

September 20, 2004

Mr. Chris Munn, President
Board of Directors
Block House MUD
c/o Armbrust & Brown, LLP
100 Congress Ave., Suite 1300
Austin, TX 78701

**Re: Evaluation of Block House Creek Clearing for Floodway Conveyance
GJA No. 349-9258-87**

Dear Mr. Munn:

Gray Jansing & Associates, Inc. (GJA) has completed the Evaluation of the Block House Creek Clearing for Floodway Conveyance (Project) as authorized by the Block House MUD (District) Board of Directors. The findings and engineering recommendations that have resulted from the Evaluation are presented herein.

Project Background

The District has recently completed clearing a pathway along and adjacent to Block House Creek as it traverses the District. The area cleared is totally contained within the 100-year floodplain of Block House Creek which is owned by the District. The purpose of the clearing was to offer access to the otherwise heavily wooded, undeveloped portion of the Block House Creek floodplain to evaluate what additional clearing, if any, or other maintenance might be necessary to insure the ability of the floodway of the creek to convey floodwater without forcing the floodwater to extend beyond the boundaries of the currently defined floodplain. It is necessary for the District to periodically maintain the floodway for Block House Creek to insure its ability to convey these flows.

The District owns the floodplain area along with additional acreage immediately adjacent to the floodplain in the area of the District's wastewater treatment plant. The total acreage is 31.6 acres upstream of Block House Drive East bridge and 35.69 acres downstream of the Block House Drive East bridge to the District's eastern boundary line. The boundary of the area that the District owns generally coincides with the 100-year floodplain boundaries and were determined based on a flood study previously prepared for the District.

Mr. Chris Munn, President
Board of Directors
September 20, 2004
Page 2

PROJECT DESCRIPTION AND SCOPE OF SERVICES

GJA was authorized by the Board of Directors to review the clearing as it has been completed to date and make recommendations to the Board as to whether any additional clearing, debris removal or other maintenance procedures need to be performed in order to restore/maintain the floodway to a condition whereby it can convey flows during flooding events without adversely affecting adjacent private property. As a result of additional comments received subsequent to the initial authorization, GJA included in the Evaluation a review of any area previously cleared which showed signs of significant erosion.

In carrying out this project, GJA performed the following services:

1. Walked the previously cleared portion of the Block House Creek floodplain to review the extent of the clearing to date and its adequacy to convey floodwater in the floodway.
2. Based on field observation, identified any additional clearing, removal of debris, underbrush or other maintenance necessary along the floodway to provide floodwater conveyance.
3. Consulted with representatives of the City of Cedar Park (City) and Texas Commission on Environmental Quality (TCEQ) regarding the clearing activities.

Field Observations of Clearing and Floodway Conveyance

Mr. Stephen K. Collins, P.E. of GJA and myself walked the Block House Creek on August 31, 2004 to review the actual condition of the area cleared to date and the condition of the floodway conveyance in areas which had not been cleared. Field observation began at the District's eastern boundary line at Block House Creek and extended upstream to Block House Creek, Section 1. In addition, observations were made of the creek floodway adjacent to the Tumlinson Park area from the park and the location of the Block House Drive South bridge.

In performing the field observations, numerous digital photographs were taken along with field dictation of the conditions observed at various points along the creek. These individual field dictation summaries and associated photographs are included in this Evaluation as Appendix 1.

In addition to the individual summaries of the field conditions observed and digital photographs, an overall key exhibit has been prepared utilizing the District's existing development map on which the approximate location of each field observation summary and picture is shown. The field locations shown on the development map exhibit are approximate and may vary due to the difficulty of estimating the location at which observations were made along the creek in relationship to surrounding development. However, the observations are deemed sufficiently accurate for purposes of making determinations regarding the condition of the existing clearing and recommendations regarding any additional clearing or debris removal which might be necessary for floodway

Mr. Chris Munn, President
Board of Directors
September 20, 2004
Page 3

conveyance. A copy of the development map exhibit is provided as Appendix 2 to this Evaluation.

Summary of Field Observations of Cleared Areas

The areas previously cleared by the District are readily identifiable when walking the floodplain area. The clearing was done with machinery used to remove underbrush, small bushes and other debris through mechanical mulching. The mulching byproduct resulting from the clearing activity has been spread along the cleared areas. Also judging by viewing the areas cleared vs. those that have not been cleared by the District, there was some amount of flood debris removed during the clearing activities.

The clearing activities exceeded, in many areas, the originally intended 10 foot wide path to be used to access the area to observe conditions of the floodplain and floodway. In those areas where the clearing was accomplished, it appears that no significant trees were removed nor was there any excavation or construction of embankments associated with the clearing activities. Clearing activities did not extend outside the floodplain area owned by the District.

The previous clearing activity which extended from the District's eastern property line upstream (westward) to Block House Creek, Section 1 generally appeared adequate to provide sufficient removal of undergrowth, debris and other trash to provide clear conveyance of floodwater in the floodway. However, as noted in several field summaries (Appendix 1), there are several areas of flood debris which were apparently either too large or outside of the scope of the previous clearing operation that still need to be removed from the floodway. This is particularly evident in the creek area downstream from the Block House Drive East bridge to the District's eastern boundary line. An example of this would be the area discussed in picture No. 10 which shows previously installed silt fence erosion controls which need to be removed from the floodway along the left side (south bank) of the creek. There are other isolated areas of debris that need to be removed from the floodway in this portion of the creek, but overall the clearing appeared to be adequate to provide clear conveyance of floodwater in the creek floodway.

A number of areas along the creek have high solid rock banks on either side of the creek. These areas were not touched by the District during the previous clearing activities and do not need any additional attention as the solid rock embankments provide a smooth floodway conveyance for floodwater.

Subsequent to the original authorization for this project, we became aware of concerns from area residents regarding conveyance of the bark mulch from the previous clearing activities into the creek, erosion issues along the creek bank in the areas that had been previously cleared, and purported degradation of water quality and reduction in natural habitat. During the field observations conducted by myself and Mr. Collins, we noted water quality to be good to excellent along all portions of the creek with the exception of several small, isolated areas in the upper reaches of the creek adjacent to Block House Creek, Sections 1 and 2. Picture No. 40 shows such an area between Section 2 and Section 607 where water quality has diminished although visibility is clear to a depth of approximately 4 feet. There is evidence of bark mulch washing into the creek in this area which appears to have settled to

Mr. Chris Munn, President
Board of Directors
September 20, 2004
Page 4

the creek bottom. The description and associated picture No. 45 which was taken along the creek behind Block House Creek, Section 1 shows an area of stagnant, deep pool water on the creek. It can be described as a scum or algae film on the top of the water. However, when disturbed the water beneath shows to be clear. There has been some washing of bark mulch in this area also, but the stagnant conditions and nutrients introduced into the water by the bark mulch appear to be accentuated by low flow conditions and low flow velocities in this portion of the creek. These combine to develop the surface algae film on the top of the water.

With regards to erosion observed in the areas previously cleared by the District along the creek, there were isolated areas where bark mulch deposited from the previous clearing activities had washed into the bottom of the creek. These areas were few and isolated in nature. There was some erosion associated with the entrance of adjacent channels into the creek such as that as observed in picture No. 4 downstream of Block House Drive. However, other areas of erosion observed including failure of a large willow tree which had been uprooted (picture No. 15) and erosion noted at the base of an existing cottonwood tree located along the bank of the creek (picture No. 23) appear to have occurred previous to any clearing activities or not as a direct result of the clearing activities previously performed by the District.

Finally, the existence of aquatic life and the ability of the creek to provide a continuing habitat for aquatic and wildlife was observed during the field observation. At virtually all points along the creek, aquatic life was observed including minnows, perch and some catfish in several of the deeper pools. Water clarity with the exception of several isolated spots (previously discussed) adjacent to Block House Creek, Sections 2 and 1 was good to excellent. The existence of aquatic life, active flow in the creek and the clarity of the creek water observed indicated a healthy aquatic environment and adequate levels of dissolved oxygen in the water to maintain a healthy aquatic environment. Bird and other wildlife were also observed, including ducks (picture No. 44) located behind Block House Creek, Section 1 and two white tailed deer (picture No. 43) in the same area.

Summary of Field Observations of Non-Cleared Areas

In addition to the areas which had previously been cleared by the District, the areas which have experienced no clearing activity were also observed. Access to these areas was very difficult and some field observations were made from proximity of previously cleared areas.

Other than the areas which have solid rock embankments along and adjacent to the creek, the areas which have not been cleared are primarily located behind Block House Creek, Sections 1 and 2, as well as the portion of the creek which extends across the Tumlinson Park tract to the Block House Drive South bridge. These areas are noted in Appendix 1, pictures No. 34, 35, 47. The contrast of the condition of the floodway prior to clearing is vividly evident both in the field and on the pictures in Appendix 1 to this Evaluation. Areas which have yet to be cleared were observed to have significant brush and undergrowth present along the banks of the creek, floodwater debris including fallen trees and other debris associated with flood events which had stacked up against existing underbrush, and trash present.

Mr. Chris Munn, President
Board of Directors
September 20, 2004
Page 5

City of Cedar Park and TCEQ Contacts

Discussions have taken place with representatives of both the City of Cedar Park and TCEQ who have reviewed the District's previous clearing activities within the floodplain. Both entities report no issues with any of the work performed to date.

Conclusions Regarding Previously Cleared Areas

The clearing previously performed by the District appears to be more than adequate to provide sufficient conveyance of floodwater through the Block House Creek floodway during stormwater events. No additional clearing is suggested in these areas with the exception of point specific removal of floodwater debris and trash. These are discussed further in the following recommendations section.

Since regrowth of natural grasses and vegetation was observed to be taking place in the areas previously cleared, the installation of additional erosion sedimentation controls is determined not to be necessary. Grass and natural vegetation regrowth should be established within several months and should provide adequate retention of adjacent soils to prevent significant future erosion along the creek banks. Near term flooding events that breach the creek's natural banks will contribute to the removal and transportation of existing bark mulch along the creek banks to the creek itself in some areas. However, removal of that bark mulch at this point in time is deemed to be more intrusive. Removal also reduces the cover for existing soils adjacent to the creek and could serve as a detriment to the re-establishment of natural grasses and underbrush along the creek banks for soil stabilization and erosion prevention. For this reason we are not recommending removal of the bark mulch along the creek banks. Should a future flood event remove significant amounts of the bark mulch prior to the re-establishment of natural grasses and underbrush to stabilize those areas or if that bark mulch becomes a debris hazard in the floodway, then the District would want to consider spot removal of those accumulations of bark mulch.

As noted in the Summary of Field Observations of Cleared Areas, we have concluded that no additional clearing is necessary in the areas that rock embankments adjacent to the creek banks nor do we conclude that there is any need for erosion controls in those areas.

After reviewing the conditions of the creek water itself and observing significant aquatic life, as well as wildlife along the floodplain, we have concluded that there appears to be no degradation of the quality of the water in the creek with the possible exception of several small areas located along the creek adjacent to Block House Creek, Section 1. Those areas which have been observed to have an algae film on the surface of the water could be addressed by manual agitation of the water at those sites to promote break up and movement of the film to areas of the creek which have more grade and, therefore, more velocity which would disperse the film. Alternately, these areas can be left alone as future flooding events will wash out these areas.

Recommendations for Additional Floodway Clearing/Debris Removal

As observed in the Summary of Field Observations of Cleared and Non-Cleared Areas, we are recommending removal of debris including fallen trees, logs, and floodwater debris

Mr. Chris Munn, President
Board of Directors
September 20, 2004
Page 6

where it exists in isolated areas along the entire length of the creek. Specific areas are noted in Appendix 1. It is recommended that the debris removal be accomplished through manual, not mechanical, means. This will require labor intensive effort but will eliminate any damage to the creek banks and floodway area.

In the areas which have not been cleared yet, primarily located adjacent to Block House Creek, Sections 1 and 2 and Tumlinson Park, we recommend the manual clearing of floodwater debris, fallen trees and underbrush for an area 10 feet back from each creek bank on either side of the creek except in the areas of solid rock embankments. In these areas recommended for clearing, we would not recommend the removal of any significant existing trees with the exception of willow trees or other small saplings which may be encountered along the creek banks. Again, we recommend manual clearing activity eliminating mechanical intrusion into the creek bank and floodway area.

For the entire length of the creek, areas of trash and debris from human activity was observed. We recommend that the District perform a clean-up of this trash along the creek and such clean-up be performed by manual means.

In conclusion, this Evaluation generally found that the clearing previously performed by the District in areas along Block House Creek has provided adequate floodway conveyance for creek water flood events, but that additional minor amounts of clearing primarily in the areas of Block House Creek, Sections 1 and 2 and Tumlinson Park should be performed for a limited (10 foot either side of the creek bank) area and flood debris should be removed in all areas of the creek to provide adequate floodway conveyance of floodwater associated with future stormwater flooding events in the Block House Creek Watershed.

Sincerely,

GRAY ♦ JANSING & ASSOCIATES, INC.

David W. Gray, P.E.
Principal

DWG:J
Attachments

cc: Board of Directors; Block House MUD (w/enclosures)
Ms. Sue Littlefield; Armbrust & Brown, LLP (w/enclosures)
Ms. Margret Wingrove; Eco Resources, Inc. (w/enclosures)
Mr. Dale Thornton; D.R. Horton (w/enclosures)
Mr. Stephen K. Collins, P.E.; GJA