

# **Watershed Protection Ordinance (WPO): Stakeholder Meeting Structural Stormwater Controls Part 1**

**February 3, 2012**



# Meeting Objective

**Identify existing challenges and potential improvements in Austin's code & criteria for structural flood & water quality controls.\***

**\* Commonly known as stormwater "ponds." But not all have a pond form.**

# Meeting Agenda

- **Introductions [5 min.]**
- **Staff Presentation [40 min.]**
  - **Structural Control History/Background**
  - **Lessons Learned/Potential Topics of Discussion**
- **Small-Group Breakout Sessions [60 min.]**
  - **Potential opportunities & challenges**
- **Full Group Wrap-Up [15 min.]**
  - **Summary of opportunities & challenges**

# **Topics of Discussion**

## **1. Today's Meeting**

- General feedback: current code & criteria**

## **2. February 17 Meeting**

- Targeted Staff & Stakeholder topics:  
e.g., maintenance & regulatory challenges**

## **3. March 2 Meeting**

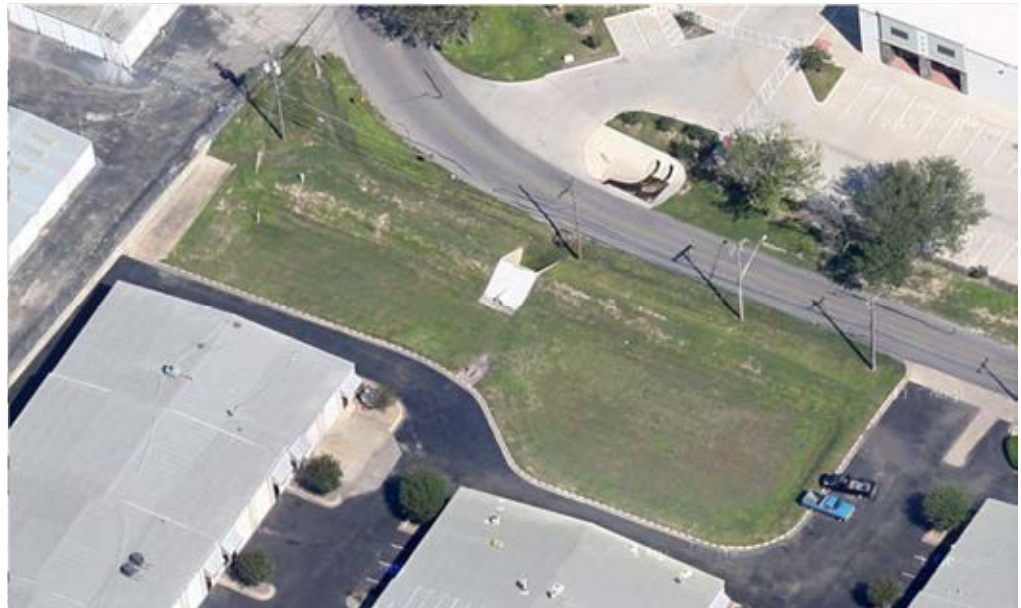
- Green Infrastructure**



# What are structural controls?

Devices designed to temporarily store or treat stormwater runoff in order to mitigate flooding, erosion, and/or pollution by:

- **Detention**
- **Filtration**
- **Retention**
- **Infiltration**



# **Watershed Protection Strategies for Land Development**

- 1. Site Selection** **[Where in Austin]**
  - Watershed classifications
  - Drinking Water Protection vs. Desired Development Zones
- 2. Development Intensity** **[How Much on Site]**
  - Impervious Cover Limits; Zoning; Utility Service Extensions
- 3. Development Placement** **[Where on Site]**
  - Stream & CEF Setbacks\*; Steep Slope Limits;  
Cut & Fill Limits; Tree Protections; Floodplain Rules
- 4. Hydrologic & Hydraulic Rate/Volume** **[Runoff]**
  - Structural Flood & Water Quality Controls

\* CEF = Critical Environmental Feature (e.g., springs, wetlands, karst recharge features)

# Development Impacts

- Addition of impervious cover (IC), compaction of soils, & greater drainage efficiency results in:
  - **Increase in runoff rates**
  - **Increase in runoff volumes**
  - **Increase in frequency of runoff events**
  - **Increase in pollutant exports**
  - **Decrease in baseflow volumes & aquifer recharge**

# **Impervious Cover and Runoff**

## **Avg. Annual Conversion of Total Rainfall to Runoff**

<b>Imperv. Cover Pct.</b>	<b>Avg. Annual Runoff</b>	<b>Ratio to Undeveloped (5% IC)</b>	<b>Typical Land Use</b>
5%	4%	1.0	Open/Preserve
20%	14%	3.3	Low-Density SFR
40%	29%	7.1	Single-Family Res.
60%	48%	11.4	Multifamily Res.
80%	69%	16.4	Commercial/Office

Source: Derived from Barrett et al., CRWR, 1998. | SFR = Single-Family Residential



# **Evolution of Structural Controls**

- **No controls/Wild West**
- **Focus on flooding**
- **Focus on sediment in water**
- **Focus on additional pollutants**
  - **especially nutrients & toxics**
- **Focus on runoff volume**
- **Focus on stream channel stability**
- **Focus on mimicking hydrologic cycle**

# **Major Structural Stormwater Control Milestones**

- **Flood Detention & Criteria (1974, 1977)**
- **Early WQ Controls (1980)**
- **Comprehensive Watershed Ordinance (1986)**
- **Environmental Criteria Manual (1988)**
- **Non-Degradation Controls (1991)**
- **Half-Inch-Plus WQ Control Sizing (1993)**
- **Innovative Water Quality Controls (2007)**

# Types of Structural Controls

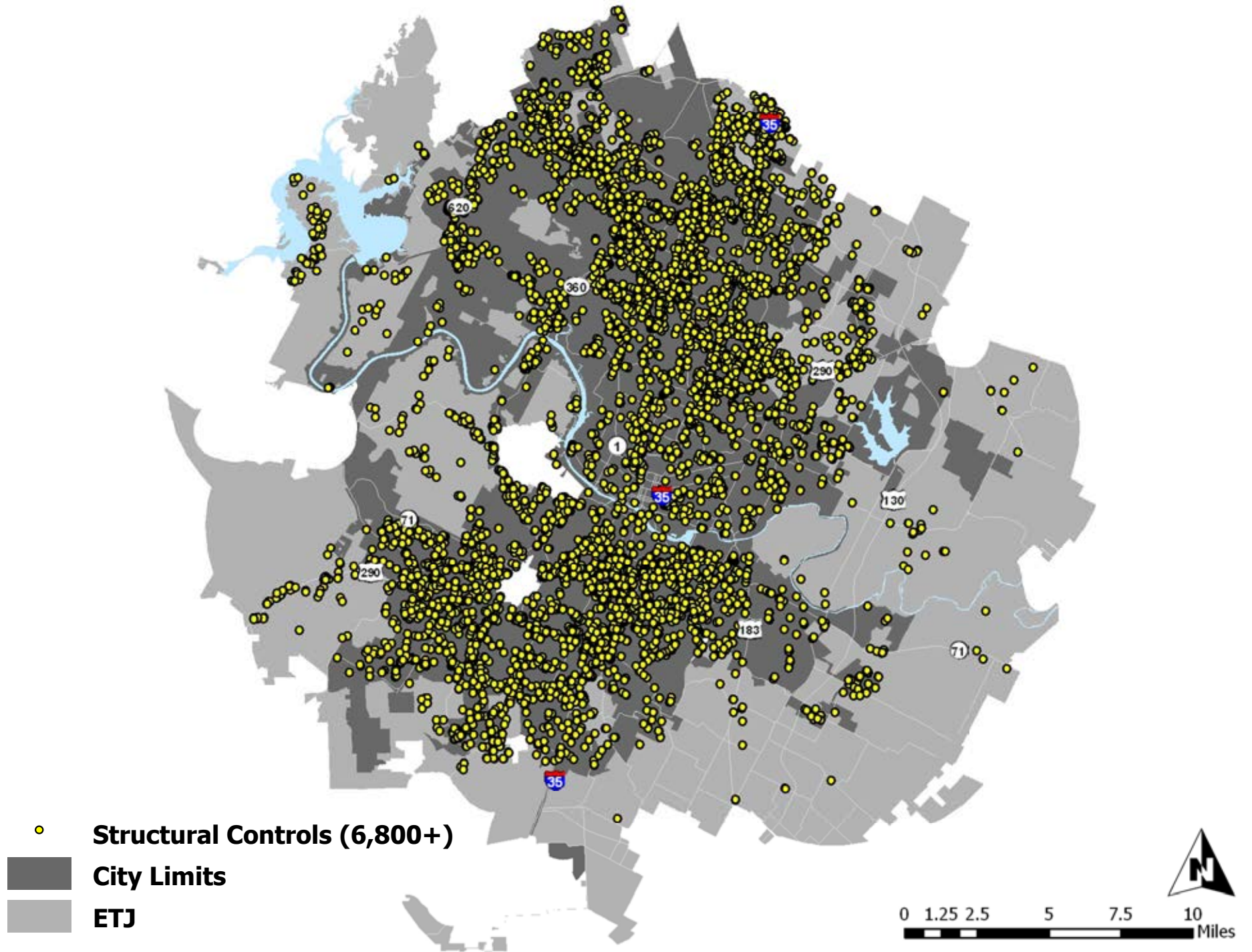
- **Flood Detention** **54%**
- **Sedim./Sand Filtration** **38%**
- **Retention/Irrigation** **3%**
- **Wet Ponds** **3%**
- **Vegetative Filter Strips** **1%**
- **New Innovative Controls** **<1%**

**Pond Database project: over 6,800 Controls**

# Types of Structural Controls

• <b>Flood Detention</b>	<b>3,714</b>
• <b>Sedim./Sand Filtration</b>	<b>2,575</b>
• <b>Retention/Irrigation</b>	<b>209</b>
• <b>Wet Ponds</b>	<b>184</b>
• <b>Vegetative Filter Strips</b>	<b>94</b>
• <b>New Innovative Controls</b>	<b>57</b>

**Pond Database project: 6,800+ Controls**



# **COA Requirements for Stormwater Controls**

- **Flood Detention**

- **Maintain post-development peak rates of discharge at existing pre-development peak rates for 2, 10, 25, and 100-year storm events**
- **Design in accordance with Drainage Criteria Manual**

- **Water Quality**

- **Capture, isolate, and treat half-inch-plus volume (or SOS volume in Barton Springs Zone)**
- **Treatment level of sedimentation/filtration (or non-degradation in Barton Springs Zone)**
- **Design in accordance with Environ. Criteria Manual**



# **Pond Inspection & Maintenance**

- **Single-family residential ponds accepted for maintenance by the City of Austin (~840)**
  - **Inspected at least annually by COA**
- **Commercial and multifamily ponds are maintained by the owner (~6,000)**
  - **Inspected at least every 3 years by COA**

# **Flood Detention**

- **Control flows from very large storms**
- **Standard criteria focus on rate, not volume**
- **Usually not designed for water quality**
  - **Can help with proper design**
  - **Wet ponds can “stack” detention on top of water quality storage**
- **Empty within 24 hours**

# Flood Detention



**Walmart: IH-35 and Ben White**

# **Sediment/Filtration Ponds**

- **Principal structural WQ control in Austin**
- **Excellent sediment control**
- **Modest dissolved pollutant control**
- **Straightforward maintenance**
- **Erosion control/channel stability benefit**
- **Usually not aesthetic, relegated to unseen corner of site**



# Sediment/Filtration Ponds



**Cannon Crossing: Mopac & William Cannon**

# **Retention-Irrigation Ponds**

- **SOS/Barton Springs Zone compliant**
- **Very high pollutant removal (including dissolved fraction)**
- **Needs minimum 12-inch soil depth**
- **Potential to integrate irrigation system into overall landscaping**
- **Mechanical system—moving parts: pumps, sprinkler heads, subject to failure**
- **Requires increased inspection**



# Retention-Irrigation Ponds



**Legend Oaks Office Park: Wm. Cannon and Beckett Rd.**

# Wet Ponds

- **Aesthetic amenity (if maintained)**
- **Serves large drainage areas (>20 acres)**
- **Makeup water/water conservation issues**
- **Liner problems (leaks, shrink/swell, karst)**
- **High maintenance costs**
  - **Difficult access (e.g., submerged trash)**
  - **Specialized work, complexity**
  - **High sediment removal costs**
  - **High vegetation management needs**



# Wet Ponds



**Central Market Wet Pond: W. 38<sup>th</sup> and N. Lamar**

# **Vegetative Filter Strips**

- **Passive, low maintenance, low irrigation system**
- **Flow spreader, grading, & slope critical**
- **Requires adequate soil quality & 6-inch depth (amend if necessary)**
- **IPM plan required**
- **Promotes groundwater recharge**
- **Currently reevaluating criteria**



# Vegetative Filter Strips



**West Bouldin Retrofit**

# Innovative Controls

**Approved in 2007 for WQ Credit:**

- 1. Biofiltration**
- 2. Rain Gardens**
- 3. Rainwater Harvesting**
- 4. Porous Pavement**





# **Biofiltration**

- **Plants provide key functional component**
- **Aesthetic amenity**
- **Can be integrated into landscaped areas**
- **Concentrates runoff onto vegetated area: requires less/no irrigation**
- **Requires 18-inch engineered soil**
- **Reduced clogging & maintenance**
- **Straightforward maintenance**

# Biofiltration



**Sand Beach: Sandra Muraida and Cesar Chavez**

# **Rain Gardens**

- **Similar to Biofiltration Pond**
- **Flexible footprint & design options**
- **Max. drainage area = 1 acre**
- **Max. 12" ponding depth**
- **Commercial/multifamily applications only**
- **Filtration & infiltration components (no underdrain, soils permitting)**



# Rain Gardens



**One Texas Center: Barton Springs and S. 1st**

# **Rainwater Harvesting**

- **Stores water in tanks for irrigation**
- **Partial WQ credit possible**
- **2 Design Options: retention-irrigation (pumps, valves, etc.) vs. vegetative filter strip (gravity)**
- **Max. 72-hour drawdown time (for WQ storage)**
- **May discharge to indoor or outdoor use**
- **May be upsized to provide water conservation function**
- **Requires active maintenance by owner**

# Rainwater Harvesting



**Twin Oaks Library: S. 5th and Mary**



# Porous Pavement

- **Pedestrian applications only**
- **Must meet design criteria:**
  - **Min. pavement thickness**
  - **Gravel/rock media specs**
  - **No off-site run-on to pavement.**
- **WQ credit since counts as pervious**
- **Cooler surface temperatures**
- **Better for plants, trees**

# Porous Pavement



**Spaces 2525: S. Lamar Blvd. & Bluebonnet Ln.**

# **Lessons Learned (1 of 3)**

- 1. Nonstructural controls are essential to complement structural controls**
- 2. Significant progress to date in developing & implementing structural controls**
  - **Need to continue to encourage innovation, creativity**
- 3. Non-degradation controls are especially challenging & are not yet perfected**
- 4. Potential for failure (due to poor design, lack of maintenance, etc.) is Achilles heel**

## **Lessons Learned (2 of 3)**

- 5. Site-specific factors (incl. operator ability) critical in selecting control type.**
- 6. Proper maintenance is critical.**
- 7. Integrate controls into site as positive, visible features (amenity, landscaping, water source, educational element).**
  - Out-of-sight-out-of-mind is NOT a good strategy**
  - Trying to replicate benefits of systems (soil, plant & animal communities) built over generations of time**

## **Lessons Learned (3 of 3)**

- 8. Design to include & benefit from natural systems (gravity, soils, plants).**
- 9. Minimize complexity & active operation elements.**
- 10. Sharing of best practice insights can advance the quality and usefulness of future controls.**

# **Topics of Discussion**

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## **3. March 2 Meeting**

- Green Infrastructure**
- Small-lot development**



# Breakout Groups

- **What is/is not working currently with Austin's structural stormwater control requirements?**
- **Assume a blank slate: no existing code & criteria. What stormwater control strategy would you use to achieve watershed goals?**
  - **Erosion control**
  - **Flood mitigation**
  - **Water quality protection**
  - **Sustainable maintenance**

# Adoption Schedule

## **Stakeholder Meetings**

Sep 2011 – April 2012

(Meetings approx. every two weeks)

- |  |                       |
|--|-----------------------|
| 1. Creek Protection  | Sep 9, 23, Oct 7      |
| 2. Floodplain Protection   | Oct 21, Nov 18, Dec 2 |
| 3. Development Patterns & Greenways                                | Dec 16, Jan 6, 20     |
| 4. Improved Stormwater Controls                                    | Feb 3, 17, Mar 2      |
| 5. Mitigation Options (DDZ) +<br>Rule Simplification & Flexibility | Mar/Apr               |
| 6. Draft Ordinance   | Apr/Jun               |

## **Boards & Commissions**

July – September 2012

## **City Council**

October/November 2012

**Travis County Commissioner's Court** Fall/Winter 2012/13

# Contact Information

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**[www.austintexas.gov/page/  
watershed-protection-ordinance-0](http://www.austintexas.gov/page/watershed-protection-ordinance-0)**