A swale is a narrow, gently sloping landscaped depression that collects and conveys stormwater runoff. The densely planted swale filters stormwater as it flows the length of the structure and allows infiltration of water into the ground. The swale discharges to a storm sewer or other approved discharge point. Compared to vegetated swales, LID/GI swales may be shorter and narrower, but require deeper levels of amended soil and a subsurface drain rock layer to compensate for the smaller size and to function effectively (Clean Water Services, et. al, 2009).

### 8.2 Application and Limitations

Application		Considerations		Benefits	Limitations
Residential	Yes	Construction Cost	Low	<ul style="list-style-type: none"> <li>• Can replace curb and gutter for site drainage and provide significant cost savings;</li> <li>• Water quality; and</li> <li>• Peak and volume control with infiltration.</li> </ul>	<ul style="list-style-type: none"> <li>• Limited application in areas where space is a concern; and</li> <li>• Unless designed for infiltration, there is limited peak and volume control.</li> </ul>
Commercial	Yes	Maintenance	Low		
Industrial	Yes	Soils	Any		
Retrofit	Limited	Sun/Shade	Any		
Highway/Road	Yes	Stormwater Quantity Function	Low/med		
Recreational	Yes	Stormwater Quality Function	Medium		
Sloped slopes	Yes	Habitat	Low		
Shallow Water Table	Yes	Drainage area	Small		
Poorly Drained Soils	Yes	Space required	Low		

Source: Clean Water Services, et. al, 2009 and SEMCOG, 2008.

### 8.3 Design Considerations

The following design factors shall be considered when implementing this methodology:

#### Sizing

The size of the swale shall depend upon the infiltration rate of existing soils. A sizing factor of 0.06 assumes the site infiltration rate is less than 2 in/hr. For example, the size of a swale managing 1,500 square feet of total impervious area would be 90 square feet (1,500 x 0.06). Size may be decreased if:

- Demonstrated infiltration rate is greater than 2 in/hr using ASTM D3395-09 method; or
- Amended soil depth is increased.

#### Geometry/Slopes

A swale's slope end to end shall be at least 0.5% and no more than 6%. For sites with steeper slopes, check dams may be incorporated into the design. Side slopes from the bottom to the top of the swale shall be 3:1 or less. The minimum bottom width shall be 2 feet with a minimum depth of 1 foot.

#### Piping for LID Swales

If needed, stormwater may be directed from impervious surfaces to swales by piping per plumbing code requirements, or may flow directly into the swale via curb openings. A LID/GI swale shall have no underdrain. An overflow drain shall allow no more 6 inches of water depth to collect in the swale. The overflow drain and piping must meet plumbing code requirements and direct excess stormwater to an approved disposal point.

### Setbacks

The City of Daphne Land Use & Development Ordinance site-specific setback requirements shall apply.

### Soil Amendment/Mulch

Amended soils with appropriate compost serve numerous benefits: infiltration; detention, retention; better plant establishment and growth; reduced summer irrigation needs; reduced fertilizer need; increased physical/chemical/microbial pollution reduction; and reduced erosion potential. Primary treatment shall occur in the top 18 inches of the swale. Amended soil in the treatment area shall be composed of imported soil, mix of one part organic compost, one part gravelly sand, and one part top soil. Compost shall be weed-free, decomposed, non-woody plant material; animal waste is not allowed. Water velocities and potential erosion shall be reduced by providing energy dissipaters such as river rock at entrances to the swale. Check with the District or local jurisdiction for Seal of Testing Approval Program (STA) Compost provider -- Chad checking into this. To avoid erosion, appropriate erosion control BMPs shall be implemented.

### Vegetation

The entire swale area including side slopes and treatment areas shall be planted with vegetation appropriate for the soil conditions. Planting conditions vary from wet to relatively dry within the swale. The flat bottom will be inundated frequently and shall be planted with species such as rushes, sedges, perennials, ferns, and shrubs well-suited to wet-to-moist soil conditions. The side slope moisture gradient varies from wet at the bottom to relatively dry near the top where inundation rarely occurs. The moisture gradient will vary depending upon the designed water depth, the swale depth, and side slope steepness. The transition zone from the bottom of the swale to the designed high water line or top of freeboard shall be planted with sedges, rushes, perennials, ferns, and shrubs that can tolerate occasional standing water and wet-to-moist planting conditions. The areas above the designed high water line and immediately adjacent to the swale will not be regularly inundated and shall be planted with self-sustaining, low maintenance grasses, perennials, and shrubs suitable for the local climate and site.

Native plants are encouraged, but appropriate, noninvasive ornamentals are acceptable for aesthetic and functional value. All vegetation should be densely and evenly planted to ensure proper hydrological function of the swale.

#### Quantities:

Bottom of the swale (wet-to-moist zone, per 100 sf) shall include at a minimum:

- 115 herbaceous plants, 1' on center spacing, ½-gal container size; or
- 100 herbaceous plants, 1' on center, and 4' shrubs, 1-gal container size, 2' on center

Slope slopes and top of the swale (wet-to-moist transition zone and dry zone) shall include at a minimum:

- 1 tree per 300 sq. ft, minimum 2-gal container size by 2 ft-tall and
- 10 shrubs (1-gal) and 70 groundcovers (½-gal) per 100 sf

Slope slope trees shall be selected by adaptability to wet-to-moist conditions and size at maturity. An area twice the width of the tree rootball and the depth of the rootball plus 12" (or total depth of 30", whichever is greater) shall be backfilled with amended soil for optimal growth, with no sub-surface rock layer (Clean Water Services, et. al, 2009.)

## 8.4 Maintenance

The following maintenance activities are required with swales:

Task	Frequency/Notes
Irrigation	As needed, water efficient irrigation shall be applied for the first two years after construction of the facility, particularly during the dry summer months, while plantings become established. Irrigation after two years is at the discretion of the owner.
Landscape maintenance (replanting and nonnative species removal).	At least twice annually, in spring and fall, evaluate and replant as necessary to ensure a minimum of 80% survival rate of the required vegetation and 90% facility coverage. Remove nonnative, invasive plant species when found in the facility. Design swales so that they do not require mowing.
Debris removal	At least twice annually, in spring and fall, remove garbage, landscaping debris and other material that may impede water flow and clog the system.
Structural inspection and maintenance	At least twice annually, in spring and fall, check inlet pipes and outlet structure for damage or missing pieces. Inlet pipes and outlet structures shall be free of obstructions and heavy vegetation.

Note: If public, the permittee is responsible for the maintenance of the swale for a minimum of two years following construction and acceptance of the facility. All publicly maintained facilities not located in the public right-of-way must have a public easement. If private, the property owner is responsible for ongoing maintenance per a recorded maintenance agreement (Clean Water Services, et. al, 2009).

## 9. Sand Filter/Oil and Grt Separation

### 9.1 Overview

Constructed filters are structures or excavated areas containing a layer of sand, compost, organic material, peat, or other media that reduce pollutant levels in stormwater runoff by filtering sediments, metals, hydrocarbons, and other pollutants. Constructed filters are suitable for sites without sufficient surface area available for bioretention.

### 9.2 Application and Limitations

Application		Considerations		Benefits	Limitations
Residential	Limited	Construction Cost	Med/High	<ul style="list-style-type: none"> <li>• Good water quality performance;</li> <li>• Variations for different applications; and</li> <li>• Can be effective pretreatment for other BMPs.</li> </ul>	<ul style="list-style-type: none"> <li>• Limited water quality benefits;</li> <li>• Relatively high cost; and</li> <li>• High maintenance needs.</li> </ul>
Commercial	Yes	Maintenance	High		
Industrial	Yes	Soils	n/a		
Retrofit	Yes	Sun/Shade	n/a		
Highway/Road	Yes	Stormwater Quantity Function	Low/High*		
Recreational	Yes	Stormwater Quality Function	High/med flow (temp)		
Slope slopes	n/a	Habitat	n/a		
Shallow Water Table	n/a	Drainage area	Max 6 acre		
Poorly Drained Soils	n/a	Space required	low		

\*Function is low without infiltration and increases when infiltration is provided. Source: SEMCOG, 2003.

### 9.3 Design Considerations

The following design factors shall be considered when implementing this methodology:

1. All constructed filters shall be designed so that larger storms may safely overflow or bypass the filters. Flow splitters, multi-stage chambers, or other devices may be used. A flow splitter may be necessary to allow only a portion of the runoff to enter the filter. This would create an "off-line" filter, where the volume and velocity of runoff entering the filter is controlled. If the filter is "on-line", excess flow shall be designed to bypass the filter and continue to another water quality BMP.
2. Entering velocity shall be controlled. A level spreader may be used to spread flow evenly across the filter surface during all storms without eroding the filter material. Level spreaders for this purpose should use a concrete lip or other non soil material to avoid clogging as a result of failure of the level spreader lip. Parking lots may be designed to sheet flow into filters. Small rip-rap or landscaped riverstone edges may be used to reduce velocity and distribute flows more evenly.
3. Contributing areas shall be stabilized with vegetation or other permanent soil cover before runoff enters filters. Permanent filters shall not be installed until the site is stabilized. Excessive sediment generated during construction can clog the filter and prevent or reduce the anticipated post construction water quality benefits.
4. Pretreatment may be necessary in areas with especially high levels of debris, large settled particulates, etc. Pretreatment may include a forebay, oil/grit separators, vegetated filter strips, or grass swales. These measures will settle out the large particles and reduce velocity of the runoff before it enters the filter. Regular maintenance of the pretreatment is critical to avoid wastes being flushed through and causing the filter to fail.
5. There shall be sufficient space (head) between the top of the filtering bed and the overflow of the filter to allow for the maximum head designed to be stored before filtration.

6. The filter media may be a variety of materials (sand, peat, GAC, leaf compost, pea gravel, etc.) and in most cases should have a minimum depth of 18 inches and a maximum depth of 30 inches, although variations on these guidelines are acceptable if justified by the designer. Coarser materials allow for greater hydraulic conductivity, but finer media filter particles of a smaller size.

Sand has been found to provide a good balance between these two criteria, but different types of media remove different pollutants.

The filter media shall have a minimum hydraulic conductivity ( $k$ ) as follows:

- o Sand 3.5 feet/day;
- o Peat 2.5 feet/day; and
- o Leaf compost 0.7 feet/day.

Depending on the characteristics of the stormwater runoff, a combination of filter materials will provide the best quality results. In addition to determining the degree of filtration, media particle size determines the travel time in the filter and plays a role in meeting release rate requirements.

7. A gravel layer at least six inches deep is required beneath the filter media.
8. Underdrain piping shall be four-inch minimum (diameter) perforated pipes, with a lateral spacing of no more than 10 feet. A collector pipe can be used, (running perpendicular to laterals) with a slope of one percent. All underground pipes shall have clean-outs accessible from the surface. Underdrain design must minimize the chance of clogging by including a pea gravel filter of at least three inches of gravel under the pipe and six inches above the pipe.
9. Infiltration filters shall be underlain by a layer of permeable nonwoven geotextile.
10. A total drawdown time of not more than 72 hours is recommended for constructed filters, though the surface should drawdown between 24 and 48 hours. The drawdown time can be estimated using the filter surface area and the saturated vertical infiltration rate of the filter media. If the storage does not drawdown in the time allowed, adjust pretreatment depth, filter media depth, and surface area. Adjust the design until the volume (if applicable) and drainage time constraints are met.
11. The filter surface area may be estimated initially using Darcy's Law, assuming the soil media is saturated:

$$A = V \times d_f / (k \times (h_f + d_f) \times t_d), \text{ where:}$$

A = Surface area of filter (square feet)

V = Water volume (cubic feet)

$d_f$  = Depth of filter media (min 1.5 ft; max 2.5 ft)

$t_d$  = Drawdown time (days), not to exceed 3 days

$h_f$  = Head (average head in ft; typically  $\frac{1}{2}$  the maximum head on the filter media, which is typically  $\leq$  6 ft)

$k$  = Hydraulic conductivity (ft/day)

12. For vegetated filters, a layer of nonwoven geotextile between non-organic filter media and planting media shall be required.

## 9.4 Maintenance

The following maintenance activities are required with sand filter/roll and grit separation:

Task	Frequency/Notes
Filter media inspection and maintenance, replacement as necessary	Four times per year. Check for accumulated sediment in pore space, and reduced hydraulic conductivity. Symptoms include: <ul style="list-style-type: none"> <li>• Standing water -- any water left in a surface filter after the design drain down time indicates the filter is not functioning according to design criteria.</li> <li>• Film or discoloration of any surface filter material -- this indicates organics or debris have clogged the filter surface.</li> </ul>
Remove trash and debris	Four times per year
Rake scrape silt if collected on top of the filter	Four times per year
Till and aerate filter area	Four times per year
Replenish filtering medium	Four times per year, if scraping/removal has reduced depth of filtering media
Repair leaks from the sedimentation chamber or deterioration of structural components	Four times per year
Clean out accumulated sediment from filter bed chamber and/or sedimentation chamber	Four times per year
Clean out accumulated sediment from underdrains	Four times per year

Note: In areas where the potential exists for the discharge and accumulation of toxic pollutants (such as metals), filter media removed from filters must be handled and disposed of in accordance with all state and federal regulations.

## 10. Green Roofs

### 10.1 Overview

A green roof (or ecoroof) is a lightweight vegetated roof system with waterproofing material, drainage, growing medium, and specially selected plants. A green roof can reduce site impervious area and manage stormwater runoff. Green roofs reduce peak runoff to near predevelopment rates and reduce annual runoff volume by at least 50% (Cost Benefit Evaluation of Ecoroofs, Portland Bureau of Environmental Services, 2008). Green roofs also help mitigate runoff temperatures by keeping roofs cool and retaining most of the runoff in dry seasons. Green roofs typically have thin layers of lightweight growing medium (4 to 8 inches) and low growing succulent vegetation. Alternatively, roof gardens that are designed to be walked on have deeper soils (8+ inches) and are more heavily planted. Professional design consultation is necessary to ensure the structural requirements of building codes are met. Green roofs must be low maintenance and use irrigation only to sustain the health of vegetation.

### 10.2 Application and Limitations

Application		Considerations		Benefits	Limitations
Residential	Yes	Construction Cost	Varies	<ul style="list-style-type: none"> <li>• Increased energy efficiency;</li> <li>• Improved air quality;</li> <li>• Reduced temperatures in urban areas;</li> <li>• Noise reduction;</li> <li>• Improved aesthetics;</li> <li>• Extended roof life; and</li> <li>• Improved stormwater management.</li> </ul>	<ul style="list-style-type: none"> <li>• Complex engineering and design factors,</li> <li>• Higher initial cost than conventional;</li> <li>• Climate limitations; and</li> <li>• Potentially costly repairs.</li> </ul>
Commercial	Yes	Maintenance	Moderate/High		
Industrial	Yes	Soils	n/a		
Retrofit	No	Sun/Shade	Sun		
Highway/Road	n/a	Stormwater Quantity Function	Varies		
Recreational	n/a	Stormwater Quality Function	Good		
Steep slopes	n/a	Habitat	Good		
Shallow Water Table	n/a	Drainage area	Roof Size		
Poorly Drained Soils	n/a	Space required	Small		

Source: Clean Water Services, et. al, 2000 and SEMCOG, 2000.

### 10.3 Design Considerations

#### Sizing

Green roofs replace impervious area at a 1:1 ratio. They shall not receive water from other impervious areas such as an adjacent conventional roof.

#### Slope

Maximum roof pitch is 4:12 (3H:1V slope) unless the applicant provides documentation of runoff retention and erosion control on steeper slopes.

#### Waterproofing

On the roof surface a waterproofing material such as modified asphalt, synthetic rubber, or reinforced thermal plastics is required. Waterproofing materials also may act as a root barrier. Waterproof membranes shall be thoroughly tested to identify and remedy potential defects and leaks prior to installation of any green roof components.

#### Protection boards or materials (recommended)

These materials protect the waterproof membrane from damage and are usually made of soft fibrous materials. They may be required to maintain the waterproofing warranty, depending on the membrane used. Consult with roofing manufacturer for requirements.

#### Ballast (optional)

Gravel ballast may be placed along the roof perimeter and at air vents or other vertical elements to separate roofing elements and vegetation. The need for ballast depends on the type of roof and rooftop flashing details. Ballast or rooftop pavers may be used to provide access, especially to vertical elements that require maintenance.

#### Header/separation board (optional)

If needed, a header or separation board may be placed between gravel ballast and soil or drains.

#### Root barrier

A root barrier may be required, depending on the waterproofing material, warranty requirements, and the types of vegetation proposed. Root barriers impregnated with pesticides, metals, or other chemicals that could leach into stormwater shall not be applied unless documentation that leaching does not occur is provided. If a root barrier is used it must extend under any gravel ballast and the growing medium, and up the side of any vertical elements.

#### Drainage

A method of drainage shall allow excess water to flow into drains when soils are saturated. A manufactured drain mat, filter fabric, aggregate or gravel layers, or the growing medium itself may be used if water drains when soils are saturated. The green roof shall have an approved discharge location and drain or drains.

#### Growing medium

The growing medium depth is 3 to 4 inches or more, depending on the project. This material shall be lightweight and provide a good base for plant growth. Mixes range from 5% organic/95% inorganic to 30% organic/70% inorganic, depending on specific vegetation needs. Growing media shall be stable over time and not break down into fine particles that might increase compaction and clog drainage layers. Components include pumice, perlite, paper pulp, digested organic fiber, and water retention components such as expanded slate, diatomaceous earth, or polymers. For growing media specification, include all constituent elements and their percent composition, and a saturated weight per cubic foot (pcf) that has been tested by a third party lab.

#### Vegetation and coverage

Green roof vegetation traits:

- o Adapted to seasonal drought, excess heat, cold and high winds and other harsh conditions;
- o Fire resistant;
- o Requires little or no irrigation once established;
- o Predominately self-sustaining, low maintenance, with minimal fertilizer;
- o Perennial or self-sowing annuals that are dense and mat-forming; and
- o Diverse palette to increase survivability and good coverage.

Examples of appropriate species: Sedum, Ice plant, blue fescue, sempervivum and creeping thyme. Other herbs, forbs, grasses, and low groundcovers can provide additional benefits and aesthetics, but may need more watering and maintenance to survive and may be prone to additional fire risk if allowed to dry out. Planting lists shall be City-approved and based on reliable sources from this region including local growers and plant suppliers.

Species shall achieve 90% plant coverage within the 2 year maintenance period. At least 70% of the green roof should be evergreen species. No more than 10% of the green roof may be non-vegetated components such as gravel ballast or pavers for maintenance access. Mechanical units may protrude through the green roof, but are not considered elements of the green roof and may be removed from square foot totals.

Exposed areas during establishment periods shall be mulched with an approved, biodegradable mesh blanket, straw, gravel, and pebbles or pumice to protect exposed soil from erosion.

#### 10.4 Maintenance

The following maintenance activities are required with sand filter/olf and grit separation:

Task	Frequency/Notes
Remove drain debris	Monthly during rainy season.
Remove dead plants and replant	As needed in spring and fall to maintain the required 90% plant coverage.
Remove weeds and undesirable plant growth	During first growing season monthly, and in late spring and early fall in subsequent years.
Fertilization	As needed, non-chemical, organic and slow release as approved by the City of Daphne.
Weed/pest abatement	Pesticides and herbicides of any kind are prohibited, unless approved by the City of Daphne to contain a detrimental outbreak of weeds or other pests.
Irrigation	As needed, minimal irrigation may be necessary to maintain vegetation health and ecological function of green roofs. Harvested rainwater is highly recommended for irrigation. Green roofs larger than 1,000 square feet should have an automatic irrigation system for more efficient coverage and to eliminate the need for hand watering. Those larger than 5,000 square feet also should have an irrigation flow meter to monitor water usage.

<sup>4</sup>The level of maintenance will vary depending on soil depth, vegetation type, and location.

## References:

*Branley, Eve (Auburn University) Dylowski, Kalle (Auburn University), Roberts, Jess (Auburn University), Shelton, Michael (Woods Bay National Estuarine Research Reserve). September 30, 2010. Low Impact Development Guidebook, Phase I Edition V1.0.*

*SEMCOG (Southeast Michigan Council of Governments Information Center: [www.semcoq.org](http://www.semcoq.org)) and Michigan Department of Environmental Quality. Low Impact Development Manual For Michigan. A Design Guide for the Implementers and Reviewers. 2008.*

*Clean Water Services, Tualatin Basin Natural Resources Coordinating Committee's Public Education and Outreach Committee, and Oregon Department of Environmental Quality (DEQ), July 2009. Low Impact Development Approaches Handbook.*

**Low Impact Development / Green Infrastructure (LID/GI)  
Project Application**

Applicant: \_\_\_\_\_ Project Name: \_\_\_\_\_

LID/GI Techniques have been considered for this project but are not being implemented for the following reason(s) \_\_\_\_\_

LID/GI Techniques have been considered and are being implemented in exchange for incentives as requested below. Plans illustrating proposed technique are included in submitted package.

Selected ✓	LID/GI Technique*	Point Value	Applicant's Description of Technique (including scale/ extent of use in project)	Reference Plan Sheet	Points Requested
	Retention	7			
	Constructed Stormwater Wetlands	7			
	Permeable / Porous Pavement	4			
	Riparian Buffers	7			
	Level Spreaders	6			
	Maximize Native Plants / Minimize Sod	6			
	Swales / Dry Swales	3			
	Rainwater Harvesting	4			
	Sand Filter / Oil and Grit Separation	4			
	Green Roofs	1			

\*Refer to Appendix O for LID/GI technique requirements.

Total Technique Points: \_\_\_\_\_

**Low Impact Development / Green Infrastructure (LID/GI)  
Project Application (Continued)**

Selected (✓)	Incentive Description	Final Point Value	Points Used
	Reduced parking requirements Option A		
	Reduced parking requirements Option B		
	Waived permit fees		
	Reduced permit fees		

Total Technique Points: \_\_\_\_\_

*Note: Total technique points must be greater than or equal to total incentive points.*

I certify that all of the LID/GI techniques and incentives have been analyzed and selected, as applicable, for the design of this project as indicated above. I also certify that the techniques selected, as applicable, will be implemented for this project as referenced on Plan Sheets provided in the application package.

Signature of Applicant/Authorized Agent \_\_\_\_\_

Date \_\_\_\_\_

## **MCM 5**

# **Post Construction Stormwater Management in New and Re-Development Sites**

### **3.5.3D**

#### **LID/GI BMPs**

#### **Implemented**

MCM 5 Post Construction Stormwater Management in New Re-development Sites

3.5.3D LID/GI BMPs Implement in Daphne

Site Name	Address	LID	Watershed
Trione Street Office Complex	810 Trione Street	Cistern & Pervious Pavers	UT Mobile Bay
Summer Oaks	US Hwy 98	Infiltration System	Yancey Branch
Popeyes	US Hwy 98	Bio-retention	Rock Creek
McDonalds	US Hwy 98	Pervious Paver	D'Olive Creek
ES Nuerology	US Hwy 98	Level Spreader/Oil Water Separator	Yancey Branch
Mayday Parking Lot	College Ave	Pervious Paver	Mobile Bay
Publix	Jubile Square	Oil Water Separator	D'Olive Creek
Adoration Chapel	Main Street	Grass Swale	UT Mobile Bay
Firestone	US Hwy 98	Created Wetlands	Yancey Branch
Klassic Kar Wash	US Hwy 98	Oil Water Separator	Rock Creek