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January 11, 2008

Dr. James Davenport (MC 150)
Texas Commission on Environmental Quality
PO Box 13087
Austin, TX 78711-3087

RE: Application of WMARSS for TPDES Permit No. WQ0014782001
Location of Change in Channel Substrate on Bullhide Creek

Dear Dr. Davenport:

The TCEQ has asked for more information concerning the reach of Bullhide Creek downstream of the proposed point of discharge, with the area of interest roughly the reach between Cooksey Lane on the upstream end and FM 2837 on the downstream end. A survey was conducted on 3 January 2008 in order to examine the transition from the wide, scoured limestone channel evident at the Cooksey Lane crossing to the gravel and cobble dominated substrate that is typical of downstream reaches.

The University of Texas Bureau of Economic Geology (BEG) has published mapping that provides an indication of where the transition should be expected (Proctor, et al, 1998, Geologic Atlas of Texas, Waco Sheet). The BEG mapping shows a transition from the Austin Chalk limestone group to the lower Taylor marl of the Ozan Formation just downstream of Cooksey Lane, as shown on the attached Figure 1. The field survey of 3 January 2008 verified the accuracy of this transition location, also as noted on Figure 1. From the Cooksey Lane bridge, Bullhide Creek exhibits a wide (25-35 m), bare rock (Austin Chalk limestone) channel that extends about 375 m downstream to the vicinity of the Smith Farm outbuildings, ending abruptly at a large outcrop on the right bank (see Figure 2). This is clearly where Bullhide Creek crosses the contact between the Austin Chalk and the Taylor Marl. Downstream of this contact point, the "limestone" would be generally described as crumbly, calcareous clay and marl.

Where Bullhide Creek is underlain by the Austin Chalk, the channel is extensively scoured and sculpted, reflecting the varying hardness of the limestone layers. The channel section is a shallow U-shape with multiple ledges, channels and shallow potholes common (see Figure 3). Bullhide Creek in this reach is incised 5-7 m into the surrounding prairie landscape. This larger channel tends to become narrower and more sharply defined in the downstream direction.

Below the outcrop where the massive limestone exposed in the upper stream reach ends, the channel exhibits bluff banks consisting of soils and Taylor Marl (Ozan formation), a weakly indurated, crumbly material that is actively eroding (see Figure 4). The stream bed tends to be smoothly scoured, reflecting the relative softness of the bedrock, and

partially covered by sheets and bars of gravel and cobbles imbedded in fine-grained (silt and sand) material.Both the Bullhide and Cow Bayou channels have this appearance throughout the reaches surveyed downstream of FM 2837. The wetted channel is much narrower (2-5 m) in this downstream reach, which meanders only slightly among the irregular gravel bars and vegetated terraces contained within the larger channel.

In the downstream Taylor Marl reach, gravel/cobble/silt coverage of the smooth limestone was estimated at intervals of approximately 10 meters over two longitudinal transects roughly midway between Cooksey Land and FM 2837. On the upper transect, coverage by gravel sheets ranged from 0 to 100% coverage, and averaged 28% (n=11). Downstream, coverage ranged from 5% to 100%, average 72% (n=12).

With respect to channel morphology, the limestone bedrock of the Austin Chalk exhibits the development of erosional features, such as parallel multiple channels, scour holes and a distinctly stair-step channel profile, that are common in the limestone beds of Edwards Plateau streams. While this erosional sculpturing appears to be present in the Bullhide Creek channel upstream of the transition area, relatively little channel irregularity is evident downstream in the Taylor Marl. The softer limestones underlying the reaches of Bullhide, and Cow Bayou as well, appear to have been scoured to a relatively smooth chute, which is facilitating bed load transport and additional scouring of the channel.

At the time of the 3 January 2008 site visit, benthic algal mat development was observed on the bedrock channel bottom in the Austin Chalk reach (Figure 5), but was most extensive in quiet backwater areas (Figure 5). Downstream of the Austin Chalk Reach into the Taylor Marl, benthic algal growth was evident on riffles, in bedrock pools and in backwater areas, but not to the extent and density seen in the upper 375 m reach between Cooksey Lane and the transition point. This winter growth is facilitated by the lack of shading due to the “leaf off” condition of the riparian corridor. Examination of aerial photography and direct observation indicates that a canopy sufficient to significantly shade the channel during spring, summer, and fall seasons is increasingly present beginning in the vicinity of the transition point where the channel narrows significantly and riparian vegetation has developed on the terraces within the larger channel.

Bullhide Creek is not a gravel bed stream. The gravel/cobble substrates are highly imbedded with finer material and the channel is very active, with the sediments scouring the limestone bedrock during each erosion – sedimentation event. In addition to material that is eroded from existing channel bars and terraces during runoff events, some of the tributaries to Bullhide Creek exhibited substantial, recent transport of sediments from the surrounding agricultural fields.

The relatively featureless Taylor Marl bed that underlies the majority of Bullhide Creek, together with the large proportion of fine material and the relatively unstable nature of the migrating sheets of silt to cobble sized bottom material tends to limit the ability of the stream habitat to support as diverse and abundant a biological community as would be expected in a more physically stable environment. Macroinvertebrate assemblages, in particular, have been observed to be relatively sparse in the stream habitats of Bullhide

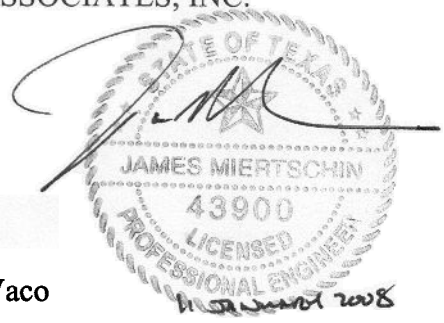
Creek and Cow Bayou, observations consistent with a habitat with a relatively high disturbance frequency. The evident erosion taking place in both streams is reflected in the highly imbedded riffle and run bottom substrate, the thin, but prevalent, silt blanket, and the smoothly scoured limestone streambeds. Those conditions are adversely affecting community integrity by reducing the quality or incidence of cover actually available in the flowing reaches of the two streams.

Bullhide Creek is quite different from a typical Hill Country stream. The channel morphology and substrate composition are different, the riparian corridor is composed of different vegetation, and the surrounding landscape, particularly with respect to topography, soils and land use, differs substantially from that of the Hill Country. The water quality of Bullhide is entirely characteristic of the Blackland Prairie.

If you have questions or comments concerning this matter, or if you require additional information, please do not hesitate to call me. You can also contact Paul Price (327 2908) if you have question specifically about the observations on Bullhide Creek, since he was the scientist that conducted the site visit and contributed the information for this letter.

Sincerely,

JAMES MIERTSCHIN & ASSOCIATES, INC.



James Miertschin, PhD, PE

cc: Mr. Ricky Garrett, Waco
Mr. Tom Ray, LAN
Mr. Martin Rochelle, LG

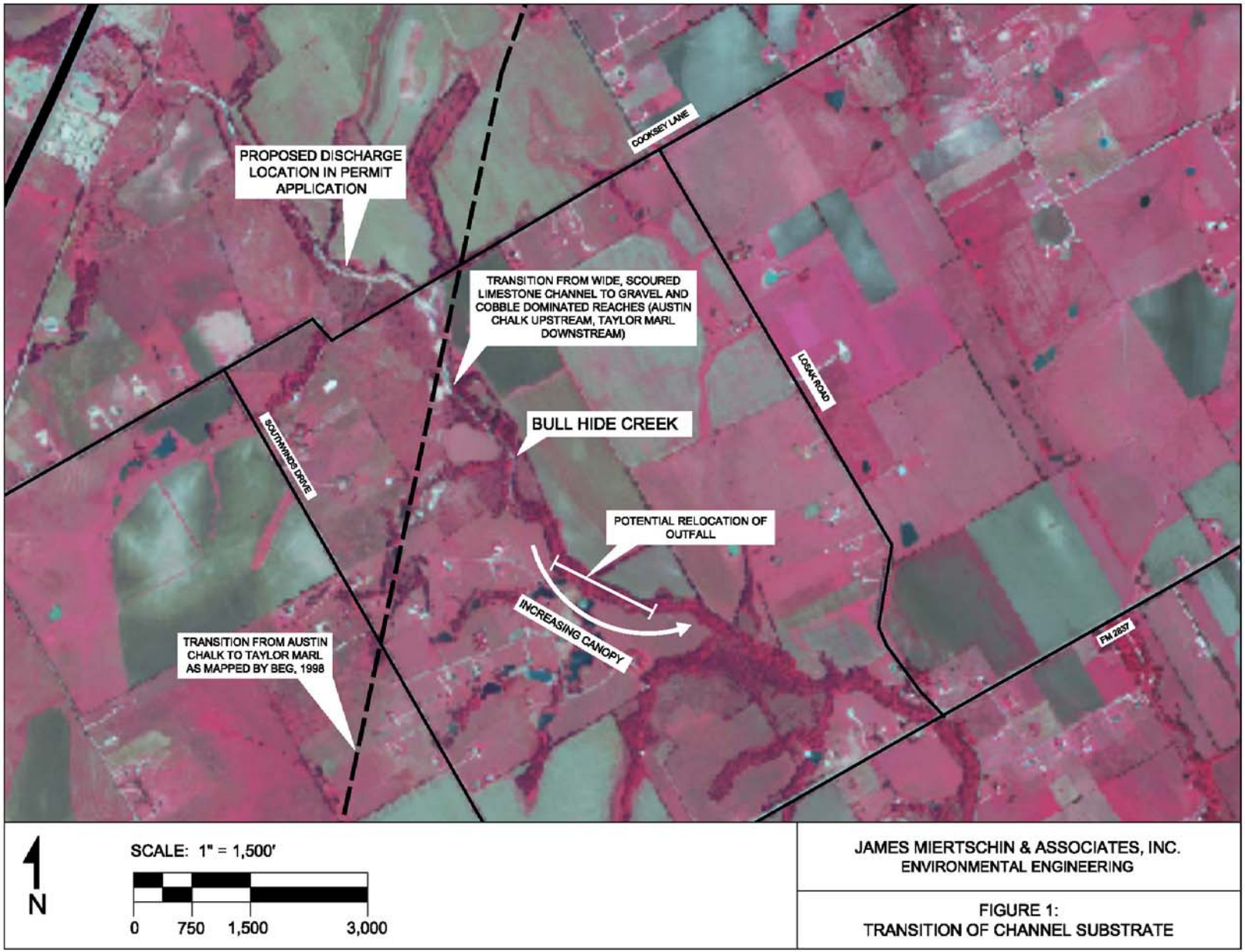

PROPOSED DISCHARGE LOCATION IN PERMIT APPLICATION
COOKSEY LANE
TRANSITION FROM WIDE, SCOURED LIMESTONE CHANNEL TO GRAVEL AND COBBLE DOMINATED REACHES (AUSTIN CHALK UPSTREAM, TAYLOR MARL DOWNSTREAM)
LOSAK ROAD
BULL HIDE CREEK
SOUTHWINDS DRIVE
POTENTIAL RELOCATION OF OUTFALL
INCREASING CANOPY
TRANSITION FROM AUSTIN CHALK TO TAYLOR MARL AS MAPPED BY BEG, 1998
FM 2837
N
SCALE: 1" = 1,500'
0
750
1,500
3,000
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FIGURE 1:
TRANSITION OF CHANNEL SUBSTRATE

Outcrop on right bank, looking down stream

Looking upstream

Figure 2: Transition Point

Figure 3: Typical Austin Chalk Substrate

Figure 4: Typical Marl Substrate

Figure 5: Algal Mats, Austin Chalk Substrate