

HDR



On-Site Water Quality Treatment Banking

Getting your most Bang for your Buck

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01 Charlotte's Growth in Aviation

02 Regulations for
Airfield Development

03 Balancing Regulations, Operations,
and Maintenance

04 WQ Trading Strategies



01

Charlotte's Growth in Aviation

Passenger Growth – Airfield Growth

- 44 Million Passengers in 2014 – 2% increase over 2013
- 2.9 Million Passengers overseas in 2014 – 4% increase over 2013
- 132,000 Tons of Air Cargo in 2014 – 2% increase over 2013
- 545,000 Takeoffs and Landings
- 6th busiest airport in nation (operations)
- 2nd largest hub to American Airlines
- Third Parallel Runway opened in 2009



Recent Entry to Full Scale Stormwater Management

- Third Parallel Runway and Intermodal Complex
 - Impacts to WOTUS trigger need for WQ BMPs
 - Charlotte Detention Ordinance



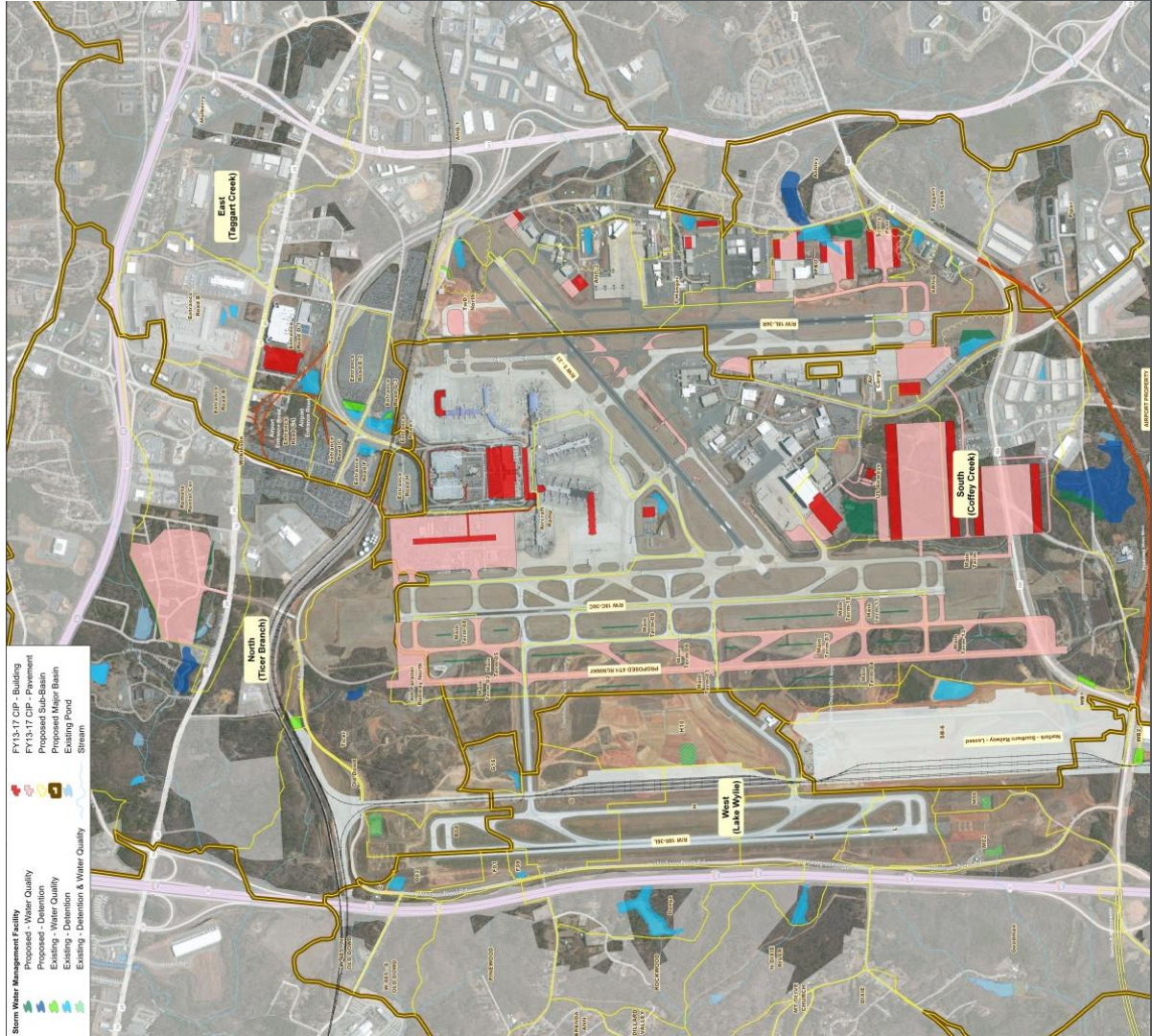
Recent Entry to Full Scale Stormwater Management

- Third Parallel Runway and Intermodal Complex
 - Treatment Train Solution
 - Extended Dry Detention, Filter Strips, Infiltration Basins, Retrofit Farm Pond, Grass Swales, Pavement Sweeping



Supporting Growth

- 380 Acres of new impervious area
 - Fourth Runway
 - Expanded Air Cargo
 - Terminal Expansions
 - Remote Rental Car Facility





U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

02 Regulations for Airfield Development

Water Quality Regulations

- Post Construction Controls
 - Charlotte's Water Quality Regulations
 - Water Quality Storm – 1 inch rainfall
 - Recent State Regulations for Airfield Exemption
 - Sheet flow exemption applies to runways and taxiways only
 - Charlotte Detention Rules still apply



FAA Design Criteria

- Advisory Circular 150/5200-33B (Hazardous Wildlife Attractants on or Near Airports)
 - 5,000 ft. – Piston Powered Aircraft
 - 10,000 ft. – Turbine Powered Aircraft
 - Maximum 48 hours drawdown on SWMF

Table 1. Ranking of 25 species groups as to relative hazard to aircraft (1=most hazardous) based on three criteria (damage, major damage, and effect-on-flight), a composite ranking based on all three rankings, and a relative hazard score. Data were derived from the FAA National Wildlife Strike Database, January 1990–April 2003.¹

Species group	Ranking by criteria			Composite ranking ²	Relative hazard score ³
	Damage ⁴	Major damage ⁵	Effect on flight ⁶		
Deer	1	1	1	1	100
Vultures	2	2	2	2	64
Geese	3	3	6	3	55
Cormorants/pelicans	4	5	3	4	54
Cranes	7	6	4	5	47
Eagles	6	9	7	6	41
Ducks	5	8	10	7	39

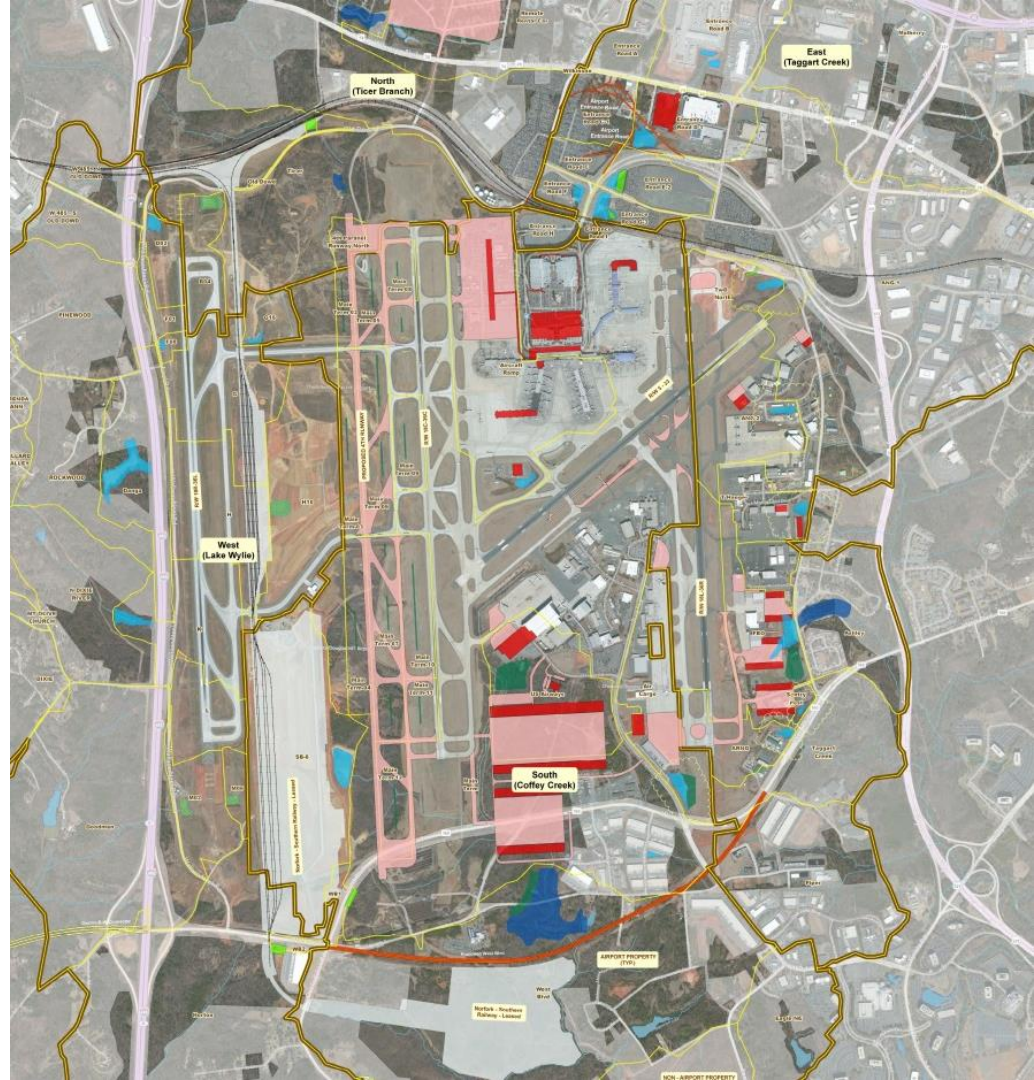




03 Balancing Regulations, Operations, and Maintenance

Charlotte Airport's 1st Stormwater Master Plan

- 10 year window of development
 - Fourth Runway
 - Expanded Terminal
 - Remote Rental Car Facility
 - Expanded Air Cargo
 - Expanded General Aviation
- Integrate PCCO and FAA Regulations
 - Water Quality
 - Detention
 - Limited Surface Storage
- Pre-dates NC rules on airfield exemption



SWMP Goals

- **Apply regional approach to BMP siting**
 - Rather than on a project-by-project basis
 - Manage by Watershed
- **More efficient use of space**
- **Meet FAA rules on storage**
- **Establish preliminary sizing**
 - WQ Volume (1 inch storm)
 - » 85% TSS
 - » 70% P
 - Detention
 - » 2-yr and 10-year 6-hour storm
 - » up to 25 year if downstream impact is not considered

Storm Water Master Plan



Charlotte•Douglas
INTERNATIONAL AIRPORT

Prepared by
HDR
HDR Project No. 174401

March 2013

General Aviation Area

- Part of the Taggart Creek Watershed
- Proposed projects
 - Taxiway Extension
 - FBO and GA expansion
- Existing Detention Facility being displaced
- New WQ and Detention BMPs



Watershed Management

- Multiple Outfalls from Airport Property
- Over 18 acres of land needed for WQ Treatment

Table 4 - Impervious Calculations and Water Quality Volumes

Basin	Sub Basin	Proposed Impervious (ac)	Existing Impervious to be Redeveloped (ac)	Existing to be Treated (ac)	Total* (ac)	Required Water Quality Surface Area** (ac)
North (Tiger Branch)	Fourth Parallel Runway North	3.6	0.1	0.0	3.7	0.1
	Remote Rental Car Facility	43.5	5.0	0.0	48.5	1.9
	Air Cargo	11.1	0.0	43.0	54.1	2.1
South (Coffey Creek)	Main Term ***	102.8	12.9	0.0	115.7	4.6
	US Airways	69.1	4.8	14.0	87.8	4.0
	Main Term 2-12	72.0	2.7	23.6	98.4	3.9
East (Taggart Creek) ****	ANG-1	1.8	0.1	0.0	1.9	
	ANG-2	3.0	0.6	0.0	3.5	
	ARNG	0.9	0.0	0.0	0.9	
	FBO	22.6	7.2	24.5	54.3	2.1
	T Hanger	0.3	0.5	0.0	0.8	
	TwD - North	1.2	0.0	0.0	1.2	
Totals		331.9	33.9	105.1	470.9	18.7

* Assumes non-impervious runoff is bypassed.

** Assumes sand filter or infiltration trench BMPs with 2 feet of storage.

*** Existing impervious is being treated in Main Term's drainage basin in lieu of creating a larger basin near West Boulevard. Includes treatment of proposed impervious in aircraft ramp sub-basin.

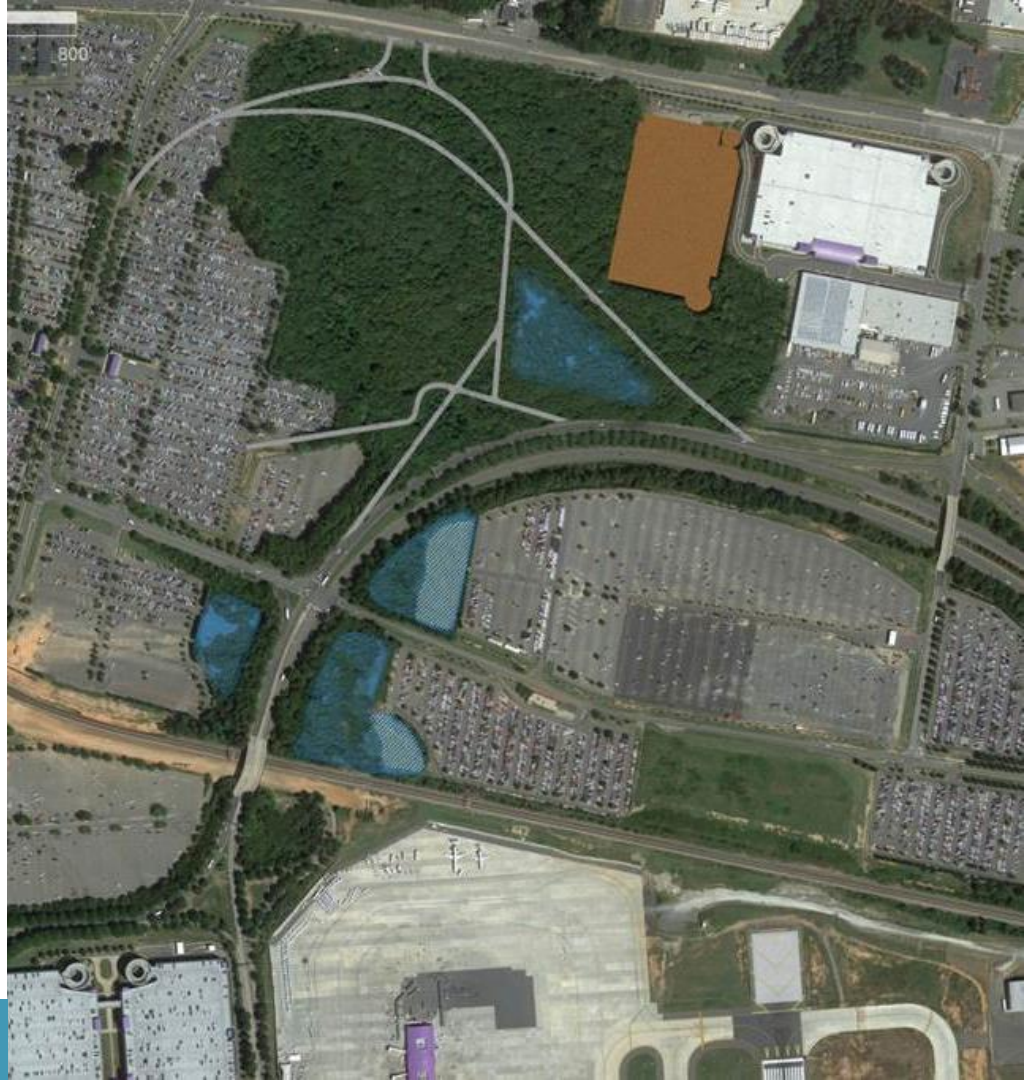
**** East (Taggart Creek) treatment is proposed in its entirety at the FBO BMP. Only 13.6 ac of existing impervious needs to be treated, but there is a total of 24.5 ac of existing impervious that is able to reach the FBO BMP.



04 Water Quality Trading

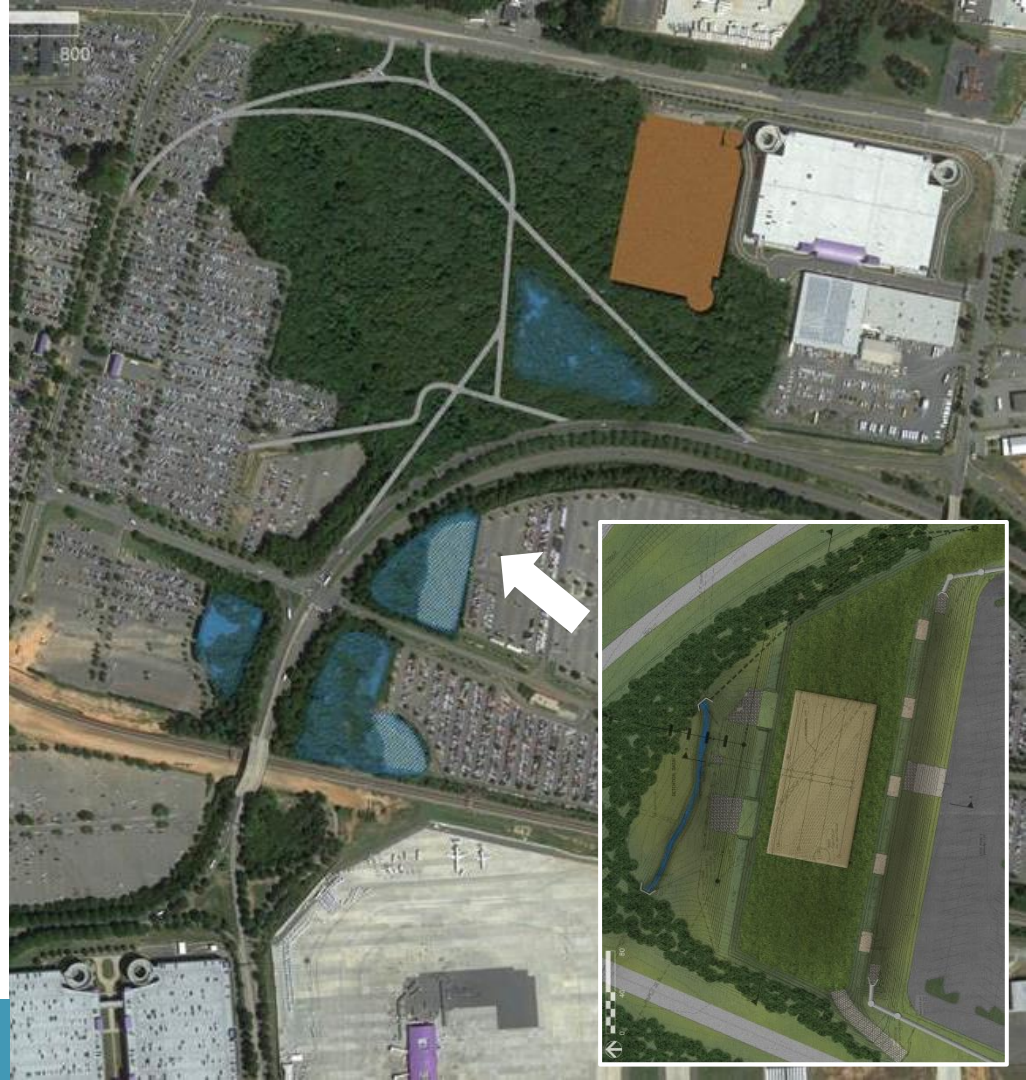
Trading Strategy

- Treat existing impervious area
- Reduce the number of BMPs
- Maintain treatment within common watershed
- Track WQ Volume by Watershed



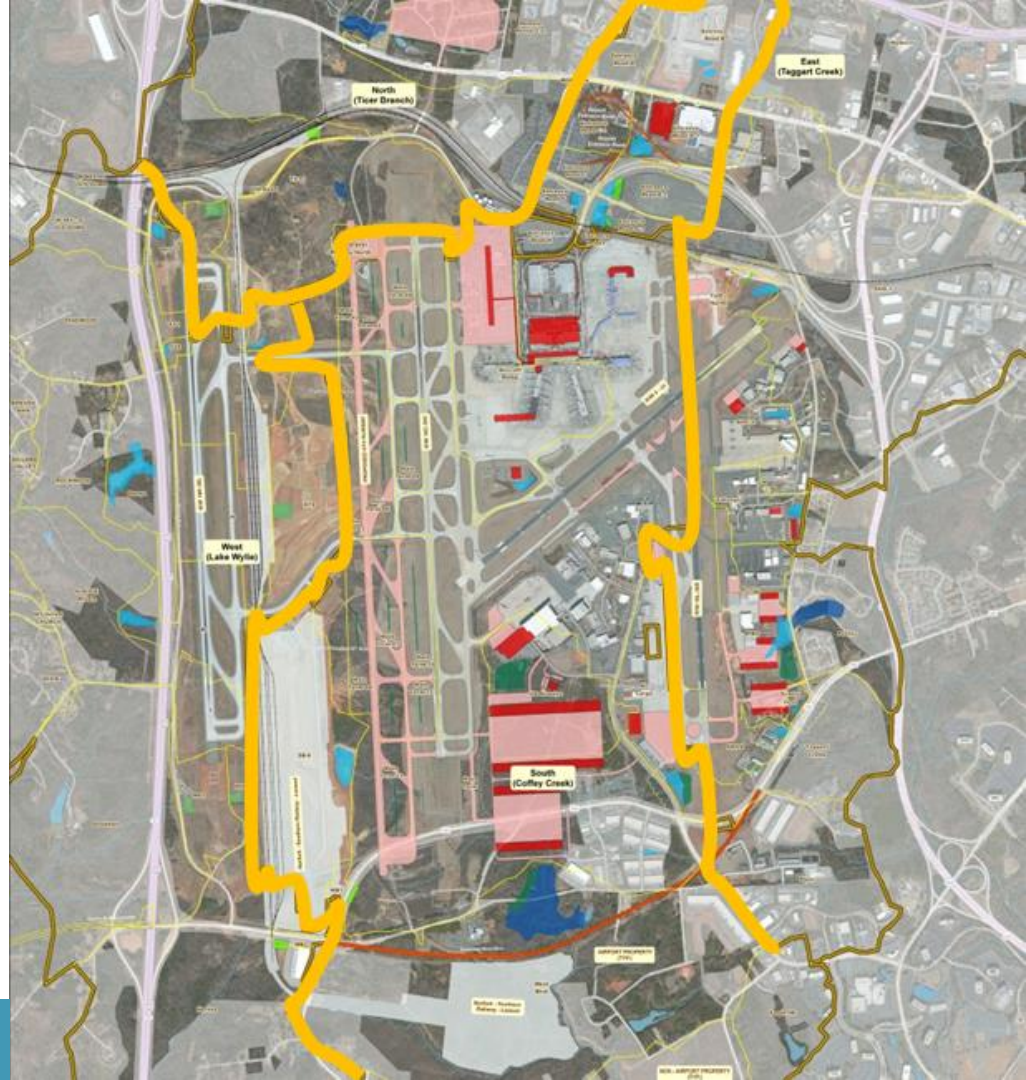
Trading Strategy

- Airport Entrance Road Project
 - New roadway surfaces
 - New Business Valet Parking Deck
 - Expansion of Long Term Parking Surface Lot
 - New impervious area spread out



Trading within Watersheds

- Four Watersheds
 - Coffey Creek - South
 - Lake Wylie - West
 - Ticer Branch - North
 - Taggart Creek – East
- Water Quality not outfall dependent
- Detention may be outfall dependent
 - Consider downstream impacts
- Banking of credits for future projects
 - Excess treatment volume



Air Cargo BMP

- 80 acres of drainage
 - 60% existing impervious
 - Proposed Ramp Expansion and new building
 - Part of Coffey Creek Watershed
 - Existing Detention Basin targeted for retrofits



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- 80 acres of drainage
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 - Part of Coffey Creek Watershed
 - Existing Detention Basin targeted for retrofits
- Proposed Strategy
 - Satisfy Detention for sub-basin development
 - Oversize Water Quality
 - New FAA Control Tower (FY16)
 - Ramp A Expansion (FY16)
 - Other future projects?



Value of WQ Trading

- Reduces the number of BMPs
 - Preserves land for revenue generation
 - Reduces maintenance
 - Allows for better selection of BMPs to increase efficiencies
- Challenges
 - Larger BMPs to maintain
 - Consequences of poor performing BMPs
 - Tracking requirements to avoid duplication or omissions

	Peak Attenuation	TSS Removal Efficiency	TN Removal Efficiency	TP Removal Efficiency	Fecal Removal Ability	Potential to heat stormwater
Bioretention without IWS	Possible	85%	35%	45%	High	Med
Bioretention with IWS <i>Coastal Plain & Sand Hills</i>	Possible	85%	60%	60%	High	Med
Bioretention with IWS <i>Piedmont & Mountains</i>	Possible	85%	40%	45%	High	Med
Stormwater wetlands	Yes	85%	40%	40%	Med	High
Wet detention basin	Yes	85%	25%	40%	Med	High
Sand filter	Possible	85%	35%	45%	High	Med
Filter strip	Some	40%	30%	35%	Med	Low
Grassed swale	No	0-35%	0-20%	0-20%	Low	Low
Restored riparian buffer	No	60%	30%	35%	Med	Low
Infiltration devices	Yes	85%	30%	35%	High	Low
Dry extended detention basin	Yes	50%	10%	10%	Med	Med
Permeable pavement <i>Infiltrating system</i>	Yes	85%	30%	60%	High	Low
Permeable pavement <i>Detention system</i>	Yes	70-85%	10%	10%	Med	Med
Rooftop runoff management	Possible	0%	0%	0%	Low	Med







Thank you!

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