ENVIRONMENTAL BOARD MOTION 051607-D1

Date: May 16, 2007

Subject: Third Revision of the Zachary Scott Off-Site Waste Water Improvements Line

Motioned By: Dave Anderson, P. E. Seconded by: Phil Moncada

Recommendation

The Environmental Board recommends **approval with conditions** of a variance to LDC Section 25-8-361 – To allow wastewater improvements in a Critical Water Quality Zone – for the Zachary Scott Off-Site Waste Water Improvements Line

Staff Conditions

1. The Applicant will provide appropriate water quality treatment if groundwater is encountered during construction, per City of Austin standards
2. Applicant will restore disturbed areas within the Critical Water Quality Zone using City of Austin standard Specification 609-S.

Board Conditions

1. No additional Certificates of Occupancy will be provided by the City of Austin to existing and future subdivisions until the wastewater line is finished.
2. Dedicated and redundant storage, and reduced frequency of pumping and hauling, will be provided to minimize potential for spillage and improve neighborhood safety.

Rationale

1. Applicant has minimized construction in the Critical Water Quality Zone.
2. Findings of Fact have been met.

Vote 8-0-0-0

For: Anderson, Neely, Moncada, Curra, Maxwell, Dupnik, Beall and Ahart

Against:

Abstain:

Absent:

Approved By:

Dave Anderson P.E., CFM
Environmental Board Chair

ITEM FOR ENVIRONMENTAL BOARD AGENDA

BOARD MEETING DATE REQUESTED:	May 16, 2007
NAME AND NUMBER OF PROJECT:	Pier Partners PUD C814-06-0202
NAME OF APPLICANT OR ORGANIZATION:	Clark, Thomas & Winters John Joseph, Attorney (472-8800)
LOCATION:	1703 River Hills Rd.
PROJECT FILING DATE:	October 18, 2006
WPDR/ENVIRONMENTAL STAFF:	Betty Lambright, 974-2696 betty.lambright@ci.austin.tx.us
WPDR/NPZ CASE MANAGER	Jorge Rousselin, 974-2975 jorge.rousselin@ci.austin.tx.us
WATERSHED:	Lake Austin (Water Supply Rural)
ORDINANCE:	Planned Unit Development (PUD)
REQUESTS:	Request to create a Planned Unit Development with multiple environmental exceptions
STAFF RECOMMENDATION:	Not recommended.

Postponed to 6/6/07

AGENDA ITEM B-1

MEMORANDUM

TO: Betty Baker, Chairperson
Members of the Zoning and Platting Commission

FROM: Betty Lambright, Environmental Review Specialist Senior
Watershed Protection and Development Review Department

DATE: May 16, 2007

SUBJECT: Pier Partners PUD/C814-06-0202
1703 River Hills Rd.

The applicant is proposing a zoning change of CS-1 and LA to Planned Unit Development for the existing Pier restaurant (closed since October 2005) and adjacent structures on 10.3 acres of land. The existing facility consists of a 2559 sq. ft. of restaurant, 5400 sq. ft. of outdoor uncovered dining, approximately 1000 sq. ft. of covered dining/deck adjacent to Lake Austin, 18 boat stalls and refueling facility, unpaved parking, and a stage with lighting and sound. Access to the property is via an existing private driveway off River Hills Road.

The applicant's PUD proposal would allow for commercial, retail, dry-stacked marina, and restaurant uses along with 10 requested environmental exceptions. A 10,000 square foot restaurant is proposed along with a 25,000 square foot dry-stacked marina (including fueling) with a capacity for approximately 200 boats. Boat access to Lake Austin is proposed via a fork-lift system by which boats will be lowered onto the lake by way of designated access. Further zoning details are provided in the Zoning Review Sheet.

Description of Property

The proposed PUD is situated in the Lake Austin watershed, which is classified as a Water Supply Rural watershed. The tract lies in the Drinking Water Protection Zone, but it is not located over the Edwards Aquifer Recharge Zone. Floodplain, Critical Water Quality Zone (CWQZ), and steep slopes occur within the property lines.

Existing Topography/Soil Characteristics/Vegetation

At this time, the applicant has not provided an Environmental Assessment, a slope map, or Q1/Q2 tables at this point.

Critical Environmental Features/Endangered Species

The applicant has not provided an Environmental Assessment at this time.

Water/Wastewater

The applicant proposes to utilize on-site septic for wastewater. Water will be supplied by a water utility district.

Environmental Exception Requests

The exceptions requested by this project are to LDC Sections:

1. Exception from LDC 25-8-341 (Cut Requirements)

"Cut on a tract of land may not exceed 4' of depth."

The applicant is requesting a modification to allow cuts up to 20'.

2. Exception from LDC 25-8-342 (Fill Requirements)

"Fill on a tract of land may not exceed 4' of depth".

The applicant is requesting a modification to allow fill up to 6'.

3. Exception from LDC 25-8-454(D)(1) (Uplands Zone)

"Impervious cover may not exceed: (a) 20%; or (b) if development intensity is transferred under Section 25-8-455(Transfer of Development Intensity) 25%."

The applicant is requesting a modification to allow impervious cover up to 45% net site area in the Uplands Zone.

4. Exception from LDC 25-8-454(D)(2) (Uplands Zone)

"At least 40% of a site must be retained in or restored to its natural state to serve as a buffer, the buffer must be contiguous to the development, and the buffer must receive overland drainage. Use of the buffer is limited to fences, utilities that cannot be reasonably located elsewhere, irrigation lines not associated with wastewater disposal, and access for site construction."

The applicant is requesting a modification to allow for a minimum of 0% of the site to be retained in or restored to its natural state to serve as a buffer.

5. Exception from LDC 25-8-261 (Critical Water Quality Zone Development)

"(A) A fence that does not obstruct flood flows is permitted in a critical water quality zone. (B) a public or private park, golf course, or open spaces, other than a parking lot, is

permitted in a critical water quality zone if a program of fertilizer, pesticide, and herbicide use is approved by the Watershed Protection and Development Review Department. (1) In a water supply rural watershed or the Barton Springs Zone, park development is limited to hiking, jogging, or walking trails and outdoor facilities, and excludes stables and corrals for animals...(C) Along Lake Travis, Lake Austin, or Town Lake: (1) a boat dock, pier , wharf, or marina and necessary access and appurtenances, is permitted in a critical water quality zone, and (2) approval by the Watershed Protection and Development Review Department of chemicals used to treat building materials that will be submerged in water is required before a permit may be issued or a site plan released...(E) A utility line may cross a critical water quality zone. (F) Except in the Barton Springs Zone, detention basins and floodplain alterations are permitted in the critical water quality zone if the requirements of Chapter 25-7 (Drainage) and the other provisions of this subchapter are met."

The applicant is requesting a modification to allow for the construction of permeable pedestrian pavement, a vertical boat launch facility, a paved connection from the vertical lift to the boat storage, boat docks, drainage facilities, gas pump, outside seating areas, decking and the reconstruction of the restaurant within the Critical Water Quality Zone.

6. Exception from LDC 25-8-452 (Critical Water Quality Zone)

"Development is prohibited in a critical water quality zone, except as provided in Article 7, Division 1."

See Exception Number 5. This section of the LDC specifically addresses a water supply rural watershed.

7. Exception from LDC 25-8-301 (Construction of a Roadway or Driveway)

"(A) A person may not construct a roadway or driveway on a slope with a gradient of more than 15% unless the construction is necessary to provide primary access to: (1) at least two contiguous acres with a gradient of 15% or less; or (2) building sites for at least five residential units. (B) For construction described in this section, a cut or fill must be revegetated, or if a cut or fill has a finished gradient of more than 33%, stabilized with a permanent structure. This does not apply to a stable cut."

The applicant is requesting a modification to allow for the construction of a roadway or driveway on a slope with a gradient of more than 15%.

8. Exception from LDC 25-8-302 (Construction of Building or Parking Area)

"(A) A person may not construct: (1) a building or parking structure on a slope with a gradient of more than 25%; or (2) except for a parking structure, a parking area on a slope with a gradient of more than 15%. (B) A person may construct a building or parking structure on a slope with a gradient of more than 15% and not more than 25% if the requirements of this subsection are met. (1) Impervious cover on slopes with a gradient of more than 15% may not exceed 10% of the total area of the slopes. (2) The terracing techniques in the Environmental Criteria Manual are required for construction that is uphill

or downhill of a slope with a gradient of more than 15%. (3) Hillside vegetation may not be disturbed except as necessary for construction, and disturbed areas must be restored with native vegetation. (4) For construction described in this section, a cut or fill must be revegetated, or if a cut or fill has a finished gradient or more than 33%, stabilized with a permanent structure. This does not apply to a stable cut."

The applicant is requesting a modification to allow for construction of a building or parking structure on a slope with a gradient of more than 25%.

9. Exception from LDC 25-8-361(C) (Wastewater Restrictions)

"For a commercial development in a water supply rural watershed, a wastewater disposal area may not be located in the 40% buffer zone."

The applicant is requesting a modification to allow for a wastewater disposal area to be located in the 40% buffer zone.

10. Exception from LDC 25-8-361(F) (Wastewater Restrictions)

"(F) Wastewater treatment by land application is prohibited: (1) on a slope with a gradient of more than 15%; (2) in a critical water quality zone; (3) in a 100-year floodplain; or (4) during wet-weather conditions."

The applicant is requesting a modification to allow for a wastewater treatment by land applicant on a property with a slope gradient of more than 15%, located in a critical water quality zone, in a 100-year floodplain, and during wet weather conditions.

Recommendations

At this time, City staff cannot recommend approval of the PUD application based on the information submitted by the applicant. In addition to Environmental, Zoning, and Transportation concerns, the applicant may have outstanding issues with Parks and Fire. The Board of Directors of the two adjacent WCID properties oppose the proposed zoning, as Rule 290.41 of TAC Title 30 Chapter 290 does not allow marinas within 1000 feet of a public drinking water intake.

The Land Development Code (Chapter 25-2, Division 5) outlines the zoning regulations and submittal requirements for a Planned Unit Development. 25-2-411(D) states "The natural topography, soils, critical environmental features, waterways, and vegetation must be incorporated into the design of a PUD district, if practicable. Buffer zones and greenbelt areas are required. In intensively developed areas, landscaping that exceeds the minimum requirements of this title is required." It is the applicant's burden to provide sufficient information to show whether or not environmental considerations have been incorporated into the design of the PUD. As previously stated, the Applicant has not provided this information. In order for staff to fully evaluate the environmental ramifications of this project, the applicant will need to provide the following information in a timely manner:

1. Provide a slope map and Q1/Q2 tables, including existing impervious cover.

2. Provide an Environmental Assessment, as defined by 25-8-121.
3. Provide details concerning the proposed capture of 100,000 gallons of rainwater. What areas would contribute to this amount (roofs, parking, etc)? What is the proposed use of the captured rainwater? If it is strictly for landscaping, provide a water budget.
4. Obtain a Letter of Intent from the Green Building program that clarifies whether a one star or two star rating will be pursued.
5. Provide a copy of the IPM plan.
6. Provide details of the landscape buffer. What is the proposed width? Will there be a restriction against any buildings, drives, parking, etc in this buffer? Provide details of the type of vegetation to be planted in the landscape buffer.
7. Provide details of the gas storage, containment and delivery system, including location.

If you need further details, please contact me at 974-2696.

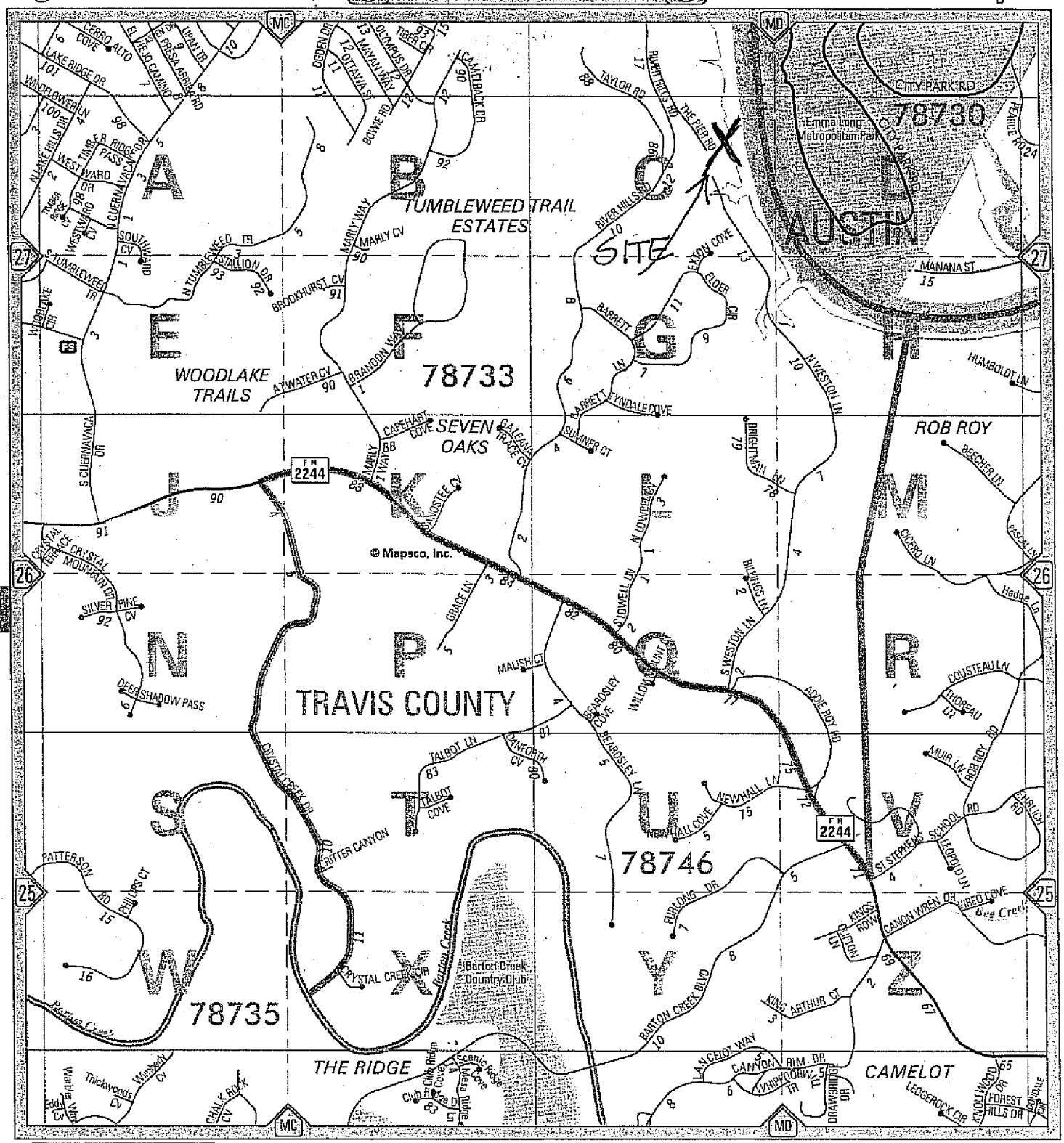
Betty Lambright, Environmental Review Specialist Sr.
Watershed Protection and Development Review

Environmental Program Coordinator: _____
Ingrid McDonald

Environmental Officer: _____
Pat Murphy

FROM CAPITAL OF TEXAS HIGHWAY, GO WEST ON 2244 TO RIVER HILLS RD. TURN RIGHT OFF RIVER HILLS RD. TO THE PIER RD.

552



SCALE IN MILES
0 1/8 1/4 3/8 1/2

SCALE IN FEET
0 1000 2000 3000

BOOK PAGE 1183

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CLARK, THOMAS & WINTERS
A PROFESSIONAL CORPORATION

TELEPHONE (512) 472-8800 | POST OFFICE BOX 1148, AUSTIN, TEXAS 78767 | FAX (512) 474-1129

300 WEST 6TH STREET, 15TH FLOOR
AUSTIN, TEXAS 78701

May 15, 2007

John M. Joseph
(512) 495-8895
jmj@ctw.com

Mr. Dave Anderson
City of Austin
Environmental Board
301 West 2nd Street
Austin, Texas 78701

RE: Postponement Request for Environmental Board; Pier Partners, L.P., Agenda No. B. 1; Case No. C814-06-0202

Dear Mr. Anderson:

On behalf of my Client, Pier Partners, L.P., I am requesting a postponement of the above-referenced case until June 6, 2007. Due to the Zoning and Platting Commission's postponement to June 19th, 2007 the Applicant would like to take this opportunity to address outstanding issues and meet with neighboring property owners and other interested parties.

Thank you in advance for you immediate attention to this matter. If you have any questions, please do not hesitate to contact me.

Sincerely,

John M. Joseph

cc: Pier Partners
Watershed Protection & Development Review Dept.
Case Manager : Jorge Rousselin

JMJ:ek #16144-01

ZONING REVIEW SHEET

CASE: C814-06-0202 **Z.A.P. DATE:** May 15, 2007

ADDRESS: 1703 River Hills Road

OWNER: Pier Partners LP, (Eric Moreland) **AGENT:** Clark, Thomas & Winters, PC (John Joseph)

REZONING FROM: CS-1 (Commercial Liquor Sales) district and LA (Lake Austin Residence) district

TO: PUD (Planned Unit Development) **AREA:** 10.315 Acres

ISSUES:
This case has been scheduled on the Environmental Board agenda for May 16, 2007 as a Staff presentation.

SUMMARY STAFF RECOMMENDATION:

At this time, Staff cannot recommend approval of the PUD application based on the information submitted by the applicant. However, Staff recommends a postponement to June 19, 2007 to address pending environmental and transportation issues on the site and to allow the Environmental Board to review and recommend on the requested environmental variances.

DEPARTMENT COMMENTS:

The subject rezoning area consists of a 10.315 acre site including the once used Pier restaurant zoned CS-1 and LA divided into 3 tracts as depicted in the land use plan. Access to the property is via an existing private driveway off River Hills Road.

The existing facility, currently not in operation, consists of 2,559 square feet of restaurant for dining and indoor recreation, restroom facilities and kitchen; 5,400 square feet of outdoor uncovered dining; 707 of covered dining and deck adjacent to Lake Austin; 260 square feet of uncovered deck adjacent to Lake Austin; 18 boat stalls and refueling facilities and a stage with lighting and sound for live music entertainment.

The applicant proposes to rezone the property to PUD district to allow for commercial, retail, dry-stacked marina, and restaurant uses along with requested environmental variances. A 10,000 square feet restaurant is proposed along with a 25,000 square feet dry-stacked marina with a capacity for approximately 200 boats. Boat access to Lake Austin is proposed via a fork-lift system by which boats will be lowered onto the lake by way of designated access.

Specifically, the applicant requests the following:

1. Land uses:
   Tract 1: All uses permitted and conditional in the GR – Community Commercial district;
   Tract 2: All uses permitted and conditional in the GR – Community Commercial district with the addition of Marina and Recreational equipment Maintenance and Storage; and
   Tract 3: No uses allowed;

For commercial land uses:

- Area: 4.136 acres;
- Maximum FAR: 0.06:1;
- Minimum lot size: 1 acre;
- Maximum building height: 45 feet;
- Setbacks:
  - Front yard: 25 feet;
  - Side street side: 25 feet;
  - Interior side yard: 8 feet;
- Maximum impervious cover: 50%;

For recreational equipment maintenance & storage and marina land uses:

- Area: 1.526 acres;
- Maximum FAR: 0.40:1;
- Total square footage: 25,000 square feet;
- Minimum lot size: 1 acre;
- Maximum building height: 60 feet;
- Setbacks:
  - Front yard: 25 feet;
  - Side street side: 25 feet;
  - Interior side yard: 20 feet;
  - Rear yard: 15 feet
- Maximum impervious cover: 65%;

2. Water quality requirements would be met through on-site water quality facilities, or other environmental mitigation methods approved by the City and adopted as a part of the PUD ordinance;

3. The project intends to be a Green Builder, provide Rainwater Harvesting and an Integrated Pest Management Plan;

4. Community Benefits.
   - Restaurant
     (i) Family dining facilities — Indoor and outdoor, attracting patrons by vehicle and watercraft as well as pedestrian visitors;
   - Restroom Facilities — Deter pollution of the lake and reduce the potential for contamination.;
   - Indoor Live Music Venues;
   - Dry Boat Storage and Maintenance;
   - Employment Opportunity;

5. Community Aesthetics — This location has become known in the community and recognized by generations of Austinites as an Austin icon and a required visit by tourists and visitors to Lake Austin. The Pier has become synonymous with lake dining and musical entertainment. Few visits to Austin are complete without a burger and fries on the deck at the Pier;

6. Wastewater — Convert the existing septic drainfield to a system of current design and construction;

7. Fuel Storage — Provide for a fuel storage, containment, and delivery system that meets or exceeds city and state standards and place the storage facility in a location that is not adjacent to the lake;

8. The Proposed PUD results in development superior to conventional development that would be permitted under current zoning and subdivision regulations in the following ways:
   - Maximization of available resources;
   - Homogeneous multi-use facilities;
   - Contributions to storm water facilities;
   - Contributions to water quality facilities;

9. The Proposed PUD Enhances Preservation of the Natural Resources:
   - Rainwater;
   - Green Builder;
   - Herbicide and Pesticide Plan;
   - Landscape buffer between the Pier Development and adjoining properties;
   - Minimizes current runoff into Lake Austin;
   - The new gas storage facility will further protect the environmental quality of Lake Austin;
   - The Proposed PUD Encourages High Quality Development and Innovative Design; and
   - The Proposed PUD Ensures Adequate Public Facilities and Services.

The following is a list of requested variances by the applicant to be included in the Planned Unit Development, in accordance with LDC § 25-2-4 11(A):

1. Section 25-8-341(A) (Cut Requirements) is modified to allow for a cut of more than four feet in depth but not to exceed 20 feet in depth for the construction of a Recreational Equipment Maintenance and Storage Building.

2. Section 25-8-342(A) (Fill Requirements) is modified to allow for a fill of more than four feet in depth but not to exceed six feet in depth for the construction of landscaping berms.

3. Section 25-8-454(D)(1) (Uplands Zone) is modified to allow for impervious cover in excess of 20% but not to exceed 45% of the net site area of the property within the Uplands Zone which excludes one acre that is designated for use as a septic drain field.

4. Section 25-8-454(D)(2) (Uplands Zone) is modified to allow for a minimum of 0% of the site to be retained in or restored to its natural state to serve as a buffer.

5. Section 25-7-92(B) (Encroachment on Floodplain Prohibited) is modified to allow for the construction of water quality controls, a paved connection from the vertical lift to the boat storage, a portion of the drive and walkway serving the restaurant, boat docks, decking and the reconstruction of the restaurant within the 100-year floodplain.

6. Section 25-8-26 1 (Critical Water Quality Zone Development) is modified to allow for the construction of permeable pedestrian pavement, a vertical boat launch facility, a paved connection from the vertical lift to the boat storage, boat docks, decking and the reconstruction of the restaurant within the Critical Water Quality Zone.

7. Section 25-7-96 (Exceptions in the 25-Year Floodplain) is modified to allow for the construction of boat docks and decking within the 25-year floodplain and the reconstruction of the restaurant within, but raised above, the 25-year floodplain.

8. Section 25-6-Appendix A (Tables of Off-street Parking and Loading Requirements) is modified to require one (1) parking space for every four (4) boat slips within the Recreational Equipment Maintenance and Storage Building.

9. Section 25-2-1063 (Height Limitations and Setbacks for Large Sites) is modified to allow for a reduction in setback and height limitations as shown on the attached Land Use Plan.

10. Section 25-2-1067 (Design Regulations) is modified to allow for a parking area or driveway to be constructed within 2S ft. or less from a lot that is in an SF-S or more restrictive zoning district; or on which a use permitted in an SF-S or more restrictive zoning district is located.

11. Section 25-7-2 (Obstruction of Waterways Prohibited) is modified to allow for an obstruction in a waterway.

12. Section 25-7-152 (Dedication of Easements and Right-Of-Way) is modified to not require the owner to dedicate to the public an easement or right-of-way for a drainage facility, open or enclosed, and stormwater flow to the limits of the 100-year floodplain.

BACKGROUND

On September 13, 1984, the property was rezoned from "A"—Residence and "Interim LA" 1st height & area to "C-2" 1st height & area imposing conditions that subsequent requests for expansion or changes of the existing land use should be accompanied by a site plan and require approval of the Planning commission and City Council. (Please see Exhibit A).

On December 9, 2005, a rezoning case was filed for the same property under case C14-05-0211 which requested to rezone the property from CS-1 to CR (Community Recreation). The case was heard before the Zoning and Platting Commission on April 4, 2006 and postponed indefinitely at the request of the applicant. The case expired on October 4, 2006.

EXISTING ZONING AND LAND USES:

	ZONING	LAND USES
Site	CS-1/LA	Former Pier Restaurant / Undeveloped land
North	LA	Travis County Water Treatment Plant Expansion
South	LA	Travis County Water Treatment Plant Expansion
East	N/A	Lake Austin
West	LA	Undeveloped land

AREA STUDY: Lake Austin Area

TIA: Pending recommendation

WATERSHED: Lake Austin

DESIRED DEVELOPMENT ZONE: Yes

CAPITOL VIEW CORRIDOR: N/A

HILL COUNTRY ROADWAY: N/A

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NEIGHBORHOOD ORGANIZATIONS:
153--Rob Roy Home Owners' Association Inc.
243--River Hills Neighborhood Assn.
434--Lake Austin Business Owners
605--City of Rollingwood
965--Old Spicewood Springs Rd. Neighborhood Assn.
996--Bee Caves Road Alliance

RELATED CASES:

NUMBER	REQUEST	COMMISSION	CITY COUNCIL
C14-83-003.189	"A" & "I-LA" 1st H&A to "C-2" 1st H&A.	03/20/84: Recommended granting to "C-2" 1st H&A noting that subsequent requests for expansion or changes of the existing land use should be accompanied by a site plan and require approval of the Planning commission and City Council and "LA" 1st H&A on balance. (8-0)	04/12/84: APVD C-2, 1ST H&A & LA ON BALANCE (5-0); 1ST RDG. 09/13/84: APVD LA, 1ST H&A; 3RD RDG.
C14-05-0211	CS-1 to CR	01/31/06: PP TO 3-7-06 BY CONSENT (STAFF); (8-0) 03/07/06: PP TO 4-4-06 (STAFF); (9-0) 04/04/06: PP INDEF (AP) (7-0)	N/A

CASE HISTORIES: N/A

ABUTTING STREETS:

NAME	ROW	PAVEMENT	CLASSIFICATION	SIDEWALKS	BICYCLE PLAN
River Hills Road	50'	Varies	Collector	No	No
Weston Lane	Varies	Varies	Collector	No	No

CITY COUNCIL DATE: **ACTION:**

ORDINANCE READINGS: 1st 2nd 3rd

ORDINANCE NUMBER:

CASE MANAGER: Jorge E. Rousselin, NPZD **PHONE:** 974-2975

E-MAIL: jorge.rousselin@ci.austin.tx.us

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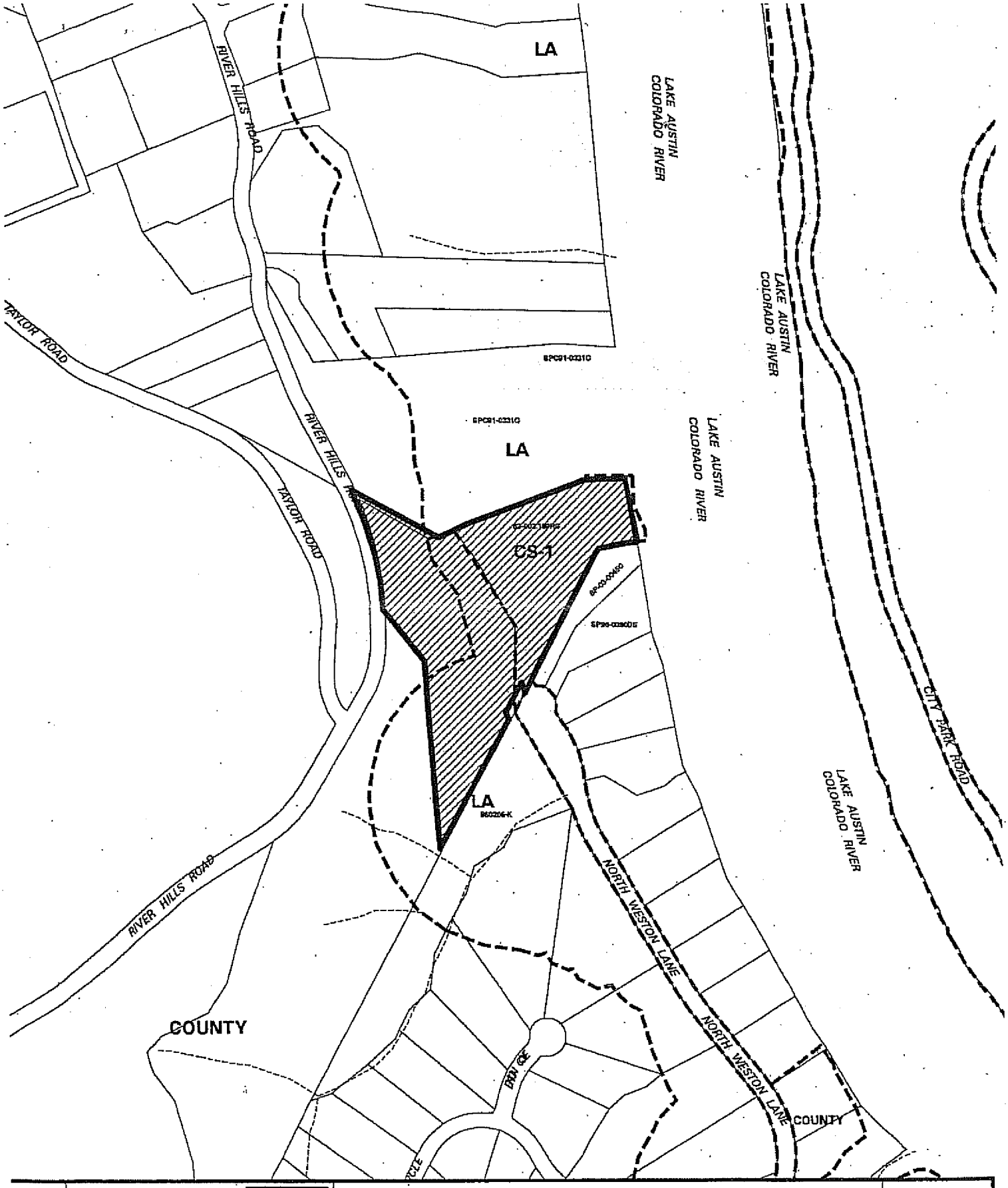

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1"=400'

SUBJECT TRACT

PENDING CASE

ZONING BOUNDARY

CASE MGR: J.ROUSSELIN

PLANNED UNIT DEVELOPMENT

CASE #: C814-06-0202

ADDRESS: 1703 RIVER HILLS RD

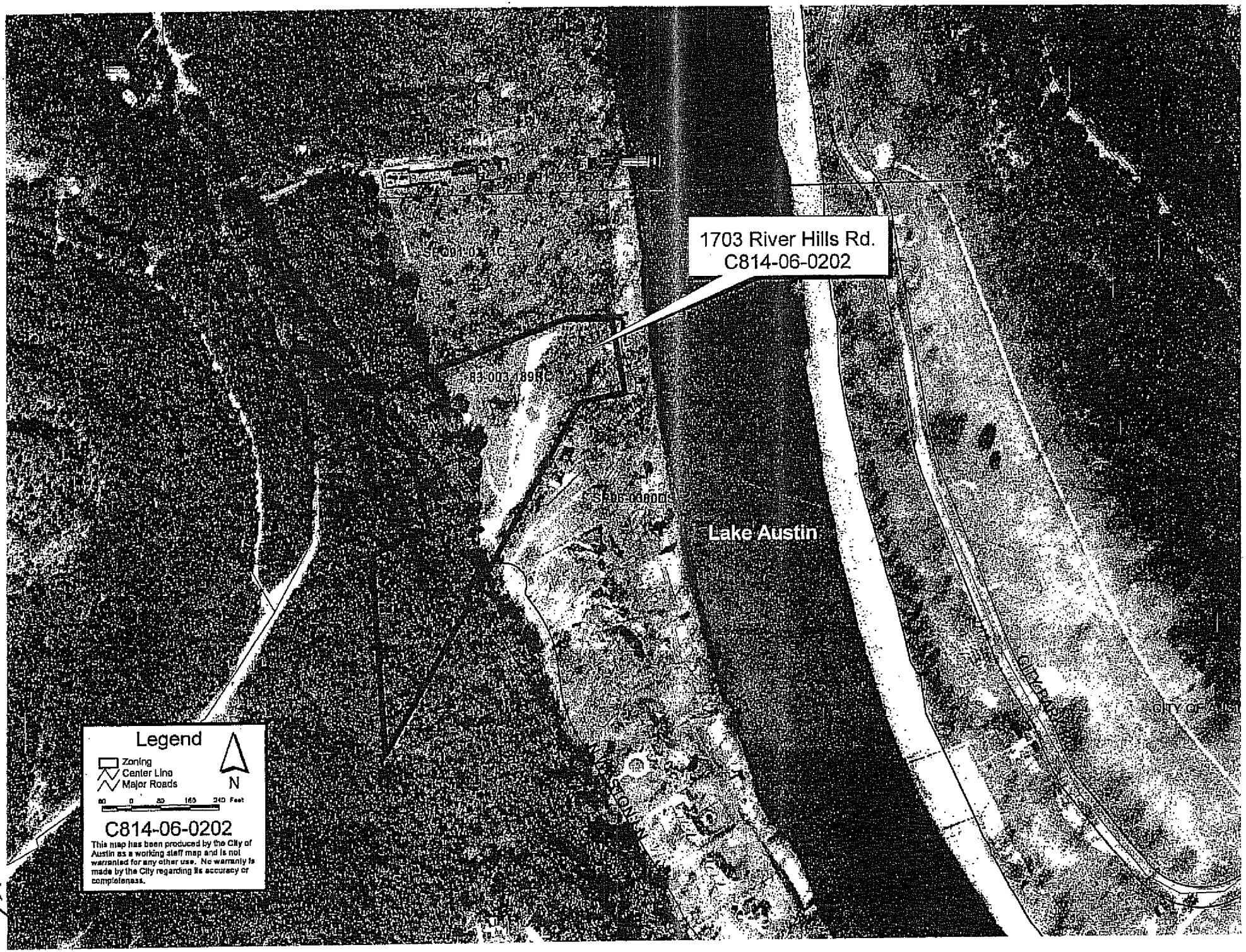
DATE: 06-10

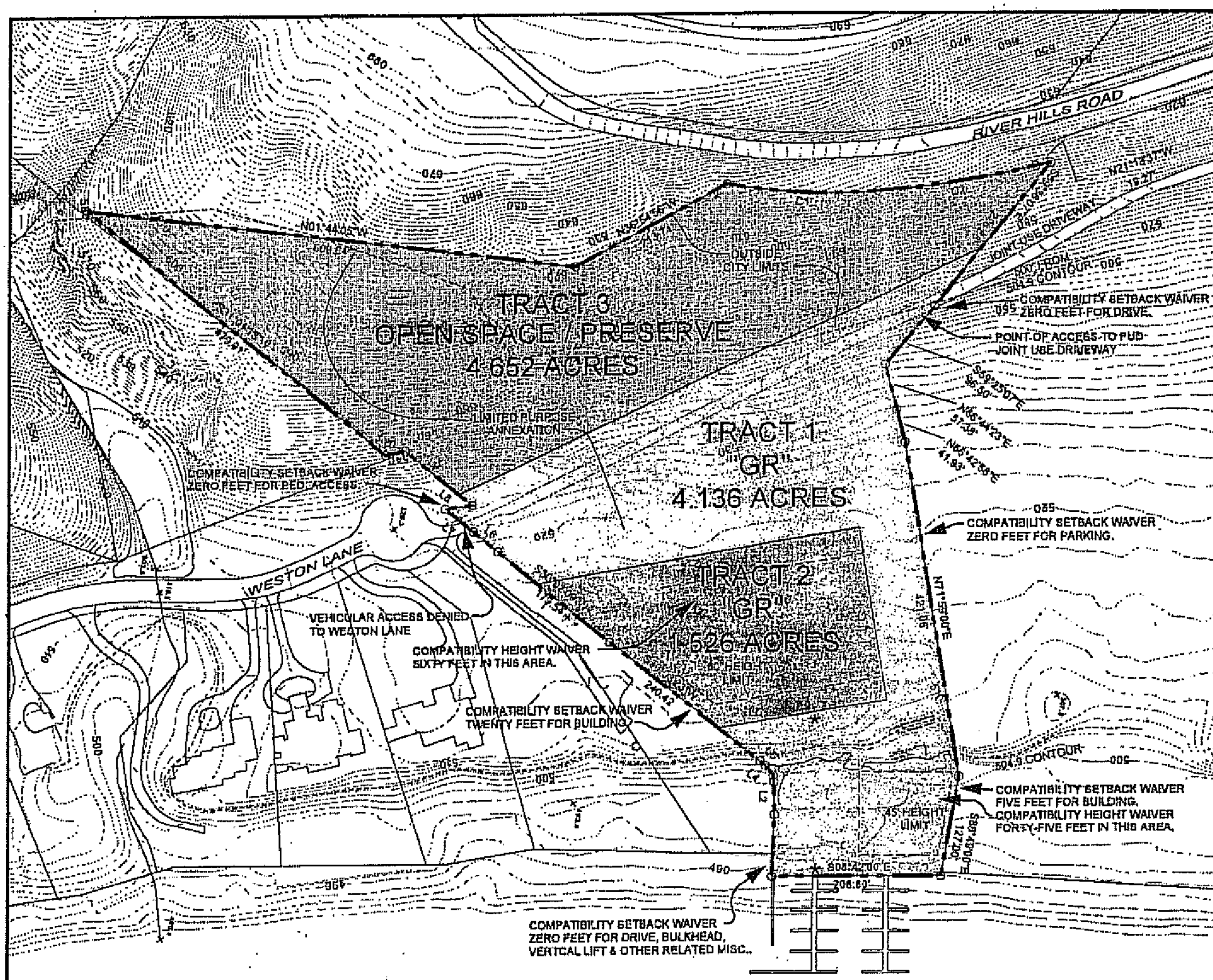
SUBJECT AREA (acres): 10.315

INTLS: SM

CITY GRID REFERENCE NUMBER

D27


1703 River Hills Rd.
C814-06-0202
Lake Austin
Legend
Zoning
Center Line
Major Roads
N
80 0 80 160 240 Feet
C814-06-0202
This map has been produced by the City of Austin as a working staff map and is not warranted for any other use. No warranty is made by the City regarding its accuracy or completeness.



LINE TABLE

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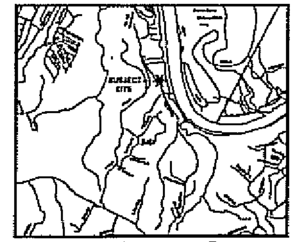
CURVE TABLE

[illegible]

* APPROXIMATE LOCATION OF FUEL PUMPS

LAKE AUSTIN

SCALE



LOCATION MAP

N.T.S.

PIER PARTNERS, L.P.	
PLANNED UNIT DEVELOPMENT	
February [illegible], 19[illegible]	
TOTAL AREA OF PUD =	[illegible] ACRES
PROPOSED PRIVATE OPEN SPACE =	[illegible] ACRES = [illegible]
PROPOSED DEVELOPABLE AREA =	[illegible] ACRES = [illegible]
PROPOSED POSSIBLE USES	
RETAIL / COMMERCIAL / MARINA / RESTAURANT =	[illegible] ACRES
RECREATIONAL EQUIPMENT MAINTENANCE & STORAGE AND MARINA =	[illegible] ACRES
(DRY STACKED BOAT STORAGE FACILITY)	
	[illegible] ACRES
PERMITTED USES	
TRACT 1	
ALL USES PERMITTED AND CONDITIONAL WITH "GR" COMMUNITY COMMERCIAL	
TRACT 2	
ALL USES PERMITTED AND CONDITIONAL WITH "GR" COMMUNITY COMMERCIAL PLUS MARINA AND RECREATIONAL EQUIPMENT MAINTENANCE & STORAGE	
TRACT 3	
NO USES ALLOWED	

COMMERCIAL USES	
USE	
RETAIL / COMMERCIAL / RESTAURANT / MARINA	
AREA	[illegible] ACRES
MAXIMUM F.A.R.	[illegible] F.A.R.
TOTAL S.F.	[illegible] S.F.
MINIMUM LOT SIZE	1 ACRE
BUILDING HEIGHT	[illegible] FT.
SETBACKS	
FRONT YARD	[illegible] FT.
STREET SIDE YARD	[illegible] FT.
INTERIOR SIDE YARD	[illegible] FT.
REAR YARD	[illegible] FT.
MAXIMUM IMPERVIOUS COVER	[illegible]
RESIDENTIAL UNITS PER ACRE	[illegible]
RECREATIONAL EQUIPMENT MAINTENANCE & STORAGE AND MARINA	
AREA	[illegible] ACRES
MAXIMUM F.A.R.	[illegible] F.A.R.
TOTAL S.F.	[illegible] S.F.
MINIMUM LOT SIZE	1 ACRE
BUILDING HEIGHT	[illegible] FT.
SETBACKS	
FRONT YARD	[illegible] FT.
STREET SIDE YARD	[illegible] FT.
INTERIOR SIDE YARD	[illegible] FT.
REAR YARD	[illegible] FT.
MAXIMUM IMPERVIOUS COVER	[illegible]
RESIDENTIAL UNITS PER ACRE	[illegible]

NOTES:

1) 100 YEAR FLOOD PLAIN TO BE DEDICATED WITHIN A DRAINAGE EASEMENT AT THE TIME OF SITE DEVELOPMENT PERMIT. THIS DOES NOT PRECLUDE THE LOCATION FOR ANY STRUCTURES WITHIN THE FLOOD PLAIN PROVIDED THAT THE FLOOD STUDY ALLOWS FOR SAME TO BE PLACED IN THE FLOOD PLAIN. ALL HABITABLE STRUCTURES MUST BE LOCATED OUT OF THE FLOOD PLAIN IN ACCORDANCE WITH THE LAND DEVELOPMENT CODE.
2) ALL ACCESS ROADWAYS MUST BE A MINIMUM OF 25' UNOBSTRUCTED WIDTH WITH UNOBSTRUCTED TURNING RADII OF [illegible]' OUTSIDE AND 25' INSIDE FOR ALL TURNS.
3) INCLINE ON AN ACCESS ROADWAY MUST NOT EXCEED [illegible]% FOR ASPHALT ROADS AND [illegible]% FOR CONCRETE ROADS. MAXIMUM [illegible] GRADE CHANGE OR GRADE CHANGE WITHIN [illegible]' SHALL NOT EXCEED [illegible]%.
4) A HAZARDOUS MATERIALS CONSTRUCTION PLAN AND SPECIFICATIONS IS REQUIRED TO BE SUBMITTED TO THE CITY OF AUSTIN WITH A SITE PLAN SUBMITTAL.
5) VEHICULAR ACCESS TO WESTON LANE IS PROHIBITED. AN ACCESS GATE WILL BE PROVIDED TO ALLOW FOR PEDESTRIAN ACCESS FROM WESTON LANE TO THE PIER PARTNERS SITE.

Thrower Design
LAND PLANNERS

LAND USE PLAN

THE PIER
PIER ROAD
AUSTIN, TEXAS

THE PIER
P.U.D.
PLAN

OVERALL

5

CLARK, THOMAS & WINTERS
A PROFESSIONAL CORPORATION

TELEPHONE (512) 472-8800

POST OFFICE BOX 1148
AUSTIN, TEXAS 78767

300 WEST 6TH STREET, 15TH FLOOR
AUSTIN, TEXAS 78701

FAX (512) 474-1129

April 25, 2007

City of Austin
Victoria Hsu, Director
Watershed Protection and Development Review Dept.
505 Barton Springs Road
Austin, Texas 78704

RE: Pier Partners Planned Unit Development Purpose Statement

Dear Ms. Hsu

The purpose of this correspondence is to provide a statement of the purpose for this Planned Unit Development "PUD", the proposed conceptual land use plan and site development regulations for the Pier Partners PUD land use plan and briefly discuss why the proposed PUD meets the applicable criteria set forth in the City of Austin Land Development Code "LDC" and should be approved by the City of Austin. As you are aware the Pier is an Austin and Lake Austin icon and I will refer to it as the Pier throughout. The Pier had been operated at this location serving as a restaurant and community gathering spot for live musical entertainment, dining, recreation and boat fueling for over 47 years.

The property that comprises the PUD is owned by The Pier Partners, LP and Embarcadero Partners, LP.

The Pier was originally opened to the public in 1958 at a time when food and entertainment services at this part of Lake Austin were non-existent.

The existing facility (not now in operation) consists of 2,559 sq. ft. of restaurant for dining and indoor recreation, restroom facilities and kitchen; 5,400 sq. ft. of outdoor uncovered dining; 707 of covered dining and deck adjacent to Lake Austin; 260 sq. ft. of uncovered deck adjacent to Lake Austin; 18 boat stalls and refueling facilities and a stage with lighting and sound for live music entertainment.

Since opening in 1958, the Pier has hosted live music by such great artists as Cross Canadian Ragweed, Leon Russell, Big Brother, & Holding Company to name a few and an untold number of local Austin musicians. During it's 58 years of operation, "The Pier" became synonymous with live music in Austin.

The Pier values the relationship it has developed with the community and neighborhoods. The Pier is committed to working closely with its neighbors during this PUD process to ensure that the needs and concerns of the community are carefully considered and incorporated in the Pier plans for the future, to the extent possible. During this process, the Pier is committed to communicate regularly with its neighbors and neighborhood associations, to ensure that the community is aware of and involved in the PUD planning process.

I. Characteristics of the Proposed PUD.

The Pier proposes that the PUD have the following site development regulations and confer the following community benefits.

A. Site Development Regulations.

1. Development occurring under the PUD would comply with the LDC regulations and those regulations as set forth in the approved Land Use Plan as modified by the PUD ordinance.

2. Land-Uses within the PUD will be those allowed in these specific zoning categories with the following specific uses prohibited:

Tract 1 – All uses permitted and conditional with "GR" Community Commercial. ALL GR

Tract 2 – All uses permitted and conditional with "GR" Community Commercial plus marina and recreation equipment maintenance & storage

3. Water quality requirements would be met through on-site water quality facilities, or other environmental mitigation methods approved by the City and adopted as a part of the PUD ordinance.

4. The project intends to be a Green Builder, provide Rainwater Harvesting and an Integrated Pest Management Plan.

B. Community Benefits.

1. Restaurant

(i) Family dining facilities – Indoor and outdoor, attracting patrons by vehicle and watercraft as well as pedestrian visitors.

2. Restroom Facilities – Deter pollution of the lake and reduce the potential for contamination.

3. Indoor Live Music Venues

4. Dry Boat Storage and Maintenance

5. Employment Opportunity

6. Community Aesthetics – This location has become known in the community and recognized by generations of Austinites as an Austin icon and a required visit by tourists and visitors to Lake Austin. The Pier has become synonymous with lake dining and musical entertainment. Few visits to Austin are complete without a burger and fries on the deck at the Pier.

7. Wastewater – Convert the existing septic drainfield to a system of current design and construction.

8. Fuel Storage – Provide for a fuel storage, containment, and delivery system that meets or exceeds city and state standards and place the storage facility in a location that is not adjacent to the lake.

II. The Proposed PUD Conforms to the Purposes of Sec. 25-2-174 of the Land Development Code of the City of Austin

A. The Proposed PUD Provides "Greater Design Flexibility for Development with the PUD"

1. The PUD zoning would address the ever changing needs of the community indefinitely at the current location and deter the pressure for the proliferation of fueling facilities and in-water boat storage facilities on the lake.

B. The Proposed PUD results in development superior to conventional development that would be permitted under current zoning and subdivision regulations

1. Maximization of available resources
2. Homogeneous multi-use facilities
3. Contributions to storm water facilities
4. Contributions to water quality facilities

C. The Proposed PUD Enhances Preservation of the Natural Resources.

1. Rainwater
2. Green Builder
3. Herbicide and Pesticide Plan
4. Landscape buffer between the Pier Development and adjoining properties
5. Minimizes current runoff into Lake Austin
6. The new gas storage facility will further protect the environmental quality of Lake Austin

D. The Proposed PUD Encourages High Quality Development and Innovative Design.

E. The Proposed PUD Ensures Adequate Public Facilities and Services

For the above-mentioned reasons, the applicant respectfully requests a PUD zoning base district for the subject site and believes that aforementioned statement of purpose justifies the PUD land use designation. If you should have any questions regarding this matter, please do not hesitate to call.

Very truly yours,

John M. Joseph

Cc: Pier Partners, LP
Attention:
Ron Thrower

JMJ:ck #16144-1
S:\mjt\wd proc\pier partners\purpose statement

CLARK, THOMAS & WINTERS
A PROFESSIONAL CORPORATION

TELEPHONE (512) 472-8800 | POST OFFICE BOX 1148, AUSTIN, TEXAS 78767 | FAX (512) 474-1129

300 WEST 6TH STREET, 15TH FLOOR
AUSTIN, TEXAS 78701

April 25, 2007

John. M. Joseph
(512) 495-8895
jmj@ctw.com

Mr. Jorge E. Rousselin, Case Manager
City of Austin
Neighborhood Planning & Zoning Department
505 Barton Springs Road, 5th Floor
Austin, Texas 78704

RE: Case No.: C814-06-0202
Project: The Pier Partners (1703 River Hills Road)
Applicant: Pier Partners, L.P.

Dear Mr. Rousselin:

The following is a list of requested variances to be included in the Planned Unit Development, in accordance with LDC § 25-2-411(A):

1. Section 25-8-341(A) (*Cut Requirements*) is modified to allow for a cut of more than four feet in depth but not to exceed 20 feet in depth for the construction of a Recreational Equipment Maintenance and Storage Building.

2. Section 25-8-342(A) (*Fill Requirements*) is modified to allow for a fill of more than four feet in depth but not to exceed six feet in depth for the construction of landscaping berms.

3. Section 25-8-454(D)(1) (*Uplands Zone*) is modified to allow for impervious cover in excess of 20% but not to exceed 45% of the net site area of the property within the Uplands Zone which excludes one acre that is designated for use as a septic drain field.

4. Section 25-8-454(D)(2) (*Uplands Zone*) is modified to allow for a minimum of 0% of the site to be retained in or restored to its natural state to serve as a buffer.

5. Section 25-7-92(B) (*Encroachment on Floodplain Prohibited*) is modified to allow for the construction of water quality controls, a paved connection from the vertical lift to the boat storage, a portion of the drive and walkway serving the restaurant, boat docks, decking and the reconstruction of the restaurant within the 100-year floodplain.

6. Section 25-8-261 (*Critical Water Quality Zone Development*) is modified to allow for the construction of permeable pedestrian pavement, a vertical boat launch facility, a paved connection from the vertical lift to the boat storage, boat docks, decking and the reconstruction of the restaurant within the Critical Water Quality Zone.

7. Section 25-7-96 (*Exceptions in the 25-Year Floodplain*) is modified to allow for the construction of boat docks and decking within the 25-year floodplain and the reconstruction of the restaurant within, but raised above, the 25-year floodplain.

8. Section 25-6-Appendix A (*Tables of Off-street Parking and Loading Requirements*) is modified to require one (1) parking space for every four (4) boat slips within the Recreational Equipment Maintenance and Storage Building.

9. Section 25-2-1063 (*Height Limitations and Setbacks for Large Sites*) is modified to allow for a reduction in setback and height limitations as shown on the attached Land Use Plan.

10. Section 25-2-1067 *(Design Regulations*) is modified to allow for a parking area or driveway to be constructed within 25 ft. or less from a lot that is in an SF-5 or more restrictive zoning district; or on which a use permitted in an SF-5 or more restrictive zoning district is located.

11. Section 25-7-2 (*Obstruction of Waterways Prohibited*) is modified to allow for an obstruction in a waterway.

12. Section 25-7-152 (Dedication *of Easements and Right-Of-Way*) is modified to not require the owner to dedicate to the public an easement or right-of-way for a drainage facility, open or enclosed, and stormwater flow to the limits of the 100-year floodplain.

If you need any additional information, please do not hesitate to contact me.

Very truly yours,

John M. Joseph

CC: Mr. Brian A. Bailey, Pier Partners, L.P.
Mr. H.M. "Mac" Pike, Jr., Pier Partners, L.P.
Mr. Eric Moreland, Pier Partners, L.P.
Mr. Ron Thrower, Thrower Designs
Mr. Kevin Flahive, Clark, Thomas & Winters, P.C.

Rousselin, Jorge

From: Terry Barnes [redacted]
Sent: Tuesday, May 08, 2007 8:59 AM
To: Rousselin, Jorge
Subject: Case C814-06-0202 Second required street access point.

Mr. Rousselin,

City transportation staff comment TR15 states " For the subdivision, new subdivisions must have at least two access streets, and each must connect to a different external street, unless otherwise approved by the Director. LDC, 25-4-157 (B). As I have stated before in reference to this case the second proposed access street named Weston Lane is a private road. No access for use of this road by the applicants has been granted by the owners of this private road. Weston Lane is incorrectly depicted on city transportation maps as an arterial roadway and public access. Weston lane is gated at it's entrance with access granted to homeowners only via code, the end of Weston Lane is also gated and padlock keyed to emergency service personal only. Weston lane and it's tributary streets have never been turned over to Travis county. Weston lane enjoys it's private status and it's maintenance is the responsibility of the residential homeowners that it serves via the homeowners association that own it. It is not a access road that will service a commercial endeavor that is beyond the surveyed plat of our subdivision.

For the proposed zoning hearing I wish to make it clear that the Pier tract has not been granted a second road access point as required by LDC 25-4-157.

Thank for your consideration
Terry Barnes
1409 N Weston Lane
Austin, TX

TRAVIS COUNTY WATER CONTROL AND
IMPROVEMENT DISTRICT NO. 20
9511 Ranch Road 620 North
Austin, Texas 78726

December 4, 2006

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

City of Austin
c/o Watershed Protection and Development Review Department
505 Barton Springs Road
Austin, Texas 78704

Attention: Jorge Rousselin, Case Manager

Re: The Pier Property; Case No. C814-06-0202

Ladies and Gentlemen:

We are writing you as the Board of Directors of Travis County Water Control and Improvement District No. 20 (the "District"). The District provides potable water service to homes with a total estimated population of 1,100 persons adjacent to the subject property known as the Pier. The District owns the lot adjacent to and downstream of the Pier. The District's lot is the location of the District's water treatment plant. The District's raw water intake structure is located four lots further downstream from the water treatment plant.

The District's Board of Directors has taken action in open session to oppose this application by the Pier for a planned unit development ("PUD") and to oppose the waiver of compatibility standards. The District urges the City of Austin to deny the request for this development.

The District's raw water intake facility is approximately 800 feet downstream of the Pier. At the time the District constructed its facilities and until recently, the Pier provided docking for approximately 19 boats. In 1983, the District's developers applied for and received approval of an exception to allow its facilities within 1,000 feet of gasoline facilities. Based upon the limited use of the Pier's boating activities at that time, the District's engineer and the staff of the Texas Health Department, concluded that the exception was reasonable.

The development proposed by Pier Partners, L.P. includes dry docking of approximately 200 boats, and, the fueling of those boats from a new proposed gasoline storage facility. The

planned development, in the District's opinion, would create a potentially hazardous and substantial source of contamination of the District's public drinking water supply.

For these reasons, the Board of Directors respectfully requests the City's Boards and Commissions and City Council deny this PUD request.

Very truly yours,

By: _____
Page Skerry, President
Board of Directors

cc: Terry Barnes
1409 N. Weston Lane
Austin, TX 78733

Pier Partners, L.P.
c/o Kelly Cannon
Clark Thomas & Winters
P.O. Box 1148
Austin, TX 78767

Hamp Skelton
P.O. Box 1609
Austin, TX 78767-1609

TRAVIS COUNTY MUNICIPAL UTILITY DISTRICT NO. 4
9511 Ranch Road 620 North
Austin, Texas 78726

December 11, 2006

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

City of Austin
c/o Watershed Protection and Development Review Department
505 Barton Springs Road
Austin, Texas 78704

Attention: Jorge Rousselin, Case Manager

Re: The Pier Property; Case No. C814-06-0202

Ladies and Gentlemen:

We are writing you as the Board of Directors of Travis County Municipal Utility District No. 4 (the "District"). The District serves as the Master District for the seven Travis County Municipal Utility District Nos 3-9 and provides potable water service to homes with a total estimated current population of approximately 2,200 persons. The District will also begin in 2007 providing water service to a new retirement and long-term care facility for the elderly located within the District's service area. The safety of the water supply is of utmost importance. The District's raw water intake structure is located approximately 700 feet upstream from the Pier property.

The District's Board of Directors has taken action in open session to oppose this application by the Pier for a planned unit development ("PUD") and to oppose the waiver of compatibility standards. The District urges the City of Austin to deny the request for this development.

As stated above, the District's raw water intake facility is approximately 700 feet upstream of the Pier. The development proposed by Pier Partners, L.P. includes dry docking of approximately 200 boats, and, the fueling of those boats from a new proposed gasoline storage facility. The planned development, in the District's opinion, would create a potentially hazardous and substantial source of contamination of the District's public drinking water supply. It is not unusual for wind conditions and lack of water release at downstream dams to allow water and debris to travel upstream for limited distances.

For these reasons, the Board of Directors respectfully requests the City's Boards and Commissions and City Council deny this PUD request.

Very truly yours,

By: Bill Dukes

Bill Dukes, President
Board of Directors

cc: Pier Partners, L.P.
c/o Kelly Cannon
Clark Thomas & Winters
P.O. Box 1148
Austin, TX 78767

Terry Barnes
1409 N Weston Ln
Austin, TX 78733

December 13, 2006

Mr. Jorge Rousselin
City of Austin Neighborhood Planning and Zoning Dept
P.O. Box 1088
RE: C814-06-0202

Austin, TX 78767

Dear Mr. Rousselin,

The new Pier owners wish to construct a dry dock boat storage building for 185+ boats on Lake Austin at the old Pier restaurant location complete with a marina at the water. City staff during a previous zoning application (C14-05-0211) moved to approve their application before it went before the zoning commission. The Parks and Recreation board wrote a resolution in support of the proposed facility as well. When the application went before the zoning commission April 4, 2006 the applicants moved for a postponement in order to revise their application before it was to be considered by the zoning commission. It is now returning to you under application number C814-06-0202.

It is my understanding that under Title 30 of the Texas Administrative Code "Raw water intakes shall not be located within 1,000 feet of boat launching ramps, marinas, docks, or floating fishing piers which are accessible by the public."[1] Water District #20's raw water intake measures on a city plat map, approximately 780 feet to the South from the gas dock and Stratus Properties raw water intake is approximately 680 feet to the North of the gas dock. Water District #20's board has opposed the redevelopment of the Pier in a letter to the City of Austin Feb 14, 2006.

The marina and fuel sales at the Pier location were in a grand fathered zoning environment that use was non-conforming for its current zoning. I find gas service and marina service unacceptable to continue under variance or waiver since the use of all of the marina type docks and structures have become "abandon" as defined by City of Austin inactivity standard of 90 consecutive days[2]. The restaurant has been closed since Oct of 2005 and a locked gate has been constructed blocking vehicle access by road. Service of all types has ceased. Video of the zoning commissions public hearing shows city staff affirming to the zoning commission that the marina use had become abandon during the public hearing on April 4, 2006. "A person may not resume an abandoned non-conforming use."[3]

Their desire to build a new restaurant, have boat storage and become a public tourist recreation area will surely fall under the restrictions mandated by State law. I would plea that no further wavier or variance for this type of operation adjacent to two large public water districts be granted or continued. I wish to respectively request the zoning review department staff move for a disapproval based upon the above facts of law.

Thank you

Terry Barnes

---

[1] Texas Administrative Code Title 30, Part 1, Chapter 290, Subchapter D, Rule 290.41, Subchapter (e)
[2] City of Austin Land development code 25-2-945 sub (A) (2)
[3] City of Austin Land development code 25-2-945 sub(C)

Rousselin, Jorge

From: Lewis Talbert [redacted]
Sent: Friday, November 17, 2006 11:33 AM
To: Rousselin, Jorge
Subject: Opposition to adding a drystack marina at the Pier

November 15, 2006

Mr. Jorge Rousselin; City of Austin Neighborhood Planning and Zoning Dept

RE: C814-06-0202 'The Pier Property'

Dear Jorge;

I am a Lake Austin Property owner. I have had many discussions with several property owners on Lake Austin, all who are opposed to the development of this site as planned. Adding another Marina to an already overcrowded lake is in no one's best interest.

The plan as it stands adds significantly to the congestion on the lake, and it requires you to bend or ignore many city codes in order to allow them to do that. I understand there are many outstanding issues with zoning, water supply impact, expired grandfathered use, access, fire codes, water availability, noise, gasoline service, building height, impervious cover, minimum acreage requirements, and many other issues.

My group of Lake Austin residents will be watching this development closely to make sure the city officials follow all aspects of the zoning in place. We have discussed the project with legal council and will be actively interested in each stage of its progress.

Since this development affects the lake itself, all lake residents need to be notified of any zoning requests, meetings, or modifications to this site. I am sure hundreds of residents will show up to dispute any development that makes this lake more crowded and more dangerous.

Could you please add this letter to the file for this development, and add me to this list of people requesting to be contacted regarding any action on this property. I would like to be notified of any further action on this development.

Thank you;

Rousselin, Jorge

From: Nan Beebe [redacted]
Sent: Tuesday, November 28, 2006 6:52 PM
To: Rousselin, Jorge
Subject: Pier property

Re: C814-06-0202
Dear Mr. Rousselin,

I am a home owner on Lake Austin and am writing to you in reference to the proposed development of the Pier property on River Hills Road. Like most of my neighbors, I am extremely concerned about the impact that this proposal could have on the safety of Lake Austin which is already very crowded as well as the tremendous increase in traffic on River Hills Road. A group of concerned residents recently attended a city council meeting with the environmental board and were given several recommendations as to which group has "authority" in this matter, but it was very unclear who has jurisdiction, especially when the list of issues includes, safety, zoning, water intake, etc., not to mention the dangerous road conditions already on River Hills Rd., which will only increase.

As a mother of 3 children that love to swim in the lake, my concern is for safety primarily. We already have one Lake Travis. (How many deaths just last summer?) Let's keep Lake Austin safe. Let's keep Lake Austin pristine.

Please include my letter in the case file for C814-06-0202.

sincerely,
Nan Beebe

1308 Bruton Springs Road
Austin, TX 78733

32

Rousselin, Jorge

From: Terry Barnes [redacted]
Sent: Tuesday, May 08, 2007 8:59 AM
To: Rousselin, Jorge
Subject: Case C814-06-0202 Second required street access point.

Mr. Rousselin,

City transportation staff comment TR15 states " For the subdivision, new subdivisions must have at least two access streets, and each must connect to a different external street, unless otherwise approved by the Director. LDC, 25-4-157 (B). As I have stated before in reference to this case the second proposed access street named Weston Lane is a private road. No access for use of this road by the applicants has been granted by the owners of this private road. Weston Lane is incorrectly depicted on city transportation maps as an arterial roadway and public access. Weston lane is gated at it's entrance with access granted to homeowners only via code, the end of Weston Lane is also gated and padlock keyed to emergency service personal only. Weston lane and it's tributary streets have never been turned over to Travis county. Weston lane enjoys it's private status and it's maintenance is the responsibility of the residential homeowners that it serves via the homeowners association that own it. It is not a access road that will service a commercial endeavor that is beyond the surveyed plat of our subdivision.

For the proposed zoning hearing I wish to make it clear that the Pier tract has not been granted a second road access point as required by LDC 25-4-157.

Thank for your consideration
Terry Barnes
1409 N Weston Lane
Austin, TX

Rousselin, Jorge

From: Terry Barnes [redacted]
Sent: Tuesday, April 03, 2007 1:18 PM
To: Rousselin, Jorge
Subject: The Pier tract C814-06-0202

Mr. Rousselin

I am trying to get an update on the Pier tract application. It is my understanding from the City's web site that their return update has so far been rejected by environmental and the transportation department.
First question is have they returned with a remedy for the lack of 250 acres required for a PUD? I am also trying to see if the letters that the two water districts wrote in opposition to this application are still on file in the correct case and are not dropped for consideration during an update process. Can you advise or meet with me in person for an update?

Thanks in advance

Terry Barnes

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Rousselin, Jorge

From: Terry Barnes [redacted]
Sent: Friday, November 17, 2006 10:31 AM
To: Rousselin, Jorge
Subject: C814-06-0202 The Pier Marina use.

Attachments: C814_06_0202.doc

C814_06_0202.doc
(35 KB)

Mr. Rousselin

Please insert the attached word document to case file #C814-06-0202. It concerns the placement of a marina adjacent to raw water intakes. State law prohibits this under Texas administrative code title 30 and there are raw water intakes to the North and South of the subject property applying for a rezoning. There is no way to develop in a manner that will not result in a violation of this rule. Movement in either direction just makes separation worse for one or the other.

Thank you for your consideration

Terry Barnes

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Terry Barnes
1409 N Weston Ln
Austin, TX 78733

May 10, 2007

Mr. Jorge Rousselin
City of Austin Neighborhood Planning and Zoning Dept
P.O. Box 1088
RE: C814-06-0202

Austin, TX 78767

Dear Mr. Rousselin,

The new Pier owners wish to construct a dry dock boat storage building for 185+ boats on Lake Austin at the old Pier restaurant location complete with a marina at the water. City staff during a previous zoning application (C14-05-0211) moved to approve their application before it went before the zoning commission. The Parks and Recreation board wrote a resolution in support of the proposed facility as well. When the application went before the zoning commission April 4, 2006 the applicants moved for a postponement in order to revise their application before it was to be considered by the zoning commission. It is now returning to you under application number C814-06-0202.

It is my understanding that under Title 30 of the Texas Administrative Code "Raw water intakes shall not be located within 1,000 feet of boat launching ramps, marinas, docks, or floating fishing piers which are accessible by the public."[1] Water District #20's raw water intake measures on a city plat map, approximately 780 feet to the South from the gas dock and Stratus Properties raw water intake is approximately 680 feet to the North of the gas dock. Water District #20's board has opposed the redevelopment of the Pier in a letter to the City of Austin Feb 14, 2006.

The marina and fuel sales at the Pier location were in a grand fathered zoning environment that use was non-conforming for its current zoning. I find gas service and marina service unacceptable to continue under variance or waiver since the use of all of the marina type docks and structures have become "abandon" as defined by City of Austin inactivity standard of 90 consecutive days[2]. The restaurant has been closed since Oct of 2005 and a locked gate has been constructed blocking vehicle access by road. Service of all types has ceased. Video of the zoning commissions public hearing shows city staff affirming to the zoning commission that the marina use had become abandon during the public hearing on April 4, 2006. "A person may not resume an abandoned non-conforming use.[3]"

Their desire to build a new restaurant, have boat storage and become a public tourist recreation area will surely fall under the restrictions mandated by State law. I would plea that no further wavier or variance for this type of operation adjacent to two large public water districts be granted or continued. I wish to respectively request the zoning review department staff move for a disapproval based upon the above facts of law.

Thank you

Terry Barnes

[1] Texas Administrative Code Title 30, Part 1, Chapter 290, Subchapter D, Rule 290.41, Subchapter (e)
[2] City of Austin Land development code 25-2-945 sub (A) (2)
[3] City of Austin Land development code 25-2-945 sub(C)

37

Rousselin, Jorge

From: Terry Barnes [redacted]
Sent: Monday, November 06, 2006 2:14 PM
To: Rousselin, Jorge
Subject: Emabarcadero as related to the Pier project.

Mr. Rousselin

The link below will take you to the marketing web site for the Embarcadero project (C81-06-0506) on River Hills road. This tract abuts the Pier property (C814-06-0202). It appears as only a development assessment has been filed but the owners are currently offering the tracts for sale, or it appears that way from their web site. The Embarcadero project is from the Sutton Company of Austin.(http://www.suttoncompany.com/) The Sutton Company is also one of the owners of the Pier project, as is Eric Moreland. Mr. Moreland is the real estate firm representing the Embarcadero project.

The two projects are in concert with each other although not at first evident, and marketing strategy and lot price are driven as having Lake Austin access, complete with boat storage stalls for each new homeowner.
I would plea that consideration be given to the development of land along Lake Austin not circumvent the zoning process as to how boat docks and marinas are placed only to find out later that the true motives were to inflate the land prices of land that normally does not have waterfront access.

In viewing the Embarcadero web site they have an error in programing, in order to fully view the page it needs to be displayed in a very large window in order for the links to navigate the site to be view able at the bottom of their home page. These links take you to their story line, lot plans and real estate contact.

http://www.embarcaderoaustin.com/

Terry Barnes

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City of Austin www.cityofau
Watershed Protection and Development Revi
Environmental Resource Management Div.
505 Barton Springs Rd., 11th Floor, Austin, TX
P.O. Box 1088, Austin, TX 78767

MICHAEL P. KELLY, P.E.
Civil Engineer

512 974-6591 Fax 512 974-2846
mike.kelly@ci.austin.tx.us

1.6.2 General Design Guidelines

The following section discusses general design parameters which most BMP water quality controls have in common. These parameters include the volume of run-off which is to be treated, a method to isolate this volume, and liner requirements.

A. ***Water Quality Volume.*** The primary control strategy for water quality basins is to capture and isolate at least a minimum volume of storm water runoff for treatment. The minimum volume is the first one-half (0.5) inch of runoff plus an additional one-tenth (0.1) inch for each ten (10) percent increase of gross impervious cover over twenty (20) percent within the drainage area to the control. This depth of runoff from the contributing drainage area to the control is and will be referred to as the "Water Quality Volume." The water quality volume must consist of runoff from all impervious surfaces such as roadways, parking areas and roof tops, and all developed pervious areas. Water quality treatment is not required for runoff from lands left in their natural state, e.g., greenbelts and open spaces. Runoff from these areas must be routed around the water quality basin or it must be included in the water quality volume. Off-site contributing drainage should be routed around the water quality basin. If this is not done, off-site contributing areas must be included in the water quality volume or a hydrologic study must be presented which indicates insignificant mixing with the on-site water quality volume. A separate case from the above is a commercial subdivision. Since development on individual lots in commercial subdivisions will incorporate water quality controls, the water quality volume for roadways in commercial subdivisions may be based on only the likely contributing drainage area of the roadway after the lots are developed. That is, contributing drainage to roadways from the individual lots does not have to be included in the water quality volume for a commercial subdivision provided that the total drainage area contributing to the roadway pond does not exceed fifty (50) acres. Section 1.6.10 includes example calculations for determining water quality volumes.

Because travel time from distant contributing areas reduces the effectiveness of the water quality controls in capturing all of the water quality volume, a maximum contributing drainage area of fifty (50) acres per water quality control basin is recommended.

B. ***Water Quality Volume Diversion Structures.*** Off-line water quality controls are required to have a diversion structure or splitter box which will capture and isolate the water quality volume. A typical approach for achieving isolation of the water quality volume is to construct an isolation/diversion weir in the storm water channel such that the height of the weir equals the elevation of the water quality volume in the pond. When runoff in excess of the water quality volume enters the storm water channel it will spill over the isolation/diversion weir with minimal mixing with the already isolated water quality volume. The splitter design must be capable of passing the peak flow rate of a twenty-five (25) year storm into the water quality pond, and pass the peak flow rate of the one-hundred (100) year design storm past the basin without overtopping the pond walls.

Figures 1-48 through 1-50 in Appendix V of this manual present examples of these structures.

C. ***Basin Liners.*** *All wet ponds require an impermeable liner.* Impermeable liners are also required for water quality basins located over the Edwards Aquifer Recharge Zone and in areas where there is surface runoff to groundwater conductivity. Impermeable liners may be clay, concrete, geosynthetic clay liner (GCL), geomembrane, or other approved liner, depending on the application. The analysis and design should entail a comprehensive review of the site specific conditions to determine the most appropriate type of liner for the site, and should include a stability analysis of the pond side slope. The guidelines below must be used for the design of liners for wet ponds, sedimentation basins, filtration basins, and retention ponds as applicable. The criteria in item 1 is applicable to any size basin or pond, while the criteria in item 2 may be applied to sedimentation basins, filtration basins and retention ponds that are less than 1,000 square feet in area. When required for sedimentation/filtration basins, the liner must underlie both the sedimentation basin and filtration basin and any gabion wall areas.

1. Wet Ponds, Sedimentation Basins, Filtration basins, and Retention Ponds

There are a number of important engineering design and construction considerations for wet pond liners and other basin liners. A geotechnical engineer must be involved in all aspects of the liner design. All liner studies, plans, details, specifications and other related documents must be sealed by a geotechnical engineer. Careful attention must be paid to each of the following areas:

- **Liner subgrade** – A stable subgrade is very important in the construction of the pond or basin. Careful evaluation must be conducted to ensure the liner will be placed on a suitable base. If any voids are encountered, proper geotechnical analysis must be performed to ensure that the integrity of the liner can be maintained. Proof rolling must be conducted as necessary to determine the suitability of the subgrade, and any suspect areas must be reworked and recompacted, or the weak soils removed and replaced with suitable fill material. ~~Native clays must be screened to remove particles exceeding 0.25 inch diameter.~~ The subgrade for geomembrane or GCL must be smooth and contain no particles greater than 0.375 inch diameter.

- **Liner characteristics** – At least ~~two~~ three types of liners can be considered, including a clay liner of appropriate thickness and permeability, ~~and~~ a geomembrane liner, and GCL. Alternative liner designs may also be considered.

    - If **geomembrane** is used, it must have a minimum thickness of thirty (30) mils and be ultraviolet resistant. Use of a geomembrane also requires that a suitable geotextile fabric ~~must~~ be placed on the top and bottom of the membrane for puncture protection if any particles greater than 0.375 inch are present in the cover soil or subgrade surface, respectively. The geotextile material must have a minimum unit weight of 8 oz./~~S~~sq. ~~Y~~yd., ~~and a minimum filtration rate of 0.08 in./sec. The fabric must have~~ a minimum puncture strength of 125 lbs., a minimum Mullen Burst Strength of 400 psi, and a minimum tensile strength of 200 lbs. ~~The equivalent opening size must be No. 80 minimum.~~ The designer must demonstrate the liner's impermeability, and the method of liner protection to be used during maintenance and sediment removal operations. Equivalent methods for protection of the geomembrane liner will be considered by the Watershed Protection and Development Review Department on a case by case basis. Equivalency will be judged on the basis of ability to protect the geomembrane from puncture, tearing and abrasion. Figure 1-56 in Appendix V of this manual illustrates this placement. Individuals installing geomembrane liners must be trained and/or certified by the liner manufacturer. Figure 1-56B and 1-56C in Appendix V of this manual present

examples of geomembrane liner end details for use on concrete walls, stacked stone walls, and earthen embankments.

- If a **clay** liner is used, it must be designed for the site-specific conditions by a geotechnical engineer, and must have a minimum thickness of twelve (12) inches or greater. Coefficient of permeability must be ~~1x10^{-6}~~ 1x10^{-7} cm/sec or less. Other parameters must be as follows: ~~P~~plasticity index of not less than ~~20~~15 ~~and not more than 30~~; ~~L~~liquid limit of not less than 30; and ~~must have~~ at least 30% clay particles passing the No. 200 sieve, with a maximum particle size of ~~0.25~~ 1 inch. Soil must be processed to reduce clod size as much as possible prior to compaction and compaction of the lifts must be done using footed rollers. Clay compaction must be no less than 95% of Standard Proctor Density at or above optimum moisture content or 90% of Modified Proctor Density at a moisture content between 1% dry and 3% wet of optimum. Soil sampling and testing must be conducted on both the borrow source samples as well as the installed liner. Liner material verification sampling and testing should occur a minimum of four times during liner construction (initial, 25% complete; 50% complete and 75% complete). In-situ materials may be used if it can be demonstrated that all required liner parameters will be met. If the clay liner is to be overlain by a drainage layer, a suitable geotextile fabric must be placed on the surface of the liner prior to placement of the drainage layer to prevent plugging of the drain by the clay liner. ~~If a clay liner is used, suitable geotextile fabric shall be placed on top for puncture protection.~~ Figure 1-56A in Appendix V of this manual illustrates this placement.

- Geomembrane or GCL ~~l~~Liner placement over excavated rock requires installation of protective material to prevent damage to ~~a geomembrane or clay~~ the liner. Examples of protective material include spray-on fiberglass, additional clay liner material, or placement of a geosynthetic fabric.
- An **alternative liner design** may be approved by the Director of the Watershed Protection and Development Review Department if it can be demonstrated by the responsible party that the liner is at least equivalent to or exceeds the above requirements.

- **Handling of liner penetrations** - ~~Locations of l~~Liner penetrations are one of the areas of the pond or basin that are most susceptible to leakage ~~and should be avoided or minimized wherever possible.~~ It is critical that the design and construction of these areas pay special attention to liner continuity around these interface points. Detailed analysis must be performed related to the handling of all areas of liner penetrations such as pipe inlet and outlet structures, headwalls, and areas where concrete access ramps, maintenance and pump pads interface with the liner. Consideration must be given to the need for special applications such ~~as anti-seep collars,~~ gaskets, clay or bentonite plugs, special backfill and compaction, and other measures to prevent leakage around all these areas. Intake pipes should be doubled-walled or lined below the elevation of the water quality volume or permanent pool elevation.

- **Protecting the liner from erosion** – The integrity of the liner, particularly a clay liner, can be severely compromised by any erosion that may occur at the surface of the liner. The design must provide appropriate mechanisms to prevent erosion of the liner at all areas, including the inlet structure and the separation berm between the forebay and main pool of wet ponds. Additionally, the liner must be continuous under wet pond separation berms to minimize the potential for leakage at the equalization/interbasin pipe.

- **Protecting the liner against damage and loss of moisture** – It is imperative that the clay liner be kept moist during construction and prior to the time the basin is filled. Otherwise, cracks can develop in the clay, particularly during the hotter months of the year, thereby rendering it susceptible to leakage. For wet ponds, pProvisions must be included in the construction documents that require the contractor to protect the liner against loss of moisture until the basin is completely filled. For all ponds, damage to unprotected clay, GCL, or geomembrane liners can also occur due to passage of equipment during construction or during future sediment removal and maintenance operations. To minimize the possibility of damage and drying, all liner designs should include a protective soil layer over the liner with a minimum thickness of 12 inches for clay liners, and 24 inches for GCL and geomembrane (the 24-inch thickness can be reduced for liners which are never to undergo traffic by heavy equipment or are otherwise protected from heavy equipment). The protective cover layer includes 4-inches of topsoil per City of Austin Landscape criteria.

- **Liner Plans and Specifications** – The engineer must prepare the necessary plans and specifications to provide the contractor clear direction for the construction of the liner and all related components. Construction details must be included for all liner cross-sections, penetrations, and any other areas requiring special attention and/or guidance to ensure proper construction. A scale drawing of the area to be lined, including a grid established across the base and side slopes of the pond or basin with target elevations shown, must also be prepared by the engineer. This grid will provide a basis for verification of liner thickness during construction and will be used for the purpose of recording elevation data prior to placement of the initial lift and following placement of the final lift. All required testing, standards, procedures, and material properties must be spelled out in detail in the documents. Parties who are responsible for any surveying, sampling, testing and other verification requirements must be identified in the documents.

- **Groundwater Control** – Liners constructed below groundwater will require dewatering as necessary to allow construction of the liner. To prevent damage to the liner due to uplift pressures after termination of dewatering or during future maintenance, the liner must included placement of sufficient soil ballast or additional thickness of clay liner to resist any uplift pressures.

- **Construction Quality Assurance/Quality Control Plan** – A construction Quality Assurance/Quality Control (QA/QC) Plan must be prepared by the engineer for the purpose of providing a basis for all construction/installation and testing of the liner system during the liner construction process. The QA/QC plan must be approved by the City prior to liner construction.

    - For clay liners, the QA/QC plan must include, but not be limited to, the following items: **recordkeeping documents**, including daily construction reports, inspection and test data sheets, non-conformance and corrective measure reports, design and specification changes, and all other documentation accumulated by inspection personnel during construction; **pre-construction soil sampling, testing and documentation protocol**, including the type of information to be documented for each sample, and the test procedures to be used; **protocol during construction**, including the monitoring of the subgrade, as well as material placement (including items such as density testing and moisture content, lift thickness and bonding, processing of soil and reduction of clods, footed compaction equipment, and number of passes of compaction equipment), sampling and testing procedures, frequencies and other requirements; Also, the handling

of any liner perforations as a result of various types of testing must be addressed along with guidance on how to address any deficiencies that may be discovered, including corrective measures to be taken.

o For geomembrane and GCL liners, the QA/QC plan must include, but not be limited to, the following items: **geomembrane/GCL manufacturing and delivery data requirements**, including raw materials properties, ~~geomembrane~~ roll and production quality assurance and control data requirements, along with transportation, handling and storage requirements, and conformance testing; **installer qualifications requirements; ~~membrane~~ installation requirements,** including surface preparation, system anchorage, geomembrane/GCL placement (including, but not limited to panel identification, placement and installation schedule), seaming information (including, as applicable to geomembrane or GCL, ~~but not limited to~~ seam layout, preparation, equipment, weather conditions, trial welds, general procedures, non-destructive testing and destructive testing), identification of defects and repair procedures, and geomembrane/GCL acceptance procedures.

• **Soils and Liner Evaluation Report (SLER), Geosynthetic Clay Liner Evaluation Report (GCLER), or ~~Flexible Membrane~~ Geomembrane Liner Evaluation Report (~~FM~~GLER) –** All liner construction and QA/QC activities must be under the supervision of an independent licensed engineer with experience in geotechnical engineering. The engineer or his representative must be on site for all liner construction and testing. Following completion of the liner construction, ~~an~~ SLER, GCLER, or ~~FM~~GLER (as applicable for the type of liner installed) must be prepared under the direction of and sealed by the engineer and submitted to the City. The report is intended to provide documentation of all installation methods and testing procedures conducted during the installation of the liner and to provide evidence that the liner was constructed in accordance with the construction plans, technical specifications and QA/QC plan.

• **Water Level Monitoring for liner integrity verification in wet ponds** – After the filling and installation of aquatic vegetation in a wet pond, the water level of the permanent pool shall be measured monitored for a minimum of eight weeks. The engineer shall specify the method and frequency of monitoring, and the responsible party for conducting water level monitoring. The engineer shall perform a water balance, as specified in 1.6.6.C. 5, to determine that the water loss does not exceed anticipated losses from calculated liner leakage, evaporation, plant transpiration and discharge. All monitoring data and calculations must be documented and submitted to the City of Austin for review.

2. Sedimentation Basins, Filtration Basins and Retention Ponds less than 1,000 square feet in area.

Concrete liners may be used for sedimentation basins, filtration basins and retention ponds less than one-thousand (1,000) square feet in area. Concrete must be five (5) inch thick Class A or better as defined in the City of Austin Standard Specifications and must be reinforced by steel wire mesh. The steel wire mesh must be six (6) gauge wire or larger and six (6) inch by six (6) inch mesh or smaller. An Ordinary Surface Finish (as specified in Item 410.25 of the City of Austin Standard Specifications) is required. When the underlying soil is clay or has an unconfined compressive strength of one-quarter (0.25) ton per square foot or less, the concrete must have a minimum six (6)

inch compacted aggregate base consisting of coarse sand and river stone, crushed stone or equivalent with diameter of three-quarters (0.75) to one (1) inch. Where visible, the concrete must be inspected annually and all cracks must be sealed.

1.6.3 Maintenance and Construction Requirements

A. ***Maintenance Responsibilities.*** Proper maintenance is as important as engineering design and construction in order to ensure that water quality controls will function effectively. Section 25-8-231 of the Land Development Code requires maintenance be performed on water quality controls facilities when necessary as defined by this section.

Water quality controls required for commercial and multi-family development shall be maintained by the property owner.

~~Maintenance of full sedimentation/filtration basins~~ Water quality control facilities for single family or duplex residential development shall be maintained by the City of Austin once the facilities have been released by the City, unless otherwise ~~approved~~ determined during the review process. For the City to release a water quality control facility, the facility must:

1. be constructed per the approved development plan;
2. meet all applicable requirements of 1.6.3 B, 1.6.3 C of the ECM and 1.2.4 E. of the DCM;
3. complete a one-year warranty period, including the completion of all maintenance and rehabilitation activities identified by the Watershed Protection and Development Review Department; and
4. obtain final warranty release approval from the Watershed Protection and Development Review Department.

The City will ~~be responsible for the maintenance of ponds~~ also maintain water quality control facilities designed to service primarily publicly owned roads and facilities. These ~~ponds~~ water quality control facilities must be designed and built according to the ~~full sedimentation/ filtration~~ appropriate city standards ~~configuration~~.

B. **Maintenance Requirements - Design and Construction.** The design of drainage facilities (including but not limited to headwalls, open channels, storm sewers, area inlets, and detention, retention and water quality controls and their appurtenances) shall comply with the requirements of Section 1.2.4.E of the Drainage Criteria Manual. In addition, drainage facilities shall comply with the following construction requirements:

1. Drainage or drainage access easements on side lot lines shall be located adjacent to a property line and not centered on a property line.
2. Points of access to water quality facilities shall have a standard City of Austin residential concrete driveway approach and curb cut on the abutting street. A pipe gate is required at the end of the driveway at the ROW limits. See Figure 8-8 of the Drainage Criteria Manual for details.

3. Retention and water quality facilities shall have a staging area not less than eight-hundred (800) square feet in area if the storage volume of the pond exceeds two-thousand (2,000) cubic feet. The staging area shall be located adjacent to the detention, retention or water quality facility, and access drive and be within an access easement. The staging area may be cleared, graded and revegetated, with slopes not exceeding ten (10) percent in any direction.

4. All pond bottoms, side slopes, and earthen embankments shall be compacted to ninety-five (95) percent of maximum density in accordance with COA Standard Specifications. Side slopes for earthen embankments shall not exceed three to one (3H:1V). Rock slopes may exceed these limits if a geotechnical report warrants a deviation. Actual field conditions may override the geotechnical report. Concrete walls shall be built to COA Standard Specifications. Expansion joints on free standing walls shall have water tight seals as needed. Earthen pond and channel bottoms must have slopes greater than two (2) percent.

5. Free-standing structural walls/facilities located on or adjacent to a residential lot shall not be greater than six feet in height.

6. Refer to section 8.3.4 of the Drainage Criteria Manual for additional safety criteria for storm water management facilities, including water quality facilities and storm water management infrastructure.

7. Sediment removed from detention, retention, or water quality facilities may be disposed of on-site if properly stabilized according to the practices outlined in the erosion and sedimentation control criteria found in Section 1.4.0 of this manual. An off-site disposal site must either be an approved landfill or be issued a permit through the Watershed Protection and Development Review Department.

8. The temporary erosion and sedimentation control plan must be configured to permit construction of detention, retention or water quality facilities while maintaining erosion and sedimentation control.

9. ~~No~~ If runoff is to enter the ~~sand~~ filtration chamber of ~~the~~ a water quality ~~sedimentation/filtration basin~~ control facility prior to completion of site construction and revegetation., ~~Construction runoff may be routed to the sedimentation chamber but outflow from this structure shall bypass the sand filtration basin. It should be noted that good~~ inspection and maintenance of all temporary erosion/sedimentation controls are ~~essential~~ required, as described in the Environmental Criteria Manual Section 1.4.1.2.E.3, to prevent heavy sediment loads caused by home construction from clogging the filtration media.

10. In all cases, trees shall be preserved according to the requirements of Section 3 of the Environmental Criteria Manual. The access drive and staging area shall be designed to preserve trees 8" (inches) in diameter and greater to the maximum extent possible. Trees 8" in diameter and larger shall be surveyed and shown for the proposed access easement at the time of construction plan permitting.

C. **Major Maintenance Requirements.**

1. Sedimentation and Detention Basins.

a. Silt should be removed when the accumulation exceeds six (6) inches in sediment basins without sediment traps. In basins with sediment traps, removal of silt shall occur when the accumulation exceeds four (4) inches in the basins, and the sediment traps shall be cleaned when full. In detention basins, silt shall be removed and the basin restored to original lines and grades when standing water conditions occur or the basin storage volume is reduced by more than 10%.

b. Accumulated paper, trash and debris should be removed every six (6) months or more often as necessary to maintain proper operation.

c. Vegetation within the basin shall not exceed eighteen (18) inches in height at any time, except as called for in the design.

d. The basin shall be inspected annually and repairs shall be made if necessary.

e. Corrective maintenance is required any time a sedimentation basin does not drain the equivalent of the Water Quality Volume within sixty (60) hours (i.e., no standing water is allowed).

f. Corrective maintenance is required any time the sediment trap in a sedimentation basin does not drain completely within ninety-six (96) hours (i.e., no standing water is allowed).

g. To limit erosion, no unvegetated area shall exceed 10 square feet.

h. Structural integrity of basins shall be maintained at all times.

2. Filtration Basins.

a. Accumulated paper, trash and debris should be removed every six (6) months or as necessary.

b. Vegetation within the basin should not be allowed to exceed eighteen (18) inches in height at any time ~~except as called for in the design~~. This requirement does not apply to Biofiltration Ponds, Rain Gardens, or Water Quality controls that require the physical properties of mature plants for the removal of pollutants from storm water runoff. However, channels designed in accordance with Drainage Criteria Manual Section 6.3.2 still must adhere to the vegetation height limit of 18 inches. In addition, no trees or woody vegetation shall be allowed on a dam (or levee/floodwall). The definition of a dam is found in the Drainage Criteria Manual Section 8.3.4. Refer to Drainage Criteria Manual Section XXX (to be developed) for additional restrictions on vegetation related to dam safety.

c. Corrective maintenance is required any time draw-down does not occur within thirty-six (36) hours after the sedimentation basin has emptied.

d. The basin should be inspected annually and repairs should be made if necessary.

3. Wet Ponds.

Due to the nature of wet ponds being full of water when in operation, the need for maintenance is not easily visible. However, when the ponds are built in stable

upland areas, the need for maintenance of these ponds should be infrequent. Accumulation of sediment in the basin is the primary reason the pond will require intensive maintenance. Because of this, very careful attention should be paid to adequate, well-maintained erosion and sedimentation controls in the contributing drainage area during construction. This, in combination with the sediment forebay, should prevent the requirement of maintenance of the main pool soon after the pond is put online. The following are guidelines for pond maintenance:

During Site Construction - The sediment load to the sediment forebay shall be closely monitored after every storm event. If heavy sediment loads are detected during an inspection, the source should be corrected. Sediment shall be removed from the sediment forebay when one-third of the forebay volume is lost.

Upon Completion of Site Revegetation - Any sediment build-up (greater than 5% volume loss) shall be removed from the forebay upon completion of site revegetation. The sediment build-up in the main pool shall be checked and if more the ten- percent of the volume is lost, it should be cleaned at that time.

Every Three Months for the First Two Years - During the three month initial inspection cycle, if more than fifteen percent of the volume of the forebay is lost, it shall be cleaned at that time.

Every Three Months - Turf areas around the pond should be mowed. Accumulated paper, trash, and debris shall be removed every three months or as necessary. Cattails, cottonwoods, and willows can quickly colonize shallow water and the edge of the pond. These species, or any areas of plant overgrowth may be thinned at this time or as needed.

Annually - The basin should be inspected annually for side slope erosion and deterioration or damage to the structural elements. Any damage shall be repaired. Large areas, which have dead or missing vegetation, shall be replanted.

Every Three Years - The sediment build-up in the sediment forebay shall be checked. The sediment forebay shall be cleaned if more than one-third of the forebay volume is lost.

Every Six Years - The sediment build-up in the main pool shall be checked. Sediment shall be removed from the main pool when twenty percent of the main pool volume is lost.

4. Retention-Irrigation Systems.

   a. Sediment must be removed from the retention basin, splitter box and wet wells, when accumulations exceed six (6) inches in depth.

   b. To the greatest extent practicable, irrigation areas are to remain in their natural state. However, vegetation must be maintained in the irrigation area such that it does not impede the spray of water from the irrigation heads. Tree and shrub trimmings and other large debris must be removed from the irrigation area in order to harvest and remove nutrients from the system. See requirements in 1.6.7.D.3.(g) and (h) regarding requirements for soil and vegetation in irrigation areas.

c. The pumps and irrigation system must be inspected or tested a minimum of six (6) times per year to show all components are operating as intended. In particular, sprinkler heads must be checked to determine if any are broken, clogged, or not spraying properly. All inspection and testing reports must be kept on site and accessible to the City of Austin.

1.6.4 ~~Types of Water Quality Controls and Selection Criteria~~ Structural Control Standard and Criteria for Fee-in-Lieu of Structural Controls in Urban Watersheds

A. Introduction. Sedimentation/filtration is the primary structural water quality control to reduce non-point source pollution in Urban, Suburban, Water Supply Suburban and Water Supply Rural Watersheds. In the Barton Springs Zone, non-degradation water quality controls are required (Please refer to Section 1.6.9 for design criteria for non-degradation controls). Innovative controls may be acceptable pursuant to § 25-8-151 of the Land Development Code (Innovative Management Practices). However, these systems must be approved by the Director of the Watershed Protection and Development Review Department (WPDR). The guidelines for several alternative controls are described in section 1.6.7.

~~A. *Sedimentation/Filtration Systems.* Sedimentation/filtration systems are the primary water quality control structures. In these systems, the water quality volume is directed to a sedimentation structure followed by a filtration basin; subsequent additional runoff is diverted to a stormwater detention basin as specified in the Drainage Criteria Manual. The sediment basin is required prior to the filtration basin in order to ensure the long term effectiveness of these systems by protecting the filter media from excessive sediment loading. Two configurations of filtration systems are described in Section 1.6.5.~~

~~In full sedimentation/filtration systems, the sedimentation structure is a basin designed to hold the entire water quality volume and to release the water quality volume to the filtration basin over an extended draw down period.~~

~~In partial sedimentation/filtration systems, a sedimentation chamber is located upstream of the filtration basin which is not required to hold the entire water quality volume and will not incorporate an extended draw down period. This system is designed to remove the heavier sediment and trash litter only and may require more intensive maintenance than the full sedimentation systems. However, partial sedimentation/filtration systems require less depth than the full sedimentation system and may be applicable where topographic constraints exist.~~

~~Full sedimentation/filtration systems shall be required where the City is responsible for maintenance unless topographic constraints make this design unfeasible. Unfeasible is considered: assuming (for the purposes of this selection process only) a maximum ponding depth of three (3) feet in the sedimentation basin, if it is not feasible to obtain an outlet for the drainage from the filtration basin within one hundred (100) feet of the crest of the filtration embankment, then the partial sedimentation/filtration configuration system may be used. If the City is not to be responsible for maintenance of the pond system, either configuration is allowable.~~

~~B. *Wet Ponds.*~~

~~The design of wet ponds for stormwater quality and quantity control may, more than any other control, requires more planning and thoughtful design. When properly designed, wet ponds are~~

~~highly effective in removing stormwater pollutants and can add to the aesthetics of a site or neighborhood. These systems can also be used when the grade of the site is relatively flat. A drawback with these systems can be the long-term maintenance of the facility. Proper measures must be taken to reduce the sediment load, which can be the largest single factor which contributes to the need for maintenance of a wet pond.~~

~~The design goal for wet ponds is to have a permanent pool with an average minimum hydraulic residence time of 14 days. This capturing and holding of runoff allows settling of suspended solids and biological uptake of nutrients.~~

~~Section 1.6.6(C) outlines the design criteria for wet ponds. When wet ponds are designed to this criteria, they are assumed (based upon local monitoring data) to provide a level of water quality treatment equivalent to sedimentation/filtration. Specific removal efficiency information will be provided when additional monitoring data is available.~~

~~A wet pond, when designed and maintained according to the following criteria, will not become a critical environmental feature as defined by the City of Austin.~~

~~D.~~

B. *Criteria for Acceptance of Fee-in-Lieu of Structural Controls.*

Urban Rule for Water Quality Controls. The City recognizes that incorporating structural water quality control facilities into some urban watershed land development projects can be difficult. In response to these challenges, Section 25-8-214(C) of the Land Development Code requires the Director to review and accept or deny projects to pay into the Urban Watersheds Structural Control Fund in lieu of on-site controls. The funds received under this program have and will be used to study, design, implement, and construct urban water quality improvement projects. This program is only for development within an urban watershed as defined by Section 25-8-2 of the Land Development Code.

1. Urban Watersheds Structural Control Fund Acceptance Guidelines

   a. Categories for Participation

      Type I – The City will strongly consider allowing urban developments that are classified as Type I to participate in the fee-in-lieu program. Type I development features include, but are not limited to one or more of the following:

      - Commercial development sites of 1 acre or less
      - Single family development of subdivisions 2 acres or less
      - Development with run-off that sheet flows over pervious cover, prior to being concentrated
      - Development that is likely to be treated by an existing or future regional water quality facility

      Type II – The following Type II developments will in most cases be required to satisfy the water quality requirements through the use of on-site water quality

controls. Type II development features include, but are not limited to one or more of the following:

- No or minimal existing impervious cover
- Substantial redevelopment
- Adjacent to an open channel stream
- Within 500 feet of Town Lake

b. Special Conditions. In addition to the specific criteria given above, the applicant should note the following conditions which could arise:

- Should a regional facility be committed to its maximum capacity, an applicant may (at the City's discretion) increase the capacity through approved modifications. The funding of any such modifications will be the responsibility of the applicant, and shall be credited towards any fees that are required.
- Existing on-site water quality facilities may be removed if the development is approved to participate in the fee-in-lieu program and the WPDRD approves such removal.

c. Participation Fees. Participation fees are calculated by the applicant at the time of project submittal. The fee schedule will be posted within the Land Use Review Division. Any increase will be posted at least 30 days prior to enactment. The present fees for participation are listed in Appendix T and are revised by the annual adjustment factor based on the construction cost index. Participation fees received under this program will be used by the City to study, design, implement, and construct urban water quality improvement projects.

After a development is accepted for participation, fees shall be paid in accordance with the following:

Commercial Site Development.
For commercial site development, payment (cash or cashier check only) must be made prior to issuance of a development permit.

Single Family and Duplex Subdivisions.
For single-family subdivisions which do require the construction of streets or drainage facilities, a letter of credit must be posted with the Watershed Protection and Development Review Department in an amount equal to the total participation fee prior to final plat approval. This letter of credit must be replaced by cash prior to construction plan approval. For single-family subdivisions which do not require the construction of streets, payment (cash or cashier check only) must be made prior to final plat approval.

In conjunction with payment of fees, the agreement shown in Appendix T shall be signed and act as a binding agreement between the applicant and the City.

~~E. **Retention/Irrigation Systems.** Retention/Irrigation systems are designed to capture the required water quality volume and irrigate it on a designated area over a specified period of time following a rain event. This method of treatment may be used to comply with the requirements~~

~~for meeting the non-degradation standards applicable in the Barton Springs Zone found in Section 1.6.9.3 of this manual.~~

~~G. *Vegetative Filter Strips.*~~

1.6.7 ~~Alternative~~ Innovative Water Quality Controls

Introduction

Innovative, or alternative, water quality controls are eligible for water quality credit pursuant to § 25-8-151 of the Land Development Code (*Innovative Management Practices*). The following innovative practices have been reviewed and approved by the Watershed Protection and Development Review Department. Acceptance of and the amount of credit allowed for such practices is based on :

- technical merit
- compliance with requirements for water quality protection and improvement
- resource protection and improvement
- advantages over standard practices
- anticipated maintenance requirements

In urban watersheds the amount of credit for the practices described below can be applied as either a reduction in the size of a water quality control or a reduction in the fee-in-lieu cost. The basic credit equation is:

WQC = IAF * BMPDF

- WQC = Water Quality Credit, a value between 0 and 1, with 1 meaning 100% credit
- Where IAF is the Impervious Area Factor, or the fraction of total impervious area treated by the control.
- BMPDF is the BMP Design Factor, a measure of the degree of design equivalency with sedimentation-filtration systems. Values are on a scale of 0 to 1, with 1 meaning 100% credit.

For two of the practices, porous pavement for pedestrian use and non-required vegetation, the water quality credit can only be applied as a reduction in site impervious cover.

The BMPDF factor will vary with each individual innovative control, as described below. Credit may be restricted or disallowed in some cases for watersheds in the Barton Springs Zone and Barton Springs Contributing Zone.

A. **Retention/Irrigation Systems.** A retention/irrigation water quality treatment system consists of two primary components: (1) a basin which captures and isolates the required volume of stormwater runoff; and (2) a distribution and land application system which generally utilizes pumps, piping and spray irrigation components. When properly designed, this system is effective in removal of pollutants through settling in the retention basin and contact with vegetation, air

and soils in the irrigation process, as well as in mitigating stream-bank erosion as required by Section 1.6.8 of the Environmental Criteria Manual. The effectiveness of this BMP at meeting required pollutant removal efficiencies is based upon the following criteria being met.

1. Minimum Design Criteria for the Retention Basin. Information on water quality volume, diversion structures, and lining requirements can be found in the Environmental Criteria Manual Section 1.6.2, General Design Guidelines. In addition, applicable requirements of Section 1.6.3, Maintenance and Construction Requirements must be incorporated in the design.

a. Retention Basin Volume. The basin must be of sufficient size to capture and hold the required capture volume. Retention basins are designed to capture and hold the water quality volume routed to them via diversion structures. For development in the Barton Springs Zone, refer to Section 1.6.9.3E. of this manual for the required capture volume.

b. One-Hundred Year Storm. A bypass capable of conveying the 100-year storm around the basin must be provided.

c. Lining. A liner may be required for a retention basin in accordance with Section 1 of the ECM. The liner must be designed in accordance with Environmental Criteria Manual Section 1.6.2C., Basin Liners.

d. Erosion Prevention. The inlets to the retention basin must be designed to prevent erosion of the soil and liner. Rock rip-rap or other erosion prevention systems must be placed at the basin inlet to reduce velocities to less than three feet per second.

e. Access Ramp. A maintenance access ramp, as described in Environmental Criteria Manual Section 1.6.3, is required for all facilities.

2. Minimum Design Criteria for Wet Well and Pumps.

a. Pumps.

(1) The retention basin must be emptied by pumping within 72-hours after a rain event ends. Emptying of the retention basin must not begin sooner than 12 hours after the end of the rainfall event.

(2) Pumps must be capable of delivering the required volume of water at the necessary rate and pressure to the irrigation system in the designated time period. Pumps and wet well must be sized to minimize the number of on and off cyclings of the pumps.

(3) A dual pump system must be provided, with each pump capable of delivering 100 percent of the design capacity. Plug valves must be located out side the wet well on the discharge side of each pump to isolate the pumps for maintenance and for throttling if necessary. Butterfly valves and gate valves must not be used. Pumps must be selected to operate within 20% of their best operating efficiency.

(4) The pumps must alternate on start up. A manual control must be provided so both pumps can be turned on if necessary. A high/low-pressure pump shut off system (in case of line clogging or breaking) shall be installed in the pump discharge piping.

(5) Float controls or submersible transducers must be provided to control operation of the pumps. Three control settings must be used: (1) one for starting the pump, (2) one for shutting off the pump at the normal low water level, and (3) one for back up shut off of the pump in case the first shut-off fails.

(6) An alarm system shall be provided consisting of a red light located at a height of at least five feet above the ground level at the wet well. The alarm shall activate when:

(a) The high water level has been maintained in excess of 72 hours.

(b) The water level is below the shutoff float and the pump has not turned off.

(c) The high/low-pressure pump shut off switch has been activated.

The alarm must be vandal proof and weather resistant. If the system is to be privately maintained, a sign must be placed at the wet well clearly displaying the name and phone number of a responsible party that may be contacted if the alarm is activated.

b. Wet Well.

(1) A separate wet well outside of the basin must be provided for the pumps. The wet well must be constructed of precast or cast in place concrete. Complete access to the pumps and other internal components of the wet well for maintenance must be provided through a lockable cover. An isolation plug valve to prevent flow from the retention basin to the wet well during maintenance activities must be provided.

(2) Calculations must be provided with the design showing that the wet well will not float under saturated soil conditions. The top elevation of the well must be at or higher than the walls or berms enclosing the retention pond. The wet well and pump must be designed to be low enough to completely evacuate the retention pond and a space of at least two feet must be available below the bottom of the pump. The two-foot minimum space below the bottom of the pump may be waived if the applicant demonstrates that adequate filtration of the water quality volume is provided.

(3) The pump installation in the wet well and access to the wet well must be designed to allow the pumps to be removed using truck-mounted hydraulic hoist equipment or a portable "A-frame." A system must be provided to allow pump removal without entering the wet well. If rails are used they must be stainless steel.

c. Intake Riser. Prior to entering the wet well, stormwater must pass through an appropriate intake riser with a screen to reduce the potential for clogging of distribution pipes and sprinklers by larger debris (e.g. cups, cans, sticks). The intake riser and screen shall be designed as shown in Figure 1-54 in the Appendices of this manual.

3. Minimum Design Criteria for the Irrigation System.

a. Irrigation Timing. The retention basin must be emptied within 72-hours after a rain event ends. Irrigation must be initiated no sooner than 12 hours after the rain event ceases. The irrigation controller must be set to provide alternating, equivalent irrigation

and rest periods until the basin is emptied. The time of irrigation on any area must not exceed the rest time. Continuous application on any area must not exceed two hours. Division of the irrigation area into two or more sections such that irrigation occurs alternately in each section is an acceptable way to meet the requirement for a rest period.

b. Irrigation Rate. The rate at which the soil can accept the irrigated storm water must be derived from the permeability listed in the U.S. Department of Agriculture National Resources Conservation Service Soil Survey for the county, location, and soil type verified to be present at the irrigation site. If a range is given, the minimum permeability rate is to be used, not to be less than .03 inches/hour. Other methods of demonstrating site-specific permeability may be approved by the Director.

c. Irrigation Area. Calculations must be provided which demonstrate that adequate irrigation area will be provided based on the application rate, soil permeability, water quality volume, and the actual irrigation time. For publicly maintained facilities the irrigation area and system must be included within the water quality easement.

d. Irrigation Area Slope. Irrigation must not occur on land with slopes greater than 10%.

e. Piping and Valves.

(1) All irrigation system distribution and lateral piping (i.e. from the pumps to the spray heads) must be Schedule 80 PVC. All pipes and electrical bundles passing beneath driveways or paved areas must be sleeved with PVC Class 200 pipe with solvent welded joints. Sleeve diameter must equal twice that of the pipe or electrical bundle.

(2) Valves. All valves must be designed specifically for sediment bearing water, and be of appropriate design for the intended purpose. All remote control, gate, and quick coupling valves must be located in ten-inch or larger plastic valve boxes. All pipes and valves must be marked to indicate that they contain non-potable water. All piping must be buried to protect it from weather and vandalism. The depth and method of burial must be adequate to protect the pipe from vehicular traffic such as maintenance equipment. Velocities in all pipelines should be sufficient to prevent settling of solids. The irrigation design and layout must be integrated with the tree protection plan and presented as part of the Site Plan or Subdivision Construction Plan.

(3) Systems must include a plug valve to allow flushing at the end of every line.

f. Sprinklers. All sprinkler heads must have full or partial circle rotor pop-up heads and must be capable of delivering the required rate of irrigation over the designated area in a uniform manner. Irrigation must not occur beyond the limits of the designated irrigation area. Partial circle sprinkler heads must be used as necessary to prevent irrigation beyond the designated limits. Sprinkler heads must be capable of passing solids that may pass through the intake. Sprinkler heads must be flush mounted and encased within a 2 feet x 2 feet concrete housing capable of protecting the head from mowing and service equipment (see Appendix V, Figure 1-59F for an example).

g. Vegetation. The irrigation area must have native vegetation or be restored or re-established with native vegetation, unless approved by the Director. These areas must not receive any fertilizers, pesticides, or herbicides. If landscaped areas are used for irrigation, fertilizers, pesticides, or herbicides must not be applied to those areas and this limitation must be outlined in the Integrated Pest Management (IPM) plan. For publicly maintained systems, fencing or signs must be installed to limit unauthorized use of the irrigation area. If signs are installed, they must include the phrase "Stormwater Irrigation Area – No Trespassing."

h. Soil. A minimum of 12 inches of soil, with the identified permeability rates, must be present in the irrigation area. Soil enhancement is allowed to achieve this requirement. A soils report must be provided and must include at a minimum a soils map verifying soil types in the irrigation area, permeability rates, soil depths, percent of coarse fragments gravel size (2.0 mm diameter) and larger, found on the soil surface and in the subsurface soils, depth of roots, locations of borings or trenches, photographs of exposed soils, location and type of soil enhancement performed, soils testing results, etc. A site visit may be conducted by the city to confirm soil conditions, including when representative trenches have been opened or borings are being conducted. City staff must be given at least 72 hours notice of when borings or trenches are to be backfilled.

i. Geological Features. The irrigation area must not contain any Critical Environmental Feature Buffer Zones.

j. Irrigation Area Buffer. A buffer area of un-irrigated vegetation must be provided downstream of the irrigation area to treat any runoff that may occur from the irrigation area during heavy rainfall or from excessive irrigation. This area must be a minimum of 50 feet in length (in the direction of flow) and be adjacent to all downstream edges of the irrigation area. As an option, a diversion system (e.g. a swale or berm) may be provided to route any runoff to the retention basin. This diversion system must be designed to carry the runoff from the two-year storm. Alternatively, the irrigation area may be located upstream from the development such that any runoff will be routed to the retention pond.

4. Manuals and As-Built Plans.

a. The applicant must provide two complete copies of an Operations Manual for the pumps and irrigation system, which must include:

(1) Pump curves, electrical schematics, pump and instrument technical information, components of the control panel, pump maintenance recommendations with required frequencies, irrigation controller operation instructions and a written warranty.

(2) As-built plans of the retention basin, wet well, pumps, piping and irrigation system. The plans must show the location, size, and type of all pipes, valves, wiring, wiring junctions, and sprinkler heads.

For retention-irrigation systems that are to be maintained by the City of Austin, both sets of plans and manuals shall be submitted to the Field Operations Division of the Watershed Protection and Development Review Department.

For systems that are to be maintained privately, one set of plans and one manual shall be included with the operating permit application and the second set of plans and one manual shall be retained on site at all times.

B. **Vegetative Filter Strips.**

1. Introduction. Vegetative Filter Strips (VFS) are typically used in areas with relatively low-density development as a passive low maintenance means of protecting nearby receiving waters from marginally increased pollutant loads. They are designed to treat uncontrolled runoff; the procedures described below should not be used when vegetated areas function as a secondary treatment (e.g. vegetated area receiving discharge from a sand filtration basin). Throughout this division, the acronym VFS and the term filter strip is used when referring to vegetative filter strips. They are referenced in the SOS rules as a method for controlling non-point source pollution in watersheds within the Barton Springs Zone. Vegetative Filter Strips may also be appropriate for use in other watersheds to provide stormwater treatment equivalent to sedimentation/filtration systems. For filter strips to work effectively sheet flow shall be maintained and maximum velocities (see Design Requirements) in the filter strip shall not be exceeded. This requirement will limit the size and/or impervious cover that is practical for treatment. Vegetated areas that are designed to pond runoff are not considered to be Vegetative Filter Strips and will require different design procedures (not described here). The VFS shall be restricted from development or any use that may negatively affect the function of the VFS (e.g. intensive recreational uses, pet use, etc.). This can be accomplished through the dedication of an easement or dedicated conservation lot for single family construction plans and, for site plans, by clearly labeling the VFS area by shading or cross hatching on the site plan sheet(s). In either case, the site plan must contain provisions to physically restrict access to the easement or conservation lot (e.g. fences, bollards, signage). An approved Integrated Pest Management Plan with a recorded Restrictive covenant is required. It is extremely important that the VFS not be over-irrigated and that fertilizer and chemical use be minimized; otherwise the VFS may become a source of pollution instead of a treatment best management practice (BMP).

2. General Design Guidelines. Filter strips must be sized correctly, have the proper slope, utilize sheet flow that does not exceed a maximum velocity, have appropriate soil type and thickness, and have appropriate vegetation of the proper density. The VFS shall not receive runoff until after the contributing drainage area has been stabilized to prevent erosion and sedimentation.

   Filter strips can be classified as either natural or engineered. In general, natural filter strips utilize existing vegetated areas whereas engineered filter strips are constructed features. Engineered vegetative filter strips differ from natural vegetative filters in that they are specifically designed and constructed to maximize the water quality benefits of this practice, particularly in areas where adequate buffers do not exist naturally or cannot be preserved.

3. Design Requirements: Size, Slope and Structure. The width (perpendicular to direction of flow) of the VFS should be as wide as the contributing drainage area.

The hydraulic loading rate applied to the VFS for the two-year, three-hour rainfall event should not exceed 0.05 cfs/ft width, calculated as the peak flow rate divided by the VFS width.

The length (dimension in direction of flow) of the vegetative filter should be at least 25 feet, and limited to a maximum of 100 feet. If this length is exceeded additional flow spreading should be provided to maintain sheet flow conditions.

Vegetative filter strips shall be sized per the following table.

Vegetative Filter Strip (VFS) Sizing Acres of VFS per Acre of Contributing Drainage Area		
Contributing Area Impervious Cover	SOS	Sand Filtration Equivalency
10%	0.21	NA
15%	0.28	NA
20%	0.36	0.32
25%	0.45	0.40
30%	0.55	0.49
35%	0.66	0.58
40%	0.78	0.68
45%	0.90	0.80
50%	1.04	0.91
55%	1.18	1.04
60%	1.34	1.17
65%	1.49	1.31

70%	1.67	1.46
75%	1.84	1.61
80%	2.03	1.77
85%	2.22	1.94
90%	2.42	2.12
95%	2.63	2.30
100%	2.85	2.49

Filter strips should have a minimum slope of 1%. Engineered filter strips should be constructed to maintain a constant slope that does not exceed 10%. Where existing vegetated areas are to be used ("Natural" VFS) the average slope of the VFS should not exceed 10%, with no portion exceeding 15%.

A level spreader device should be used to facilitate overland sheet flow. To ensure that runoff enters the VFS instead of flowing around it, the elevation of the leading edge of the VFS should be lower than the elevation at which flow is discharged from the level spreader.

4. Landscape Elements. Vegetative filter strips shall have a minimum topsoil depth of four inches, but greater depth is preferred. If soil must be added to achieve the minimum depth, the imported soil shall be clean and free of weeds (including seed). Compost-amended soils (25% compost) shall be used when turfgrasses will be used as the vegetation, or if the native soils are classified (per NRCS) as type C or D. The condition, type, structure and quality of the soil shall be conducive to infiltration and to plant growth. Soil, if compacted, must be loosened. Compact soils are defined as those having a reading of greater than 300 psi at a depth of three inches (using a soil compaction penetrometer). Non-compacted soils, or loosened soils, shall have a reading of less than 300 psi.

   The filter strip should have dense vegetative cover (minimum 95% coverage as measured at the base of the vegetation). Suitable vegetation for VFS includes grasses, forbs, shrubs and trees. The use of native grasses is strongly recommended due to their resource efficiency and their ability to enhance soil infiltration. In the case of natural wooded areas where 95% vegetative cover is not present, a minimum of four inches of leaf litter, mulch or other organic matter must be in place. In these areas, lower tree limbs should be removed, the canopy opened and the area seeded with appropriate grasses and forbs in order to enhance ground cover.

Native grasses used for filter strips shall be a minimum of six inches in height (four inches if the VFS slope is 2% or less), unless it can be demonstrated that flow across the strip will not submerge the vegetation. Turfgrasses used for engineered vegetative filter strips shall be a minimum of two inches in height.

Existing vegetation can be used as filter strips if all other design criteria are met. An appropriate selection of plants will vary with site conditions and the user is referred to growgreen.org for guidance regarding appropriate plants and their use. The VFS should not include invasive and pest species (e.g., Johnson Grass). To establish a dense and healthy vegetative cover, temporary irrigation and limited fertilization may be required.

Signage should be provided to delineate the boundaries of the filter strip, and to notify residents, inspection, and maintenance staff of its function and proper management.

5. Maintenance Requirements. Filter strips shall be managed so that a dense, healthy vegetative cover is preserved. Once established, filter strips using native grasses shall be maintained without pesticides and fertilizers. Turfgrass filter strips may be managed with a minimal amount of irrigation and fertilization (not more than 1 lb. of nitrogen per 1,000 square feet per year) however no herbicides or pesticides shall be applied.

   Bare spots and areas of erosion identified during inspections must be replanted and restored to meet specification. If sediment accumulates on the vegetative filter strip then it must be removed. Any disturbance to the filter strip as a result of maintenance procedures (or other reasons) shall be repaired, including re-establishment of the vegetation.

C. Biofiltration.

1. Introduction. Biofiltration ponds are a water quality control best management practice (BMP) that uses the chemical, biological, and physical properties of plants, microbes, and soils for removal of pollutants from stormwater runoff. Biofiltration is a critical component of Low Impact Development (LID). LID is a philosophy of development in which steps are taken to maintain predevelopment hydrology, as near a possible. Green space is made functional to keep storm water onsite, to minimize runoff and to employ natural processes for water quality improvement.

   A biofiltration system utilizes several treatment mechanisms for removing pollutants from stormwater runoff. As with a sand filtration system, a sedimentation basin provides pre-treatment of runoff in order to protect the biofiltration media from becoming clogged prematurely by sediment loads. Likewise, sand filtration and biofiltration both remove pollutants through physical filtration. The primary difference between the two is that the presence of a biological community of plants and microorganism in a biofiltration system can theoretically provide more treatment of runoff. Another benefit of having a plant community is that the permeability of the biofiltration media may be sustained for longer periods of time without maintenance.

The health of the biological (plant and microorganism) community is intimately tied to the soil-water-moisture conditions of the filtration media, thus it is important to have a basic understanding of soil-water-plant dynamics, in particular "available water capacity." During periods of rainfall, soils are often saturated, meaning the pore spaces are largely filled with water. The volume of water held in a saturated soil can be estimated as being equal to the porosity, or the volume fraction of pores. Most soils have similar porosity values, in the range of 0.4 – 0.5, i.e., pores represent 40-50% of the total soil volume. During saturated conditions, plants are largely inactive due to the absence of oxygen in the soil. Once rainfall and runoff have ceased, water will gravity drain out of the soil through larger pores down to a level known as "field capacity." At field capacity, reaeration of the soil has also typically begun, and plant (and microorganism) activity resumes. The plant uptake and evapotranspiration processes will then proceed and, without additional water inputs, the soil wetness will decrease to a level known as "wilting point", a level below which many plants cannot survive for extended periods. Thus, to sustain a healthy plant and microorganism community, the soil wetness should be maintained between the "field capacity" and "wilting point" levels; this range is known as the "available water capacity" of the soil. Compared to most soils, sand has a low available water capacity, thus it has a limited ability to provide "biological" treatment of pollutants (see following table).

Soil Texture	Available Water Capacity ft/ft
Coarse Sand and Gravel	0.02 – 0.06
Sand	0.04 – 0.09
Loamy Sand	0.06 – 0.12
Sandy Loam	0.11 – 0.15
Fine Sandy Loam	0.14 – 0.18
Loam and Silt Loam	0.17 – 0.23
Clay Loam and Silty Clay Loam	0.14 – 0.21
Silty Clay and Clay	0.13 – 0.18

A biofiltration pond consists of a splitter box diversion structure at the flow entrance, a flow spreading structure, a sedimentation chamber, separator element, a biofiltration media filtration chamber with an underdrain piping system beneath the biofiltration media, an outlet structure, and native vegetation selected for tolerance to ponding and dry soil conditions. Biofiltration ponds can provide equivalent treatment to a standard sedimentation/filtration system but are not acceptable as a primary method for controlling non-point source pollution in watersheds within the Barton Springs Zone or Barton Springs Contributing Zone.

For biofiltration ponds to work effectively maximum velocities into the sedimentation chamber shall not be exceeded. This requirement will limit the size and amount of impervious cover that is practical for treatment. Biofiltration ponds are relatively low maintenance once native plantings are well established and should be restricted from any use that may negatively affect the function of the biofiltration pond (e.g. pet use, application of herbicides and pesticides, excessive mowing, etc.). To ensure this, an

approved and recorded Integrated Pest Management plan will be required for the drainage area up to and including the pond area.

2. Basin Surface Areas and Volumes.

The following equation gives the minimum surface area required for the filtration basin:

$A_f = WQV*L/kt(H/2+ L)$

Where,

- A_f = required surface area of the media in square feet
- WQV = the water quality volume in cubic feet as defined in section 1.6.2.
- L = Depth of the soil media (typ. 1.5 feet)
- k = Hydraulic Conductivity (3.5 ft/day for "full" sedimentation-filtration systems; 2 ft/day for "partial" systems)
- H = Maximum head over the soil media (feet)
- t = Drawdown Time (two (2) days)

As can be seen the hydraulic conductivity for biofiltration media is assumed to be the same as sand filtration. This is a reasonable assumption based on several factors (but the assumptions may change in the future as monitoring data becomes available). For sand filtration, the assumptions reflect the fact that the media will typically experience a significant reduction in conductivity over time due to surface crusting and clogging of void spaces by lower-permeability silt and clay particles. For example, the hydraulic conductivity of sand that does not have sediment-laden water applied can exceed 100 ft/day, but values of less than 1 ft/day have been observed for sand filters treating stormwater. For biofiltration systems it will be difficult to estimate the actual hydraulic conductivity, primarily because the media will be an artificial soil mixture whose texture and structure may be different than true soils. Testing of various soil mixtures conducted by the City of Austin, the University of Texas Center for Research in Water Resources, and others have documented that candidate soil mixtures generally drain slower than sand, but at rates greater than 3.5 ft/day. If surface crusting and clogging can be minimized, which should be the case for biofiltration systems due to the presence of vegetation, it is reasonable to assume that the hydraulic conductivity of biofiltration systems should be comparable to sand filters.

Full Sedimentation-Biofiltration Systems.

In these systems the entire water quality volume is stored in the sedimentation basin, which discharges the volume to the biofiltration basin in 48 hours. See 1.6.5.A. for additional design criteria and Figure 1A, Full Sedimentation/Biofiltration Pond, for general details.

Based on the equation and assumptions given above, the minimum surface area required for the biofiltration basin is:

$A_f = WQV/(7 + 2.33*H)$

Where "Af" is the filtration area in square feet, "WQV" is the water quality volume in cubic feet as defined in section 1.6.2A, and "H" is the maximum ponding depth in the filtration basin. The assumed maximum ponding depth of the filtration basin should be at least one (1) foot less than the maximum ponding depth in the sedimentation basin, to account for tailwater effects.

Partial Sedimentation-Biofiltration Systems.

The combined volume of the sediment chamber and filtration basin must be equal to the water quality volume, i.e., $V_s + V_f$ = water quality volume where "V_s" is the sediment chamber volume and "V_f" is the filtration basin volume. The volume of the sediment chamber, "V_s", shall be a minimum of 20 percent of the water quality volume. The water quality pond design shall allow enough freeboard to pass the design flow rate for the 100 year storm over the splitter/diversion structure without overtopping of any side walls of the pond, plus an additional 5% of the total fill height or three inches, whichever is greater, to allow for construction irregularities and long term soil settling. The design shall ensure that under no circumstances does the sediment chamber allow water to return to the isolation/diversion structure, i.e., isolation of the water quality volume and minimal mixing must be ensured. See Figure 1B, Partial Sedimentation/Biofiltration Pond, for general details.

Based on the equation and assumptions given above, the minimum surface area required for the biofiltration basin is:

$A_f = WQV/(4 + 1.33*H)$

Where "A_f" is the required surface area of the media in square feet and "WQV" is the water quality volume in cubic feet as defined in section 1.6.2A, and "H" is the maximum ponding depth above the filtration media in feet.

3. Sedimentation Basin/Sediment Chamber Details. The system consists of an inlet structure, flow spreader, vegetative settling area, and separator element.

   A. Inlet Structure. The inflow of the water quality pond should pass through the splitter structure where the water quality volume is separated (see section 1.6.2B). The water quality volume should be discharged uniformly and at low velocity into the basin/chamber in order to maintain near quiescent conditions which are necessary for effective treatment. It is desirable for the heavier suspended material to drop out near the front of the basin. Flow spreading should occur after the inlet to return flows to sheetflow conditions of a maximum two (2) feet per second for the peak flow rate of the developed

twenty five (25) year storm when entering the basin/chamber. Plantings in the sedimentation basin are to provide resistance to flow and further spread the flows; therefore reducing runoff velocities further to improve settling, biological uptake, and adsorption.

The basin/chamber should have minimum 1% bottom slope to ensure that the pond will drain adequately even after silt accumulation.

B. Separator Element. The Separator Element structure is required for the Partial Sedimentation Biofiltration pond and should be designed to discharge the flow evenly across the filtration basin. It is recommended that you use five (5) inch by eight (8) inch rock flow spreaders or low gabion structures, two (2) feet wide and six (6) inches to twelve (12) inches deep, with hedgerows located within the structure (see Figure 1B). The outflow side should incorporate features to prevent gouging of the soil media.

4. Biofiltration Basin Details. The Biofiltration media bed filtration system consists of the biofiltration media bed, underdrain piping, and outlet structure.

A. Biofiltration Media. In order to provide acceptable drainage and plant growth characteristics, the biofiltration media shall meet the following performance criteria:

Porosity $n \geq 0.45$
Saturated Hydraulic Conductivity $k \geq 2$ in/hr
Available Water Capacity $AWC \geq 0.10$
Percent Organic Matter (by weight) of 3 – 5%

The hydraulic conductivity needs to be high enough to provide adequate drainage, support healthy plant growth, and prevent nuisance conditions

The criteria is intended to meet the NRCS definition of soils with "moderate" to "high" available water capacity. The criteria should ensure that the media has sufficient water holding capacity to support vigorous plant growth, enhancing the ability for plants to survive during dry periods. In should also sustain a healthy microorganism population which, in concert with the plants, should enhance biological removal of pollutants in stormwater.

The percent organic matter criterion is needed to ensure healthy vegetation. Most native soils in the Austin area have less than 4% organic matter, and native plants in the area have adapted to surviving in these types of soils. A higher organic matter content is not desirable as nutrients may be exported out of the media; an unacceptable situation for a system intended to *reduce* nutrient loads. The biofiltration media must be certified as meeting the above performance criteria before acceptance by the City.

B. Evaluating Drainage Performance of the Biofiltration Media. The drainage performance of the media can be evaluated using the hydraulic conductivity (k), porosity, and available water capacity (AWC) data. Porosity is a measure of the total void space in the filtration media and, under saturated conditions, the soil moisture content of the media is equal to porosity. By definition, the available water capacity is the difference between the field capacity (FC) and wilting point (WP) soil moisture content levels. Using the symbol θ to denote soil moisture content (in/in), the following terms can be used:

θ_{SAT} = saturated condition
θ_{FC} = field capacity
θ_{WP} = wilting point

It can be assumed that saturated conditions are prevalent in biofiltration systems during rainfall runoff events, because the void space volume of the media is small compared to the runoff volume for most storm events. The portion of the media that is readily drainable by gravity, sometimes labeled effective porosity (n_e), is the difference between the saturated and field capacity conditions, or:

$$n_e = \theta_{SAT} - \theta_{FC}$$

The effective porosity volume be calculated in inches as:

$$V_{drain} = L * (\theta_{SAT} - \theta_{FC})$$

Where L is filtration media depth in inches (typically 18").

In ft^3 as:

$$V_{drain} = Af * L * (\theta_{SAT} - \theta_{FC})$$

Where Af is the filtration media surface area in ft^2 and L is media depth in ft (typically 1.5 ft).

To estimate the travel time for runoff to drain through a media under saturated conditions, assuming no ponding and a free draining underdrain system:

$$TT_{drain} = [L*(\theta_{SAT} - \theta_{FC})]/k$$

This equation is simply a version of Darcy's Law with a hydraulic gradient of 1.

If water is ponded at a height H above the media, the time for the water to drop from H to the top of the media can be estimated using Darcy's Law:

$$TT_{pond} = (H * L)/[k * (H_{avg} + L)]$$

~~Where H_{avg} = H/2~~

~~As should be obvious from the above, the volume of water stored in the media below the field capacity does not contribute significantly to gravity drainage; this water is more slowly redistributed into smaller pore spaces in the media, and removed from the system by evaporation and plant transpiration. Thus, this volume of water should typically not be included in drainage calculations.~~

~~It should also be noted that the "ponded" travel time equation above does not directly account for water that is stored adjacent to, but hydraulically connected, to the filtration media, e.g., a sedimentation basin.~~

B. Biofiltration Media Bed with Gravel Layer. The biofiltration media bed for biofiltration basins must be built to the "Sand Bed with Gravel Layer" configuration (substitute biofiltration media for sand and use Figure 1-56 in Appendix V of this manual). The biofiltration media layer is to be a minimum of eighteen (18) inches meeting the specifications stated in Section 4A above. The biofiltration media shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the biofiltration area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. Note: Biofiltration media bed depths are final. Consolidation effects must be taken into account. Under the biofiltration media shall be a layer of one-half (0.5) to one and one-half (1.5) inch diameter washed, rounded, river gravel which provides a minimum of three (3) inches of cover over the top of the 6", Schedule 40, PVC underdrain lateral pipes. The soil media and gravel must be separated by a layer of geotextile fabric meeting the specifications listed in Section 1.6.2(C). To avoid compaction of the biofiltration media and promote filtration do not allow heavy equipment in biofiltration area after the biofiltration media has been placed.

Access for cleaning all underdrain piping is needed. Cleanouts with a removable PVC cap are required within fifty (50) feet of every portion of lateral, at collector drain lines, and at every bend. In order to minimize damage to these cleanouts due to maintenance equipment, vandalism, and mowing set the top of the cleanout flush with the top of the biofiltration media bed. At least one lateral must be accessible for cleaning when the pond is full. The full pond cleanout should extend above the water quality elevation and/or be located outside of the water quality volume ponding area. In order to minimize vandalism or other types of damage to this full pond cleanout the use of exposed piping shall be avoided or minimized.

Note: The top surface of the biofiltration media bed must be horizontal, i.e. no grade is allowed.

C. Outlet Structure. The outlet structure controls the water quality volume from the biofiltration basin. The outlet structure shall be designed to provide for a minimum draw-down time of forty eight (48) hours. The draw-down time should

be achieved by installing a removable PVC cap with the appropriate sized orifice at the end of the underdrain pipe (the discharges through the perforations should not be used for draw-down time design purposes). The PVC cap must be accessible for maintenance.

5. Landscape Design. Although an essential role of the landscaping is to make the pond attractive, the highest priority shall be to meet the ponds functional requirements. Plants should be selected based on their ability to survive under alternating conditions of inundation and extended dry periods. The landscape elements for the sedimentation basin or chamber may be different than for the biofiltration basin, due primarily to different soil characteristics. Compared to most native soils in the Austin area, the biofiltration media may drain more rapidly, have a greater percent organic matter, and less clay content, but should have comparable water holding characteristics. The selection of plants for the biofiltration media depth will also be limited because the media depth is typically only 1.5 feet, thus plants with large root systems, such as trees, are not appropriate. The soil characteristics and depth in the sedimentation basin or chamber will probably vary widely from site-to-site, and this will have a significant effect on the plant selection.

   In general, the biofiltration basin should be planted with native or adapted grasses, and forbs~~, and shrubs may also be included~~. Small trees (< 8" diameter at maturity) can be incorporated around the perimeter, above the water quality volume, as long as the underdrain system is protected from penetration by the tree root system. and the embankment does not meet the definition of a floodwall.

   Vegetative elements in the sedimentation basin or chamber can be similar, but small trees (< 8" in diameter) can be placed in the floor and side slopes within the water quality volume, if soil conditions and depth are appropriate, and measures are taken to prevent root penetration into the adjacent filtration underdrain system.

   Plant Quantities.
   The minimum quantity of **total required plants** (rooted) for the pond is described. Place these plants in specific areas according to the following restrictions.

   1. Pond bottom: Pond bottom shall be vegetated with a uniform cover of turf grass sod or an approved equivalent, with containerized plants interspersed according to Table 1-12.To determine the minimum quantity of total required plants for the biofiltration system, multiply the surface area (in square feet) of the entire pond bottom by ten percent (0.1). This number represents the minimum number of plants to be placed in the pond bottom. These plants must be rooted one-gallon equivalents.
   2. Sedimentation basin: A minimum of 20% of the total required rooted plants shall be placed in the sedimentation basin.
   3. Filtration basin: A minimum of 50% of the total required plants shall be placed in the filtration basin. A minimum of 20% of the total required rooted plants shall be comprised of tall herbaceous species. No more than

30% of the total required plants may be medium herbaceous plants. Table 1-12 establishes the plant quantity requirements per plant category for the filtration basin.

4. Additional plants: Additional plants beyond the established minimums are encouraged. Additional plants must comply with other pertinent criteria (i.e. Table 1-18 Plants That Are Not Permitted).

5. Example: The following example demonstrates the minimum plant quantity and location requirements for a pond bottom area of 3,000 square feet.

- Overall Pond requirements

  3,000 s.f. x 0.1 = 300 total required plants (one-gallon plants – refer to Table 1-13 for plant size equivalents)

- Sedimentation basin requirements

  300 total required plants x 0.2 = 60 plants (minimum) must be placed in the sedimentation basin

- Filtration Basin requirements

  300 total required plants x 0.5 = 150 rooted plants (minimum) must be placed in the filtration basin

  150 total required plants for filtration x 0.2 = 60 tall herbaceous plants (minimum) must be placed in the filtration basin

  300 total required plants x 0.3 = 90 medium herbaceous plants (maximum) are allowable in the filtration basin

  300 total required plants x 0.5 = 90 short herbaceous plants (maximum) are allowable in the filtration basin

Table 1-12
Plant Quantity Requirements – Filtration Basin

Pond Bottom (PB) 0.1 x PB sq. ft. = minimum quantity of rooted plants for the entire pond		
Plant Category Refer to Tables 1-15, 1-16, and 1-17 for allowable herbaceous species	**Filtration Basin Requirements** 0.5 x total reqd. plants (min.)	
	% of total required plants – minimum	% of total required plants – maximum

Tall Herbaceous	40%	No maximum
Medium Herbaceous	-	50%
Short Herbaceous	-	30%
Optional: Designer's choice*	–	10%

*Designer's choice includes plants that are not restricted to the plants listed in tables 1-15, 1-16, and 1-17. (See item 1.6.7 (C) 5.)

Plant Size.

Rooted plants may be provided in bare-root form, sod or in containers. Root mass of bare-root plants must be equal in mass to the equivalent container sizes. For the purpose of fulfilling the required minimum plant quantity, it is assumed that the plants to be installed will be 1-gallon size. Other sizes are acceptable but overall the quantity must be equivalent to the required minimum 1-gallon plants. See Table 1-13 for equivalency.

Table 1-13
Plant Size Equivalents

Potential Substitute		Equivalent To	
Quantity	**Plant Size**	**Quantity**	**Plant Size**
1	Five-gallon or larger	4	One-gallon
1	Two or Three-gallon	2	One-gallon
4	4" pots or quarts	1	One-gallon
8	Plugs	1	One-gallon
2	Pieces of sod	1	One-gallon

Plant Spacing.

Table 1-14 establishes specific requirements for the arrangement of plants. There are no minimum spacing requirements. While dense plantings are encouraged, tall plants shall not be spaced so close to each other as to form an impenetrable barrier for maintenance personnel.

Table 1-14
Plant Spacing Requirements

Plant Category	Spacing Requirement
Tall Herbaceous	Maximum distance is 13' (4 mtrs) from another tall or medium herbaceous plant
Medium Herbaceous	Maximum distance is 13' (4 mtrs) from another medium or tall herbaceous plant
Short Herbaceous	Maximum width of turf (i.e. short herbaceous plants) is 10' (3 mtrs)

Plant Selection.

Select and locate plants carefully so that they serve their intended function. Both rooted plants and seed are required to meet the landscape requirements of biofiltration. Select and arrange plants carefully so that they serve their intended function. In addition to choosing plants for their aesthetic properties, select plants that:

- Are adapted to the pond hydrology (i.e. periodic flooding and drought)
- Are adapted to the soil types within the pond
- Are suitable for their specific function (e.g. erosion control, filtration, etc.)
- Are durable, resilient and resistant to pests and disease
- Are tolerant of the pollution in stormwater runoff
- Have a root system of the desired type, mass and depth
- Are resistant to weed invasion
- Require minimal maintenance
- Are not invasive

Choose from among the plants listed in Tables 1-15, 1-16, and 1-17 to meet the requirements established in item 1.6.7 (C) 5. Plant Quantities.

Plant Species.

1. Tall Herbaceous Plants: This category includes grasses, forbs, sedges and rushes that usually attain a height greater than 4' at maturity. These plants are well-suited for biofiltration. Certain grasses are ideal species for use as hedgerows as well. When spaced closely together (e.g. 3' o.c.) the hedgerow grasses shade the ground so effectively that most weeds cannot survive.

Table 1-15
Tall Herbaceous Plants

This table includes grasses, sedges, rushes and forbs that are usually taller than 4' at maturity

Botanical Name	Common Name	Sed	Filt
Andropogon gerardii	Big bluestem	x	x
Andropogon glomeratus	Bushy bluestem	x	
Helianthus maximiliani	Maximilian sunflower		x
Juncus effusus	Soft rush	x	x
Muhlenbergia lindheimeri	Big muhly	x	x
Panicum virgatum	Lowland switchgrass	x	x
Panicum virgatum	Upland switchgrass	x	x
Saccharum alopecuroides	Silver plumegrass	x	
Schizachyrium scoparium	Little bluestem		x
Schoenoplectus acutus	Hardstem bulrush	x	
Sorghastrum nutans	Indian grass	x	x
Spartina pectinata	Prairie cordgrass	x	
Tridens strictus	Longspike tridens		x
Tripsacum dactyloides	Eastern gama grass	x	x
Verbesina virginica	Frostweed	x	x

2. Medium Herbaceous Plants: This category includes grasses, forbs, sedges, ferns, and rushes that are from 2' to 4' tall.. The cool-season grasses are typically green in the winter, extending the growing season. Certain plants can tolerate some shade.

Table 1-16
Medium Herbaceous Plants

This table includes grasses, sedges, rushes, ferns and forbs that are from 2' to 4' at maturity

Botanical Name	Common Name	Sed	Filt
Carex emoryi	Emory's sedge	x	
Capsicum annuum	Chili pequin	x	x
Chasmanthium latifolium	Inland sea oats	x	x

Eleocharis quadrangulata	Squarestem spikerush	x	
Elymus canadensis	Canada wildrye	x	x
Elymus virginicus	Virginia wildrye	x	x
Equisetum hyemale	Horsetail	x	
Justicia americana	American Water-willow	x	
Leptochloa dubia	Green sprangletop		x
Liatris pycnostachya	Prairie blazing star	x	
Lobelia cardinalis	Cardinal flower	x	
Muhlenbergia capillaris	Gulf coast muhly	x	x
Muhlenbergia filipes	Purple muhly	x	x
Muhlenbergia rigens	Deer muhly		x
Physostegia spp.	Obedient plant	x	
Pluchea odorata	Marsh fleabane	x	x
Solidago altissima	Tall goldenrod	x	x
Sporobolus airoides	Alkali sacaton		x
Sporobolus virginicus	Seashore dropseed	x	x
Symphyotrichum praealtum	Tall aster	x	x
Teucrium canadense	Canada germander	x	
Thelypteris ovata	Shield fern	x	

Short Herbaceous Plants: This category includes grasses, forbs, sedges, ferns, and rushes that are shorter than 2' at maturity. Certain plants are shade tolerant. Many will colonize an area by way of rhizomes, stolons or seed. The colonizers include sod-forming grasses that may be managed as turf. Mowing/trimming restrictions will apply to these areas. Other colonizers form attractive groundcovers and may serve as "fillers" in a garden.

Table 1-17
Short Herbaceous Plants

This table includes grasses, sedges, rushes and forbs that are usually shorter than 2' at maturity

Botanical Name	Common Name	Sed	Filt
Agrostis stolonifera	Creeping bentgrass	x	
Buchloe dactyloides	Buffalo grass	x	x
Calyptocarpus vialis	Horseherb		x
Carex cherokeensis	Cherokee sedge	x	
Conoclinium coelestinum	Blue mistflower	x	

Distichlis spicata	Salt grass	x	x
Eleocharis palustris	Common spikerush	x	
Helianthus angustifolius	Swamp sunflower		x
Juncus tenuis	Slender rush	x	
Leersia hexandra	Clubhead cutgrass	x	
Marsilea macropoda	Water clover	x	
Muhlenbergia utilis	Aparejograss	x	x
Panicum obtusum	Vine mesquite	x	x
Paspalum distichum	Knotgrass	x	
Paspalum vaginatum	Seashore paspalum	x	
Penstemon tenuis	Brazos penstemon	x	
Phyla nodiflora	Frogfruit	x	x
Poa arachnifera	Texas bluegrass	x	
Rivina humilis	Pigeonberry		x
Rudbeckia hirta	Black-eyed Susan		x
Salvia penstemonoides	Big red sage	x	
Setaria parviflora	Knotroot bristlegrass	x	x
Solidago nemoralis	Gray goldenrod		x
Stenotaphrum secundatum	St. Augustine grass	x	x
Viola missouriensis	Missouri violet	x	x

Optional Plants: Designer's Choice.

Plants in this category are counted towards the minimum quantity requirements (See item 1.6.7 (C) 5). While native grasses dominate the plant lists, many designers will want to use non-native ornamental grasses and plants. Ornamental grasses are used chiefly for ornament; however the plants in biofiltration have a greater purpose. The following restrictions apply:

- Plant types must conform to the requirements explained in the opening paragraph of Section 5 – Landscape Design.
- Plant species may not include plants that are considered invasive (refer to the Grow Green Native and Adapted Plant Guide – published by the City of Austin).
- Plant species may not include plants listed in Table 1-18 (Plants That Are Not Permitted).

Plants That Are Not Permitted.

Plants listed in Table 1-18 are not permitted in biofiltration systems. These plants are not native, yet have shown the capacity to naturalize here or in other areas of the country. The intent is to avoid future problems with invasive plants. The following restrictions apply:

- Plant species listed as invasive by the state of Texas are not allowed. Two lists are maintained.
- Refer to http://www.texasinvasives.org/Invasives_Database/Invasives.html
  - TDA Noxious Weed List
  - TPWD Prohibited Exotic Species
  - USDA NRCS – Texas, State-listed noxious weeds http://plants.usda.gov/java/noxious?rptType=State&statefips=48

Table 1-18
Plants That Are Not Permitted

Botanical Name	Common Name	Comments
Arundo donax	Giant reed	Tall invasive grass
Bothriochloa ischaemum var. songarica	'King Ranch' bluestem (KR bluestem)	Invasive grass
Cortaderia selloana	Pampas grass	Potentially invasive
Cytisus scoparius	Scotch broom	Invasive shrub
Eragrostis curvula	Weeping love grass	Invasive grass
Imperata cylindrica	Cogon grass	Invasive grass
Miscanthus sinensis	Japanese silver grass	Invasive grass
Pennisetum setaceum	Fountain grass	Invasive grass
Phragmites australis	Common reed	Tall invasive grass
Sapium sebiferum	Chinese tallow	Invasive tree

Performance Requirements.

A minimum of 95% of the vegetation shall be alive and viable for one year following installation. No bare areas greater than 1 square foot may exist. These performance requirements apply to the entire pond including the pond bottom, side slopes, and areas adjacent to the pond.

Landscape Maintenance.

A lack of maintenance considerations in the design of a landscape commonly results in a site that is more maintenance intensive (i.e., costly) than necessary and/or appropriate for its purpose, and one that requires the routine use of practices that are undesirable (e.g.,

extensive pesticide use, intensive pruning of plants that grow too large for the spaces they occupy). It is important that the designer include maintenance considerations and IPM throughout the planning and design phase of a biofiltration project. To the extent possible, these criteria are designed to minimize the potential for pests and the amount of maintenance required for the biofiltration pond. Landscapes should be designed to allow for the access and aid the maneuverability of maintenance equipment (e.g., if areas of the pond are designed to be mown, acute angles should be avoided in turf areas; wide angles, gentle, sweeping curves, and straight lines are easier to mow).

A. Mowing and/or Trimming.

Mowing and/or trimming of vegetation is allowable with certain restrictions.

1. Tall Herbaceous and Medium Herbaceous Plants

Trimming activities must not impinge on the growing tips (basal crown) of the bunchgrasses. Cutting these grasses below the basal crown will severely stress and possibly kill them. These plants shall be cut no lower than 2' from the ground. The annual physical removal of all woody weeds from the filtration basin is required.

2. Short Herbaceous Plants

Sod-forming grasses may be mown or trimmed to an appropriate height. These plants shall not be scalped; cut no lower than 5" from the ground.

B. Integrated Pest Management (IPM).

An integrated pest management (IPM) plan and associated restrictive covenant is required for a biofiltration pond. IPM is a continuous system of controlling pests (weeds, diseases, insects or others) in which pests are identified, action thresholds are considered, all possible control options are evaluated and selected control(s) are implemented. Control options--which include biological, cultural, manual, mechanical and chemical methods--are used to prevent or remedy unacceptable pest activity or damage. Choice of control option(s) is based on effectiveness, environmental impact, site characteristics, worker/public health and safety, and economics. The goal of an IPM system is to manage pests and the environment to balance benefits of control, costs, public health and environmental quality. IPM takes advantage of all appropriate pest management options.

1. Weed Management

Preventing the introduction of weeds is the most practical and cost-effective method for their management. Do not allow bare soil to be present, design it out of the system. Prevention programs include such techniques as limiting weed seed dispersal, minimizing soil disturbance, and properly managing desirable vegetation. Remove weeds early in their growth stage, before they set seed. (One year of seeds is equal to seven years of weeds) Allow the desired vegetation to out-compete the weeds.

(a) Mulch: Control weeds by blocking light and air space.

(i) Bark mulch, the traditional material for minimizing weeds in ornamental landscapes, is not recommended because it will tend to float or otherwise be washed out of the system. The innovative use of non-traditional mulches will be required when ornamental beds are used in biofiltration facilities. Gravel is permitted as mulch both in the sediment basin and the filter basin.

(ii) Gravel or crushed recycled glass equivalent in size to gravel may be used as mulch in biofiltration.

(iii) Weed fabric is not permitted in biofiltration due to the potential for clogging of the pores.

(b). Cultivation: Cultivating cuts the weed roots below the soil to reduce root carbohydrates. May be done by hand tools only; using cultivating machines is not acceptable. Repeat cultivation at 2 – 3 week intervals during the growing season. Keep hoes sharp and in good condition to reduce the effort needed. Any bare areas must be re-seeded.

(c). Organic herbicides: Be aware that organic herbicides must be used with caution and can be dangerous in concentrated form. Personal protective equipment must be used: rubber gloves, long pants, eye protection. The use of organic herbicides is restricted to the following products:

(i). Acetic acid (20% vinegar) is effective on small annuals.

(ii). Essential oils: Includes cinnamon, clove, summer savory and thyme must be used at the appropriate concentration. Effective on a limited number of species.

2. Mosquito Management

Biofiltration ponds shall not become breeding places for mosquitoes. Meet the drainage requirements established per 1.6.7 (C). Once the pond has drained, remaining incidental standing water must not be present for longer than three days (72 hours) thereafter.

3. Wildlife and Pet Management

In addition to water quality treatment, biofiltration ponds offer additional benefits such as providing food and habitat for wildlife. Pets may also be attracted to them. However, activities by animals within a pond shall not interfere with pond functions and design objectives. Digging or burrowing by animals in the filtration basin is particularly troublesome. There is the potential for certain animals to become a pest of biofiltration ponds in the Austin area. Evaluate the potential for problems due to animal activity in the proposed pond site. Where the potential

exists for problematic activity, fencing or similar exclusionary method shall be provided.

6. Irrigation. Irrigation will be necessary to establish the vegetative community during the first 3-6 months after planting. Thereafter irrigation needs should be minimal and a permanent irrigation system may not be necessary. If a permanent irrigation system is proposed, the design must address both stormwater management and plant health needs. In particular, overwatering is unacceptable as it will negatively impact the hydraulic performance and pollutant removal capabilities of the biofiltration system. The following minimum criteria will apply for permanent irrigation systems:

   Soil water moisture sensors must be installed at appropriate depths and locations in the biofiltration basin.
   No irrigation during periods when rainfall is occurring.
   No irrigation is to commence until the soil moisture content of the filtration media is ≤ 25% of the Available Water Capacity (AWC). For plants native or adapted to arid and semi-arid conditions, no irrigation should commence until the soil moisture content is ≤ Wilting Point (WP), or 0% AWC.
   Irrigation will cease once the soil moisture content is ≤ 75% AWC; 50% for plants native or adapted to arid and semi-arid conditions.

   It is required that the irrigation designer conduct a water balance to aid in the design, using a time step of one day or less.

7. Maintenance. Once vegetation is established, biofiltration systems should require less maintenance than sand filtration systems because the vegetation protects the filtration media from surface crusting and sediment clogging. Plant roots also provide a pathway for water to permeate down into the media, thus further enhancing the hydraulic performance of the system. Unless damaged by unusual sediment loads, high flows, or vandalism, the biofiltration media should be left undisturbed and allowed to age naturally.

   Water Plants as necessary during the first growing season and during dry periods. Irrigation will be necessary to establish the vegetative community during the first 3-6 months after planting has been completed and by hand immediately after completion of the project.

   Biweekly inspection of vegetation during first growing season until 95% vegetative cover is established.

   Monthly Check for accumulated sediments, remove as needed.

   Quarterly removal of debris, sediment accumulation, and soil media should be replaced in void areas caused by settlement, and repair eroded areas. Remulch any void areas by hand whenever needed.

Six months remove and replace dead and diseased vegetation. Removal and replacement of all dead and diseased vegetation considered beyond treatment (See planting specifications).
Treat all diseased trees and shrubs mechanically or by hand depends on insect or disease infestation.

Late Winter harvesting involving trimming of bunchgrasses (trim to minimum 18" or higher, see specific trimming recommendations), and mowing of turf grasses (minimum 5" high). For other types vegetation see recommendations in the planting specifications.

Spring remove previous mulch layer before applying new layer (optional) by hand once every two to three years in the Spring.

Any time 48 hour drawdown time is exceeded or significant decrease in drawdown time is observed evaluate bed soil, underdrain system and appropriate measures should be taken. Biofiltration pond vegetation shall be managed so that a dense, healthy vegetative cover is preserved. Once established, native grasses shall be maintained without fertilizers and limited use of organic herbicides. A recorded restrictive covenant and cover sheet notes will establish the requirements for the implementation and on-going maintenance of an approved Integrated Pest Management Plan (IPM).

8. Signage. Delineate the boundaries of the biofiltration area as minimal mow maintenance, no fertilizers, and limited use of organic herbicides application is allowed.

9. Sequence of Construction. The following sequence of construction shall be used for all development using the biofiltration design criteria. The applicant is encouraged to provide any Additional details appropriate for the particular development.

    1. Erosion controls and tree protection are to be installed as indicated on the approved site plan.
    2. Contact the Watershed Protection and Development Review Department to schedule a preconstruction coordination meeting to be held on site.
    3. Erosion controls will be revised, if needed, to comply with Inspectors' directives, and revised construction schedule relative to the water quality plan requirements and the erosion plan.
    4. Rough-cut all required or necessary ponds. Either the permanent outlet structure or a temporary outlet must be constructed prior to development of any embankment or excavation that leads to ponding conditions. The outlet system must consist of a low-level outlet and an emergency overflow meeting the requirements of the Drainage Criteria Manual (Section 8.3) and/or the Environmental Criteria Manual (section 1.4.2.K) as required. The outlet system

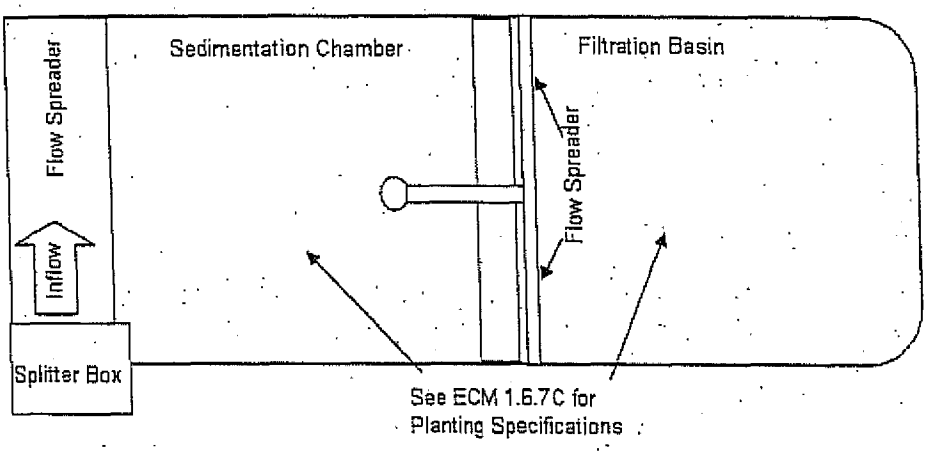
shall be protected from erosion and shall be maintained throughout the course of construction until final restoration is achieved.

5. Temporary controls to be inspected and maintained weekly and prior to anticipated rainfall events, and after rainfall events, as needed.
6. Schedule a mid-construction conference with the City Inspector to coordinate changes in the construction schedule and evaluate effectiveness of the erosion control plan after possible construction alterations to the site.
7. Complete construction and stabilize all areas draining to the biofiltration basin. Permanent controls will be cleaned out and filter media will be installed after stabilization of the site.
8. Complete permanent erosion control and site restoration. Remove temporary erosion/sedimentation controls and tree protection. Restore any areas disturbed during removal of erosion/sedimentation controls.
9. Provide plant material tags for the vegetation and soil media test analysis report to the Environmental Inspector prior to planting followed by the Engineer's concurrence letter.

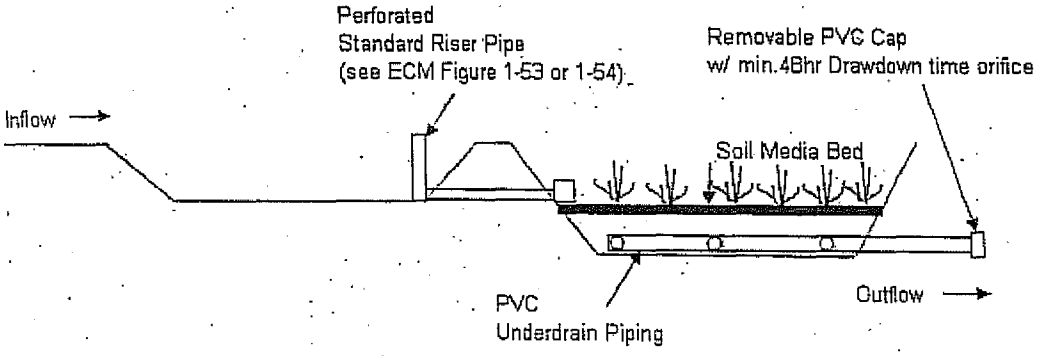
References:

1. Maryland Department of the Environment, Center for Watershed Protection, 2000, *2000 Maryland Stormwater Design Manual, Volumes I and II*
2. New Jersey Department of Environmental Protection, 2004, *Stormwater Best Management Practices Manual*, Division of Watershed Management Trenton, NJ.
3. Prince George's County Department of Environmental Resources Programs and Planning Division, 2001, *The Bioretention Manual*, Maryland
4. Low Impact Development (LID), Urban Design Tools, lid-stormwater.net
5. USEPA, NPDES, Stormwater Best Management Practices, cfpub.epa.gov/npdes/stormwater/

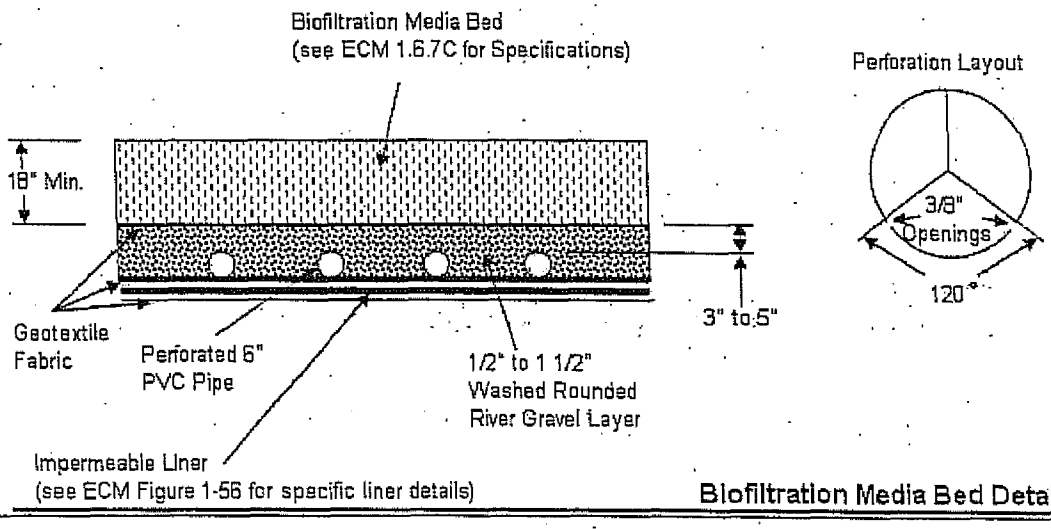
Figure 1A: Full Sedimentation / Biofiltration Pond



Plan View

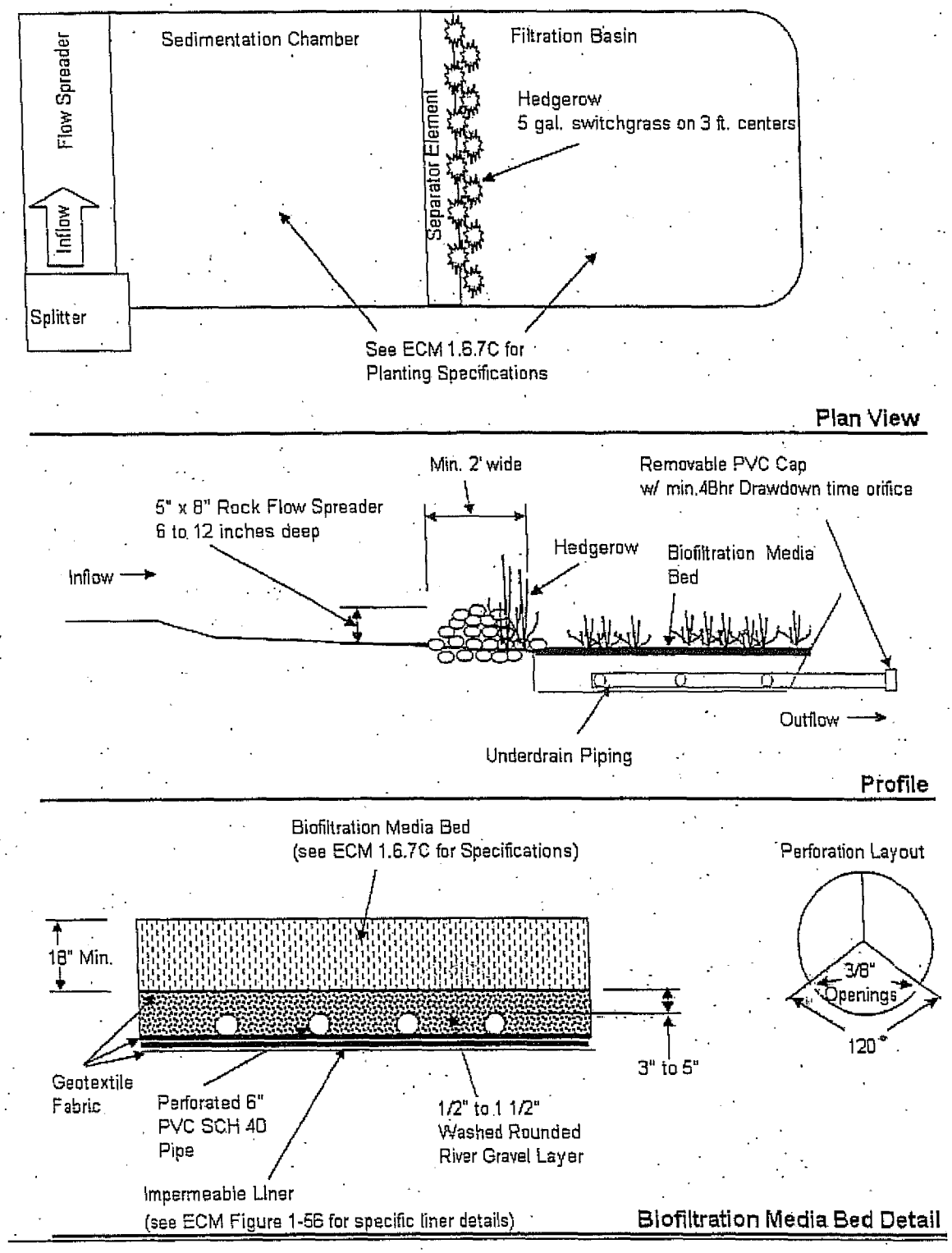


Profile



Biofiltration Media Bed Detail

Figure 1B: Partial Sedimentation / Biofiltration Pond



D. Rainwater Harvesting

1. Introduction. Rooftops can generate large volumes of runoff which, when discharged to paved surfaces and landscaped areas, can generate large pollutant loads. Rainwater harvesting systems can capture this runoff before it is discharged, thus preventing pollution while also putting the captured water to beneficial use, such as landscape irrigation or cooling water. The amount of runoff captured will depend on the size (water quality volume) and drawdown time of the rainwater harvesting system. The systems can also control the peak flow rate for the 2-year, 3-hour rainfall event see section 1.6.8 of the Environmental Criteria Manual (ECM) if specifically designed for this purpose. Rainwater harvesting systems can provide equivalent treatment to a standard sedimentation/filtration system but only the irrigation design (Option B) described below will meet retention irrigation system standards and therefore can be used as a primary method for controlling non-point source pollution in watersheds within the Barton Springs Zone or Barton Springs Contributing Zone. Rainwater Harvesting systems will only be permitted for commercial developments.

In an effort to promote water conservation, the State of Texas offers financial incentives and tax exemptions to offset the equipment costs. Additionally, the Water Conservation staff of the City of Austin Water Utility Department is available to provide input on how to achieve cost efficient design and equipment selection that will also help reduce water and wastewater costs.

2. Water Quality Credit.

The water quality credit will typically be applied as either a reduction in the water quality volume for a structural control or a reduction in the fee-in-lieu cost. The basic credit equation is:

$WQC = IAF * BMPDF$

- WQC = Water Quality Credit, a value between 0 and 1, with 1 meaning 100% credit.
- Where IAF is the Impervious Area Factor, or the ratio of the impervious area treated by the control to the total site impervious area..
- BMPDF is the BMP Design Factor, a value between 0 and 1, is a measure of the potential effectiveness of the control.

For rainwater harvesting systems the BMPDF variable will be calculated as:

$$BMPDF = (WQV_{rwh}/WQV_{ecm}) * (DDT_{ecm}/DDT_{rwh})$$

- WQV_{rwh} is the water quality capture depth provided by the rainwater harvesting system in inches.
- WQV_{ecm} is the ECM required water quality capture depth in inches.

- DDT_{ecm} is the ECM required drawdown time for sedimentation-filtration system in hours (48 hrs.).
- DDT_{rwh} is the rainwater harvesting system drawdown time in hours (a maximum of 72 hrs.).

It is assumed that the rainwater harvesting system will be capturing runoff from rooftops that are 100% impervious cover. The water quality capture depth for 100% impervious cover is 1.30-inch for projects located outside of the Barton Springs Zone. The drawdown time for equivalency, based on sedimentation-filtration systems, is 48 hours. Inserting these values into the BMPDF equation, with rounding, gives:

$BMPDF = 37 * WQV_{rwh} / DDT_{rwh}$

- Where WQV_{rwh} is in inches
- DDT_{rwh} is in hours

The derivation of the drawdown time will vary with the type of system, as described below for specific design options. In all cases the drawdown is calculated as:

$DDT = WQV/Q_{rwh}$

- Where DDT is the drawdown time
- WQV is the water quality volume
- Q_{rwh} is the rate of discharge from the rainwater harvesting system

A. Design Options: : Rainwater harvesting with Infiltration or Irrigation of a Vegetated Area in ≤ 72 hours

In this design, the captured runoff is held in the rainwater harvesting system for at least 12 hours after rainfall has ceased, then either gravity-drained to a vegetated area sized large enough to infiltrate all the water (Option A), or used to irrigate the vegetated area (Option B). The latter design is similar to a retention/irrigation system and ECM section 1.6.7(A) should be referenced for guidance. The vegetated area can also serve as a vegetated filter strip for flows that by-pass the rainwater harvesting system.

Because the required drawdown time is no more than three (3) days, these systems generally cannot be used to meet water conservation-oriented landscape irrigation needs (e.g., 5-day watering schedule).

Option A - Captured Runoff Gravity-Drained to a Vegetated Area for Infiltration

The water quality volume must be provided by the system designer, with the drawdown time set to 72 hours. The designer must demonstrate that the vegetated area is sufficiently large to infiltrate the entire water quality volume within 72 hours (see Figure 1A). In lieu of a detailed analysis the procedure described below can be used.

The average "treatment" rate of the rainwater harvesting system is:

$Q_{avg} = WQV/DDT$

- Where Q_{avg} is the treatment rate
- WQV is the water quality volume
- DDT is the drawdown time, which is set to 72 hours

It is reasonable to assume saturated conditions, and the infiltration rate of the vegetated area can be calculated as:

$Q_{veg} = k * i * A$

- Where k is the soil hydraulic conductivity
- i is the hydraulic gradient
- A is the infiltration (vegetated) area

As minimal ponding of water over the vegetated area is expected, the hydraulic gradient can be assumed equal to 1, thus:

$Q_{veg} = k * A$

To be conservative, design the vegetated area for the maximum flowrate discharged from the rainwater harvesting system. A reasonable assumption is to assume a value twice Q_{avg}, and to also assume a lag time (LT) between the time runoff ends and when the rainwater harvesting system begins discharging:

$Q_p = (2 * WQV)/(DDT - LT)$

Setting the peak flow rate discharged from the rainwater harvesting system (Q_p) equal to the vegetated area infiltration rate (Q_{veg}), and solving for A:

$A = (2 * WQV)/(k * (DDT - LT)$

A low hydraulic conductivity value that is typical of Austin area soils should be used, and 0.06 in/hour, or 0.005 ft/hour, is assumed. The lag time LT should be set to 12 hours. Inserting these assumptions into the infiltration (vegetated) area gives:

$A = (400 * WQV)/(DDT - 12)$

- Where A is the minimum required infiltration (vegetated) area in ft^2
- WQV is the water quality volume in ft^3
- DDT is the drawdown time in hours
- 12 is the lag time (LT) in hours

Assuming a 72 hour drawdown time the equation becomes:

$A = 6.67 * WQV$

- Where A is the minimum required infiltration (vegetated) area in ft^2
- WQV is the water quality volume in ft^3

A larger area will be needed for drawdown times less than 72 hours. A drawdown time greater than 72 hours is not allowed.

To be eligible for water quality credit the vegetated area must meet the vegetated filter strip criteria in ECM 1.6.7(B) or 1.6.7(F), with the following additions:

- The length (dimension in direction of flow) of the vegetative area should be at least 15 feet
- The hydraulic loading rate should not exceed 0.05 cfs per ft. width for the maximum flowrate applied to the filter strip (see below for procedure to calculate peak flowrate). Higher hydraulic loading rates are allowed but will reduce water quality credit. In this case, a maximum allowable rate of 0.15 cfs per ft. width is allowed.
- The soil depth should be a minimum of eight (8) inches
- An irrigation plan is required.

Option B – Captured Runoff Used to Irrigate Vegetated Area

The water quality volume must be provided by the system designer, with the drawdown time set to 72 hours. The system should be designed according to the retention/irrigation criteria in section 1.6.7 of the Environmental Criteria Manual should be used (see Figure 1B).

Example – Captured runoff gravity-drained to vegetated area (Option A)

A 5 acre commercial development with 80% impervious cover (4 impervious acres) is proposing a rainwater harvesting system that would capture runoff from 2 acres of rooftop. The system would have a water quality volume of 25,000 gallons, which would be emptied in 72 hours by discharging to a vegetated area that is 260' wide by 90' long. Evaluate this design and determine the water quality credit it may be eligible for.

The water quality credit will typically be applied as either a reduction in the water quality volume for of a structural control or a reduction in the fee-in-lieu cost.

As the alternative control is for 2 acres of impervious cover, and the site has a total of 4 impervious acres, the IAF value is 0.50 (= 2/4).

- The BMPDF factor is a function of two components, the rainwater harvesting system and the vegetated area. The BMPDF value for the rainwater harvesting system is based

on the water quality volume and drawdown time, subject to the requirement that the vegetated area must be large enough to infiltrate the captured volume.

To determine the BMPDF value, first convert the water quality volume from gallons to inches:

WQV = (25,000 gallons * 1 ft^3/7.481gal) = 3,342 ft^3 = 0.460-inch

The BMPDF value is calculated as:

BMPDF = 37 * WQV/DDT

- Where WQV is in inches
- DDT is in hours

Or BMPDF = 37 * 0.46/72= 0.236

Before this credit can be applied first determine if the vegetated area is sufficient to infiltrate the water quality volume in 72 hours.

Is it large enough?

Minimum size A = 6.67 * WQV = 6.67 * 3,342 = 22,290 ft^2
Size provided = 260' * 90' = 23,400 ft^2 – just large enough

Is the length of the vegetated area at least 15 feet?

Yes as the proposed length is 90 feet.

Does it meet the 0.05 cfs/ft. width hydraulic loading rate for the discharge from the rainwater harvesting system?

To estimate peak flowrate and hydraulic loading rate:

Q_p = (2 * WQV)/(DDT – LT) = (2 * 3,342)/(72 – 12) = 111 cfh = 0.031 cfs

HLR = Q/W = 0.031/260 = 0.00012 cfs/ft width – Okay as < 0.05

All other slope, soil depth, vegetative cover, etc. criteria is also met, thus the vegetated area is acceptable and:

The total water quality credit for the proposed system is:

WQC = IAF * BMPDF = 0.5 * 0.235 = 0.118

Thus the rainwater harvesting system reduces by 11.8% the required water quality volume or fee-in-lieu cost.

Maintenance. Proper monitoring and maintenance is important for any system to work appropriately and efficiently. Each configuration will perform differently. After the system has stabilized, inspection and maintenance might be needed several times a year and/or after heavy rainfall events. A pretreatment filter system (i.e., leaf guards, strainers, roof washers, etc.) will be required prior to the cistern. An approved Integrated Pest Management Plan (IPM) with a recorded restrictive covenant will be required for all drainage areas to the control and irrigation areas.

Post Construction:

- The control and repair of erosion rills, from the irrigation system, should take place after each rainfall event until the vegetation is well established.
- Adjustments to the irrigation area should be considered as the vegetation matures and/or to minimize erosion problem areas.

Quarterly or after each rain event:

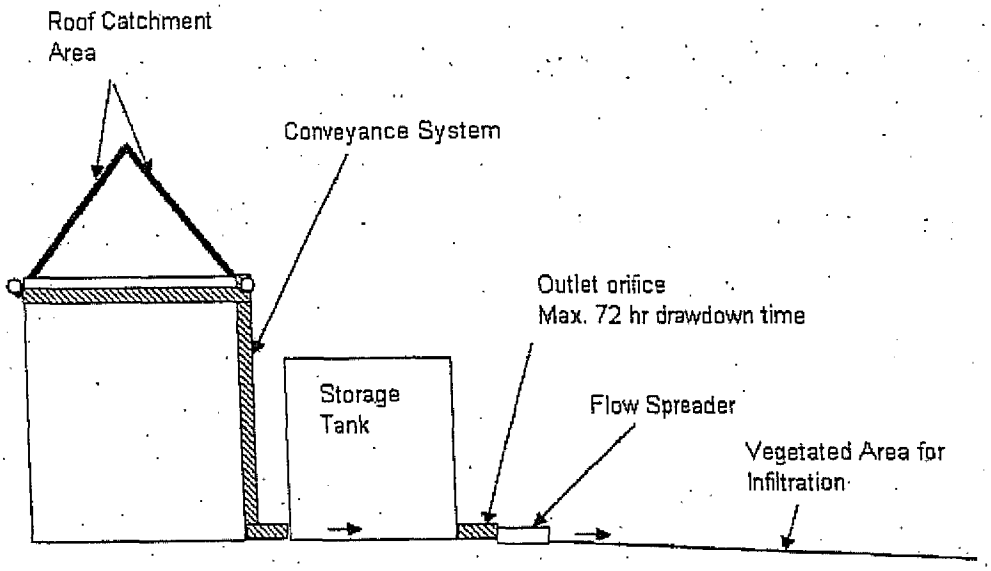
- Inspect water tanks periodically to insure proper functioning. Screen inlet and outlet pipes to keep the system closed to mosquitoes. Cap and lock tanks for safety.
- Caps should have access ports for interior inspection and maintenance.
- Clean pretreatment filter system, gutters, inflow, and outflow pipes as needed; sediment, trash, leaves, or other debris should not be allowed to accumulate to a point where it impedes the proper function of the rainwater harvesting system.
- Irrigation systems should be cleaned and damage sprinkler heads replaced.

References:

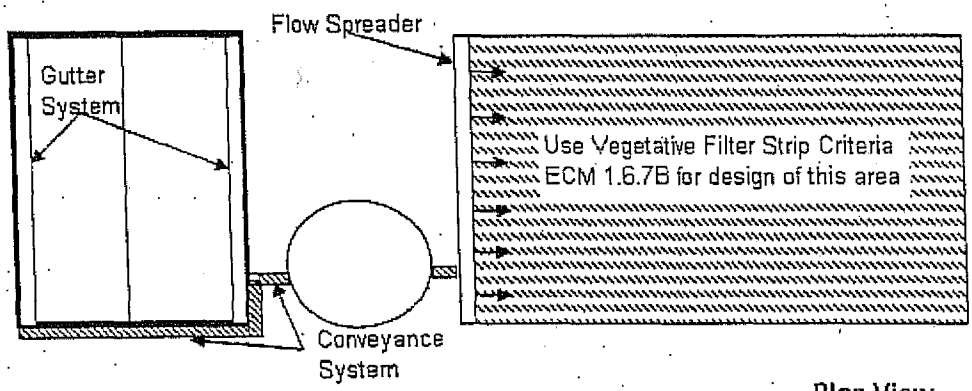
1. The Texas Manual on Rainwater Harvesting, 3rd edition 2005
2. City of Tucson Water Harvesting Guidance Manual, October 2005
3. City of Austin Energy, Green Building Program, 1995

Figure 1A: Rainwater Harvesting: Option A

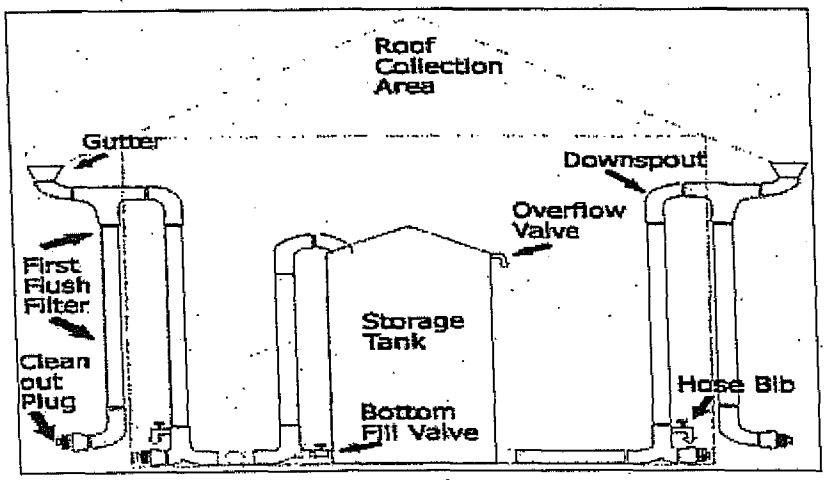
Captured Runoff discharged to a Vegetative Filter Strip for Infiltration (< 72 hr drawdown time)



Profile



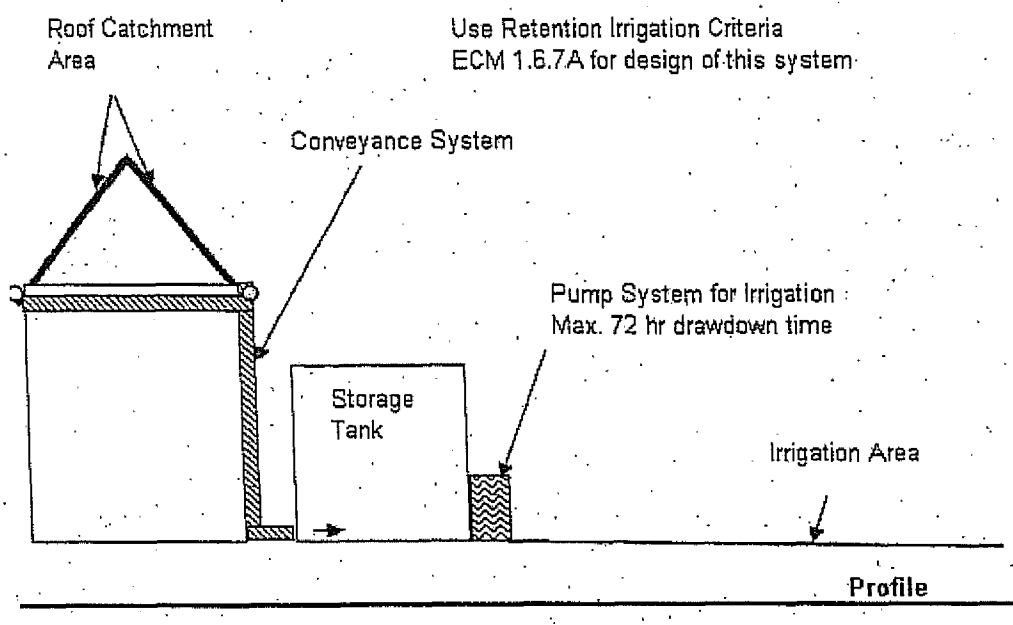
Plan View

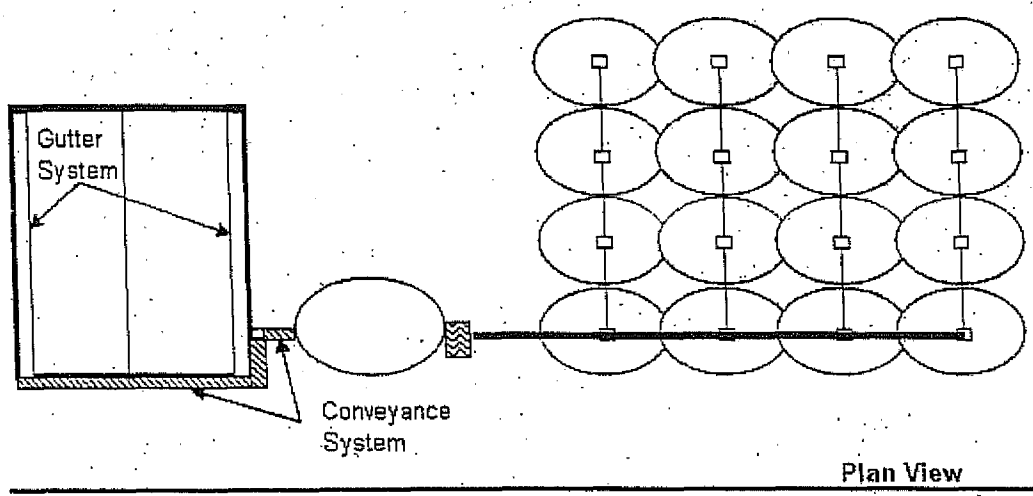


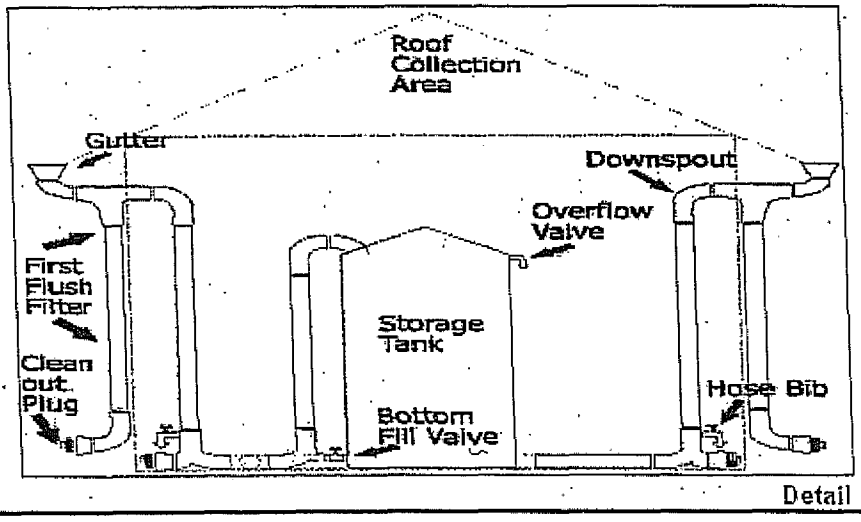
Detail

Figure 1B: Rainwater Harvesting: Option B

Captured Runoff Used to Irrigate Vegetated Area (<72 hr drawdown time)







E. Porous Pavement for Pedestrian Use

1. Introduction. Porous Pavement describes a system comprising a load-bearing, durable concrete surface together with an underlying layered structure that temporarily stores water prior to infiltration. Porous Pavement is a water quality control best management practice (BMP) using the storage within the underlying structure or sub-base to provide ground water recharge and to reduce pollutants in stormwater runoff. Unlike traditional pavement, porous pavement contains little or no "fine" materials; instead, it contains voids that encourage infiltration. Porous pavement consists of an open-graded coarse aggregate, bonded together by asphalt cement, with sufficient interconnected voids to make it highly permeable to water. When proposing the use of this material be sure to provide highly detailed specifications and ensure that an experienced contractor is used to minimize potential problems.

Porous pavement is not allowed under stormwater hot spots or areas where land use or activities generate highly contaminated runoff. Hot spot runoff frequently contains pollutant concentrations exceeding those typically found in stormwater. Hot spots include commercial nurseries, auto recycle facilities, drive through service facilities, fueling stations, storage areas, industrial rooftops, marinas, outdoor container storage of liquids, outdoor loading and unloading facilities, public works storage areas, hazardous materials generators (if containers are exposed to rainfall), vehicle service and maintenance areas, and vehicle and equipment washing and steam cleaning facilities. Since porous pavement is an infiltration practice, it should not be applied at stormwater hot spots due to the potential for ground water contamination.

2. Water Quality Credit and Design Guidelines.

Porous pavement for pedestrian use can be counted as pervious area if the following criteria is met:

- Porous pavement thickness ≥ 3 inches with ~~total~~ effective porosity ≥ 0.30.
- COA walkways standard sidewalk dimensions used (i.e., no over-sized walkways that may encourage vehicular use).
- No off-site runoff
- No irrigation
- Depth to water table ≥ 3 feet
- Depth to bedrock ≥ 12"
- Industrial vacuuming or pressure washing every six months.
- See Figure 1A for general details.

Example 1

A 5 acre commercial site with 80% impervious cover (4 impervious acres) is required to implement on-site water quality controls. The development proposes to use 0.5 acres of

porous pavement for pedestrian walkways. Determine the water quality credit for this system.

Without the porous pavement, the water quality volume required is 1.10", or 19,965 ft^3.

Assuming the above criteria is met, the porous pavement deducts 0.5-acre from the site impervious cover, thus the site behaves as if it is 4.5 acres with 3.5 impervious acres, or 77.8% impervious cover. This reduces the required water quality volume from 1.10" to 1.078" and the drainage area is also reduced from 5 acres to 4.5 acres. The required water quality volume with porous pavement is thus 17,605 ft^3, or about a 12% reduction.

3. Construction.

Subgrade Preparation. Since porous pavement is an infiltration practice it is imperative that the permeability of the underlying native soils be preserved. It is important to protect the subgrade from over compaction, accumulation of fines, excessive construction equipment traffic, and surface ponding. No grading should take place during wet soil conditions to minimize sealing of the soil surface. In situations where the subgrade has been over compacted or the permeability has been diminished scarification should take place to a depth sufficient to match the naturally occurring in-situ state, typically scarification should be a minimum of three (3) to twelve (12) inches in depth. Any accumulation of debris, fines, or sediment that has occurred during subgrade preparation should be removed prior to starting the gravel bed installation.

Gravel Bed Preparation. Immediately upon completion of the subgrade preparation and after acceptance of the subgrade work by the Watershed Protection and Development Review inspector the placement of the one-half (0.5) to one and one-half (1.5) inch diameter washed, rounded, river gravel, can begin. Any accumulation of debris, fines, or sediment that has occurred during the placement of the gravel bed installation should be removed.

Porous Pavement Installation. Contractor installation qualifications require that the contractor provide to the Watershed Protection and Development Review Department inspector at the preliminary construction meeting a statement attesting to qualifications and demonstrating experience with the following porous pavement procedures and tests:

- A minimum of two (2) completed projects with addresses
- Measuring unit weight acceptance data
- Conducting in-situ pavement tests including void content and unit weight
- Preparing product samples

If the installing contractor and pavement producer do not have sufficient experience with porous pavement systems, the installing contractor shall retain an experienced consultant to monitor production, handling, and placement operations at the contractor's expense.

4. Maintenance.

Construction and Post construction:

- Do not seal or repave with non-porous materials.
- No piling of dirt, sand, gravel, or landscape material without covering the pavement first with a durable cover to protect the integrity of the pervious surface.
- All landscape cover must be graded to prevent washing and or floating of such materials onto or through the pervious surface. No off-site flows allowed onto the porous pavement area.
- All chemical spills inclusive but not limited to petrochemicals, hydrocarbons, pesticides, and herbicides should be reported to the owner so they can prevent uncontrolled migration. Chemical migration control may require flushing, and/or the introduction of microbiological organisms to neutralize any impacts to the soil or water.

Monthly:

Ensure that paving area is clean of debris, ensure that paving dewaters between storms, and ensure that the area is clean of sediments.

Semi-annually:

The porous pavement should be protected from landscape clogging due to runoff from landscape areas, rooftops, and other areas that may significantly reduce the long-term permeability by diverting flows away.. It is recommended that the pervious surface be power washed and surface vacuumed semi-annually in order to flush out silt or other contaminants that may reduce the long-term permeability. It is recommended that this frequency be increased for areas where overhanging vegetation, excessive dirt and pollutants are frequent.

Annually:

Inspect the surface for deterioration and repair and/or replace porous pavement as necessary.

5. Signage. Signs should be posted in landscape areas and/or at entrances to the property as reminders of an ecologically sensitive pavement structure and that certain guidelines must be adhered to.

6. Sequence of Construction. The following sequence of construction shall be used for all development using the porous pavement design-criteria. The applicant is encouraged to provide any Additional details appropriate for the particular development.

1. Erosion controls and tree protection are to be installed as indicated on the approved site plan.
2. Contact the Watershed Protection and Development Review Department to schedule a preconstruction coordination meeting to be held on site.
3. Contractor installation letter attesting to qualifications and demonstrating experience with porous pavement systems must be provided to the inspector at the preliminary construction meeting.

4. Erosion controls will be revised, if needed, to comply with Inspectors' directives, and revised construction schedule relative to the water quality plan requirements and the erosion plan.

5. Rough-cut all required or necessary ponds. Either the permanent outlet structure or a temporary outlet must be constructed prior to development of any embankment or excavation that leads to ponding conditions. The outlet system must consist of a low-level outlet and an emergency overflow meeting the requirements of the Drainage Criteria Manual (Section 8.3) and/or the Environmental Criteria Manual (section 1.4.2.K) as required. The outlet system shall be protected from erosion and shall be maintained throughout the course of construction until final restoration is achieved.

6. Temporary controls to be inspected and maintained weekly and prior to anticipated rainfall events, and after rainfall events, as needed.

7. Schedule a mid-construction conference with the City Inspector to coordinate changes in the construction schedule and evaluate effectiveness of the erosion control plan after possible construction alterations to the site.

8. Contact Watershed Protection and Development Review Department to schedule inspection of sub-grade prior to placement of the gravel bed and porous pavement installation. The removal of fines, scarification of over compacted subgrade bed, and restoration of the naturally occurring in-Situ state should occur prior to placement of the gravel bed and installation of the porous pavement. For Vehicular Use porous pavement provide documentation verifying that the hydraulic conductivity of at least three (3) feet of soil immediately beneath the subgrade is > 0.5 inch/hour prior to placement of the porous pavement.

9. Complete permanent erosion control and site restoration. Remove temporary erosion/sedimentation controls and tree protection. Restore any areas disturbed during removal of erosion/sedimentation controls.

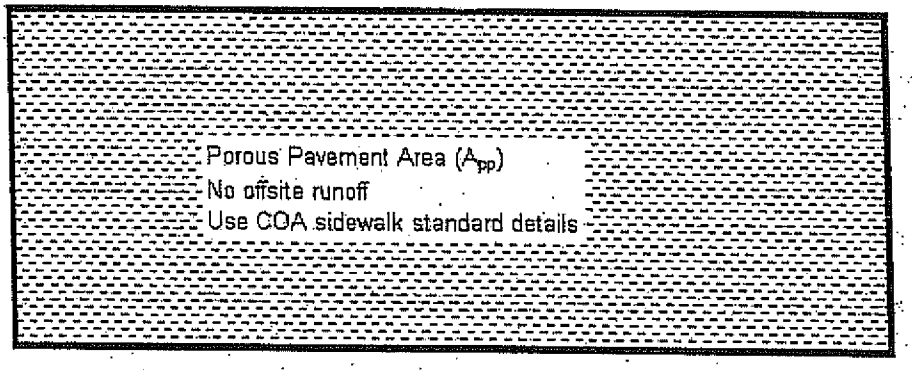
10. Upon completion of the proposed site improvements the engineer shall provide an Engineer's concurrence letter certifying in writing that the proposed facilities were constructed in conformance with the approved plans.

References:

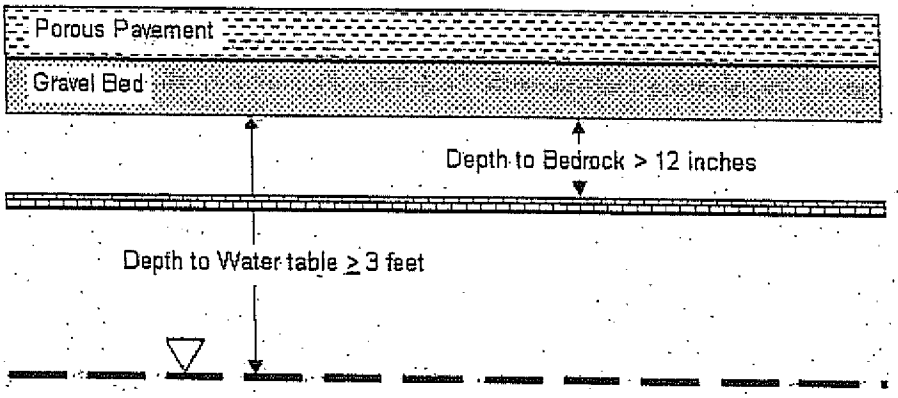
1. USEPA, NPDES, Stormwater Best Management Practices, cfpub.epa.gov/npdes/stormwater/

2. Lower Colorado River Authority, Highland Lakes Watershed Ordinance, *Water Quality Management Technical Manual*, February 1, 2006

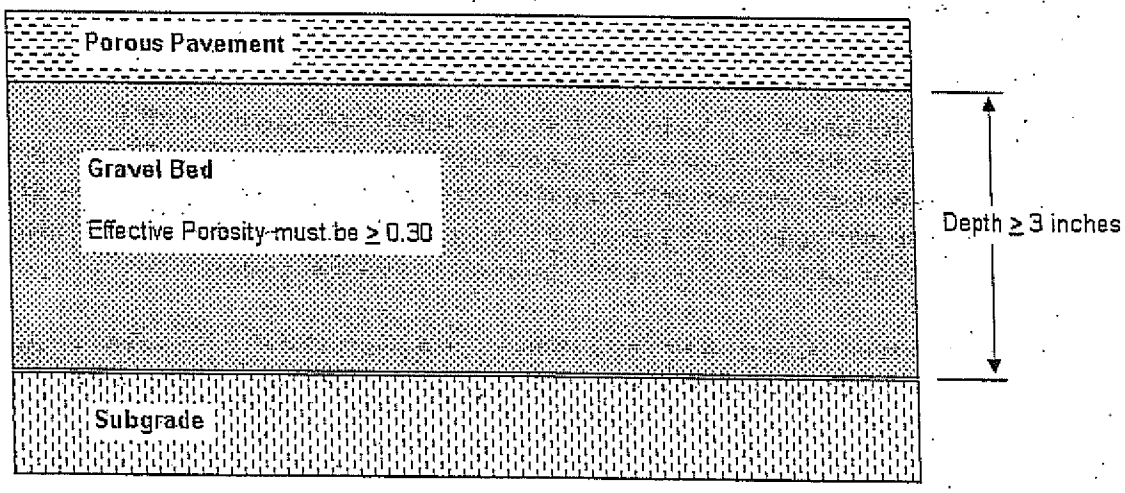
Figure 1A: Porous Pavement for Pedestrian Use Only



Plan View



Overall Profile



Cross Section Detail

F. Vegetative Filter Strip - Disconnection of Impervious Cover

1. Introduction. The disconnection of impervious cover and treatment of stormwater runoff by vegetative filter strips are considered a water quality control best management practice (BMP) by using the physical filtration properties of plants and infiltration properties of soils for removal of pollutants from stormwater runoff. The purpose of this section is to provide guidance on assigning partial water quality credit for vegetative filter strips smaller than those meeting the criteria provided in 1.6.7(B) of the Environmental Criteria Manual (ECM). All other design, operational, and maintenance criteria provided in ECM 1.6.7(B) must be met. It is imperative that stormwater flows from the impervious cover disconnection will not cause any increase in flooding conditions to the interior of existing building structures, including basement areas, for storms of magnitude up through the 100-year event or increased inundation of any building or roadway surfaces (Drainage Criteria Manual Section 1.2.2). Vegetative filter strips for treatment of disconnected impervious cover can provide partial treatment equivalent to a standard sedimentation/filtration system but are not acceptable as a primary method for controlling non-point source pollution in watersheds within the Barton Springs Zone and Contributing Barton Springs Zone. Throughout this section, the acronym VFS and the term filter strip are used when referring to vegetative filter strips.

2. General Design Guidelines. Filter strips must be sized correctly, have the proper slope, utilize sheet flow that does not exceed a maximum velocity, have appropriate soil type and thickness, and have appropriate vegetation of the proper density. The VFS shall not receive runoff until after the contributing drainage area has been stabilized to prevent erosion and sedimentation. Filter strips can be classified as either natural or engineered. In general, natural filter strips utilize existing vegetated areas whereas engineered filter strips are constructed features. Engineered vegetative filter strips differ from natural vegetative filters in that they are specifically designed and constructed to maximize the water quality benefits of this practice, particularly in areas where adequate buffers do not exist naturally or cannot be preserved. It should also be noted that vegetative filter strips cannot be used to provide detention of erosive flow (2-year control per ECM 1.6.8) or flood flows.

3. Water Quality Credit. A credit is given when impervious cover runoff is disconnected and then directed to a pervious area where it can filter over it. The credit is typically obtained by grading the site to promote overland flow of runoff to a vegetated area. For rooftop impervious cover disconnects the downspouts must be at least 10 feet away from the nearest impervious surface to discourage "re-connections".

The water quality credit will typically be applied as either a reduction in the water quality volume for of a structural control or a reduction in the fee-in-lieu cost. The basic credit equation is:

$$WQC = IAF * BMPDF$$

- WQC = Water Quality Credit, a value between 0 and 1, with 1 meaning 100% credit.
- Where IAF is the Impervious Area Factor, or the ratio of the impervious area treated by the control to the total site impervious area.
- BMPDF is the BMP Design Factor, a value between 0 and 1, is a measure of the potential effectiveness of the control.

Water quality credit for the VFS BMPDF variable will be calculated as:

If the hydraulic loading rate (HLR) for the peak flowrate for the 2-year, 3-hour rainfall event is ≤ 0.05 cfs/ft. width:

$BMPDF = A_{vfs}/A_{ecm}$

If the hydraulic loading rate (HLR) for the peak flowrate for the 2-year, 3-hour rainfall event is > 0.05 cfs/ft. width:

$BMPDF = (A_{vfs}/A_{ecm}) * (HLR_{ecm}/HLR_{vfs})$

- Where A_{vfs} is the area of the proposed vegetative filter strip in acres
- A_{ecm} is the area in acres of a vegetated filter strip that would be required per section ECM 1.6.7B.
- HLR_{vfs} is the hydraulic loading rate (flowrate/width) of the proposed vegetative filter strip, in cfs/ft.
- HLR_{ecm} is the 0.05 cfs/ft. width hydraulic loading rate criterion from section 1.6.7.B. of the ECM.
- HLR values greater than 0.15 cfs/ft. width are not permitted.

A maximum value of 1 is allowed for the BMPDF factor, even if the proposed VFS is larger than required by the ECM, or if the HLR is lower than required by the ECM.

Example:

A 5 acre commercial site with 80% impervious cover (4 impervious acres) is required to provide on-site water quality treatment. It is proposed to route 1 acre of parking lot (100% impervious cover) to a 0.75-acre vegetative filter strip (VFS), with dimensions 350 feet wide by 93 feet long. Without the VFS the water quality volume required is 1.10", or 19,965 ft^3. What water quality credit can be applied to this site?

As the parking lot area to be treated is 1 acre, and the total site impervious cover is 4 acres; the IAF value is 1/4 = 0.25.

For determining the BMPDF value, first look in section 1.6.7B of the ECM; a vegetative filter strip sized to treat a 1 acre parking lot at 100% impervious cover would have to be $\geq$ 2.49 acres in size. The proposed VFS is 0.75-acre. Next calculate the peak flow rate for the 2-year, 3-hour rainfall event, then determine if the proposed HLR is ≤ 0.05 cfs/ft. width. In this case this criteria is met, thus:

BMPDF = (0.75/2.49) * 1 = 0.301

Inserting the values into the water quality credit equation:

WQC = IAF * BMPDF = 0.25 * 0.301 = 0.075

The vegetative filter strip reduces the required WQV by 1,503 ft^3, or to 18,462 ft^3.

4. Signage. Should be provided to delineate the boundaries of the filter strip, and to notify residents, inspection, and maintenance staff of its function and proper management per ECM 1.6.7(B).

5. Maintenance. Filter strips shall be managed so that a dense, healthy vegetative cover is preserved. Once established, filter strips using native grasses shall be maintained without pesticides and fertilizers. Turfgrass filter strips may be managed with a minimal amount of irrigation and fertilization (not more than 1 lb. of nitrogen per 1,000 square feet per year) however no herbicides or pesticides shall be applied.

Bare spots and areas of erosion identified during inspections must be replanted and restored to meet specification. If sediment accumulates on the vegetative filter strip then it must be removed. Any disturbance to the filter strip as a result of maintenance procedures (or other reasons) shall be repaired, including re-establishment of the vegetation.

An approved Integrated Pest Management Plan with a recorded Restrictive covenant is required. It is extremely important that the VFS not be over-irrigated and that fertilizer and chemical use be minimized; otherwise the VFS may become a source of pollution instead of a treatment BMP.

G. Non-Required Vegetation

1. Introduction. Additional non-required vegetation, especially trees, can help reduce stormwater runoff and enhance ground water recharge by breaking the impact of raindrops and improving soil structure. A tree's effectiveness in this capacity is correlated with the size of the crown and root zone area. There are numerous environmental and stormwater benefits to additional vegetation. Non-required vegetation can act as natural stormwater management area by filtering particulate matter, including pollutants, some nutrients, sediments, and pesticides, and by absorbing water. A study done by the U.S. Department of Agriculture's Center for Urban Forest Research found that a medium-sized tree can intercept 2,380 gallons of rain per year (Center for Urban Forest Research 2002). A factor that can reduce the life and health of trees in urban areas, and thus their effectiveness, is compaction of or pavement over root systems. The criteria below are designed to protect the root system.

Non-required vegetation is eligible for water quality credit except in watersheds within the Barton Springs Zone and Contributing Barton Springs Zone.

2. Water Quality Credit and Design Guidelines

Non-required vegetation is eligible for water quality credit, in terms of pervious area (impervious area reduction), if the criteria below is met.

The following factors affect non-required vegetation Water Quality credit:

- The available planting area, see ECM 3.5.0;
- The anticipated rate of survival of vegetation planted;
- The quantity of vegetation to be planted; and
- The types of vegetation proposed.

The vegetation area eligible for credit is the 25-year growth root system. For trees, the root system is assumed to be equal to the canopy cover. To be eligible for credit the entire spatial area of the 25-year root system must be pervious (landscape and/or pedestrian-only porous pavement).

Direct rainfall is assumed to be the primary source of stormwater and no off-site runoff is allowed.

Minimum soil depths of twelve (12) inches for new trees and eight (8) inches for plants and grasses will be required. For the soil media requirements use the biofiltration media specifications shown in Environmental Criteria Manual (ECM) 1.6.7(C) Biofiltration.

For Non-required vegetation where porous pavement is used above the root zone the design criteria for porous pavement should be followed, see ECM 1.6.7(E).

Note: No Water Quality credit will be given for the 25-year growth root system of non-required vegetation located within vehicular parking areas. Additionally, porous pavement is not allowed under stormwater hot spots or areas where land use or activities generate highly contaminated runoff as described in ECM 1.6.7(E).

3. Maintenance. An approved Integrated Pest Management Plan with a recorded Restrictive covenant is required. It is extremely important that fertilizer and chemical use be minimized; otherwise the Non-required vegetation may become a source of pollution instead of a treatment best management practice. Tree Pruning and vegetation management should be modified (i.e., less frequent and less intensive) to maximize the leaf surface area, or Leaf Area Index (LAI), the 25-year growth root system, and the rainfall interception rate to increase future benefits.

References:

1. USDA Forest Service, PSW, Center for Urban Forest Research, Rainfall Interception by Santa Monica's Municipal Urban Forest, September 2003

H. **Rain Garden.**

1. Introduction. A rain garden is a filtration and/or infiltration system that has a contributing drainage area not to exceed 1.0 (one) acre, and a ponding depth not to exceed 6 (six) inches. Unlike conventional centralized stormwater management systems, the rain garden approach may employ multiple controls dispersed across a development, and incorporated into the landscape, providing aesthetic as well as ecological benefits. The purpose of this section is to provide guidance on assigning water quality credit for rain gardens smaller than those meeting the criteria provided in the Environmental Criteria Manual (ECM) Section 1.6.7(C), Biofiltration. Other than what is specifically mentioned in this section, all other design, construction, landscape, inspection, and maintenance criteria provided in ECM 1.6.7(C) must be met.

A Rain Garden can provide partial treatment equivalent to a standard sedimentation/filtration system but is not acceptable as a primary method for controlling non-point source pollution in watersheds within the Barton Springs Zone and Contributing Barton Springs Zone. The use of a Rain Garden as a water quality control is limited to Commercial and Multi-Family developments only.

As with sand and biofiltration systems, a rain garden will provide physical filtration of pollutants in stormwater runoff. However, because of the small drainage area and shallow ponding depth, which necessitate a larger surface area, biological and plant uptake mechanisms may be more significant for rain gardens. In addition, rain gardens may receive lower sediment loads than other systems, and this can also potentially enhance their pollutant removal performance, and prolong operational life.

On the negative side, if rain gardens are over-irrigated and receive significant applications of fertilizers and herbicides, they can become sources of pollution rather than pollutant removal BMPs. Thus, it is essential that these rain garden systems be managed carefully and that an approved and recorded Integrated Pest Management plan be required for the drainage area up to and including the rain garden.

Like all filtration systems in the City of Austin, isolation of the Water Quality volume and the minimization of mixing of additional flows are necessary, as is pre-treatment in order to protect the filtration media from sediment loads. Pre-treatment can be provided by a sediment chamber, analogous to a "partial" sedimentation-filtration system.

2. Surface Area.

The total area of the system is the sum of the filtration and sediment chamber areas.

A Darcy's Law approach is used to determine the minimum filtration area required:

$$Q = k * i * A_f$$

- Where Q is the treatment rate of the BMP
- k is the saturated hydraulic conductivity
- i is the hydraulic gradient
- A_f is the filtration media surface area

Because of the shallow ponding depth it is reasonable to set the hydraulic gradient i to a value of 1.0:

$Q = k A_f$

By definition:

$Q = WQV/DDT$

- Where WQV is the water quality volume
- DDT is the drawdown time; 48 hours is used

Setting the two equations equal and solving for A:

$A_f = WQV/(k * DDT)$

Pending local monitoring data a k value of 3.5 ft/day is recommended for filtration media. If an infiltration system is proposed the saturated hydraulic conductivity of the soil must be determined. If a range of values are available then the lowest value should be used. For design purposes, the soil conductivity value should be reduced by at least a factor of safety of 2 to account for potential clogging over time.

Assuming a filtration system with 3.5 ft/day hydraulic conductivity, and a 48 hour drawdown time gives:

$A_f = WQV/7$

- Where A_f is the minimum required filtration media surface area in ft^2
- WQV is in ft^3

Because of significant uncertainties as to the actual k value over the life of the rain garden, the underdrain system is to have an orifice installed that is sized to provide a 48 hour drawdown time.

The sediment chamber area is the total area minus the filtration area; this area should be determined after accounting for the water quality volume held in and above the filtration media (see design example below).

3. Water Quality Volume.

The water quality volume is the combined volume of the filtration and the sedimentation chamber areas. The sediment chamber must hold at least 20% of the water quality volume. Due to the small drainage area and large surface area of these systems, the filtration media should be protected better against sedimentation than typical filtration systems. Because of this water quality volume credit will be allowed for 80% of the effective porosity volume of the filtration media, or:

$$WQV = WQV_{ne} + WQV_{ponded}$$

- Where WQV is the total water quality volume in ft^3
- WQV_{ne} is 80% of the filtration media effective porosity volume
- WQV_{ponded} is the ponded volume, with a maximum ponding depth (H) of 6 inches

To calculate WQV_{ne} in ft^3:

$$WQV_{ne} = 0.8 * A_f * L * n_e$$

- Where A_f is the surface area of the filtration media is ft^2
- L is the depth of the filtration media, a minimum of 1.5 ft
- n_e is the effective porosity of the media. As a default assumption a value of 0.3 can be used.

Inserting the values and assumptions results in:

$$WQV_{ne} = 0.24 * A_f * L$$

- Where A_f is the surface area of the filtration media is ft^2
- L is the depth of the filtration media in ft

The ponded water quality volume is then calculated as:

$$WQV_{ponded} = WQV - WQV_{ne}$$

Also WQV_{ponded} can be estimated as:

$$WQV_{ponded} = (A_f + A_{sed}) * H$$

The two equations can be combined and, setting H equal to 6 inches (0.5 feet), the sediment chamber area can be calculated:

$$A_{sed} = [2 * (WQV - WQV_{ne})] - A_f$$

Example

A 1 acre parking lot (100% impervious cover) proposes to use a rain garden for water quality treatment. Design the system using the criteria presented above.

The water quality volume (WQV) for a 100% impervious cover site is 1.30-inches, or 4,719 cu.ft. for a 1 acre site.

The proposed design will have a maximum ponding depth of 6 inches, and a media depth of 1.5 feet. The minimum required filtration area is:

$A_f = WQV/7 = 4719/7 = 674$ *sq.ft.*

The designer proposes 700 sq.ft.of filtration area.

The WQV assigned to the filtration media effective porosity void space is:

$WQV_{ne} = 0.24 * A_f * L = 0.24 * 700 * 1.5 = 252$ *cu.ft.*

The ponded WQV is estimated as:

$WQV_{ponded} = WQV - WQV_{ne} = 4719 - 252 = 4,467$ *cu.ft.*

The sediment chamber area can be estimated as:

$A_{sed} = [2 * (WQV - WQV_{ne})] - A_f = [2 * (4719 - 252)] - 700 = 8,234$ *sq.ft.*

*The sediment chamber area must be at least 20% of the total area, or WQV/H * 0.2 = 4719/0.5 * 0.2 = 1888 sq.ft. As 8,234 is greater than 1,888 the design is acceptable.*

APPENDIX R-11
RAIN GARDEN CALCULATIONS
FOR DEVELOPMENT PERMITS

DRAINAGE AREA DATA:	Required		Provided	
Drainage Area to Control (DA ≤ 1.0 acre)		ac.		
Drainage Area Impervious Cover		%		
Capture Depth (CD)		in.		
Water Quality Volume (WQV = CD * DA * 3630)		cf.		cf.

WATER QUALITY CONTROL CALCULATIONS:	Required		Provided	
The Water Quality Control is to be RAIN GARDEN				
100-year Peak Flow Rate to Control (Q100)		cfs.		
Filtration Pond Area (A_f = WQV / 7)		sf.		sf.
Depth of Filtration Media (L)	≥ 1.5	ft.		ft.
Effective Porosity Water Quality Volume ($WQV_{ea} = 0.24 * A_f * L$)				cf.
Ponded Water Quality Volume ($WQV_{ponded} = WQV - WQV_{ea}$)				cf.
Sedimentation Pond Area ($A_{sed} = [2 * (WQV - WQV_{ea})] - A_f$)	≥ 20% of WQ Pond Area	sf.		sf.
Rain Garden Pond Drawdown Time	≥ 48	hr.		hr.
Underdrain Orifice Size (diameter)				in.
Underdrain Orifice Size (area)				sq. in
Water Quality Elevation (WQE)				ft. m
Elevation of Splitter/Overflow Weir	≥ WQE	ft. msl		ft. m
Length of Splitter Weir				ft.
Required Head to Pass Q100	≤ 0.5 ft.	ft.		ft.
Pond Freeboard Provided to Pass Q100	≥ 0.25 ft.	ft.		ft.

INTERLOCAL AGREEMENT BETWEEN THE LOWER COLORADO RIVER AUTHORITY AND THE CITY OF AUSTIN

Executive Summary

This Agreement between the City of Austin (City) and the Lower Colorado River Authority (LCRA) results in the City issuing a development permit within the City of Austin city limits if applicable) and the extra-territorial jurisdiction (ETJ) in the Lake Travis watershed as shown on Exhibit A, attached hereto and incorporated for all purposes. The City's development permit will include water quality protection requirements that are equal to or greater than the protection provided by the LCRA Highland Lakes Watershed Ordinance. Thus, "one-stop" shopping is achieved in development permitting in the City limits (if applicable) and ETJ. The City will seek LCRA's input on projects requesting a water quality variance. Since LCRA has technical expertise relating to water quality protection in the Lake Travis area, the City and LCRA will cooperate in the land development management process to manage the lake resources to the maximum extent practical. The City has the water quality protection ordinance and resources to successfully administer water quality protection in the Lake Travis watershed, can work directly with the residents and developers of their community, yet can rely on LCRA as a technical resource throughout the process.

This Interlocal Agreement ("Agreement") is made and entered into pursuant to the Interlocal Cooperation Act, Texas Government Code Chapter 791, by and between the Lower Colorado River Authority , a conservation and reclamation district created pursuant to Article 16, Section 59 of the Constitution of the State of Texas, and the City of Austin, Texas, a political subdivision of the State of Texas, for the purpose of coordinating policies and programs which will preserve and protect water quality in the City, the extraterritorial jurisdiction of the City, and Lake Travis.

W I T N E S S E T H:

WHEREAS, LCRA and the City are committed to preserving and protecting the water quality of the creeks and Lake Travis; and

WHEREAS, on the 16th day of November, 2005, the Board of Directors of LCRA adopted the Highland Lakes Watershed Ordinance ("Ordinance"), effective on February 1, 2006, which establishes certain requirements for managing stormwater runoff and pollution in the Highland Lakes region, including the Lake Travis watershed in Travis County; and

WHEREAS, the City of Austin Land Development Code applies within the City limits and extraterritorial jurisdiction within a portion of the Lake Travis watershed, and

WHEREAS, the City's Land Development Code provides management of stormwater pollution that is equal to or greater than that provided by the LCRA ordinance; and

WHEREAS, the City requires a landowner or land user to manage stormwater runoff and obtain a development permit before commencing development; and

WHEREAS, the LCRA and the City wish to cooperate closely in administering their permitting programs, and in devising policies to protect water quality that are efficient, effective, and enforceable;

NOW, THEREFORE, LCRA and the City agree as follows:

I. JURISDICTIONAL AGREEMENT

The LCRA and the City agree that, subject to the conditions agreed to below, LCRA's Highland Lakes Watershed Ordinance and its subsequent amendments shall not apply within the City limits and its extraterritorial jurisdiction (ETJ) in the Lake Travis watershed. The City shall administer the City of Austin Land Development Code and applicable rules in the Lake Travis watershed to provide protection of Lake Travis and its tributaries that is as protective or greater than that provided by the LCRA's Highland Lakes Watershed Ordinance.

This Agreement does not impact the Interlocal Agreements or any amendments thereto between the City of Austin and The City of Jonestown or the City of Austin and The City of Lago Vista.

II. CITY RESPONSIBILITIES.

1. The City shall initiate a review of its water quality rules and regulations applicable in the Lake Travis watershed to include low impact development approaches and other techniques found in the LCRA Ordinance and Technical Manual.
2. If an applicant seeks a variance from the water quality protection measures found in the City's Land Development Code, the City shall provide notice to LCRA.
3. The City shall provide notice to LCRA Water Resource Protection staff for review and comment on any proposed changes to the City limits through annexation or extraterritorial jurisdiction transfers in the Lake Travis watershed and any proposed amendments to the City's water quality protection measures in the Lake Travis watershed.
4. Prior to commence of construction, the City will host a pre-construction meeting at the site that is attended by the City and the owner's representatives.
5. The City shall perform construction inspection relating to the requirements found in the development permit, including water quality requirements. The City may contact LCRA for input on construction inspection activities.

6. The City will perform enforcement as necessary to ensure that the project remains in compliance with the Land Development Code.

7. At project completion, the City will host a final project inspection meeting at the site that is attended by the City and the owner's representatives.

8. Upon successful project completion, the project will come under the City's annual inspection program to ensure that maintenance is performed per the City standards.

9. The City will perform enforcement as necessary to ensure that the permitted and constructed water quality controls are maintained in accordance with the permit requirements.

10. The City agrees to make available and distribute water quality and conservation education materials. These materials may be billing inserts displays in the City office, website information, and information packets to residents. LCRA will provide materials and support to the City upon request.

11. The City agrees to meet semi-annually with LCRA to ensure program coordination.

III. LCRA RESPONSIBILITIES

1 At LCRA's discretion, LCRA may review permit applications that have requested a variance to City's ordinance. LCRA may provide input on the variance request.

2. LCRA will assist the City upon request in designing water quality management controls including best management practices for the City Capital Improvement Projects and for parkland that the City may lease from LCRA.

3. LCRA will provide 30 days advance written notice to the City of any proposed amendments to the LCRA Highland Lakes Watershed Ordinance.

4. LCRA will provide water quality and water conservation education materials to the City to share with residents of new projects. LCRA will participate in water quality education programs in the Lake Travis watershed area.

5. LCRA agrees to meet semi-annually with the City to ensure program coordination.

IV. TERM; TERMINATION

1. This term of this Agreement shall be for the remainder of the calendar year in which it was executed and shall be automatically renewed from year to year unless terminated by either party following 30 days advanced written notice.
2. LCRA may terminate this Agreement following 30 days advanced written notice if it determines that the City's Land Development Code no longer provides management of stormwater pollution that is equal to or greater than that provided by the LCRA ordinance.

V. MISCELLANEOUS

1. This Agreement represents the entire agreement between the City and LCRA and supersedes all prior negotiations, representations, or agreements, either written or oral between the parties regarding water quality regulation in the Lake Travis watershed. This Agreement may be amended only by written instrument signed by both the City and LCRA. No official, employee, agent, or representative of the City or LCRA has any authority, either express or implied, to amend this Agreement, except by such express authority as may be granted by the governing bodies of the City and LCRA.

2. If the final judgment of a court of competent jurisdiction invalidates any part of this Agreement, then the remaining parts shall be enforced, to the extent possible, consistent with the intent of the parties as evidenced by this Agreement.

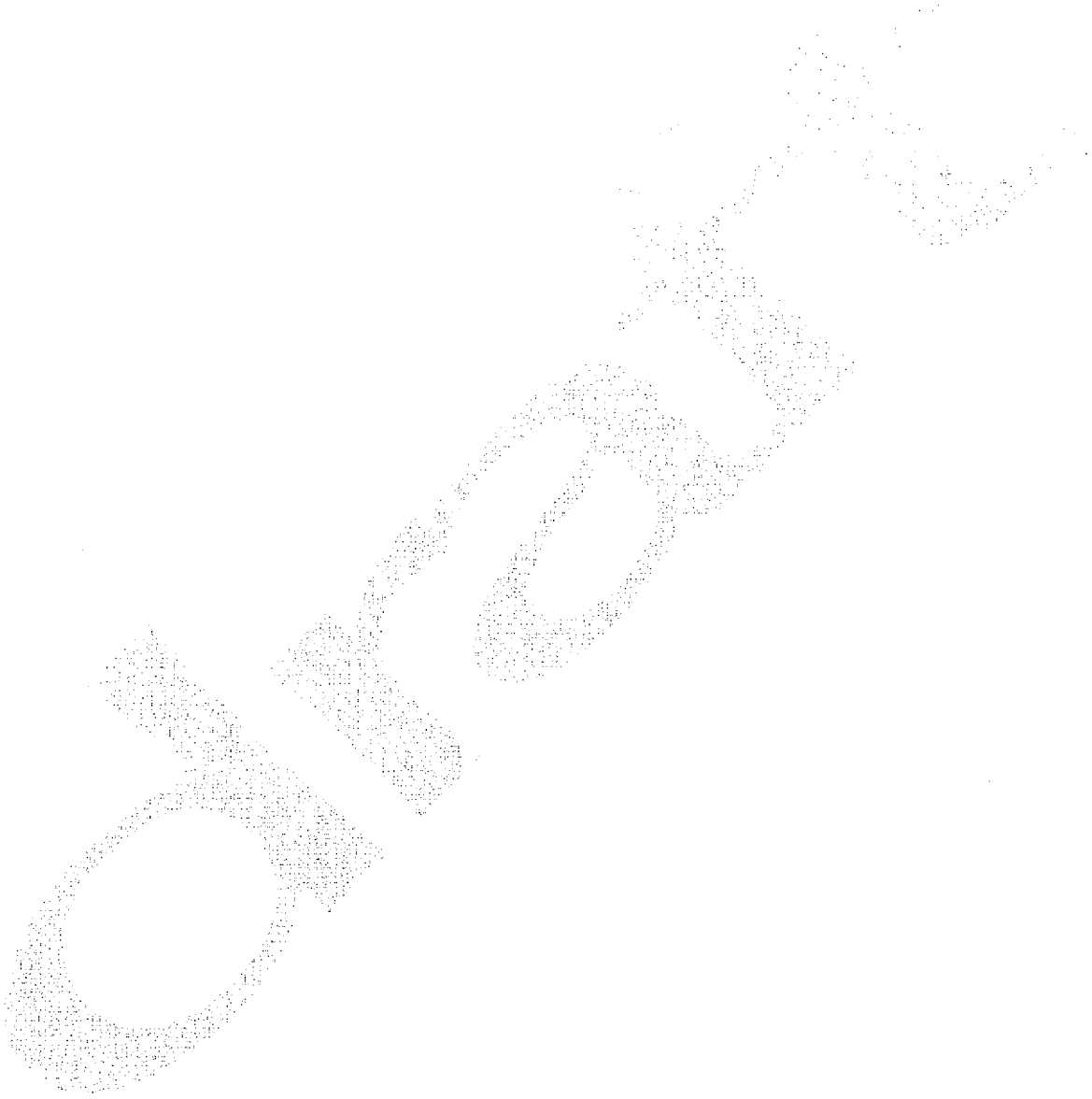
3. Regardless of the actual drafter, this Agreement shall, in the event of dispute over its meaning or application, be interpreted fairly and reasonably, and neither more strongly for or against either party.

4. Any notice to be given hereunder by either party to the other shall be in writing and may be effected to personal delivery or registered or certified mail, return receipt requested, addressed to the proper party, at the following address:

LCRA:	Joe Beal, General Manager LCRA P.O. Box 220 Austin, Texas 78767
With copy to:	Tom Hegemier, Water Resource Protection LCRA P.O. Box 220 Austin, Texas 78767
City of Austin:	Toby Hammett Futrell City Manager P.O. Box 1088 Austin, Texas 78767
With copy to:	Vistoria Hsu Director, Watershed Protection and Development Review P.O. Box 1088 Austin, Texas 78767

Each party may change the address for notice to it by giving notice of such change in

accordance with the provisions in this paragraph.



5. The signatories hereby acknowledge that this Agreement is duly authorized by the governing bodies of LCRA and the City.

LOWER COLORADO RIVER AUTHORITY

By: _____ Date: _____
Joe Beal

CITY OF AUSTIN

By: _____ Date: _____
Laura Huffman
Assistant City Manager

APPROVED AS TO FORM:

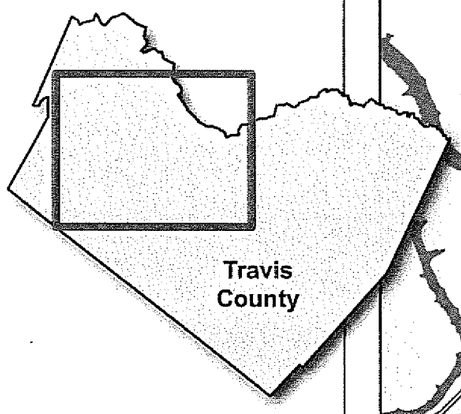
By: _____
City of Austin
Law Department

Lake Travis Watershed Jurisdictions

N
W E
S

0 1 2 Miles

Area of Detail



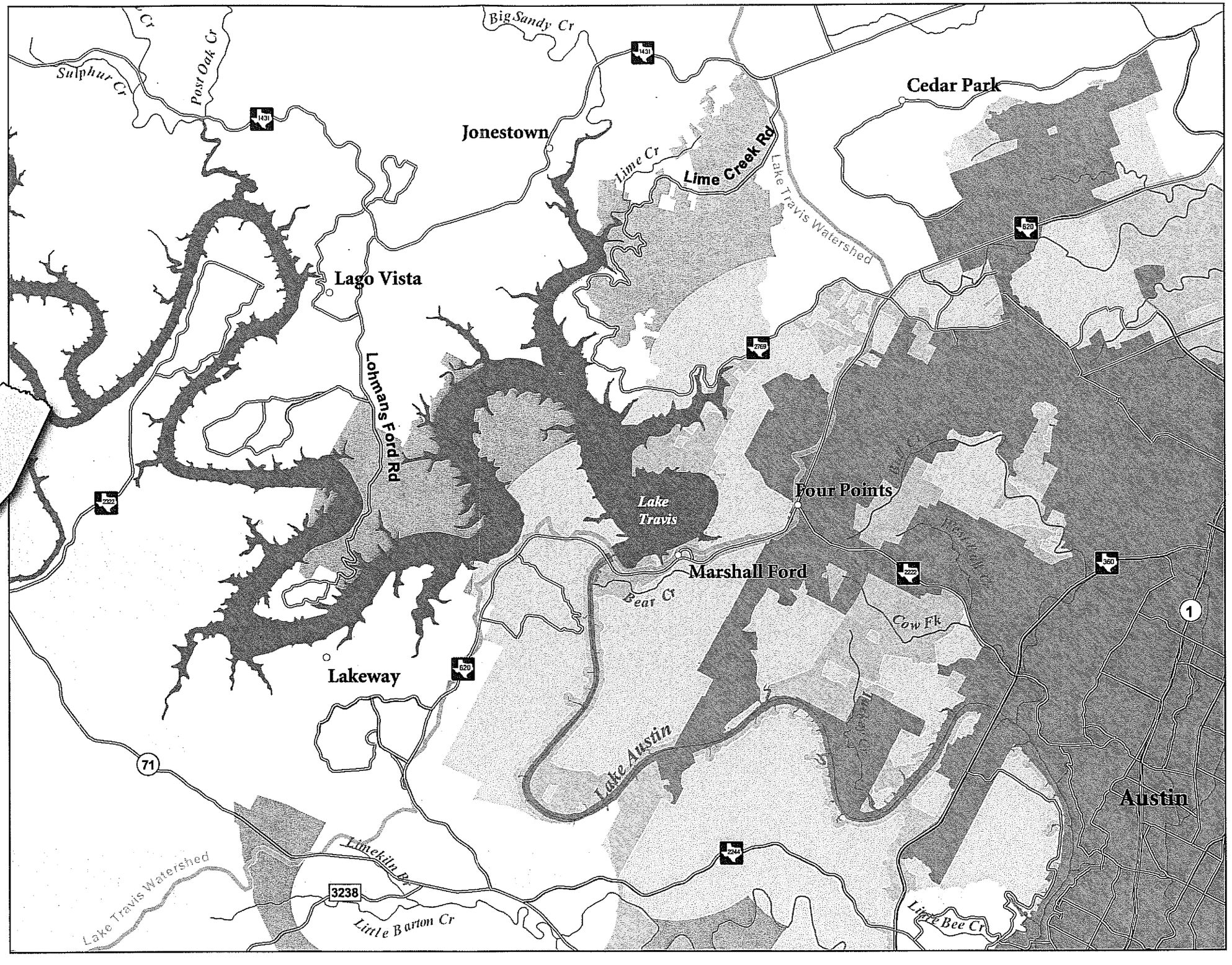
- City of Austin Full Purpose
- City of Austin Limited Purpose
- City of Austin 2 Mile ETJ
- City of Austin 5 Mile ETJ
- Lake Travis Watershed Boundary

LCRA ENERGY • WATER • COMMUNITY SERVICES

Source: Jurisdictions- Travis County

This map has been produced by the Lower Colorado River Authority for its own use. Accordingly, certain information, features, or details may have been emphasized over others or may have been left out. LCRA does not warrant the accuracy of this map, either as to scale, accuracy or completeness.

May 9, 2006



File Copy

Measure/Control/BMP	COA Water Supply Rural	LCRA Highland Lakes Watershed Ordinance, 2006	LCRA Lake Travis Ordinance, 1990	City of Lakeway, December 2001	Village of Bee Cave, August 2000,	Travis County, Interim Rules Proposal, March 2005	TPDES - Construction Stormwater General Permit, March 2003, TCEQ	TCEQ Edwards Aquifer, Optional Enhanced Measures, February 2005	TCEQ Edwards Aquifer Protection Rules, June 1999
Definition of Uplands Area (= "Net Site Area" for COA) = "developable area"	Net Site Area = Gross Site Area – CWQZ – WQTZ – Slope Restricted Areas (varies with slope category)	None specified. Impervious cover for BMP design based on gross site area.	None specified.	Net site area is land outside of CEF zones, CWQZ, buffer zones, and slopes greater than 15%. Reduction of net site area for slopes between 15-25%.	None specified.	None specified.	None specified.	None specified.	None specified.
Shoreline Protection/Management	None specified. Any setbacks from the water?	Dredge and Fill standards are in place for projects in compliance with the Corps of Engineers 404 permit requirements. No permit is necessary if property owners follow the standards. Enforcement authority is found in the Ordinance for projects exceeding the allowances in the standards.	Shoreline Development Permit is required for major developments which includes BMPs per water quality treatment specs below, temporary erosion controls, and design requirements for shoreline construction. - Also, Dredge/Fill permit for smaller shoreline projects (move less than 500 cubic yards). Permit required which identifies temporary erosion control requirements and design strategies for shoreline construction. Closely connected to docks and boat slips.		None specified.	Setbacks from shoreline, no development in buffer except docks, piers, etc. Setback of 75 feet from the 681 contour for single family development and 100 feet from the 681 contour for all other development.	None specified.	None specified.	None specified.
Buffer Zone Sizes – Streams	Buffer composed of two zones, the Critical Water Quality Zone (CWQZ) and the Water Quality Transition Zone (WQTZ). Setbacks from stream centerline are 100 year floodplain or as follows, whichever is greater: - CWQZ = 50 – 100' for drainage area 64 acres and 320 acres with WQTZ = 100' beyond CWQZ - CWQZ = 100 – 200' for drainage area > 320 acres and 640 acres with WQTZ = 200' beyond CWQZ - CWQZ = 200 – 400' for drainage area > 640 acres with WQTZ = 300' beyond CWQZ - For Barton Creek main channel only, CWQZ = 400' with WQTZ = 300' beyond CWQZ - Notwithstanding above, CWQZ does not extend beyond crest of a bluff	Buffer zones are natural areas along the creek with following setbacks from stream centerline: • 25' on each side of creek for drainage area > 5 acres and < 40 acres • 75' on each side of creek for drainage area > 40 acres and < 128 acres - 100' on each side of creek for drainage area > 128 acres and < 320 acres - 200' on each side of creek for drainage area > 320 acres and < 640 acres - 300' on each side of creek for drainage area > 640 acres • Option to above setbacks, 100-year developed floodplain plus 25 feet on each side. • For rivers/creeks draining more than 40 square miles, the buffer zone is equal to the 100-year floodplain. Burnet/Llano County, buffer zones are 25 wide beginning at top of creek bank.	None specified.	Critical water quality zone shall be defined by the 100 year floodplain provided that it shall never be greater than the largest number below or less than the smallest number below. Floodplain based on fully developed watershed conditions. - 25 -50' for drainage area 64 acres and < 640 acres - 50-100' for drainage area 640 acres and < 1280 acres - 100-200' for drainage area 1280 Buffer zones extend 50-75' beyond the CWQZ	Upland waterways - buffer shall extend a minimum of 85' from the outer limit of the two-year flood level. This applies to all waterways with drainage areas of at least 30 acres. Little Barton Creek, Barton Creek - the buffer shall extend 300 feet from the outer limit of the two year flood level.	Development is prohibited within the buffer zone except as identified below. (Allowed and prohibited uses) - - 50' to 100' for drain areas > 64 acres and < 320 acres - 100' to 200' for drain areas > 320 acres and < 640 acres - 200' to 400' for drain areas > 640 acres The fully developed 100-year floodplain is the buffer, with the above the minimum and maximum buffer widths. Based on COA Rural Water Supply ordinance requirements as applied to Lake Travis and Lake Austin watersheds which is included in Chapter 30 Travis County Code (Joint Austin/Travis County Subdivision Regulations)	None specified.	Buffer zones defined as "undisturbed natural areas" with following setbacks from stream centerline: - 25' for drainage area 5 acres and < 40 acres - 50' for drainage area 40 acres and < 128 acres - 100' for drainage area 128 acres and < 320 acres - 200' for drainage area 320 acres and < 640 acres - 300' for drainage area 640 acres No provisions for reducing buffers due to presence of bluffs or other site-specific circumstances	None specified.
Buffer Zones – Sensitive Environmental Features	Critical Environmental Features (CEF) includes bluffs, canyon rimrocks, caves, sinkholes, springs, and wetlands Cut and fill limitations. Buffer zone of 150 – 300'; can be reduced to 50' for yard, hiking trail, or recharge basin, or based on determination of "minor" features.	None specified	None specified.	Buffer zone shall extend 50' from the identified critical environmental features (natural springs, recharge features, bluffs, wetlands etc.)	Buffer zone shall extend 85' around the outside periphery of natural springs, recharge features, and wetlands.	_ 150 feet around springs, bluffs, caves, wetlands - 150 to 300 feet around recharge points depending upon drainage.	None specified.	Isolated sensitive features identified in a geologic assessment may not be sealed, but protected by natural buffers. Protection of the features through gates and other structural approaches is required. Buffer should extend 150 feet in all directions and up to 300 feet in the direction of contributing flow.	None specified.
Buffer Zones – Allowed and Prohibited Uses	By definition, activities other than those explicitly allowed are disallowed. Activities allowed in CWQZ: - hiking, jogging, or walking trail and outdoor facilities, excluding stables and corrals for animals. - master planned park (with conditions) - boat docks, piers, wharf, or marina - pedestrian bridge, bicycle or golf cart path - roadway and utility crossings (with restrictions) Activities allowed in WQTZ - same as CWQZ except: - drainage facilities or water quality controls with restrictions - development transfers - no more than 1 single-family unit per 3 acres	Activities not allowed: - impervious cover, wastewater irrigation, wastewater lines - structural water quality controls, golf courses Activities allowed include: - Minimum utility and roadway crossings, perpendicular to creek - Water quality monitoring devices. - Low impact parks and trails	None specified.	Impervious cover in the buffer zone shall not exceed 20% of net site area. - Wastewater trunk lines shall be located outside the CWQZ whenever possible except for crossings. Exceptions to the policy can be approved by the City Manager and City Engineer. - Every one acre of CWQZ dedicated to City entitles the applicant to an additional 20,000 square feet of impervious cover. - Every one acre of Buffer Zone dedicated to the City entitles the applicant to additional 12,000 sq ft imp cvr	Allowed uses include roadway and driveway crossings, hike and bike trails, restoration of natural vegetation, water quality monitoring, fences that do not obstruct flood flows, and public and private parks.	No development is allowed in environmental feature buffers except yards, trails, and recharge basins. - Stream buffers, allowed uses include fences, golf course with IPM plan, trails, utility line crossing the buffer, detention basins and floodplain alterations if meet Travis County Section 82.207, and specified roadway crossing spacing requirements based on street type (residential, collector, arterial).	None specified.	Sensitive Features – No development in buffer. - Stream buffers should remain free of construction and development, although stormwater treatment systems can be constructed if the drainage area is less than 128 acres. Other allowed uses include fences, low impact parks, limited roadway and utility crossings and these should be perpendicular to the buffer. Golf courses and wastewater effluent irrigation shall not take place in the buffer.	None specified.
Streambank Erosion Control	When structural controls are used, capture the runoff from the 2-year, 3-hour storm and release runoff to not exceed the pre-development rate.	Detain the runoff from the 1-year, 3-hour storm (1.93 inches) for a minimum period of 24-hours.	Retain 1-year, 3-hour storm runoff for a minimum of 24 hours.	None specified.	None specified.	Retain 1-year, 3-hour storm runoff for a minimum of 24 hours.	None specified.	To protect stream morphology, projects shall limit the peak runoff rate for the 2-year, 24-hour storm to 50% of the undeveloped rate for that event and limit the 10-year, 24-hour storm peak runoff rate to that calculated for the undeveloped condition for the same storm conditions.	None specified.
Impervious Cover	Single-family - 1 unit per 1-2 acres Multi-family - 20-25% impervious cover maximum Commercial 20-25% impervious cover maximum	No limitations specified, however water quality design is directly connected to impervious cover level. The greater the impervious cover, the larger the BMP size.	No limitations specified, however water quality design is directly connected to impervious cover level. The greater the impervious cover, the larger the BMP size.	Single family and duplex impervious cover shall not exceed 50% net site area (NSA) or 60% if transfers - Multi-family impervious cover shall not exceed 60% NSA or 70% if transfers - Commercial impervious cover shall not exceed 60% NSA or 70% if transfers	20 % maximum for single family development, - 40% max for multi-family and non-residential use - Impervious cover allowances for isolation of roof runoff (5% increase), for appropriate water quality controls (20% increase), and for development transfers.	None specified.	None specified.	None specified.	None specified.
Low-Impact Development	None specified.	Termed alternated standards for single-family development when gross impervious cover is less 15% and open drainage systems are utilized. Commercial tracts less than 3 acres in area can use vegetated filter strips to comply. Stormwater credits such as rainwater harvesting, porous pavement, roof-top disconnection, native landscaping, and natural area preservation can be used to reduce impervious cover and/or gain compliance with alternate standards.	Suggested as large lot development (lot >1 acre). If lots are larger than 1 acre and use open drainage system, deemed to comply with alternate standards. Single family subdivisions only.	None specified.	None specified.	Suggested as large lot development (lot > 1 acre). If lots are larger than 1 acre and use open drainage system, deemed to comply with alternate standards. Single-family subdivisions only.	None specified.	Encourages site planning with greater building setbacks and deed restrictions to limit landscaping to native plants that require little or no fertilizers.	No specific criteria, but suggestions are provided. - Comprehensive site planning to minimize impacts to natural features, maintain the perviousness of the site, and slowing the rate of runoff. - Integrated Pest Management plans - Good housekeeping such as street sweeping, proper solid waste management, recycling used waste oil, etc - Landscaping and vegetative practices. Special requirements for underground storage tanks.
Stormwater Quality Treatment	Requires use of sedimentation-filtration to manage water quality. Includes increased capture volume methodology. See LCRA Highland Lakes Watershed Ordinance info for comparison of capture volumes. - City does allow alternative treatment strategies on a case by case basis.	Treat and detain the runoff from the 1-year, 3-hour storm (1.93 inches). Detailed sizing and design criteria based on BMP types and systems. The BMP system was established to manage between 70-75% of the pollutant load (TSS, TP, O&G). BMP options include bioretention, wet ponds, extended detention, sand filtration, retention-irrigation, vegetative filter strips, and infiltration devices. Must submit stormwater management plan that demonstrates permanent water quality controls comply with this section. - Water Quality Volume comparison to the COA rules, if impervious cover = 30%, LCRA is 0.59", COA = 0.8" if impervious cover = 50%, LCRA is 0.92", COA=0.8" if impervious cover = 70%, LCRA is 1.24", COA = 1.0"	0 - 10% slopes, 70% capture of TSS, TP, O & G; 10 - 25% slopes, 80% capture of TSS, TP, O&G; 25 - 35% slopes, 90% capture of TSS, TP, O&G. Detailed sizing and design criteria. Treat runoff from 1.5" rainfall with BMP or series of BMPs. Must submit stormwater management plan that demonstrates permanent water quality controls comply with this section.	Capture and isolate 0.5 inches of runoff volume for commercial development, - For single family and multi-family development, capture and isolate the runoff from a 0.5 inch rainfall. - Provide stormwater detention for the 10 and 100 year storms per the COA Drainage Criteria Manual. - Runoff in excess of water quality pond volume is conveyed to the detention pond. - Design criteria is provided for slopes, maintenance access, and freeboard.	Capture 95% of TSS, TP, oil and grease generated by development. Water quality volume shall be the first 0.5 inches of runoff plus an additional 0.1 inches for each ten percent increase of the gross impervious cover over 20% of the contributing drainage area to the water quality control. Vegetation and filter strips are encouraged.	0 - 10% slopes, 70% capture of TSS, TP, O & G; 10 - 25% slopes, 80% capture of TSS, TP, O&G; 25 - 35% slopes, 90% capture of TSS, TP, O&G.	None specified.	Hazardous material traps are required for roadways capable of conveying at least 5000 vehicles per day and must be designed to retain a spill of 10,000 gallons of liquid hazardous material. • Developments must remove 80% of the annual total suspended sediment load. - Extensive design guidance provided.	If impervious cover of the site exceeds 20%, then the BMP(s) must reduce the increase in TSS load associated with development by at least 80%. - Extensive guidance on permanent BMPs - Approach very similar to the methods provided in the LCRA NPS Technical Manual, 1998.
Groundwater Protection	None specified.	None specified.	None specified.	None specified.	None specified.	See buffers around recharge features.	None specified.	See buffers for environmental sensitive recharge features.	Activities prohibited in the recharge zone include waste disposal wells, CAFOs, land disposal of toxic or hazardous wastes, sewage holding tanks, new Type 1 MSW landfills - Geologic site assessment required. - Locate all known wells. - Locate all sensitive feature(s) described in the geologic assessment.
Wastewater Treatment	None specified.	None specified.	None specified.	See buffer zones above, allowed and prohibited uses.	Wastewater treatment is prohibited on slopes > 15%, in a buffer zone, in a 100-year floodplain, during wet weather. Wastewater lines must be outside the buffer zone.	None specified.	None specified.	None specified.	Must provide plans for Organized Sewage collection Systems for state review and approval.

Measure/Control/BMP	COA Water Supply Rural	LCRA Highland Lakes Watershed Ordinance, 2006	LCRA Lake Travis Ordinance, 1990	City of Lakeway, December 2001	Village of Bee Cave, August 2000.	Travis County, Interim Rules Proposal, March 2005	TPDES - Construction Stormwater General Permit, March 2003, TCEQ	TCEQ Edwards Aquifer, Optional Enhanced Measures, February 2005	TCEQ Edwards Aquifer Protection Rules, June 1999
Golf Course Design and Management	No specific golf course requirements exist.	Golf courses are not allowed within the creek buffer zone.	None specified.	None specified.	None specified.	IPM plan required if golf courses are located in buffer zones.	None. If >5 acres is disturbed, send NOI to state. If area disturbed is between 1 and 5 acres, no NOI is needed.	None specified.	None specified.
Construction-related Erosion and Sedimentation Controls	Projects use the City's standard erosion and sedimentation control requirements.	Extensive guidance and design criteria, mostly derived from the 2005 TCEQ Edwards Recharge Zone Manual. Requirements closely mirror the TCEQ Construction Stormwater General Permit (2003) and SWPPP requirements. Construction phasing is strongly encouraged.	Extensive guidance and design criteria. Requires preparation of temporary ESC plan.	Must comply with TPDES requirements for sites disturbing more than one acre of land.	Extensive guidance and design criteria. Requires preparation of temporary ESC plan. Follows LCRA Tech Manual.	May require measures in addition to TCEQ/LCRA if over 5 acres is disturbed at one time, or site has slopes greater than 15%, or pollution problems arise after construction starts.	Prepare SWPPP. Extensive guidance, reporting and inspection criteria. - If > 5 acres disturbed, send NOI to state. If area disturbed is between 1 and 5 acres, no NOI is needed but SWPPP is prepared.	Follow TPDES Stormwater Pollution Prevention Plan requirements. In addition, sediment basins are required for common drainage areas serving at least 10-acres and are sized to capture the runoff from the 2-year, 24-hour storm. Sediment basins can not be installed in drainage areas larger than 128 acres.	Detailed guidance and construction details to manage erosion and sediment. Inspection and maintenanceof temporary BMPs is required. An erosion control plan is required to obtain Water Pollution Abatement Plan approval. Also, relies on the SWPPP for EPA NPDES.
Maintenance Plans	Similar requirements exist for stormwater controls, erosion and sedimentation plans, Pollution Prevention Measures, and IPM Plans.	Extensive guidance on BMP and temporary ESC maintenance. Requires BMP maintenance permit for permanent controls. LCRA performs annual inspections after project completion to ensure maintenance. LCRA has enforcement authority to require proper maintenance.	Extensive guidance on BMP and temporary ESC maintenance. Requires BMP maintenance permit for permanent controls. LCRA performs annual inspections after project completion to ensure maintenance. LCRA has enforcement authority to require proper maintenance.	Maintenance access and other slope and grading requirements.	Extensive guidance on BMP and temporary ESC maintenance. Requires BMP maintenance permit. Performs annual inspections after completion to ensure maintenance. Follows LCRA criteria.	Provide proof to the county that the owner, or owners' association, or district, or municipality is responsible for maintenance.	Extensive guidance on maintaining temporary ESC.	The operator of a BMP is obligated to provide all the maintenance activities required to maintain the function of the facility. The owner/operator must maintain records of all maintenance activities for the most recent 3 years. The records must be made available to TCEQ upon request. - A legible sign must be posted at all structural BMPs and indicate the name of the owner/operator, Edwards ID, and telephone numbers of responsible official.	Maintenance requirements are identified in the manual including maintenance access, staging areas, slope requirements for maintenance areas, etc. - Focus is on accessibility, durability, and material disposal.
Environmental Education	None specified.	Required as part of the permit. LCRA water quality education staff meet annually with POA, HOA, neighborhoods to promote good housekeeping practices in lawn management, vehicle maintenance, water conservation, etc.	None specified.	None specified.	None specified.	None specified.	TCEQ is performing limited outreach to inform communities of Phase 2 requirements.	None specified.	None specified.
Monitoring of Developments and Management Procedures	Can be required if non-standard BMPs are proposed.	Can be required if non-standard BMPs are proposed.	Can be required if non-standard BMPs are proposed.	None specified.	None specified.	Can be required if non-standard BMPs are proposed.	None	None specified.	None specified.
Exemptions	Disturbed area less than 5,000 square feet.	Agricultural activities. Lot(s) platted before Ordinance effective date, refers to the original Lake Travis Ordinance, 1990. - Impervious cover less than 10,000 square feet and less than 1 acre disturbed.	Agricultural activities. Lot(s) platted before Ordinance effective date, 1990.	Subdivision of land where each tract is at least 5 acres in area, each tract has access to an existing public street through frontage or recorded private easement (no street construction) and no public improvement is dedicated.	Single family homes not part of a subdivision. - Existing development at date of Ordinance adoption. - Final plats approved by the village prior to the Ordinance adoption - Utility maintenance and installation, however, erosion controls are required.	No guidance provided on this topic in the interim rules. Most likely, existing Travis County development exemptions apply.	If disturbed area is less than 1 acre. - Agricultural activities.	Exemption from streambank protection requirement - Projects constructing less than 10,000 square feet of impervious cover, projects directing discharge directly to listed rivers and lakes and if the impervious cover is less than 15% in all subwatersheds on the site.	Residential developments with less than 20% impervious cover are not required to treat stormwater discharges. - Other types of development with less than 20% impervious cover may be allowed to discharge stormwater without treatment on a case by case basis. - Utility lines (above and underground) - Agricultural activities - Clearing land without disturbing soil

ITEM FOR ENVIRONMENTAL BOARD AGENDA

BOARD MEETING DATE REQUESTED:	May 16, 2007
NAME & NUMBER OF PROJECT:	Zachary Scott Off-Site Wastewater Improvements - Tunnel SP-05-0033D
NAME OF APPLICANT OR ORGANIZATION:	Lennar Buffington Zachary Scott, LP (John Clark, P.E. – Phone 439-4701)
LOCATION:	10300 Block of River Plantation Dr.
PROJECT FILING DATE:	September 27, 2005
WPDR/ENVIRONMENTAL STAFF:	Teresa Alvelo, 974-7105 teresa.alvelo@ci.austin.tx.us
WPDR/ CASE MANAGER:	Chris Yanez, 974-9795 chris.yanez@ci.austin.tx.us
WATERSHED:	Onion Creek and Rinard Creek Watersheds (Suburban) Desired Development Zone
ORDINANCE:	Comprehensive Watershed Ordinance (current Code)
REQUEST:	Variance request is as follows: 1. To allow wastewater improvements in a critical water quality zone. (LDC Section 25-8-361).

STAFF RECOMMENDATION: Recommended.

REASONS FOR RECOMMENDATION:	Findings of fact have been met.

AGENDA ITEM D-1 LATE BACKUP

MEMORANDUM

TO: Betty Baker, Chairperson
Members of the Zoning and Platting Commission

FROM: Teresa Alvelo, Environmental Reviewer
Watershed Protection and Development Review Department

DATE: May 16, 2007

SUBJECT: Zachary Scott Off-Site Wastewater Improvements - Tunnel
10300 Block of River Plantation Drive / SP-05-0033D

A variance to LDC 25-8-361, to develop off-site wastewater improvements within a critical water quality zone, is being requested for this project. The improvements are required in order to provide essential wastewater services to the planned Zachary Scott subdivision. This proposed project seeks recommendation for a tunneled, 48" wastewater line approximately 2,760 linear feet, at an average depth of about 40'. This project is currently in a conceptual phase, as no engineering plans are available at this time.

Description of Project Area

The 271-acre Zachary Scott subdivision is located at the east corner of the intersection of Bradshaw Lane and Old Lockhart Road. The southwestern boundary of the site is bordered by Rinard Creek, and the western boundary lies along Onion Creek. The site drains into the Onion Creek and Rinard Creek watersheds, both of which are classified as Suburban. The property partially lies within both watersheds. The confluence of Rinard Creek and Onion Creek lies about 1,000 feet west of the project's western boundary. The improvements will consist of the installation of wastewater lines and manholes to serve the subdivision.

The wastewater system in this area directs wastewater to the existing Onion Creek Wastewater Treatment Plant. This plant is located on the opposite side of Rinard Creek, and is beyond homes and structures of the Onion Creek subdivision. This existing wastewater service is a decentralized system that serves the general area. The effluent from the treatment plant is used to irrigate the Onion Creek Golf Course. This

decentralized system is slated to service not only the Zachary Scott subdivision, but also the proposed Bella Fortuna and Legend's Way subdivisions.

The proposed improvements would be constructed within portions of the critical water quality zone, and water quality transition zone. Other options considered for this project would require installation of lines within the critical water quality zone at even greater lengths, an aerial crossing over Rinard Creek, and/or increased riparian and limit of construction disturbance. Disturbance within the boundaries of the Onion Creek Golf Course is essentially eliminated with this project.

Hydrogeologic Report

Elevation ranges from about 694 feet above Mean Sea Level on the east side to about 594 feet above MSL in the centerline of Rinard Creek on the south and west sides. The property is underlain by marine limestone and clay-rich limestone deposits. The rock outcropping in the property and in the creek are from the Austin Group and consist of mostly soft, easily weathered clay and marl deposits with interbeds of ledge-forming biomicrite limestone. The Austin Group members typically weather into deep, clay soils that contain abundant chert gravels and fossils.

Outcrops include limestone ledge and fossiliferous beds of the Dessau Chalk Formation and the Burditt Marl. The nature of the rocks forms ledges that create the banks of the stream channels and underlie the floor of the stream channels. The erosion resistance of these rocks creates a broad, shallow stream channel with vertical sides in most locations.

Vegetation

The proposed route along Rinard Creek to the proposed crossing site is primarily open to semi-open canopy with the majority of the trees being mesquite, cedar elm and hackberry. Once the line crosses Rinard Creek and moves to the west toward the golf course, larger trees occur in the floodplain of a former meander of Onion Creek. Species represented include the Texas pecan, hackberry, and cedar elm.

Critical Environmental Features

A number of rimrocks, seeps, and springs that feed into Rinard Creek were identified, none of which fall within the footprint of the project's limit of construction. The seeps and springs occur at the contact between two geologic members where infiltrating water encounters a tight clay zone, travels along the zone horizontally, and ultimately discharges when the horizon is truncated by erosion at the creek bank.

Applicant has worked very closely with COA Watershed Engineering and Environmental Resources Management staff to take measures that are specifically designed to protect the rimrocks, seeps, springs, creek and creek bed.

Water/Wastewater Report

Water and wastewater services will be provided by the City of Austin. A gravity main will be routed generally westward of the Zachary Scott subdivision to cross Rinard

Creek, and continue along the Rinard Creek critical water quality zone to existing Lift Station No. 147.

The tunnel depth of the required Rinard Creek Crossing is proposed at a minimum of fifteen feet under the bed of the creek. Working closely with COA Watershed Engineering staff and Environmental Resources Management (ERM) staff, the applicant chose the least-environmentally sensitive location for the Rinard Creek crossing.

Zoning and Platting Commission Variance Request

The following variance is being requested:

1. To allow wastewater improvements within a Critical Water Quality Zone (LDC Section 25-8-361).

1. Variance from Land Development Code Section 25-8-361 – Wastewater Restrictions

A wastewater line is prohibited in a critical water quality zone, except for a necessary crossing.

The proposed location of the wastewater line is a necessary and essential component of a wastewater system currently served by the nearest-available wastewater treatment plant. The plant is located on the opposite bank of Rinard Creek from the proposed Zachary Scott subdivision.

Recommendations:

Staff recommends approval of this variance request for the following reasons:

1) Variance approval is vital in order to provide reasonable and economic use of the property.
2) The applicant worked closely with COA Watershed Engineering and ERM staff to protect rimrocks, seeps, springs, the creek, creek bed and trees.
3) The line alignment is largely placed outside the critical water quality zone.
4) The riparian areas remain undisturbed, with the exception of one tree.
5) Open-cut trenching will only occur in a relatively small area in the critical water quality zone.
6) Tunneling activities occur at the greatest possible distance from seeps and springs.
7) Four manholes are proposed, as opposed to as many as 13 in alternative alignments.

Conditions:

1. If ground water is encountered, appropriate water quality treatment will be applied per COA standards.
2. Disturbed areas within the CWQZ will be restored using COA Standard Specification 609-S revegetation.

Similar Cases

No similar cases found.

Staff supports and recommends approval of this variance with conditions.

If you have any questions or need additional information, please contact Teresa Alvelo at 974-7105.

Teresa Alvelo

Teresa Alvelo, Environmental Reviewer
Watershed Protection and Development Review Department

Environmental Lead: _____
Ingrid McDonald

Environmental Officer: _____
Patrick Murphy

Watershed Protection and Development Review Department
Staff Recommendations Concerning Required Findings
Water Quality Variances

Application Name: *Zachary Scott Subdivision Wastewater Improvements - Tunnel*
Application Case No: *SP-05-0033D*
Code Reference: *LDC 25-8-361*
Variance Request: *To allow wastewater improvements within a Critical Water Quality Zone.*

A. Land Use Commission variance determinations from Chapter 25-8, Subchapter A – Water Quality of the City Code:

1. The requirement will deprive the applicant of a privilege or the safety of property given to owners of other similarly situated property with approximately contemporaneous development.

   Yes ***The requirement will deprive the applicant of a privilege or the safety of property given to owners of other similarly situated property with approximately contemporaneous development. Variance approval is necessary in order to provide vital wastewater services to the referenced subdivision.***

2. The variance:

   a) Is not based on a condition caused by the method chosen by the applicant to develop the property, unless the development method provides greater overall environmental protection than is achievable without the variance;

      Yes ***The variance is not based on a condition caused by the method chosen by the applicant to develop the property. The existing decentralized wastewater treatment plant is located across Rinard Creek from the proposed Zachary Scott subdivision. This is a condition not caused by the applicant.***

   b) Is the minimum change necessary to avoid the deprivation of a privilege given to other property owners and to allow a reasonable use of the property;

      Yes ***Applicant has worked very closely with COA Watershed Engineering and ERM staff to design a plan that offers a minimum change necessary to avoid the deprivation of a privilege given to other property owners and to allow a reasonable use of the property. Available alternative options would result in increased riparian disturbance, increased safety risks due to excessive trench depths, and/or an aerial crossing over Rinard Creek.***

c) Does not create a significant probability of harmful environmental consequences; and

Yes ***The approved variance does not create a significant probability of harmful environmental consequences. The proposed plan makes every feasible effort to avoid harmful environmental consequences to seeps and springs. Also, the proposed alignment is largely outside the critical water quality zone, leaves riparian areas undisturbed, and tunnels at least 15 feet under the Rinard Creek bed. It also reduces the number of proposed manholes from a high count of about 13 to four.***

3. Development with the variance will result in water quality that is at least equal to the water quality achievable without the variance.

Yes ***Water quality will at least be equal to the water quality achievable without the variance. The use of tunneling techniques minimizes negative affects to the natural and traditional characteristic of the land, and minimizes areas of disturbance.***

B. Additional Land Use Commission variance determinations for a requirement of Section 25-8-393 (Water Quality Transition Zone), Section 25-8-423 (Water Quality Transition Zone), Section 25-8-453 (Water Quality Transition Zone), or Article 7, Division 1 (Critical Water Quality Zone Restrictions):

1. The above criteria for granting a variance are met;

Yes ***The above criteria for granting a variance are met.***

2. The requirement for which a variance is requested prevents a reasonable, economic use of the entire property; and

Yes ***Development of the Zachary Scott subdivision is not possible without granting of the variance. Reasonable and economic use of the entire property would be denied without granting a variance that provides wastewater service for the referenced subdivision.***

3. The variance is the minimum change necessary to allow a reasonable, economic use of the entire property.

Yes ***The variance presents the minimum change necessary to allow a reasonable, economic use of the entire property. Available alternative options would result in a change greater than what is being presented with this variance request.***

Reviewer Name: **Teresa Alvelo**

Reviewer Signature: Teresa Alvelo

Date: **May 16, 2007**

Staff may recommend approval of a variance after answering all applicable determinations in the affirmative (YES).

LJA Engineering & Surveying, Inc.

5316 Highway 290 West
Suite 150
Austin, Texas 78735

Phone 512.439.4700
Fax 512.439.4716
www.ljaengineering.com

May 15, 2007

Teresa Alvelo
Watershed Protection and Development Review Department
City of Austin
P.O. Box 1088
Austin, Texas 78767

RE: Zachary Scott Subdivision Off-site Wastewater Line (SP-05-0033D)
LJA Job No. A135-401-404

Dear Ms. Alvelo:

The Zachary Scott Subdivision Off-site Wastewater Line was originally approved by the City of Austin February 23, 2006. With this approval an Environmental Variance was approved from LDC 25-8-361(A) "A wastewater line is prohibited in a critical water quality zone, except for a necessary crossing". This variance was granted by the Environmental Board on November 16, 2006 and by the Zoning and Platting Commission on January 17, 2006.

The revision to the Zachary Scott Off-site Wastewater Line (SP-05-0033D) is being proposed to reduce the construction cost of the project and to reduce environmental impacts. In the original design the wastewater line was designed to go under Rinard Creek, which caused a majority of the wastewater line to be thirty (30) feet deep. Due to the excessive line depths, damage to the existing golf course, and the large amount of bores (1,425 feet) the construction cost was excessive. An alternate design proposed by applicant and the Austin Water Utility to reduce the construction cost and provide gravity sewer service for the watershed was to cross Rinard Creek above the floodplain. This aerial crossing was designed to keep the flow line of wastewater line above the fully developed 25-year floodplain. This option has since been discarded by the City of Austin. The design that is now being proposed is to tunnel approximately 2,760 linear feet. Tunnel construction is normally more expensive than open cut construction but it can be competitive when the line is excessively deep and the damage caused by the construction is either unacceptable or very costly as in this case.

The Environmental Board and the Zoning and Platting Commission have both requested to see this project again before proceeding. Per LDC 25-8-361(A)(1) "The Land Use Commission may grant a variance to the prohibition of this subsection. An application for a variance must provide an environmental assessment evaluating the effects of the alternate sewer alignments".

Findings of Fact:

1. *Does the requirement deprive the applicant of a privilege or the safety of property given to owners of the other similarly situated property with approximately contemporaneous development?*

   Yes, as mentioned above this variance was previously granted to this project. This project like others has topographic and existing element restraints that effect the ability of this project to access the existing wastewater facilities. The City of Austin has identified this interceptor as a regional project to serve the Rinard Creek

Watershed, not just the Zachary Scott project. The proposed tunnel will reduce the environmental impact by reducing the overall limits of construction. The limits of construction will be reduced by approximately 4.9 acres.

2.(a). *The variance is not based on a condition caused by the method chosen by the applicant to develop the property, unless the development method provides greater overall environmental protection than is achievable without the variance*

Yes, this method provides greater overall environmental protection because tunneling will reduce the disturbed area. With the proposed revision the limits of construction is reduced by approximately 4.9 acres.

2.(b) *The variance is the minimum change necessary to avoid the deprivation of a privilege given to other property owners and to allow a reasonable use of the property.*

Yes, the existing Onion Creek Golf Course currently encroaches within the critical water quality zone. The placement of the wastewater line is within and immediately adjacent to the Onion Creek Golf Course.

2.(c) *The variance does not create a significant probability of harmful environmental consequences.*

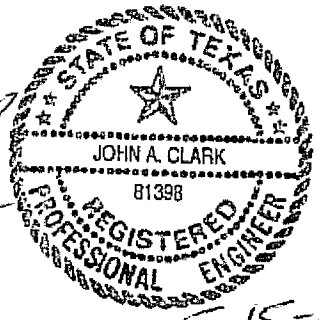
Yes, with a tunnel the disturbance is greatly reduced, therefore reducing the probability of harmful environmental consequences.

3. *The development with the variance will result in water quality that is at least equal to the water quality achievable without the variance.*

Yes, because this variance is for the installation of the wastewater line in a tunnel, the limits of construction is approximately 4.9 acres less than the original construction plans which the variance was previously granted. Water quality impacts will be reduced due to reduction in disturbed area.

If you have any questions, please do not hesitate to contact me at 439-4700.

Sincerely,



John A. Clark, P.E.

5-15-07

W:\A135 (Zachary Scott WWL)\TeresaAlvelo-Variance2.doc

DIRECTIONS TO ZACHARY SCOTT
OFF-SITE WASTEWATER SITE

Choice 1

These directions will take you to the Onion Creek Wastewater Treatment Plant (and associated Lift Station No. 147) location. This route is suggested due to easy access to the creek. The proposed line route can then be walked fairly easily.

-At Onion Creek Parkway and the IH-35 (north bound) Access road, take Onion Creek Parkway east to Pinehurst.

-Turn north onto Pinehurst and travel all the way around to River Plantation Drive. It's only possible to turn south onto River Plantation Drive at this point.

-Turn right (south) onto River Plantation Drive, cross over the bridge, and immediately find the drive to the Onion Creek Wastewater Treatment plant on the right.

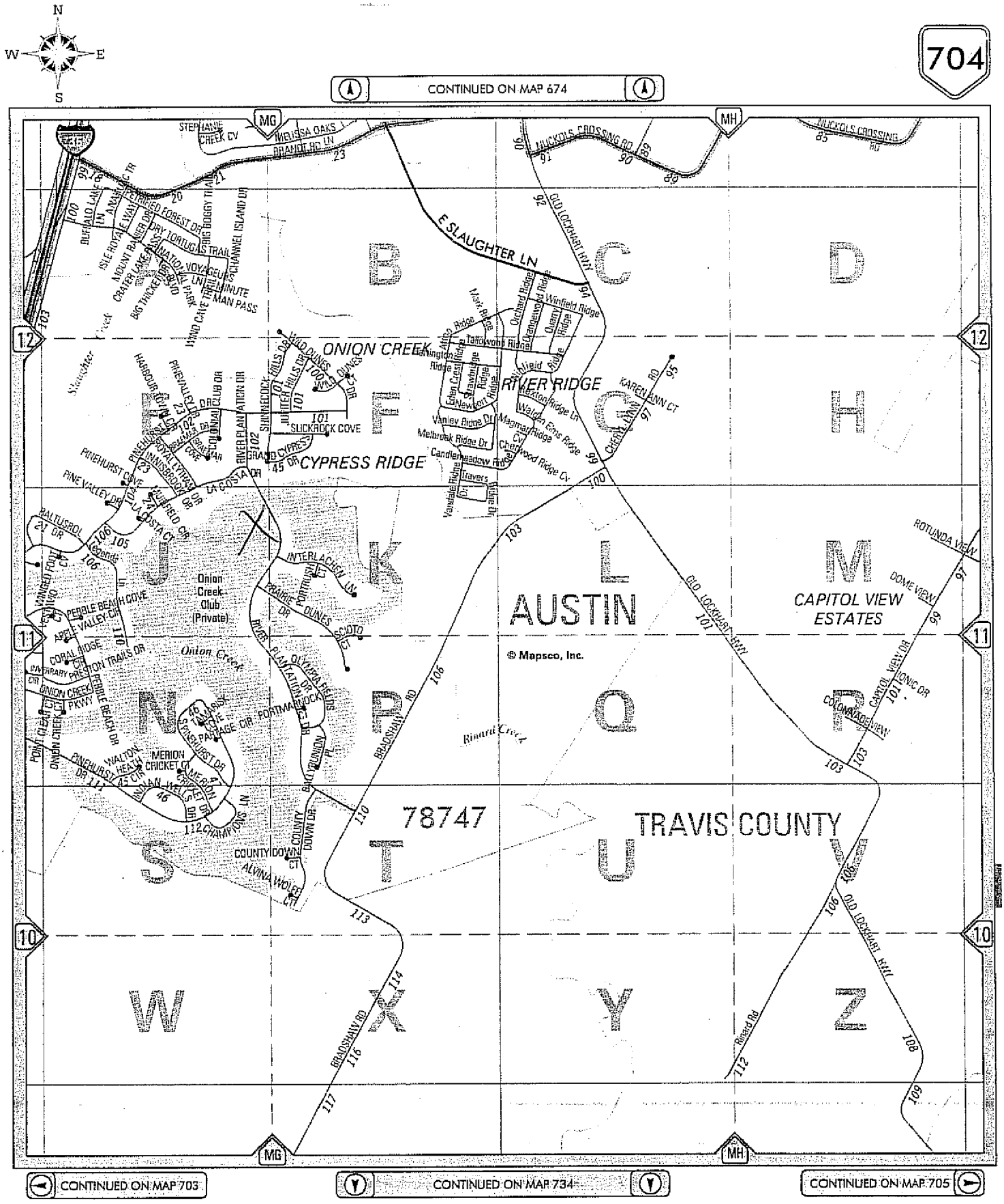
If you pass Interlacen Lane on the left, you've traveled too far.

Choice 2

-At Slaughter Lane and I-35, take Slaughter Lane east to Old Lockhart Road.

-At Old Lockhart Road, turn south until you see Bradshaw Road on the right. You can only turn right onto Bradshaw Road at this point.

-Turn right onto Bradshaw Road and travel roughly a half mile to the dirt road with gate on the right. This dirt road will take you to the creek in the general vicinity of the proposed line crossing.



MuniAgenda

Austin Water Utility
CITY OF AUSTIN

AGENDA
DATE: 5/17/2007

RECOMMENDATION FOR COUNCIL ACTION

Title: RCA051707 ZACHARY SCOTT WW
Subject: Approve an ordinance authorizing negotiation and execution of an amendment to the existing Wastewater Cost Reimbursement Agreement with Lennar Buffington Zachary Scott, L.P., to increase the amount of City cost reimbursement for construction of an 18-inch and 30-inch wastewater main and appurtenances to provide wastewater service to the Zachary Scott Tract located in the south corner of the Old Lockhart Highway and Bradshaw Road intersection for a new total actual construction cost for wastewater improvements not to exceed $3,696,000, and for the professional services costs for engineering, design and project management only for the original design, the aerial crossing design and the new wastewater tunnel alignment in an amount not to exceed $774,999, and cost reimbursement of the pump and haul operations in an amount not to exceed $150,000, increasing the original Council approval amount by $3,287,259 for a new overall total amount not to exceed $4,620,999; and waiving the requirements of Section 25-9-63 of the City Code relating to amount of cost reimbursement, waiving the requirements of Section 25-9-67 of the City Code relating to the schedule for cost reimbursement payments.

Amount and Source of Funding: Funding in the amount of $3,287,259 is included in the Fiscal Year 2006-2007 Capital Improvement Budget of the Austin Water Utility.

Fiscal Note: A fiscal note is attached.

Agenda Category: Austin Water Utility

For More Information: Seyed Miri, P.E. 972-0202 and Denise Avery 972-0104

Prior Council Action: Originally approved by Council on 10/23/2003, Ordinance No. 031023-7.

Boards and Commission Action: Scheduled for Water and Wastewater Commission 5-16-2007; Scheduled for Environmental Board 5-16-2007.

Purchasing Language:

MBE/WBE:

The Zachary Scott Tract is a proposed 975 lot single-family development located on approximately 272 acres of land in the south corner of the Old

Lockhart Highway and Bradshaw Road intersection (the "Property"), currently inside the corporate limits of Austin, which is within the Desired Development Zone and Rinard Creek Watershed. The City Council approved the negotiation and execution of a cost reimbursement agreement with Development Alliance of Texas, L.L.C., on October 23, 2003, with City cost reimbursement not to exceed $1,333,740 for the actual wastewater construction costs ("hard costs"). After the Cost Reimbursement Agreement was executed by Development Alliance of Texas, L.L.C., on February 17, 2005, it was assigned to Lennar Buffington Zachary Scott, L.P. ("Lennar Buffington").

The proposed original wastewater main improvements were based on conceptual engineering and planning documents to include approximately 850 feet of 18-inch gravity wastewater main, 2,200 feet of 24-inch gravity wastewater main and 1,100 feet of 15 or 18-inch gravity wastewater main from the existing Onion Creek Wastewater Treatment Plant southeast along the fairway of the Onion Creek Golf Course and under Rinard Creek to the Property. During the actual design of the proposed wastewater main, at the request of City environmental staff, the alignment was changed to move further into the fairway of the golf course and farther away from Critical Environmental Features identified during site visits. This change in alignment created a project that required many sections of the wastewater main to be bored underground in order to avoid damage to trees and identified Critical Environmental Features.

The City opened bids for the originally designed wastewater improvements on January 19, 2006, and the apparent low bidder was $2,415,394 higher than the total 2003 Council authorization approved for hard cost reimbursement. Based on these bids, the City did not want to move forward with this project and requested Lennar Buffington to investigate the possibility of an alternative construction method. Because of this new delay imposed by the City, Lennar Buffington made a request to perform a pump and haul program for 64 homes within the Property currently under construction. The City approved the pump and haul program in September 2006 with stipulations that limited the number of connections, set an expiration date and required the deposit of $50,000. The pump and haul program was amended in April 2007 to allow up to 136 single-family homes. The actual pump and haul operations did not start until January 2007.

After months of work, Lennar Buffington submitted a wastewater design in the fall of 2006 that drastically reduced the length and number of bores and the depth of the proposed wastewater main. The primary change to the original design was the inclusion of an aerial wastewater crossing of Rinard Creek. Lennar Buffington worked with Watershed Protection and Development Review (WPDR) and the Utility on this design and after a number of concessions and requirements required by WPDR and the Utility then both Departments supported the design. The construction cost for this design is estimated at $1,400,000. During the February 21, 2007 Environmental Board and the April 17, 2007 Zoning and Platting Commission hearings, the Board and Commission expressed some environmental concerns regarding the aerial wastewater crossing. On April 30, 2007 the City directed Lennar Buffington to abandoned the aerial design and investigate a subsurface design that will be the ultimate wastewater infrastructure to serve the entire Rinard Creek Basin.

The newly proposed wastewater main alignment will include approximately 650 feet of 18-inch gravity wastewater tunnel and 2,900 feet of 30-inch gravity wastewater tunnel from the existing Onion Creek Wastewater Treatment Plant southeast along the fairway of the Onion Creek Golf Course and under Rinard Creek to Bradshaw Road. This design proposes to avoid all Critical Environmental Features and only have minimal disturbance to the golf course.

The proposed 30-inch gravity wastewater improvements have been identified as a required wastewater improvement to provide wastewater service to the Rinard Creek and a portion of the Onion Creek Drainage Basins.

The proposed amendment to the Wastewater Cost Reimbursement Agreement will allow for cost reimbursement to Lennar Buffington of the hard costs of the 18 and 30-inch gravity wastewater tunnel and appurtenances constructed within public right-of-way or easements for a total not to exceed $3,696,000, and the costs for engineering, design and project management of the wastewater tunnel and appurtenances within public right-of-way or easements for a total not to exceed 15% of the hard costs or $554,400, whichever is less, for a total not to exceed $4,250,400 in one payment 90-days after final acceptance. Lennar Buffington will bear all other costs for financing, accounting, easements acquisition and legal services associated with this construction.

Lennar Buffington and the Utility are requesting a waiver of Section 25-9-67 of the City Code, relating to the schedule for cost reimbursement payments to permit the modified payment schedule of the wastewater tunnel improvements described above. Under Section 25-9-67 of the City Code, cost reimbursement payments are to be made in one payment on March 1 of the second year following the year in which the wastewater improvements are accepted.

The proposed amendment to the Wastewater Cost Reimbursement Agreement will also allow for cost reimbursement to Lennar Buffington for the original wastewater design and the aerial wastewater design for the professional services costs for engineering, design and project management ("soft costs") for a total not to exceed $220,599, in one payment 30-days after execution of the amended agreement.

Lennar Buffington and the Utility are requesting a waiver of Section 25-9-63 of the City Code relating to the amount of cost reimbursement to allow for payment of both the hard and soft costs described above. Under Section 25-9-63 of the City Code, the amount of reimbursement is for the actual construction costs ("hard costs").

The proposed amendment to the Wastewater Cost Reimbursement Agreement will also allow for cost reimbursement to Lennar Buffington for 50% of the direct pump and haul costs from September 1, 2007 for a period of one year or the completion of the 18 and 30-inch gravity wastewater tunnel and appurtenances, whichever is sooner, for a total not to exceed amount of $150,000, in monthly payments starting October 1, 2007.

MuniAgenda

Austin Water Utility
CITY OF AUSTIN

AGENDA
DATE: 5/17/2007

RECOMMENDATION FOR COUNCIL ACTION

Title: RCA051707 ZACHARY SCOTT - WATER
Subject: Approve an ordinance authorizing negotiation and execution of a second amendment to the existing Water Cost Reimbursement Agreement with Lennar Buffington Zachary Scott, L.P. to change the cost reimbursement payment schedule for both Phase One and Phase Two on the construction of a 24-inch water main and appurtenances with a cost not to exceed $3,428,000 to provide water service to the Zachary Scott Tract located in the south corner of the Old Lockhart Highway and Bradshaw Road; and to waive the requirements of Section 25-9-67 of the City Code relating to cost reimbursement payments.

Amount and Source of Funding: No impact to the Capital Budget of the Austin Water Utility.

Fiscal Note:

Agenda Category: Austin Water Utility

For More Information: Seyed Miri, P.E. 972-0202 and Denise Avery 972-0104

Prior Council Action: Originally approved by Council on 10/23/2003, Ordinance No. 031023-6. Amendment approved by Council on 10/20/2005.

Boards and Commission Action: Review by Water & Wastewater Commission 5/16/07. Review by Environmental Board 5/16/07.

Purchasing Language:

MBE/WBE:

The Zachary Scott Tract is a proposed 975 lot single-family development located on approximately 272 acres of land in the south corner of the Old Lockhart Highway and Bradshaw Road intersection (the "Property"), currently inside the corporate limits of Austin, which is within the Desired Development Zone and Rinard Creek Watershed. The City Council approved the negotiation and execution of a cost reimbursement agreement with Development Alliance of Texas, L.L.C., on October 23, 2003, with City cost reimbursement not to exceed $1,080,000.00 for the Phase One Water Improvements and $2,348,000.00 for the Phase Two Water Improvements, for a total not to exceed $3,428,000.00 for actual "hard" construction costs. After the Cost Reimbursement Agreement was executed by Development Alliance of Texas, L.L.C., on February 17, 2005, it was assigned to Lennar Buffington Zachary

Scott, L.P. On October 20, 2005, the City Council approved an amendment to the Cost Reimbursement Agreement to increase the amount of City cost reimbursement for construction of Phase One 24-inch water main and appurtenances. The first amendment did not increase the original overall actual "hard" construction cost dollars, but allowed $299,379.00 approved for Phase Two to be allocated to Phase One.

The Phase One 24-Inch Water Improvements have been constructed and accepted by the City on August 21, 2006.

The proposed second amendment to the Water Cost Reimbursement Agreement will allow for the cost reimbursement payment of the actual "hard" construction dollars for the Phase One Water Improvements to be made in one (1) payment on July 1, 2007, and the Phase Two Water Improvements cost reimbursement payment to be made in one (1) payment 90-days after final acceptance.

The Developer and Utility are requesting a waiver of the City Code requirements in Section 25-9-67, relating to cost reimbursement payments to permit the modified payment schedule of the water improvements described above. Under Section 25-9-67, cost reimbursement payments are to be made in one (1) payment on March 1 of the second year following the year in which the water improvements are accepted. The accepted Phase One Water Improvements would be reimbursed on March 1, 2008 under the originally approved Cost Reimbursement Agreement.

Zachary Scott Off-site Wastewater Issue

At the February 21, 2007 Environmental Board meeting, the Zachary Scott Off-Site Wastewater Improvements Revision number 2 was on the agenda to re-visit the approved variance to Land Development Code 25-8-361- Wastewater Restrictions. During the discussions of this Project, the Board had concerns regarding the wastewater pump and haul program and requested additional information regarding Certificate of Occupancy and pumping and hauling wastewater issues.

Austin Water Utility does not consider wastewater pump and haul operations as a standard practice and are rarely allowed. In the past 10-years, the Utility has only agreed to four other requests. Of these, only two actually operated a pump and haul program for a very short period. Under the pump and haul program approved for the Zachary Scott Subdivision, the terms of the agreement require the Developer to abide by a list of requirements to safeguard the future residences, the surrounding environment and the City from liability.

Under the pump and haul program, the City is granting the Subdivision a conditional release of infrastructure improvements without final acceptance until the off-site wastewater system has been completed and final acceptance made by the City, at which time the pump and haul operations will cease. The Developer must provide written notice to potential buyers of the homes, and lenders on the subject property concerning the pump and haul operations. The executed release of claims document by each homeowner is an agreement to release and indemnify the City from any and all claims that the homeowner has or may have against the City that are related to the utilization of a pump and haul operation.

The following is a chronology of the Zachary Scott Service Extension Request presented to the Director of the Utility in February of this year.

Zachary Scott wastewater Service Extension Request SER 2260, was submitted in April of 2003. The proposed 975 lot single-family development is located on approximately 272 acres in the south corner of the Bradshaw Road and Old Lockhart Highway intersection. Council approved a wastewater cost reimbursement agreement on October 23, 2003. The SER proposed approximately 850 feet of 18-inch gravity wastewater line, 2,200 feet of 24-inch gravity wastewater line and 1,100 feet of 15 or 18-inch gravity line with a maximum reimbursement amount for actual construction costs of $1,333,740 (approximately $320 per foot). The construction cost estimate was developed on conceptual engineering and planning documents during the SER review and approval process.

The proposed wastewater route anticipated during the development of the SER started at the existing Onion Creek Wastewater Treatment Plant Lift Station, north to the 2-year Onion Creek floodplain and then east along the Onion Creek floodplain (850 feet of 18-inch gravity wastewater line) at a point the pipe size changed and continued southeast along the west side of Rinard Creek/Onion Creek Golf Course (2,200 feet of 24-inch

gravity wastewater line). At the point the line was to cross Rinard Creek, the pipe size changed again to a 15 or 18-inch gravity line and crossed Rinard Creek and extended to the proposed Zachary Scott subdivision (1,100 feet). The proposed 24-inch section of line was sized and located to allow wastewater service to extend further into the Rinard Creek drainage basin. Original SER is attached. This route did not cross Onion Creek at any point.

During last month's Environmental Board meeting, concerns were raised by the Board regarding this wastewater SER. Their concerns regarding aerial wastewater crossings, the Clean Water Program, pump and haul, and construction costs are addressed below.

During the preliminary design of the proposed wastewater line (late 2004 early 2005) it was determined that the proposed wastewater improvements would be within the 100-year floodplain and Critical Water Quality Zone (CWQZ) of Onion and Rinard Creeks and that the Developer would need to work with Watershed Protection and Development Review (WPDR) to acquire a variance to Land Development Code 25-8-361-Wastewater Restrictions. Also, because the Golf Course is platted as a Public Utility Easement, the Utility assumed that they could work with the golf course management on a suitable alignment along one of its fairways. At first, this was not the case. The golf course ownership, at the time, was Lumberman's Investment Corporation (LIC) LIC initially refused to work with the City and stated that they had an agreement with the City that gave LIC the right to approve any crossing of the golf course. Their stance was based on language inserted in the Sales Agreement of the Onion Creek wastewater infrastructure to the City. At the time Utility Development staff was unaware of this condition. Also, the Onion Creek Homeowners Association (OCHA) became aware of the proposed Zachary Scott development and they along with LIC were going to try and hold the proposed development to very strict compatibility standards. To keep the project moving forward, the Developer obtained rights to enter the golf course in order to survey and create an initial route design.

As the Developer began working with LIC and OCHA on their concerns, the Utility, WPDR and the Developer's engineer walked the initial route proposed by the engineer. The main concerns that WPDR had with this route was that they wanted the wastewater route kept away from the existing trees and moved farther on to the fairway, keep a minimum distance from the creek bank to avoid critical environmental features (CEFs) identified by WPDR during the initial field walk, bore the areas with potential ground water instead of open cutting, and a few other minor alignment issues. Based on the concerns raised by WPDR the engineer revised the route, and then met with LIC and the golf course management. When reviewing the revised route LIC and golf course management had major concerns over moving the proposed line into the fairway. Their biggest concern was fairway restoration. LIC wanted the line moved closer to the trees. To compromise on the alignment issue, the route was finally moved slightly closer to the trees, which required additional boring in order to provide protection of the trees.

During 2005 all the issues mentioned were worked out and the wastewater project went to the Environmental Board in November of that year seeking a variance to allow

wastewater improvements in a critical water quality zone. At this same time, System Planning had performed a more refined analysis of the Rinard Creek basin and determined that the diameter of the main wastewater line should be 27 or 30-inches. The project was advertised in late December 2005 with a 27-inch line. Today, System Planning projects the need for a 30-inch line to be constructed. This size will be included in the latest redesign.

Prior to advertising a cost estimate was prepared by the Developer's engineer, which estimated that the project could cost approximately $1,500,000 more than the original Council approval. Because of cost uncertainties in the construction sector, it was determined that the best way to get a real cost was to go out to bid. Bids where opened on January 19, 2006 with only two solicitors. The lowest bid of the two was $2,415,394 more than the original Council approval. The Developer's engineer checked with contractors during the drafting of the cost estimate. These same contractors did not bid on the project.

The Developer's engineer contacted the two bidders and other contractors to see why the project costs came in so high and why other contractors did not bid on the wastewater improvements. The three biggest concerns expressed, were the length of bores (1,425 feet of the 4,051 total length of pipe), flatness of the line (0.3%), and the depth of the open cut portion of the line, in some cases thirty feet deep. See attached profile sheet for comparison of the original (in red) and proposed (in black) designs. Additional concerns were the restoration of the golf course and future liability associated with the work and replacement materials (the golf course restoration part of the bid was approximately $508,000). When the bids were opened all construction projects Citywide were coming in higher than engineer's estimates. The depth of the bores, open cut, and petroleum based product costs changing rapidly played a very big part in the overall higher cost.

Staff took an amended RCA back to the Water and Wastewater Commission on February 1, 2006, and the Commission approved the amendment for an additional $2,677,833. After this approval the Director did not feel comfortable taking this amendment forward to Council and wanted the Developer to investigate the possibility of a cheaper construction method.

With the Director's decision to stop the wastewater improvements from moving ahead to Council, the Developer moved forward and hired a new consultant to produce a design that the City could accept that would be a cheaper alternative to the original design. With this delay, the Developer did not want to place his approved Subdivision on hold and wait. The Developer made a request to perform a pump and haul program for 64 homes. The Utility approved the pump and haul concept in August of 2006 with stipulations that, 1) an agreement is executed that limited the number of connections, 2) set an expiration date, and 3) required the deposit of $50,000.

The Parties executed the Pump and Haul Agreement in September of 2006, using a Pump and Haul Agreement that had previously been used and acceptable to the Utility. The one concession added by the Developer was that they may request that the City authorize

connections of up to a maximum of 200 homes. The Developers wanted this option because they felt they did not have full control of the time it may take to reach final acceptance of a redesigned wastewater system. As of the end of February 2007, the Developer was starting 12 homes a month with 45 under construction with 36 sold and 25 of those occupied. The Developer has made a request to amend to the Pump and Haul Agreement to allow occupancy of up to 136 homes under a new pumping program. The Utility is currently working with the Developer to amend the 2006 Agreement to allow the additional connections. Even though the Pump and Haul Agreement has a lot of safeguards to avoid spills, the City and Developer are diligently working together to get the offsite wastewater improvements constructed and stop the pump and haul.

After many months of work the Developer submitted a plan that drastically reduced the length of bore and depth of the proposed wastewater line. The biggest change to the design was an aerial wastewater crossing of Rinard Creek. The Developer submitted the aerial option last fall and at the time Utility management and review staff along with WPDR were receptive of this design as long as it is constructed above the 25-year floodplain of Rinard Creek. The Developer met with the Utility and WPDR in January and February. Both Departments supported the aerial crossing.

The City currently has aerial wastewater crossings, with most of these placed in service many years ago without consideration to flooding. The Austin Clean Water Program is replacing some of these older crossings. However, the majority of the problem wastewater lines the Program is addressing are the removal and replacement of old lines in creek beds or creek crossings, not aerial crossings. Any aerial crossing being replaced today is subsidiary to the replacement project, not the main project. The EPA administrative order does not address the replacement or construction of aerial wastewater crossings.

Onion Creek is a large watershed and prone to flooding as stated; however this creek crossing is not on Onion Creek but on Rinard Creek. The 100-year flow for the Rinard Creek watershed alone is passed under the structure with no issues. The only instance in which the aerial crossing is exposed to flooding is in backwater from Onion Creek. This flood condition is at a very low velocity of approximately 1.3 feet per second for the 100-year flow. Therefore the worst-case scenario for the crossing is the backwater condition caused by a 100-year flood in the Onion Creek watershed. The engineering consultant hired by the Developer has designed a truss and carrier pipe system to withstand hydrostatic pressure caused by 5-ft/second velocities. Because hydrostatic pressure is a function of the velocity squared, the actual factor of safety in the design is 25/1.7 or 14.7.

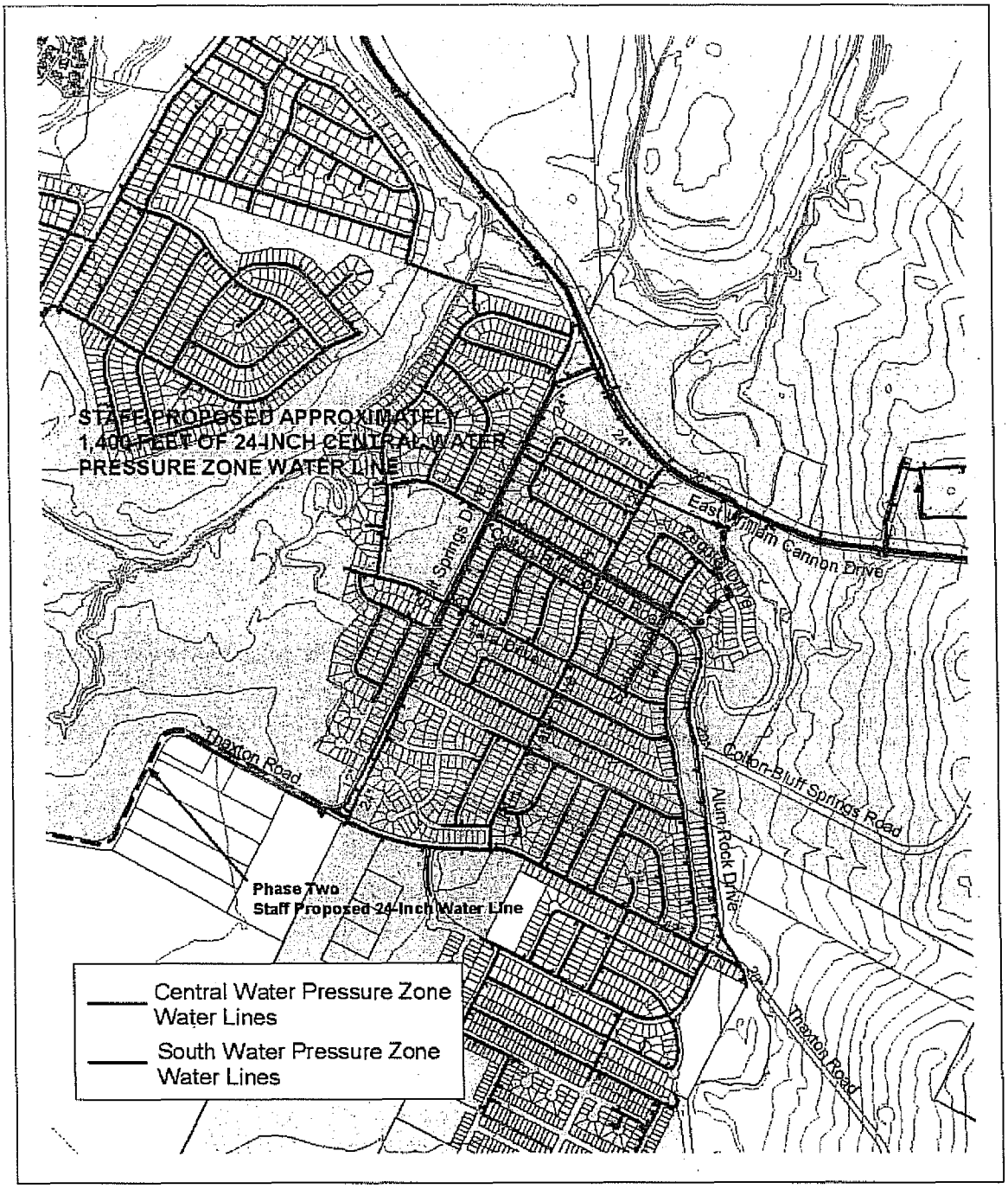
The proposed structure is "anchored" at both banks with additional support columns. The center span is 120 feet wide to accommodate crossing the floodway without impact. The piers are 2.5' diameter and will be installed with minimal disturbance within the 100-year floodplain. The carrier pipe is structural grade steel and the members supporting the carrier pipe will serve as an additional barrier. Rinard Creek has a well-defined 2-year floodway and this project will be staying completely out of this floodway. Every effort

was made to minimize impact to the creek and verify that the crossing structure would be capable of withstanding any forces associated with the 100-year flood event.

On February 26, 2007, Assistant City Manager Rudy Garza received a letter from the Developers attorney. In the letter, they spoke of working diligently with the City to construct the wastewater infrastructure necessary to serve their proposed development as well as potential growth in the Rinard Creek watershed. Because of delays they are requesting our assistance to help mitigate additional costs and expedite the completion of the needed wastewater improvements. They have requested that the approved Cost Reimbursement Agreement be amended with Council approval to allow reimbursement for the additional hard construction costs associated with the redesign (we are awaiting a new cost estimate from the Developer's engineer), soft costs associated with the redesign, the timeframe for reimbursement, and the costs associated with the pump and haul.

Staff and the Utility Director have looked at this request and have recommended that the Cost Reimbursement Agreement be amended, with Council consent, to include the additional hard construction cost dollars. Once the construction plans have been approved the project will be publicly bid. The Utility will take the lowest bid back to Council for the additional hard construction cost dollars. However, AWU will not reimburse any of the pump and haul costs.

Attached is a copy of the approved Pump and Haul Agreement for Zachary Scott. The Agreement addresses the major pump and haul issues that the Utility has. Within the Agreement is the condition that the Developer also notify each potential homeowner of the pump and haul operation.



900 0 900 Feet

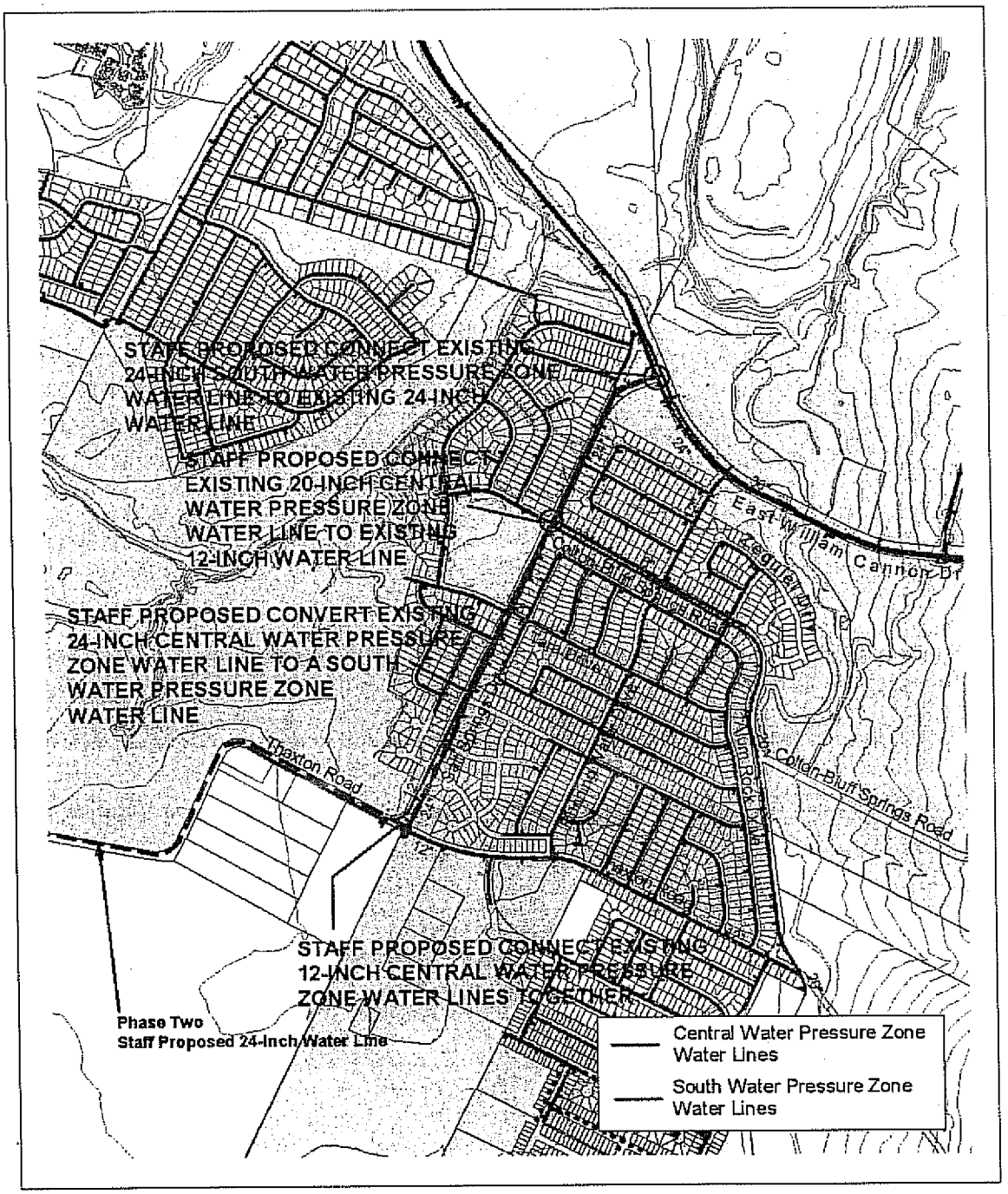
Subject Tract

City Limits

N

W. S.E.R. Name: Zachry Scott Tract
Additional Phase Two
Central Water Pressure Zone Improvements
W. S.E.R. Number: 2259

Utility Development Services Plotted 9/11/2003



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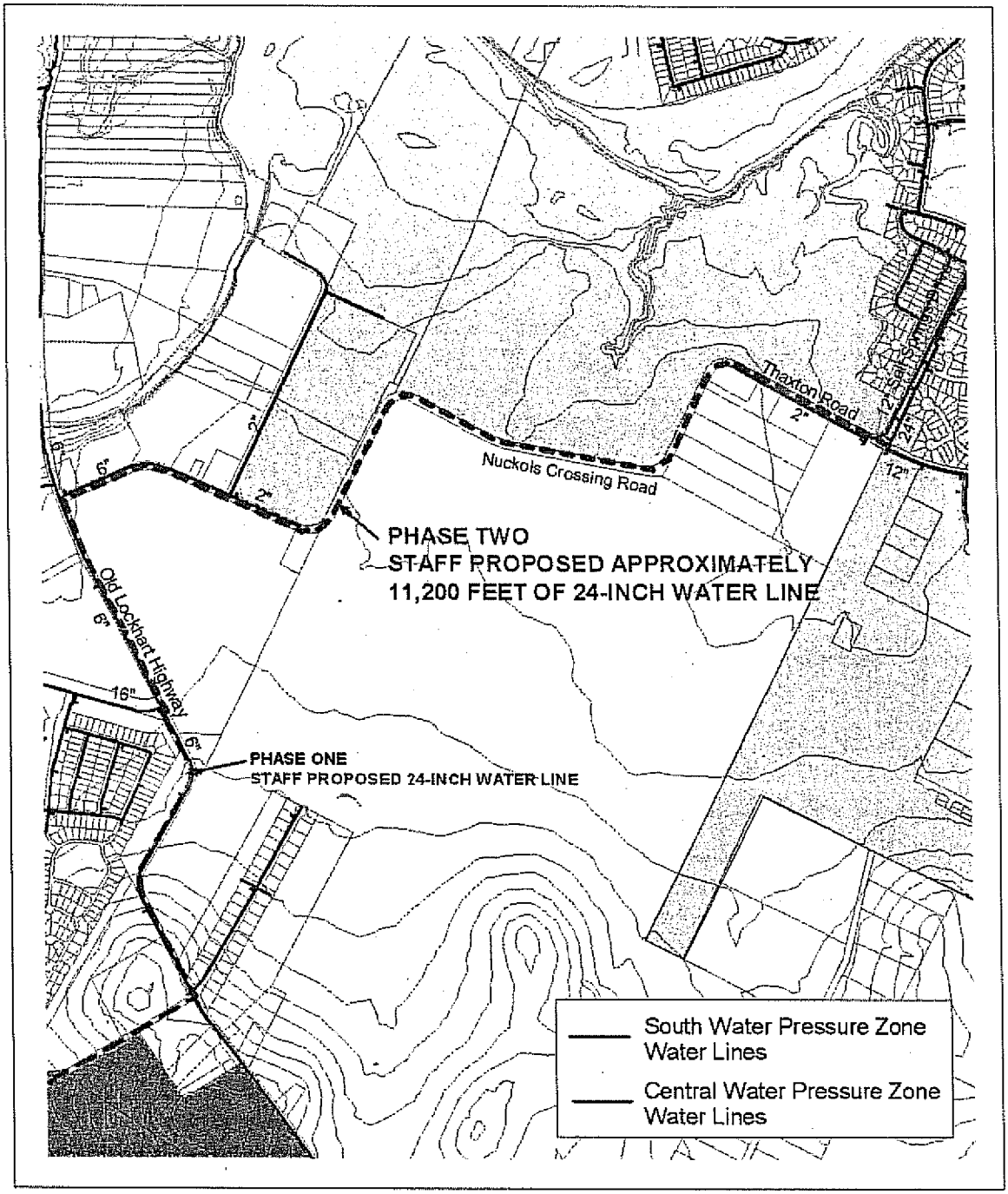
Subject Tract

City Limits

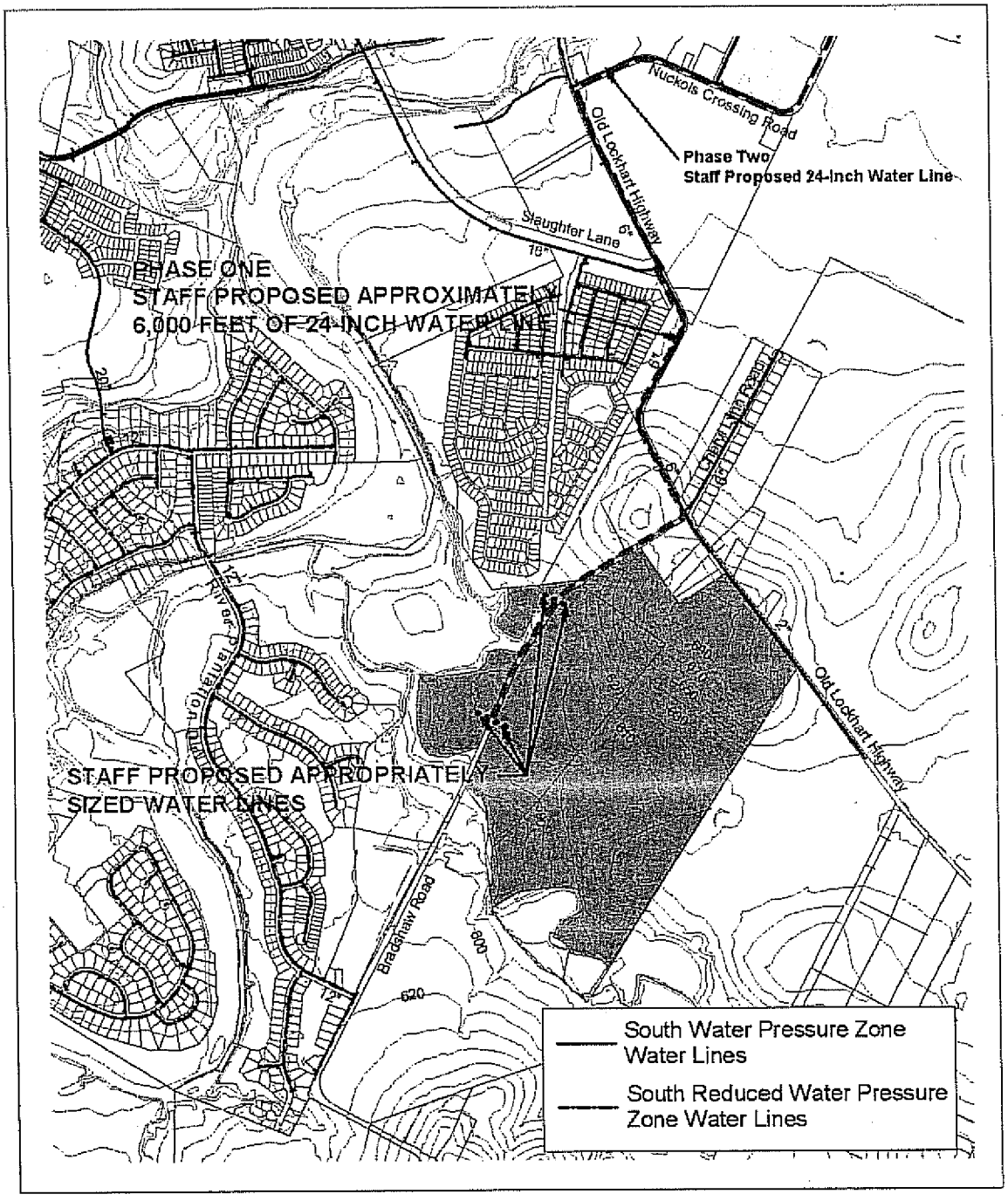
N

W. S.E.R. Name: Zachry Scott Tract
Additional Phase Two
South Water Pressure Zone Improvements
W. S.E.R. Number: 2259

Utility Development Services Plotted 9/11/2003



Utility Development Services Plotted 9/11/2003



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N

W. S.E.R. Name: Zachry Scott Tract
Phase One

W. S.E.R. Number: 2259

Subject Tract
City Limits
Creedmoor-Maha
Water Supply Corp.

Utility Development Services Plotted 9/11/2003

ENVIRONMENTAL BOARD MOTION 051607-D1

Date: May 16, 2007

Subject: Third Revision of the Zachary Scott Off-Site Waste Water Improvements Line

Motioned By: Dave Anderson, P. E. Seconded by: Phil Moncada

Recommendation

The Environmental Board recommends **approval with conditions** of a variance to LDC Section 25-8-361 – To allow wastewater improvements in a Critical Water Quality Zone – for the Zachary Scott Off-Site Waste Water Improvements Line

Staff Conditions

1. The Applicant will provide appropriate water quality treatment if groundwater is encountered during construction, per City of Austin standards
2. Applicant will restore disturbed areas within the Critical Water Quality Zone using City of Austin standard Specification 609-S.

Board Conditions

1. No additional Certificates of Occupancy will be provided by the City of Austin to existing and future subdivisions until the wastewater line is finished.
2. Dedicated and redundant storage, and reduced frequency of pumping and hauling, will be provided to minimize potential for spillage and improve neighborhood safety.

Rationale

1. Applicant has minimized construction in the Critical Water Quality Zone.
2. Findings of Fact have been met.

Vote 8-0-0-0

For: Anderson, Neely, Moncada, Curra, Maxwell, Dupnik, Beall and Ahart

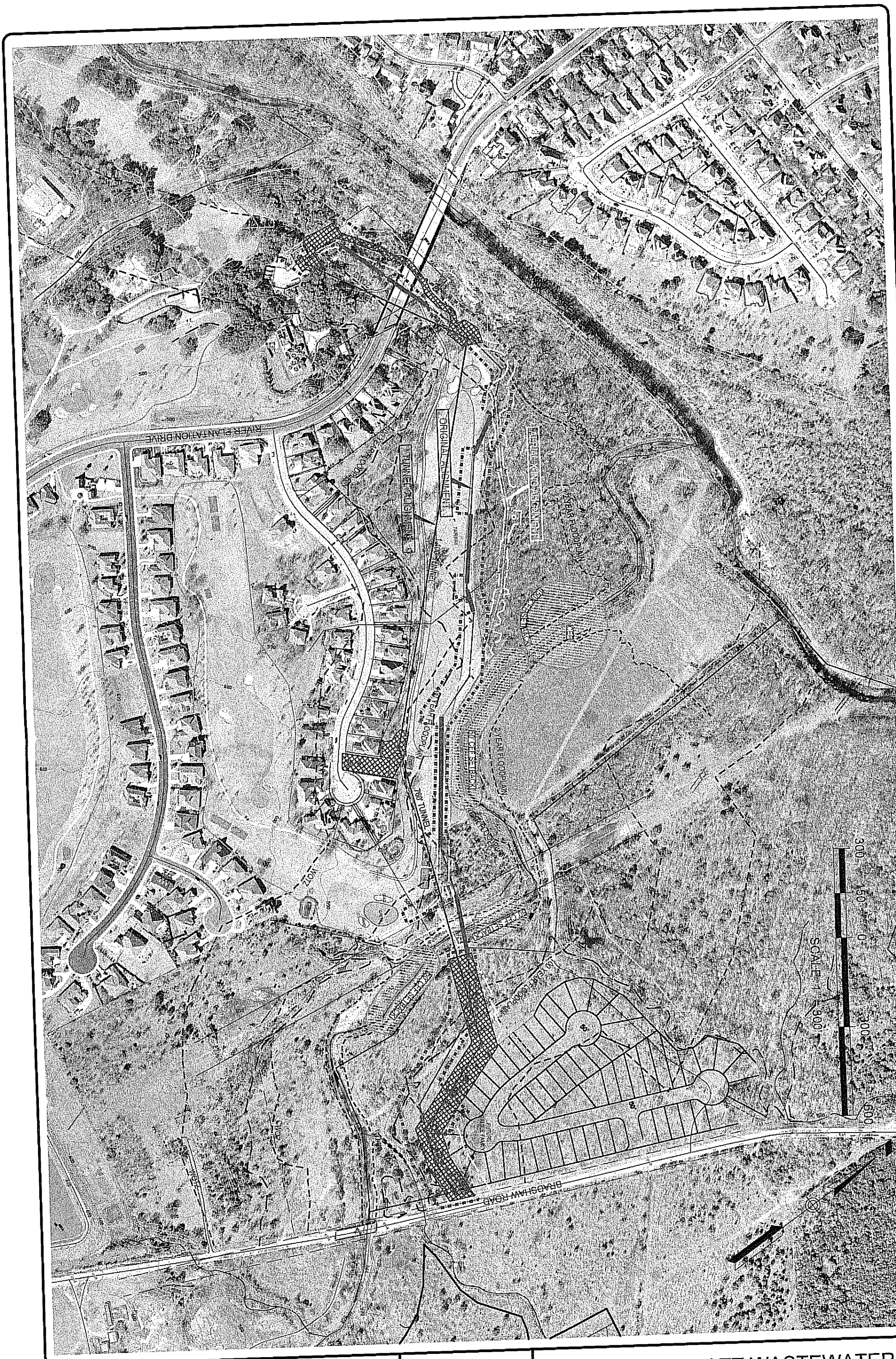
Against:

Abstain:

Absent:

Approved By:

Dave Anderson P.E., CFM P.E.
Environmental Board Chair



SHEET NAME

1 OF 1

LJA Engineering & Surveying, Inc.
5316 Highway 290 West
Suite 150
Austin, Texas 78735
Phone 512.439.4700
Fax 512.439.4716

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JOHN A. CLARK, P.E. 81398, ON 05/15/07. IT IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.

ZACHARY SCOTT WASTEWATER

ALTERNATIVE DESIGN ANALYSIS

FOR: LENNAR HOMES & CITY OF AUSTIN

Zachary Scott Off-site Wastewater Issue

At the February 21, 2007 Environmental Board meeting, the Zachary Scott Off-Site Wastewater Improvements Revision number 2 was on the agenda to re-visit the approved variance to Land Development Code 25-8-361- Wastewater Restrictions. During the discussions of this Project, the Board had concerns regarding the wastewater pump and haul program and requested additional information regarding Certificate of Occupancy and pumping and hauling wastewater issues.

Austin Water Utility does not consider wastewater pump and haul operations as a standard practice and are rarely allowed. In the past 10-years, the Utility has only agreed to four other requests. Of these, only two actually operated a pump and haul program for a very short period. Under the pump and haul program approved for the Zachary Scott Subdivision, the terms of the agreement require the Developer to abide by a list of requirements to safeguard the future residences, the surrounding environment and the City from liability.

Under the pump and haul program, the City is granting the Subdivision a conditional release of infrastructure improvements without final acceptance until the off-site wastewater system has been completed and final acceptance made by the City, at which time the pump and haul operations will cease. The Developer must provide written notice to potential buyers of the homes, and lenders on the subject property concerning the pump and haul operations. The executed release of claims document by each homeowner is an agreement to release and indemnify the City from any and all claims that the homeowner has or may have against the City that are related to the utilization of a pump and haul operation.

The following is a chronology of the Zachary Scott Service Extension Request presented to the Director of the Utility in February of this year.

Zachary Scott wastewater Service Extension Request SER 2260, was submitted in April of 2003. The proposed 975 lot single-family development is located on approximately 272 acres in the south corner of the Bradshaw Road and Old Lockhart Highway intersection. Council approved a wastewater cost reimbursement agreement on October 23, 2003. The SER proposed approximately 850 feet of 18-inch gravity wastewater line, 2,200 feet of 24-inch gravity wastewater line and 1,100 feet of 15 or 18-inch gravity line with a maximum reimbursement amount for actual construction costs of $1,333,740 (approximately $320 per foot). The construction cost estimate was developed on conceptual engineering and planning documents during the SER review and approval process.

The proposed wastewater route anticipated during the development of the SER started at the existing Onion Creek Wastewater Treatment Plant Lift Station, north to the 2-year Onion Creek floodplain and then east along the Onion Creek floodplain (850 feet of 18-inch gravity wastewater line) at a point the pipe size changed and continued southeast along the west side of Rinard Creek/Onion Creek Golf Course (2,200 feet of 24-inch

gravity wastewater line). At the point the line was to cross Rinard Creek, the pipe size changed again to a 15 or 18-inch gravity line and crossed Rinard Creek and extended to the proposed Zachary Scott subdivision (1,100 feet). The proposed 24-inch section of line was sized and located to allow wastewater service to extend further into the Rinard Creek drainage basin. Original SER is attached. This route did not cross Onion Creek at any point.

During last month's Environmental Board meeting, concerns were raised by the Board regarding this wastewater SER. Their concerns regarding aerial wastewater crossings, the Clean Water Program, pump and haul, and construction costs are addressed below.

During the preliminary design of the proposed wastewater line (late 2004 early 2005) it was determined that the proposed wastewater improvements would be within the 100-year floodplain and Critical Water Quality Zone (CWQZ) of Onion and Rinard Creeks and that the Developer would need to work with Watershed Protection and Development Review (WPDR) to acquire a variance to Land Development Code 25-8-361-Wastewater Restrictions. Also, because the Golf Course is platted as a Public Utility Easement, the Utility assumed that they could work with the golf course management on a suitable alignment along one of its fairways. At first, this was not the case. The golf course ownership, at the time, was Lumberman's Investment Corporation (LIC) LIC initially refused to work with the City and stated that they had an agreement with the City that gave LIC the right to approve any crossing of the golf course. Their stance was based on language inserted in the Sales Agreement of the Onion Creek wastewater infrastructure to the City. At the time Utility Development staff was unaware of this condition. Also, the Onion Creek Homeowners Association (OCHA) became aware of the proposed Zachary Scott development and they along with LIC were going to try and hold the proposed development to very strict compatibility standards. To keep the project moving forward, the Developer obtained rights to enter the golf course in order to survey and create an initial route design.

As the Developer began working with LIC and OCHA on their concerns, the Utility, WPDR and the Developer's engineer walked the initial route proposed by the engineer. The main concerns that WPDR had with this route was that they wanted the wastewater route kept away from the existing trees and moved farther on to the fairway, keep a minimum distance from the creek bank to avoid critical environmental features (CEFs) identified by WPDR during the initial field walk, bore the areas with potential ground water instead of open cutting, and a few other minor alignment issues. Based on the concerns raised by WPDR the engineer revised the route, and then met with LIC and the golf course management. When reviewing the revised route LIC and golf course management had major concerns over moving the proposed line into the fairway. Their biggest concern was fairway restoration. LIC wanted the line moved closer to the trees. To compromise on the alignment issue, the route was finally moved slightly closer to the trees, which required additional boring in order to provide protection of the trees.

During 2005 all the issues mentioned were worked out and the wastewater project went to the Environmental Board in November of that year seeking a variance to allow

wastewater improvements in a critical water quality zone. At this same time, System Planning had performed a more refined analysis of the Rinard Creek basin and determined that the diameter of the main wastewater line should be 27 or 30-inches. The project was advertised in late December 2005 with a 27-inch line. Today, System Planning projects the need for a 30-inch line to be constructed. This size will be included in the latest redesign.

Prior to advertising a cost estimate was prepared by the Developer's engineer, which estimated that the project could cost approximately $1,500,000 more than the original Council approval. Because of cost uncertainties in the construction sector, it was determined that the best way to get a real cost was to go out to bid. Bids where opened on January 19, 2006 with only two solicitors. The lowest bid of the two was $2,415,394 more than the original Council approval. The Developer's engineer checked with contractors during the drafting of the cost estimate. These same contractors did not bid on the project.

The Developer's engineer contacted the two bidders and other contractors to see why the project costs came in so high and why other contractors did not bid on the wastewater improvements. The three biggest concerns expressed, were the length of bores (1,425 feet of the 4,051 total length of pipe), flatness of the line (0.3%), and the depth of the open cut portion of the line, in some cases thirty feet deep. See attached profile sheet for comparison of the original (in red) and proposed (in black) designs. Additional concerns were the restoration of the golf course and future liability associated with the work and replacement materials (the golf course restoration part of the bid was approximately $508,000). When the bids were opened all construction projects Citywide were coming in higher than engineer's estimates. The depth of the bores, open cut, and petroleum based product costs changing rapidly played a very big part in the overall higher cost.

Staff took an amended RCA back to the Water and Wastewater Commission on February 1, 2006, and the Commission approved the amendment for an additional $2,677,833. After this approval the Director did not feel comfortable taking this amendment forward to Council and wanted the Developer to investigate the possibility of a cheaper construction method.

With the Director's decision to stop the wastewater improvements from moving ahead to Council, the Developer moved forward and hired a new consultant to produce a design that the City could accept that would be a cheaper alternative to the original design. With this delay, the Developer did not want to place his approved Subdivision on hold and wait. The Developer made a request to perform a pump and haul program for 64 homes. The Utility approved the pump and haul concept in August of 2006 with stipulations that, 1) an agreement is executed that limited the number of connections, 2) set an expiration date, and 3) required the deposit of $50,000.

The Parties executed the Pump and Haul Agreement in September of 2006, using a Pump and Haul Agreement that had previously been used and acceptable to the Utility. The one concession added by the Developer was that they may request that the City authorize

connections of up to a maximum of 200 homes. The Developers wanted this option because they felt they did not have full control of the time it may take to reach final acceptance of a redesigned wastewater system. As of the end of February 2007, the Developer was starting 12 homes a month with 45 under construction with 36 sold and 25 of those occupied. The Developer has made a request to amend to the Pump and Haul Agreement to allow occupancy of up to 136 homes under a new pumping program. The Utility is currently working with the Developer to amend the 2006 Agreement to allow the additional connections. Even though the Pump and Haul Agreement has a lot of safeguards to avoid spills, the City and Developer are diligently working together to get the offsite wastewater improvements constructed and stop the pump and haul.

After many months of work the Developer submitted a plan that drastically reduced the length of bore and depth of the proposed wastewater line. The biggest change to the design was an aerial wastewater crossing of Rinard Creek. The Developer submitted the aerial option last fall and at the time Utility management and review staff along with WPDR were receptive of this design as long as it is constructed above the 25-year floodplain of Rinard Creek. The Developer met with the Utility and WPDR in January and February. Both Departments supported the aerial crossing.

The City currently has aerial wastewater crossings, with most of these placed in service many years ago without consideration to flooding. The Austin Clean Water Program is replacing some of these older crossings. However, the majority of the problem wastewater lines the Program is addressing are the removal and replacement of old lines in creek beds or creek crossings, not aerial crossings. Any aerial crossing being replaced today is subsidiary to the replacement project, not the main project. The EPA administrative order does not address the replacement or construction of aerial wastewater crossings.

Onion Creek is a large watershed and prone to flooding as stated; however this creek crossing is not on Onion Creek but on Rinard Creek. The 100-year flow for the Rinard Creek watershed alone is passed under the structure with no issues. The only instance in which the aerial crossing is exposed to flooding is in backwater from Onion Creek. This flood condition is at a very low velocity of approximately 1.3 feet per second for the 100-year flow. Therefore the worst-case scenario for the crossing is the backwater condition caused by a 100-year flood in the Onion Creek watershed. The engineering consultant hired by the Developer has designed a truss and carrier pipe system to withstand hydrostatic pressure caused by 5-ft/second velocities. Because hydrostatic pressure is a function of the velocity squared, the actual factor of safety in the design is 25/1.7 or 14.7.

The proposed structure is "anchored" at both banks with additional support columns. The center span is 120 feet wide to accommodate crossing the floodway without impact. The piers are 2.5' diameter and will be installed with minimal disturbance within the 100-year floodplain. The carrier pipe is structural grade steel and the members supporting the carrier pipe will serve as an additional barrier. Rinard Creek has a well-defined 2-year floodway and this project will be staying completely out of this floodway. Every effort

was made to minimize impact to the creek and verify that the crossing structure would be capable of withstanding any forces associated with the 100-year flood event.

On February 26, 2007, Assistant City Manager Rudy Garza received a letter from the Developers attorney. In the letter, they spoke of working diligently with the City to construct the wastewater infrastructure necessary to serve their proposed development as well as potential growth in the Rinard Creek watershed. Because of delays they are requesting our assistance to help mitigate additional costs and expedite the completion of the needed wastewater improvements. They have requested that the approved Cost Reimbursement Agreement be amended with Council approval to allow reimbursement for the additional hard construction costs associated with the redesign (we are awaiting a new cost estimate from the Developer's engineer), soft costs associated with the redesign, the timeframe for reimbursement, and the costs associated with the pump and haul.

Staff and the Utility Director have looked at this request and have recommended that the Cost Reimbursement Agreement be amended, with Council consent, to include the additional hard construction cost dollars. Once the construction plans have been approved the project will be publicly bid. The Utility will take the lowest bid back to Council for the additional hard construction cost dollars. However, AWU will not reimburse any of the pump and haul costs.

Attached is a copy of the approved Pump and Haul Agreement for Zachary Scott. The Agreement addresses the major pump and haul issues that the Utility has. Within the Agreement is the condition that the Developer also notify each potential homeowner of the pump and haul operation.

WTP4 Stormwater Monitoring Stations

DRAFT

DRAFT

ENVIRONMENTAL BOARD MOTION FORM

Date: 4-5-06 Motion by: Phil Moncada

Agenda Item: B5 Seconded by: Julie Jenkins

Subject: EL MILAGRO SUBDIVISION

Motion: ☐ Approval ☒ Approve with conditions ☐ Disapproval

TO recommend conditional approval to VARIANCE to LDC- 25-8-483 - to allow development within the Water Quality transition zone.

Conditions: ~~Prior~~ · Compliance with SOS ordinance.

(1) use of green building standards
(2) Rainwater collection system
(3) Xeriscape landscaping
(4) Restricting turf areas in 100 year floodplain.

Rationale ~~Preliminary~~ (1) single-family construction to other surrounding lots would deny this ~~lot~~ property owner of these privileges (2) existing roadway + utilities

Vote:	*CONSENTING*	*DISSENTING*	*ABSTAINING*	*ABSENT*
David Anderson, P. E, Chair	(✓)	( )	( )	( )
Karin Ascot, Vice Chair	( )	( )	( )	(✓)
Phil Moncada, Secretary	(✓)	( )	( )	( )
William Curra, P. E.	(✓)	( )	( )	( )
Dr. Mary Gay Maxwell	(✓)	( )	( )	( )
Rodney Ahart	(✓)	( )	( )	( )
Julie Jenkins	(✓)	( )	( )	( )
John Dupnik, P. G.	(✓)	( )	( )	( )
Amer Gilani, P. E.	( )	( )	( )	(✓)

Chair Sign Off DJA

ENVIRONMENTAL BOARD MOTION 040506 B-5

Date: April 05, 2006

Subject: El Milagro Subdivision

Motioned By: Phil Moncada **Seconded By:** Julie Jenkins

Recommendation: The Environmental Board recommends **approval with conditions** to a variance LDC 25-8-483 -To allow development within the Water Quality Transition Zone.

Conditions:

1. Compliance with SOS Ordinance.
2. Compliance of Green Building Standards with at least a one star rating
3. Rainwater collection system.
4. Xeriscape Landscaping
5. Restricting turf areas in 100 year flood plain.

Rationale:

1. Single Family construction to other surrounding lots would deny this property owner of these privileges.
2. Existing roadway and utilities.

Vote: 7-0-0-2

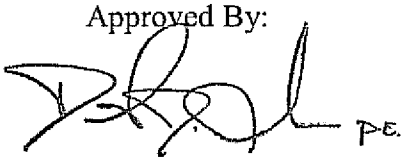
For: Anderson, Moncada, Curra, Maxwell, Ahart, Jenkins, and Dupnik

Against: None

Abstain: None

Absent: Ascot and Gilani

Approved By:



Dave Anderson, PE, CFM
Chair

ITEM FOR ENVIRONMENTAL BOARD AGENDA

BOARD MEETING DATE REQUESTED:	April 5, 2006
NAME & NUMBER OF PROJECT:	El Milagro Subdivision C8-05-0249.0A
NAME OF APPLICANT OR ORGANIZATION:	Clifford Martinez (Juan P. Martinez, E.I.T – Phone 447-7400)
LOCATION:	Dobbin Drive Cul-de-sac Dobbin Drive at Brodie Lane
PROJECT FILING DATE:	December 09, 2005
WPDR/ENVIRONMENTAL STAFF:	Teresa Alvelo, 974-7105 teresa.alvelo@ci.austin.tx.us
WPDR/ CASE MANAGER:	Don Perryman don.perryman@ci.austin.tx.us
WATERSHED:	Slaughter Creek (Barton Spring Zone) Drinking Water Protection Zone
ORDINANCE:	Comprehensive Watershed Ordinance (current Code)
REQUEST:	Variance requests are as follows: 1. To allow development within the Water Quality Transition Zone (LDC Section 25-8-483).

STAFF RECOMMENDATION: Not recommended.

REASONS FOR RECOMMENDATION:	Findings of fact have not been met.

MEMORANDUM

TO: Betty Baker, Chairperson
Members of the Zoning and Platting Commission

FROM: Teresa Alvelo, Environmental Reviewer
Watershed Protection and Development Review Department

DATE: April 5, 2006

SUBJECT: El Milagro Subdivision
El Milagro / C8-05-0249.0A

The referenced property is currently unplatted. The applicant, Mr. Clifford Martinez, wishes to purchase the property from the current owners and move forward to construct a 3180 sf home within the Water Quality Transition Zone present on the western side of the site. There are two other unplatted lots adjacent to this lot. These two lots are owned by others.

Description of Project Area

The 0.96 acre property is located on Dobbin Drive, south of Slaughter Lane and east of Brodie Lane. This property is currently owned by Jan R. and Kay M. Shinol. Mr. and Mrs. Shinol also own the adjacent lot located opposite the creek from the subject property (3303 Graybuck Drive). Mr. Martinez has the permission of the current owners to move forward with the subdivision application for this proposed tract. The property is situated in the Slaughter Creek watershed, and is classified as Barton Springs Zone. The subject property was previously platted in 1968, but vacated in 1972, and remains so today. The current owners purchased this property along with the adjoining lot at 3303 Graybuck Drive in 1992. The subject property has essentially functioned as an extension to the homeowners lot, and has also served as a buffer to surrounding development.

A dry, intermediate waterway runs along the eastern perimeter of the property. A 200-foot Critical Water Quality Zone setback extends from the creek centerline, and the remaining portion of the property falls within the Water Quality Transition Zone. The property lies within the Drinking Water Protection Zone, and is located over the Edwards

Aquifer Recharge Zone. There is floodplain, Critical Water Quality Zone (CWQZ), and Water Quality Transition Zone (WQTZ) associated with this site.

Hydrogeologic Report

Topography is gently-sloping eastward with no slopes exceeding 15%. The site consists of Edwards Limestone, part of the Fredericksburg Group. Edwards Limestone is characterized as limestone, dolomite, and chert. This feature is typically located in a zone of considerable weathering, is "honeycombed" and cavernous forming an aquifer. Edwards limestone was identified within the dry creek bed area. Upon inspection, no karst topography, depressions, or recharge features were found on the site or in the adjacent creek.

Vegetation

Dominant vegetation consists of oak trees, juniper, hackberry, cedar elm, and yaupon trees with overgrown grasses, dewberry and scattered brush.

Critical Environmental Features

An Environmental Assessment provided by the applicant, as well as site visits conducted by staff, determined that there are no critical environmental features (CEF's) within 300 feet of this site.

Water/Wastewater Report

COA water and wastewater services are currently available to provide services to this property.

Zoning and Platting Commission Variance Request(s)

The following variance is being requested:

1. To allow development within the Water Quality Transition Zone LDC Section 25-8-483.

1. **Variance from Land Development Code Section 25-8-483 – Water Quality Transition Zone**

   Development is prohibited in a water quality transition zone that lies over the Edwards Aquifer recharge zone.

   Applicant desires to be granted a variance for this property in order to make the tract eligible to proceed with the subdivision process, and ultimately ready the site for residential development. The applicant maintains that many similarly-situated surrounding lots are built out with homes, and denial of the variance deprives the property owner of privileges granted to other similarly-situated property owners.

Recommendations:

Staff cannot recommend approval of the variance request because the findings-of-fact are not met. The property is currently unplatted and a "similar" comparison to legally-platted lots is not possible. Legally-platted lots are due development entitlements not granted to

unplatted lots. Also, many surrounding lots were platted prior to enactment of the Comprehensive Watershed Ordinance. Staff acknowledges that this now-vacated property was once platted and still exists in that originally-platted configuration today.

However the findings-of-fact are not met for this application. The current owners are not denied a reasonable or economic use of the property as they purchased this unplatted lot along with the 3303 Graybuck Drive property in 1992. The subject property has essentially served as extension acreage to the Graybuck Drive property, and currently performs as a buffer to surrounding development.

Conditions:
None.

Similar Cases
None found.

Staff does not recommend approval of this variance, as the findings-of-fact are not met.

If you have any questions or need additional information, please contact Teresa Alvelo at 974-7105.

Teresa Alvelo

Teresa Alvelo, Environmental Reviewer
Watershed Protection and Development Review Department

Environmental Officer:
Patrick Murphy

Watershed Protection and Development Review Department
Staff Recommendations Concerning Required Findings
Water Quality Variances

Application Name: *El Milagro*
Application Case No: *C8-05-0249.0A*
Code Reference: *LDC 25-8-483*
Variance Request: ***To allow development within a water quality transition zone.***

A. Land Use Commission variance determinations from Chapter 25-8, Subchapter A – Water Quality of the City Code:

1. The requirement will deprive the applicant of a privilege or the safety of property given to owners of other similarly-situated property with approximately contemporaneous development.

   No. ***This lot is unlike others including the other two neighboring unplatted lots. The subject property was purchased, unplatted, in 1992 along with the adjacent 3303 Graybuck lot by the current owners. The two remaining unplatted lots were purchased and are owned by separate owners with no association to adjacent lots. There are no similarly-situated properties with which to make an accurate comparison.***

2. The variance:

   a) Is not based on a condition caused by the method chosen by the applicant to develop the property, unless the development method provides greater overall environmental protection than is achievable without the variance;

      No. ***The variance is based on a condition caused by the method chosen by the applicant to develop the property as the property is unplatted and not eligible for development entitlements granted to platted lots.***

   b) Is the minimum change necessary to avoid the deprivation of a privilege given to other property owners and to allow a reasonable use of the property;

      No ***This is a unique situation where the subject property is unplatted and, therefore an accurate, fair comparison between similarly-situated property owners is not possible.***

   c) Does not create a significant probability of harmful environmental consequences; and

   Yes ***Significant harmful environmental consequences would not be likely if the applicant is agreeable to providing additional mitigative measures such as providing for a low total***

impervious cover limit within the WQTZ, using green building standards, water quality improvements including construction of a rainwater collection system, xeriscape landscaping, and restricting turf area. Restrictive covenants may be considered that requires an IPM plan, and prohibits any further disturbances within the critical and water quality zones. These measures can be effective particularly since no seeps, springs, or recharge features exist near this property.

3. Development with the variance will result in water quality that is at least equal to the water quality achievable without the variance.

   Yes *Compliance with the SOS ordinance, along with the additional mitigative measures identified previously should provide equivalent water quality protection.*

B. Additional Land Use Commission variance determinations for a requirement of Section 25-8-393 (Water Quality Transition Zone), Section 25-8-423 (Water Quality Transition Zone), Section 25-8-453 (Water Quality Transition Zone), or Article 7, Division 1 (Critical Water Quality Zone Restrictions):

1. The above criteria for granting a variance are met;

   No *The applicant is not proposing any development within the CWQZ for this property. The variance requested for this property is not addressed by this finding. The above criteria are not met.*

2. The requirement for which a variance is requested prevents a reasonable, economic use of the entire property; and

   N/A *Reasonable, economic use of the property is not being deprived.*

3. The variance is the minimum change necessary to allow a reasonable, economic use of the entire property.

   N/A

Reviewer Name: Teresa Alvelo

Reviewer Signature: Teresa Alvelo

Date: April 5, 2006

Staff may recommend approval of a variance after answering all applicable determinations in the affirmative (YES).

DIRECTIONS TO EL MILAGRO SUBDIVISION

C8-05-0249.0A

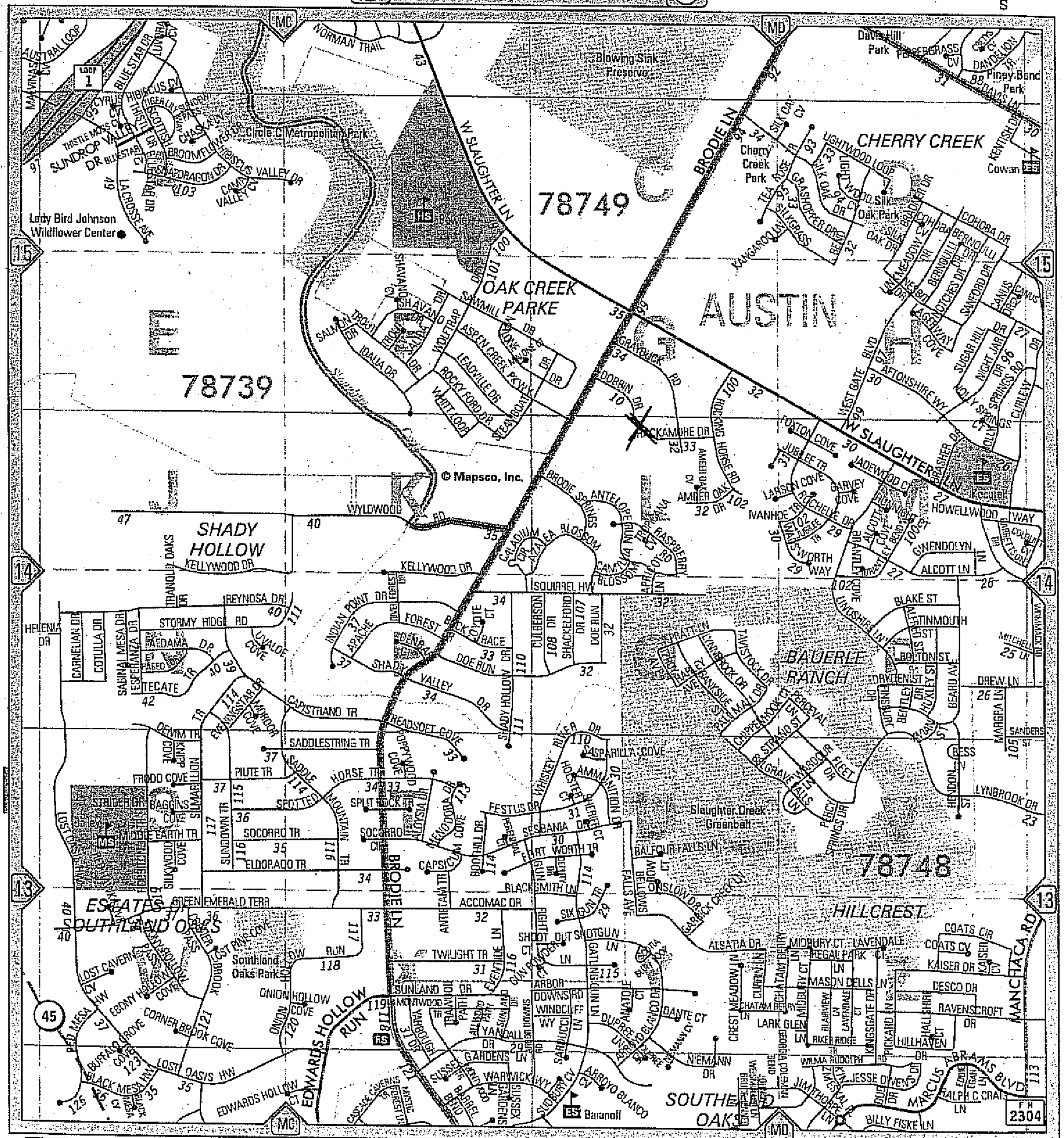
At Slaughter Lane and IH-35, turn west onto Slaughter Lane.

Turn south (left) onto Brodie Lane. Travel a few blocks to find Dobbins Drive on the left.

Turn east (left) onto Dobbin Drive.

Continue to the cul-de-sac.

CONTINUED ON MAP 642



CONTINUED ON MAP 671

CONTINUED ON MAP 702

CONTINUED ON MAP 673

SCALE IN MILES

0 1/8 1/4 3/8 1/2

SCALE IN FEET

0 1000 2000 3000

JONES & CARTER, INC.
ENGINEERS • PLANNERS • SURVEYORS

805 Las Cimas Parkway, Suite 230
Austin, Texas 78746-5493

TEL 512 441 9493
FAX 512 445 2286

AUSTIN
DALLAS
HOUSTON
THE WOODLANDS

April 24, 2007

City of Austin Environmental Board
C/o Watershed Protection and Development Review Department
505 Barton Springs Road
Austin, Texas 78705

Re: Cut/Fill and Clearing Variances for Site Development Permit SP-06-0544D
Parmer Lane Extension Phase 1A and Old Hwy. 20
10200 US Hwy. 290
Austin, Texas

Dear Board Members:

On behalf of our client, Wild Horse Addition, Ltd., and Travis County Transportation and Natural Resources, Jones & Carter, Inc. is requesting a variance from the 4 foot cut/fill restriction per LDC 25-8-341and 25-8-342, and a variance to allow clearing outside the right-of-way per LDC 25-8-322, for the Parmer Lane Extension project south of US Hwy 290. The project is associated with the Wildhorse Ranch Planned Unit Development project (C814-00-2063) that was approved by City Council on February 14, 2002. Parmer Lane Extension is shown in the CAMPO 2030 Plan as a MAD4 roadway from US 290 south to SH 130. Travis County and the City of Austin are jointly funding the project with the developer and the road will be dedicated to Travis County. The Parmer Lane Participation Agreement was approved by Travis County Commissioners Court, and the interlocal agreement between Travis County and the City of Austin is being drafted at this time.

1. The Parmer Lane Extension Phase 1A project is the 1200 foot extension of a four-lane divided major arterial roadway from US Hwy 290 going south to the Capital Metro railroad right-of-way, and the relocation of 500 feet of Old Hwy 20 to intersect the Parmer Lane Extension at 90 degrees. The vertical alignment of Parmer Lane is restricted by the elevation of the US Hwy 290 intersection, the Old Hwy 20 intersection, and the Capital Metro railroad tracks. To tie into these three elevations and meet the 45 MPH design speed for the major arterial, the cut and fill required for the road and embankments exceed 4 feet. The maximum cut is ten feet and the maximum fill is sixteen feet. The roadway construction is phased to allow Old Hwy. 20 to remain in operation until the Parmer Lane Extension is operational. Clearing outside the right-of-way will allow the developer's adjacent property to provide the fill soil necessary to construct the south portion of the Parmer Lane as Phase 1. Phase 2 will involve construction of the north portion of the Parmer Lane Extension and placing any excess fill material back onto the developer's site.

2. The project was designed within minimum departures to still allow the Parmer Lane Extension to be constructed to meet the design speed and vertical alignment with US 290, Old Hwy 20 and the Capital Metro railroad. Side slopes are 3 to 1 to minimize the potential for erosion of the side slopes. To construct vertical walls at the right-of-way line in-lieu-of cutting and filling outside the right-of-way would significantly increase the cost of the project and increase the risk to the public's health, safety and welfare.

3. The project does not provide special privileges not enjoyed by other similarly situated properties with similarly timed development because it is required to be constructed by the Wild Horse Ranch P.U.D. approved by the City Council. It is not based on a special or unique condition that was created as a result of the method by which a person voluntarily subdivided land because no land was subdivided to require the road alignment.

10

4. The strict application of the requirement would require vertical walls to be built at the right-of-way rather than a sloped embankment. This would increase the cost of the project being jointly funded by the developer, Travis County and the City of Austin. The retaining walls would increase the safety hazards for a vehicle that jumped the curb and impacted the retaining wall.

5. The project is not in Barton Springs Zone; it lies within the Gilleland Creek (Suburban) Watershed.

The construction limits will include temporary construction easements extending beyond the Parmer Lane right-of-way. The proposed side slopes will allow stabilization and revegetation of the embankments with native seeding. Native herbaceous plants will be used in the sedimentation basis to mitigate the cut and fill in the existing ditch required by the box culvert under Parmer Lane. Tree replacement will be provided on the adjoining Wild Horse Addition property at a ratio of 100 caliper inches replacing the 523 caliper inches removed.

If you have any questions or require additional information, please contact me at (512) 441-9493.

Very truly yours,
Jones & Carter, Inc.

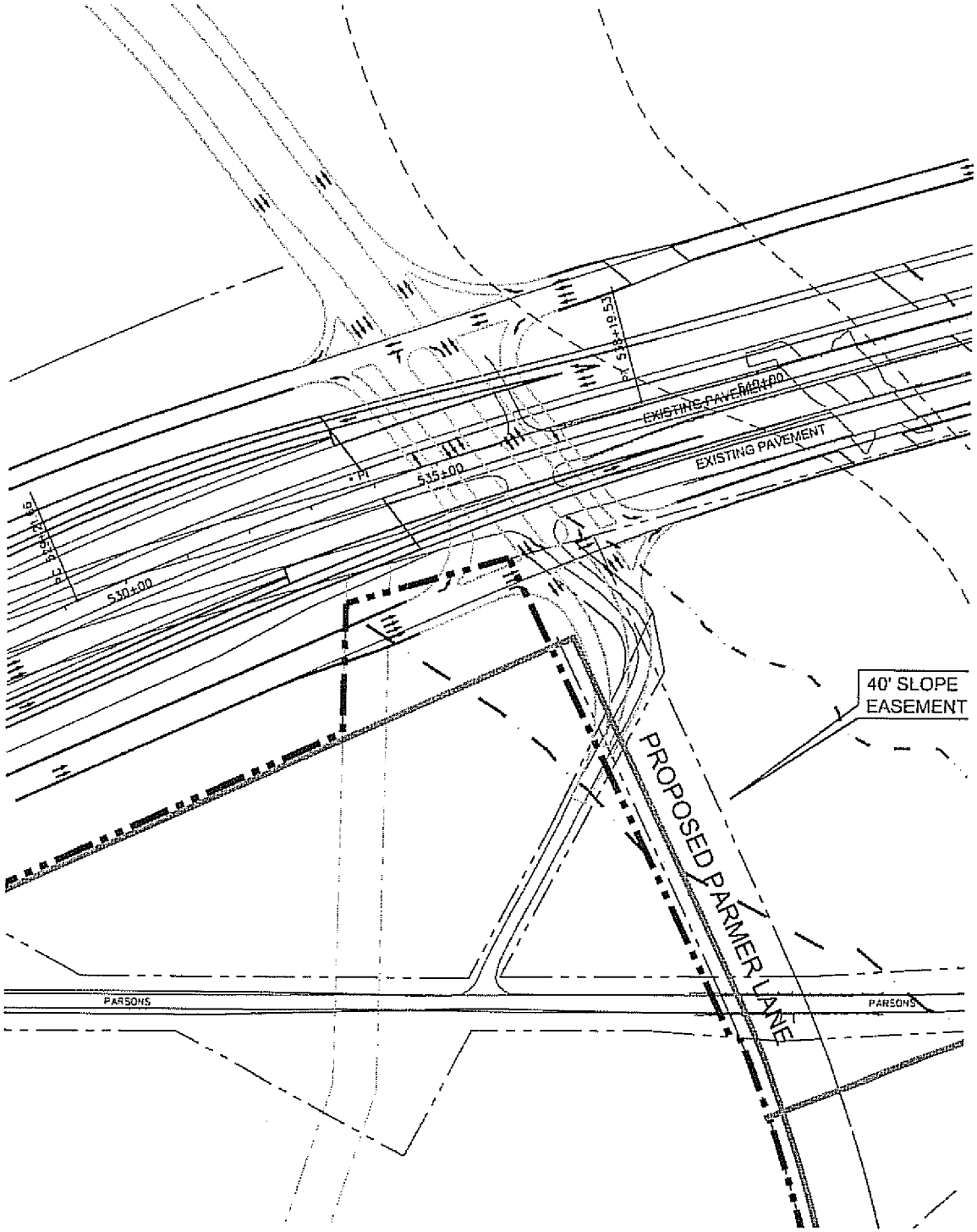
James M. Schissler

James M. Schissler, P.E.

Cc: Mark Drinkard, Wild Horse Addition, Ltd.

J:/projects/A155/003/general/document/letters/Cut/Fill Letter 031907.doc

11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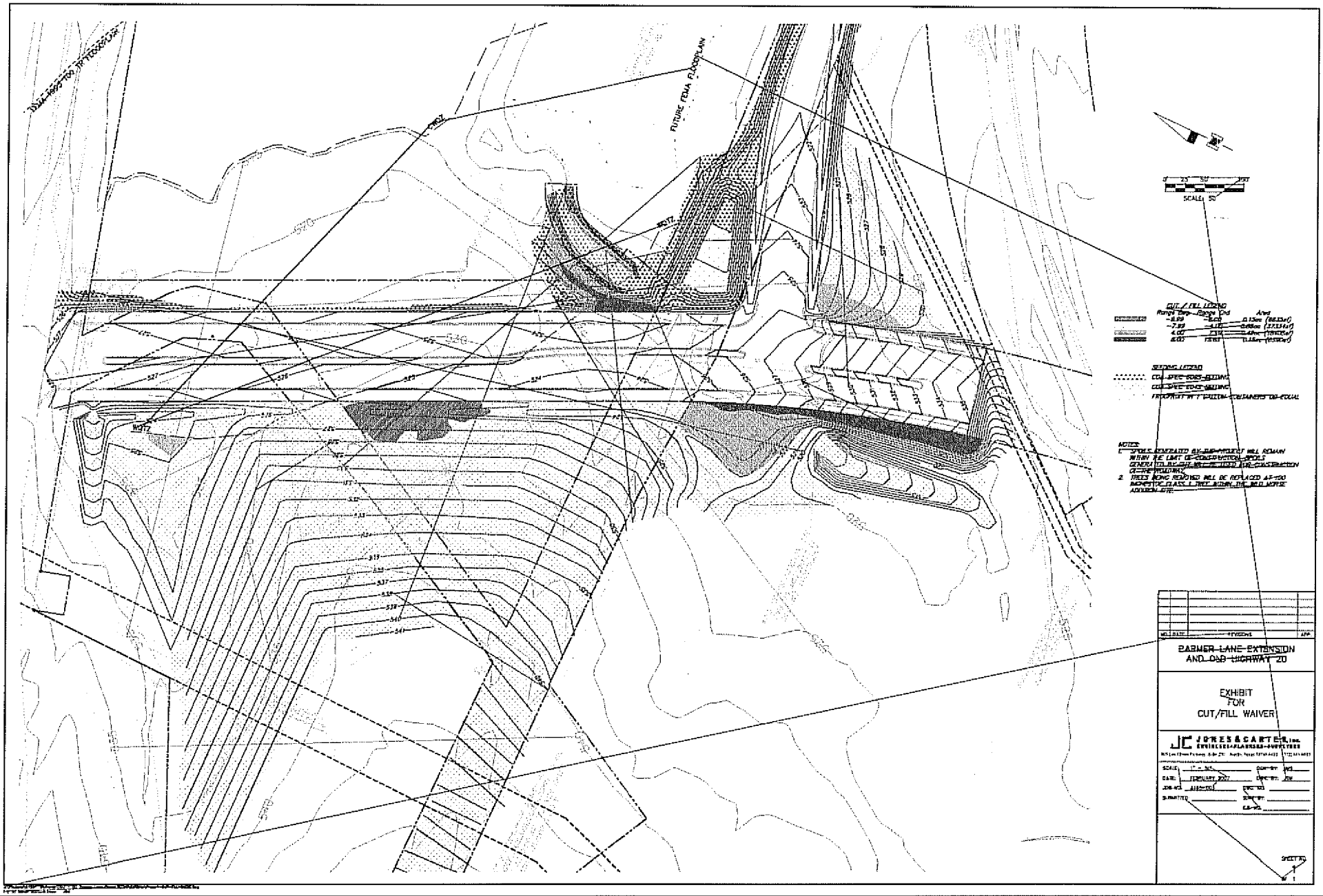
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SEEDING LEGEND
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AND OLD HIGHWAY 20
EXHIBIT
FOR
CUT/FILL WAIVER
JONES & CARTER, Inc.
CIVIL ENGINEERS • PLANNERS • SURVEYORS

ENVIRONMENTAL BOARD

Notes of Regular Meeting

May 16, 2007

Meeting Called to Order: 6:04 p.m. Meeting Adjourned: 10:00 p.m.

Attendance of Board Members:

David Anderson, P.E., Chair	Present	William Curra, P. E.	Present
Mary Ann Neely	Present	Dr. Mary Gay Maxwell, Vice Chair	Present
Phil Moncada, Secretary	Present	Rodney Ahart	Present
John Dupnik, P.G.	Present	Jon Beall	Present

Staff Members Present:

Marilla Carter, WPDR	Pat Murphy, WPDR	Mitzi Cotton, Attorney at Law
Teresa Alvelo, WPDR	Mike Kelly, P. E., WPDR	David Juarez, AWU
William Conrad P. E., AWU	Chris Yanez, WPDR	Scott Hiers, WPDR
Pat Hartigan, WPDR Daryl Slusher, AWU	Phillip Jaeger, P. E, AWU	Lonnie Robinson, P.E., AWU

Attached is an agenda of the meeting and the motions made by the Board. There were two (2) motions passed by the Environmental Board. An audio tape recording of this meeting is available through the Watershed Protection Department.

1. One citizen signed up to speak on Lake Austin and the Interlocal agreement between The Lower Colorado River Authority and City of Austin.

2. The Environmental Board recommends adoption of the proposed agreement, and that the Austin City Council moves forward with the Interlocal agreement. See attached.

3. The Environmental Board recommends approval with conditions of variances to LDC Section 25-8-361 – To allow wastewater improvements in a critical water quality zone – for the Zachary Scott Off-Site Waste Water Improvements Line. See attached.

Respectfully submitted,

DRAFT

pls. review/edit

Marilla Carter
Environmental Board Liaison

ENVIRONMENTAL BOARD MOTION 051607-D1

Date: May 16, 2007

Subject: Third Revision of the Zachary Scott Off-Site Waste Water Improvements Line

Motioned By: Dave Anderson, P. E. Seconded by: Phil Moncada

Recommendation

The Environmental Board recommends **approval with conditions** of variances to LDC Section 25-8-361 – To allow wastewater improvements in a critical water quality zone – for the Zachary Scott Off-Site Waste Water Improvements Line

Staff Conditions

1. The Applicant will provide appropriate water quality treatment if groundwater is encountered during construction, per City of Austin standards
2. Applicant will restore disturbed areas within the Critical Water Quality Zone using City of Austin standard Specification 609-S.

Board Conditions

1. No additional Certificates of Occupancy will be provided by the City of Austin to existing and future subdivisions until the wastewater line is finished.
2. Dedicated and redundant storage, and reduced frequency of pumping and hauling, will be provided to minimize potential for spillage and improve neighborhood safety.

Rationale

1. Applicant has minimized construction in the Critical Water Quality Zone.
2. Findings of Fact have been met.

Vote 8-0-0-0

For: Anderson, Neely, Moncada, Curra, Maxwell, Dupnik, Beall and Ahart

Against:

Abstain:

Absent:

Approved By:

Appv/Edits by Dave A. on 5/17/2007 Pushed for City Council

Dave Anderson P.E., CFM
Environmental Board Chair

ENVIRONMENTAL BOARD MOTION 051607 C-2

Date: May 16, 2007

Subject: Interlocal Agreement between the City of Austin and Lower Colorado River Authority

Motioned By: Dave Anderson, P. E. **Seconded By:** Mary Ann Neely

Recommendation:

The Environmental Board recommends adoption of the proposed agreement, and that the Austin City Council moves forward with the Interlocal agreement.

Board Condition:

The agreement will include, under IRMS II and III requirement to communicate new rules to append residents.

Rationale:

Environmental protection is equivalent.

Vote: 8-0-0-0

For: Anderson, Moncada, Maxwell, Curra, Neely, Ahart, Beall and Dupnik

Against: None

Abstain: None

Absent: None

Approved By:

Dave Anderson, PE, CFM
Chair

File
4/23/07
EB MEETING
5/2/2007
MC

MEMORANDUM

TO: David Anderson, P.E., Environmental Board Chair and Members

FROM: Chuck Lesniak, REM, Environmental Program Coordinator
Watershed Protection and Development Review Department

DATE: April 12, 2007

SUBJECT: Response to Questions on WTP4 Status Report

Attached are responses to your questions on the Water Treatment Plant #4 February Status Report. If there are any questions, please contact me at 974-2699 or by e-mail to charles.lesniak@ci.austin.tx.us.

Chuck Lesniak

Chuck Lesniak, REM
Environmental Program Coordinator
Watershed Protection and Development Review Department

Agenda Item C-1

Response to Environmental Board Questions Submitted March 27, 2007

Page 1

1. What is "significant loss" in the first issue resolution?
   "Significant" was not defined other than as an unusual loss of drilling fluid. As it turned out, all of the borings lost most or all of the drilling fluid during the borings. As a result of the Environmental Commissioning (EC) process, the drillers used only water from Bull Creek as a boring fluid, no bentonite or other additives were used.
2. Need a map of the Bull Creek crossings listed in the 2nd issue resolution.
   Attached
3. Need a copy of the tailgate briefing agenda listed in the 3rd issue resolution.
   Attached

Page 2

1. Under EC recent activities, what are results of the geotech boring activities?
   We have not received the boring logs as of yet, but expect to shortly. We should be able to include a discussion of this at the April briefing.
2. Under EC upcoming activities, when will we have results of groundwater dye tracing?
   Early results are in and we can include this in the April briefing as well.
3. Under EC upcoming activities, can we get a copy of EC checklists?
   Attached
4. Under EC upcoming activities, what are type and location of stormwater monitoring equip?
   There are currently 2 stormwater monitoring sites on Bull Creek located upstream and downstream of the property (see attached map). We have not been able to install monitoring stations on Tributary 8 because there are no suitable, accessible monitoring locations.

   Each station consists of an equipment shelter housing two flow meter/data loggers, two automatic water samplers, and two cell phones for remote control and data communications. The equipment is battery powered with a solar panel installed near each station. A rain gauge has also been installed at each station. These stations should be able to characterize the stormwater impacts of the plant on Bull Creek.

5. Under EC upcoming activities, please describe training and education in last bullet.
   All contractors and City staff that work on the project will receive training describing the environmental sensitivities of the site and an overview of the Commissioning process. All field workers (geotech staff, surveyors, etc.) receive environmental protection "tail gate" briefings.
6. Under Engineering recent activities, what do revised WTP layouts look like? Bigger? *The WTP 4 site plan is being developed based upon the BMPs in the Mitigation Plan. A workshop has been scheduled in mid-April with a conservation design firm that will assist in laying out the water plant within the technical, engineering, and environmental constraints of the site.*

Page 3

1. Under Engineering recent activities, what are the results of the lessons learned session on Ullrich?

Three lessons learned sessions on plant process equipment have been conducted with the Ullrich WTP plant personnel and AWU staff involved in the Ullrich WTP design. Minutes of the meeting will be used to improve the design of the process equipment used on WTP 4.

2. Under Engineering upcoming activities, when will CEF features be surveyed?
   The survey work to tie the locations of the CEF features to the Plant baseline survey has been completed.

3. Under Communication recent activities, what were the results of the meeting with the Bull Creek Foundation? What were there concerns?
   At the time of our meeting with the Bull Creek Foundation we were still trying to persuade the County that the Cortaña Site was where WTP 4 should be built. We advised them that unless the County agreed to proceed with the Cortaña site, the City was committed to designing constructing WTP 4 on the Bull Creek Site. We then discussed in great detail the Environmental Commissioning process and addressed their questions. They seem pleased that as part of the mitigation process there will be an Environmental Inspector assigned to the plant site and the upper Bull Creek watershed.

4. Under Communication upcoming activities, what is the frequency and schedule of informational meetings and community-wide to be held?
   We have committed to two open house meetings during 2007. The first is an open house scheduled for April 23, 5:30-7:30 at 3M and the second meeting will be held in the fall.

General

1. How has delay in awarding the Environmental Commissioning project to a 3rd party impacted ongoing or already completed activities (both design and construction)?
   WPDRD staff are serving in the role of EC agent until the consultant can be hired. We believe this has been effective, but we realize there are some limitations on depth of analysis and participation with this arrangement. One of the first tasks for the EC consultant will be to review the EC work that has occurred prior to their being hired. Additionally, a firm from the Public Works environmental services rotation list is being hired to develop contaminant impact threshold concentrations and to perform any needed environmental impact analysis until the permanent firm is hired.

2. When will the Board be briefed on the results of conversation with Seattle on their treatment plant?
   Staff is still trying to schedule that discussion and the results will be included in the monthly status report and the subsequent quarterly briefing once it has occurred.

WTP4 Stormwater Monitoring Stations

Water Treatment Plant #4
Environmental Briefing for Light Field Activities

The Water Treatment Plant #4 site is located in a very sensitive natural environment. It contains habitat for federally regulated endangered species (birds) and very rare aquatic species (salamanders). Extreme care must be taken to prevent any amount of pollution at the site. Requirements include:

- Any leaking equipment must be shut down and the leak stopped or the equipment must be removed from the property.
- Fueling, oil changes, chain oiling and similar activities must occur in a contained area (pickup bed, lined area) or the activity must occur off the property.
- Any spilled or leaked oil, fuel, hydraulic fluid or other materials must be cleaned up immediately. Spills must immediately be reported to the City at 974-2550.
- Any wounds from damage or cutting of oak trees must be sealed with an appropriate wound sealing material within 30 minutes. Other common oak wilt prevention practices must be followed as well.
- No protected size tree (>8" diameter) may be cut without a City of Austin permit.
- A supervisor that has received this briefing must be on site at all times.
- No soil disturbance may occur within 300' of known Critical Environmental Features with City of Austin approval.
- Portable toilets must be provided for workers at the site.
- Any trash brought in must be removed from the site at the end of each work day.

Acknowledgement
I have received and understood the briefing as described above.

Print Name	Signature
Company	Date