

STAFF REPORT

- PROPOSED COUNTY CODE AMENDMENT
- PROPOSED PFM AMENDMENT
- APPEAL OF DECISION
- WAIVER REQUEST

Proposed Amendments to Chapter 4 (Geotechnical Guidelines), Chapter 2 (General Subdivision and Site Plan Information), and Chapter 7 (Streets, Parking and Driveways) of the Public Facilities Manual Re: Testing Procedures for Infiltration Facilities and Minor Editorial Corrections

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|------------------------------|---|
| Authorization to Advertise | <u>June 19, 2012</u> |
| Planning Commission Hearing | <u>July 12, 2012</u> |
| Board of Supervisors Hearing | <u>September 11, 2012</u> |
| Prepared by: | Site Code Research and Development Branch <u>BF 703- 324-7180</u> |
| | June 19, 2012 |

STAFF REPORT

A. ISSUE:

Proposed amendments to Chapter 4 (Geotechnical Guidelines), Chapter 2 (General Subdivision and Site Plan Information) and Chapter 7 (Streets, Parking and Driveways) of the Public Facilities Manual (PFM). The proposed amendments address soil testing procedures for infiltration facilities and minor editorial corrections.

B. RECOMMENDED ACTION:

Staff recommends that the Board of Supervisors adopt the proposed amendments to Chapter 4 (Geotechnical Guidelines), Chapter 2 (General Subdivision and Site Plan Information) and Chapter 7 (Streets, Parking and Driveways) of the PFM.

C. TIMING:

Board of Supervisors authorization to advertise – June 19, 2012

Planning Commission Public Hearing – July 12, 2012

Board of Supervisors Public Hearing – September 11, 2012

Effective Date – September 12, 2012

D. SOURCE:

Department of Public Works and Environmental Services (DPWES)

E. COORDINATION:

The proposed amendments have been prepared by the Department of Public Works and Environmental Services and coordinated with the Office of the County Attorney. The proposed amendments to Chapter 4 the PFM have been recommended for approval by the Engineering Standards Review Committee.

F. BACKGROUND:

Testing guidelines for infiltration facilities have been available in Chapter 5 of the Northern Virginia BMP Handbook since 1992. The guidelines in the Northern Virginia BMP Handbook were originally developed by the Fairfax County Soil Science Office. A review of the soil testing guidelines was initiated by County staff in 2005. The testing

guidelines were refined and distributed informally to submitting engineers. Those guidelines were first published by the Department of Public Works and Environmental Services (DPWES) in Letter to Industry No. 07-04 on April 3, 2007. In June, 2010, Letter to Industry No. 10-04 and its accompanying Technical Memorandum further refined the guidelines. This most recent letter to industry included a new technique for determining the seasonal high water table based on soil morphology that can be used regardless of the season of the year or amount of antecedent rainfall.

The soil testing guidelines for infiltration facilities were developed in cooperation with industry and the academic community between 2005 and 2010. Committee members from industry included practicing geotechnical engineers, soil scientists and geologists. Representatives from the Northern Virginia Soil and Water Conservation District and the Virginia Polytechnic Institute and State University were also involved in the development of the procedures. County staff members involved in the committee meetings included geotechnical and stormwater engineers. Current scientific literature on soil science and soil morphology was reviewed and discussed during the many committee meetings. The Engineering Standards Review Committee (ESRC) reviewed the proposed amendments and provided comments in 2011 and 2012.

The proposed amendments will incorporate the procedures for soil testing necessary for the design of infiltration facilities into the PFM. The proposed amendments include requirements and procedures for the determination of the seasonal high water table, soil characterization, soil borings, soil infiltration rate, laboratory testing, and report presentation. The proposed amendments also include a requirement for a pre-construction conference to discuss construction and certification requirements for proposed infiltration facilities.

There has been an increase in the number of Low-Impact Development (LID) stormwater facilities proposed since LID facilities were added to the PFM in 2007. Many of the LID practices are enhanced when used in conjunction with infiltration facilities or depend on infiltration of stormwater runoff to provide water quality and quantity controls. These LID practices include pervious pavement, bioretention facilities and wet and dry swales. The number of site, subdivision construction and grading plans proposing the construction of LID facilities is expected to further increase when the new State stormwater regulations come into effect. Infiltration testing will become more important as the number of proposed LID facilities grows.

G. PROPOSED AMENDMENTS:

The amendments to Chapter 4 of the PFM incorporate the following provisions:

- The amendments describe the soil testing procedures required before the design of an infiltration facility can be approved on a site plan, a subdivision construction plan or a grading plan. The number, depth and location of borings and test pits for each facility are specified. The method to determine the depth requirements of the soil tests, based on the depth of the proposed infiltration facility, is

established. Also specified are the measurements to be taken during the soil testing.

- A definition of bedrock, to distinguish it from soil, is provided in the amendments.
- The use of soil morphology to determine the seasonal high water table (SHWT) is provided as an alternative to some of the required soil tests. Normal testing of the SHWT by observation of water levels in boring holes is limited to only part of the year depending on the antecedent rainfall. By incorporating this testing procedure, infiltration facilities can be sited and designed throughout the year
- The methodology to be used to determine the infiltration rate of soils is provided in the procedures. The requirements for the casing used to line the soil borings where the infiltration test is to be completed are provided. The groundwater sampling methodology is specified. The minimum acceptable infiltration rate at the location of the future infiltration facility is defined.
- A notable change from the current soil testing guidelines is the maximum infiltration rate allowed. Previously, the maximum infiltration rate was limited to 8 inches per hour based on concerns that higher rates would not allow the stormwater runoff to be treated before it entered the groundwater. The amendments propose to allow infiltration facilities in areas where the infiltration rate is over 8 inches per hour provided that the facility is in an environmentally suitable location.
- The amendments require a preconstruction meeting to discuss PFM and site-specific requirements as well as third-party inspection certifications. Earlier guidelines did not require this meeting.
- The amendments require infiltration rate tests use a modified constant head methodology. The ESRC recently suggested this methodology since it would better model an infiltration system. The letters to industry in 2007 and 2010 used a falling head test.
- The amendments identify how the soil samples for the laboratory tests are gathered and identify the required laboratory tests.
- The amendments identify the information from the soil testing procedures to be included in the final report for each project. The final report can be provided within the Soil Report for the project. Alternatively, the final report can be submitted as a part of the first submission of a site plan, a subdivision construction plan or a grading plan. A narrative would accompany the testing results and the soil classifications. The feasibility of the proposed infiltration facility and recommendations for the design and construction of the facility would also be a part of the narrative.

The amendments to Chapters 2 and 7 are limited to minor editorial corrections.

H. REGULATORY IMPACT:

Minimal. The amendments to PFM Chapter 4 formalize existing County guidelines for infiltration testing currently being used by industry with minimal changes. The requirement to perform the testing already exists. The infiltration testing procedures will help to ensure proper design of infiltration facilities.

I. ATTACHED DOCUMENTS:

Attachment A -- Proposed amendments to Chapter 4 of the PFM
Attachment B – Proposed amendments to Chapter 2 of the PFM
Attachment C – Proposed amendments to Chapter 7 of the PFM

**Proposed Amendment to Chapter 4 (Geotechnical Guidelines)
of the
Public Facilities Manual**

1 **Deletions are shown as strikeouts and insertions are underlined.**

2
3 **Insert §4-0700 (Testing for Infiltration Facilities) into the Public Facilities Manual**
4 **to read as follows:**

5
6 **4-0700 Testing for Infiltration Facilities**

7
8 **4-0701 Purpose and Scope**

9
10 4-0701.1 The purpose of infiltration testing is to determine the character, physical
11 properties and seasonal high water table (SHWT) of natural soil deposits proposed to be
12 used for infiltration of stormwater. Infiltration facilities include facilities such as
13 percolation trenches (see § 6-1303), pervious pavement with full or partial exfiltration
14 (see § 6-1304), and bioretention basins or rain gardens (see § 6-1307). See Virginia DCR
15 Stormwater Design Specification No. 8, Infiltration Practices for a general discussion of
16 the design of infiltration facilities.

17
18 4-0701.2 The scope of the investigation must be planned with knowledge of the intended
19 project size, facility size, land utilization, and general subsurface characteristics. The
20 complete evaluation must include a geotechnical investigation in the field, laboratory
21 testing of select soil samples retrieved in the field to confirm soil and strata classifications
22 and a final report.

23
24
25 **4-0702 Geotechnical Investigation**

26
27 4-0702.1 Geotechnical investigations are to be performed by borings or a combination of
28 borings and test pit(s) per § 4-0702.5.

29
30 4-0702.2 A determination of the SHWT should be performed during the months of
31 November through May. A SHWT determination by direct observation of the
32 groundwater level should not be performed during the months of June through October,
33 unless the value of the Palmer Drought Severity Index (PDSI) is equal to or greater than
34 2.0 (i.e., wet). If the value of the PDSI is less than 2.0 (i.e., near normal or drier), the
35 determination of SHWT by direct observation and testing conducted during the months of
36 June through October may be used for preliminary design only. Final design shall then
37 be based on a confirmatory investigation performed during the months of November
38 through May (or anytime of the year when the PDSI is equal to or greater than 2.0).
39 Weekly values of the PDSI may be obtained from the National Weather Service Climate
40 Prediction Center. Fairfax County is located in Virginia Climate Division #4.

41
42 4-0702.3 The SHWT may be determined using soil morphology throughout the year by a
43 certified or licensed professional registered in Virginia with training and experience in

1 soil morphology such as a certified or licensed professional soil scientist, a licensed
2 onsite soil evaluator, a certified professional wetland delineator or a certified professional
3 geologist. Professional engineers registered in Virginia with experience in the field of
4 geotechnical engineering may also be certified to determine the SHWT provided that they
5 have successfully completed the Soil Morphology Training Class offered by the Northern
6 Virginia Soil and Water Conservation District (NVSWCD) and are on its list of certified
7 professionals.

8
9 4-0702.4 Evaluation of the SHWT utilizing soil morphology shall be based on low
10 chroma colors, mottles, and redoximorphic features of the soil. Unlike other types of
11 field tests which may be performed by an individual under the responsible charge of the
12 registered professional, this evaluation must be performed by the registered professional
13 personally. If the registered professional performing the evaluation or the County
14 determines that a follow-up confirmatory field measurement of the SHWT is required,
15 the follow-up evaluation shall be performed when the Palmer Drought Severity Index
16 (PDSI) is equal to or greater than 2.0, or anytime during the months of November
17 through May.

18
19 4-0702.5 Each proposed facility requires a minimum of three borings, or a test pit and
20 two borings, located within the footprint of the proposed infiltration facility.

21
22 4-0702.5A The first or initial boring, which could also be a test pit, should be located
23 approximately in the center of the footprint of the proposed facility. The first boring or
24 test pit is performed to document the soil profile, horizons, groundwater table, depth of
25 bedrock (see § 4-0702.5B) and the general suitability of the site for infiltration.

26
27 4-0702.5B Bedrock is defined as materials exhibiting a minimum SPT N-value of 60. In
28 the Triassic (Culpeper) Basin and Piedmont Upland physiographic provinces, the
29 aforementioned minimum SPT N-value will correlate approximately to weathered rock
30 (i.e., in such areas the separation is measured to weathered rock surface especially where
31 underlain by shale, siltstone, sandstone and/or schist).

32
33 4-0702.5C The soil description must include all soil horizons.

34
35 4-0702.5D Soil textures should be identified according to the Unified Soil Classification
36 System (USCS) per ASTM D-2488 (Description and Identification of Soils Visual-
37 Manual Procedure) and the USDA textural classification.

38
39 4-0702.5E Dynamic Cone Penetrometer (DCP) [ASTM Special Technical Publication
40 #399] test or Standard Penetration Test (SPT) [ASTM D1586-99] results should be
41 provided for the initial boring or test pit.

42
43 4-0702.5F The boring or test pit depth shall extend no less than 48 inches below the
44 invert of the proposed facility.

45

1 4-0702.5G The boring shall be continuously sampled from 24 inches above the
2 anticipated or proposed facility invert to the termination depth of the boring in order to
3 evaluate the subsurface conditions.

4
5 4-0702.5H Groundwater elevations are to be recorded at the time of the boring and at
6 least 24 hours following its completion.

7
8 4-0702.5I The shallowest measurement may be used as the SHWT if the conditions of §
9 4-0702.2 are met.

10
11 4-0702.6 The second and third borings, with minimum diameters defined in § 4-0703.3B
12 and drilled at an offset distance of not less than 5 feet from the initial boring or test pit,
13 shall be used for the infiltration tests.

14
15 4-0702.7 Additional profile borings and/or test pits shall be provided for every 100 linear
16 feet or every 10,000 square feet of the proposed infiltration facility. Additional borings
17 and/or test pits may also be performed at the discretion of the registered professional to
18 adequately characterize infiltration characteristics.

19
20 4-0702.8 Additional infiltration tests shall be required for every 50 linear feet or every
21 2,000 square feet of the proposed facility. Additional infiltration tests may also be
22 performed at the discretion of the registered professional to adequately characterize
23 infiltration characteristics.

24
25 4-0702.9 The field infiltration rate is based on the average of all field tests located within
26 the facility.

27 28 29 **4-0703 Infiltration Testing**

30
31 4-0703.1 Actual infiltration rates shall be determined through on-site test(s) conducted
32 within 24 inches of the anticipated or proposed invert of the facility.

33
34 4-0703.2 Specific requirements are as follows:

35
36 4-0703.2A Drill two borings adjacent to the initial test pit or boring, each at an offset of
37 greater than 5 feet, and to a depth of within 24 inches of the anticipated or proposed
38 invert of the facility. The diameter of the boring shall snugly fit the diameter of the
39 casing (see § 4-0703.3B). Remove any loose material from each boring.

40
41 4-0703.2B Install a solid casing 3 to 5 inches in diameter to the bottom of the boring.
42 Remove any smeared soil surfaces and loose material from the casing. A 2-inch layer of
43 coarse sand or fine gravel may be placed at the bottom of the boring to prevent scouring
44 and sedimentation.

45

1 4-0703.2C Fill a standpipe with water to a height of at least 24 inches above the bottom
2 of the casing and allow pre-soaking for 24 hours.

3
4 4-0703.2D After 24 hours, refill the standpipe to a height of 24 inches above the bottom
5 of the casing and record the water level drop in inches after one hour. Repeat the
6 procedure three times by filling the standpipe to a height of 24 inches and measuring the
7 drop in water level after one hour. A total of four observations shall be completed. The
8 infiltration rate of each test boring is the average of the change in water level readings in
9 inches per hour or the last reading, whichever is the most representative of the subsurface
10 conditions based on the opinion of the registered professional conducting the tests.
11 Should the infiltration rates in the two borings prove inconsistent, additional borings and
12 infiltration tests must be performed or the lowest infiltration rate obtained shall be used as
13 the field infiltration rate.

14
15 4-0703.2E The field infiltration rate for a proposed facility is the average of all field
16 infiltration rates conducted within that facility, see § 4-0702.9. A field infiltration rate of
17 at least 0.5 inches per hour at the design depth of the proposed facility must be obtained
18 for the infiltration facility to be considered feasible. The design infiltration rate for the
19 facility is one-half of the field infiltration rate. If field infiltration rates of 8 or more
20 inches per hour are recorded, the facility's design professional shall be contacted to
21 confirm that the facility is in a suitable location with respect to environmental concerns.

22
23 4-0703.2F Soil boring locations shall be accurately documented on the plans.

24
25 4-0703.2G Infiltration testing shall be performed by a registered professional or his/her
26 authorized representatives. The professional shall either be a Virginia licensed
27 professional engineer with experience in geotechnical engineering and soil evaluation, a
28 Virginia certified or licensed professional soil scientist, or a Virginia certified
29 professional geologist.

30
31 4-0703.2H A change in design at the permitting plan review stage may necessitate
32 additional testing. The final design invert of the proposed facility must be within 24
33 inches of the elevation at which the infiltration test(s) used for design were conducted.

34
35 4-0703.2I Septic percolation tests are not an acceptable alternative to infiltration tests.

36 37 38 **4-0704 Laboratory Testing**

39
40 4-0704.1 Grain-size sieve analyses and hydrometer tests must be performed to determine
41 the USDA textural classification and the USCS soil description at the proposed or
42 anticipated invert of the facility.

43
44 4-0704.2 The tests should also be done on representative samples from all soil layers
45 encountered to a depth of 4 feet below the final invert of the facility.

46

1
2 **4-0705 Report Presentation and Submission**
3

4 4-0705.1 The report shall include the proposed infiltration facility plan, the boring
5 locations, all boring logs and laboratory test data.
6

7 4-0705.1A The USDA textural classification and the USCS soil description shall be
8 provided in the report as well as on the boring logs.
9

10 4-0705.1B A table shall be included in the report showing the dates, times and hourly
11 readings of the water level for each infiltration test and the averaged field infiltration
12 rates for each test within the proposed facility.
13

14 4-0705.1C The report shall discuss the feasibility of the proposed facility, the impact of
15 the proposed facility on adjoining properties, provide recommendations for construction
16 for the proposed facility and provide the design infiltration rate for the proposed facility.
17

18 4-0705.2 The report can be included as part of the formal Geotechnical Report submitted
19 for a site plan, a subdivision construction plan or a grading plan.
20

21 4-0705.2A The report may also be submitted as part of the site plan, the subdivision
22 construction plan or the grading plan provided it is included on the first submission.
23

24 4-0705.2B The report may also be submitted separately as a Geotechnical Report or as an
25 addendum to a Geotechnical Report if a separate report was previously submitted.
26

27
28 **4-0706 Preconstruction Meeting**
29

30 4-0706.1 A preconstruction meeting shall be held with representatives of the
31 owner/developer, contractor, third-party inspection firm, and the Site Development and
32 Inspection Division. The PFM and site-specific requirements and the third-party
33 inspection certification shall be reviewed and discussed.

**Proposed Amendment to Chapter 2 (General Subdivision and Site Plan
Information)
of the
Public Facilities Manual**

1 **Deletions are shown as strikeouts and insertions are underlined.**

2

3 **Amend §2-0502 (Inspections) of the Public Facilities Manual by revising the text to**
4 **read as follows:**

5

6 2-0502.1B Prior to requesting a pre-construction conference, the developer ~~director~~
7 shall:

8

9 2-0502.1B(1) Have the project plans approved by the Director.

10

11 2-0502.1B(2) Obtain all necessary permits.

**Proposed Amendment to Chapter 7 (Streets, Parking and Driveways)
of the
Public Facilities Manual**

1 **Deletions are shown as strikeouts and insertions are underlined.**

2

3 **Amend §7-1004 (Standards and Criteria) of the Public Facilities Manual by revising**
4 **Table 7.11 to read as follows:**

5

| Table 7.11 Lighting Levels For Proposed Curb & Gutter Streets: Alternate Security Fixtures (RF-3) (High Pressure Sodium Vapor) (110-12-PFM, 99-07-PFM, 80-03-PFM) | | | | | | |
|--|----------------------|-------------------------------------|-------------------------|----------------------------|----------------------------|----------------|
| Area Class | Roadway Class | ADT | Lamp Size Lumens | Maximum Spacing ft. | Mounting Height ft. | Notes |
| Residential | Local | <u>0-400</u> | 5,000 | 160 | 14 | 1,2 |
| | | 251-400 | 5,000 | 160 | 14 | 1,2 |
| | | 401- 1000 <u>2000</u> | 8,000 | 160 | 14 | 1,2 |
| | | 1001-2000 | 8,000 | 160 | 14 | 1,2 |
| NOTES: ^{1/} Measured from face of pole to face of curb. ^{2/} Poles to be placed on one side of the roadway. | | | | | | |

6