PRIVATE INFILTRATION BASIN /

STORMWATER QUALITY BEST MANAGEMENT PRACTICE

MAINTENANCE AGREEMENT AND EASEMENT

This PRIVATE INFILTRATION 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 ANDRII VARKO (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) 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 develop on the Property a land use to be known as Varko Storage Solutions; 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 land use on Developer's promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices ("BMPs") for the 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 infiltration 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 land use 3 infiltration basins/stormwater quality BMP(s) ("infiltration 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 infiltration basin/BMP(s); and

I. WHEREAS, Developer desires to construct the infiltration basin/BMP(s) on property that is legally described in Exhibit A, attached hereto; and

J. WHEREAS, Developer shall be charged with the duties of constructing, operating, maintaining and repairing the infiltration basin/BMP(s) on the Property described in Exhibit A; 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 infiltration basins/BMPs, and that these infiltration 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 infiltration 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 infiltration basin/BMP(s) serving this land use due to the Developer's failure to meet its obligations to do the same; and

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

N. WHEREAS, the County could condition this 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's promises contained herein; and

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

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 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 the Property described in Exhibit A attached hereto and incorporated herein by this reference, 3 infiltration basin/BMP(s). Developer shall not commence construction of the infiltration basin/BMP(s) until the El Paso County Planning and Community Development Services Department (PCD) has approved in writing the plans and specifications for the infiltration basin/BMP(s) and this Agreement has been signed by all Parties and returned to the PCD. Developer shall complete construction of the infiltration basin/BMP(s) in substantial compliance with the County-approved plans and specifications for the infiltration 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 infiltration 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 infiltration basin/BMP(s) must be completed and inspected by the PCD 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 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 agrees, for itself and its successors and assigns, that it will regularly and routinely inspect, clean and maintain the infiltration basin/BMP(s) in compliance with the County-reviewed Operation and Maintenance Manual, attached hereto as Exhibit B and incorporated herein by reference, 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 infiltration basin/BMP(s) shall be planted or allowed to grow on the infiltration basin/BMP(s).

5. Creation of Easement: Developer hereby grants the County a non-exclusive perpetual easement upon and across that the Property described in Exhibit A. The purpose of the easement is to allow the County to access, inspect, clean, repair and maintain the infiltration 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 infiltration basin/BMP(s).

6. County's Rights and Obligations: Any time the County determines, in the sole exercise of its discretion, that the infiltration basin/BMP(s) is not properly cleaned, maintained and/or otherwise kept in good repair, the County shall give reasonable notice to the Developer and its successors and assigns, that the infiltration basin/BMP(s) needs to be cleaned, maintained and/or otherwise repaired. The notice shall provide a reasonable time to correct the problems. Should the responsible parties fail to correct the specified problems, the County may enter upon the Property to so correct the specified problems. 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 infiltration basin/BMP(s).

7. Reimbursement of County's Costs / Covenant Running with the Land: The Developer 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 infiltration 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'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: Developer 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 infiltration 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, 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 infiltration 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 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, 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 _____ day of _____, 20___, by:
Andrii Varko

By: _____
Andrii Varko, Owner

The foregoing instrument was acknowledged before me this _____ day of _____, 20___, by Andrii Varko, Owner.

Witness my hand and official seal.

My commission expires: _____

_____
Notary Public

Executed this _____ day of _____, 20___, by:

BOARD OF COUNTY COMMISSIONERS
OF EL PASO COUNTY, COLORADO

By: _____
Christina Prete, Stormwater Operations & Compliance Manager
Engineering Division, Department of Public Works
Designee of Joshua Palmer, County Engineer
Authorized signatory pursuant to Resolution No. 24-145

The foregoing instrument was acknowledged before me this _____ day of _____, 20___, by _____, Stormwater Operations & Compliance Manager, El Paso County Department of Public Works.

Witness my hand and official seal.

My commission expires: _____

_____
Notary Public

Approved as to Content and Form:

_____
Assistant County Attorney

EXHIBIT A: LEGAL DESCRIPTION

THE NORTH ONE-HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 10, TOWNSHIP 14 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN, EXCEPTING THERFROM THE WESTERLY 30 FEET FOR CURTIS ROAD, IN EL PASO COUNTY, COLORADO.

EXHIBIT B: Operation and Maintenance Manual

Standard Operation Procedures
for
Inspection and Maintenance
of
Infiltration Area Basin(s)

1185 N CURTIS RD - RV/Mixed Storage Park SDP

(Adapted from the El Paso County EDB O&M manual template)

Owner:
ANDRII VARKO

El Paso County Department of Public Works 3275 Akers Drive
Colorado Springs, CO 80922
dotweb@elpasoco.com 719-520-6900

Introduction

This plan addresses operation and maintenance of public detention / water quality facilities (**Infiltration Area S, Infiltration Area N, and Infiltration Area N2**) constructed as part of the **RV & Mixed Storage** development project to the east of N Curtis Rd **(EPC PCD projects number(s): 2319). The plat number of the RV/Mixed Storage Park is 4410000052.**

Background

The State of Colorado Department of Public Health and Environment, Water Quality Control Division (CDPHE), has implemented federal regulations within the State of Colorado through permitting, and has included El Paso County as one of numerous Municipal Separate Storm Sewer Systems (MS4s) required to be permitted in compliance with National Pollutant Discharge Elimination System (NPDES) Phase 2 Regulations, as defined within Colorado's Phase 2 Municipal Guidance.

NPDES Phase 2 MS4s stormwater discharges are covered under a general permit under the Colorado Discharge Permit System (CDPS) under Regulation 61, and as a minimum require the MS4's operator (e.g., El Paso County) to develop, implement, and enforce a stormwater management program to reduce the discharge of pollutants to the maximum extent practicable to protect water quality requirements of the Colorado Water Quality Control Act, Colorado Code of Regulations [CCR] 61.8(11)(a)(i)).

This Stormwater Facilities Operation and Maintenance Plan (O&M Plan) is for public subregional infiltration facilities (**Infiltration Area S, Infiltration Area N, and Infiltration Area N2**) constructed as part of the development project referenced above.

Associated Agreements

The Subdivision Improvements Agreement (SIA) for the development (recorded at Reception No. 4410000052) required the developer to complete Infiltration Areas N, N2 and S public improvements as itemized in the associated Financial Assurance Estimate (FAE).

The SIA indemnifies the County from any losses or damages caused by overtopping or spillage from the detention ponds located within the subdivision.

The SIA allowed the developer to defer payment of drainage basin fees because the construction costs of Infiltration Areas N, N2 and S would exceed the drainage basin fees due, and to recover the construction costs exceeding the drainage basin fees due from the basin fund.

The SIA and FAE require as-built plans and certification of completion of the detention facilities in general conformance with the approved construction drawings.

Prior to final County acceptance of the Infiltration Areas N, N2 and S facilities, approval of a Letter of Map Revision (LOMR) by FEMA is required.

Funding for and Organization of Facility Operation and Maintenance

Andrii Varko or active property owner will be responsible for operations and maintenance of the Infiltration Areas N, N2 and S infiltration facilities upon acceptance of the facilities.

Site and Facilities Description

1) The infiltration areas are located on the north and south property line at the low points of the property.
2) The Infiltration Areas N, N2 and S are built of 3:1 native grass vegetated slopes and a gabion structure retaining wall and must be maintained from sediment build up that reduces its volume.

3) Outflow also occurs at the infiltration areas from percolation though the soil slope and through the gabion wall along the entire length of the wall.
4) Infiltration Area S is 3 feet deep while Infiltration Area N his 2 feet deep and N2 is 1 foot deep.

Infiltration Area Basin (IAB) Description

The subsections below describe general IAB operations and maintenance.

IAB-1 GENERAL IAB CONCEPT

Infiltration Area Basins (IABs) are a common type of permanent stormwater control measure utilized within the Front Range of Colorado. The stormwater facilities within this development function as infiltration basins designed to detain runoff and promote infiltration into underlying soils. The basins are shallow, with typical depths ranging from 2 to 3 feet, and are designed to fully drain through infiltration and controlled seepage within the required drain time.

Side slopes are constructed at 3H:1V and are stabilized with grassed soil cover to minimize erosion and facilitate infiltration and maintenance access. One basin side includes a gabion retaining wall, which provides structural support for the slope while also allowing stormwater seepage through the soil slope and void spaces within the gabion baskets.

The basins are intended to remain dry between storm events, with no permanent pool of water.

IAB-2 INSPECTING INFILTRATION AREA BASINS (IABs)

IAB-2.1 Access and Easements

Inspection and maintenance personnel may utilize the stormwater facility map in the FDR or Drainage Plan containing the location(s) of the access points and maintenance easements of the IAB(s) within this development. The IAB can be accessed from any side (3:1 slope) with excavator or track loader or by foot.

IAB-2.2 Stormwater Management Facilities Locations

Inspection and maintenance personnel may utilize the attached stormwater facility map in the FDR or Drainage Plan containing the location(s) of the access points and maintenance easements of the IAB(s) within this development.

IAB-2.3 Infiltration Area Basin (IAB) Features

IABs have a number of features that are designed to serve a particular function. Many times, the proper function of one feature depends on another. For example, if the grass cover of the area is not properly maintained, it could negatively affect the performance of the infiltration capacity, slope stability, and percolation.

Therefore, it is critical that each feature of the IAB is properly inspected and maintained to ensure that the overall facility functions as it was intended. Below is a list and description of the most common features within an IAB and the corresponding maintenance inspection items that can be anticipated:

Table IAB-1: Typical Inspection & Maintenance Requirements Matrix

IAB Features	Sediment Removal	Mowing/ Weed Control	Trash & Debris Removal	Erosion	Over- grown Vegetation Removal	Standing Water (mosquito/ algae control)	Structure Repair
Inflow Points (outfalls)	X		X	X			X
Perimeter	X		X				
Slopes	X	X	X	X	X		X
Bottom Stage	X	X	X	X	X	X	
Micropool	X		X		X	X	X
Gabion Wall				X			X
Wall Base	X		X	X	X		X
Gabion Wire							X
Embankment		X		X	X		

IAB-2.3.1 Inflow Points

Inflow points or outfalls into Infiltration Areas/Basins (IABs) are the locations where stormwater runoff enters the facility. Inflow points are typically storm sewer pipes with flared end sections that discharge into the basin. In some cases, inflow may occur from a stabilized drainage swale, channel, or overland flow path designed to convey runoff into the infiltration basin.

Energy dissipation measures, such as riprap aprons or other hard armor protection, are provided immediately downstream of inflow points to reduce flow velocities and prevent erosion of basin soils. In some instances, the storm sewer outfall may include a toe wall or cut-off wall beneath the structure to prevent undercutting and maintain long-term structural stability.

Because infiltration basins rely on permeable soils and controlled surface conditions, proper maintenance of inflow points is critical to preventing erosion, sediment transport, and clogging of basin soils.

Typical inspection and maintenance items associated with inflow points include the following:

a. Riprap Displaced – Many times, because the repeated impact/force of water, the riprap can shift and settle. If any portion of the riprap 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.

c. 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 hydraulic performance of the upstream infrastructure, sediment that accumulates in this area must be removed in a timely manner.

d. Structural Damage – Structural damage can occur at any time during the life of the facility. Structural damage can lead to additional operating problems with the facility, including loss of hydraulic performance.

e. Woody Growth/Weeds Present – Undesirable vegetation can grow in and around the inflow area to an IAB that can significantly affect the performance of the

drainage facilities discharging into the facility. This type of vegetation includes trees (typically cottonwoods) and dense areas of shrubs (willows). If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate, resulting in blockage of the infiltration. Also, tree roots can cause damage to the structural components of the inflow. Routine maintenance is essential for trees (removing a small tree/sapling is much cheaper and "quieter" than a mature tree). In addition, noxious weeds growing in the facility can result in the loss of desirable native vegetation and impact adjacent open spaces/land.

IAB-2.3.2 Gabion Basket Walls (Infiltration and Stabilization Feature)

Gabion basket walls are incorporated within the infiltration basins to provide slope stabilization, erosion control, and controlled stormwater conveyance while allowing infiltration through the void spaces between the stone fill. The gabion baskets are designed to be permeable structures that dissipate energy, support soil slopes, and promote infiltration without creating a hard, impervious barrier.

Routine inspection and maintenance of gabion baskets are critical to ensure both structural integrity and continued infiltration performance of the basin.

Typical inspection and maintenance items associated with gabion basket walls include the following:

a. Basket Deformation or Bulging – Gabion baskets shall be inspected for bulging, sagging, or distortion of the wire mesh, which may indicate internal stone migration, foundation settlement, or excessive loading. Minor deformation shall be monitored, while significant deformation shall be evaluated and repaired to prevent structural failure.

b. Wire Mesh Damage or Corrosion – Inspect baskets for broken wires, torn mesh, corrosion, or loosening of connections. Damaged wire mesh may allow stone loss and reduce structural stability. Any compromised sections shall be repaired or replaced in accordance with the original design specifications.

c. Stone Loss or Voids – Gabion baskets shall be inspected for missing stone, excessive voids, or uneven stone distribution. Stone loss can reduce the effectiveness of the wall and create preferential flow paths that may cause localized erosion. Missing or displaced stone shall be replaced with appropriately sized material.

d. Sediment Clogging of Voids – Because gabion baskets are intended to allow stormwater seepage, accumulation of fine sediments within the void spaces may reduce infiltration capacity. Inspect the face and interior of the gabions for sediment buildup. If clogging is observed, sediment shall be removed using hand tools or low-pressure washing methods that do not damage the baskets or underlying soils.

e. Vegetation Growth Within Baskets – Vegetation may establish within gabion voids over time. While limited shallow-rooted vegetation may be acceptable, woody vegetation or deep-rooted plants shall be removed to prevent displacement of stone, deformation of baskets, and blockage of infiltration pathways.

f. Toe Undermining or Settlement – Inspect the base of the gabion wall for evidence of undermining, scour, or settlement. Loss of support at the toe may compromise wall stability and shall be repaired promptly by restoring grade, replacing stone, and stabilizing adjacent soils.

g. Adjacent Soil Erosion – Areas immediately upstream and downstream of gabion baskets shall be inspected for erosion, rilling, or washout. Erosion adjacent to the gabion wall may indicate concentrated flows or inadequate energy dissipation and shall be corrected to protect both the wall and basin soils.

IAB-2.3.3 Basin Bottom and Sides (Infiltration Zone)

The basin bottom within the infiltration area functions as the primary infiltration surface and temporary storage zone for stormwater runoff. Basin depths are shallow, typically ranging from 2 to 3 feet, and are designed to detain runoff long enough to allow infiltration into underlying soils without creating a permanent pool of water. The basin bottom is generally graded to promote uniform ponding and infiltration and is stabilized with vegetated or amended soil surfaces.

The infiltration basin is intended to fully drain between storm events, and prolonged standing water is not anticipated under normal operating conditions.

The typical maintenance items that are found with the basin bottom are as follows:

a. *Sediment and Debris Accumulation* – Fine sediments and debris may accumulate on the basin bottom over time, potentially reducing infiltration capacity by sealing soil pores. Accumulated sediment shall be removed when it begins to form a visible surface layer or when infiltration performance is noticeably reduced.

b. *Surface Sealing or Soil Compaction* – Repeated storm events or maintenance activities may compact soils or create a hardened surface crust that inhibits infiltration. Indicators include prolonged ponding, hardened soil surfaces, or sparse vegetation. Corrective actions may include scarification, soil amendment, or partial replacement of the basin bottom soils.

c. *Vegetation Condition and Weed Growth* – Vegetation shall be inspected for vigor, uniform coverage, and suitability. Woody vegetation and deep-rooted plants shall be removed to prevent interference with infiltration and potential damage to adjacent structures. Noxious weeds shall be controlled to preserve desirable ground cover and maintain basin function.

d. *Localized Erosion or Rilling* – Minor erosion, rills, or depressions may occur due to concentrated inflows or uneven drainage patterns. Any erosion shall be repaired promptly to maintain uniform infiltration and prevent sediment transport to lower portions of the basin.

e. *Prolonged Ponding* – Standing water persisting longer than 72 hours after a storm event may indicate reduced infiltration capacity or clogged soils. If prolonged ponding is observed, the basin bottom shall be evaluated and maintenance actions implemented to restore infiltration performance.

IAB-2.3.4 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the IAB. This category on the inspection form is for maintenance items that are commonly found in the IAB 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 IABs, even though they are required to 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* – Damage to the IAB infrastructure can be caused by vandals. 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 vertical drops of greater than 4-feet, containers of unknown/suspicious substances, 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 Sheriff at 911 immediately!

d. *Burrowing Animals/Pests* – Prairie dogs and other burrowing rodents may

cause damage to the IAB features and negatively affect the vegetation within the IAB. Consult EPC Environmental Division if this becomes an issue.

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

IAB-3 MAINTAINING INFILTRATION AREA BASINS (IABS)

IAB-3.1 Maintenance Personnel

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

IAB-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 an IAB:

1.) Loppers/Tree Trimming Tools
2.) Mowing Tractors
3.) Trimmers (extra string)
4.) Shovels
5.) Rakes
6.) All Surface Vehicle (ASVs)
7.) Skid Steer
8.) Backhoe
9.) Track Hoe/Long Reach Excavator
10.) Dump Truck
11.) Jet-Vac Machine
12.) Engineers Level (laser)
13.) Riprap (Minimum - Type M)
14.) Filter Fabric
15.) Erosion Control Blanket(s)
16.) Seed Mix (Native)
17.) Illicit Discharge Cleanup Kits
18.) Trash Bags
19.) Tools (wrenches, screw drivers, hammers, etc.)
20.) Chain Saw
21.) Confined Space Entry Equipment
22.) Approved Stormwater Facility Operation and Maintenance Manual

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.

IAB-3.3 Safety

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 IAB that is greater than 48” in height, make the appropriate note/comment on the maintenance inspection form.

IAB-3.4 Maintenance Categories and Activities

A typical IAB Maintenance Program will consist of three broad categories of work: routine, minor,

and major maintenance activities. Within each category of work, a variety of maintenance activities can be performed on an IAB. A maintenance activity can be specific to each feature within the IAB, or general to the overall facility. A variety of maintenance activities are typical of IABs. The maintenance activities range in magnitude from routine trash pickup to the reconstruction of drainage infrastructure. The following three sub-sections (3.5, 3.6, and 3.7) explain each of the categories and briefly describes the typical maintenance activities for an IAB, including the objectives and frequency of actions.

IAB-3.5 Routine Maintenance Activities

The majority of this work consists of regularly scheduled mowing 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 structure. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities will normally be performed numerous times during the year. These items can be completed without any prior correspondence with the EPC Stormwater; however, completed inspection and maintenance forms shall be retained for each inspection and maintenance activity.

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

TABLE – IAB-2 Summary of Routine Maintenance Activities

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR	MAINTENANCE ACTION
Mowing	Twice annually	Excessive grass height/aesthetics	Mow grass to a height of 4” to 6”
Trash/Debris Removal	Twice annually	Trash & debris in IAB	Remove and dispose of trash and debris
Gabion Wall Inspection	As needed – after significant rain events – twice annually at a minimum	Structural Damage, Rusting, Erosion	Remove and dispose of debris/trash/sediment and correct any structural issues
Weed control	Minimum twice annually	Noxious weeds; Unwanted vegetation	Treat w/ herbicide or hand pull; Consult the local weed specialist
Mosquito Treatment	As needed	Standing water/ mosquito habitat	Treat w/ EPA approved chemicals
Algae Treatment	As needed	Standing water/ Algal growth/green color	Treat w/ EPA approved chemicals

IAB-3.5.1 Mowing

Occasional mowing is necessary to limit unwanted vegetation and to improve the overall appearance of the IAB. Native vegetation should be mowed to a height of 4-to-6 inches tall. Grass clippings should be collected and disposed of properly.

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

IAB-3.5.2 Trash/Debris Removal

Trash and debris must be removed from the entire IAB area to minimize 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.

IAB-3.5.3 Gabion Wall Inspection

Inspection activities shall include removal of trash, sediment, and excessive vegetation from gabion faces and voids, and verification that baskets remain properly aligned, intact, and free of displacement

or undermining. Any observed damage, deformation, or clogging that may impair infiltration or structural stability shall be addressed promptly.

Frequency – Routine – After significant rainfall events and concurrently with other scheduled maintenance activities.

IAB-3.5.4 Weed Control

Noxious weeds and other unwanted vegetation must be treated as needed throughout the IAB. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with the Environmental Division at 719-520-7878 is highly recommended prior to the use of herbicide.

Frequency – Routine – As needed based on inspections.

IAB-3.5.5 Mosquito/Algae Treatment

Treatment of permanent pools is necessary to control mosquitoes and undesirable aquatic vegetation that can create nuisances. Only EPA approved chemicals/materials can be used in areas that are warranted.

Frequency – As needed.

IAB- 3.6 Minor Maintenance Activities

This work consists of a variety of isolated or small-scale maintenance or operational problems. Most of this work can be completed by a small crew, tools, and small equipment. These items may require prior correspondence with EPC Stormwater and require completed inspection and maintenance forms to be submitted to EPC upon request for each inspection and maintenance activity.

Table – IAB-3 Summary of Minor Maintenance Activities

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR	MAINTENANCE ACTION
Sediment Removal	As needed; typically, every 1–2 years	Sediment build-up; decrease in pond volume	Remove and dispose of sediment
Erosion Repair	As needed, based upon inspection	Rills/gullies forming on side slopes, trickle channel, other areas	Repair eroded areas Revegetate; address source of erosion
Vegetation Removal/Tree Thinning	As needed, based upon inspection	Large trees/wood vegetation in lower stage of pond	Remove vegetation; restore grade and surface
Gabion Cleaning (Jet/Vac)	As needed, based upon inspection	Sediment build-up/ non draining system	Clean rocks; Jet Vac if needed

IAB-3.6.1 Sediment Removal

Sediment removal is necessary to maintain the original design volume of the IAB and to ensure proper function of the infrastructure. Regular sediment removal (minor) from the forebay, inflow(s), and trickle channel can significantly reduce the frequency of major sediment removal activities (dredging) in the upper and lower stages. The minor sediment removal activities can typically be addressed with shovels and smaller equipment. Major sediment removal activities will require larger and more specialized equipment. The major sediment activities will also require surveying with an engineer's level, and consultation with EPC Stormwater Staff to ensure design volumes/grades are achieved.

Stormwater sediments removed from IABs do not meet the criteria of "hazardous waste". However, these

sediments are contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments from permanent pools must be carefully removed to minimize turbidity, further sedimentation, or other adverse water quality impacts. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a landfill for proper disposal. Prompt and thorough cleanup is important should a spill occur during transportation.

Frequency – Nonroutine – As necessary based upon inspections. Sediment removal in the forebay and trickle channel may be necessary as frequently as every 1-2 years.

IAB-3.6.2 Erosion Repair

The repair of eroded areas is necessary to ensure the proper function of the IAB, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to trickle channels, energy dissipaters, and rilling to major gullies in the embankments and spillways. The repair of eroded areas may require the use of excavators, earthmoving equipment, riprap, concrete, erosion control blankets, and turf reinforcement mats. Major erosion repair to the basin embankments, and adjacent to structures will require consultation with EPC Stormwater Staff.

Frequency – Nonroutine – As necessary based upon inspections.

IAB-3.6.3 Vegetation Removal/Tree Thinning

Dense stands of woody vegetation (willows, shrubs, etc) or trees can create maintenance problems for the infrastructure within an IAB. Tree roots can damage structures and invade pipes/channels thereby blocking flows. Also, trees growing in the upper and lower stages of the IAB will most likely have to be removed when sediment/dredging operations occur. A small tree is easier to remove than a large tree, therefore, regular removal/thinning is preferred. All trees and woody vegetation that is growing in the bottom of the IAB or near structures (gabion wall) should be removed. Any trees or woody vegetation in the IAB should be limited to the upper portions of the pond banks.

Frequency – Nonroutine – As necessary based upon inspections.

IAB-3.6.4 Clearing Jet-Vac

An IAB contains gabion structures that can be clogged with debris. These blockages can result in a decrease of hydraulic capacity and create standing water in areas outside of the micropool. Often 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 – Nonroutine – As necessary based upon inspections.

IAB-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 EPC Stormwater Staff to ensure the proper maintenance is performed. This work requires that the staff review the original design and construction drawings to assess the situation and assign the necessary maintenance. **An ESQCP permit may be required for major maintenance activities.** This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

Table – IAB-4 Summary of Major Maintenance Activities

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR	MAINTENANCE ACTION
Major Sediment Removal	As needed – based upon scheduled inspections	Large quantities of sediment; reduced basin capacity	Remove and dispose of sediment. Repair vegetation as needed
Major Erosion Repair	As needed – based upon scheduled inspections	Severe erosion including gullies, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
Structural Repair	As needed – based upon scheduled inspections	Deterioration and/or damage to structural components – gabion wall	Structural repair to restore the structure to its original design

IAB-3.7.1 Major Sediment Removal

Major sediment removal consists of removal of large quantities of sediment or removal of sediment from vegetated areas. Care shall be given when removing large quantities of sediment and sediment deposited in vegetated areas. Large quantities of sediment need to be carefully removed, transported and disposed of. Vegetated areas need special care to ensure design volumes and grades are preserved.

Frequency – Nonroutine – Repair as needed based upon inspections.

IAB-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.

Frequency – Nonroutine – Repair as needed based upon inspections.

IAB-3.7.3 Structural Repair

An IAB includes gabion structures that can deteriorate or be damaged during the course of routine maintenance. These structures are constructed of steel wire and rocks that can degrade or be damaged and may need to be repaired or re-constructed from time to time.

In-house operations staff can perform some of the minor structural repairs. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with EPC Stormwater Staff should take place prior to all structural repairs.

Frequency – Nonroutine – Repair as needed based upon inspections.

Reference:

This manual is adapted from SEMSWA and the Town of Parker, Colorado, *STORMWATER PERMANENT BEST MANAGEMENT PRACTICES (PBMP) LONG-TERM OPERATION AND MAINTENANCE MANUAL*, October 2004

For additional resources and contact info, visit the EPC Stormwater website:
https://publicworks.elpasoco.com/stormwater/