

RETENTION PONDS

for stormwater detention and water quality management

[RETENTION] as a flood control practice:

Holding areas that do not have an outlet to release captured water. Water captured in a retention pond evaporates or infiltrates into underlying soils to restore pre-event capacity.

[RETENTION] as a water quality practice:

Facilities that consist of a permanent pool that does not drain between events and a surcharge pool that fills and drains over 12 hours. Also known as “wet ponds.”

SOURCE: Armando Icoy, unsplash.com

what are the ISSUES WITH RETENTION?

- There may be existing retention facilities in Commerce City due to the lack of outfalls in some watersheds. Retention is typically implemented to allow development without requiring construction of outfalls.
- Unlike qualified detention facilities, retention facilities are subject to administration by the State and Division Engineer. Retaining stormwater runoff requires water rights and an approved plan for augmentation to make up for evaporative losses. This applies to flood control and water quality applications. Whether there are water rights associated with existing retention facilities in Commerce City is unknown; however, it is believed that facilities within the City may lack adequate water rights for retaining (storing) and replacing evaporation from the facilities.
- Due to the design and construction of a retention facility (i.e., no outlet, limited or partial pond liner, lack of beneficial use of water), it is possible that Commerce City will be unable to obtain a storage water right for a retention facility. This would increase the City's augmentation obligations.
- Obtaining a water right(s) for a retention facility can be very costly, including a Plan for Augmentation, and the administration of that water right(s) will result in ongoing costs including but not limited to all costs associated with maintenance, operation, accounting, and repair obligations.
- Because retention ponds do not have outlets, back-to-back runoff events have the potential to exceed capacity and affect surrounding areas.
- Good drainage policy dictates that development should not be allowed without an outfall to drain runoff to the nearest receiving water. The Policy and Principles chapter of the Mile High Flood District's (MHFD) *Urban Storm Drainage Criteria Manual* states that “[t]he stormwater management system should be designed beginning with the outlet or point of outflow from the project, giving full consideration to downstream effects and the effects of off-site flows entering the system. The downstream conveyance system should be evaluated to ensure that it has sufficient capacity to accept design discharges without adverse upstream or downstream impacts such as flooding, stream bank erosion, and sediment deposition.”
- Retention ponds may cause groundwater “mounding” that results in an elevated water table that can affect foundations and basements of nearby structures.
- Some retention ponds are designed with infiltration through the bottom of the pond as the “outlet.” This may work as intended initially, but over the long term, infiltration capacity will be reduced due to plugging of the pond bottom with fine sediments that are transported in stormwater runoff. Restoring infiltration capacity at a minimum is very expensive and in some cases infeasible.

ADVANTAGES & DISADVANTAGES

of retention as a stormwater management practice

ADVANTAGES	DISADVANTAGES
Allows for development in areas without outfalls	Postpones construction of outfalls. Allowing development to occur without an adequate outfall can result in unintended flooding and/or requirements for pumped drainage that are costly and less reliable than gravity drainage to an outfall. Violates principle that there must be adequate downstream conveyance to allow upstream development
Effective as a water quality practice	Water rights are required (regardless of whether the facility is used for water quality or flood control)
Open water surface enhances aesthetics and may provide habitat for wildlife	May attract waterfowl, which can degrade water quality due to nutrients and bacteria. Can also increase the potential for aircraft bird strikes if the retention facility is located near an airport
Can be converted to detention at a future date when an outfall is available	Potential for problems associated with stagnation (e.g., mosquitos, algae, odor)
--	May be an attractive nuisance if accessible by the public. Can be a drowning hazard unless safety benches are incorporated
--	If infiltration is used as “outlet,” rates are not likely sustainable for the long term and maintenance to restore infiltration capacity is complicated and expensive
--	Potential legal implications. Retrofitting a detention facility is usually very expensive. Water rights are required for retention facilities until they are converted to qualified detention facilities



SOURCE: Patricia Flood, Wright Water Engineers, Inc.





QUESTIONS *for* INPUT

- Should retention be allowed as a flood control practice in Commerce City?
 - If so, what criteria or restrictions should apply (e.g., temporary measure only, need for clear overflow path, freeboard requirements, demonstrate adequate water rights, etc.)?
- Should retention be allowed as a water quality practice in Commerce City?
- Is implementation of retention as a "temporary" measure realistic?
 - How far in the future before outfalls are constructed?
 - How can Commerce City assure that retention facilities are converted to detention (fill-and-drain) facilities when an outfall is available?
 - What water rights would be used during the temporary period as a retention facility?
- Does Commerce City have a means to bringing any existing retention facilities into compliance with water rights requirements?
- How should the City's policy for retention be related to the policy addressing outfalls?

ATTACHMENTS

- Excerpts from the MHFD Urban Storm Drainage Criteria Manual
- Colorado Revised Statute 37-92-602(8) Frequently Asked Questions
- Map of Retention Ponds in Commerce City