

Private Detention Pond (PDB)
BMP's for Operations & Maintenance

The proposed Northcrest Center Development includes an Extended Detention Basin (EDB) Detention Pond. In El Paso County, property owners are responsible for implementing stormwater best management practices (BMPs). The Drainage Criteria Manual, Volume 2, requires that the County take measures to protect the quality of stormwater from sediment and other contaminants, requires sub-dividers, 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 developments or significant redevelopment. The development application process with El Paso County addresses BMPs to ensure proper functioning and to limit any potential on-site impacts or impacts to adjacent properties.

The Northcrest Center Development proposes one on-site EDB on the site (See project design documents). The proposed EDB is located on the south-easterly side of the site near the intersection of Constitution Avenue and Canada Drive. The owner, K&S Development LLC, will be responsible for constructing, maintaining, operating, repairing, and decommissioning the EDB according to BMPs.

An EDB is a sedimentation basin designed to totally empty out sometime after a stormwater event ends. Detention ponds are designed to release all captured runoff over time, and do not allow for permanent pooling of water. These basins are typically smaller than flood control basins and use a smaller outlet to extend emptying times for more frequent runoff events, thereby facilitating pollutant and sediment control. The EDB for this development is a dry basin and should not hold water on a regular basis.

The Applicant will coordinate with El Paso County prior to the construction of any detention basin and secure approval from the El Paso County Planning and Community Development Department (PCD) regarding final plans and specifications for the private detention basin through the Site Plan Review or other formal process with the County. Construction timeframes will follow the construction schedule of the Northcrest Center Development project with a duration not expected to exceed one year from beginning of construction.

Following construction, the EDB shall be inspected to ensure that stormwater management complies with specifications put forward in the Site Plan Review and other applicable regulations such as the El Paso County Drainage Criteria Manual.

Maintenance shall be included in the general operations and maintenance actions for the Northcrest Center Development project. Formal inspections will take place at a minimum of once a year. Visual checks of the EDB will likely take place multiple times throughout the year alongside other maintenance actions such as site cleaning and landscaping activities. Inspection actions and BMPs for maintaining the EDB shall follow the checklist and Table 1 guidance as attached to the end of this document. Most of the maintenance work can be completed by a small crew, hand tools, and small equipment.

Rehabilitation activities are not included in this document. Rehabilitation is defined as large-scale maintenance and major improvements to address failures and should be addressed as-needed and alongside County guidance.

Table 1: Best Management Practices for Extended Detention Ponds

Maintenance Action	Maintenance Objective	Frequency of Action
Inspections	Inspect basins to ensure basins are functioning as intended (in compliance with El Paso County Drainage Manuals 1 & 2). Examine outlet for vegetation height, structural integrity, clogging, excessive sedimentation, pests, invasive species, embankment, and any damage. Inspections will follow County protocols and site checklist for topics below.	Routine - annual basis specifically for the drainage features. However, inspection will also take place alongside routine maintenance visits, particularly observing structural integrity and clogging.
Mowing and Vegetation Treatment	Mowing to control grass height and unwanted vegetation in the feature. Establish general continuity with grass height elsewhere on site. Ensure that no trees or shrubs will impair structural integrity. Detrius will be removed from basin during mowing as necessary to prevent clogging. A healthy vegetative cover will be targeted across the basin.	Routine - alongside site inspection
Debris and Litter Removal	Remove debris from the feature to minimize potential for clogging. Also helps with general aesthetics.	Routine. Particular attention will be made in advance of rainy months (April-May). Removal will also take place following significant rain or debris events. Sediment removal will take place when basin is dry.
Erosion and Sediment Control	Repair and revegetate eroded areas on slope of features.	On an ad-hoc basis as determined by inspection. Sediment removal is expected to take place a number of times during the life of the facility.
Structural Repair	Repair inlets, outlets, forebays, low flow channel liners, and other features when damage is discovered	On an ad-hoc basis as determined by inspection.
Nuisance Control	Address any problems posed by species establishment in and around features. Treat any invasive species by hand pulling or herbicide - consultant Weed Management Plan and County weed specialist.	On an ad-hoc basis as determined by inspection.

Detention Ponds Checklist

Frequency	Drainage System Feature	Date				Problem	Conditions to Check For	Conditions That Should Exist
		✓	✓	✓	✓			
M,S	General					Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size garbage can). In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
A	General					Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local weed board) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
M,S	General					Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants	No contaminants or pollutants present. (Coordinate removal/cleanup with local water quality response agency).
M	General					Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
M	General					Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
A	General					Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies.
A	General					Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood).

Detention Ponds Checklist (Continued)

Frequency	Drainage System Feature	Date				Problem	Conditions to Check For	Conditions That Should Exist
		✓	✓	✓	✓			
							trees are not interfering with access or maintenance, do not remove	
A	General						If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Remove hazard Trees
M	Side Slopes of Pond					Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.
M,S	Side Slopes of Pond						Any erosion observed on a compacted berm embankment.	If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.
M	Storage Area					Sediment	Accumulated sediment that exceeds 10% (typically 6" to 12") of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
M	Storage Area					Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
A	Pond Berms (Dikes)					Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
A	Pond Berms (Dikes)					Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.

Detention Ponds Checklist (Continued)

Frequency	Drainage System Feature	Date				Problem	Conditions to Check For	Conditions That Should Exist
		✓	✓	✓	✓			
A	Emergency Overflow/ Spillway					Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration.
A	Emergency Overflow/ Spillway					Emergency Overflow/ Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.

Key:

(M) Monthly from November through April.

(A) Once in late summer (preferably September)

(S) After any major storm (use 1-inch in 24 hours as a guideline).

Extended detention basins have low to moderate maintenance requirements. Routine and nonroutine maintenance is necessary to assure performance, enhance aesthetics, and protect structural integrity. The dry basins can result in nuisance complaints if not properly designed or maintained. Bio-degradable pesticides may be required to limit insect problems. Frequent debris removal and grass-mowing can reduce aesthetic complaints. If a shallow wetland or marshy area is included, mosquito breeding and nuisance odors could occur if the water becomes stagnant. Access to critical elements of the pond (inlet, outlet, spillway, and sediment collection areas) must be provided. The basic elements of the maintenance requirements are presented in the following table.

Required Action	Maintenance Objective	Frequency of Action
Lawn Mowing & Lawn Care	Occasional mowing to limit unwanted vegetation. Maintain irrigated turf grass as 2 to 4 inches tall and nonirrigated native turf grasses at 4 to 6 inches.	Routine – Depending on aesthetic requirements.
Debris & Litter Removal	Remove debris and litter from the entire pond to minimize outlet clogging and improve aesthetics.	Routine – Including just before annual storm seasons (that is, April and May) and following significant rainfall events.
Erosion & Sediment Control	Repair and revegetate eroded areas in the basin and channels.	Nonroutine – Periodic and repair as necessary based on inspection.
Structural	Repair pond inlets, outlets, forebays, low flow channel liners, and energy dissipators whenever damage is discovered.	Nonroutine – Repair as needed based on regular inspections.

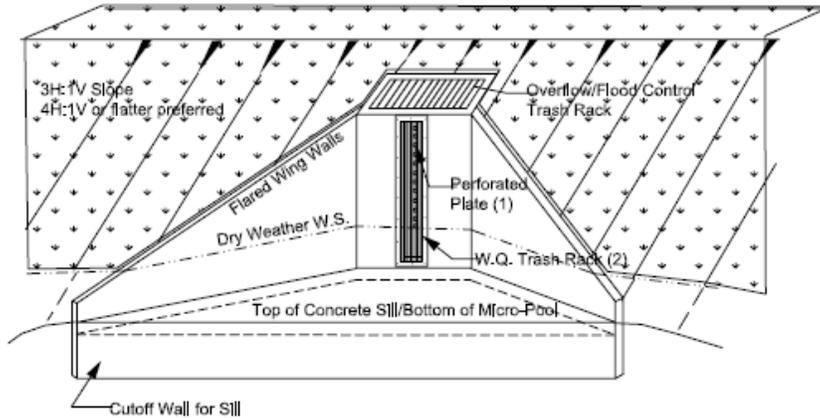
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Required Action	Maintenance Objective	Frequency of Action
Inspections	Inspect basins to insure that the basin continues to function as initially intended. Examine the outlet for clogging, erosion, slumping, excessive sedimentation levels, overgrowth, embankment and spillway integrity, and damage to any structural element.	Routine – Annual inspection of hydraulic and structural facilities. Also check for obvious problems during routine maintenance visits, especially for plugging of outlets.
Nuisance Control	Address odor, insects, and overgrowth issues associated with stagnant or standing water in the bottom zone.	Nonroutine – Handle as necessary per inspection or local complaints.
Sediment Removal	Remove accumulated sediment from the forebay, micro-pool, and the bottom of the basin.	Nonroutine – Performed when sediment accumulation occupies 20 percent of the WQCV. This may vary considerably, but expect to do this every 10 to 20 years, as necessary per inspection if no construction activities take place in the tributary watershed. More often if they do. The forebay and the micro-pool will require more frequent cleanout than other areas of the basin, approximately every 3 to 6 months until the concrete liners are constructed. After each concrete liner is constructed, slightly less frequent cleanout will be required, approximately every 1 or 2 years.

Control Structure/Flow Restrictor

Control structures/flow restrictors are located on the outlet pipe of a detention system. The control structure is typically a concrete catch basin with a riser. The control structure reduces the discharge rate of stormwater from a detention facility. The flow is regulated by a combination of orifices (holes with specifically sized diameters) and weirs (plates with rectangular or vee shaped notch).

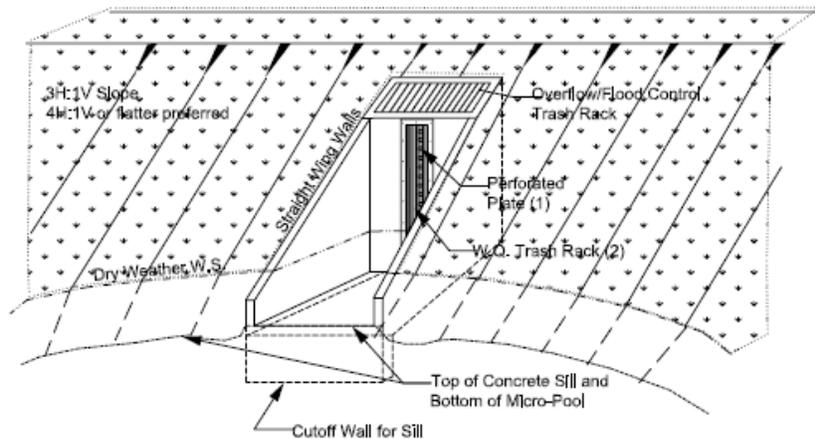
Lack of maintenance of the control structure can result in the plugging of an orifice. This can result in flooding of the stormwater system and/or an increase in the rate of discharge from the site potentially damaging downstream property.



Notes:

- (1) Mounted to the back of the headwall
- (2) Mounted to the front of the headwall

Perspective View of a Standardized Water Quality Outlet with Flared Wing Walls



Notes:

- (1) Mounted to the back of the headwall
- (2) Mounted to the front of the headwall

Perspective View of a Standardized Water Quality Outlet with Straight Wing Walls

Control Structure/Flow Restrictor Checklist

Frequency	Drainage System Feature	Date				Problem	Conditions to Check For	Conditions That Should Exist
		✓	✓	✓	✓			
M	General					Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
A	General					Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
A	General					Structural Damage	Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
A	General					Structural Damage	Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
A	General					Structural Damage	Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
A	Cleanout Gate					Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
A	Cleanout Gate					Damaged or Missing	Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
A	Cleanout Gate					Damaged or Missing	Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
A	Cleanout Gate					Damaged or Missing	Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
A	Orifice Plate					Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
M,S	Orifice Plate					Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
	Overflow Pipe					Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
A	Manhole					Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.

Control Structure/Flow Restrictor Checklist (Continued)

Frequency	Drainage System Feature	Date				Problem	Conditions to Check For	Conditions That Should Exist
		✓	✓	✓	✓			
A	Manhole					Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
A	Manhole					Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
A	Manhole					Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.

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