

**Stormwater Management Facility  
Operation and Maintenance (O&M) Manual**

**for:**

***Falcon Landing***

**Located at:**

***7344 McLaughlin Rd.  
Falcon, CO***

**Prepared for:**

***Falcon Properties, LLC  
9230 Gingerhill Ct.  
Colorado Springs, CO 80920***

**Prepared by:**

**Dakota Springs Engineering  
31 N Tejon St, Suite 500  
Colorado Springs, CO 80903**

**PROJECT NO. PPR-18-053**

**Stormwater Management Facility  
Operation and Maintenance (O&M) Manual**

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## **Stormwater Management Facility Operation and Maintenance (O&M) Manual**

### **I. Compliance with Stormwater Facility Maintenance Requirements**

All property owners are responsible for ensuring that stormwater facilities installed on their property are properly maintained and that they function as designed. In some cases, this maintenance responsibility may be assigned to others through special agreements. The maintenance responsibility for a stormwater facility may be designated on the subdivision plat, the site development plan, and/or within a maintenance agreement for the property. Property owners should be aware of their responsibilities regarding stormwater facility maintenance. Maintenance agreement(s) associated with this property are provided in Appendix A.

### **II. Inspection & Maintenance – Annual Reporting**

Requirements for the inspection and maintenance of stormwater facilities, as well as reporting requirements are included in this Stormwater Management Facility Operation and Maintenance (O&M) Manual.

**Verification that the Stormwater facilities have been properly inspected and maintained; submittal of the required Inspection and Maintenance Forms and Inspector qualifications shall be provided to Woodmen Hills Metro District on an annual basis. The annual reporting form shall be provided to Woodmen Hills Metro District prior to May 31st of each year.**

Copies of the Inspection and Maintenance forms for each of the stormwater facilities are located in Appendix D and E. A standard annual reporting form is provided in Appendix F. Each form shall be reviewed and submitted by the property owner or property manager to Woodmen Hills Metro District.

### **III. Preventative Measures to Reduce Maintenance Costs**

The most effective way to maintain your water quality facility is to prevent the pollutants from entering the facility in the first place. Common pollutants include sediment, trash & debris, chemicals, dog wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. A thoughtful maintenance program will include measures to address these potential contaminants, and will save money and time in the long run. Key points to consider in your maintenance program include:

- Educate property owners/residents to be aware of how their actions affect water quality, and how they can help reduce maintenance costs.
- Keep properties, streets and gutters, and parking lots free of trash, debris, and lawn clippings.
- Ensure the proper disposal of hazardous wastes and chemicals.
- Plan lawn care to minimize the use of chemicals and pesticides.
- Sweep paved surfaces and put the sweepings back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings – dispose of properly.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean out the upstream components of the storm drainage system, including inlets, storm sewers and outfalls.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.

#### **IV. Access and Easements**

All stormwater management facilities located on the site have both a designated access location as well as a maintenance easement. Refer to the Stormwater Facilities Map located in Appendix G for access and easement locations.

#### **V. Safety**

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present.

If a toxic or flammable substance is discovered, leave the immediate area and contact the local Sheriff at 911.

Potentially dangerous (e.g., fuel, chemicals, hazardous materials) substances found in the areas must be referred to the local Sheriff's Office immediately for response by the Hazardous Materials Unit. The emergency contact number is 911.

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures that have a significant vertical drop. If a vertical drop is identified within the pond that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

**If any hazard is found within the facility area that poses an immediate threat to public safety, contact the local Sheriff's Office immediately.**

## **VI. Field Inspection Equipment**

It is imperative that the appropriate equipment is taken to the field with the inspector(s). This is to ensure the safety of the inspector and allow the inspections to be performed as efficiently as possible. Below is a list of the equipment that may be necessary to perform the inspections of all Stormwater Management Facilities:

- Protective clothing and boots.
- Safety equipment (vest, hard hat, confined space entry equipment).
- Communication equipment.
- Operation and Maintenance Manual for the site including stormwater management facility location maps.
- Clipboard.
- Stormwater Facility Maintenance Inspection Forms (See Appendix D).
- Manhole Lid Remover
- Shovel.

Some of the items identified above need not be carried by the inspector (manhole lid remover, shovel, and confined space entry equipment). However, this equipment should be available in the vehicle driven to the site.

## **VII. Inspecting Stormwater Management Facilities**

The quality of stormwater entering the waters of the state relies heavily on the proper operation and maintenance of permanent best management practices. Stormwater management facilities must be periodically inspected to ensure that they function as designed. The inspection will determine the appropriate maintenance that is required for the facility.

### **A. Inspection Procedures**

All stormwater management facilities are required to be inspected by a qualified individual at a minimum of once per year. Inspections should follow the inspection guidance found in the SOP for the specific type of facility. (Appendix C of this manual).

### **B. Inspection Report**

The person(s) conducting the inspection activities shall complete the appropriate inspection report for the specific facility. Inspection reports are located in Appendix D.

The following information explains how to fill out the Inspection Forms:

#### General Information

This section identifies the facility location, person conducting the inspection, the date and time the facility was inspected, and approximate days since the last rainfall. Property classification is identified as single-family residential, multi-family residential, commercial, or other.

The reason for the inspection is also identified on the form depending on the nature of the inspection. All facilities should be inspected on an annual basis at a minimum. In addition, all facilities should be inspected after a significant precipitation event to ensure the facility is draining appropriately and to identify any damage that occurred as a result of the increased runoff.

#### Inspection Scoring

For each inspection item, a score must be given to identify the urgency of required maintenance. The scoring is as follows:

- 0 = No deficiencies identified.
- 1 = Monitor – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.
- 2 = Routine Maintenance Required – Some inspection items can be addressed through the routine maintenance program (See SOP in appendix A). This can include items like vegetation management or debris/trash removal.
- 3 = Immediate Repair Necessary – This item needs immediate attention because failure is imminent or has already occurred. This could include items such as structural failure of a feature (outlet works, forebay, etc), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.
- N/A This is checked by an item that may not exist in a facility. Not all facilities have all of the features identified on the form (forebay, micro-pool, etc.).

### Inspection Summary/Additional Comments

Additional explanations to inspection items, and observations about the facility not covered by the form, are recorded in this section.

### Overall Facility Rating

An overall rating must be given for each facility inspected. The overall facility rating should correspond with the highest score (0, 1, 2, 3) given to any feature on the inspection form.

### C. Verification of Inspection and Form Submittal

The Stormwater Management Facility Inspection Form provides a record of inspection of the facility. Inspection Forms for each facility type are provided in Appendix D. Verification of the inspection of the stormwater facilities, the facility inspection form(s), and Inspector Qualifications shall be provided to Woodmen Hills Metro District on an annual basis. The verification and the inspection form(s) shall be reviewed and submitted by the property owner or property manager.

Refer to Section II of this Manual regarding the annual reporting of inspections.

## **VIII. Maintaining Stormwater Management Facilities**

Stormwater management facilities must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained.

### A. Maintenance Categories

Stormwater management facility maintenance programs are separated into three broad categories of work. These categories are based largely on the Urban Drainage and Flood Control District's Maintenance Program for regional drainage facilities. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

#### Routine Work

The majority of this work consists of scheduled mowings and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times

during the year. These items can be completed without any prior correspondence with Woodmen Hills Metro District; however, completed inspection and maintenance forms shall be submitted Woodmen Hills Metro District for each inspection and maintenance activity.

#### Restoration Work

This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. These items require prior correspondence with Woodmen Hills Metro District and require that completed maintenance forms be submitted to Woodmen Hills Metro District for each maintenance activity.

#### Rehabilitation Work

This work consists of large-scale maintenance and major improvements needed to address failures within the stormwater management facilities. This work requires consultation with Woodmen Hills Metro District and may require an engineering design with construction plans to be prepared for review and approval. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. These items require prior correspondence with Woodmen Hills Metro District and require that completed maintenance forms be submitted to Woodmen Hills Metro District for each maintenance activity.

### B. Maintenance Personnel

Maintenance personnel must be qualified to properly maintain stormwater management facilities. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

### C. Maintenance Forms

The Stormwater Management Facility Maintenance Form provides a record of maintenance activities. Maintenance Forms for each facility type are provided in Appendix E. Maintenance Forms shall be completed by the contractor completing the required maintenance items. The form shall then be reviewed by the property owner or an authorized agent of the property owner and submitted on an annual basis to the Southeast Metro Stormwater Authority.

Refer to Section II of this Manual regarding the annual reporting of inspections and maintenance activities performed.



**PRIVATE DETENTION BASIN /  
STORMWATER QUALITY BEST MANAGEMENT PRACTICE  
MAINTENANCE AGREEMENT AND EASEMENT**

This PRIVATE DETENTION BASIN / STORMWATER QUALITY BEST MANAGEMENT PRACTICE MAINTENANCE AGREEMENT AND EASEMENT (Agreement) is made by and between EL PASO COUNTY by and through THE BOARD OF COUNTY COMMISSIONERS OF EL PASO COUNTY, COLORADO (Board or County) and Falcon Properties, LLC (Owner or Developer). The above may occasionally be referred to herein singularly as "Party" and collectively as "Parties."

Recitals

A. WHEREAS, Developer is the owner of certain real estate (the Property or Subdivision) in El Paso County, Colorado, which Property is legally described in Exhibit A attached hereto and incorporated herein by this reference; and

B. WHEREAS, Developer desires to plat and develop on the Property a subdivision/land use to be known as Falcon Landing; and

C. WHEREAS, the development of this Property will substantially increase the volume of water runoff and will decrease the quality of the stormwater runoff from the Property, and, therefore, it is in the best interest of public health, safety and welfare for the County to condition approval of this subdivision/land use on Developer's promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices ("BMPs") for the subdivision/land use; and

D. WHEREAS, Chapter 8, Section 8.4.5 of the El Paso County Land Development Code, as periodically amended, promulgated pursuant to Section 30-28-133(1), Colorado Revised Statutes (C.R.S.), requires the County to condition approval of all subdivisions on a developer's promise to so construct adequate drainage, water runoff control facilities, and BMPs in subdivisions; and

E. WHEREAS, the Drainage Criteria Manual, Volume 2, as amended by Appendix I of the El Paso County Engineering Criteria Manual (ECM), as each may be periodically amended, promulgated pursuant to the County's Colorado Discharge Permit System General Permit (MS4 Permit) as required by Phase II of the National Pollutant Discharge Elimination System (NPDES), which MS4 Permit requires that the County take measures to protect the quality of stormwater from sediment and other contaminants, requires subdividers, developers, landowners, and owners of facilities located in the County's rights-of-way or easements to provide adequate permanent stormwater quality BMPs with new development or significant redevelopment; and

F. WHEREAS, Section 2.9 of the El Paso County Drainage Criteria Manual provides for a developer's promise to maintain a subdivision's drainage facilities in the event the County does not assume such responsibility; and

G. WHEREAS, developers in El Paso County have historically chosen water runoff detention basins as a means to provide adequate drainage and water runoff control in subdivisions,

which basins, while effective, are less expensive for developers to construct than other methods of providing drainage and water runoff control; and

H. WHEREAS, Developer desires to construct for the subdivision/land use one(1) detention basin/stormwater quality BMP(s) ("detention basin/BMP(s)") as the means for providing adequate drainage and stormwater runoff control and to meet requirements of the County's MS4 Permit, and to operate, clean, maintain and repair such detention basin/BMP(s); and

I. WHEREAS, Developer desires to construct the detention basin/BMP(s) on property that is or will be platted as Lot 3, as indicated on the final plat of the subdivision, and as set forth on Exhibit B attached hereto; and

J. WHEREAS, Developer shall be charged with the duties of constructing, operating, maintaining and repairing the detention basin/BMP(s) on the Property described in Exhibit B; and

K. WHEREAS, it is the County's experience that subdivision developers and property owners historically have not properly cleaned and otherwise not properly maintained and repaired these detention basins/BMPs, and that these detention basins/BMPs, when not so properly cleaned, maintained, and repaired, threaten the public health, safety and welfare; and

L. WHEREAS, the County, in order to protect the public health, safety and welfare, has historically expended valuable and limited public resources to so properly clean, maintain, and repair these detention basins/BMPs when developers and property owners have failed in their responsibilities, and therefore, the County desires the means to recover its costs incurred in the event the burden falls on the County to so clean, maintain and repair the detention basin/BMP(s) serving this subdivision/land use due to the Developer/Owner's failure to meet its obligations to do the same; and

M. WHEREAS, the County conditions approval of this subdivision/land use on the Developer's promise to so construct the detention basin/BMP(s), and conditions approval on the Owner's promise to reimburse the County in the event the burden falls upon the County to so clean, maintain and/or repair the detention basin/BMP(s) serving this Subdivision; and

N. WHEREAS, the County could condition subdivision/land use approval on the Developer's promise to construct a different and more expensive drainage, water runoff control system and BMPs than those proposed herein, which more expensive system would not create the possibility of the burden of cleaning, maintenance and repair expenses falling on the County; however, the County is willing to forego such right upon the performance of Developer/Owner's promises contained herein; and

O. WHEREAS, the County, in order to secure performance of the promises contained herein, conditions approval of this subdivision/land use upon the Developer's grant herein of a perpetual Easement over a portion of the Property for the purpose of allowing the County to periodically access, inspect, and, when so necessary, to clean, maintain and/or repair the detention basin/BMP(s); and

#### Agreement

NOW, THEREFORE, in consideration of the mutual Promises contained herein, the sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Incorporation of Recitals: The Parties incorporate the Recitals above into this Agreement.

2. Covenants Running with the Land: Developer/Owner agrees that this entire Agreement and the performance thereof shall become a covenant running with the land, which land is legally described in Exhibit A attached hereto, and that this entire Agreement and the performance thereof shall be binding upon itself, its successors and assigns.

3. Construction: Developer shall construct on that portion of the Property described in Exhibit B attached hereto and incorporated herein by this reference, one(1) detention basin/BMP(s). Developer shall not commence construction of the detention basin/BMP(s) until the El Paso County Planning and Community Development Department (PCD) has approved in writing the plans and specifications for the detention basin/BMP(s) and this Agreement has been signed by all Parties and returned to the PCD. Developer shall complete construction of the detention basin/BMP(s) in substantial compliance with the County-approved plans and specifications for the detention basin/BMP(s). Failure to meet these requirements shall be a material breach of this Agreement, and shall entitle the County to pursue any remedies available to it at law or in equity to enforce the same. Construction of the detention basin/BMP(s) shall be substantially completed within one (1) year (defined as 365 days), which one year period will commence to run on the date the approved plat of this Subdivision is recorded in the records of the El Paso County Clerk and Recorder. In cases where a subdivision is not required, the one year period will commence to run on the date the Erosion and Stormwater Quality Control Permit (ESQCP) is issued. Rough grading of the detention basin/BMP(s) must be completed and inspected by the El Paso County Planning and Community Development Department prior to commencing road construction.

In the event construction is not substantially completed within the one (1) year period, then the County may exercise its discretion to complete the project, and shall have the right to seek reimbursement from the Developer/Owner and its successors and assigns, for its actual costs and expenses incurred in the process of completing construction. The term actual costs and expenses shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tool and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the Provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

4. Maintenance: The Developer/Owner agrees for itself and its successors and assigns, that it will regularly and routinely inspect, clean and maintain the detention basin/BMP(s), and otherwise keep the same in good repair, all at its own cost and expense. No trees or shrubs that will impair the structural integrity of the detention basin/BMP(s) shall be planted or allowed to grow on the detention basin/BMP(s).

5. Creation of Easement: Developer/Owner hereby grants the County a non-exclusive perpetual easement upon and across that portion of the Property described in Exhibit B. The purpose of the easement is to allow the County to access, inspect, clean, repair and maintain the detention basin/BMP(s); however, the creation of the easement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

6. County's Rights and Obligations: Any time the County determines, in the sole exercise of its discretion, that the detention basin/BMP(s) is not properly cleaned, maintained and/or otherwise kept in good repair, the County shall give reasonable notice to the Developer/Owner and its successors and assigns, that the detention basin/BMP(s) needs to be cleaned, maintained and/or otherwise repaired. The notice shall provide a reasonable time to correct the problem(s). Should the responsible parties fail to correct the specified problem(s), the County may enter upon the Property to so correct the specified problem(s). Notice shall be effective to the above by the County's deposit of the same into the regular United States mail, postage pre-paid. Notwithstanding the foregoing, this Agreement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

7. Reimbursement of County's Costs / Covenant Running With the Land: The Developer/Owner agrees and covenants, for itself, its successors and assigns, that it will reimburse the County for its costs and expenses incurred in the process of completing construction of, cleaning, maintaining, and/or repairing the detention basin/BMP(s) pursuant to the provisions of this Agreement.

The term "actual costs and expenses" shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tools and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney's fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

8. Contingencies of Land Use/Land Disturbance Approval: Developer/Owner's execution of this Agreement is a condition of land use/land disturbance approval.

The County shall have the right, in the sole exercise of its discretion, to approve or disapprove any documentation submitted to it under the conditions of this Paragraph, including but not limited to, any separate agreement or amendment, if applicable, identifying any specific maintenance responsibilities not addressed herein. The County's rejection of any documentation submitted hereunder shall mean that the appropriate condition of this Agreement has not been fulfilled.

9. Agreement Monitored by El Paso County Planning and Community Development Department and/or El Paso County Department of Public Works: Any and all actions and decisions to be made hereunder by the County shall be made by the Director of the El Paso County Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works. Accordingly, any and all documents, submissions, plan approvals, inspections, etc. shall be submitted to and shall be made by the Director of the Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works.

10. Indemnification and Hold Harmless: To the extent authorized by law, Developer/Owner agrees, for itself, its successors and assigns, that it will indemnify, defend, and hold the County harmless from any and all loss, costs, damage, injury, liability, claim, lien, demand, action and causes of action whatsoever, whether at law or in equity, arising from or related to its intentional or negligent acts, errors or omissions or that of its agents, officers, servants, employees, invitees and licensees in the construction, operation, inspection, cleaning (including analyzing and disposing of any solid or

hazardous wastes as defined by State and/or Federal environmental laws and regulations), maintenance, and repair of the detention basin/BMP(s), and such obligation arising under this Paragraph shall be joint and several. Nothing in this Paragraph shall be deemed to waive or otherwise limit the defense available to the County pursuant to the Colorado Governmental Immunity Act, Sections 24-10-101, *et seq.* C.R.S., or as otherwise provided by law.

11. Severability: In the event any Court of competent jurisdiction declares any part of this Agreement to be unenforceable, such declaration shall not affect the enforceability of the remaining parts of this Agreement.

12. Third Parties: This Agreement does not and shall not be deemed to confer upon or grant to any third party any right to claim damages or to bring any lawsuit, action or other proceeding against either the County, the Developer/Owner, or their respective successors and assigns, because of any breach hereof or because of any terms, covenants, agreements or conditions contained herein.

13. Solid Waste or Hazardous Materials: Should any refuse from the detention basin/BMP(s) be suspected or identified as solid waste or petroleum products, hazardous substances or hazardous materials (collectively referred to herein as "hazardous materials"), the Developer/Owner shall take all necessary and proper steps to characterize the solid waste or hazardous materials and properly dispose of it in accordance with applicable State and/or Federal environmental laws and regulations, including, but not limited to, the following: Solid Wastes Disposal Sites and Facilities Acts, §§ 30-20-100.5 – 30-20-119, C.R.S., Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 C.C.R. 1007-2, *et seq.*, Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k, and Federal Solid Waste Regulations 40 CFR Ch. I. The County shall not be responsible or liable for identifying, characterizing, cleaning up, or disposing of such solid waste or hazardous materials. Notwithstanding the previous sentence, should any refuse cleaned up and disposed of by the County be determined to be solid waste or hazardous materials, the Developer/Owner, but not the County, shall be responsible and liable as the owner, generator, and/or transporter of said solid waste or hazardous materials.

14. Applicable Law and Venue: The laws, rules, and regulations of the State of Colorado and El Paso County shall be applicable in the enforcement, interpretation, and execution of this Agreement, except that Federal law may be applicable regarding solid waste or hazardous materials. Venue shall be in the El Paso County District Court.

IN WITNESS WHEREOF, the Parties affix their signatures below.

Executed this 26 day of March, 2019, by:

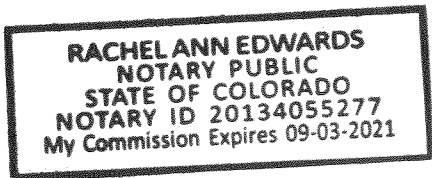
Falcon Properties, LLC

By: Chun P. Pahk  
Chun P. Pahk, Manager

The foregoing instrument was acknowledged before me this 26 day of March, 2019, by Chun P. Pahk, Manager, Falcon Properties, LLC

Witness my hand and official seal.

My commission expires: 9/3/2021



*Rachel Ann Edwards*  
Notary Public

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

BOARD OF COUNTY COMMISSIONERS  
OF EL PASO COUNTY, COLORADO

By: \_\_\_\_\_  
Craig Dossey, Executive Director  
Planning and Community Development Department  
Authorized signatory pursuant to LDC

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_,  
2018, by \_\_\_\_\_, Executive Director of El Paso County Planning and Community  
Development Department.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Approved as to Content and Form:

\_\_\_\_\_  
Assistant County Attorney

Exhibit A

**LEGAL DESCRIPTION**

Lot 3 Beckett at Woodmen Hills Filing 3.

Address:

7344 McLaughlin Road

Falcon, Colorado 80831



## Exhibit B

PLOT PLAN  
LOT 3  
BECKETT AT WOODMEN HILLS

LOT 1  
BECKETT AT WOODMEN HILLS  
FILING NO 3  
ZONE: CR  
AREA: 2.93 ACRES  
EXISTING USE: RETAIL COMMERCIAL

LOT 2  
BECKETT AT WOODMEN HILLS  
FILING NO 3  
ZONE: CR  
AREA: 37,497

LOT 2  
BECKETT AT WOODMEN HILLS  
FILING NO 2  
ZONE: CR  
AREA: 32,332  
EXISTING USE: MEINEKE CAR CARE

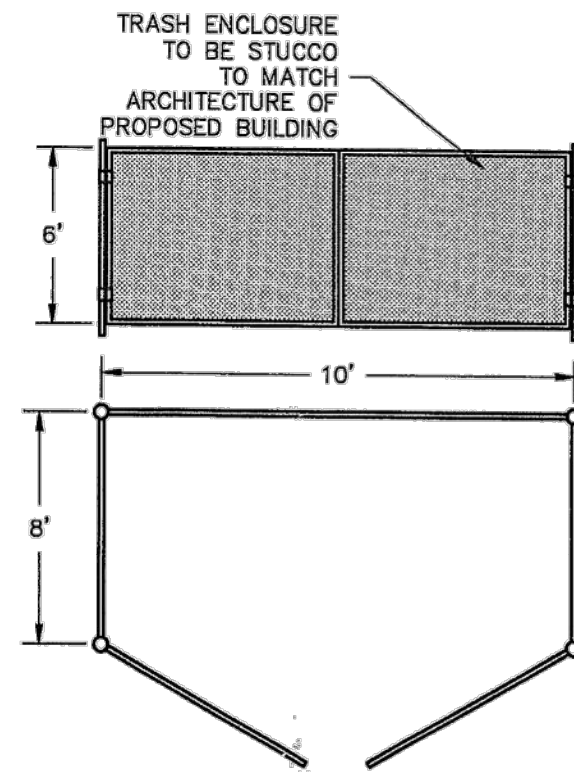
LOT 5A  
BECKETT AT WOODMEN HILLS  
FILING NO 3  
VACATION OF INT LOT LINE  
REC # 20709+3025  
ZONE: CR  
AREA: 1.62 ACRES

LOT 5A  
BECKETT AT WOODMEN HILLS  
FILING NO 3  
VACATION OF INT LOT LINE  
REC # 20709+3025  
ZONE: CR  
AREA: 1.62 ACRES

LOT 4  
BECKETT AT WOODMEN HILLS  
FILING NO 3  
ZONE: CR  
AREA: 7,593 S.F.  
EXISTING USE: FALCON BROADBAND

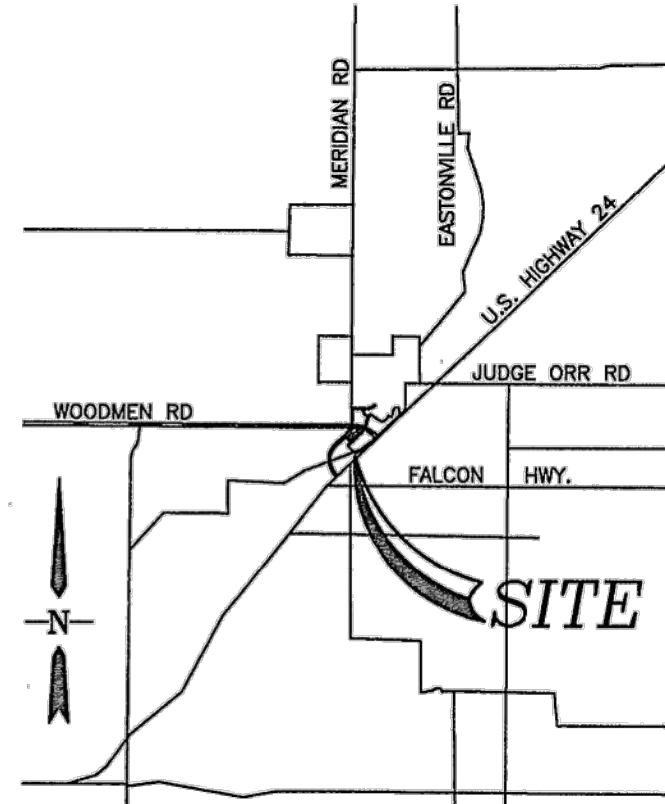
TRACT A  
BECKETT AT WOODMEN HILLS  
FILING NO 3  
ZONE: CR  
AREA: 25,406 S.F.  
EXISTING USE: WHMD SANITARY SEWER LIFT STATION

- ADA HANDRAIL STANDARDS
- HANDRAIL IS TO BE BETWEEN 34" AND 38" FROM THE SURFACE (GROUND, RAMP, SIDEWALK).
  - POSTS (UPRIGHTS/VERTICALS) MUST BE NO MORE THAN 8' APART FROM CENTER TO CENTER.
  - POSTS AND HANDRAIL PIPE NEEDS TO BE SCHEDULE 40, 1-1/4" TO 1-1/2".
  - THE SPACE BETWEEN THE INSIDE OF THE HANDRAIL AND THE WALL OR ANY OTHER OBSTRUCTION MUST BE AT LEAST 1-1/2".
  - HANDRAIL MUST BE CONTINUOUS.
  - A 'D' RETURN IS NEEDED TO "ROUND OUT" THE ENDS OF THE HANDRAIL.
  - HANDRAILS SHALL NOT ROTATE WITHIN THE FITTINGS.

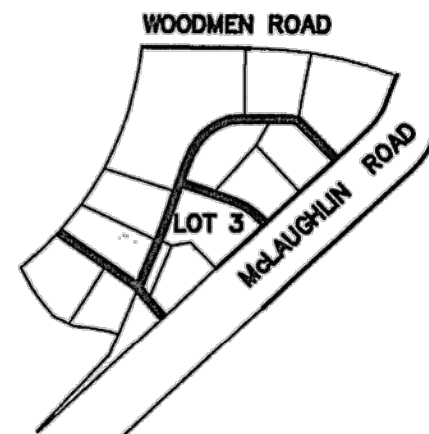


TRASH ENCLOSURE DETAIL

N.T.S.



VICINITY MAP



SITE MAP

SITE INFORMATION

OWNER: FALCON PROPERTIES, LLC  
9230 GINGERHILL CT.  
COLORADO SPRINGS, CO 80920

ENGINEER: DAKOTA SPRINGS ENGINEERING  
31 N TEJON ST. # 500  
COLORADO SPRINGS, CO 80903

LEGAL DESCRIPTION:  
LOE 3 BECKETT AT WOODMEN HILLS FILING 3

ADDRESS: 7344 MCLAUGHLIN ROAD

LOT AREA: 1.07 ACRES

SCHEDULE #: 4307202030

EXISTING ZONE: CR

MIN DISTRICT SIZE: N/A

MIN LOT AREA: N/A

MAX ALLOWABLE BUILDING HEIGHT: 45'

PARKING:  
RETAIL USE 1:250 S.F. (44)

REGULAR (9x18)	34
COMPACT (8x16)	14 (LESS THAN 30%)
HC	2
TOTAL	50

REQUIRED FOR 11,042 S.F. = 44 + 2 HC = 46

SETBACKS FROM ZONE BOUNDARY

FRONT	50
SIDE	25
REAR	25
INTERNAL	0

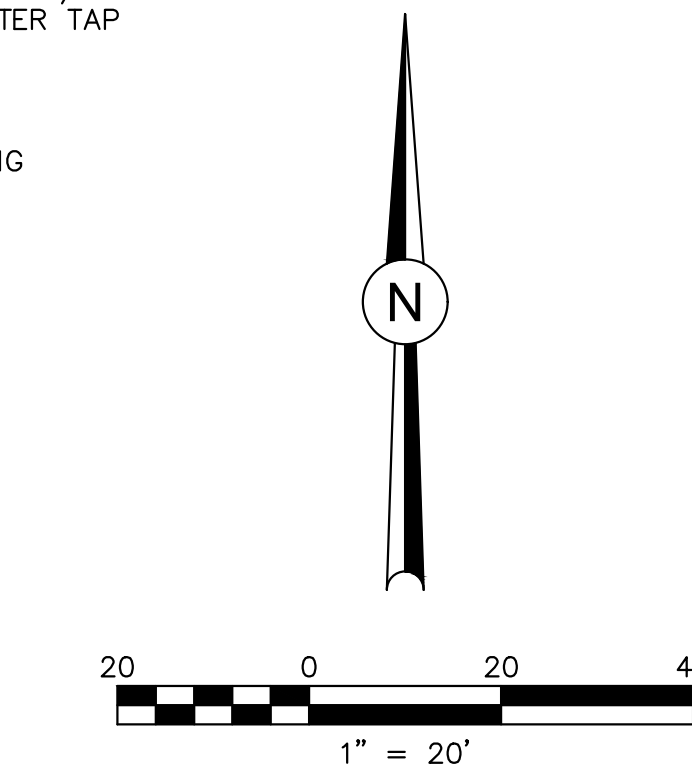
BUILDING INFORMATION

USE: RETAIL

NUMBER OF UNITS: 2

11,042 GROSS S.F.

COVERAGE:  
BUILDING - 24%  
PAVEMENT - 50%  
TOTAL IMPERVIOUS COVERAGE - 74%



DEVELOPMENT SCHEDULE

INITIAL GRADING - APRIL 2019  
BMP INSTALLATION - APRIL 2019  
UTILITY INSTALLATION - MAY 2019  
PAVING - SEP 2019  
LANDSCAPING - SEP 2019

REVISIONS:		
NO.	DESCRIPTION	DATE

ENGINEER:  
DESIGNED BY: WDC DATE:   
DRAWN BY: WDC DATE:   
CHECKED BY: DATE:

48 HOURS BEFORE YOU DIG,  
CALL UTILITY LOCATORS  
1-800-922-1987  
CITY OF COLORADO SPRINGS DEPT. OF UTILITIES  
GAS, ELECTRIC, WATER AND WASTEWATER

SE Springs  
Engineering

31 N. TEJON, SUITE 315  
COLORADO SPRINGS, CO 80903  
P: (719) 227-7388  
F: (719) 227-7392

PROJECT BECKETT AT WOODMEN HILLS LOT 3

SHEET TITLE SITE PLAN

FROM n/a TO n/a

JOB NO. 06-0056 SHEET 2 OF 9

## **Appendix B**

### **General Location and Description of Stormwater Management Facilities**

#### **A. General Site Description**

Falcon Landing, is located in El Paso County on McLaughlin Road south of Woodmen Road. The 1.07-acre site will consist of 1 single-level commercial building with multiple suites.

#### **B. General Stormwater Management Description**

Stormwater is conveyed via curb and gutter with a conventional reinforced concrete rundown to a single porous landscape detention (PLD) basin. Flows from the PLD are conveyed in an existing drainage system to Regional Detention Pond #5 as described in the Final Drainage Report for Becket at Woodmen Hills Filing No. 7A (see Figure 1).

#### **C. Stormwater Facilities Site Plan**

Inspection or maintenance personnel may utilize the Stormwater Facilities Map located in Appendix G for locating the stormwater facilities within this development.

#### **D. On-Site Stormwater Management Facilities**

##### **Storage Facilities (Detention)**

Detention for Falcon Landing site is provided in an onsite porous landscape detention basin with excess flows joining an existing storm system that flows to Regional Detention Pond # 5 as described in the Final Drainage Report for Becket at Woodmen Hills Filing No. 7A (see Figure 1).

##### **Water Quality Facilities**

Falcon Landing site utilizes 1 porous landscape detention basin (PLD) for providing water quality capture volume for more than 80% of the construction site. Portions of the construction site that are not captured by the PLD are less than 0.12 acres (total property is 1.07 acres) and continue to flow along the curb and gutter of McLaughlin Rd. to discharge into the current floodplain as defined in the Final Drainage Report for Beckett at Woodmen Hills Filing No. 3 (see Figure 2).

The Falcon Landing project contains 5 primary drainage basins as detailed below and shown on the Proposed Basin Map (see Figure 3):

EX-1 is part of Basin #1 as defined in the Final Drainage Report for Becket at Woodmen Hills Filing No. 3. No changes are made within this basin as it was part of the previously developed access road.

EX-2 is part of Basin #3 as defined in the Final Drainage Report for Becket at Woodmen Hills Filing No. 3. No changes are made within this basin as it was part of the previously developed access road.

D-1 (0.78 acres, 81% impervious) is the main basin for the Falcon Landing project site. The whole of this basin flows into the porous landscape detention (PLD) pond located on the northerly property line. The PLD serves as a water quality feature before discharging into the existing inlet on the southerly side of the access road joining that storm system eventually reaching Regional Detention Pond #5.  $Q_5=2.3$ ,  $Q_{100}=4.1$

D-2 (0.07 acres, 10% impervious) is primarily a landscape basin that continues to flow in similar manner to what was defined for Basin #4 in the Final Drainage Report for Becket at Woodmen Hills Filing No. 3. It continues to flow to the westerly curb and gutter of McLaughlin Rd. passing through an existing curb inlet before discharging to the existing floodplain south of the property.  $Q_5=0.1$ ,  $Q_{100}=0.2$

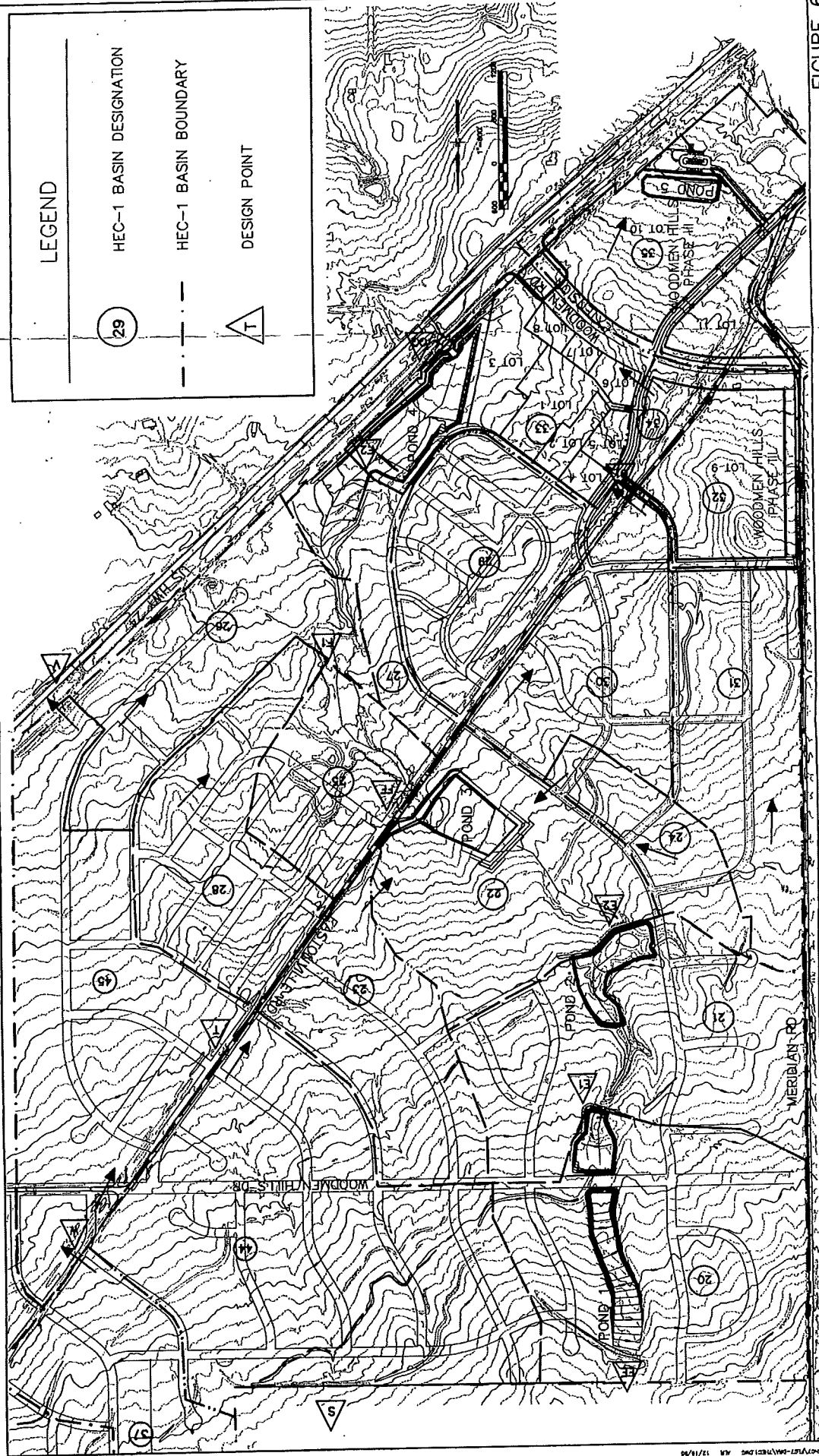
D-3 (0.05 acres, 47% impervious) is a basin along the westerly side of the project area and drains to the easterly curb and gutter of the existing access road joining flows from Basin #6 in the Final Drainage Report for Becket at Woodmen Hills Filing No. 3. Said Basin #6 joins Basin #4 of the same report where it eventually flows to the westerly curb and gutter of McLaughlin Rd. passing through an existing curb inlet before discharging to the existing floodplain south of the property.  $Q_5=0.1$ ,  $Q_{100}=0.2$

### **Source Control Best Management Practices**

Falcon Landing site does not include any nonstructural BMPs.

**Figure 1**

## WOODMEN HILLS PHASE III: HEC-1 BASINS



**FIGURE 6**

**WOODMEN HILLS**  
GROW TO GROW

**USA OUTDOOR**  
8412 EXPLORER DR, STE 110  
COLORADO SPRINGS, CO 80901  
(714) 631-0001

**Figure 2**





**Figure 3**



# Standard Operation Procedures for Inspection and Maintenance

## Porous Landscape Detention (PLDs)

November 2018

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## **PLD-1      BACKGROUND**

Porous Landscape Detention (PLD) is a common type of Stormwater Management Facility utilized within the Front Range of Colorado. PLDs consist of a low-lying vegetated area underlain by a sand bed with an underdrain pipe. A shallow surcharge zone exists above the PLD for temporary storage of the Water Quality Capture Volume (WQCV). During a storm, accumulated runoff ponds in the vegetated zone and gradually infiltrates into the underlying sand bed, filling the void spaces of the sand. The underdrain gradually dewateres the sand bed and discharges the runoff to a nearby channel, swale, or storm sewer. The PLD provides for filtering, adsorption, and biological uptake of constituents in stormwater<sup>1</sup>. The popularity of PLDs has increased because they allow the WQCV to be provided on a site that has little open area available for stormwater management.

## **PLD-2      INSPECTING POROUS LANDSCAPE DETENTION (PLD)**

### **PLD-2.1   Access and Easements**

Inspection or maintenance personnel may utilize the stormwater facility map located in Appendix G containing the locations of the access points and maintenance easements of the PLDs within this development.

### **PLD-2.2   Stormwater Management Facilities Locations**

Inspection or maintenance personnel may utilize the stormwater facility map located in Appendix G containing the locations of the PLDs within this development.

### **PLD-2.3   Porous Landscape Detention (PLD) Features**

PLDs have a number of features that are designed to serve a particular function. Many times the proper function of one feature depends on another. It is important for maintenance personnel to understand the function of each of these features to prevent damage to any feature during maintenance operations. Below is a list and description of the most common features within a PLD and the corresponding maintenance inspection items that can be anticipated:

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<sup>1</sup> Design of Stormwater Filtering Systems, Centers for Watershed Protection, December 1996

**Table PLD-1**  
**Typical Inspection & Maintenance Requirements Matrix**

	Sediment Removal	Mowing Weed control	Trash/ Debris Removal	Erosion	Overgrown Vegetation Removal	Removal/ Replacement	Structure Repair
Inflow Points	X		X				X
Landscaping	X	X	X	X	X		
Filter Media	X	X	X	X	X	X	
Underdrain System						X	
Overflow Outlet Works	X		X				X
Embankment		X	X	X	X		

#### PLD-2.3.1 Inflow Points

Inflow points or outfalls into PLDs are the point of stormwater discharge into the facility. An inflow point is commonly a curb cut with a concrete or riprap rundown. In limited cases, a storm sewer pipe outfall with a flared end section may be the inflow point into the PLD.

An energy dissipater (riprap or concrete wall) is typically immediately downstream of the discharge point into the PLD to protect the PLD from erosion. In some cases, the storm sewer outfall can have a toe-wall or cut-off wall immediately below the structure to prevent undercutting of the outfall from erosion.

*The typical maintenance items that are required at inflow points are as follows:*

*a. Riprap Displaced* – Many times, because of the repeated impact/force of water, the riprap can shift and settle. If any portion of the riprap rundown or apron appears to have settled, soil is present between the riprap, or the riprap has shifted, maintenance may be required to ensure future erosion is prevented.

*b. Erosion Present/Outfall Undercut* – In some situations, the energy dissipater may not have been sized, constructed, or maintained appropriately and erosion has occurred. Any erosion within the vicinity of the inflow point will require maintenance to prevent damage to the structure(s) and sediment transport within the facility. It is imperative that material utilized to correct erosion

problems within the filter media meets the requirements for filter media as shown on the approved construction drawings.

*d. Sediment Accumulation* – Because of the turbulence in the water created by the energy dissipater, sediment often deposits immediately downstream of the inflow point. To prevent a loss in performance of the upstream infrastructure, sediment that accumulates in this area must be removed on a timely basis.

*e. Structural Damage* – Structural damage can occur at anytime during the life of the facility. Typically, for an inflow, the structural damage occurs to the concrete or riprap rundown or pipe flared end section (concrete or steel). Structural damage can lead to additional operating problems with the facility, including loss of hydraulic performance.

#### PLD-2.3.2 Landscaping

The landscaped area consists of specific plant materials and associated landscaping mulch in the bottom of the PLD. These plantings provide several functions for the PLD. Planting not only provides an aesthetic value for the PLD, but in many cases assists with biological uptake or removal of pollutants.

The plants are carefully selected for use in the PLDs. Plants utilized in PLDs must be able to grow in dry sandy soils but also be able to withstand frequent inundation by stormwater runoff. These plants also must be able to withstand a variety of pollutants commonly found in stormwater runoff. In addition, plants utilized in PLDs cannot have a deep extensive root system that may cause maintenance difficulty or damage to the facility.

*The typical maintenance activities that are required within the landscape areas are as follows:*

*a. Woody Growth/Weeds Present* – Undesirable vegetation can grow in and around the landscaped area in the PLD that can significantly affect the performance of the facility. This type of vegetation includes dense areas of shrubs (willows), grasses and noxious weeds. If undesired vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate, resulting in blockage of the filter media. Also, shrub, grass and weed roots can cause damage to the filter media and underdrain system. Routine management is essential to prevent more extensive and costly future maintenance.

*b. General Landscape Care* – The landscape elements of the PLD are the same as any other landscape area and need to be provided with regular care. Landscape mulch will need to be removed and replaced to ensure the aesthetics of the PLD.

### PLD-2.3.3 Filter Media

The filter media is the main pollutant removal component of the PLD. The filter media consists of 18-inches of a mixture of washed sand and peat. The filter media removes pollutants through several different processes, including sedimentation, filtration, absorption, infiltration and microbial uptake.

Sedimentation is accomplished by the slow release of stormwater runoff through the filter media. This slow release allows sediment particles to be deposited on the top layer of the filter media where they are easily removed through routine maintenance. Other pollutants are also removed through this process because many pollutants utilize sediment as a transport mechanism.

Filtration is the main pollutant removal mechanism of PLDs. When the stormwater runoff migrates down through the filter media, many of the particulate pollutants are physically strained out as they pass through the filter bed of sand and are trapped on the surface or among the pores of the filter media.<sup>2</sup>

Absorption results from the peat utilized in the filter media. Organic materials have a natural ability to attach to soluble nutrients, metals and organic pollutants. This attachment then prevents these pollutants from leaving the PLD.

PLDs that are not lined with an impervious liner allow for infiltration into the native soils. This process also allows for additional pollutant removal.

Microbes that naturally occur in the filter media can assist with pollutant removal by breaking down organic pollutants.

*The typical maintenance activities that are required within the filter media areas are as follows:*

*a. Infiltration Rate Check* – The infiltration rate of the PLD needs to be checked in order to ensure proper functioning of the PLD. Generally, a PLD should drain completely within 12-hours of a

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<sup>2</sup> Design of Stormwater Filtering Systems, Centers for Watershed Protection, December 1996



storm event. If drain times exceed the 12-hour drain time then maintenance of the filter media shall be required.

*b. Sediment Removal* – Although PLDs should not be utilized in areas where large concentrations of sediment may enter the PLD, it is inevitable that some sediment will enter the PLD.

*c. Filter Replacement* - The top layers of the filter media are the most susceptible to pollutant loading and therefore may need to be removed and disposed of properly on a semi-regular basis when infiltration rates slow.

#### PLD-2.3.4 Underdrain System

The underdrain system consists of a layer of geotextile fabric, gravel storage area and perforated PVC pipes. The geotextile fabric is utilized to prevent the filter media from entering the underdrain system. The gravel storage area allows for storage of treated stormwater runoff prior to the discharge of the runoff through the perforated PVC pipe.

*The typical maintenance activities that are for the underdrain system are as follows:*

With proper maintenance of the landscape areas and filter media, there should be a minimum amount of maintenance required on the underdrain system. Generally the only maintenance performed on the underdrain system is jet-vac cleaning.

#### PLD-2.3.5 Overflow Outlet Works

Generally, the initial runoff ("first flush") or WQCV during the storm event contains the majority of the pollutants. PLDs are designed to treat only the WQCV and any amount over the WQCV is allowed to go to a detention facility without water quality treatment. The overflow outlet works allows runoff amounts over the WQCV to exit the PLD to the detention facility. The outlet works is typically constructed of a reinforced concrete box in the embankment of the PLD. The concrete structure typically has a steel grate to trap litter and other debris from entering the storm sewer system. Proper inspection and maintenance of the outlet works is essential in ensuring the long-term operation of the PLD.

*The most typical maintenance items that are found with overflow outlet works are as follows:*

*a. Structural Damage* - The overflow outlet structure is primarily constructed of concrete, which can crack, spall, and settle. The steel grate on the overflow outlet structure is also susceptible to damage.

*b. Woody Growth/Weeds Present* – The presence of plant material not part of the original landscaping, such as wetland plants or other woody growth, can clog the overflow outlet works during a larger storm event, causing flooding damage to adjacent areas. This plant material may indicate a clogging of the filter media and may require additional investigation.

*c. Trash/Debris* – Trash and debris can accumulate in the upper area after large events, or from illegal dumping. Over time, this material can clog the PLD outlet works.

#### PLD-2.3.6 Embankments

Some PLDs utilize irrigated turf grass embankment to store the WQCV.

*The typical maintenance activities that are required with the embankments areas are as follows:*

*a. Vegetation Sparse* – The embankments are one of the most visible parts of the PLD, and therefore aesthetics is important. Adequate and properly maintained vegetation can greatly increase the overall appearance of the PLD. Vegetation can reduce the potential for erosion and subsequent sediment transport to the filter media, thereby reducing the need for more costly maintenance.

*b. Erosion* – Inadequate vegetative cover may result in erosion of the embankments. Erosion that occurs on the embankments can cause clogging of the filter media.

#### PLD-2.3.7 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the PLD. This category on the inspection form is for maintenance items that are commonly found in the PLD, but may not be attributed to an individual feature.

*a. Encroachment in Easement Area* – Private lots/property can sometimes be located very close to the PLDs, even though FLD requires that PLDs be located in tracts with drainage easements. Property owners may place landscaping, trash, fencing, or other

items within the easement area that may affect maintenance or the operation of the facility.

*b. Graffiti/Vandalism* – Vandals can cause damage to the PLD infrastructure. If criminal mischief is evident, the inspector should forward this information to the local Sheriff's Office.

*c. Public Hazards* – Public hazards include items such as containers of unknown/suspicious substances, and exposed metal/jagged concrete on structures. **If any hazard is found within the facility area that poses an immediate threat to public safety, contact the local Sheriff's Office at 911 immediately.**

*d. Other* – Any miscellaneous inspection/maintenance items not contained on the form should be entered here.

#### **PLD-2.4 Inspection Forms**

PLD Inspection forms are located in Appendix D. Inspection forms shall be completed by the person(s) conducting the inspection activities. Each form shall be reviewed and submitted by the property owner or property manager to the Woodmen Hills Metro District per the requirements of the Operations and Maintenance Manual. These inspection forms shall be kept indefinitely and made available to the Woodmen Hills Metro District upon request.

### **PLD-3 MAINTAINING POROUS LANDSCAPE DETENTIONS (PLD)**

#### **PLD-3.1 Maintenance Personnel**

Maintenance personnel must be experienced to properly maintain PLDs. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

#### **PLD-3.2 Equipment**

It is imperative that the appropriate equipment and tools are taken to the field with the operations crew. The types of equipment/tools will vary depending on the task at hand. Below is a list of tools, equipment, and material(s) that may be necessary to perform maintenance on a PLD:

- 1.) Mowing Tractors
- 2.) Trimmers (extra string)
- 3.) Shovels
- 4.) Rakes
- 5.) All Surface Vehicle (ASVs)

- 6.) Skid Steer
- 7.) Back Hoe
- 8.) Track Hoe/Long Reach Excavator
- 9.) Dump Truck
- 10.) Jet-Vac Machine
- 11.) Engineers Level (laser)
- 12.) Riprap (Minimum - Type M)
- 13.) Geotextile Fabric
- 14.) Erosion Control Blanket(s)
- 15.) Sod
- 16.) Illicit Discharge Cleanup Kits
- 17.) Trash Bags
- 18.) Tools (wrenches, screw drivers, hammers, etc)
- 19.) Confined Space Entry Equipment
- 20.) Approved Stormwater Facility Operation and Maintenance Manual
- 21.) ASTM C-33 Sand
- 22.) Peat
- 23.) Wood Landscaping Mulch

Some of the items identified above may not be needed for every maintenance operation. However, this equipment should be available to the maintenance operations crews should the need arise.

### **PLD-3.3 PLD Maintenance Forms**

The PLD Maintenance Form provides a record of each maintenance operation performed by maintenance contractors. The PLD Maintenance Form shall be filled out in the field after the completion of the maintenance operation. Each form shall be reviewed and submitted by the property owner or property manager to the Woodmen Hills Metro District per the requirements of the Operations and Maintenance Manual. The PLD Maintenance form is located in Appendix E.

### **PLD-3.4 PLD Maintenance Categories and Activities**

A typical PLD Maintenance Program will consist of three broad categories of work: Routine, Minor and Major. Within each category of work, a variety of maintenance activities can be performed on a PLD. A maintenance activity can be specific to each feature within the PLD, or general to the overall facility. This section of the SOP explains each of the categories and briefly describes the typical maintenance activities for a PLD.

A variety of maintenance activities is typical of PLDs. The maintenance activities range in magnitude from routine trash pickup to the reconstruction of the PLD filter media or underdrain system. Below is a description of each maintenance activity, the objectives, and frequency of actions:

### **PLD-3.5 ROUTINE MAINTENANCE ACTIVITIES**

The majority of this work consists of scheduled mowings, trash and debris pickups and landscape care for the PLD during the growing season. It also includes activities such as weed control. These activities normally will be performed numerous times during the year. These items do not require any prior approval by WHMD, however, completed inspection and maintenance forms shall be submitted to WHMD for each inspection and maintenance activity.

The Routine Maintenance Activities are summarized below, and further described in the following sections.

**Table PLD-2**  
**Summary of Routine Maintenance Activities**

Maintenance Activity	Minimum Frequency	Look for:	Maintenance Action
<b>Mowing</b>	Twice annually	Excessive grass height/aesthetics	2"-4" grass height
<b>Trash/Debris Removal</b>	Twice annually	Trash & debris in PLD	Remove and dispose of trash/debris
<b>Overflow Outlet Works Cleaning</b>	As needed - after significant rain events – twice annually minimum	Clogged outlet structure; ponding water above outlet elevation	Remove and dispose of debris/trash/sediment to allow outlet to function properly
<b>Weed Control</b>	As needed, based upon inspection	Noxious weeds; Unwanted vegetation	Treat w/herbicide or hand pull; consult a local Weed Inspector

#### PLD-3.5.1 Mowing

Routine mowing of the turf grass embankments is necessary to improve the overall appearance of the PLD. Turf grass should be mowed to a height of 2 to 4- inches and shall be bagged to prevent potential contamination of the filter media.

*Frequency* – Routine - Minimum of twice annually or depending on aesthetics.

#### PLD-3.5.2 Trash/Debris Removal

Trash and debris must be removed from the entire PLD area to minimize outlet clogging and to improve aesthetics. This activity must be performed prior to mowing operations.

*Frequency* – Routine – Prior to mowing operations and minimum of twice annually.

#### PLD-3.5.3 Overflow Outlet Works Cleaning

Debris and other materials can clog the overflow outlet work's grate. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

*Frequency* - Routine – After significant rainfall event or concurrently with other maintenance activities.

#### PLD-3.5.4 Weed Control

Noxious weeds and other unwanted vegetation must be treated as needed throughout the PLD. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with a local Weed Inspector is highly recommended prior to the use of herbicide. Herbicides should be utilized sparingly and as a last resort. All herbicide applications should be in accordance with the manufacturer's recommendations.

*Frequency* – Routine – As needed based on inspections.

#### PLD-3.6 MINOR MAINTENANCE ACTIVITIES

This work consists of a variety of isolated or small-scale maintenance/operational problems. Most of this work can be completed by a small crew, hand tools, and small equipment. These items require approval by WHMD. Completed inspection and maintenance forms shall be submitted to WHMD for each inspection and maintenance period. In the event that the PLD needs to be dewatered, care should be given to ensure sediment, filter material and other pollutants are not discharged. All dewatering activities shall be coordinated with WHMD.

**Table PLD-3**  
**Summary of Minor Maintenance Activities**

Maintenance Activity	Minimum Frequency	Look for:	Maintenance Action
<b>Sediment/Pollutant Removal</b>	As needed; Based on infiltration test	Sediment build-up; decrease in infiltration rate	Remove and dispose of sediment
<b>Erosion Repair</b>	As needed, based upon inspection	Rills/gullies forming on embankments	Repair eroded areas & revegetate; address cause
<b>Jet Vac/Cleaning underdrain system</b>	As needed, based upon inspection	Sediment build-up /non draining system	Clean drains; Jet-Vac if needed

#### PLD-3.6.1 Sediment/Pollutant Removal

Sediment/Pollutant removal is necessary to ensure proper function of the filter media. The infiltration rate of the PLD needs to be checked in order to ensure proper functioning of the PLD. Generally, a PLD should drain completely within 12-hours of a storm event. If drain times exceed the 12-hour drain time then maintenance of the filter media shall be required.

Generally, the top 3-inches of filter media should be removed at each removal period. Additional amounts of filter media may need to be removed if deeper sections of the filter media are contaminated. New filter media will need to replace the removed filter media. It is critical that only sand that meets the American Society for Testing and Materials (ASTM) C-33 standard be utilized in the replacement of the filter media.

#### ASTM C-33 Sand Standard

US Standard Sieve Size (Number)	Total Percent Passing (%)
9.5 mm (3/8 inch)	100
4.75 mm (No. 4)	95-100
2.36 mm (No. 8)	80-100
1.18 mm (No. 16)	50-85
600µm (No. 30)	25-60
300µm (No. 50)	10-30
150µm (No. 100)	2-10



In addition, only Peat Moss that meets the following specifications shall be utilized with the filter media.

<b>pH (Units)</b>	<b>7.6</b>
<b>Total Salts (MMHOS/CM, 1:5)</b>	<b>2.28</b>
<b>Organic Matter (%)</b>	<b>20.22</b>
<b>Moisture (%)</b>	<b>21.43</b>
<b>Dry Matter Basis:</b>	
<b>Nitrogen - Total (%)</b>	<b>0.780</b>
<b>Nitrogen - Organic (%)</b>	<b>0.773</b>
<b>Nitrogen - Ammonia (PPM)</b>	<b>46.8</b>
<b>Nitrogen - Nitrate (PPM)</b>	<b>31.3</b>
<b>Total Phosphorus (%) as P</b>	<b>0.103</b>
<b>(%) as P<sub>2</sub>O<sub>5</sub></b>	<b>0.237</b>
<b>Total Potassium (%) as K</b>	<b>0.138</b>
<b>(%) as K<sub>2</sub>O</b>	<b>0.166</b>
<b>Carbon / Nitrogen Ratio</b>	<b>13.6</b>

Other types of sand or soil material may lead to clogging of the PLD. The minor sediment removal activities can typically be addressed with shovels, rakes, and smaller equipment. Major sediment removal activities will require larger and more specialized equipment. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur. The major sediment removal activities will also require surveying with an engineer's level, and consultation with WHMD Engineering Staff to ensure design volumes/grades are achieved.

Stormwater sediments removed from PLDs do not meet the regulatory definition of "hazardous waste". However, these sediments can be contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a licensed landfill for proper disposal. Should a spill occur during transportation, prompt and thorough cleanup and disposal is imperative.

*Frequency* – Non-routine – As necessary, based upon inspections and infiltration tests. Sediment removal in the forebay and trickle channel may be necessary as frequently as every 1-2 years.

#### PLD-3.6.2 Erosion Repair

The repair of eroded areas is necessary to ensure the proper functioning of the PLD, to minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to filter media and embankments, to rills and gullies in the embankments and inflow points. The repair of eroded areas may require the use of excavators, earthmoving equipment, riprap, concrete, and sod. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur. Major erosion repair to the pond embankments, spillways, and adjacent to structures will require consultation with WHMD Engineering Staff.

*Frequency* – Non-routine – As necessary, based upon inspections.

#### PLD-3.6.3 Jet-Vac/Clearing Drains

A PLD contains an underdrain system that allows treated stormwater runoff to exit the facility. These underdrain systems can develop blockages that can result in a decrease of hydraulic capacity and create standing water. Many times the blockage to this infrastructure can be difficult to access and/or clean. Specialized equipment (jet-vac machines) may be necessary to clear debris from these difficult areas.

*Frequency* – Non-routine – As necessary, based upon inspections.

### **PLD-3.7 MAJOR MAINTENANCE ACTIVITIES**

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires consultation with WHMD Engineering to ensure the proper maintenance is performed. This work requires that Engineering Staff review the original design and construction drawings to assess the situation and assign the necessary maintenance. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

**Table PLD-4**  
**Summary of Major Maintenance Activities**

Maintenance Activity	Minimum Frequency	Look for:	Maintenance Action
<b>Major Sediment/Pollutant Removal</b>	As needed – based upon scheduled inspections	Large quantities of sediment; reduced pond capacity	Remove and dispose of sediment. Repair vegetation as needed
<b>Major Erosion Repair</b>	As needed – based upon scheduled inspections	Severe erosion including gullies forming, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
<b>Structural Repair</b>	As needed – based upon scheduled inspections	Deterioration and/or damage to structural components – broken concrete, damaged pipes & outlet works	Structural repair to restore the structure to its original design
<b>PLD Rebuild</b>	As needed – due to complete failure of PLD	Removal of filter media and underdrain system	Contact WHMD Engineering

**PLD-3.7.1    Major Sediment/Pollutant Removal**

Major sediment removal consists of removal of large quantities of pollutants/sediment/filter media/landscaping material. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur. Some PLDs also contain an impermeable liner that can be easily damage if care is not taken when removing the filter media. Stormwater sediments removed from PLDs do not meet the regulatory definition of “hazardous waste”. However, these sediments can be contaminated with a wide array of organic and inorganic pollutants and handling must be done with care to ensure proper removal and disposal. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a licensed landfill for proper disposal. Should a spill occur during transportation, prompt and thorough cleanup and disposal is imperative. Vegetated areas need special care to ensure design

volumes and grades are preserved or may need to be replaced due to the removal activities.

*Frequency* – Non-routine – Repair as needed, based upon inspections.

#### PLD-3.7.2 Major Erosion Repair

Major erosion repair consists of filling and revegetating areas of severe erosion. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion repair. Care should be given to ensure design grades and volumes are preserved. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur.

*Frequency* – Non-routine – Repair as needed, based upon inspections.

#### PLD-3.7.3 Structural Repair

A PLD generally includes a concrete overflow outlet structure that can deteriorate or be damaged during the service life of the facility. These structures are constructed of steel and concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with WHMD Engineering Staff shall take place prior to all structural repairs.

*Frequency* – Non-routine – Repair as needed, based upon inspections.

#### PLD-3.7.4 PLD Rebuild

In very rare cases, a PLD may need to be rebuilt. Generally, the need for a complete rebuild is a result of improper construction, improper maintenance resulting in structural damage to the underdrain system, or extensive contamination of the PLD. Consultation with WHMD Engineering Staff shall take place prior to any rebuild project.

*Frequency* – Non-routine – As needed based upon inspections.

**POROUS LANDSCAPE DETENTION (PLD)  
INSPECTION FORM**

Date: \_\_\_\_\_

Subdivision/Business Name: \_\_\_\_\_ Inspector: \_\_\_\_\_

Subdivision/Business Address: \_\_\_\_\_

Weather: \_\_\_\_\_

Date of Last Rainfall: \_\_\_\_\_ Amount: \_\_\_\_\_ Inches

**Property Classification:** Residential   Multi Family   Commercial   Other: \_\_\_\_\_  
(Circle One)

**Reason for Inspection:** Routine   Complaint   After Significant Rainfall Event  
(Circle One)

**INSPECTION SCORING** - For each facility inspection item, insert one of the following scores:  
0 = No deficiencies identified                      2 = Routine maintenance required  
1 = Monitor (potential for future problem)      3 = Immediate repair necessary  
N/A = Not applicable

**FEATURES**

**1.) Inflow Points**

- \_\_\_\_ Rip Rap Displaced/Rundown or Pipe Damage
- \_\_\_\_ Erosion Present/Outfall Undercut
- \_\_\_\_ Sediment Accumulation
- \_\_\_\_ Structural Damage

**2.) Filter Media**

- \_\_\_\_ Infiltration Rate Check
- \_\_\_\_ Sediment Removal
- \_\_\_\_ Filter Replacement

**3.) Landscaping**

- \_\_\_\_ Woody Growth/Weeds Present
- \_\_\_\_ General Landscape Care

**4.) Underdrain System**

- \_\_\_\_ Evidence of clogged system  
(jet-vac cleaning required)

**6.) Embankments**

- \_\_\_\_ Vegetation Sparse
- \_\_\_\_ Erosion Present

**5.) Overflow Outlet Works**

- \_\_\_\_ Structural Damage
- \_\_\_\_ Woody Growth/Weeds Present
- \_\_\_\_ Trash/Debris

**7.) Miscellaneous**

- \_\_\_\_ Encroachment in Easement Area
- \_\_\_\_ Graffiti/Vandalism
- \_\_\_\_ Public Hazards
- \_\_\_\_ Other

Inspection Summary / Additional Comments: \_\_\_\_\_

**OVERALL FACILITY RATING (Circle One)**

- 0 = No Deficiencies Identified                      2 = Routine Maintenance Required
- 1 = Monitor (potential for future problem exists)      3 = Immediate Repair Necessary

This inspection form shall be kept indefinitely and made available to the Woodmen Hills Metro District upon request.

**POROUS LANDSCAPE DETENTION (PLD)  
MAINTENANCE FORM**

Subdivision/Business Name: \_\_\_\_\_ Completion Date: \_\_\_\_\_  
Subdivision/Business Address: \_\_\_\_\_ Contact Name: \_\_\_\_\_

**Maintenance Category:**                      Routine                      Restoration                      Rehabilitation  
(Circle all that apply)

**MAINTENANCE ACTIVITIES PERFORMED**

**ROUTINE WORK**

- \_\_\_ MOWING
- \_\_\_ TRASH/DEBRIS REMOVAL
- \_\_\_ OUTLET WORKS CLEANING (TRASH RACK/WELL SCREEN)
- \_\_\_ WEED CONTROL (HERBICIDE APPLICATION)

**RESTORATION WORK**

- \_\_\_ SEDIMENT REMOVAL
  - \_\_\_ INFLOW POINT
  - \_\_\_ OUTLET WORKS
  - \_\_\_ FILTER MEDIA
- \_\_\_ EROSION REPAIR
  - \_\_\_ INFLOW POINT
  - \_\_\_ EMBANKMENTS
  - \_\_\_ OUTLET WORKS
- \_\_\_ REVEGETATION
  - \_\_\_ EMBANKMENTS
- \_\_\_ JET-VAC/CLEARING DRAINS
  - \_\_\_ OUTLET WORKS
  - \_\_\_ INFLOWS
  - \_\_\_ UNDERDRAIN SYSTEM

**REHABILITATION WORK**

- \_\_\_ SEDIMENT REMOVAL (DREDGING)
  - \_\_\_ FILTER MEDIA
  - \_\_\_ INFLOW POINT
- \_\_\_ EROSION REPAIR
  - \_\_\_ OUTLET WORKS
  - \_\_\_ EMBANKMENTS
  - \_\_\_ BOTTOM STAGE
- \_\_\_ STRUCTURAL REPAIR
  - \_\_\_ INFLOW
  - \_\_\_ OUTLET WORKS
  - \_\_\_ FILTER MEDIA

OTHER \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ESTIMATED TOTAL MANHOURS: \_\_\_\_\_

EQUIPMENT/MATERIAL USED: \_\_\_\_\_

COMMENTS/ADDITIONAL INFO: \_\_\_\_\_

This Maintenance Activity Form shall be kept indefinitely and made available to the Woodmen Hills Metro District upon request.

Annual Inspection and Maintenance Reporting Form  
for  
Stormwater Facilities

*(This form to be submitted to WHMD prior to May 31 of each year)*

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

**To: Woodmen Hills Metro District**  
**Attn: Stormwater Facility Operations and Maintenance Program**  
**8046 Eastonville Rd.**  
**Falcon, CO 80831**

**Re: Certification of Inspection and Maintenance; Submittal of forms**

Property/Subdivision Name: \_\_\_\_\_

Property Address: \_\_\_\_\_

Contact Name: \_\_\_\_\_

I verify that the required stormwater facility inspections and required maintenance have been completed in accordance with the Stormwater Facilities Maintenance Agreement and the Operations and Maintenance Manual associated with the above referenced property.

The required Stormwater Facility Inspection and Maintenance forms are hereby provided.

\_\_\_\_\_  
Name of Party Responsible for Inspection  
& Maintenance

\_\_\_\_\_  
Property Owner

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Signature