Memorandum

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RE: Lower Fox River OU3 *COMMP* Cap Integrity Assessment - Year 3

Background

The Lower Fox River Remediation LLC (LLC) retained Foth Infrastructure & Environment, LLC (Foth) to document the methodology employed for and the results of the Year 3 hydrographic survey in compliance with requirements of the *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan* (*COMMP*) for the Lower Fox River Operable Units 2-5 (Anchor QEA and Tetra Tech EC, 2009), which was approved by the Agencies/Oversight Team (A/OT) on April 22, 2009. The *COMMP* describes post-placement cap monitoring activities that will be performed to provide a high level of assurance that the engineered caps retain their physical integrity and protectiveness over time. The *COMMP* also outlines contingency response actions that will be implemented if the engineered caps do not meet performance standards.

On June 29, 2011, the LLC met with representatives of the A/OT to discuss the *COMMP* to gain concurrence on the methods to be employed for monitoring of the engineered caps. Discussions during this meeting refined and clarified several items such as monitoring requirements and schedule. Meeting minutes for this meeting were drafted by Tetra Tech EC (TtEC) and accepted by the A/OT, on August 4, 2011, and were included as Attachment 1 in the Foth April 26, 2012 memorandum regarding "LFR OU3 COMMP Hydrographic Survey-Year Zero" (herein referred to as the Year 0 memo). The Year 0 memo is included as Attachment A to this memorandum (hereinafter referred to as the Year 3 memo).

As part of the *COMMP* requirements, routine monitoring of all cap areas by geophysical methods (including sub-bottom profiling and/or hydrographic survey) will be completed. Further, the *COMMP* states the first routine monitoring of completed engineered caps shall be completed 2 years post-construction (denoted as the "Year 3 survey"). This routine monitoring includes the completion of a hydrographic survey to analyze the top of engineered cap elevations and the change in that surface, if any, over time. In order to evaluate the change in top of cap elevation over time, a baseline or reference point needed to be established. Baseline cap elevations were established by completing a hydrographic survey of each cap in OU3 following completion of construction. The hydrographic survey documenting the baseline conditions has been termed the "Year 0" survey. The locations of all capped areas in OU3 are illustrated on Figures 1 and 2.

To supplement the hydrographic surveys for determining if erosion of the armor layer over more than 5% of a cap certification unit (CCU) has occurred (a requirement of the *COMMP*), the cap areas are assessed using a poling survey each time a routine (or river flow event-triggered) hydrographic survey is completed. The main objectives of the poling survey is to determine if the armor stone layer is intact (i.e., present and how much, if any, sediment deposition has occurred since placement of the cap. If physical poling confirms the armor stone remains present, it will be concluded that the sediment substrate has settled rather than the cap has eroded.

This memorandum presents the methods utilized and the results of the Year 0 and Year 3 hydrographic surveys, as well as of the Year 3 poling survey for the 27 acres of caps placed in OU3 through 2011. In addition, integrating sediment deposition measurements into hydrographic survey elevation data, this memorandum compares the Year 0 and Year 3 top of cap elevations and assesses if more than 5% of any CCU has experienced erosion or other damage that will not allow it to function as designed.

Finally, this memorandum provides the results of an evaluation of the 20-year recurrence-interval flow rate for OU3. The *COMMP* requires: "In addition to the scheduled monitoring of all capped areas in OU3-5, supplemental bathymetric surveys will be performed only in "sentinel" capping areas following major river-flow events…that may have a significant impact on river hydrodynamics…Sentinel cap area monitoring will be performed within 1 year following a river flow (combined flood and seiche discharge) event with a recurrence interval of 20 years or more…Hourly average flows exceeding the 20-year return-interval flow rate (i.e., 21,000 cfs for OU3 and 22,100 cfs for OU4) will be used to trigger the supplemental bathymetric surveys."

Year 0 (2011) Hydrographic Survey

Methods

On November 2, 2011, J.F. Brennan Company (Brennan) completed hydrographic surveys of approximately 27 acres of engineered caps in OU3 in accordance with the *COMMP*. Foth audited Brennan's surveys. Auditing reports for the completion of these surveys are included as Attachment 2 of Foth's Year 0 memo.

Because a vast majority of the caps are in areas with water depths of greater than 3 feet, a multi-beam survey system (200 kilohertz [kHZ]) was utilized to ensure the highest degree of accuracy and coverage. As discussed below, only one cap, CA 69, was located in less than 3 feet of water in 2011. This cap was surveyed using a 200 kHZ single-beam system which is more accurate for water depths less than 3 feet. (This area was approved for single-beam survey, as an exception area, by the A/OT.) Overlap of the multi-beam survey swaths resulted in over 95% coverage of the survey project area, which meets or exceeds project specifications and industry standards. All other quality assurance (QA) requirements regarding project requirements were satisfied, as verified in the field by the Foth auditor.

A performance test area was surveyed using both a single-beam system and a multi-beam system. The single-beam edited data and the multi-beam edited data within the performance test area were then compared for potential discrepancies or issues within the system (e.g., incorrect multi-beam survey setup). Each day of survey, another multi-beam survey was conducted over the performance area, and compared to the initial single-beam survey to ensure repeatability and confidence in the accuracy.

A patch test was also completed at the start of survey activities for multi-beam equipment calibration.

Results

The hydrographic survey data collected for the Year 0 cap monitoring indicated that the cap aggregates in place met the performance standards set forth in the *Lower Fox River Remedial Design 100% Design Report* (Tetra Tech et al., 2009a and 2009b) and the *COMMP,* and no irregularities were identified. These surveys were accepted by A/OT to serve as the baseline for future surveys to assess long-term cap performance, as indicated and discussed in further detail in the Year 0 memo.

To supplement the Year 0 survey information, cap thickness verification data, prepared by TtEC (Attachment 3 of the Year 0 memo), is provided. These data indicate that when applying A/OT-approved statistical procedures (i.e., summary statistics), the minimum cap aggregate thicknesses were achieved in all cases.

2012 Warranty Survey

Multi-beam hydrographic surveys were completed in 2012 by Brennan over the approximate 27 acres of engineered caps placed in OU3 during 2010 and 2011 to measure performance for warranty purposes (herein referred to as Warranty Surveys) and to provide useful data for implementing the COMMP. Foth audited the surveys and then used the data to evaluate the capped areas for damage or failure. The findings of the evaluation were presented in a memorandum, which is included in Attachment B, and portions of which are discussed in this Year 3 memo. All QA/QC procedures described for the Year 0 survey were also carried out for the Warranty Surveys.

Year 3 (2014) Hydrographic Survey

The subsequent routine post-cap monitoring event, required by the *COMMP,* was completed on September 12, 2014 (Year 3 survey). This multi-beam hydrographic survey was completed over the approximate 27 acres of engineered caps placed in OU3 during 2010 and 2011 following nearly identical protocols summarized in the Methods section above (variations from the Year 0 methods are noted) and as described in more detail in the section below, as well as in the *COMMP*.

The multi-beam survey work was conducted using a 400 KHz acoustical system. All survey work was performed by Brennan and audited by Foth. The hydrographic survey audit form is provided in Attachment C. The survey work, including survey control check-in and check-out procedures and hydrographic survey QC procedures, were carried out in compliance with the OU2-5 *Quality Assurance Project Plan* (TtEC, et al., 2009) and industry standards. The Foth auditor reviewed the results of the performance and patch tests for compliance with hydrographic survey specifications and industry standards. Foth obtained raw survey files and gridded survey files (2 feet x 2 feet) from Brennan in a format consistent with the 2011 Year 0 survey of the same area. It should be noted that the multi-beam survey for the 2011 Year 0 *COMMP* work in OU3 was performed by Brennan using a 200 KHz multi-beam system rather than the 400 KHz multi-beam system used in 2014 for the Year 3 *COMMP* survey. While this frequency difference is not likely to cause more than an average 0.0 to 0.2 feet difference in survey elevation of capped areas, it does present some uncertainty in our analysis. The potential effect of the frequency level difference in the 2011 and 2014 survey comparisons is further discussed below.

Results from the Year 3 hydrographic survey have been compared to the baseline (Year 0) and the 2012 Warranty Survey to assess integrity of the caps, which is discussed below in the Cap Integrity Assessment section.

Poling Evaluation

To better compare elevation changes in the capped surface over time, Foth collected poling measurements to determine if and if so to what extent sediment deposition occurred between Year 0 and Year 3. When sediment deposition thickness was measured, the presence of the armor layer was also verified by poling through sediment, if present, and "feeling" the armor layer with the poling rod (probing).

<u>Statistical Determination of Poling Locations</u>

The appropriate number of poling/probing locations to be occupied is determined using statistical confidence limits with a lower 95% confidence limit targeted as described in the following paragraph. This methodology has been previously presented in the April 19, 2013 memorandum *Lower Fox River OU1 Cap Monitoring Maintenance Plan 5-Year Flow Hydrographic Survey Comparison* (Foth, 2013) and accepted by the A/OT

A total of 60 poling/probing locations were selected for evaluating cap integrity. Assuming that the armor layer is observed at all 60 locations, this number of monitoring

points provides 95% statistical confidence that a minimum 95% proportion of the cap has maintained integrity (as measured by the armoring layer of the cap being present). Specifically, when all 60 locations (100% proportion) indicate armor integrity, a lower statistical confidence limit (exact binomial) can be calculated on this proportion (Conover, 1999) as follows:

> The lower 95% confidence limit on the observed 100% proportion is found by selecting the largest proportion (p_1) such that:
>
> $$P(Y \geq y|p = p_1) = \alpha = \sum_{i=60}^{60} \binom{60}{60} {p_1}^{60}(1 - p_1)^{60-60} = {p_1}^{60} \leq 0.05.$$
>
> Solving the above (for p_1) results in a lower confidence limit of 0.951 ≈ 0.95. This implies there is 95% confidence that a minimum 95% proportion of the cap area has maintained integrity.

In addition to the poling's providing confidence that the armored cap is present, the sediment thickness measurements at each of the 60 locations can be used to determine the thickness of sediment across the capped areas and be factored into isopach drawings depicting the change in cap elevation over time.

Using the base number of 60 poling locations, a 130-foot grid was used to locate the 60 samples within the cap areas. After review by the A/OT, 42 poling locations were added, more specifically in the smaller cap areas, to provide more coverage within the cap areas. In addition, some of poling locations needed slight adjustment from the exact 130-foot grid coordinates so that they fell within a 10-foot buffer inside the CCU area. Slight adjustments were also made to provide coverage of areas with discernible decreases in elevation (i.e., depressions, gullies, etc.). Poling locations are provided on Figures 3C through 15C (i.e., Figures 3C, 4C, 5C, etc.).

Poling Survey – Deposition Measurements

On October 29, 2014, Foth performed deposition measurements within the 27-acre capped areas utilizing a Foth vessel equipped with real-time kinematic global positioning system (RTK GPS). At each of the 102 poling locations, while hovering with the sampling vessel, top of sediment elevation was determined with a graduated pole fitted with a 6-inch disc. At the same locations, a probing rod with 1-inch diameter probing tip was advanced until armor stone was encountered, and the elevation of the top of armor stone was determined. Thickness of sediment deposition above the caps was then determined at each location. Field observations were recorded in a field activity observation report, which is included in Attachment C. Table 1, in Attachment C, presents the poling/probing data.

The poling survey indicated that armor stone is present at each of the 102 locations visited. With the 102 selected locations, all having armor stone present, there is greater than 95% statistical confidence that a minimum 95% proportion of the cap has maintained integrity. Further, the poling survey indicated no discernible sediment deposition has occurred over the armor stone in these areas.

The poling information was integrated into the cap elevation determination to assess the integrity of the cap, as discussed below.

Cap Integrity Assessment by CCU (Comparison of Year 0 and Year 3 Surveys)

Upon completion of the Year 0 and Year 3 hydrographic surveys, the data were processed and top of cap contours were created; using these data. A set of figures were prepared for visual review to identify any failing or damaged cap areas. Figure 1 illustrates the cap placement areas of CA3 and CA6, and Figure 2 illustrates the remainder of the OU3 cap placement areas, totaling 27 acres in OU3. Figures 3 through 15 illustrate the top of cap elevations for the 2014 Year 3 survey and the elevation differences between the 2011 and 2014 surveys. Each figure set includes an "A" figure, which depicts the top of cap elevations; a "B" figure, which depicts the top of cap elevations in a three-dimensional isometric view (as an added visual aid to assess cap integrity); and a "C" figure, which depicts the 2011 and 2014 differences in elevation (isopachs). For some cap areas, "D" series figures were added to offer cross sections to better depict anomalous conditions.

In viewing the 27 acres of capped areas in OU3, there are several areas of interest as described below:

- A small, depressed area is visible in the mid-section of Cap Area CB2 (Figure 4B, as well as a cross section through the area of interest, Figure 4D), which was also visible during the 2012 Warranty Survey evaluation (provided in Attachment B). Viewing the isopach difference in this area (Figure 4C), the change in elevation between 2011 and 2014 is insignificant, indicating that it is likely a reflection of the river bottom topography at the time of cap placement. This depressed area was also visible in 2011. Coincidentally, a chemical isolation core sample was collected within the limits of the depressed area in 2012 and 2014 as part of the OU3 Long-term Monitoring Plan (see Figure 4C). Results from these samplings indicate the presence of armor stone and chemical isolation layer sand meeting design standards.

- A gully feature is visible near the central portion of Cap Area CA13B (Figures 8B and 8D). Like the discussion above for CB2, the gully was present in 2011 and 2014, indicating that the gully feature was present at the time of cap placement and therefore is not a post-cap scour area. Poling/probing conducted in this area indicate no cap abnormality.

- Another small gully feature is apparent in the isometric view for Cap Area CB3A (Figure 10B). Like the other gully feature described in the previous paragraph, the cross section on Figure 10D indicates that the gully feature was present at the time of cap placement and therefore is not a post-cap scour area. Poling/probing conducted in this area indicate no cap abnormality.

- Areas near the west shore of Cap Area CB31 (Figures 14C and 14D) exhibit 0.4 to 1.0 feet lower elevation in 2014 than in 2011, whereas eastern areas of CB31 show higher elevation in 2014 than in 2011, on the order of 0.1 to 0.2 feet. This difference in elevation change was also seen between 2011 and 2012, which warranted a field poling evaluation in 2012 to determine if capping aggregates were sloughing on the western sloped portions on CB31, moving toward the east. A description of the evaluation is presented below, with further detail provided in Attachment B.

- The Cap Area CA69 has shallow water (on the order of a few feet) and as a result was surveyed with single-beam equipment during the Year 0 survey. Of all the OU3 capped areas, it shows the greatest drop in top of cap elevation overall from 2011 to 2014, with some areas as much as 0.8 to 1.0 feet (see Figure 15C). Figure 15D shows an east/west and a north/south cross-section to further illustrate the drop in top of cap elevation. The CA69 area also exhibited this same trait between the 2011 and 2012 surveys and was the subject of a poling evaluation in 2012, along with CB31 as described below, with further detail provided in Attachment B. The cross sections confirm that relatively uniform settlement of the cap has incurred in the CA69 area, indicative of normal consolidation of soft sediment beneath capped areas in other segments of the Lower Fox River (Foth, 2013).

  - ***2012 Poling Evaluation***

    A field evaluation was completed by TtEC and audited by Foth in areas CB31 and CA69 on December 5, 2012 to determine if the differences in top of cap elevations between the Year 0 and 2012 Warranty Surveys were attributable to cap failure or simply the cap and underlying sediment settling/ consolidating. To evaluate the field conditions, TtEC implemented a poling survey to determine if the armor stone was still in place at the suspect areas identified by this evaluation. Foth reviewed the cap elevation difference isopachs between the baseline survey and the 2012 survey and located proposed poling points in areas of interest within the two cap areas. Ten (10) proposed poling points were selected for CB31 and six proposed poling locations for CA69 (shown on Figures 14F and 15F, respectively, in Attachment B). In addition, poling data from the October 29, 2014 event were used to evaluate these areas. Poling locations are shown on Figures 14C and 15C.

    Both of these poling surveys indicate that armor stone is still present at each of the cap areas visited. Further, the poling surveys indicated no discernible sediment deposition has occurred over the armor stone in these areas. Additional details regarding the 2012 poling evaluation are provided in the memorandum in Attachment B.

Other general observations made during the evaluation include the following:

- General elevation decreases less than 0.6 feet between the 2011 and 2014 surveys (typically 0.2-0.4 feet) are noted throughout the OU3 cap areas, particularly in areas CB2, CA6, CA9B, CB5, CA13A, CB3A, CA13B, CA16A, CA13E, and CA15. This indicates consolidation of the soft sediment beneath the cap continues to occur, which is expected given the relatively short duration since completion of capping activities. In addition, poling in these CCUs confirmed that the armor stone was still in place.

- The isopachs for CA13E, CA15, CA69, and CB31 indicate settlement of up to 0.8-1.0 foot in some portions of these areas. However, the respective top of cap elevations and isometric views do not indicate irregularities, and polings indicate no cap abnormalities in these areas.

- No irregularities or significant elevation changes between the 2011 and 2014 surveys were noted for CA3, CA9A, CA9B, CB3B, CB13D, CA16B, and CA17.

The following section further address cap settlement/consolidation and a statistical evaluation of cap elevation changes over time.

Statistical Evaluation of Survey Differences by CCU

In order to further quantify the observed differences between the 2011 and 2014 survey elevations, data sets of elevation differences, along a 5-foot by 5-foot grid, were generated and evaluated through statistical box plots for each CCU. These distributions are illustrated on Figure 16. The data were generated by subtracting the 2011 elevation from the 2014 elevation at each 5-foot by 5-foot grid node. Positive values reflect elevations which are higher in 2014 than 2011, while negative values reflect elevations which are lower in 2014 than in 2011.

In the boxplots of Figure 16, the grey box represents the 25th to 75th percentiles (quartiles), with the whiskers reaching to the minimum and maximum data points, or to the quartiles plus/minus 1.5 times the inner quartile range (IQR), whichever is first. Asterisks denote outliers past 1.5 times the IQR, and circles denote outliers past 3 times the IQR. The mean of the data is represented by a blue diamond and the median by a solid black line.

The majority of CCUs is seen on Figure 16 to have survey differences which are lower on average by 0 to 0.5 feet in 2014 than in 2011. This matches the general observations made above for the cap integrity assessment. The larger average differences are seen in CB3A, CB3B, CA13A, CA13C, CA13E, CA15 and CA69.

Of interest in the data sets are the 5th percentiles for each CCU, since this is the value that will be exceeded by 95% of the data. If 95% of the data fall above a desired threshold value, further evidence is provided that cap integrity is maintained for 95% of the CCU area.

The 5th percentile for each CCU on Figure 16 is indicated by a solid gold line. For comparison, the solid blue line indicates the combined vertical error estimate of the 2014 and 2011 surveys based on equipment manufacturer information. The vertical accuracy for both the 200 kHz and 400 kHz multi-beam sonar is ± 0.2 to 0.3 feet, and the vertical accuracy of the 200 kHz single beam sonar is ± 0.1 to 0.2 feet. Assuming a 0.25 foot accuracy for the multi-beam surveys, the propagation of errors formula $\sqrt{(Error^2_{Survey1} + Error^2_{Survey2})}$ would predict the differential accuracy to be approximately 0.35 feet.

Further, applying the manufacturers vertical error estimate of 0.25 feet for the 400 kHz multi-beam survey and 0.15 feet for the 200 kHz single beam survey gives a combined vertical accuracy of approximately 0.29 feet, i.e., $\sqrt{0.25^2 + 0.15^2} \cong 0.29$.

The 5th percentile of the data (Figure 16 gold line) extends past the combined vertical survey accuracy (Figure 16 blue line) for CB3A, CB3B, CB5, CA6, CA13A, CA13B, CA13C, CA13E, CA15, CA16A, CB31 and CA69. Therefore, potentially more than 5% of the area for these CCUs has experienced an elevation decrease from 2011 to 2014 which exceeds the combined survey vertical accuracy. As noted above, however, physical poling confirmed in 2014 that armor stone remains intact at all locations visited with no discernible sediment deposition, and therefore, it is assumed that the underlying soft sediment has consolidated resulting in settlement of the surface of the cap rather than the cap having been eroded.

Since the 2011 and 2014 surveys utilized different frequencies (200 kHz during 2011 and 400 kHz during 2014), an additional uncertainty factor potentially exists in the data. In 2011, Foth assessed the estimated bias factor resulting from the comparison of two surveys of differing frequency levels, i.e., 200 kHz vs. 455 kHz (Foth, 2010). In that assessment, the average bias factors were estimated for comparisons between 200 kHz single beam and 455 kHz multi-beam; 200 kHz single beam and 200 kHz multi-beam; and 200 kHz multi-beam and 455 kHz multi-beam surveys as measured in the OU1 cap monitoring and maintenance program. The findings concluded that on average, the 455 kHz multi-beam survey resulted in readings of 0.12 feet higher than the 200 kHz single beam survey, and the 455 kHz multi-beam survey resulted in readings of 0.16 feet higher than the 200 kHz multi-beam survey.

Under the assumption that negligible bias would exist between a 400 kHz and 455 kHz multi-beam survey, the bias estimates discussed above were incorporated into the data presented on Figure 16. On Figure 16, the dashed gold line represents the 5th percentile of the data, if a bias factor of 0.16 feet is included between the 400 kHz and 200 kHz multi-beam surveys; and a bias factor of 0.12 feet is included between the 400 kHz multi-beam and 200 kHz single beam surveys. If the estimated bias factors are included, the 5th percentiles of the data for CB2, CA9B, CA13D, CA16B and CA17 would also extend beyond the combined vertical survey accuracy, in addition to the other OU3 CCUs mentioned above.

The 2012 Warranty Survey data previously discussed (further presented in Attachment B) was utilized to determine whether this observed consolidation occurred mostly between 2011 and 2012, or if decreasing elevations in the CCUs continued beyond 2012. Similar statistical techniques which were used to evaluate the differences between the 2011 and 2014 surveys (presented on Figure 16) were applied to the 2012 Warranty Survey and the 2014 survey.

The results of the 2014 to 2012 comparison are presented on Figure 17. There is still, on average, a small decrease in elevation observed for certain CCUs, but to a much lesser degree than seen on Figure 16 with the 2014 to 2011 comparison. Most of the CCUs mentioned above having the largest degree of settling from 2011 to 2014 (i.e., CB3A, CB3B, CA13A, CA13C, CA13E and CA15) continue to show the largest differences between the 2012 and 2014 data. However, CA69, which had the largest drop in the 2011 to 2014 data, shows much less difference from 2012 to 2014.

As illustrated on Figure 17, for the comparison between the 2012 and 2014 surveys, the 5th percentile (gold line) remains within the combined vertical survey accuracy (blue line) for all CCUs except CA69. This is due in part to the tighter vertical accuracy estimate of the 200 kHz single beam survey collected in 2012 for this CCU.

Finally, a comparison of the average difference observed for each CCU from 2011 to 2012, and from 2012 to 2014, is provided on Figure 18. The top graphic on Figure 18 illustrates the CCU average difference without considering the assumed bias factor between the 200 kHz and 400 kHz surveys, while the bottom graphic on Figure 18 presents the average differences when the bias factor is included. Particularly, when the bias factor is considered, a significant slowing of the settling is seen on average between the 2012 and 2014 data, as compared to the 2011 and 2012 data. The only CCU, which shows an equal amount of settling between 2012 and 2014 as to 2011 and 2012, is CA13C. For CA6, the 2012 to 2014 settling was approximately 20% less than that from 2011 to 2012; and for CA69, the 2012 to 2014 settling was approximately 45% less. For all other CCUs, the approximate degree of settling between 2012 and 2014 was at least 50% less than the 2011 to 2012 values. This evaluation supports the expected result in cap settlement, with rapid consolidation occurring in the first year, slowing thereafter, as well documented in Lower Fox River OU1 caps (Foth, 2013). The anomalous increase from 2012 to 2014 in CB31 was due to the eastern areas of this CCU and is discussed in the Cap Integrity Assessment by CCU section above.

20-Year Flow Rate Evaluation

Foth performed an evaluation of the 20-year recurrence-interval flow rate for the period between the Year 0 and Year 3 surveys. The *COMMP* requires: "In addition to the scheduled monitoring of all capped areas in OU3-5, supplemental bathymetric surveys will be performed only in "sentinel" capping areas following major river-flow events…that may have a significant impact on river hydrodynamics…Sentinel cap area monitoring will be performed within 1 year following a river flow (combined flood and seiche discharge) event with a recurrence interval of 20 years or more…Hourly average flows exceeding the 20-year return-interval flow rate (i.e., 21,000 cfs for OU3 and

22,100 cfs for OU4) will be used to trigger the supplemental bathymetric surveys. If cap integrity and performance are verified under a 20-year flow event, follow-on event-based cap monitoring will occur following a 100-year flow event (e.g., 24,200 cfs for OU3 and 25,500 cfs for OU4; subject to future updates)."

Flows for OU3 are approximated using measurements from the Rapide Croche gaging station (U.S. Geological Survey [USGS] Station No. 04084500), and flows for OU4 are approximated using measurements from the U.S. Oil Tank Depot (Station 040851385). (Refer to the *COMMP* for more details regarding the calculation of the recurrence interval flow values.)

Based on the available data, Foth cannot confirm that the 20-year flow monitoring event was triggered in OU3 between the Year 0 and Year 3 surveys. Kaukauna Utilities provided daily discharge data for the Rapide Croche station in the past to the USGS, which was verified by the USGS periodically; however, the USGS discontinued use of the station after September 30, 2013 (confirmation correspondence provided in Attachment D). Kaukauna Utilities continued to provide data through October 2014, but the data after September 30, 2013 has not been verified by the USGS. The 2014 data are provided in Attachment D. Though not validated by the USGS, the data show that there was a peak discharge event in April 2014; however, the maximum daily value of 15,126 cfs (occurring on April 14, 2014) does not exceed the 20-year recurrence interval for OU3 of 21,000 cfs.

Moving forward, the LLC anticipates working collaboratively with the A/OT to develop a revised method of determining flow gauging for OU3, as the Rapide Croche gauging station is no longer a reliable source for obtaining data that are validated by the USGS.

To further evaluate discharge values for the river, data were reviewed for OU4 at the U.S. Oil Tank Depot (USGS Station 040851385), and for OU1 at USGS Station 04084445 near Appleton, Wisconsin (http://waterdata.usgs.gov/nwis/). Flows at the Appleton gauging station are measured approximately every 15 minutes. Figure 1, in Attachment D, presents the 2014 discharge values compared to the OU1 5-year and 50-year recurrence intervals and the OU3 20-year and 100-year recurrence intervals. The OU3 20-year and 100-year recurrence intervals were not exceeded during the peak discharge event occurring in May 2014 for flow measured at the Appleton gauge; not even the OU1 5-year recurrence interval was exceeded.

By comparison, the 20-year and the 100-year recurrence intervals were exceeded for OU4 in April 2014. Flows near the mouth of the Fox River (including the combined effects of upstream floods and seiches) are measured approximately every 5 minutes at the Oil Tank Depot gaging station. Figure 2, in Attachment D, presents the mid-April 2014 discharge values, at which time a peak discharge event occurred for OU4, compared to the OU4 20-year and 100-year recurrence intervals.

Conclusions

Based upon the results of the Year 0 to Year 3 hydrographic survey comparison, the following conclusions can be made:

1. Poling conducted on October 29, 2014 indicated cap armor was present at all 102 poling locations. This finding supports a conclusion that CCUs which exhibit decreased elevations between the 2014 and 2011 hydrographic surveys reflect settlement caused by consolidation of the soft sediments that underlie the cap rather than cap erosion. A lower statistical confidence limit on the poling data confirmed that a minimum 95% of the capped areas in OU3 maintained armor with greater than 95% confidence.

2. A direct comparison of the 2011 and 2014 hydrographic surveys indicates there are several CCUs for which greater than 5% of the area has decreased in elevation, beyond the range of the combined survey vertical uncertainty level. This is the case for CB3A, CB3B, CB5, CA6, CA13A, CA13B, CA13C, CA13E, CA15, CA16A, CB31 and CA69. Of these CCUs, the largest average differences were observed for CB3A, CB3B, CA13A, CA13C, CA13E, CA15 and CA69.

3. A comparison of the 2014 hydrographic survey data with the 2012 Warranty Survey data illustrates that between 2012 and 2014, with the exception of CA69, at least 95% of the area for all CCUs maintained settling levels of no greater magnitude than the combined survey vertical accuracy. Further, the 5th percentile of the CA69 data was only moderately below the combined survey vertical accuracy. As stated, poling conducted in 2014 indicated cap armor was present at all poling locations. This finding confirms that, within the framework established for performing the cap integrity assessment, none of the OU3 capped areas has experienced more than 5% erosion or other damage and caps are performing as designed.

4. The general settling for each CCU observed between 2012 and 2014 slowed considerably (consistent with the anticipated slowing rate of consolidation of the underlying soft sediments) from that observed between 2011 and 2012. After accounting for an estimated factor of bias between the 400 kHz survey (collected in 2014 and 2012) and the 200 kHz survey (collected in 2011 for all CCUs and in 2012 for CA69), the degree of settling between 2012 and 2014 was approximately 50% or less of the 2011 to 2012 values for all CCUs except CA6, CA13C and CA69.

5. Based on the available flow data from the USGS for the Fox River, OU1 to OU4, Foth is unable to confirm that the 20-year flow monitoring event was triggered in OU3 between the Year 0 and Year 3 surveys. However, the limited data available suggest that the 20-year flow event was not triggered in OU3. Because the USGS discontinued monitoring at the Rapide Croche station in OU3, the LLC anticipates working collaboratively with the A/OT to develop an alternative method for determining flows in OU3.

6. The LLC anticipates working collaboratively with the A/OT during 2015 to establish sentinel cap areas to be monitored during flow-induced *COMMP* events.

7. Implementation of the Year 0 to Year 3 cap monitoring in OU3 indicates that the caps have performed consistent with their design. Following completion of the 2014 cap monitoring, there is no indication of need for additional investigation of the integrity of the caps or for repair.

8. Based on the *COMMP* schedule established by the A/OT, the next routine cap monitoring survey for OU3 will occur in 2018.

References

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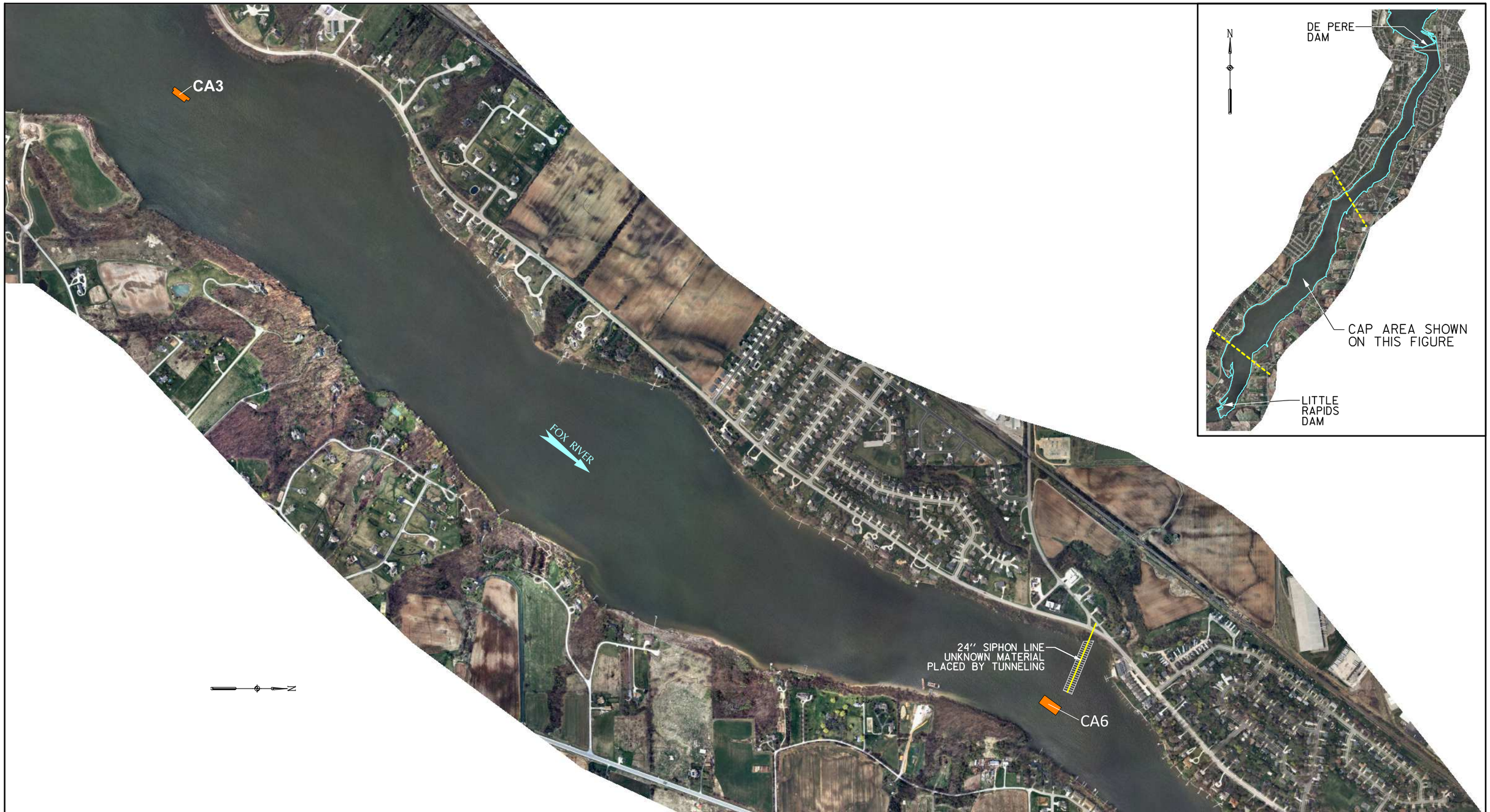
Figures



LEGEND

CA6 — DESIGN CAP PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0' 500' 1000'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 1

LOWER FOX RIVER – OU3
CAP PLACEMENT LOCATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

CA15 ''A'' CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

CB31 ''B'' CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 500' 1000'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 2

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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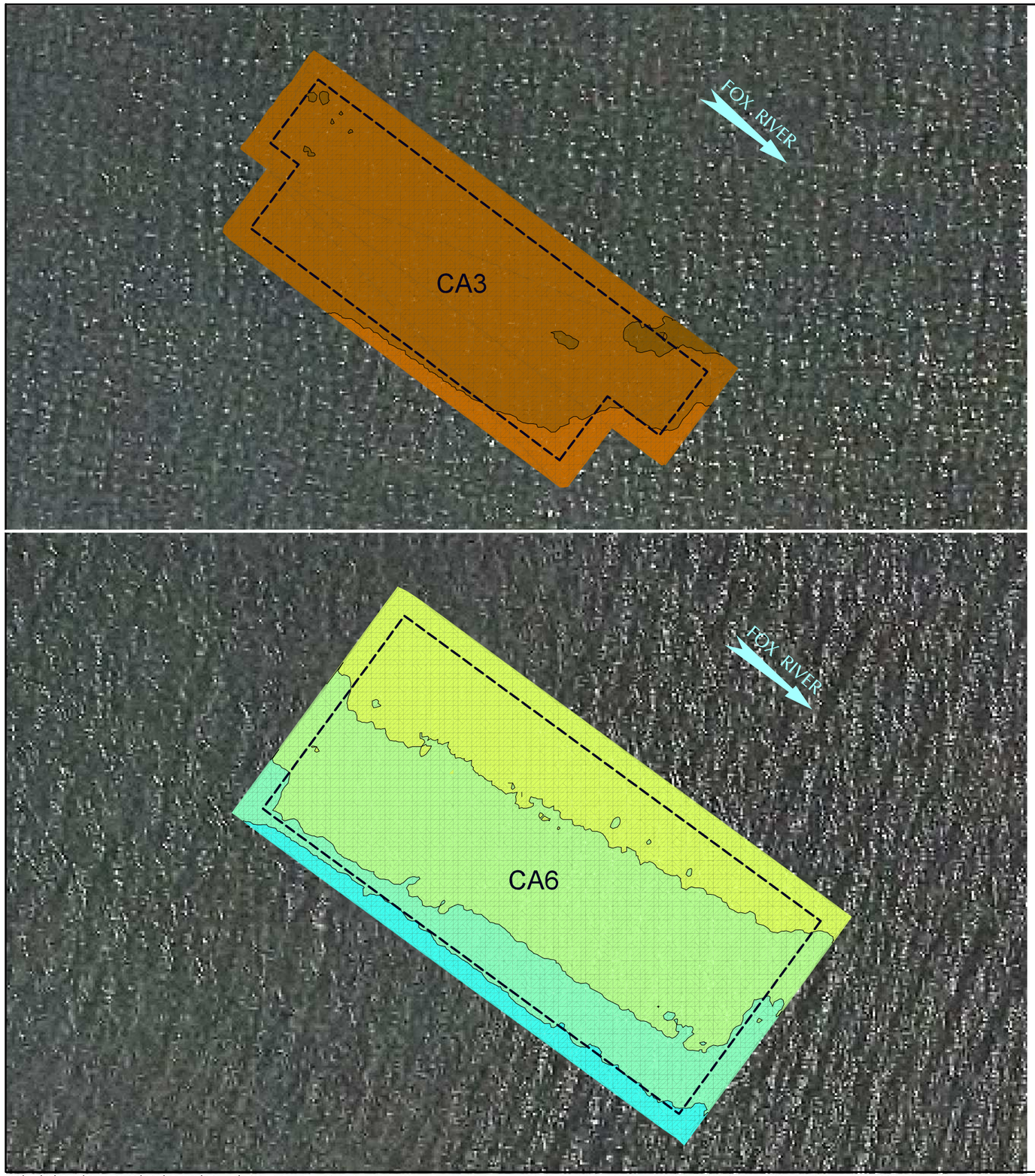

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT
SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 3A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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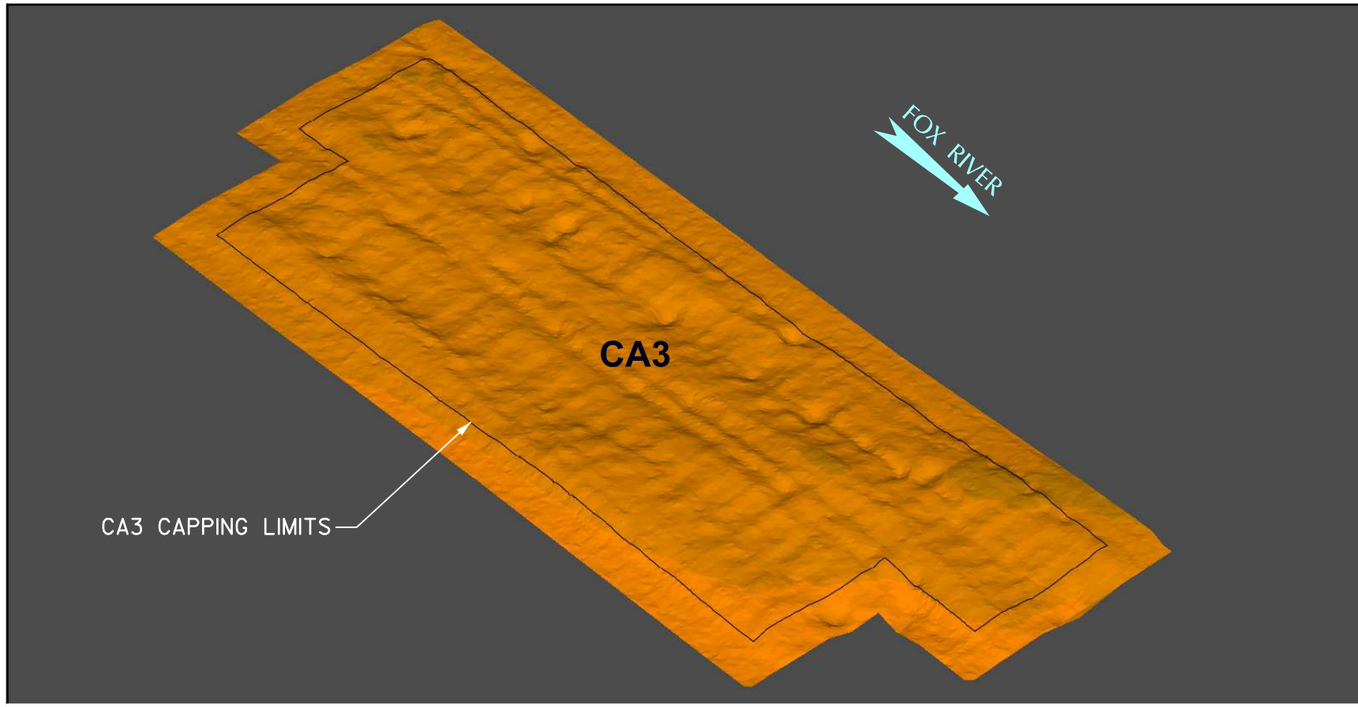

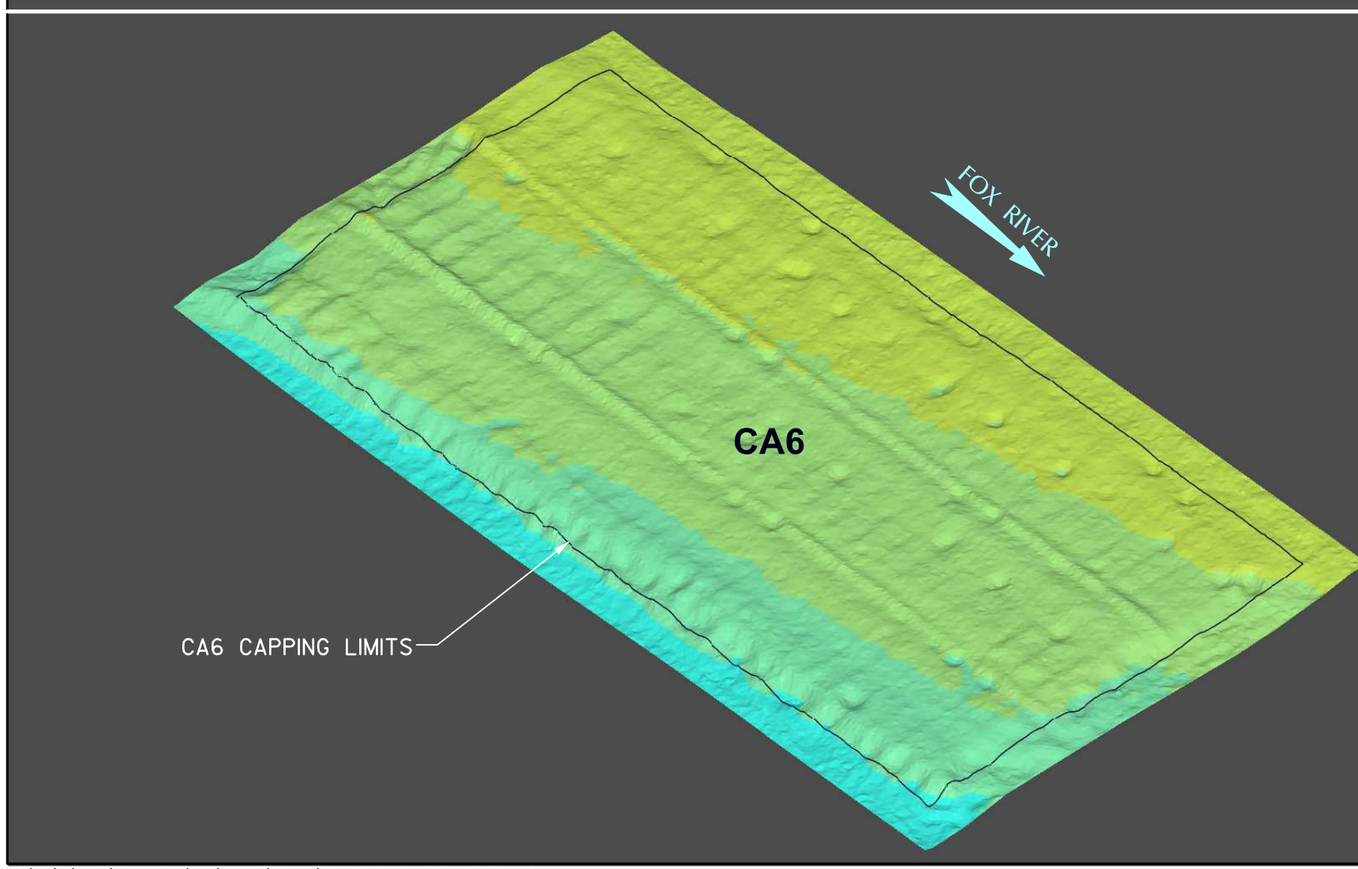

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 3B
LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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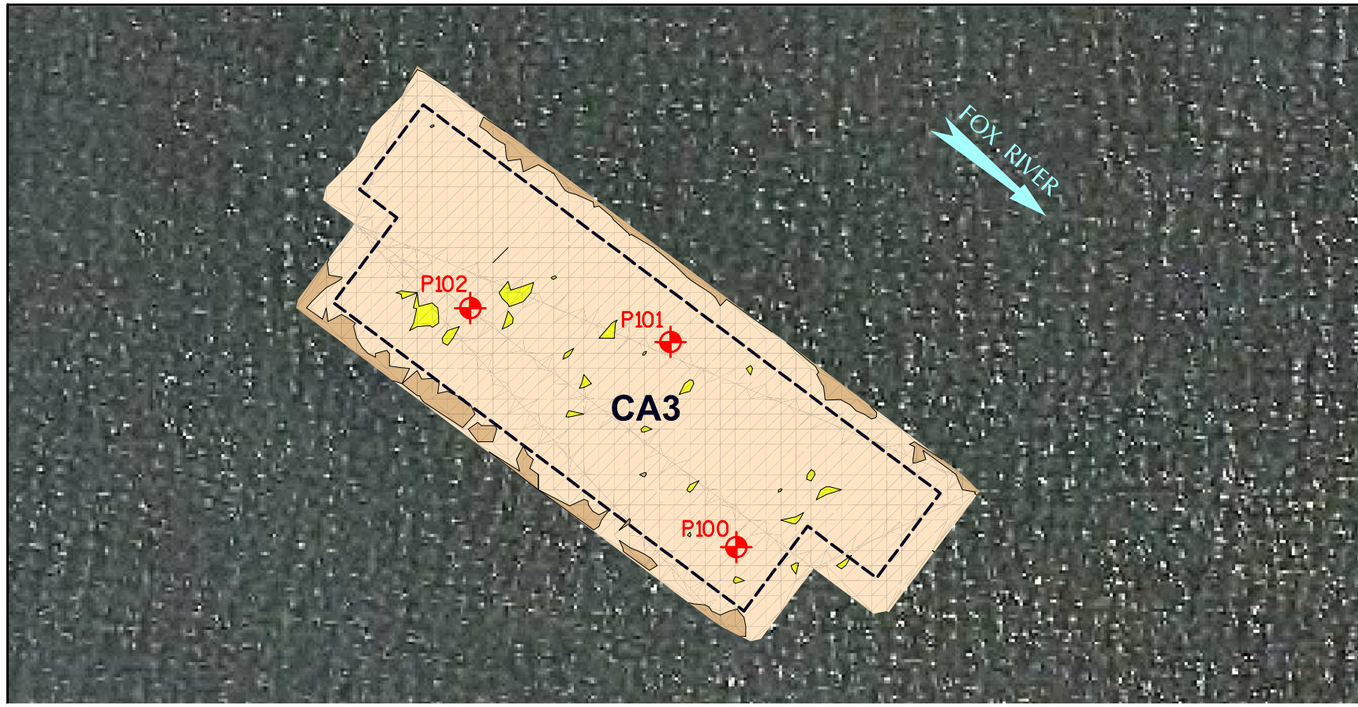

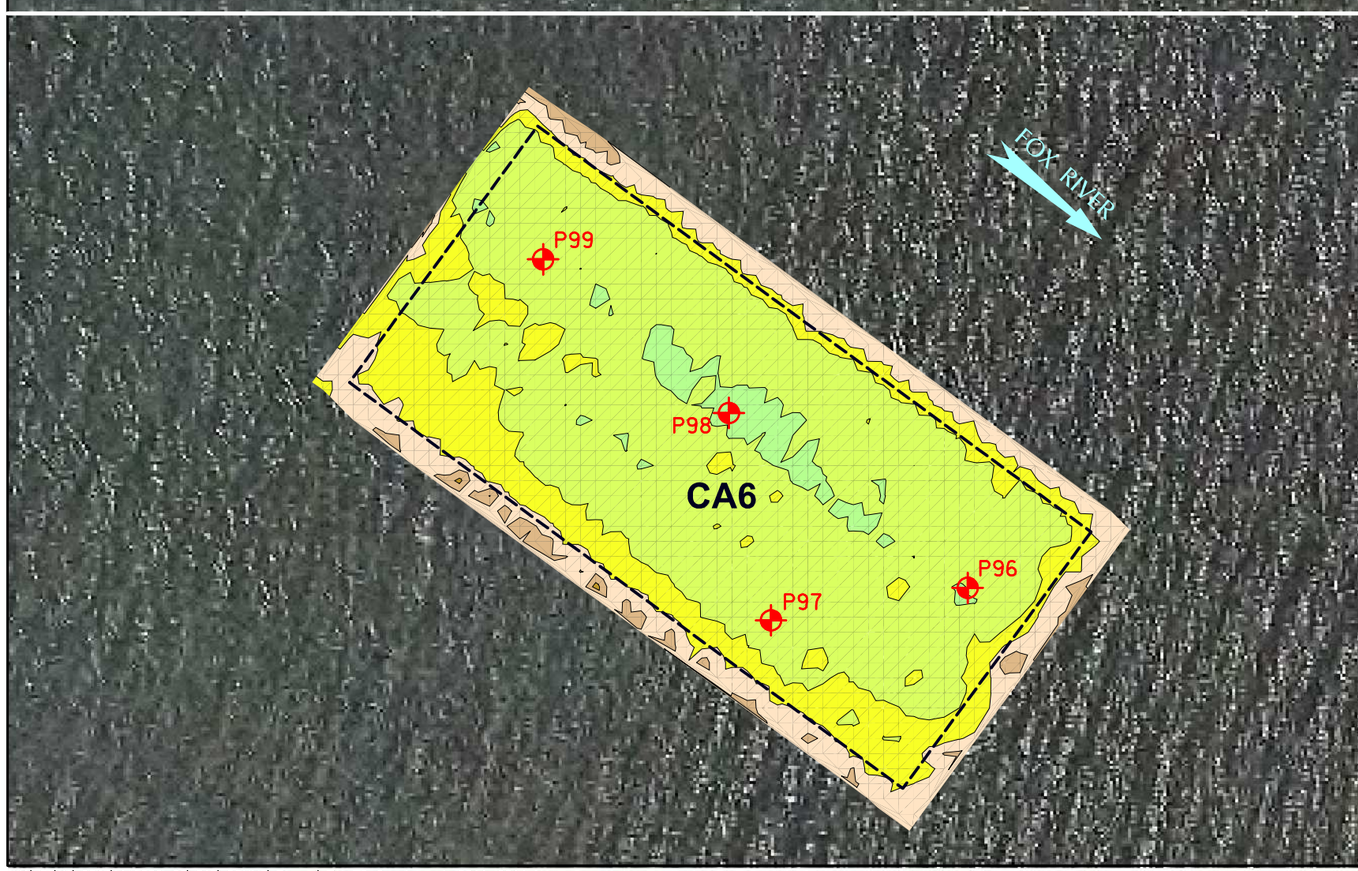

LEGEND

DESIGN CAP PLACEMENT LIMITS

P101 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25′ 50′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 3C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN NOV. 2, 2011 & SEPT. 12, 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 4A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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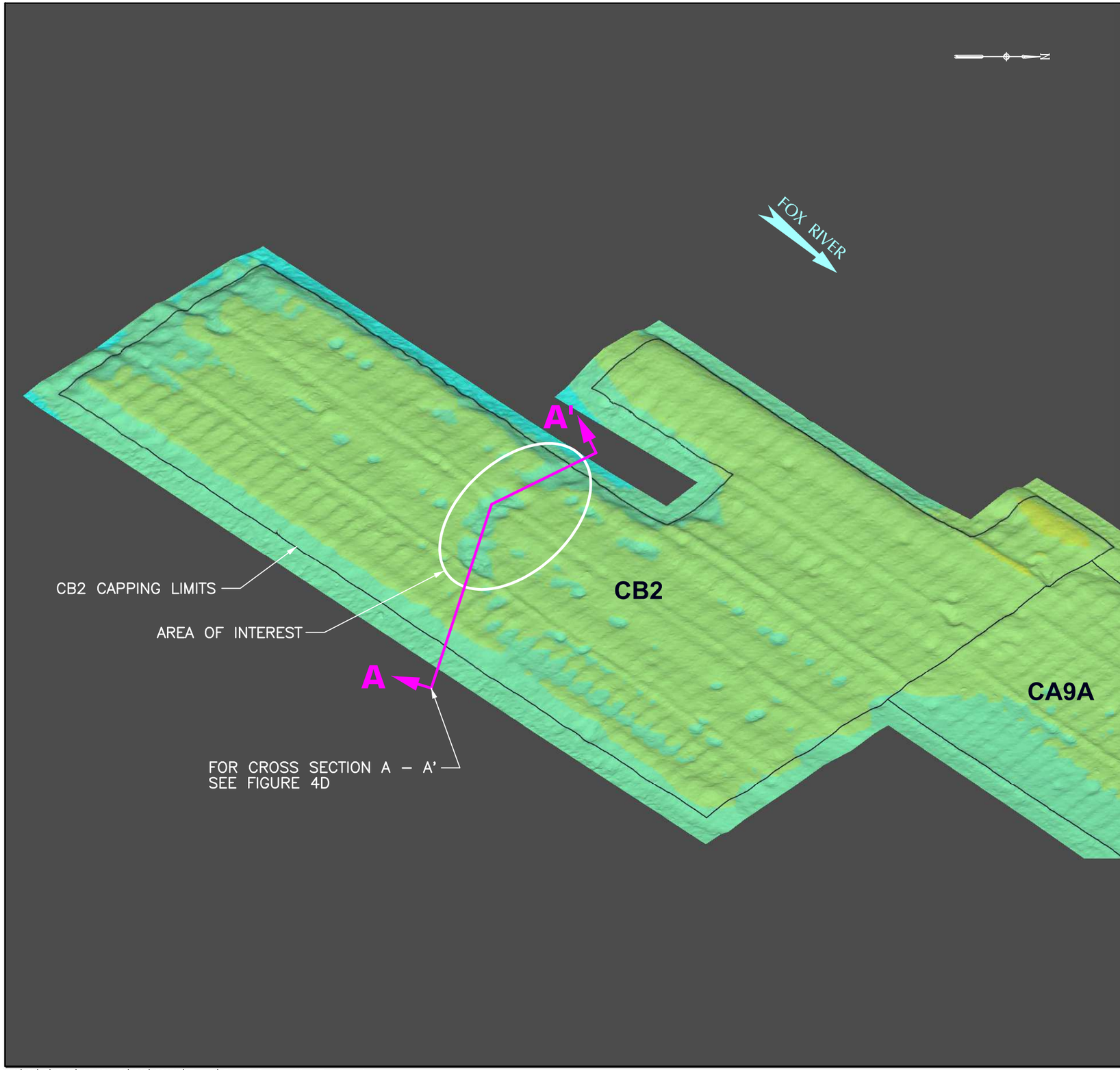

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 4B
LOWER FOX RIVER - OU3
TOP OF 2014 CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

P92 — 2014 CAP POLING/PROBING LOCATIONS

X — 2012 CHEMICAL ISOLATION LAYER SAMPLING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25′ 50′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 4C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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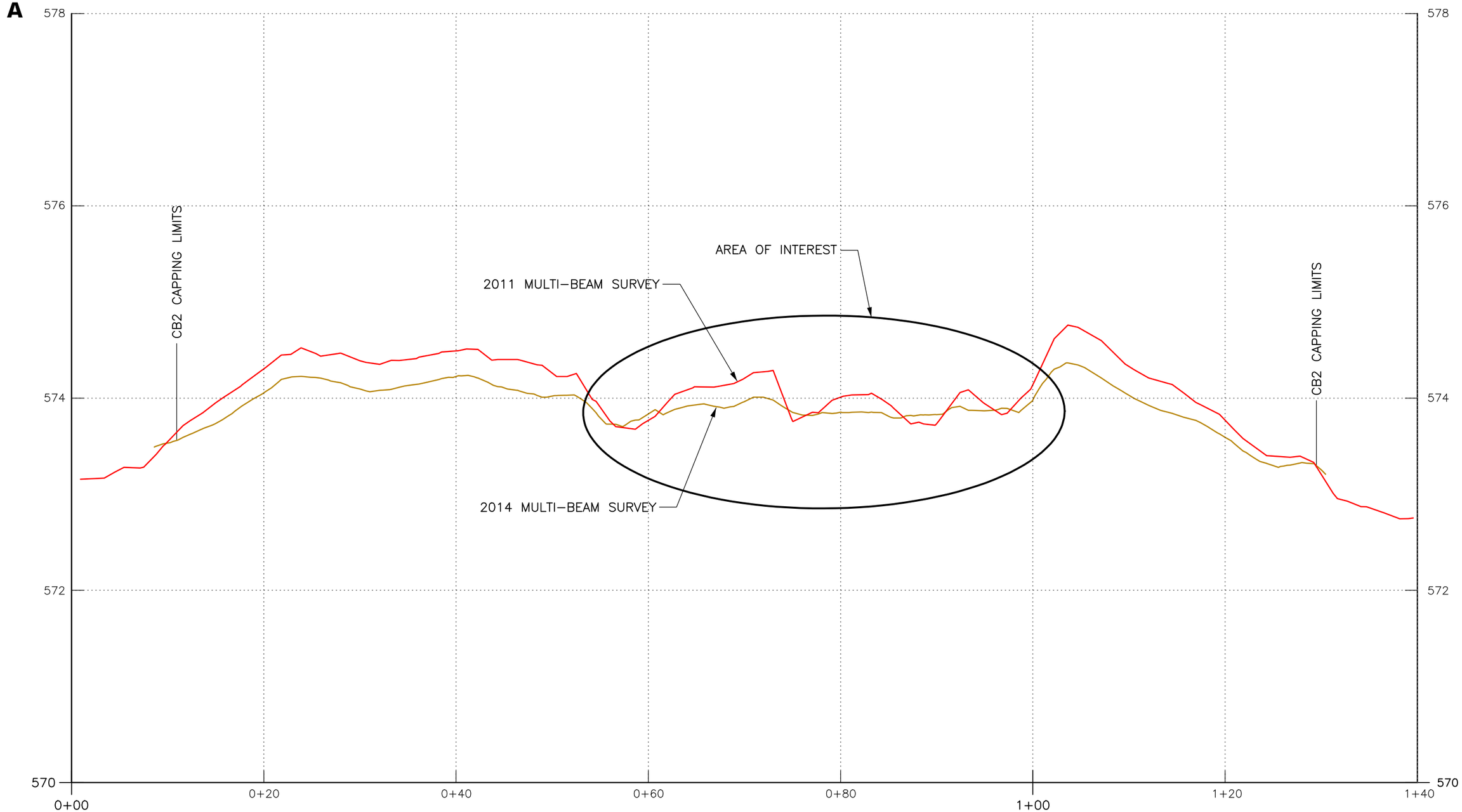

SECTION A - A'

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 4D

LOWER FOX RIVER - OU3
CROSS SECTION A - A'

Foth

SCALE: AS SHOWN

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 30' 60'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 5A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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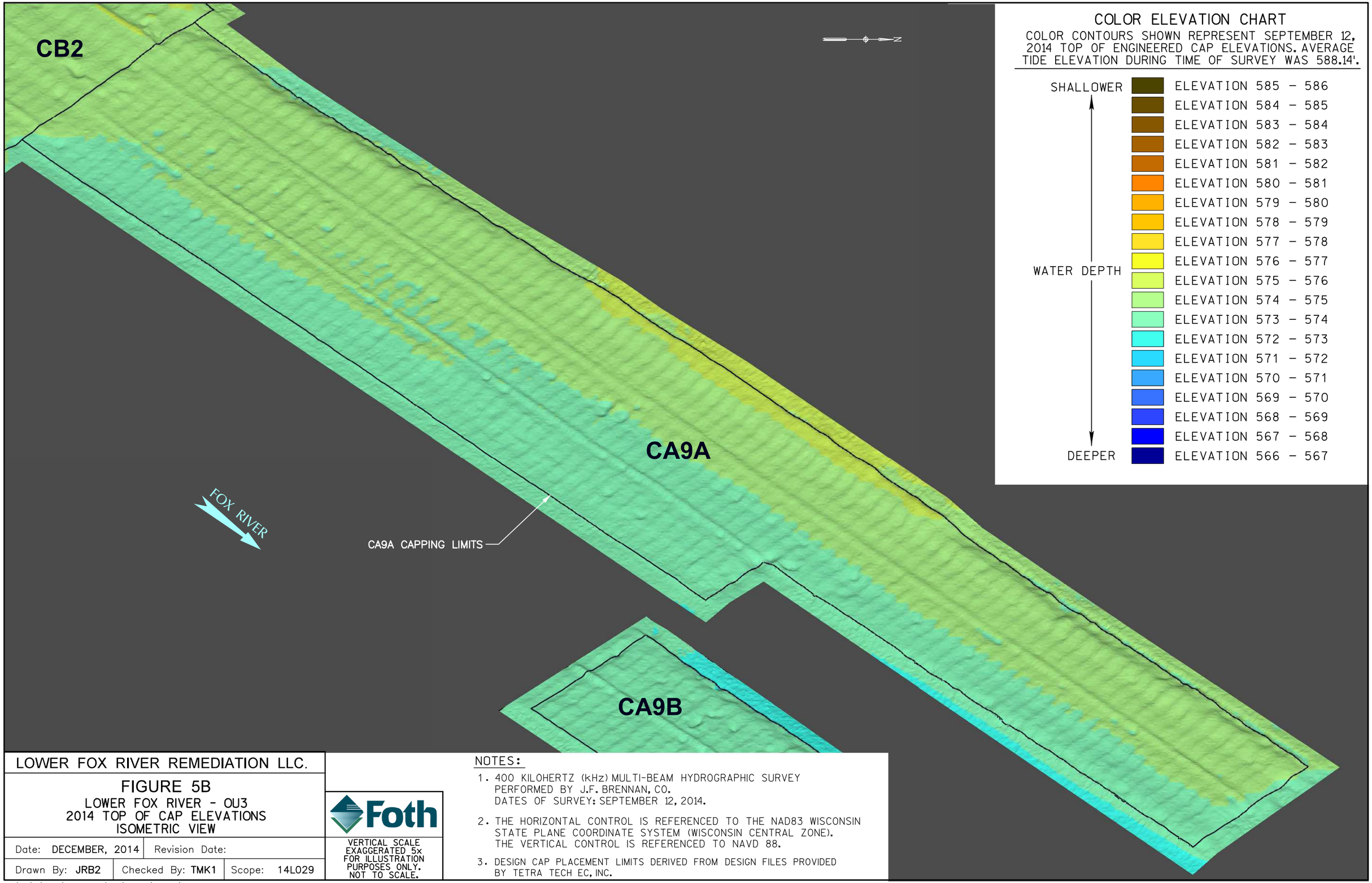

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 5B
LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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LEGEND

DESIGN CAP PLACEMENT LIMITS

P89 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 30′ 60′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 5C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: OCTOBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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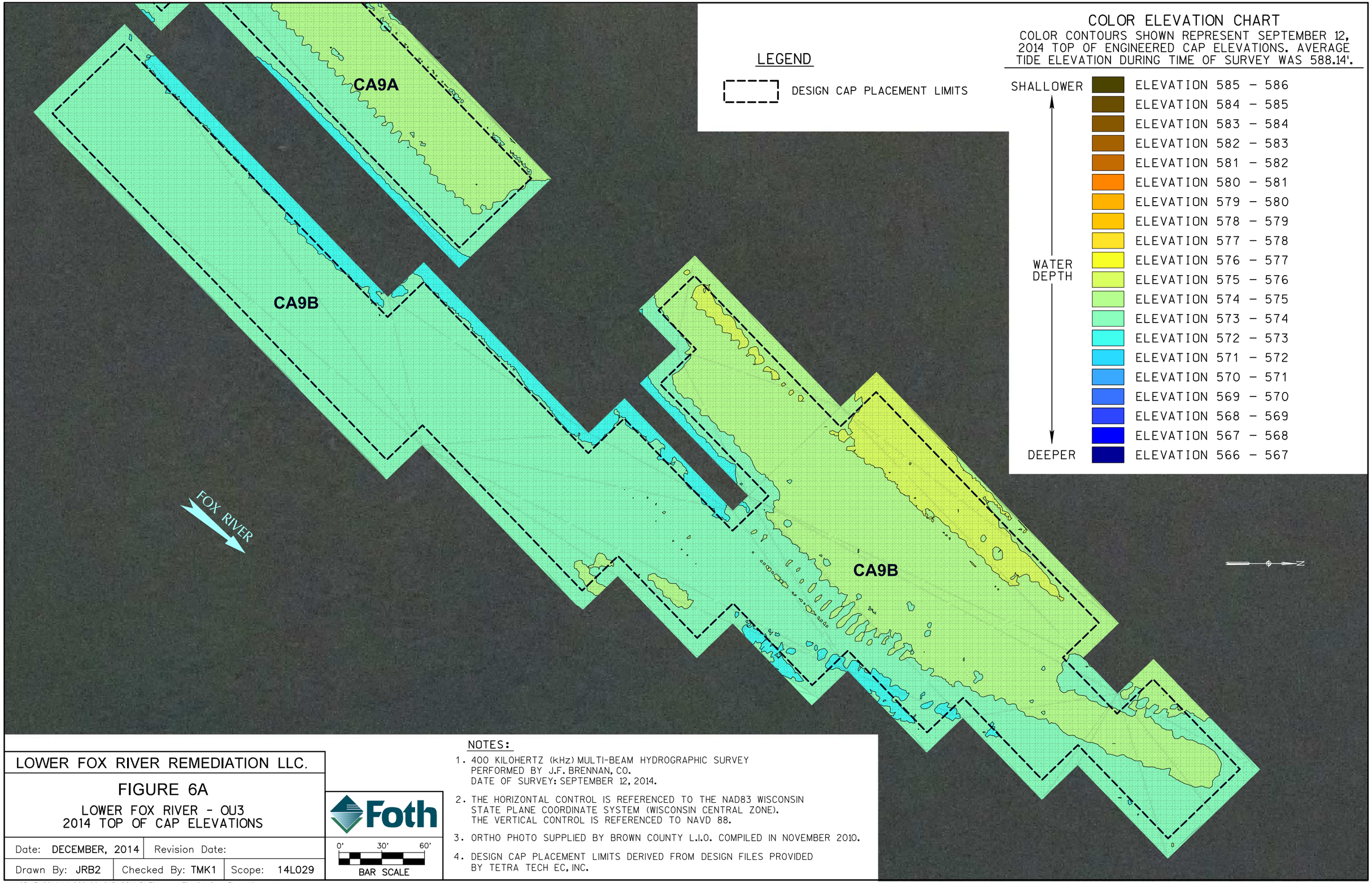

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 6A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Foth

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

0' 30' 60'
BAR SCALE

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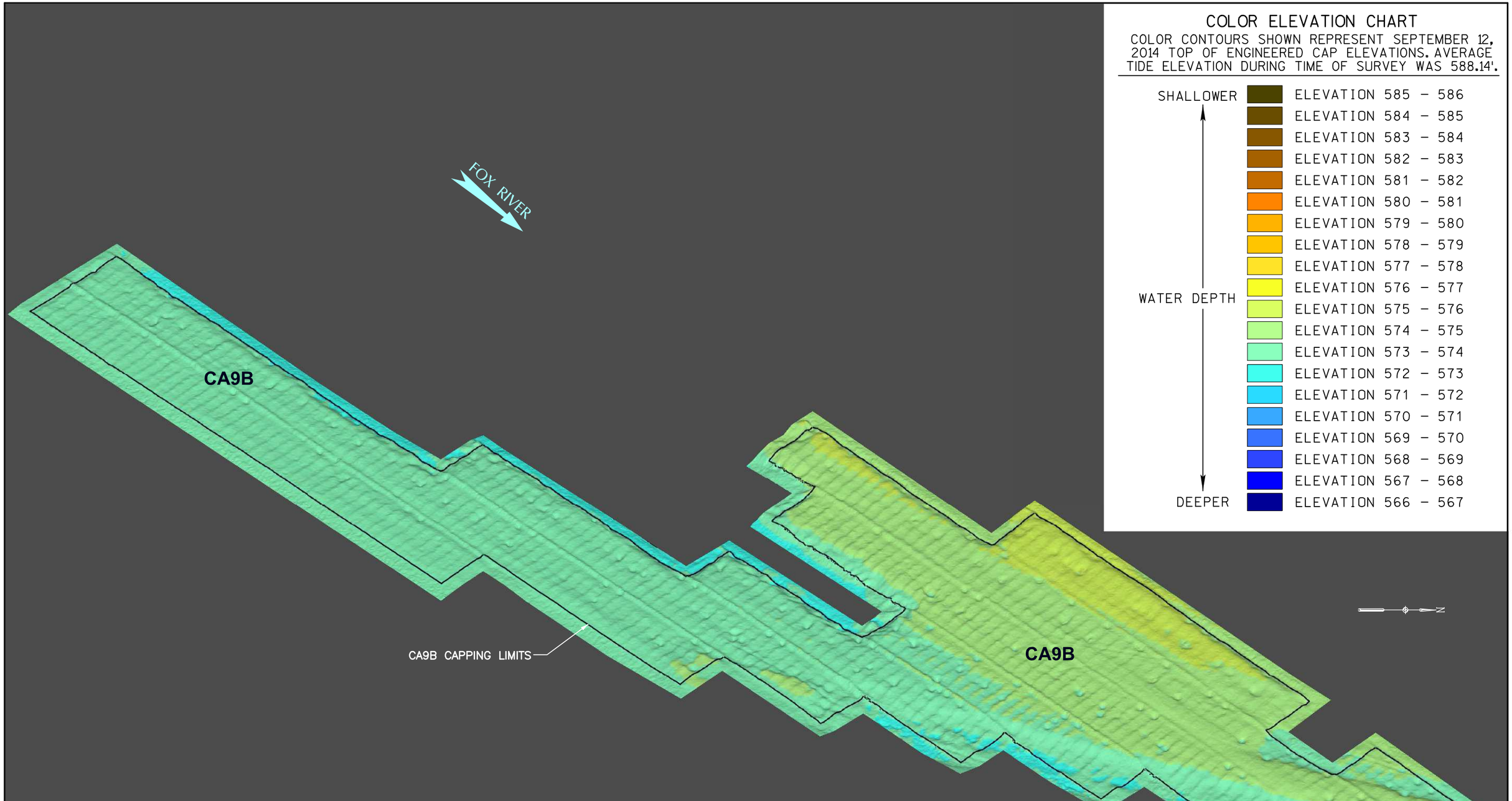

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 6B

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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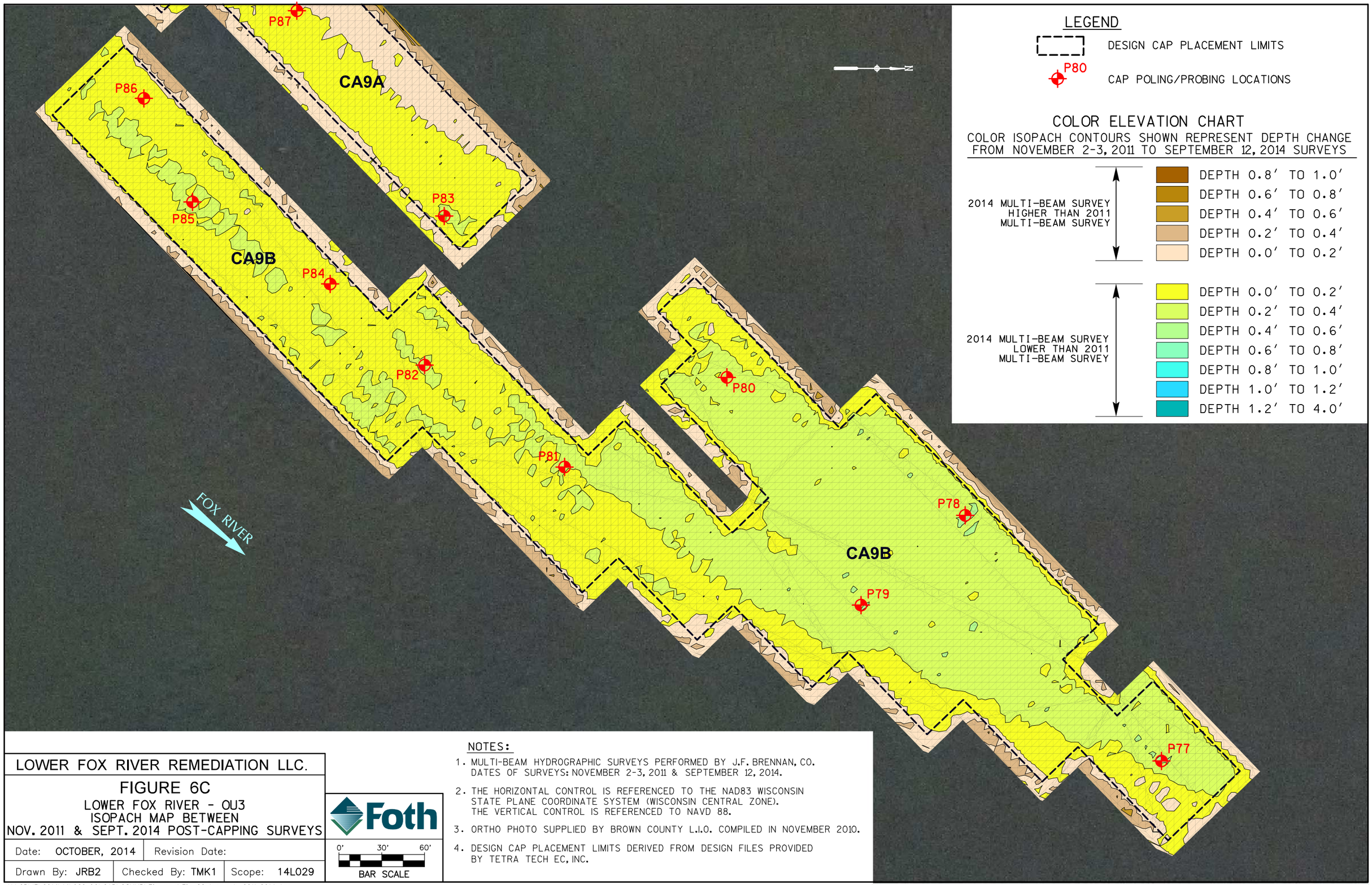
12/17/2014 jrb2



LOWER FOX RIVER REMEDIATION LLC.

FIGURE 6C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: OCTOBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

0' 30' 60'
BAR SCALE

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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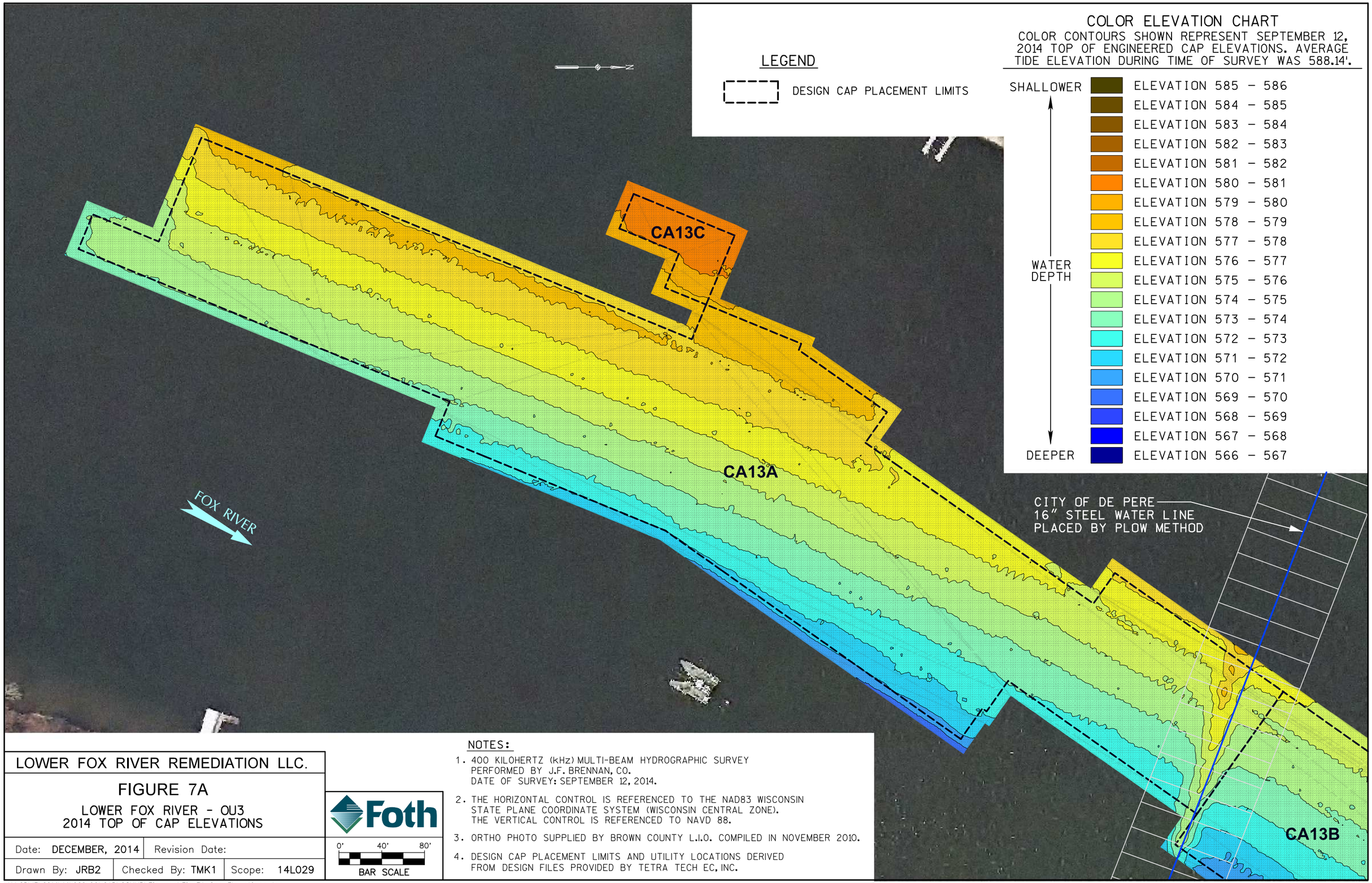
12/17/2014 jrb2



NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 7A

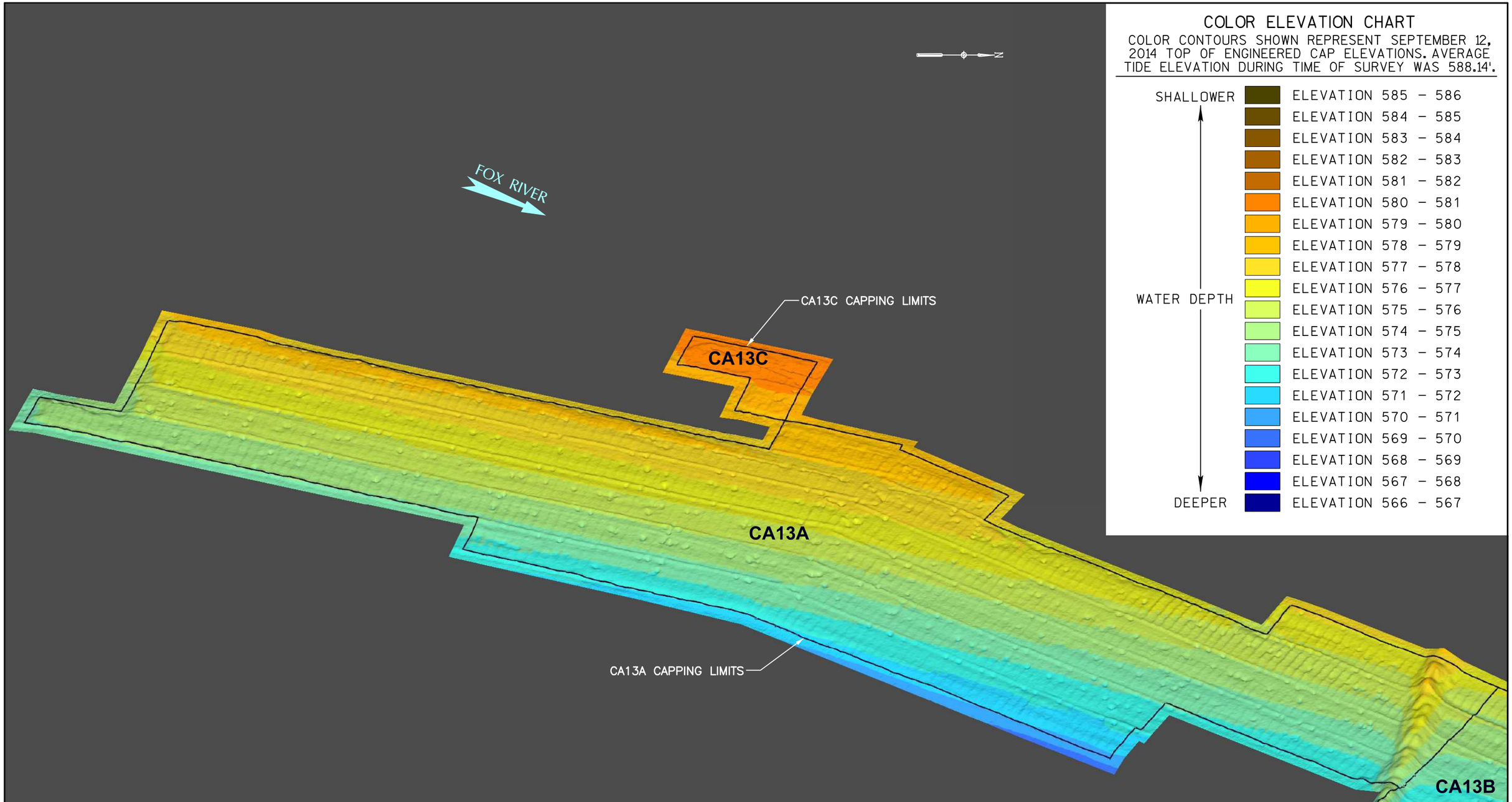
LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Foth

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

0' 40' 80'
BAR SCALE

X:\GB\IE\2014\14L029-00\CAD\COMMP\Figures\Fig-7A Cap Elevations.dgn
12/17/2014 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 7B

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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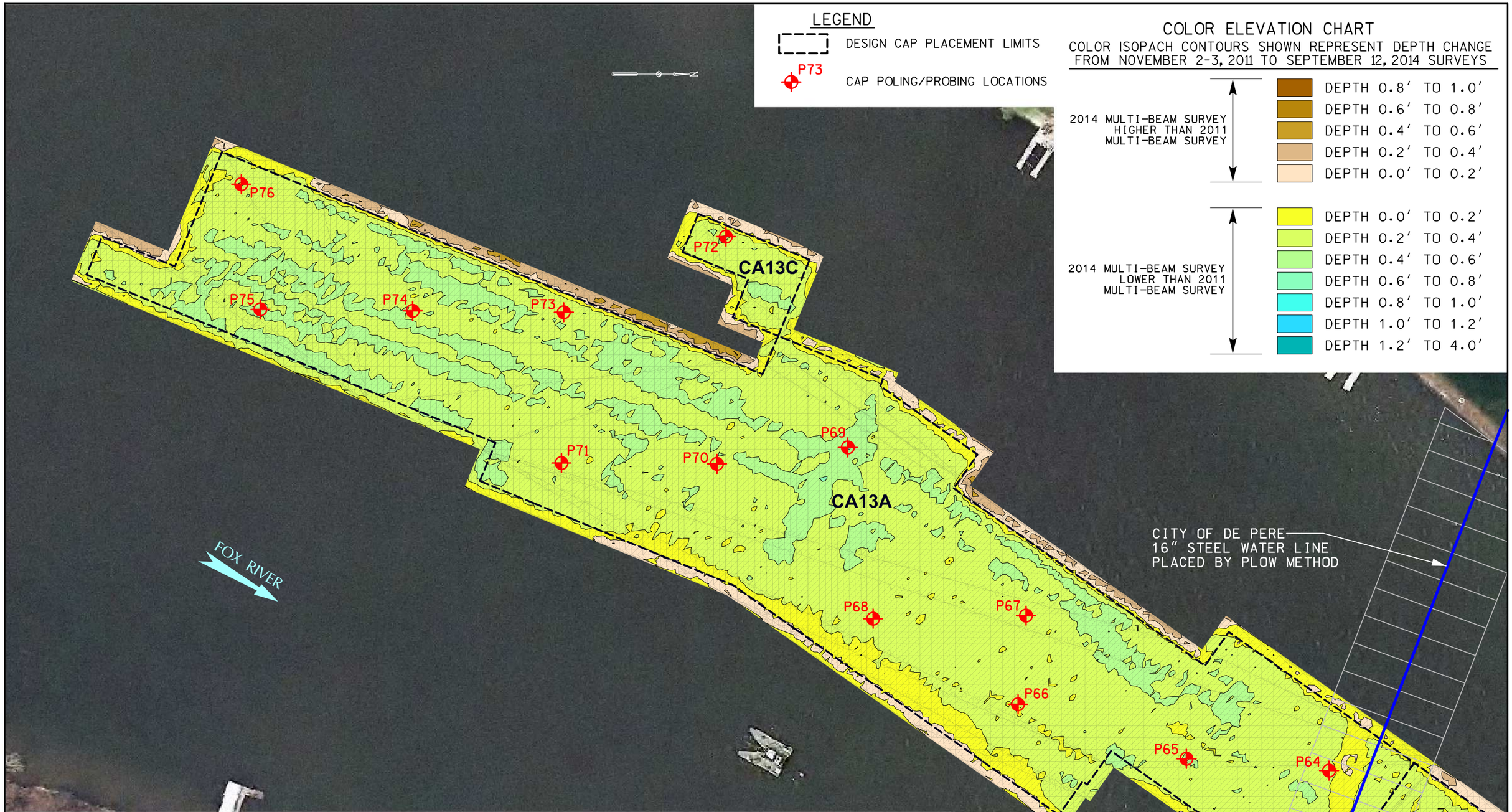
12/17/2014 jrb2



LOWER FOX RIVER REMEDIATION LLC.		
FIGURE 7C LOWER FOX RIVER - OU3 ISOPACH MAP BETWEEN NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS		
Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

0' 40' 80'
BAR SCALE

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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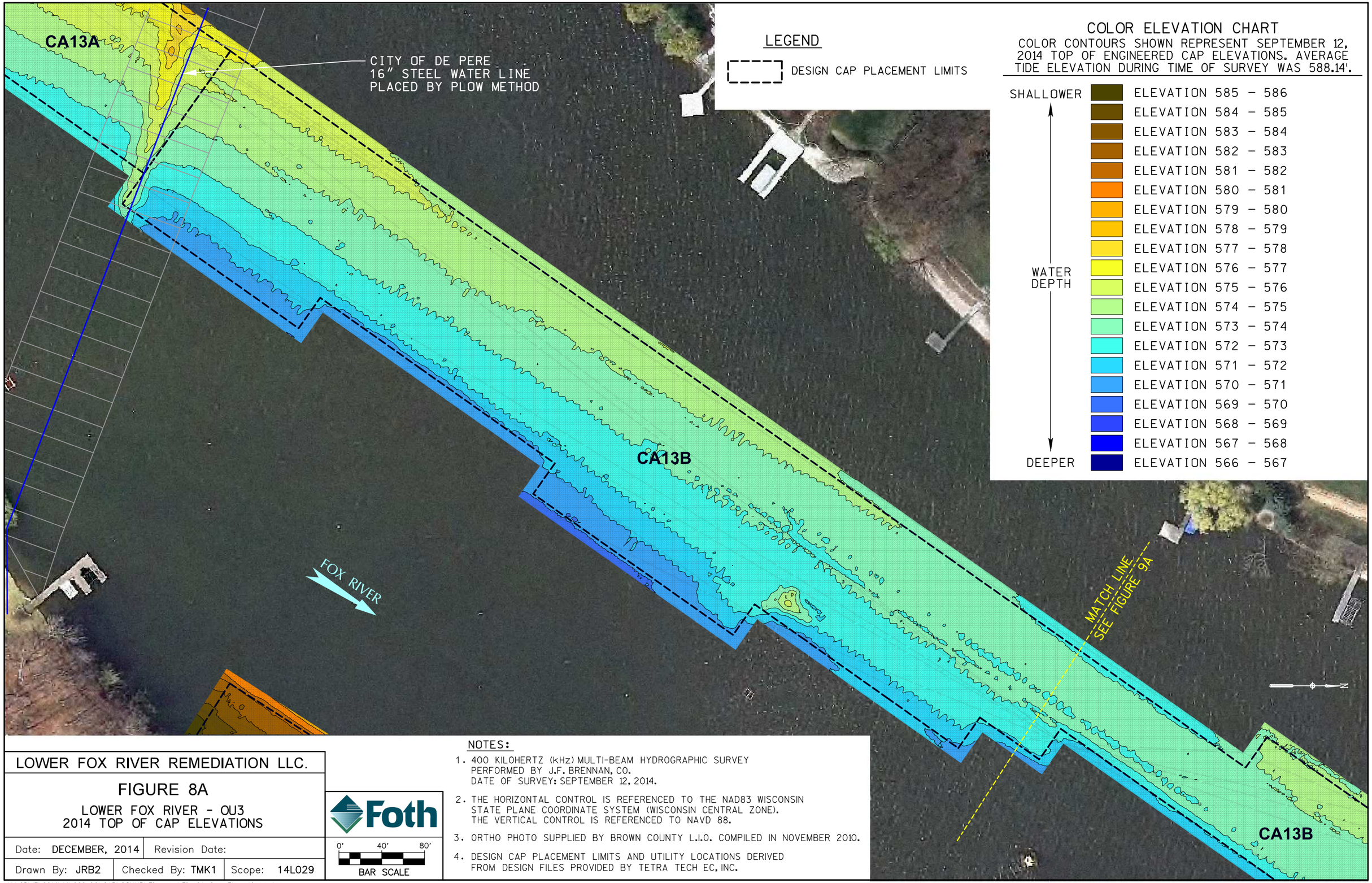
12/17/2014 jrb2



LOWER FOX RIVER REMEDIATION LLC.

FIGURE 8A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

0' 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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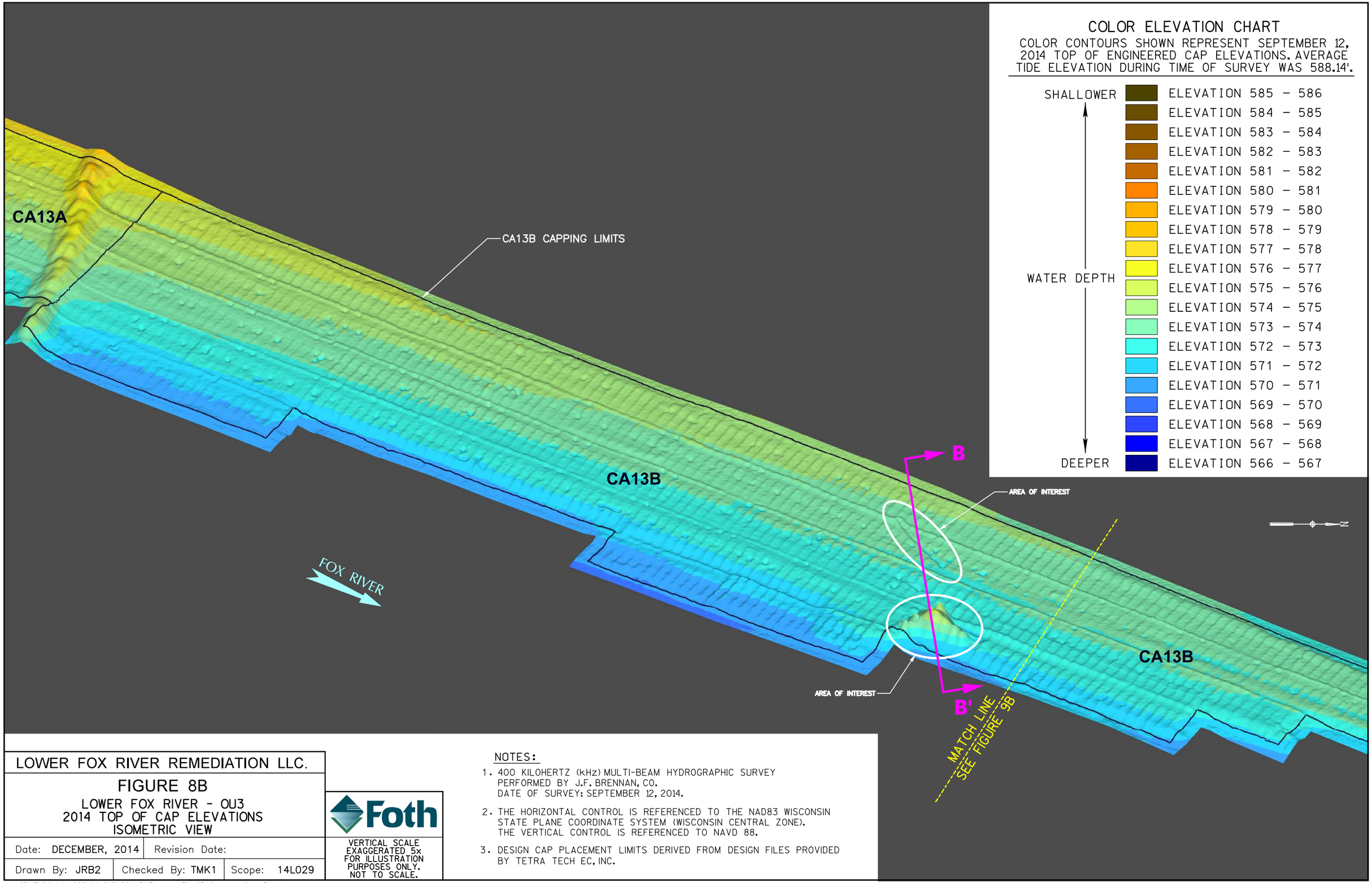
12/17/2014 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER	ELEVATION 585 – 586
	ELEVATION 584 – 585
	ELEVATION 583 – 584
	ELEVATION 582 – 583
	ELEVATION 581 – 582
	ELEVATION 580 – 581
	ELEVATION 579 – 580
	ELEVATION 578 – 579
	ELEVATION 577 – 578
WATER DEPTH	ELEVATION 576 – 577
	ELEVATION 575 – 576
	ELEVATION 574 – 575
	ELEVATION 573 – 574
	ELEVATION 572 – 573
	ELEVATION 571 – 572
	ELEVATION 570 – 571
	ELEVATION 569 – 570
	ELEVATION 568 – 569
	ELEVATION 567 – 568
DEEPER	ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 8B

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

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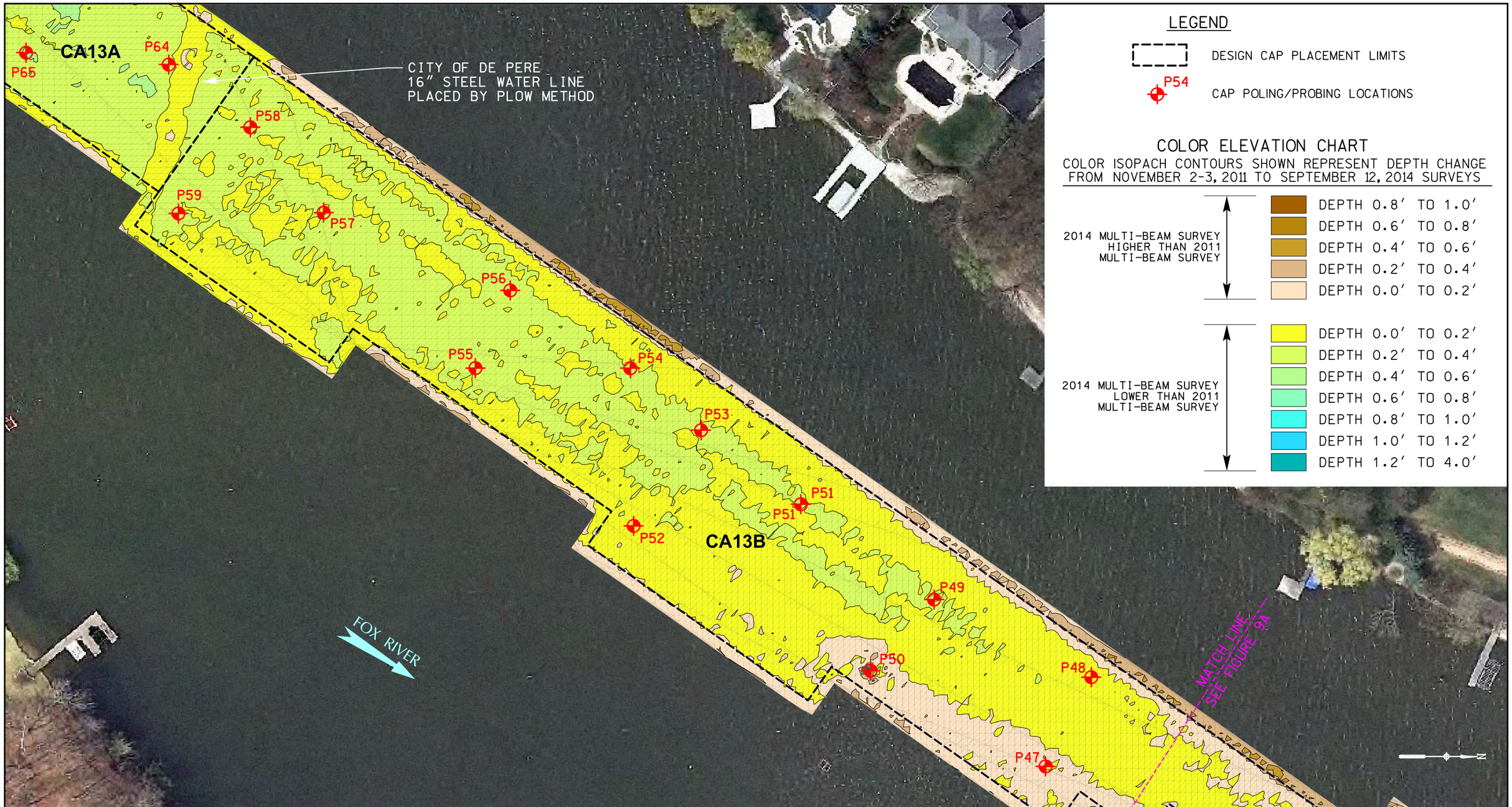
12/17/2014 jrb2



LOWER FOX RIVER REMEDIATION LLC.

FIGURE 8C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

0' 40' 80'
BAR SCALE

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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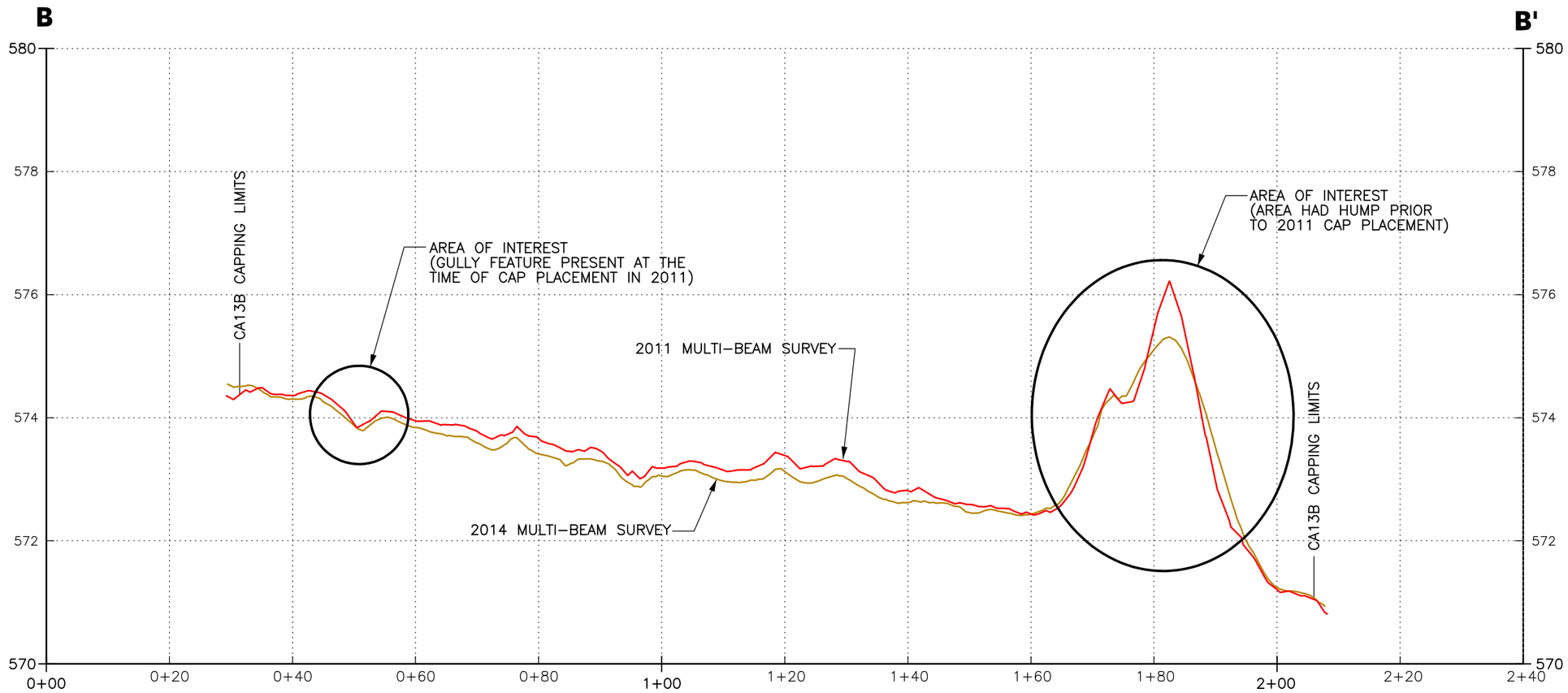
12/17/2014 jrb2



SECTION B - B'

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 8D

LOWER FOX RIVER - OU3
CROSS SECTION B - B'

Foth

SCALE: AS SHOWN

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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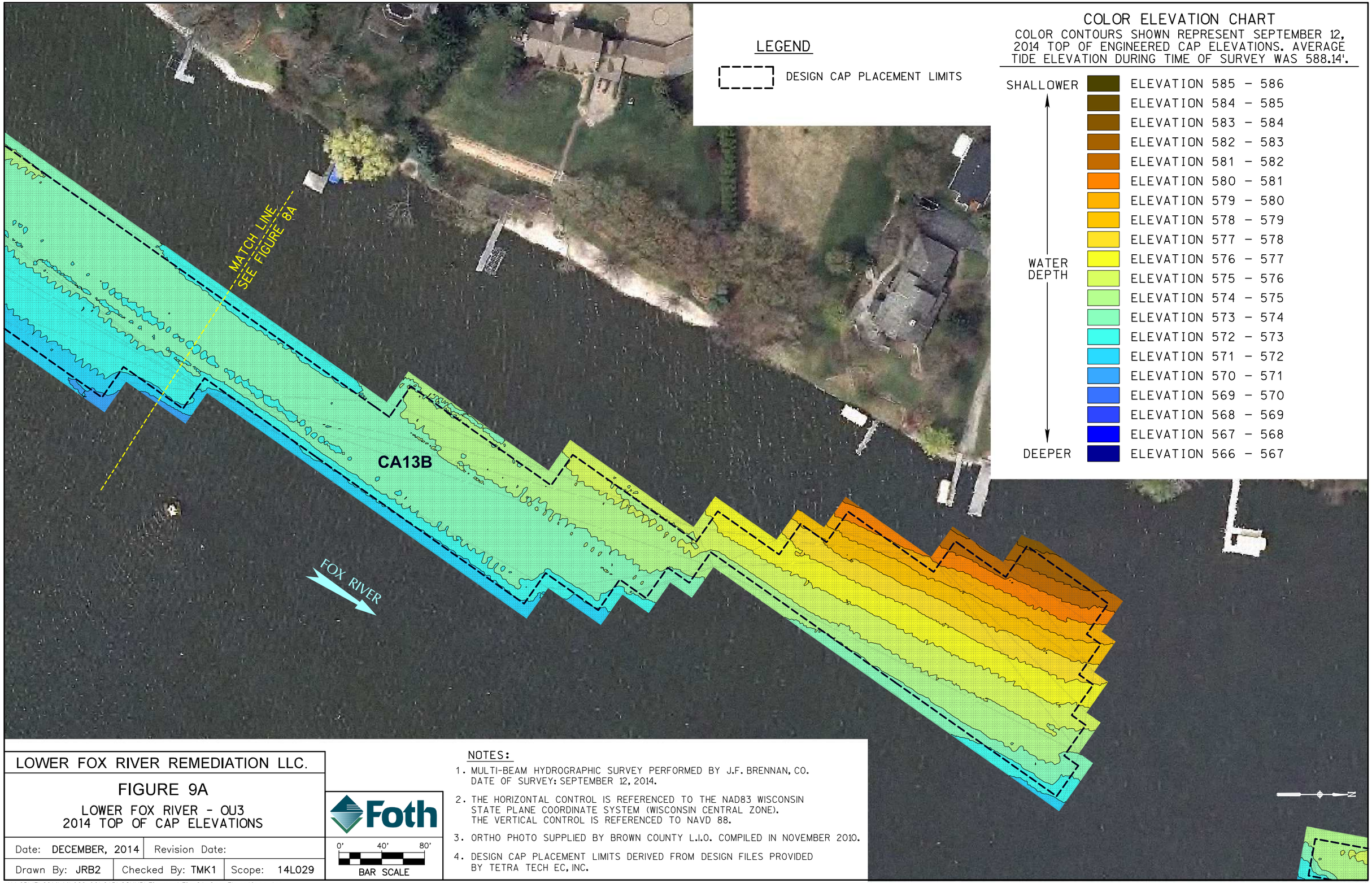
12/17/2014 jrb2



LOWER FOX RIVER REMEDIATION LLC.

FIGURE 9A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

0' 40' 80'
BAR SCALE

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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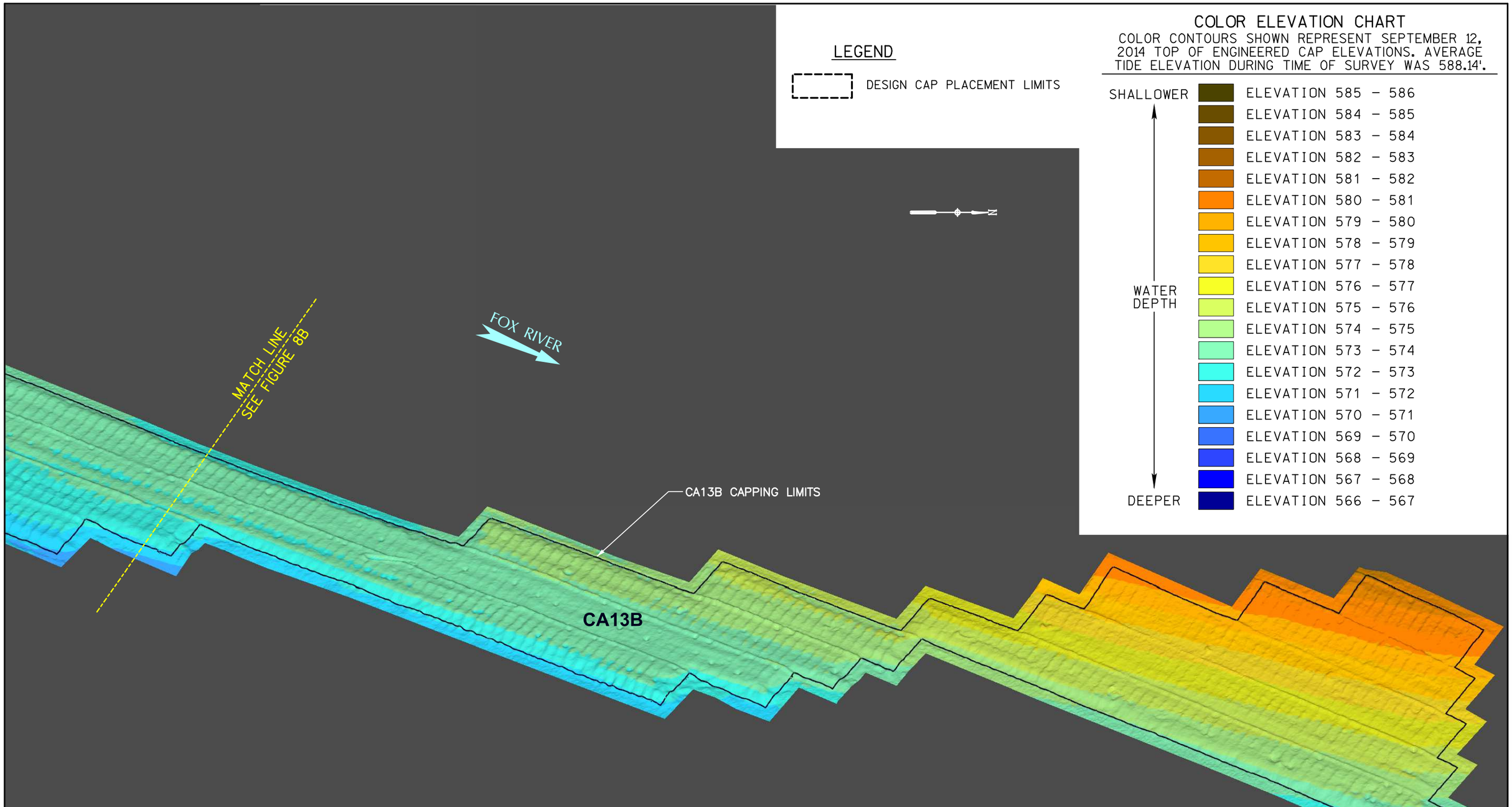

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 9B

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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12/17/2014 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

P45 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 9C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

Foth

0′ 40′ 80′
BAR SCALE

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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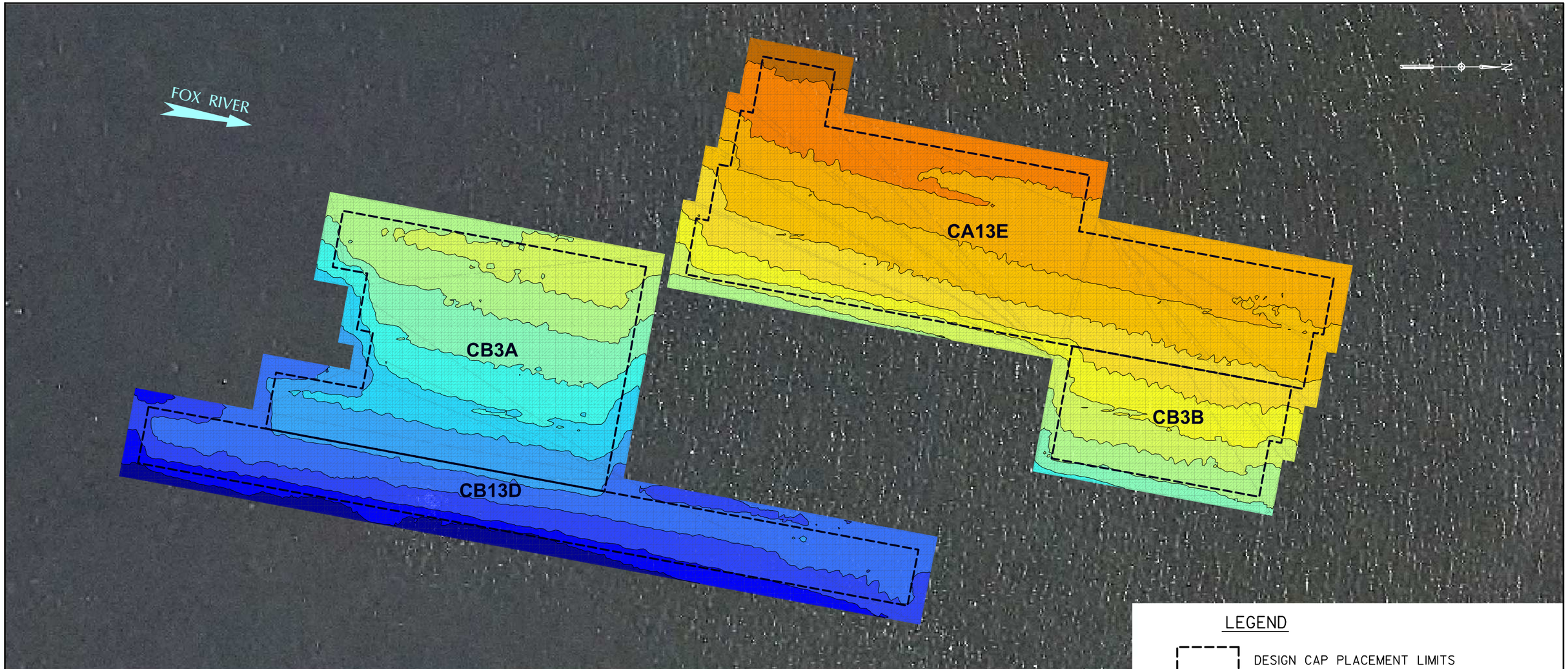
12/17/2014 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 30' 60'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 10A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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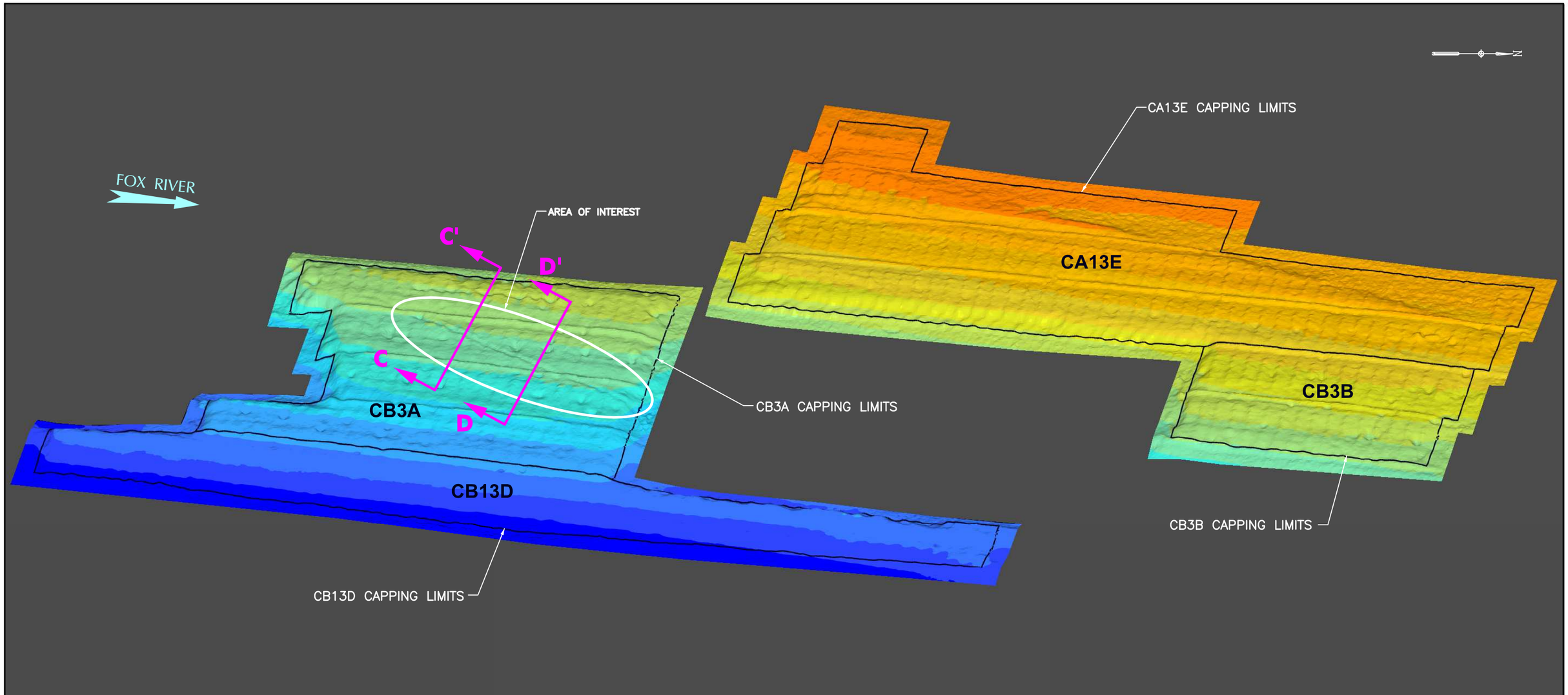

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 10B
LOWER FOX RIVER – OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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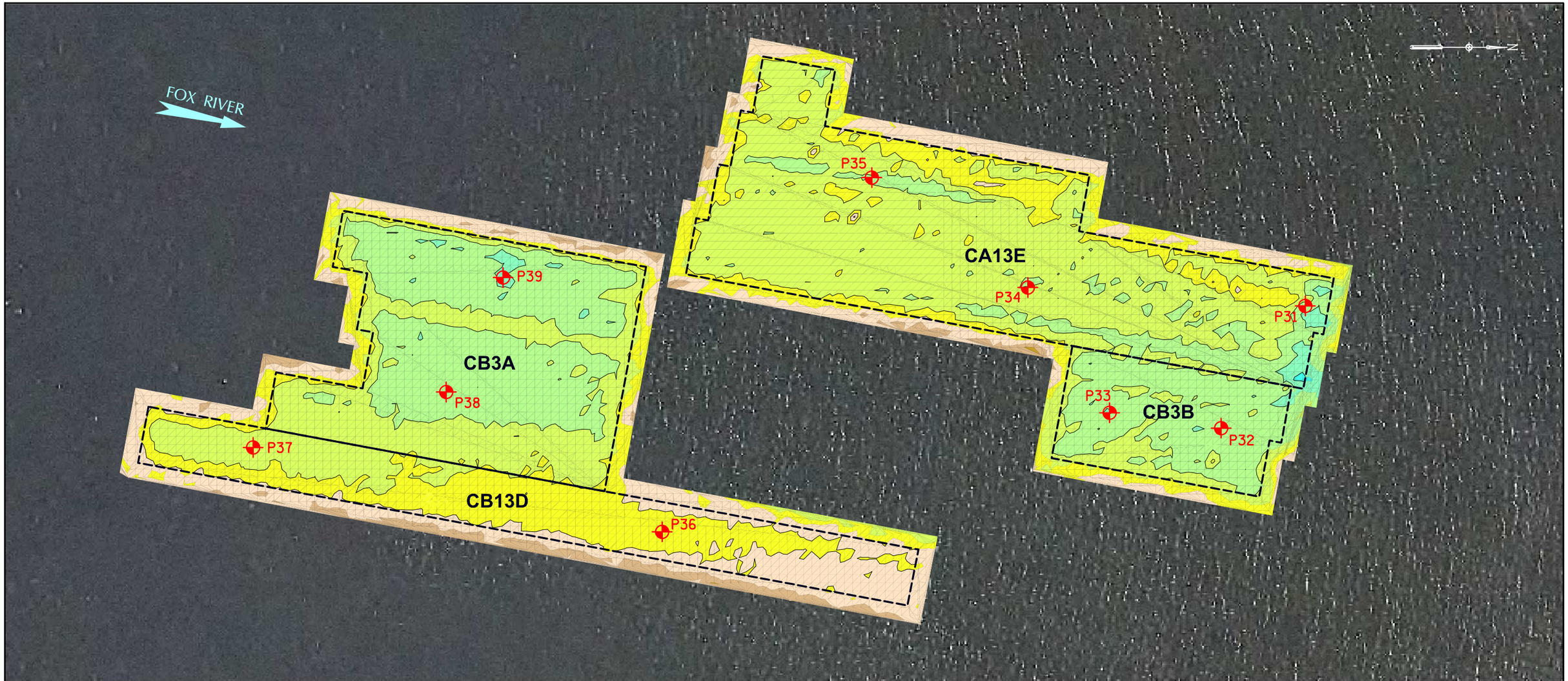

LEGEND

DESIGN CAP PLACEMENT LIMITS

P35 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH > 1.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 30′ 60′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 10C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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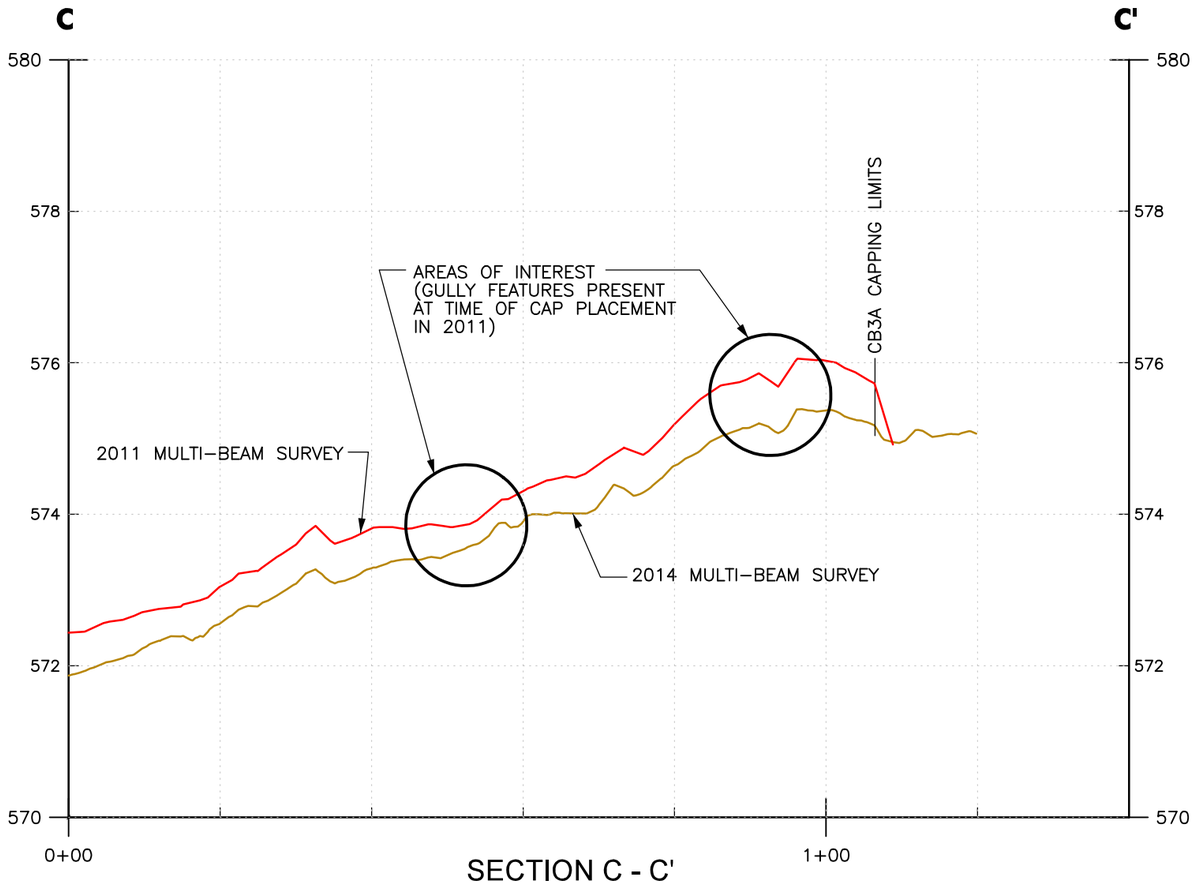

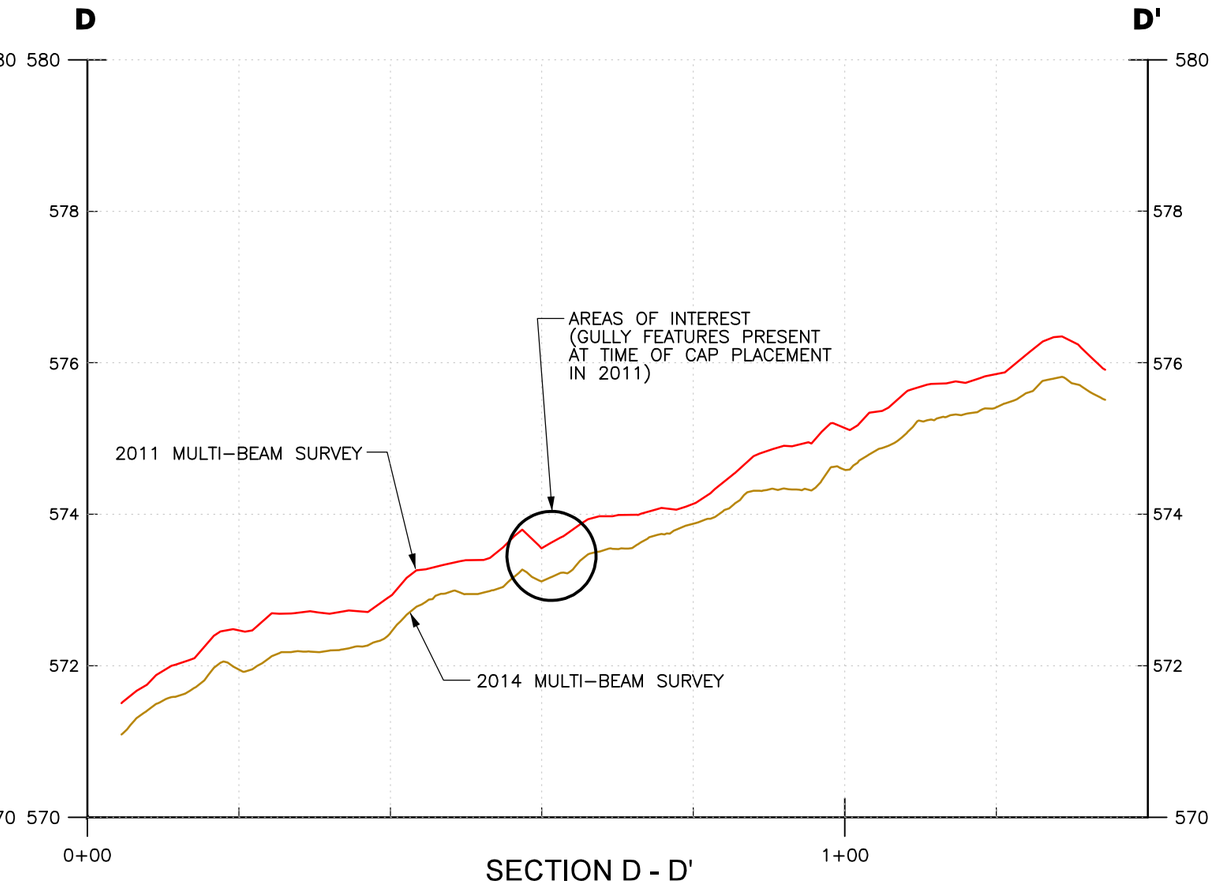

Foth	LOWER FOX RIVER REMEDIATION LLC.		
	FIGURE 10D LOWER FOX RIVER - OU3 CROSS SECTIONS C - C' & D - D'		
SCALE: AS SHOWN	Date: DECEMBER, 2014	Revision Date:	
	Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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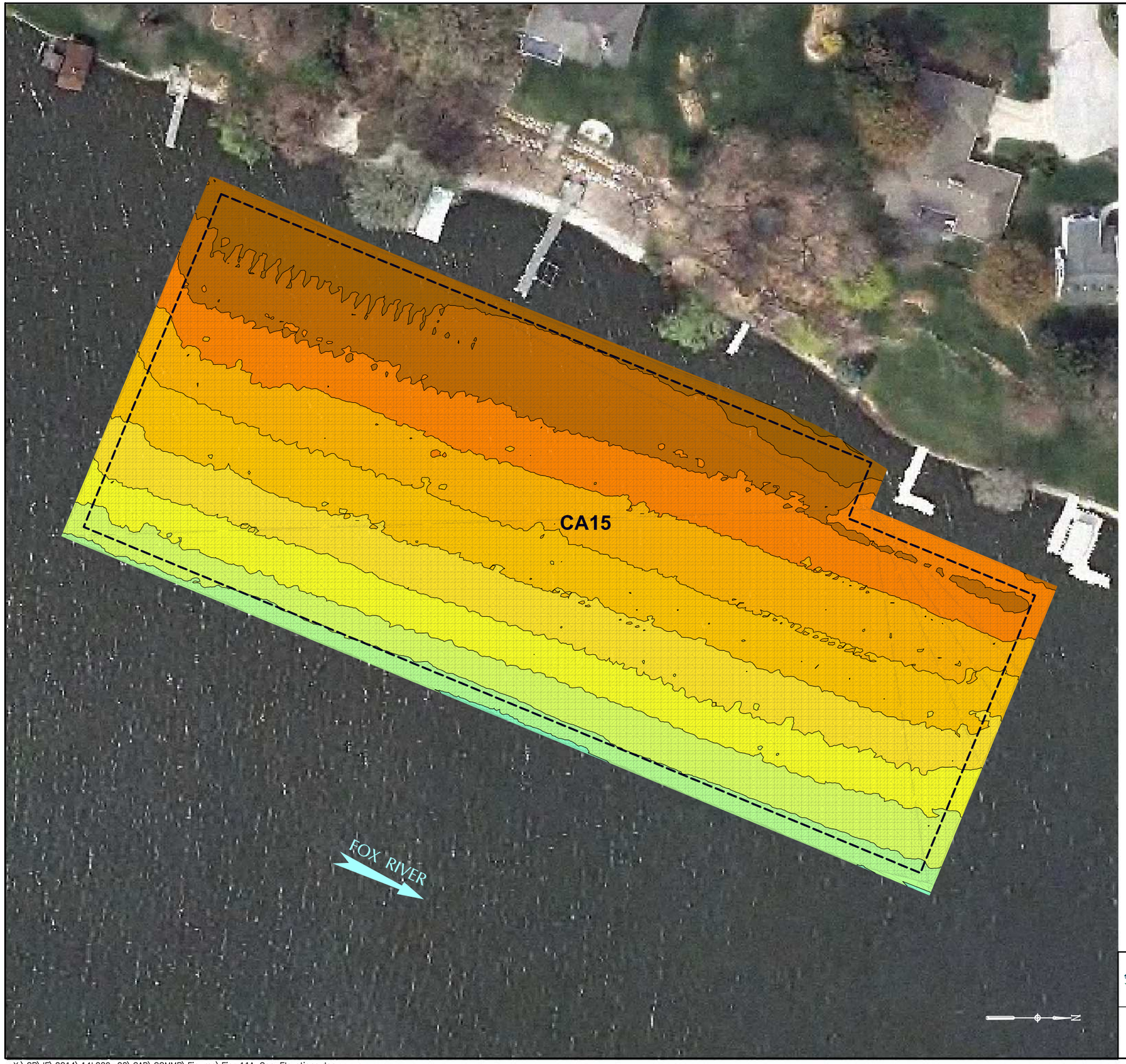

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 30′ 60′

BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 11A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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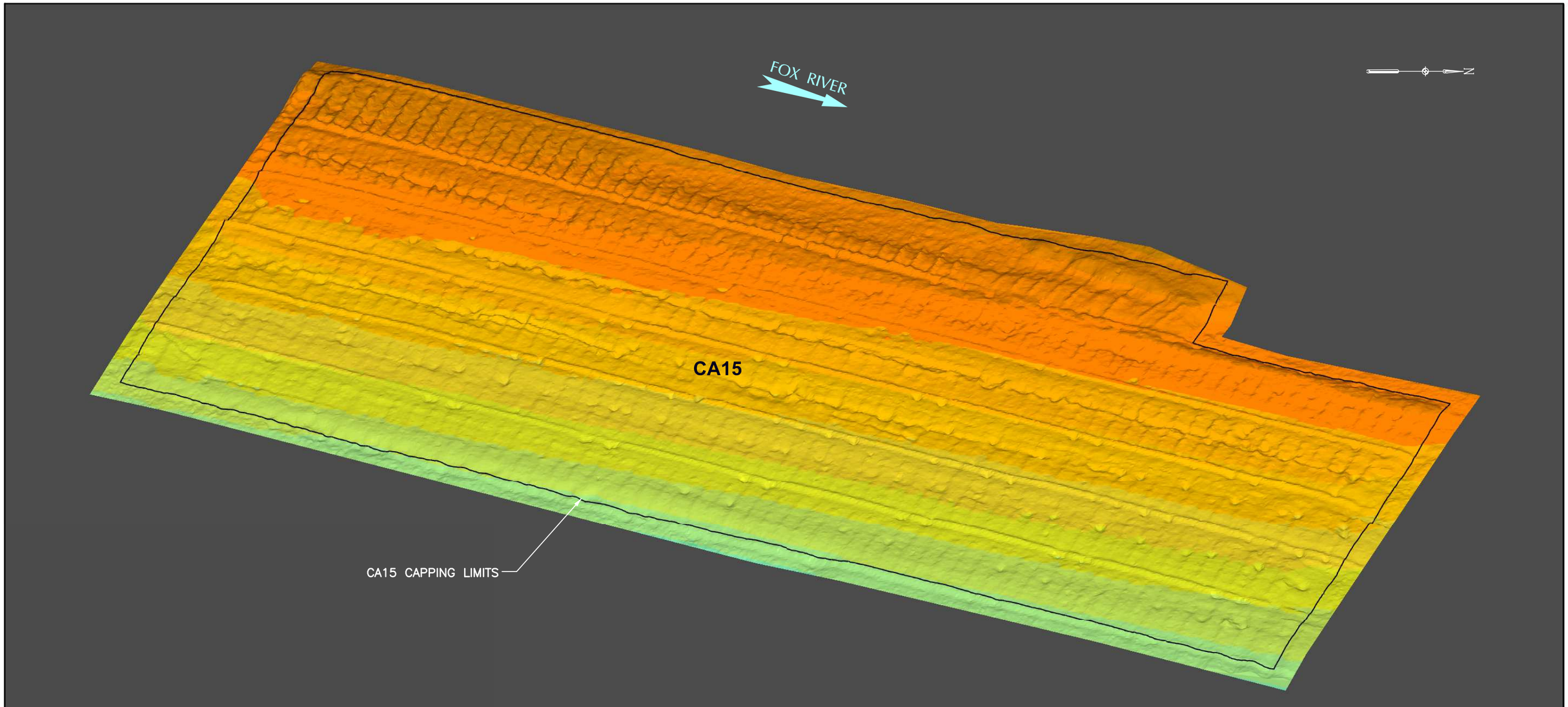

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 11B
LOWER FOX RIVER – OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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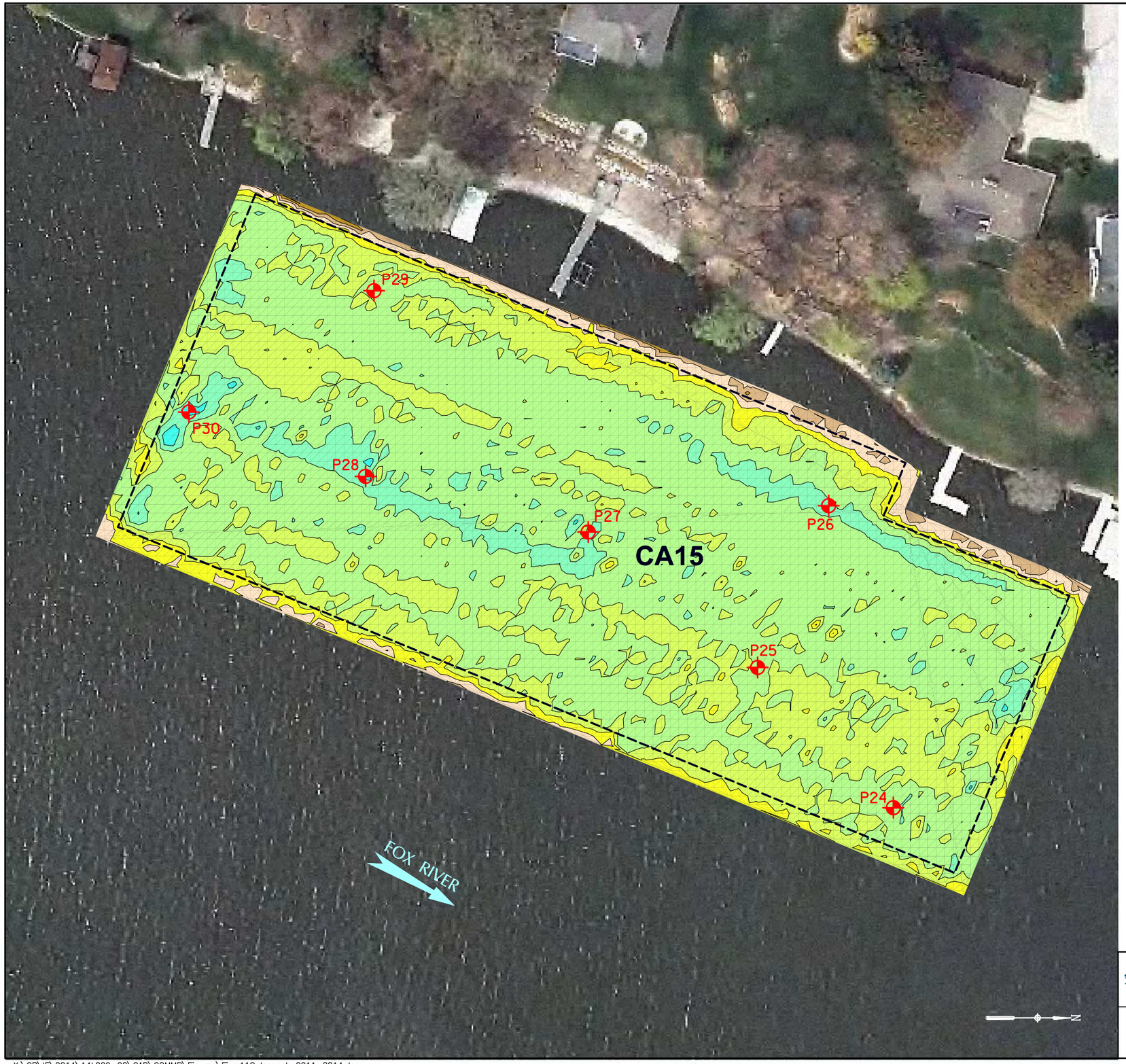

LEGEND

DESIGN CAP PLACEMENT LIMITS

P28 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 30′ 60′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 11C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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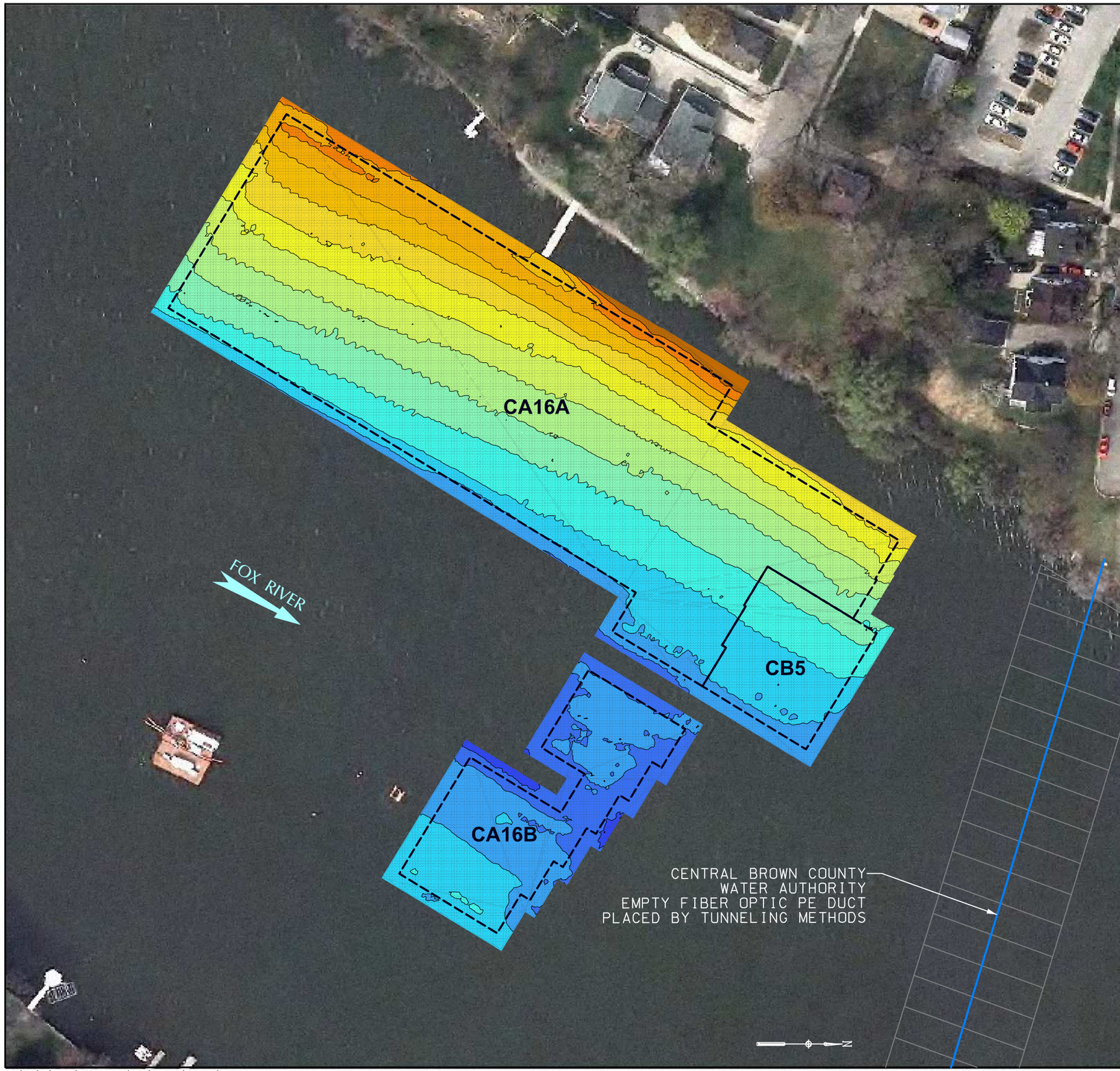

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 40' 80'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 12A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: OCTOBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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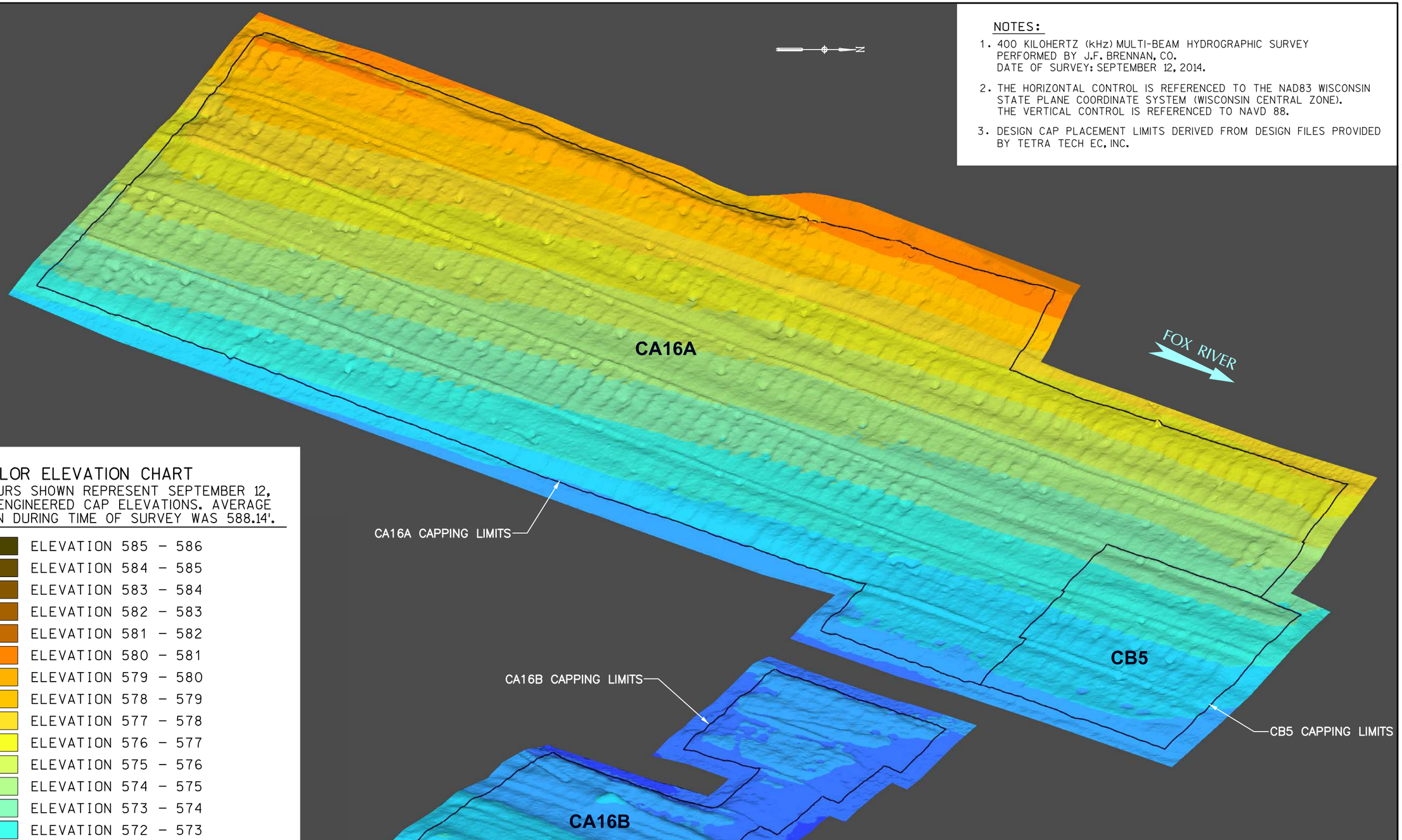
NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER	ELEVATION 585 – 586
	ELEVATION 584 – 585
	ELEVATION 583 – 584
	ELEVATION 582 – 583
	ELEVATION 581 – 582
	ELEVATION 580 – 581
	ELEVATION 579 – 580
	ELEVATION 578 – 579
	ELEVATION 577 – 578
WATER DEPTH	ELEVATION 576 – 577
	ELEVATION 575 – 576
	ELEVATION 574 – 575
	ELEVATION 573 – 574
	ELEVATION 572 – 573
	ELEVATION 571 – 572
	ELEVATION 570 – 571
	ELEVATION 569 – 570
	ELEVATION 568 – 569
	ELEVATION 567 – 568
DEEPER	ELEVATION 566 – 567

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 12B

LOWER FOX RIVER – OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

P18 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 40′ 80′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 12C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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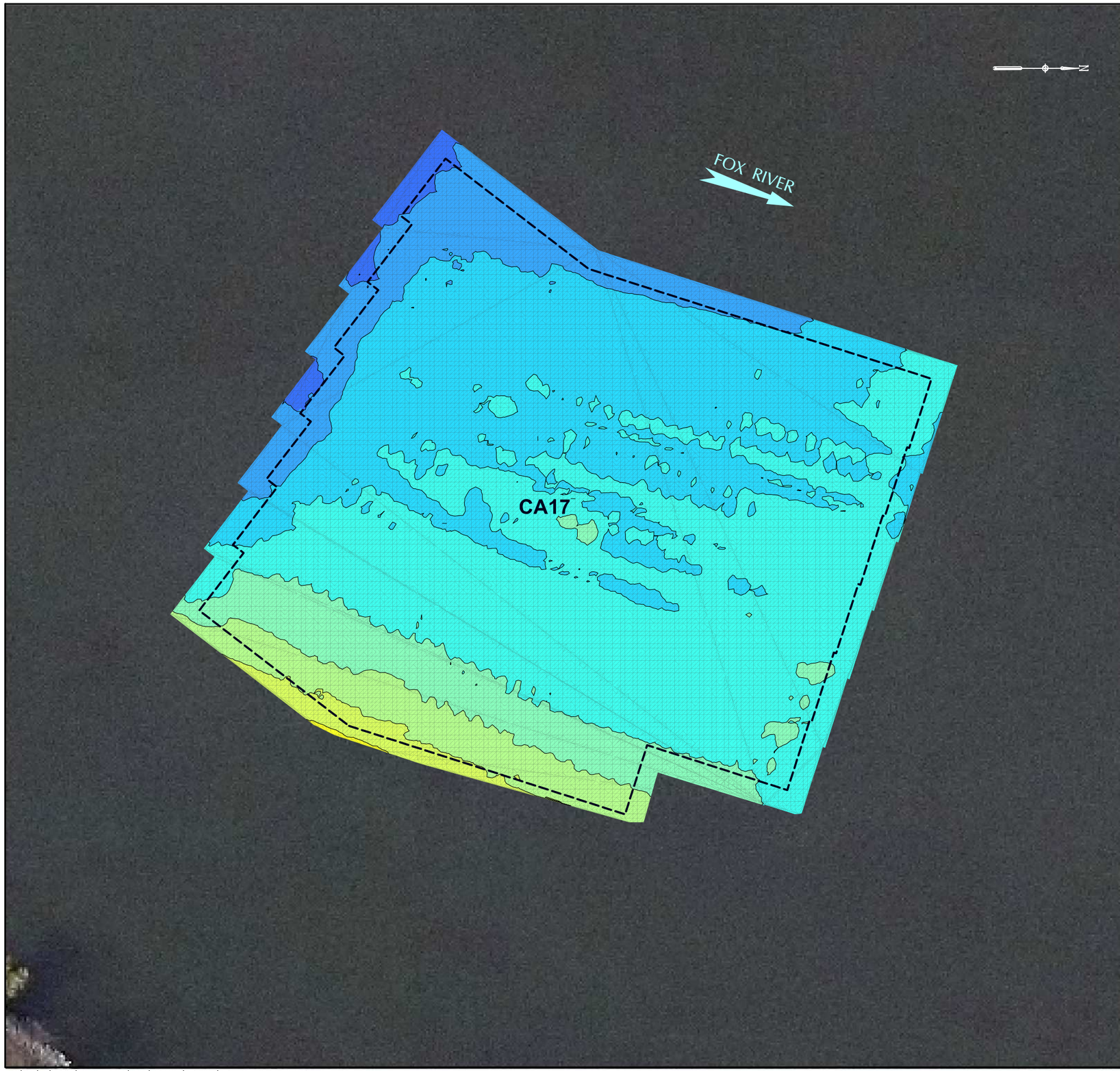

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 13A

LOWER FOX RIVER – OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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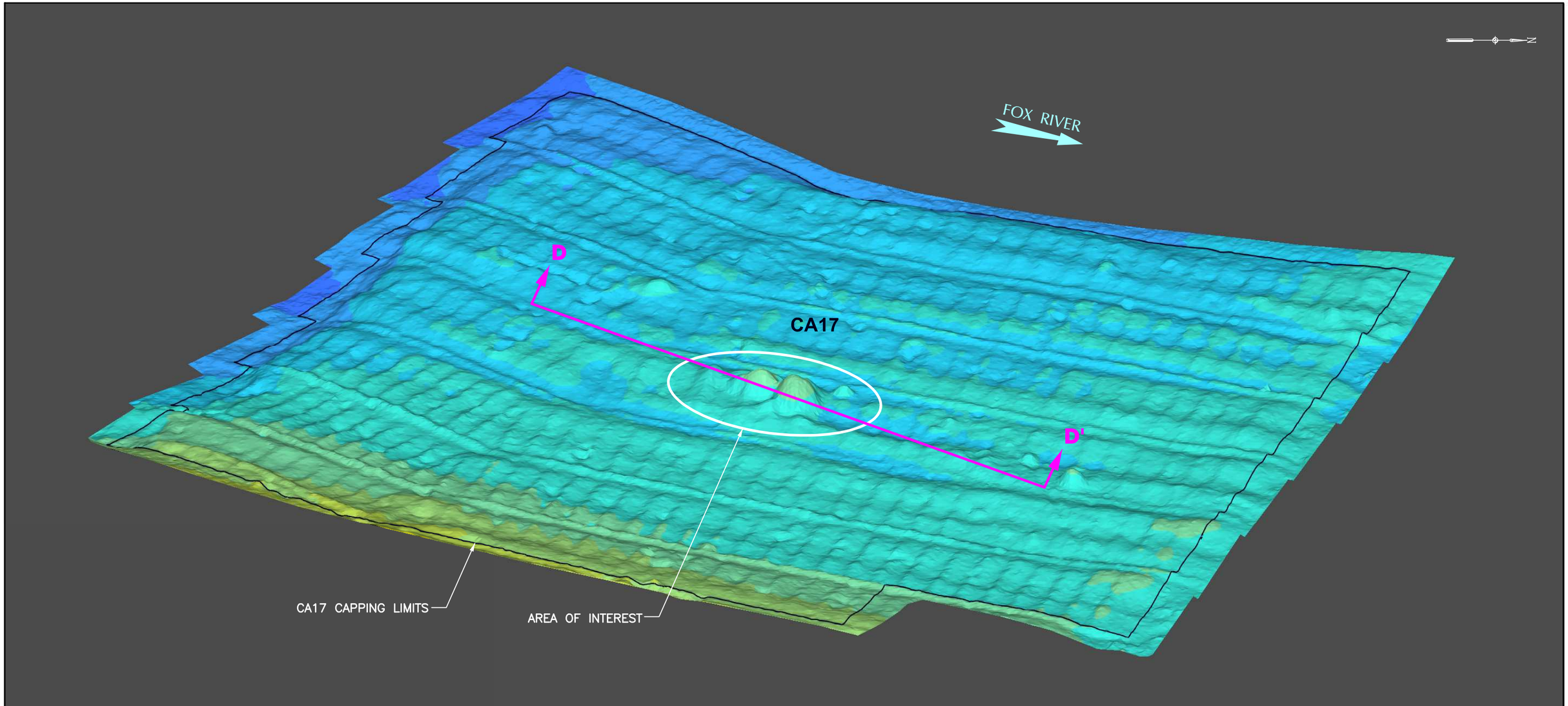

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 13B

LOWER FOX RIVER – OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

P8 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25′ 50′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 13C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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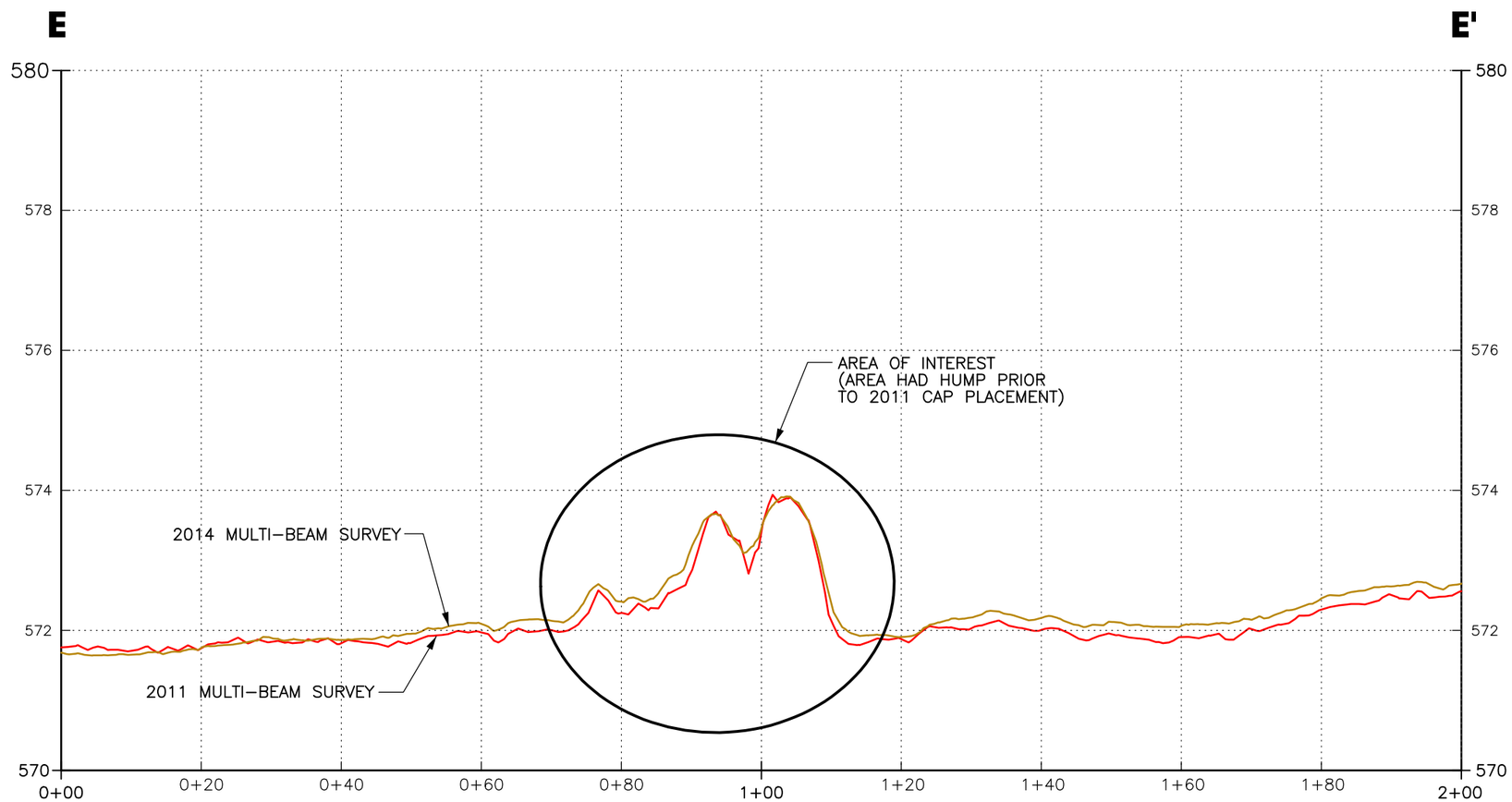

SECTION E - E'

Foth	LOWER FOX RIVER REMEDIATION LLC.
	FIGURE 13D LOWER FOX RIVER - OU3 CROSS SECTION E - E'
SCALE: AS SHOWN	Date: DECEMBER, 2014 / Revision Date:
	Drawn By: JRB2 / Checked By: TMK1 / Scope: 14L029

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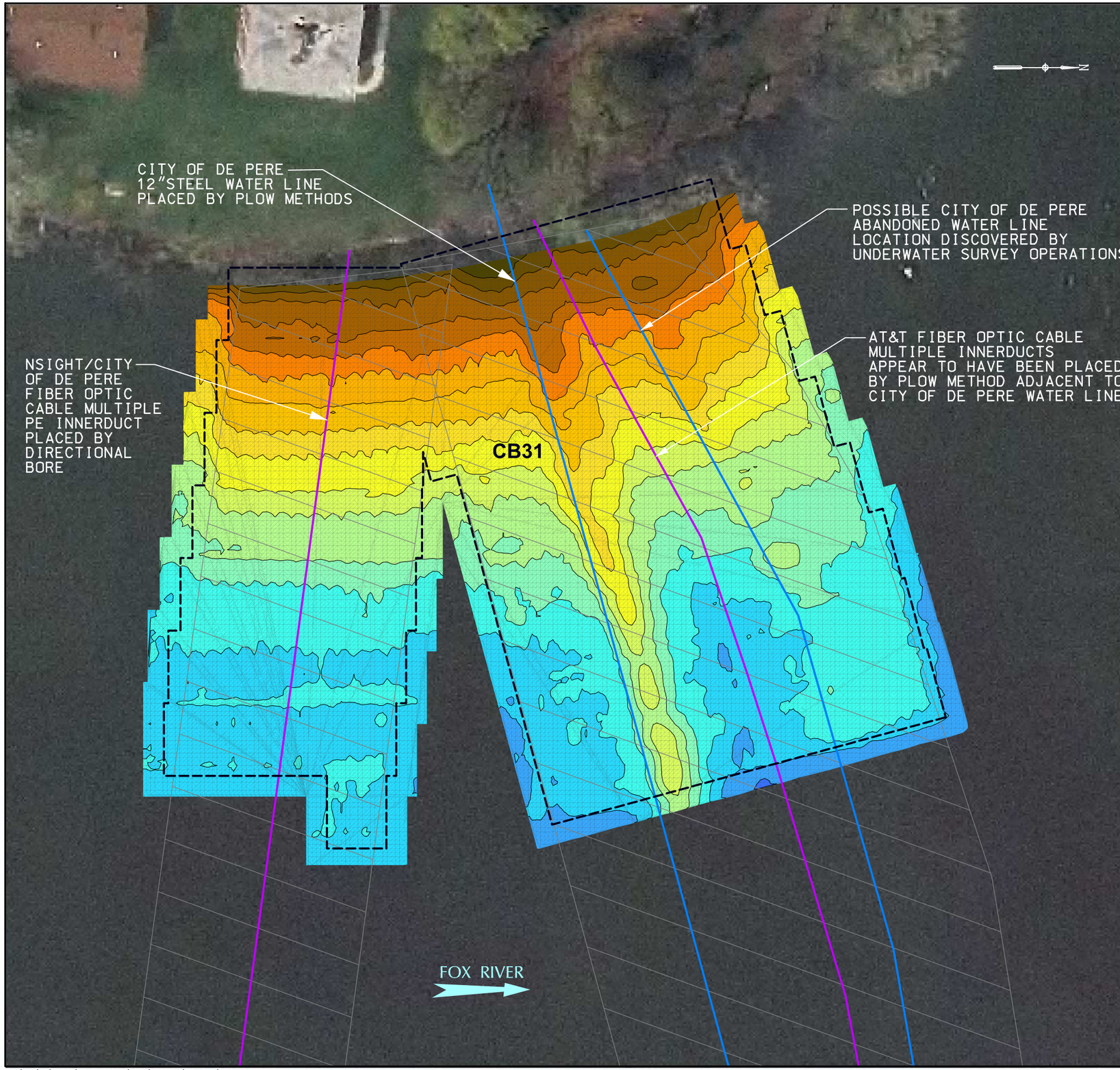

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITIES DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 14A

LOWER FOX RIVER – OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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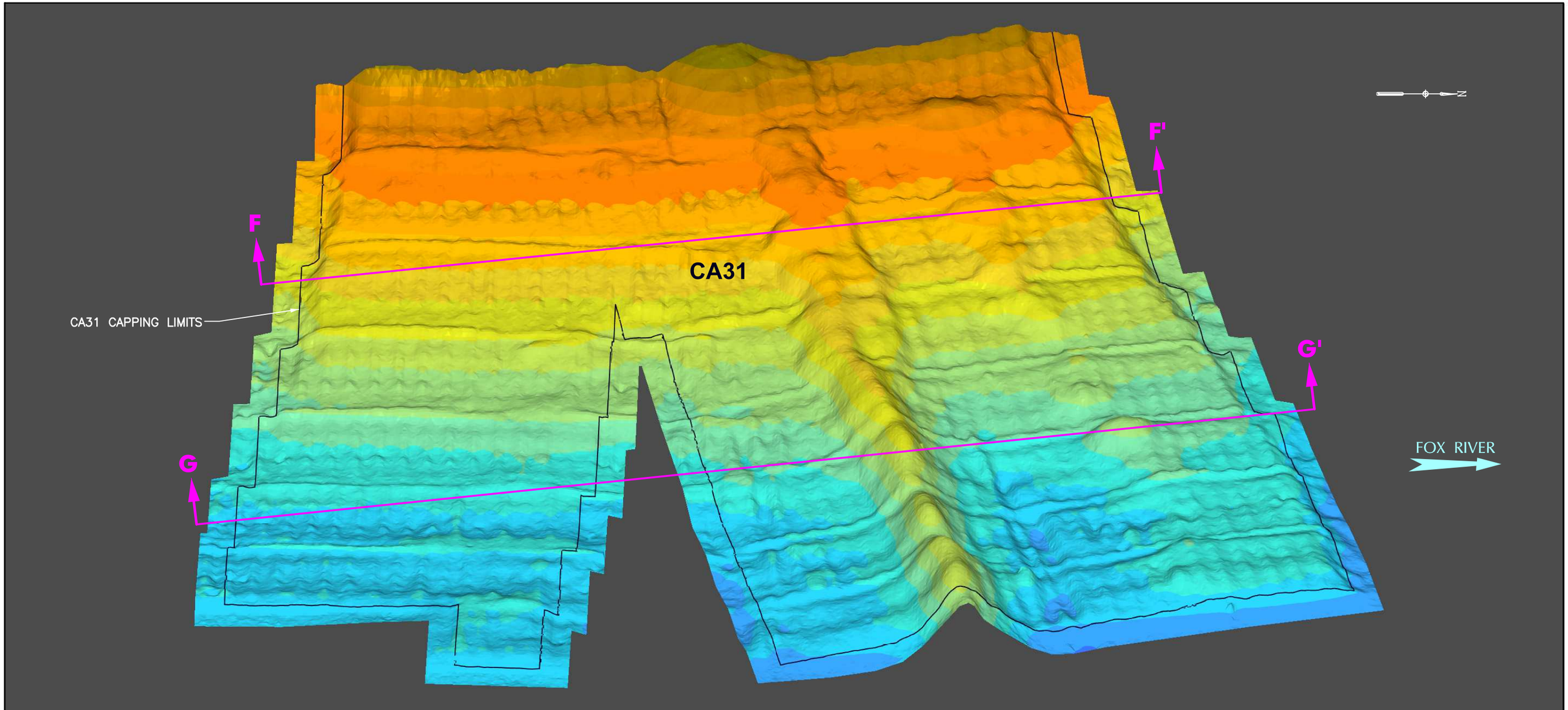

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 14B
LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: OCTOBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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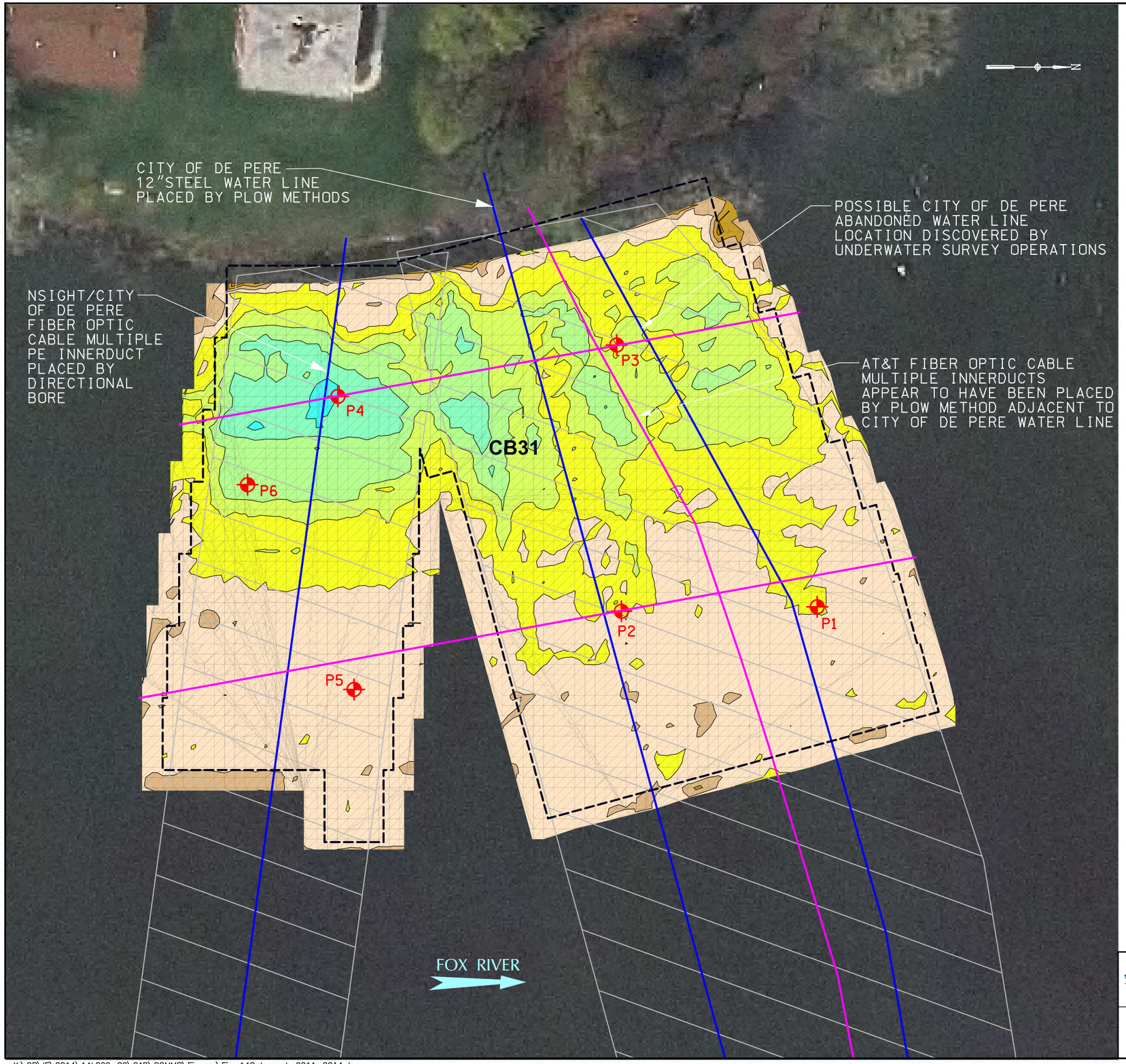

LEGEND

DESIGN CAP PLACEMENT LIMITS

P3 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2014 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

1. MULTI-BEAM HYDROGRAPHIC SURVEYS PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2-3, 2011 & SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 14C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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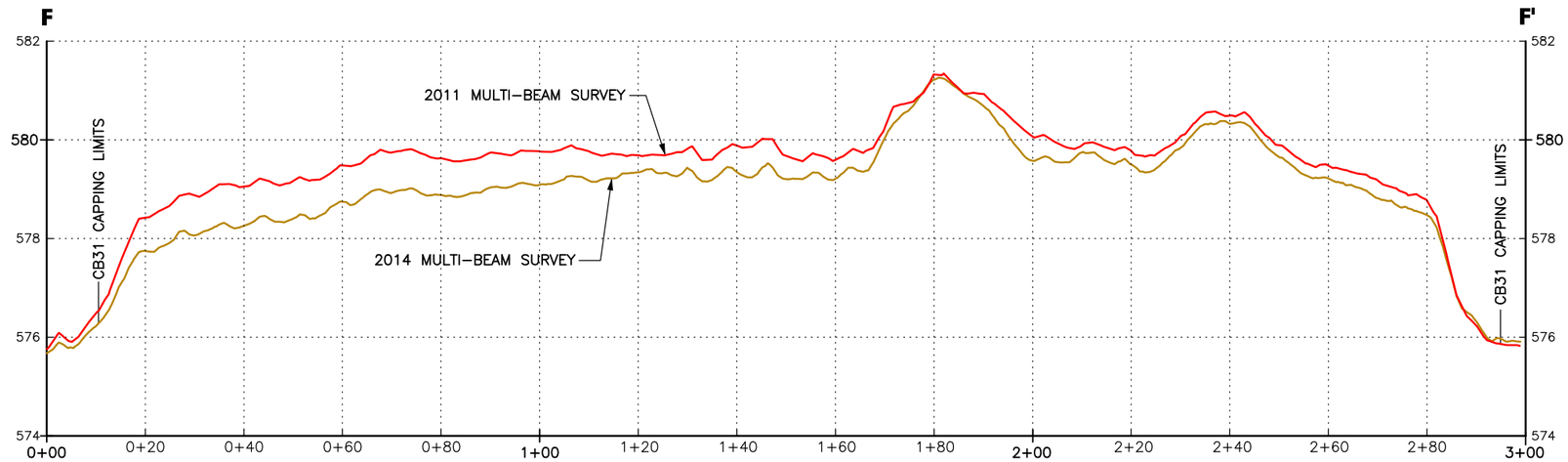
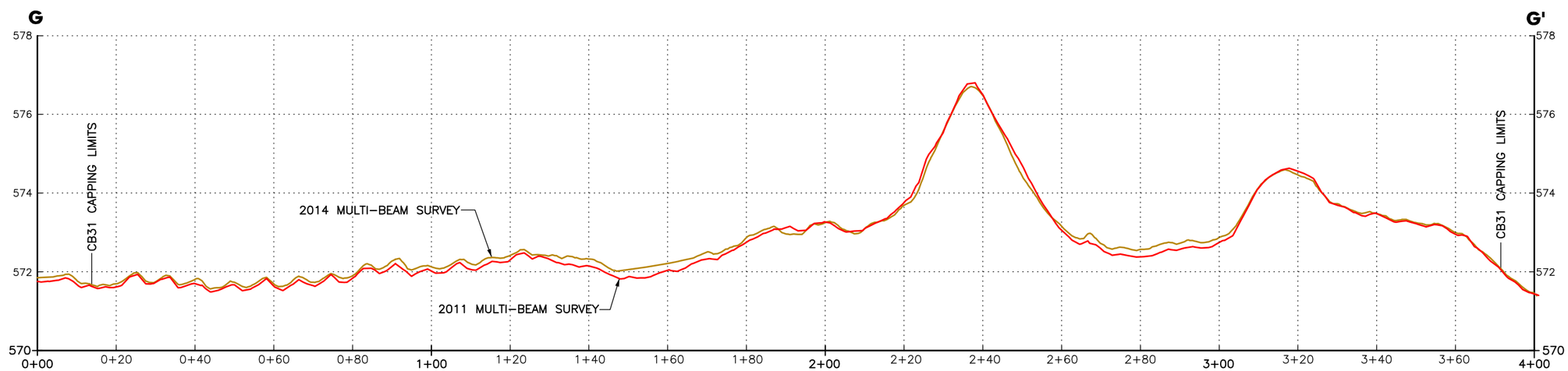


SECTION F - F'



SECTION G - G'

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 14D
LOWER FOX RIVER - OU3
CROSS SECTIONS
F - F' & G - G'

Foth

SCALE: AS SHOWN

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 15A

LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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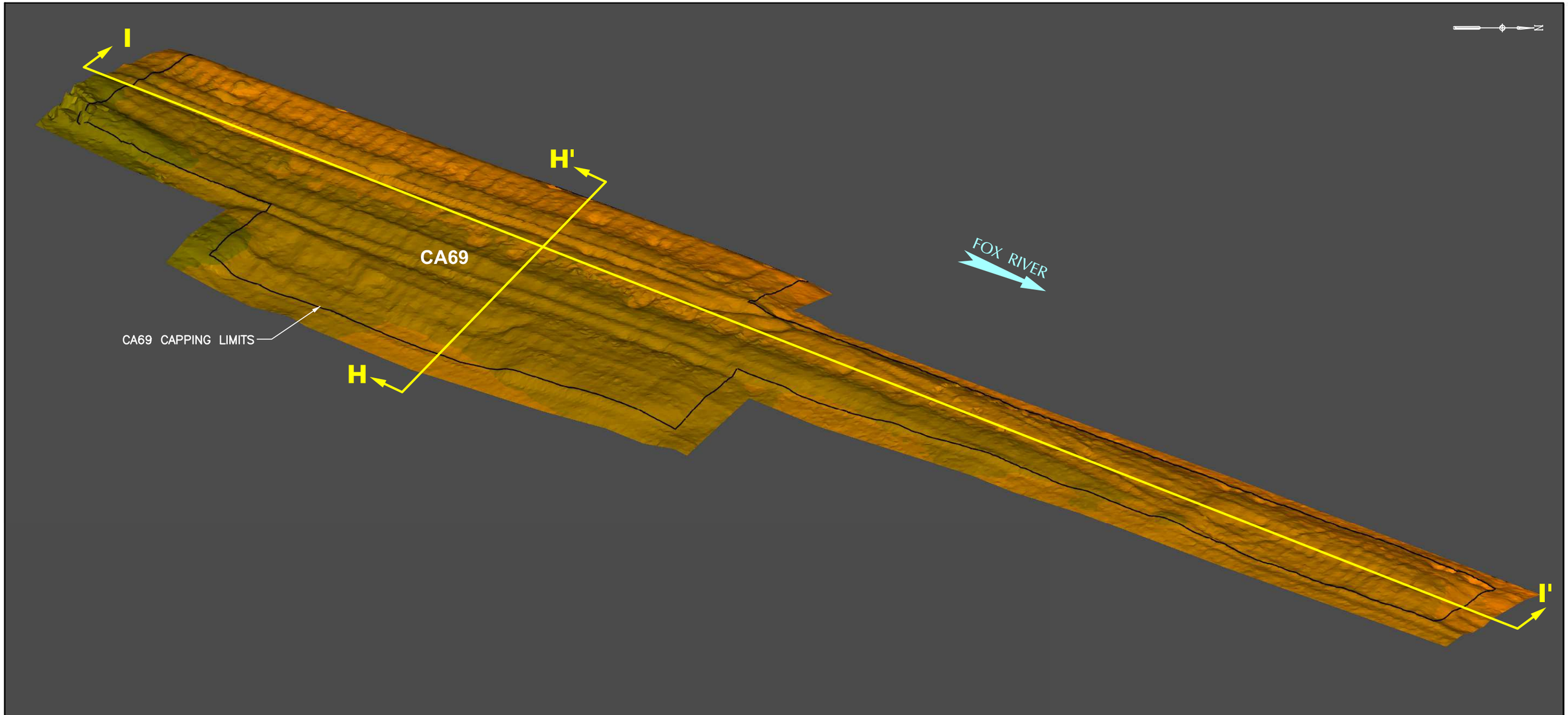

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT SEPTEMBER 12, 2014 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 15B
LOWER FOX RIVER - OU3
2014 TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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LEGEND

DESIGN CAP PLACEMENT LIMITS

P62 CAP POLING/PROBING LOCATIONS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2-3, 2011 TO SEPTEMBER 12, 2014 SURVEYS

2014 MULTI-BEAM SURVEY HIGHER THAN 2011 SINGLE BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2014 MULTI-BEAM SURVEY LOWER THAN 2011 SINGLE BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. 200 KILOHERTZ (kHZ) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: NOVEMBER 2-3, 2011.

   400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: SEPTEMBER 12, 2014.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25′ 50′
BAR SCALE

LOWER FOX RIVER REMEDIATION LLC.

FIGURE 15C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV. 2011 & SEPT. 2014 POST-CAPPING SURVEYS

Date: DECEMBER, 2014	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 14L029

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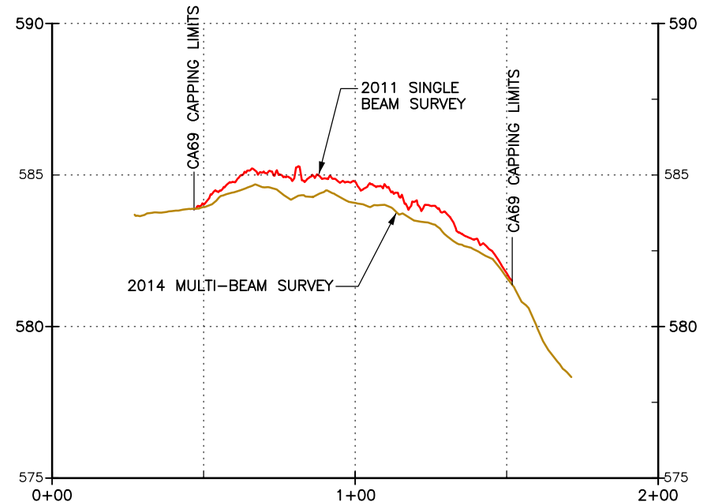
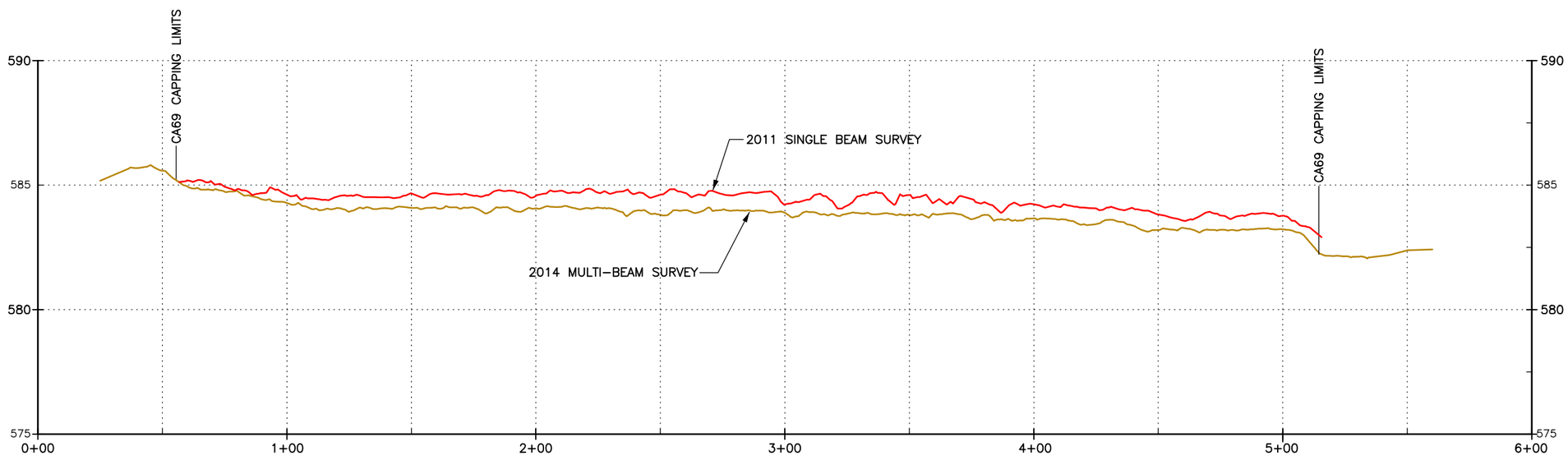


SECTION H - H'



SECTION I - I'

Foth	LOWER FOX RIVER REMEDIATION LLC.
	FIGURE 15D LOWER FOX RIVER - OU3 CROSS SECTIONS H - H' & I - I'
SCALE: AS SHOWN	Date: DECEMBER, 2014 Revision Date:
	Drawn By: JRB2 Checked By: TMK1 Scope: 14L029

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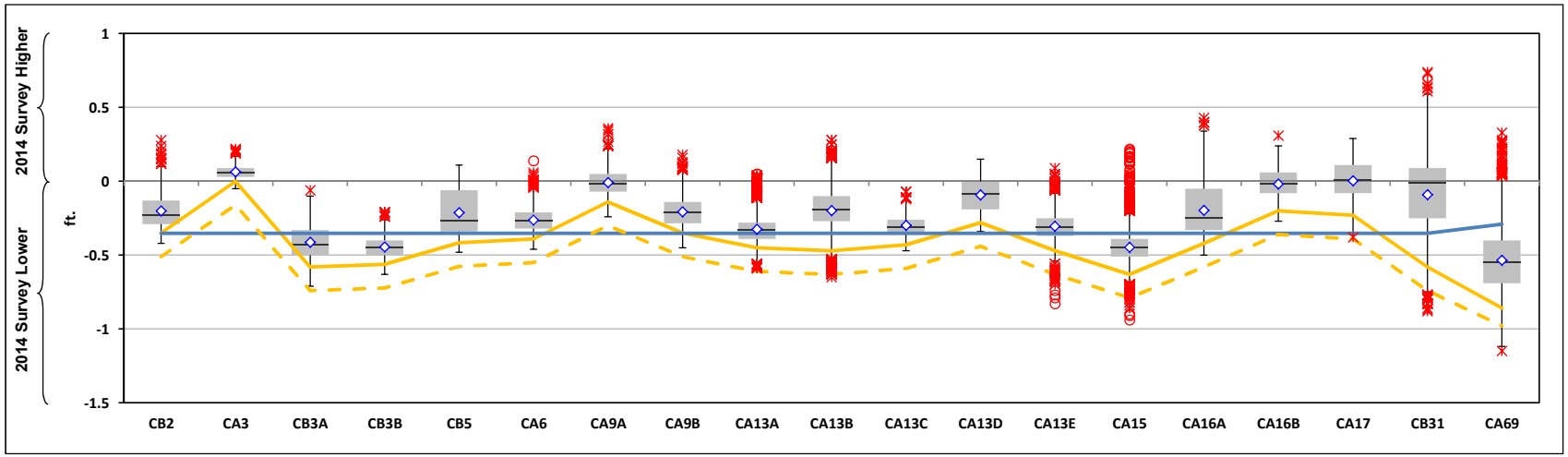
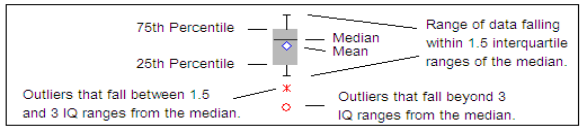
Boxplot Distributions of Survey Differences for 2014 (400 kHz Multi-beam) Minus 2011 (200 kHz Multi-Beam[1])



n:	1943	535	1015	374	407	952	2511	3895	7429	9634	202	672	1444	4267	3683	685	2650	3107	4643
5th Percentile:	-0.35	0.00	-0.58	-0.56	-0.42	-0.39	-0.14	-0.35	-0.45	-0.47	-0.43	-0.28	-0.47	-0.63	-0.42	-0.20	-0.23	-0.58	-0.86
50th Percentile:	-0.23	0.06	-0.43	-0.45	-0.27	-0.27	-0.02	-0.21	-0.33	-0.19	-0.31	-0.09	-0.31	-0.45	-0.25	-0.02	0.01	-0.01	-0.55
95th Percentile:	0.01	0.14	-0.23	-0.31	0.04	-0.09	0.13	-0.05	-0.14	0.03	-0.11	0.07	-0.11	-0.27	0.10	0.14	0.17	0.18	-0.15
Vertical Error[2]:	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.29
5th Percentile Plus Bias[3]:	-0.51	-0.16	-0.74	-0.72	-0.58	-0.55	-0.30	-0.51	-0.61	-0.63	-0.59	-0.44	-0.63	-0.79	-0.58	-0.36	-0.39	-0.74	-0.98

Boxplot Legend:



Notes: [1]A 400 kHz multi-beam survey was performed in all areas during 2014. A 200 kHz multi-beam survey was performed in all areas during 2011, with the exception of CA69, in which a 200 kHz single beam survey was performed.

[2]Combined vertical error estimate using propogation of errors formula $\sqrt{(Error^2_{Survey1} + Error^2_{Survey2})}$ applying the manufacturers vertical error estimate of 0.25 ft. for the 400 kHz multi-beam survey and 0.15 ft. for the 200 kHz single beam survey.

[3]Estimated bias factors were calculated between 455 kHz and 200 kHz surveys in the October 31, 2011 Foth techincal memorandum *Lower Fox River OU1 Cap Monitoring Maintenance Plan - Hydrographic Survey Comparison - 455 kHz vs. 200 kHz Multi-Beam Bias (Nov. 2010)*. The bias between 455 kHz and 200 kHz multi-beam surveys was estimated at 0.16 ft., with the 455 kHz survey giving the higher reading. The bias between the 455 kHz multi-beam and 200 kHz single beam surveys was estimated at 0.12 ft., again with the 455 kHz survey giving the higher reading. While the current 2014 survey was performed at a frequency of 400 kHz, the bias estimates are included for comparison.

Foth

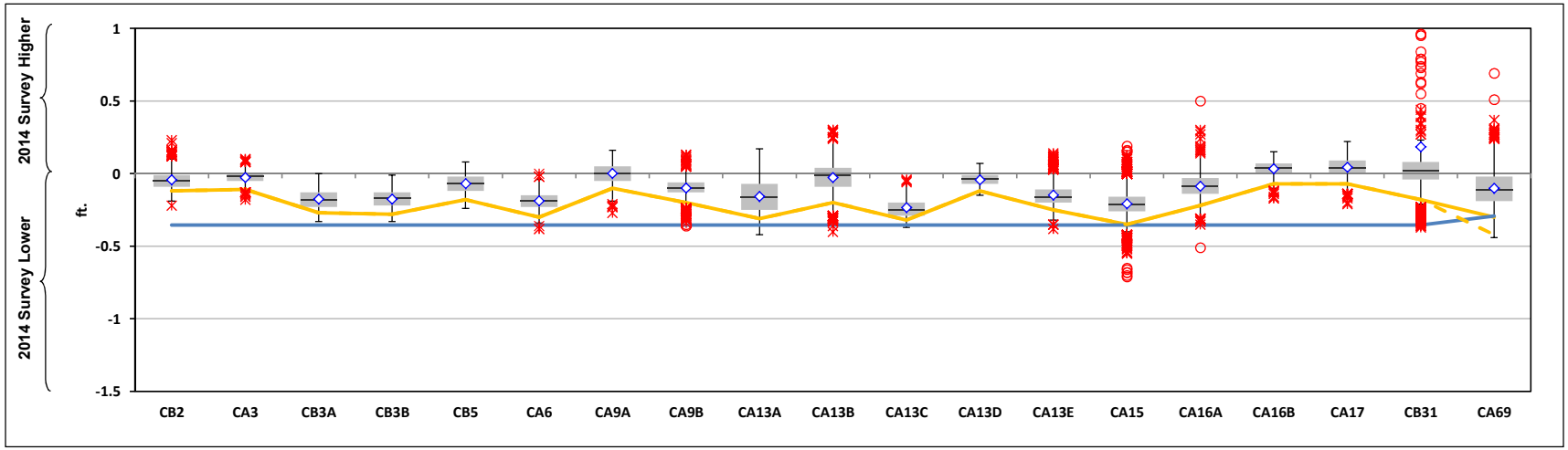
LOWER FOX RIVER REMEDIATION LLC

FIGURE 16
DISTRIBTUIONS OF SURVEY DIFFERENCES
FOR 2014 AND 2011

Date: DECEMBER 2014	Revision Date:	
Drawn By: SGL	Checked By: TMK1	Scope: 14L029

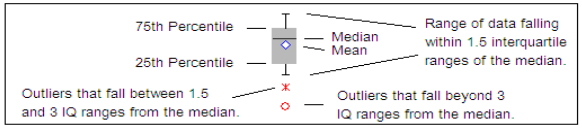
Path: X:\GB\IE\2014\14L029-00\10300 Draft Reports and Docs\OU3 Year 3 COMMP\Bathymetry Data Comparisons\[2011_MB_to_2014 All Areas.xlsx]Boxplots

Boxplot Distributions of Survey Differences for 2014 (400 kHz Multi-beam) Minus 2012 (400 kHz Multi-Beam[1])



n:	1943	535	1015	374	407	952	2511	3895	7429	9634	202	672	1444	4261	3683	685	2650	3105	2644
5th Percentile:	-0.12	-0.11	-0.27	-0.28	-0.18	-0.30	-0.10	-0.20	-0.31	-0.20	-0.32	-0.12	-0.25	-0.35	-0.22	-0.07	-0.07	-0.18	-0.30
50th Percentile:	-0.05	-0.02	-0.18	-0.17	-0.07	-0.19	0.00	-0.10	-0.16	-0.01	-0.25	-0.04	-0.16	-0.21	-0.09	0.04	0.04	0.02	-0.11
95th Percentile:	0.06	0.05	-0.07	-0.07	0.04	-0.07	0.11	-0.01	0.01	0.11	-0.09	0.02	0.00	-0.06	0.05	0.12	0.15	0.76	0.12
Vertical Error[2]:	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.35	-0.29
5th Percentile Plus Bias[3]:	-0.12	-0.11	-0.27	-0.28	-0.18	-0.30	-0.10	-0.20	-0.31	-0.20	-0.32	-0.12	-0.25	-0.35	-0.22	-0.07	-0.07	-0.18	-0.42

Boxplot Legend:



Notes: [1]A 400 kHz multi-beam survey was performed in all areas with the exception of CA69 in 2012, during which a 200 kHz single beam survey was performed.

[2]Combined vertical error estimate using propogation of errors formula $\sqrt{(Error^2_{Survey1} + Error^2_{Survey2})}$ applying the manufacturers vertical error estimate of 0.25 ft. for the 400 kHz multi-beam survey and 0.15 ft. for the 200 kHz single beam survey.

[3]Since 400 kHz multi-beam surveys were used for all areas in 2012 and 2014 except CA69, CA69 is the only area where a bias factor is considered. Estimated bias factors were calculated between 455 kHz and 200 kHz surveys in the October 31, 2011 Foth techincal memorandum *Lower Fox River OU1 Cap Monitoring Maintenance Plan - Hydrographic Survey Comparison - 455 kHz vs. 200 kHz Multi-Beam Bias (Nov. 2010)*. In the 2011 memorandum, the bias estimate presented between the 455 kHz multi-beam and 200 kHz single beam surveys was 0.12 ft., with the 455 kHz survey giving the higher reading. While the current 2014 survey was performed at a frequency of 400 kHz, the bias estimates are included for comparison.

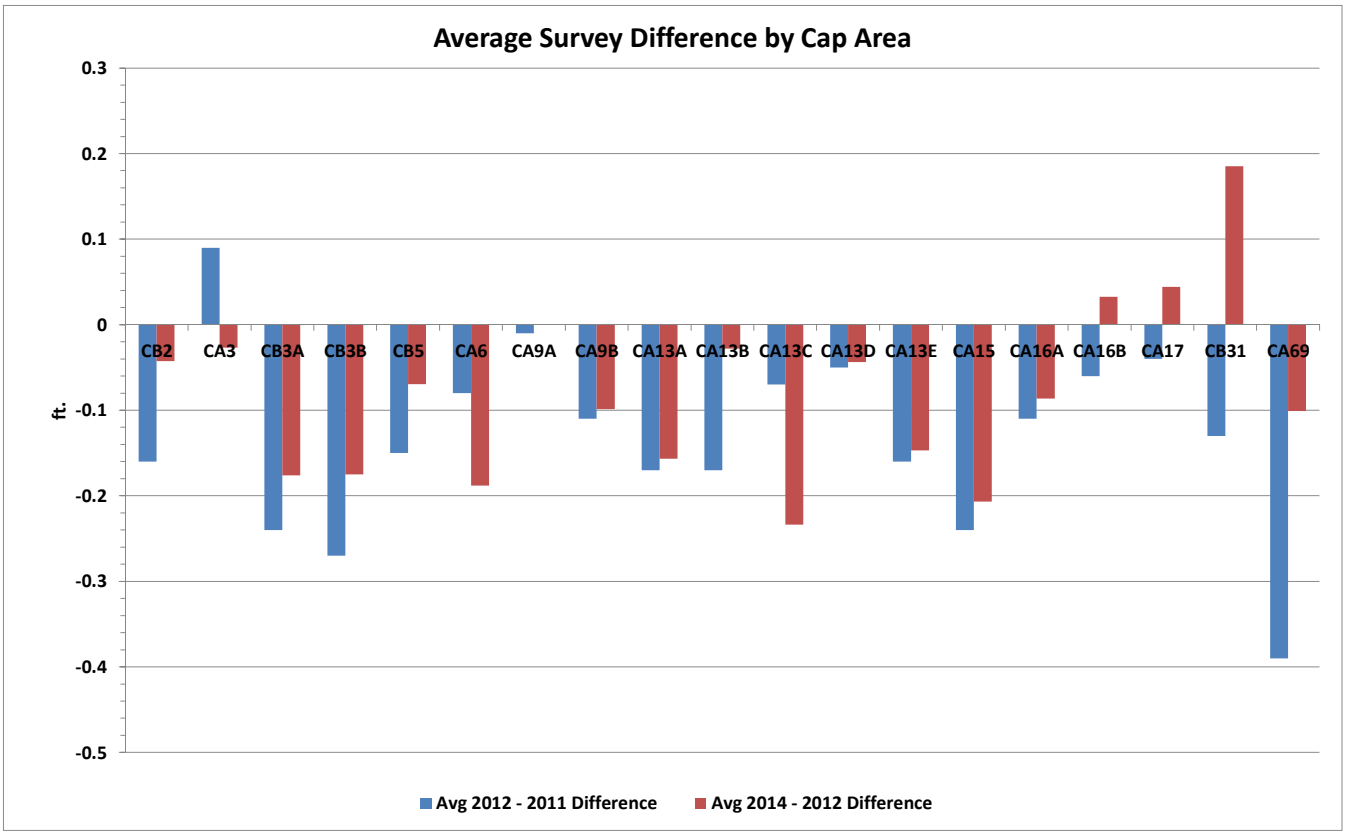
Foth

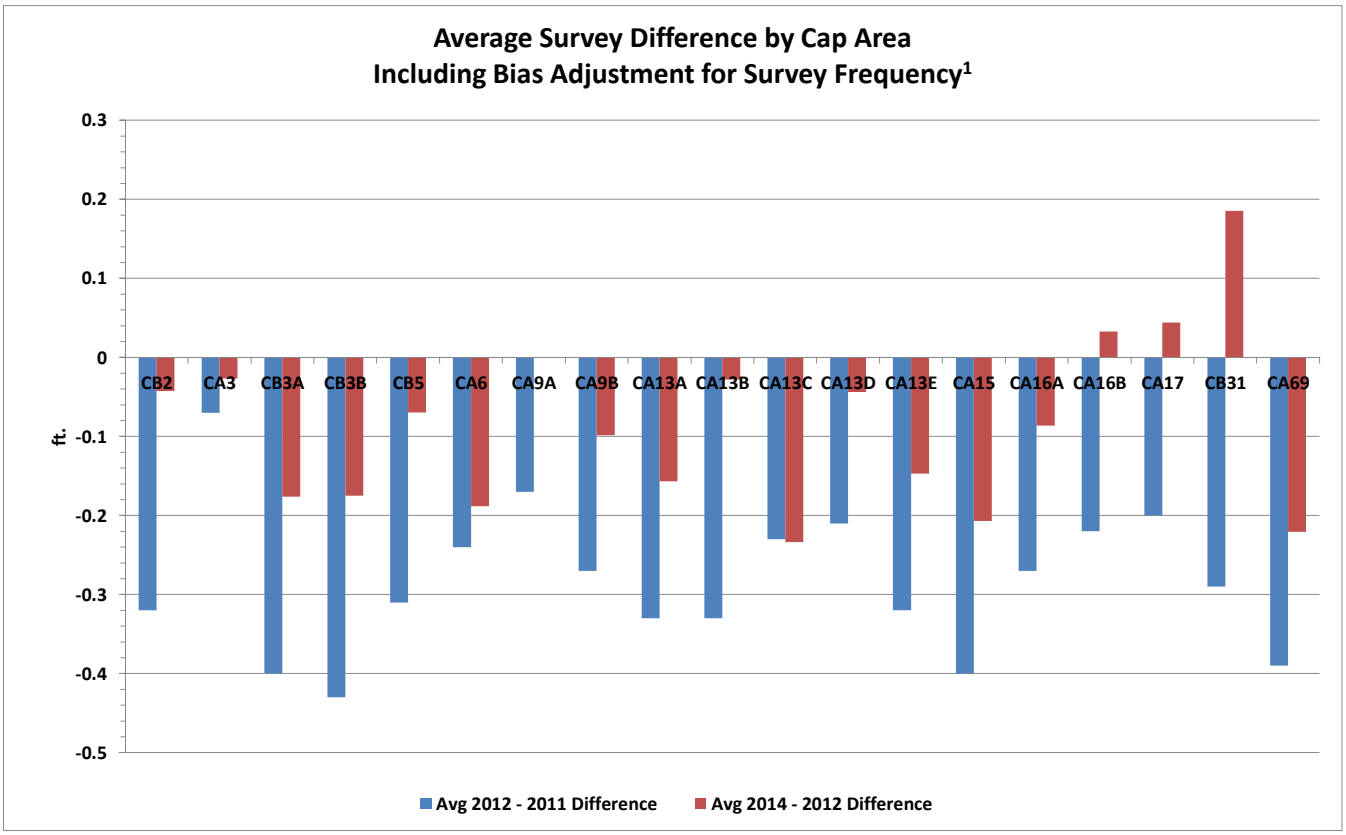
LOWER FOX RIVER REMEDIATION LLC

FIGURE 17
DISTRIBTUIONS OF SURVEY DIFFERENCES
FOR 2014 AND 2012

Date: DECEMBER 2014	Revision Date:	
Drawn By: SGL	Checked By: TMK1	Scope: 14L029

Path: X:\GB\IE\2014\14L029-00\10300 Draft Reports and Docs\OU3 Year 3 COMMP\Bathymetry Data Comparisons\[2012_MB_to_2014 All Areas.xlsx]Figure





[1]Estimated bias factors were calculated between 455 kHz and 200 kHz surveys in the October 31, 2011 Foth techincal memorandum *Lower Fox River OU1 Cap Monitoring Maintenance Plan - Hydrographic Survey Comparison - 455 kHz vs. 200 kHz Multi-Beam Bias (Nov. 2010)*. The bias between 455 kHz and 200 kHz multi-beam surveys was estimated at 0.16 ft., with the 455 kHz survey giving the higher reading. The bias between the 455 kHz multi-beam and 200 kHz single beam surveys was estimated at 0.12 ft., again with the 455 kHz survey giving the higher reading. While the current 2014 survey was performed at a frequency of 400 kHz, the bias estimates are included for comparison.

Foth

LOWER FOX RIVER REMEDIATION LLC		
FIGURE 18 AVERAGE SURVEY DIFFERENCE BY CCU 2012-2011 AND 2014-2012		
Date: DECEMBER 2014	Revision Date:	
Drawn By: SGL	Checked By: TMK1	Scope: 14L029

Path: X:\GB\IE\2014\14L029-00\10300 Draft Reports and Docs\OU3 Year 3 COMMP\Bathymetry Data Comparisons\[Average Reductions.xlsx]Figure

Attachment A

LFR OU3 COMMP Hydrographic Survey-Year Zero
(Foth memorandum dated April 26, 2012)

Memorandum

2737 South Ridge Road, Suite 600
P.O. Box 11295 • Green Bay, WI 54307-1295
(920) 497-2500 • Fax: (920) 497-8516
www.foth.com

April 26, 2012

TO: Jim Hahnenberg, U.S. Environmental Protection Agency
Beth Olson, Wisconsin Department of Natural Resources

CC: Jeff Lawson, Lower Fox River Remediation LLC
Sue O'Connell, Lower Fox River Remediation LLC
Bryan Heath, NCR Corporation
George Berken, Boldt Technical Services
Gary Kincaid, Wisconsin Department of Natural Resources
Denis Roznowski, Foth

FR: Troy Gawronski, Foth

RE: Lower Fox River OU3 *COMMP* Hydrographic Survey – Year Zero

Background

The Lower Fox River Remediation LLC (LLC) retained Foth Infrastructure & Environment, LLC (Foth) to document the methodology employed for and the results of the Year Zero hydrographic survey in compliance with requirements of The *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan* (*COMMP*) for the Lower Fox River Operable Units 2-5 (Anchor QEA and Tetra Tech EC, 2009), which was approved by the Agencies/Oversight Team (A/OT) on April 22, 2009. The *COMMP* describes post-placement cap monitoring activities that will be performed to provide a high level of assurance that the engineered caps retain their physical integrity and protectiveness over time. The *COMMP* also outlines contingency response actions that will be implemented if the engineered caps do not meet performance standards.

On June 29, 2011, the LLC met with representatives of the A/OT to discuss the *COMMP* to gain concurrence on the methods to be employed for monitoring of the engineered caps. Discussions during this meeting refined and clarified several items such as monitoring requirements and schedule. Meeting minutes for this meeting were drafted by TtEC and accepted by the A/OT on August 4, 2011 and are included as Attachment 1.

As part of the *COMMP* requirements, routine monitoring of all cap areas by geophysical methods (including sub-bottom profiling and/or hydrographic survey) will be completed. Further, the *COMMP* states the first routine monitoring of completed engineered caps shall be completed 2 years post-construction. This routine monitoring will include the

completion of a hydrographic survey to analyze the top of engineered cap elevations and the change in that surface, if any. In order to evaluate the change in top of cap elevation over time, a baseline or reference point needs to be established. Baseline cap elevations were established by completing a hydrographic survey of each cap in OU3 following completion of construction (Figures 1 and 2). The hydrographic survey documenting the baseline conditions has been termed the "Year Zero" survey.

This memorandum presents the methods utilized and the results of the Year Zero hydrographic survey for OU3.

Methods

In November 2011, J. F. Brennan Company (Brennan) completed hydrographic surveys of approximately 26.8 acres of engineered caps in OU3 in accordance with the *COMMP*. Foth audited Brennan's surveys. Auditing reports for the completion of these surveys are included as Attachment 2.

Because a vast majority of the caps are in areas with water depths of greater than 3 feet, a multi-beam survey system (200 kilohertz [kHZ]) was utilized to ensure the highest degree of accuracy and coverage. As discussed below, only one cap, CA 69, is located in less than 3 feet of water. This cap was surveyed using a 200 kHZ single-beam system which is more accurate for water depths less than 3 feet. (This area was approved as an exceptional area by the A/OT.) Overlap of the multi-beam survey swaths resulted in over 95% coverage of the survey project area, which meets or exceeds project specifications and industry standards.

Results

Upon completion of the hydrographic surveys, the data were processed and top of cap contours were created. For each cap in OU3 (excluding CA 69), Foth produced two figures to show top of cap elevations (Figures 3A and 3B through 14A and 14B). The first figure, in each series of two, shows the post construction top of cap elevation in a two dimensional plan view. This figure also shows the designed cap-placement limits. The second figure in the series shows a three dimensional (3-D) isometric view, which better depicts potential minor surface irregularities as compared to the two dimensional views. The results of these multi-beam surveys will be used as the baseline information for future monitoring events.

As stated previously, CA 69 was not included in the multi-beam survey as water depths were not sufficient to allow for the multi-beam survey system to be utilized; however, a baseline survey was completed using single-beam equipment. Figure 15 shows the results of the CA 69 single-beam survey that will be used as the baseline information for future monitoring events.

The Year Zero survey work was completed to serve as the baseline post-construction survey for engineered caps in OU3. The next post-cap monitoring event will be completed after an event-based trigger (e.g., a 20-year or greater flow event) or in the

next scheduled COMMP year-two post-construction survey in 2014. At that time, another hydrographic survey will be completed over the entire OU3 cap area following the same protocols summarized in the methods section of this memorandum and as described in more detail in the *COMMP*. Results from the next hydrographic survey will be compared to the baseline survey to assess integrity of the caps.

To supplement the survey information provided in this Year Zero *COMMP* reporting memorandum, we have also attached cap thickness verification data prepared by TtEC (Attachment 3). These data indicate that when applying A/OT approved statistical procedures, the minimum cap aggregate thicknesses were achieved in all cases.

The hydrographic survey data collected for the Year Zero cap monitoring indicate that the cap material in place meets the performance standards set forth in the *Lower Fox River Remedial Design 100% Design Report* (Tetra Tech et al., 2009 a and b) and the *COMMP,* and no irregularities were identified. These surveys will serve as the baseline for future surveys to assess long-term cap performance.

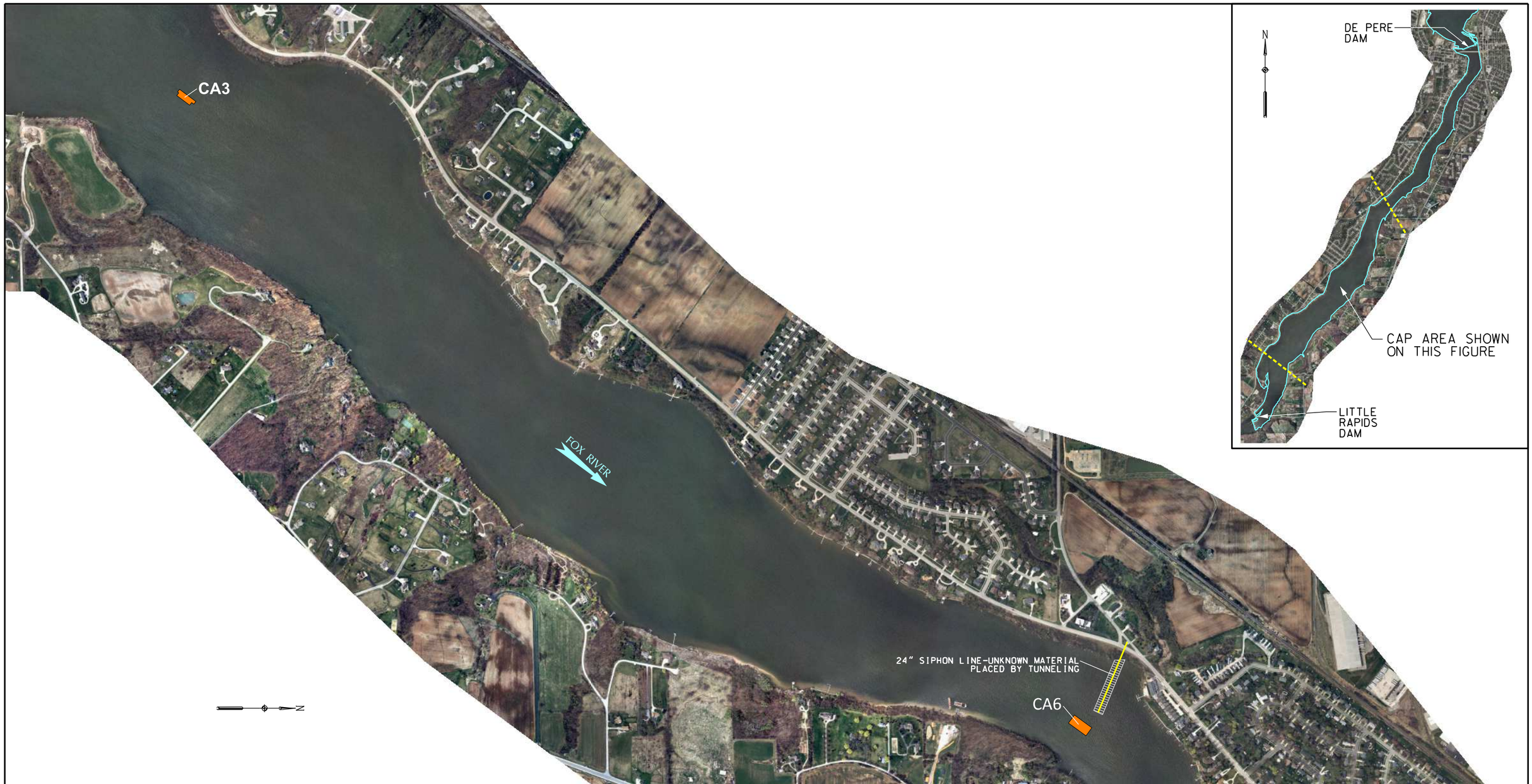
References

Anchor QEA, LLC and Tetra Tech EC, Inc., 2009. *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan*. Prepared for Appleton Papers Inc., Georgia-Pacific Consumer Products LP, and NCR Corporation. April 2009.

Tetra Tech EC, Inc., Anchor Environmental, L.L.C., J. F. Brennan Co, Inc., and Boskalis Dolman (Tetra Tech et al.). 2009a. *Lower Fox River Remedial Design; 100 Percent Design Report Volume 1*. Prepared for Appleton Papers Inc., Georgia-Pacific Consumer Products LP, and NCR Corporation. April 2009.

Tetra Tech EC, Inc., Anchor QEA, L.L.C., J. F. Brennan Co, Inc., and Boskalis Dolman (Tetra Tech et al.). 2009b. *Lower Fox River Remedial Design; 100 Percent Design Report Volume 2*. Prepared for Appleton Papers Inc., Georgia-Pacific Consumer Products LP, and NCR Corporation. November 2009.

Figures



LEGEND

CA6 — DESIGN CAP PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS and UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 500' 1000'
BAR SCALE

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FIGURE 1

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-1 All Caps.dgn
1/23/2012 jrb2

LEGEND

CA15 "A" CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

CB31 "B" CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 500' 1000'
BAR SCALE

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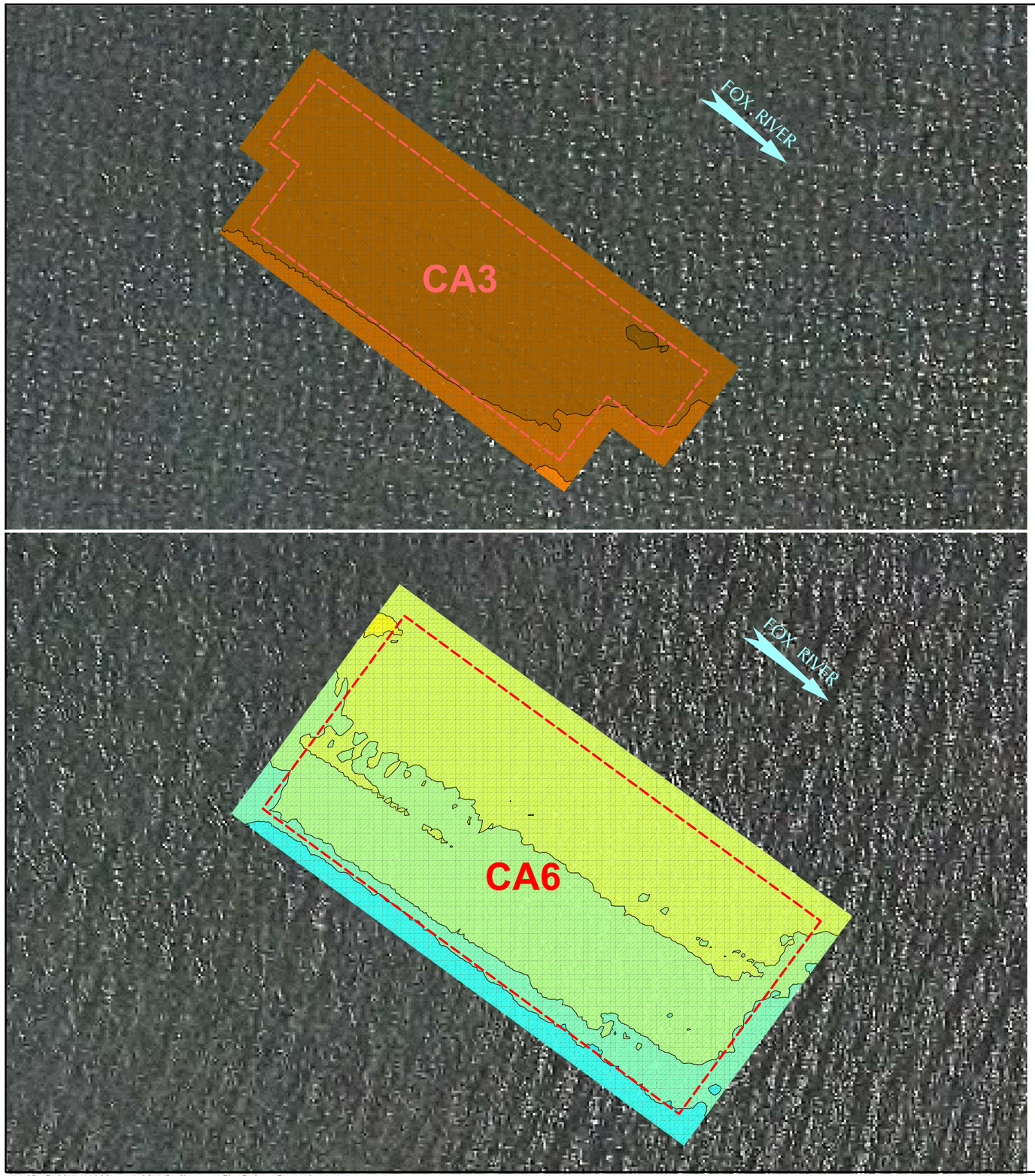
LOWER FOX RIVER REMEDIATION LLC

FIGURE 2

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-2 All Caps.dgn
1/23/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25′ 50′
BAR SCALE

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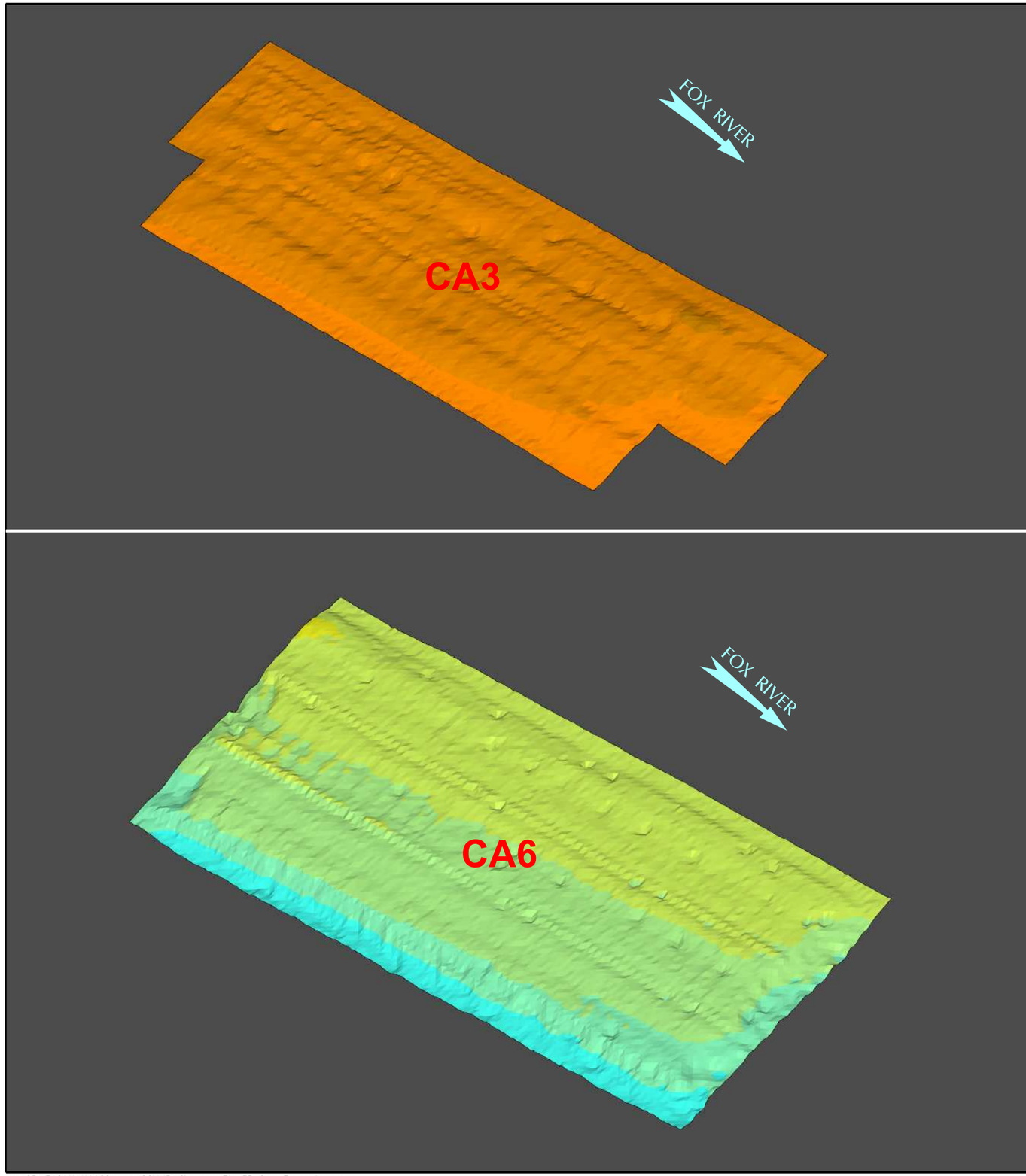
FIGURE 3A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-3 Cap Elevations.dgn
1/21/2012 jrb2



N

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 3B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-3B Cap Elevations.dgn
1/21/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25′ 50′
BAR SCALE

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FIGURE 4A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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1/20/2012 jrb2

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 4B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-4B Cap Elevations..dgn
1/21/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
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3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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FIGURE 5A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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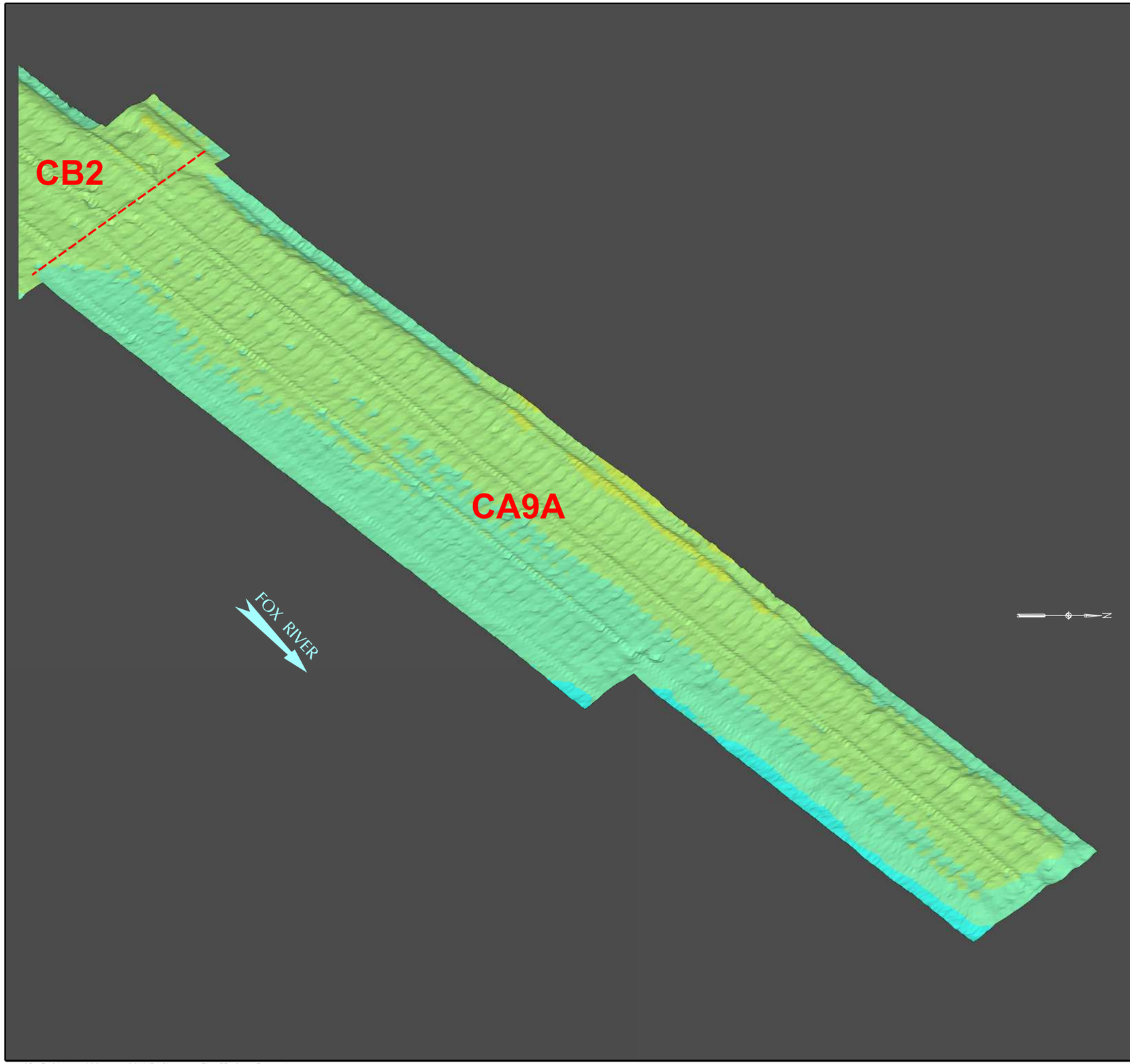
1/20/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
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   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 5B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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1/21/2012 jrb2

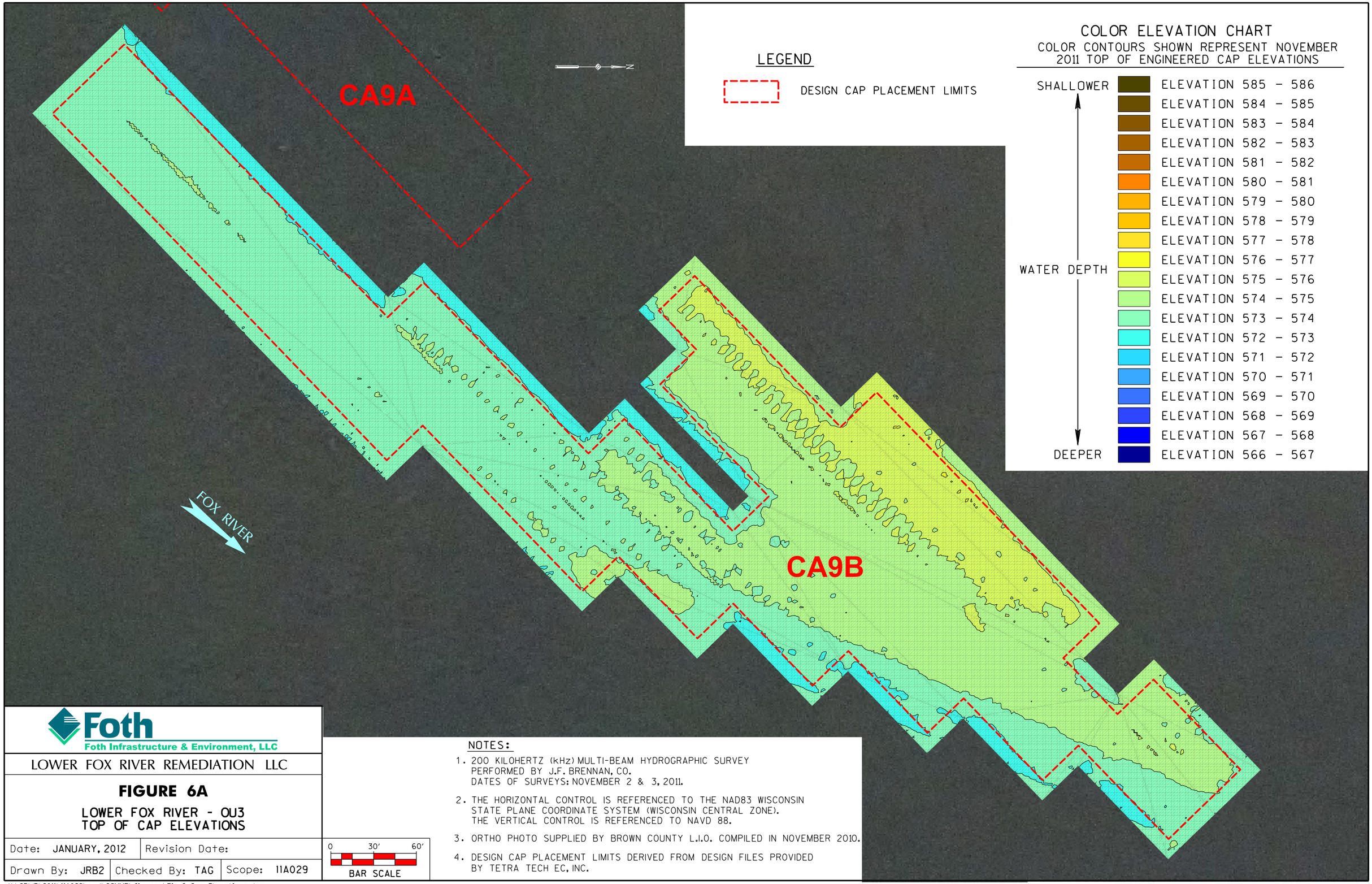

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FIGURE 6A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
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3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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1/23/2012 jrb2

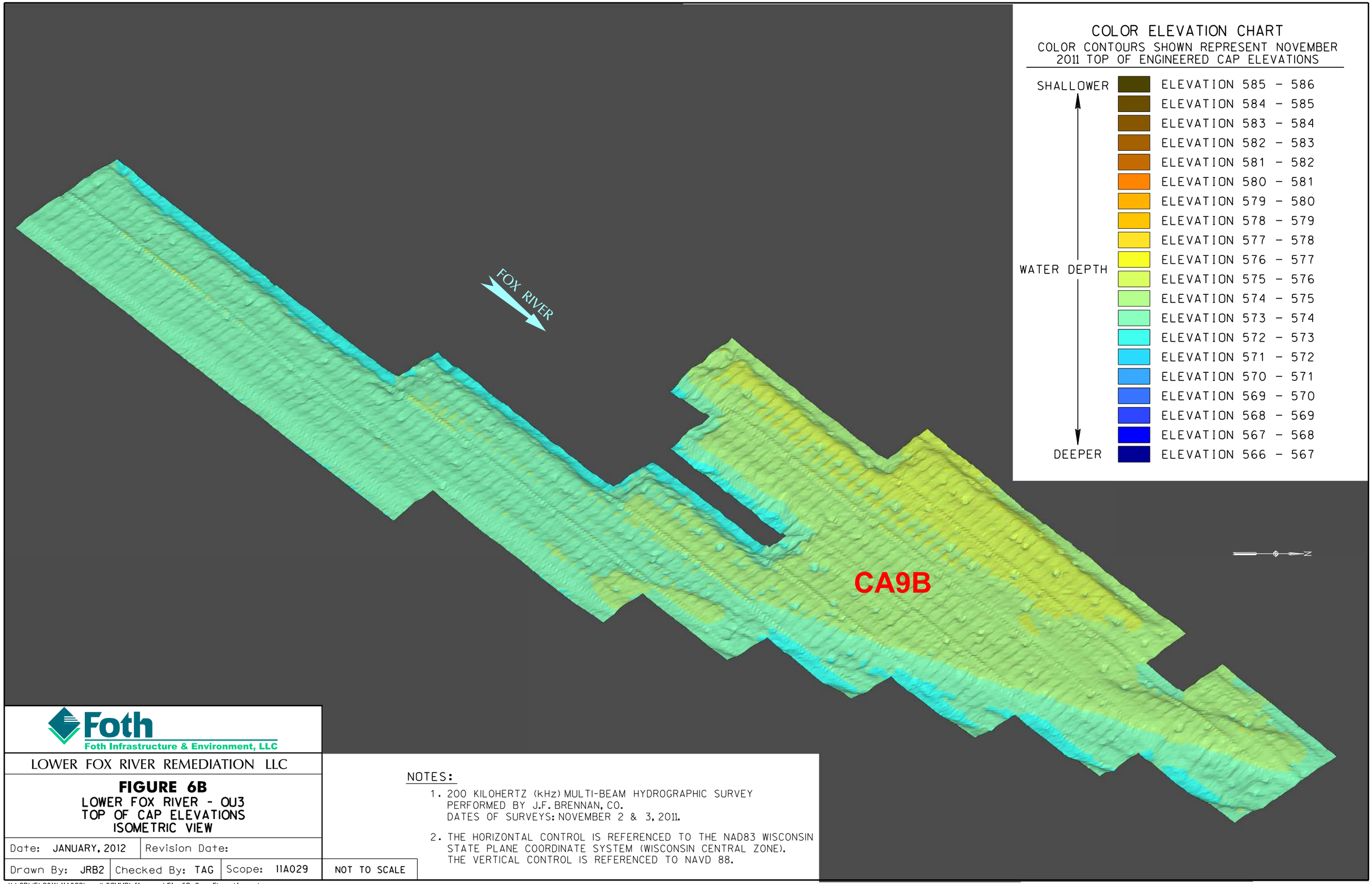

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FIGURE 6B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
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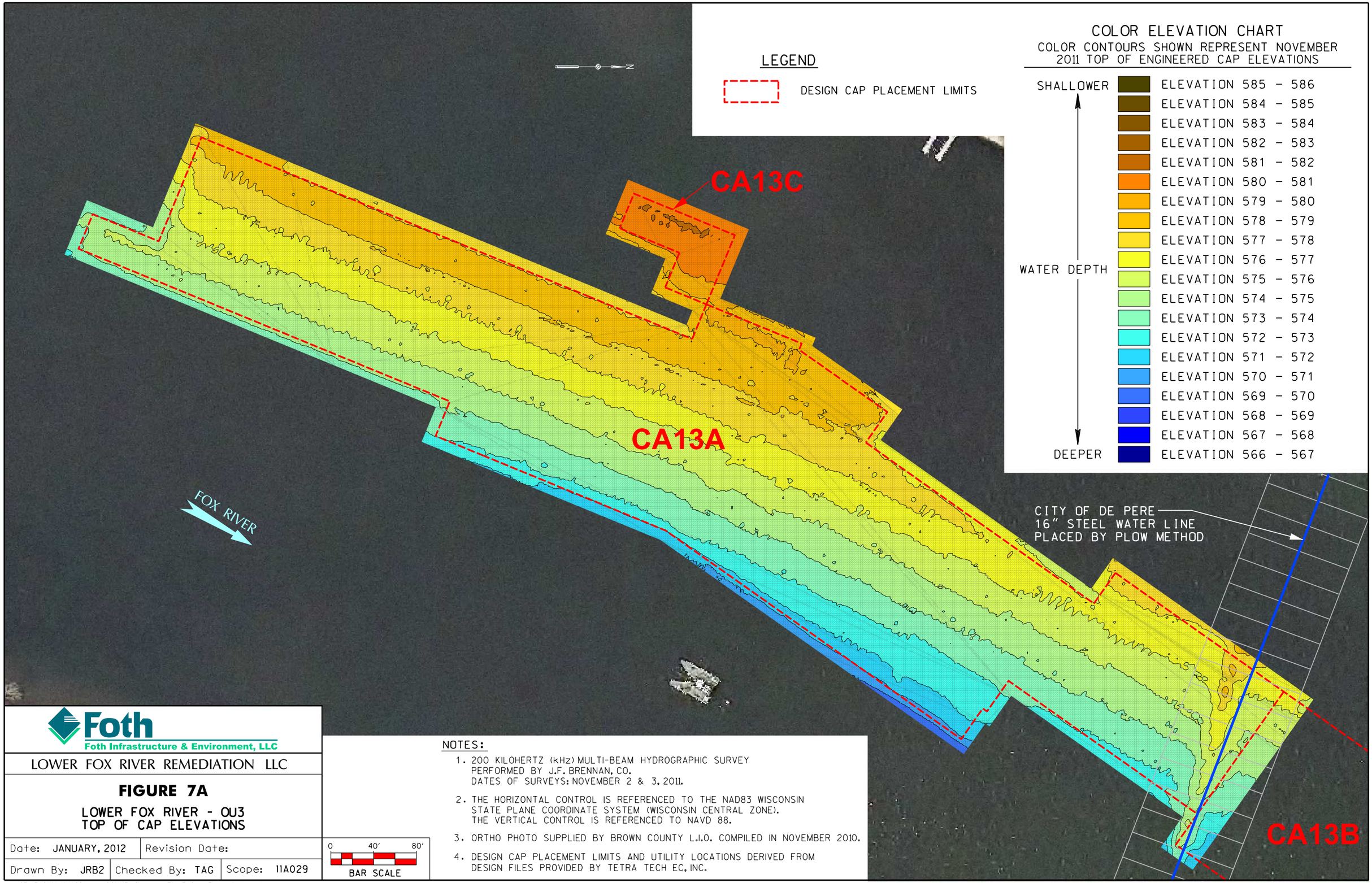

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FIGURE 7A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

0 40' 80'
BAR SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-7 Cap Elevations.dgn
1/23/2012 jrb2

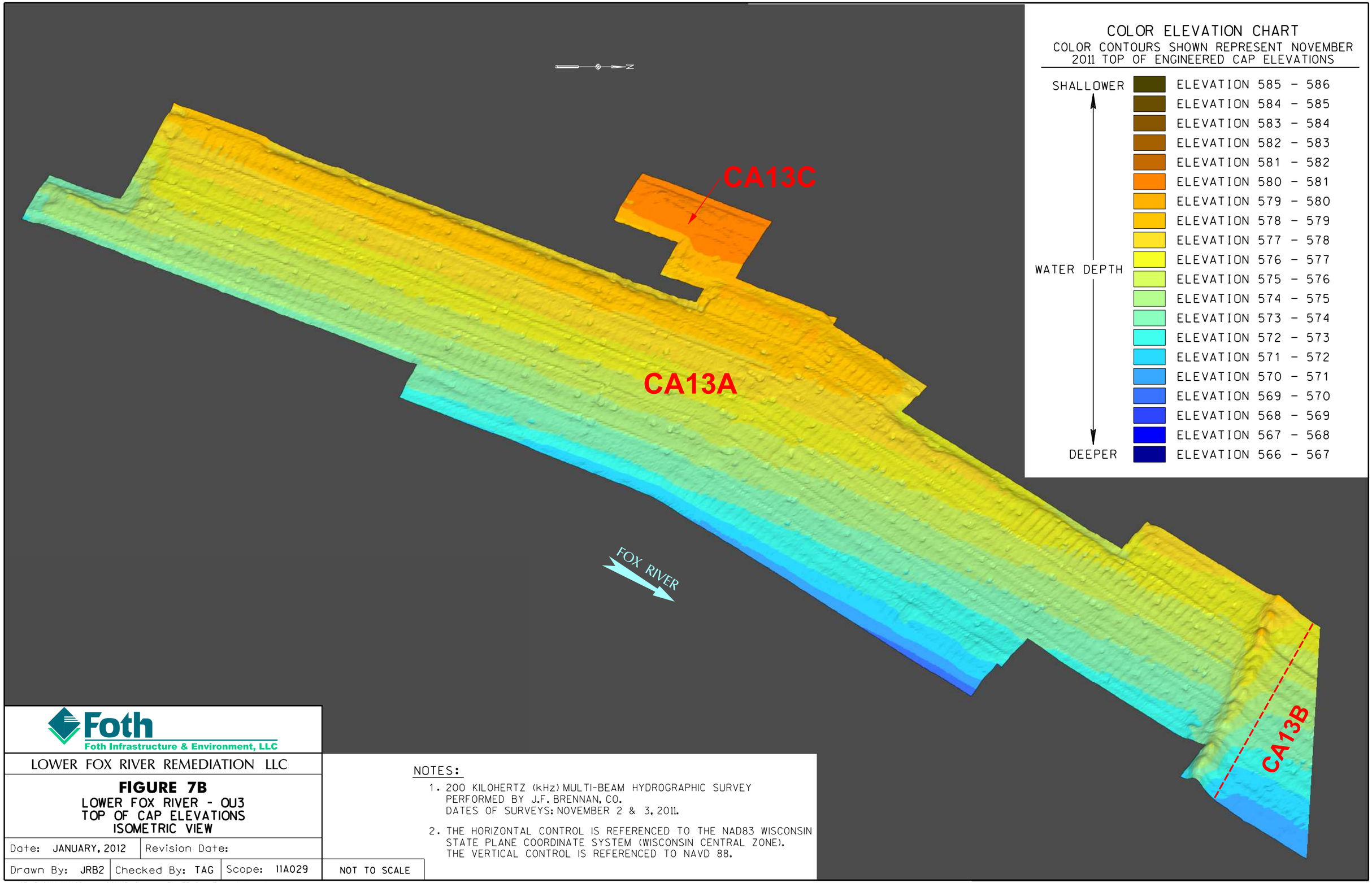

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FIGURE 7B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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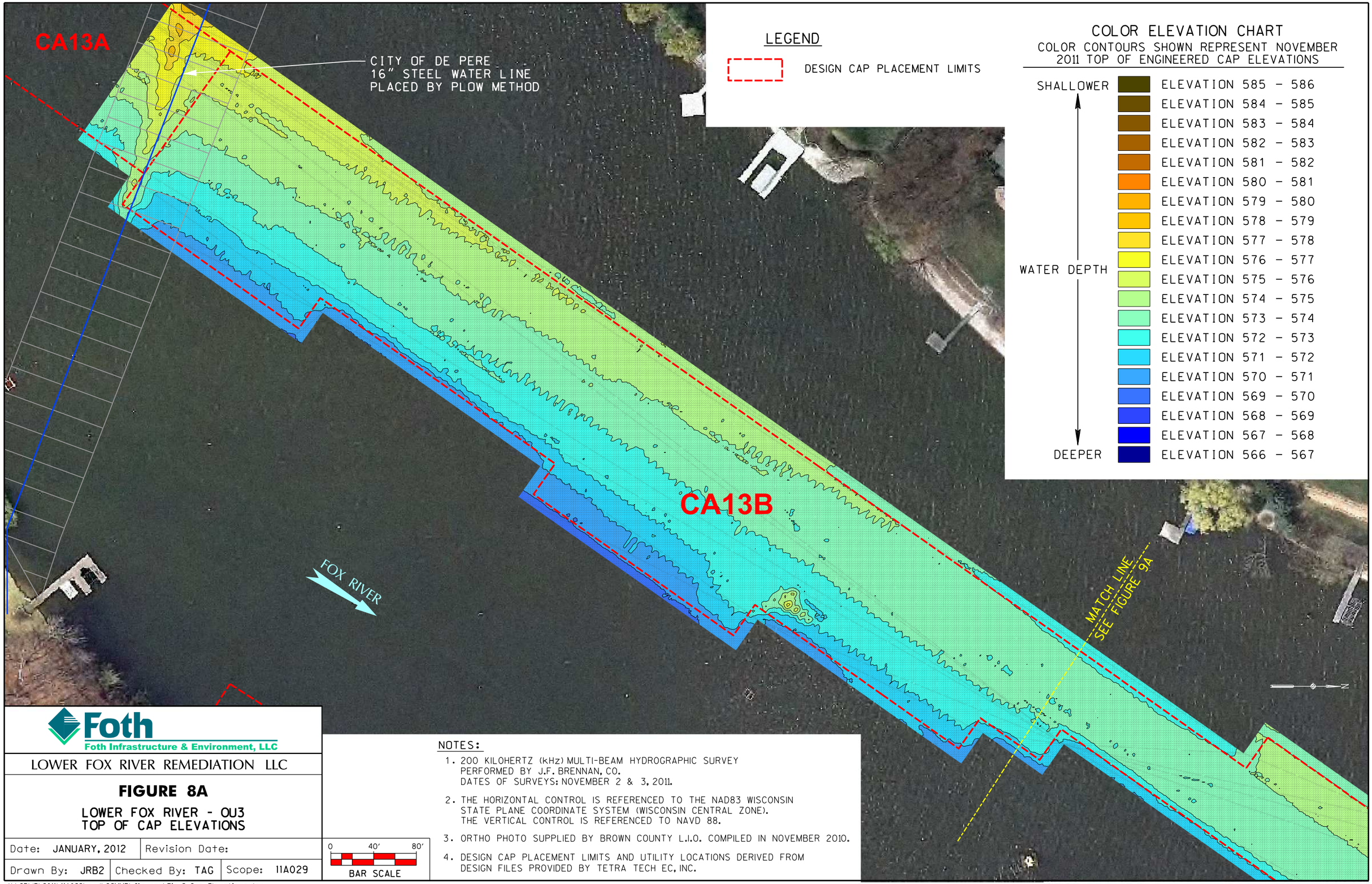
1/21/2012 jrb2



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Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 8A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

0 40' 80'
BAR SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
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X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-8 Cap Elevations.dgn
1/23/2012 jrb2

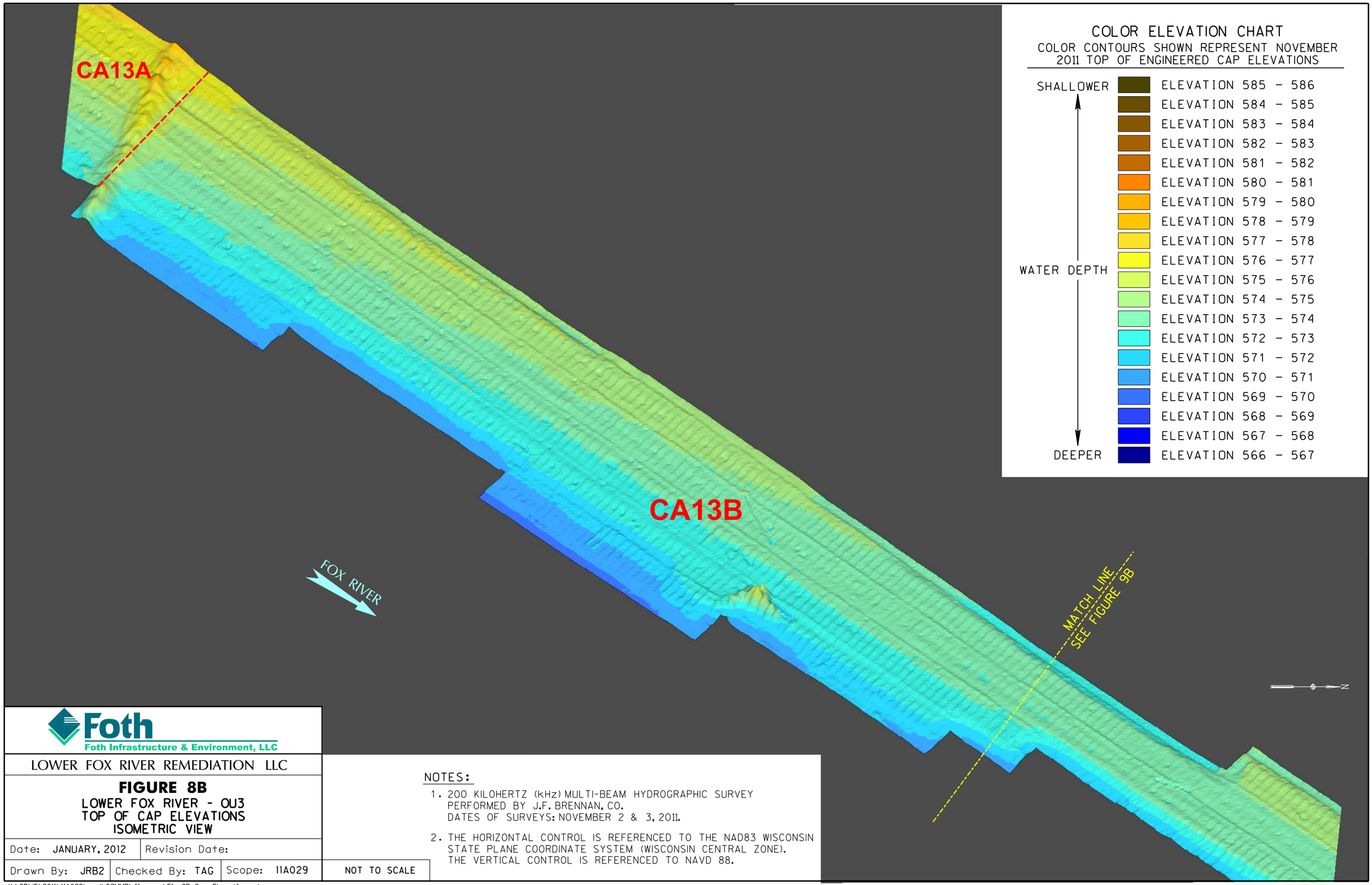

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FIGURE 8B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-8B Cap Elevations.dgn
1/21/2012 jrb2

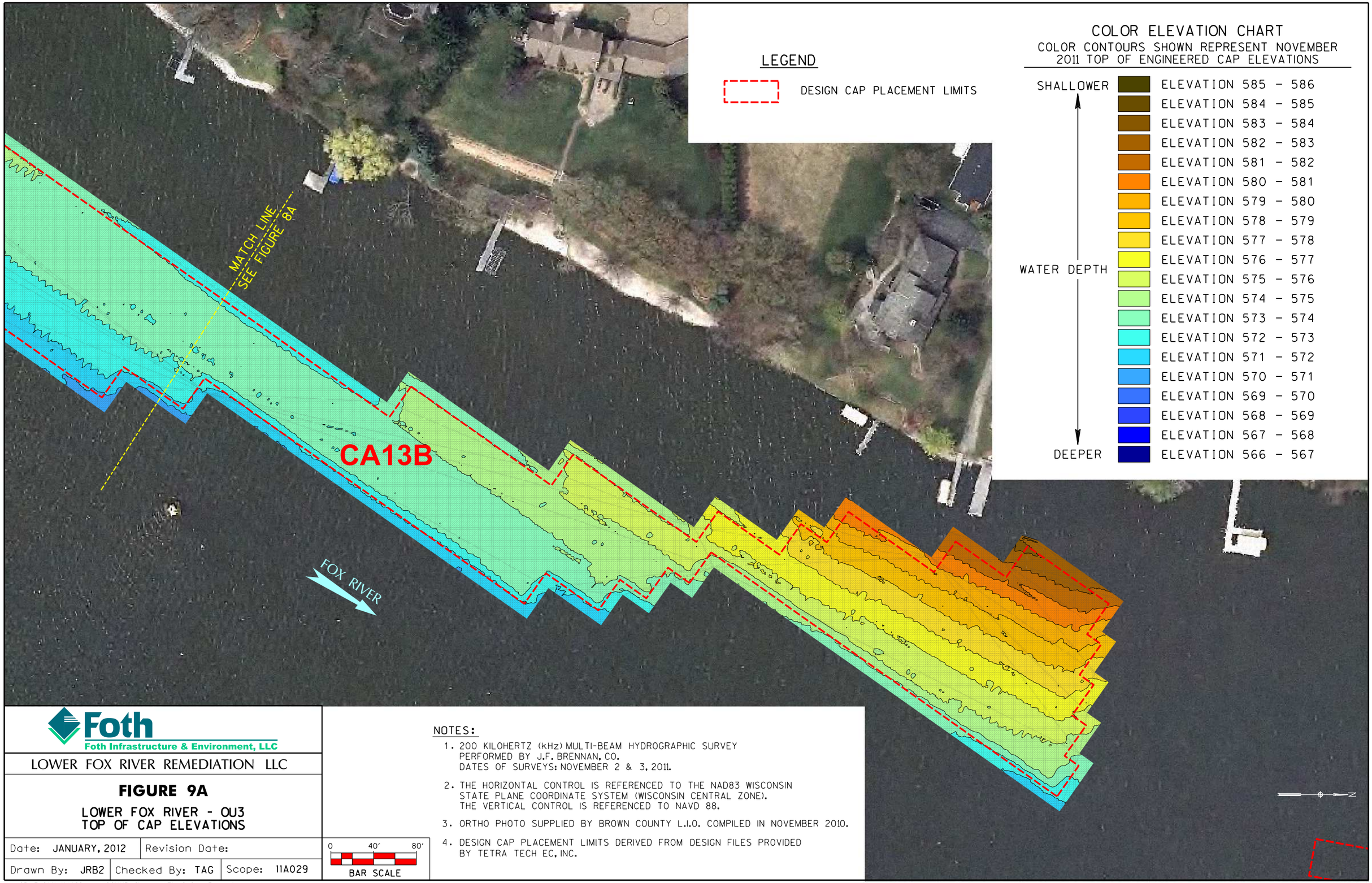

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FIGURE 9A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

0 40' 80'
BAR SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-9 Cap Elevations.dgn
1/23/2012 jrb2

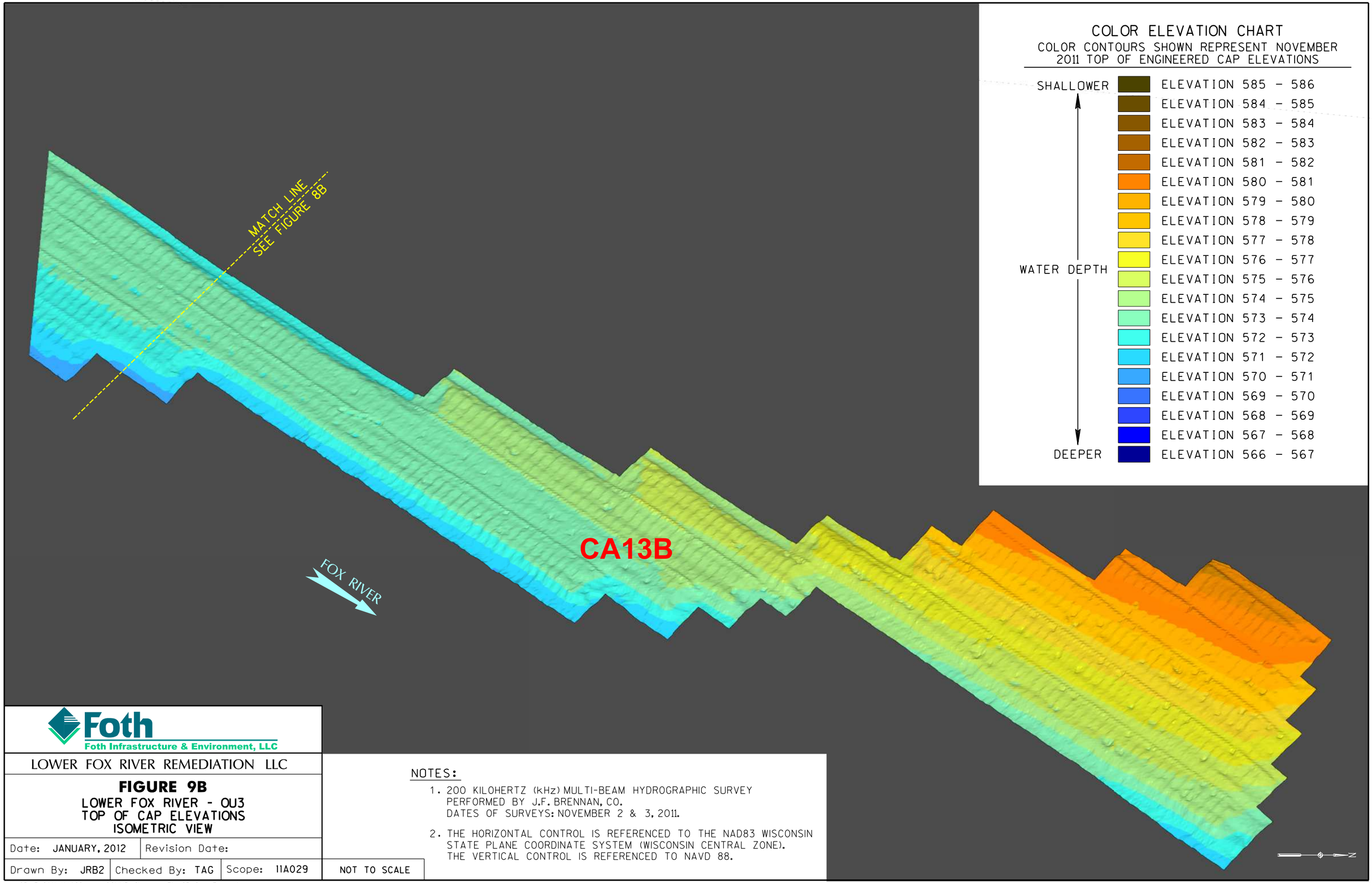

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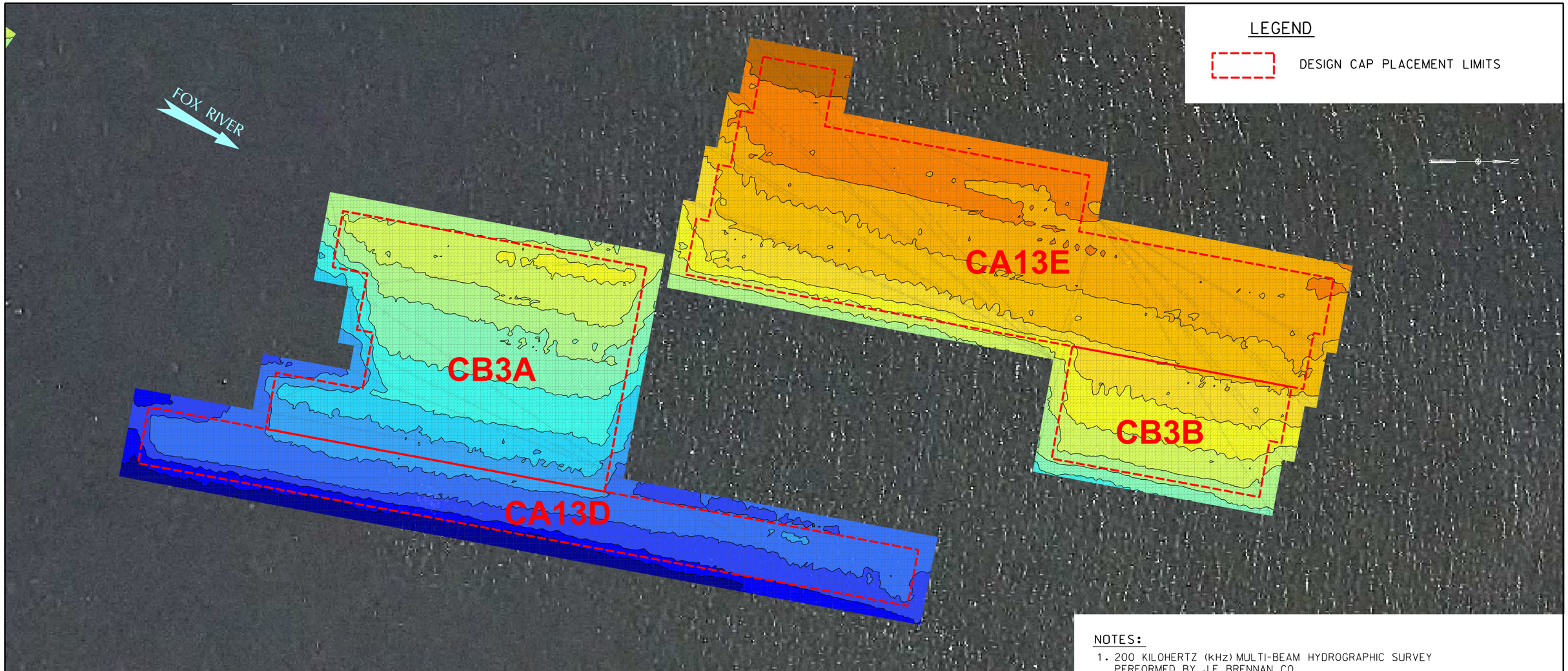
FIGURE 9B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-9B Cap Elevations.dgn
1/21/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30′ 60′
BAR SCALE

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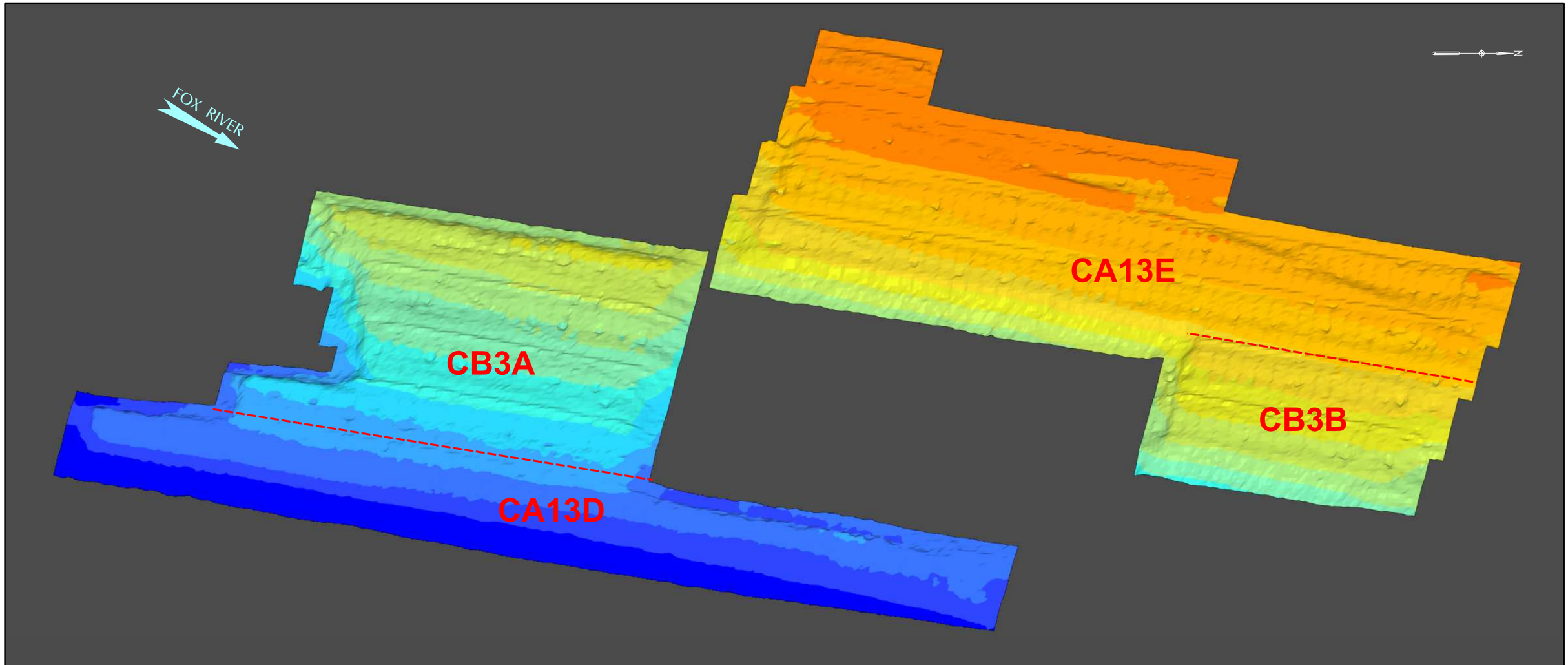
FIGURE 10A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-10 Cap Elevations.dgn
1/21/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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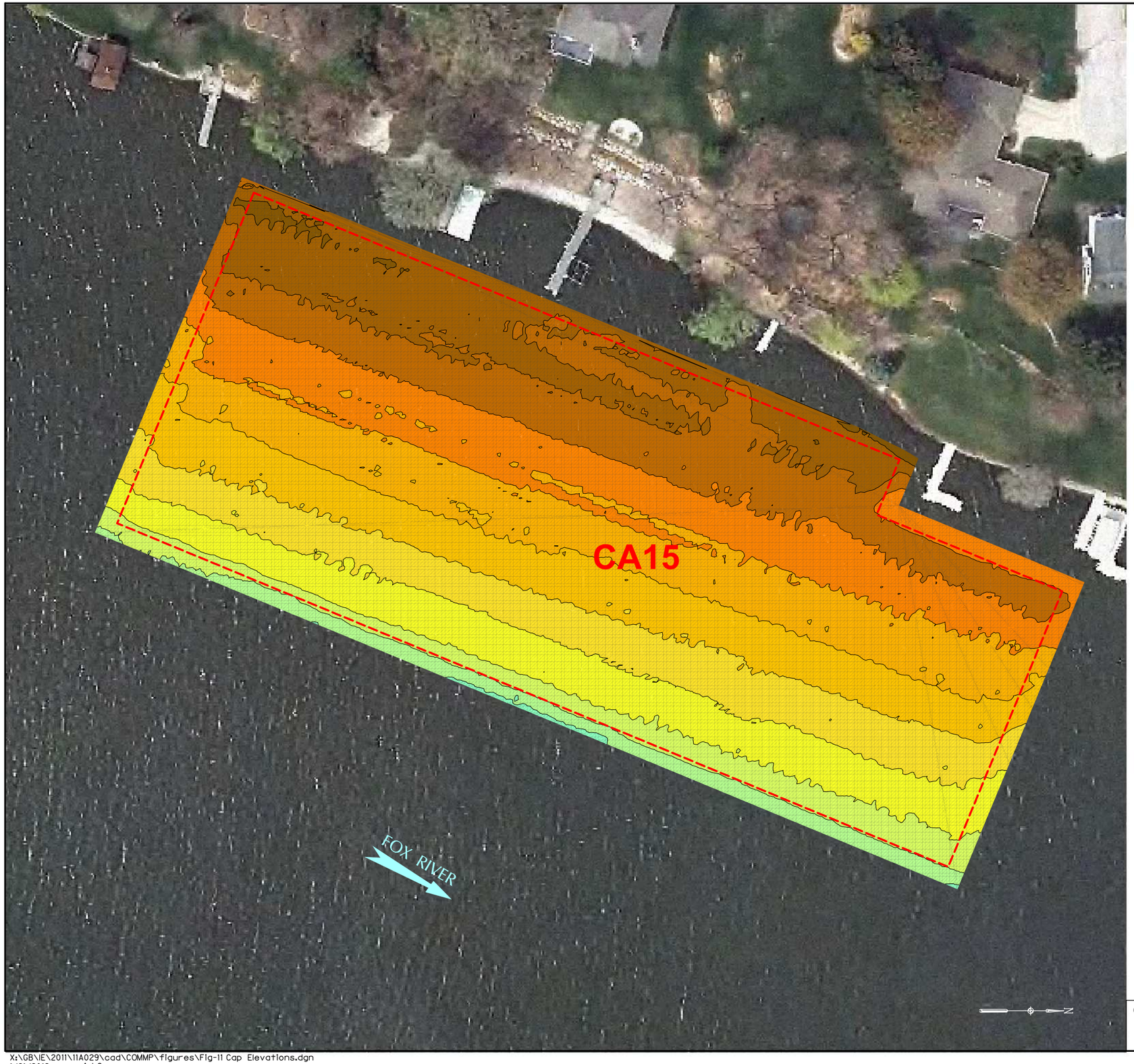
FIGURE 10B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-10B Cap Elevations.dgn
1/21/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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FIGURE 11A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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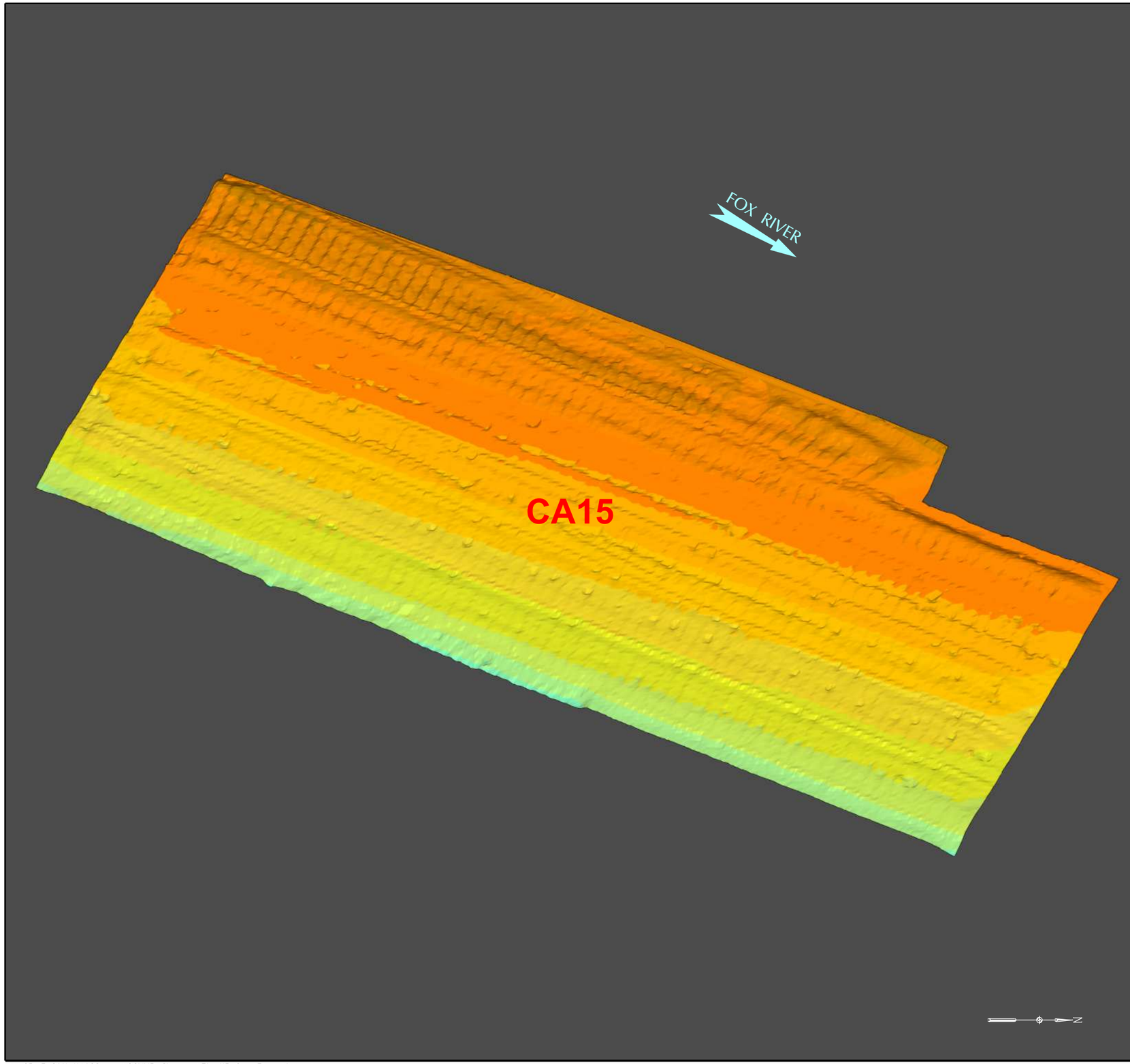
1/21/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 11B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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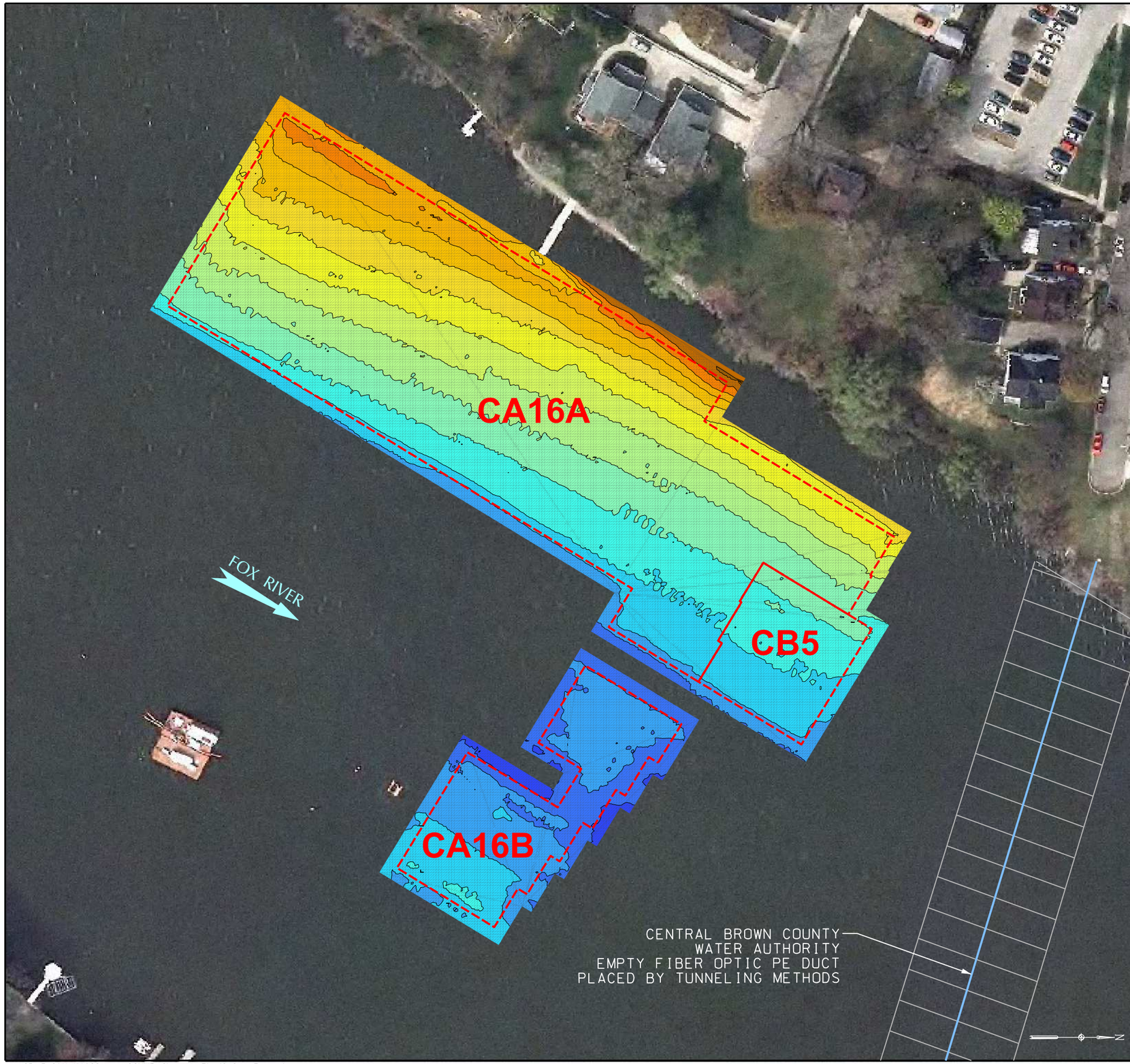
1/21/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 40' 80'

BAR SCALE

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FIGURE 12A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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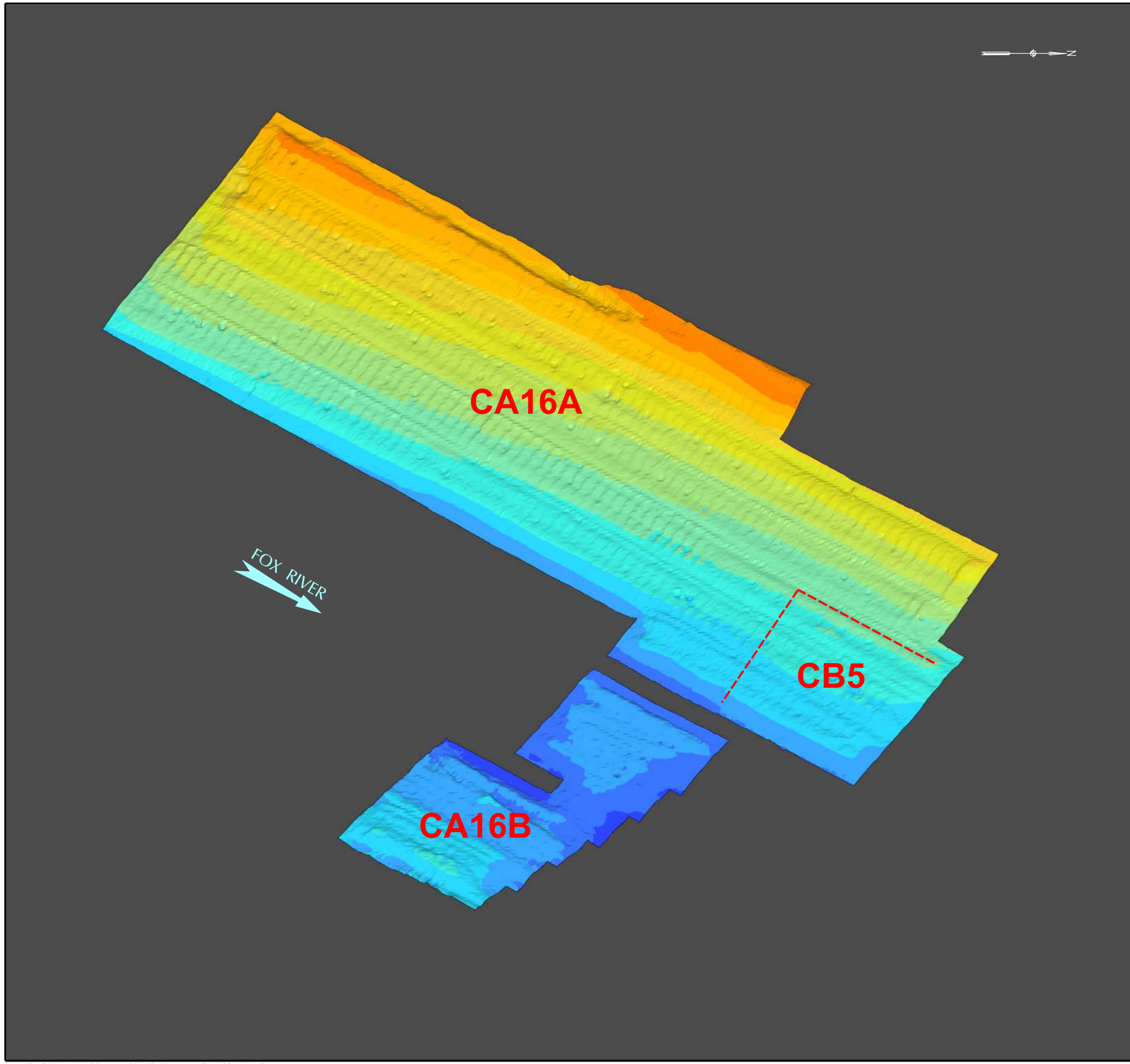
1/23/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 12B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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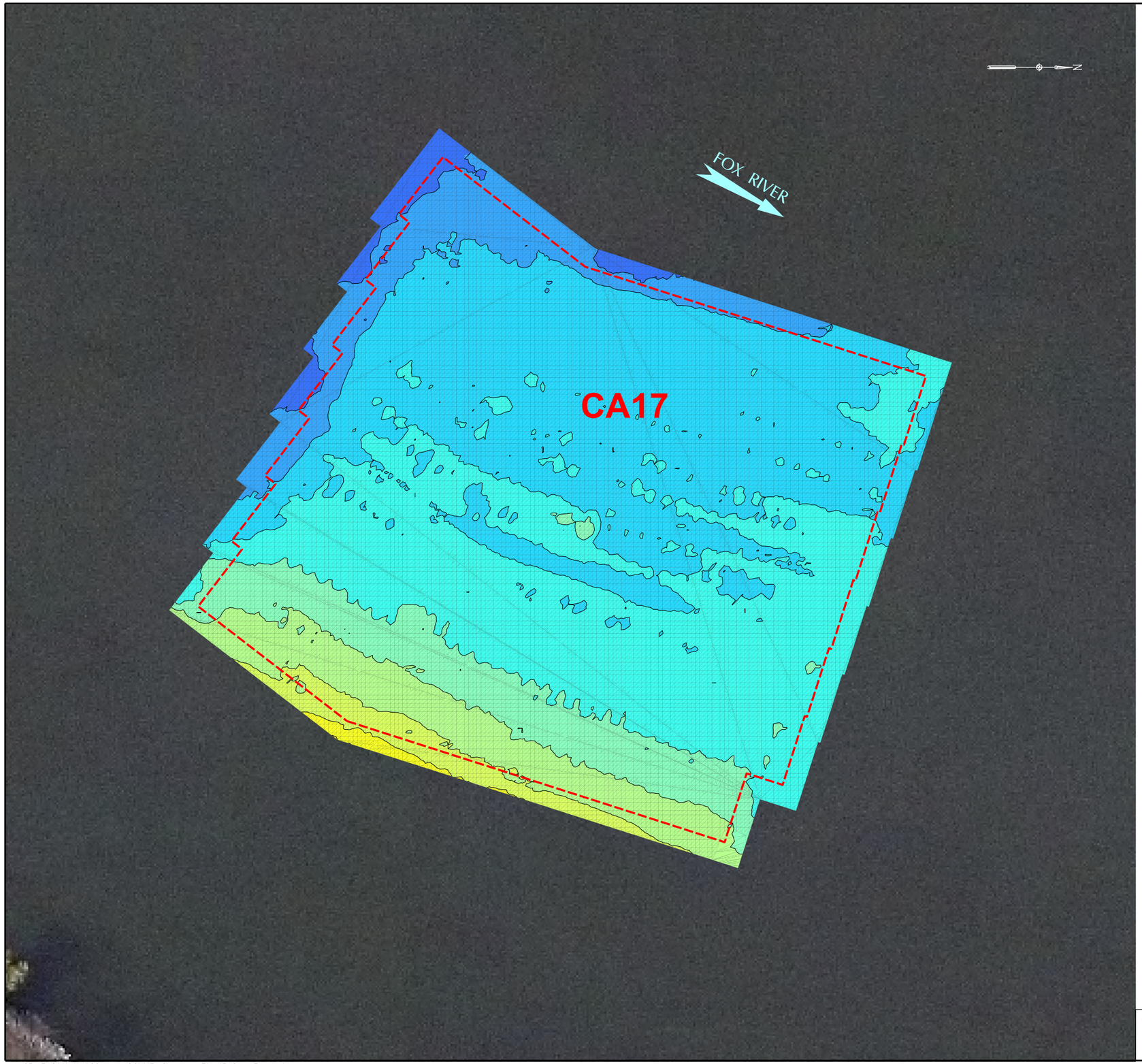
1/21/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

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FIGURE 13A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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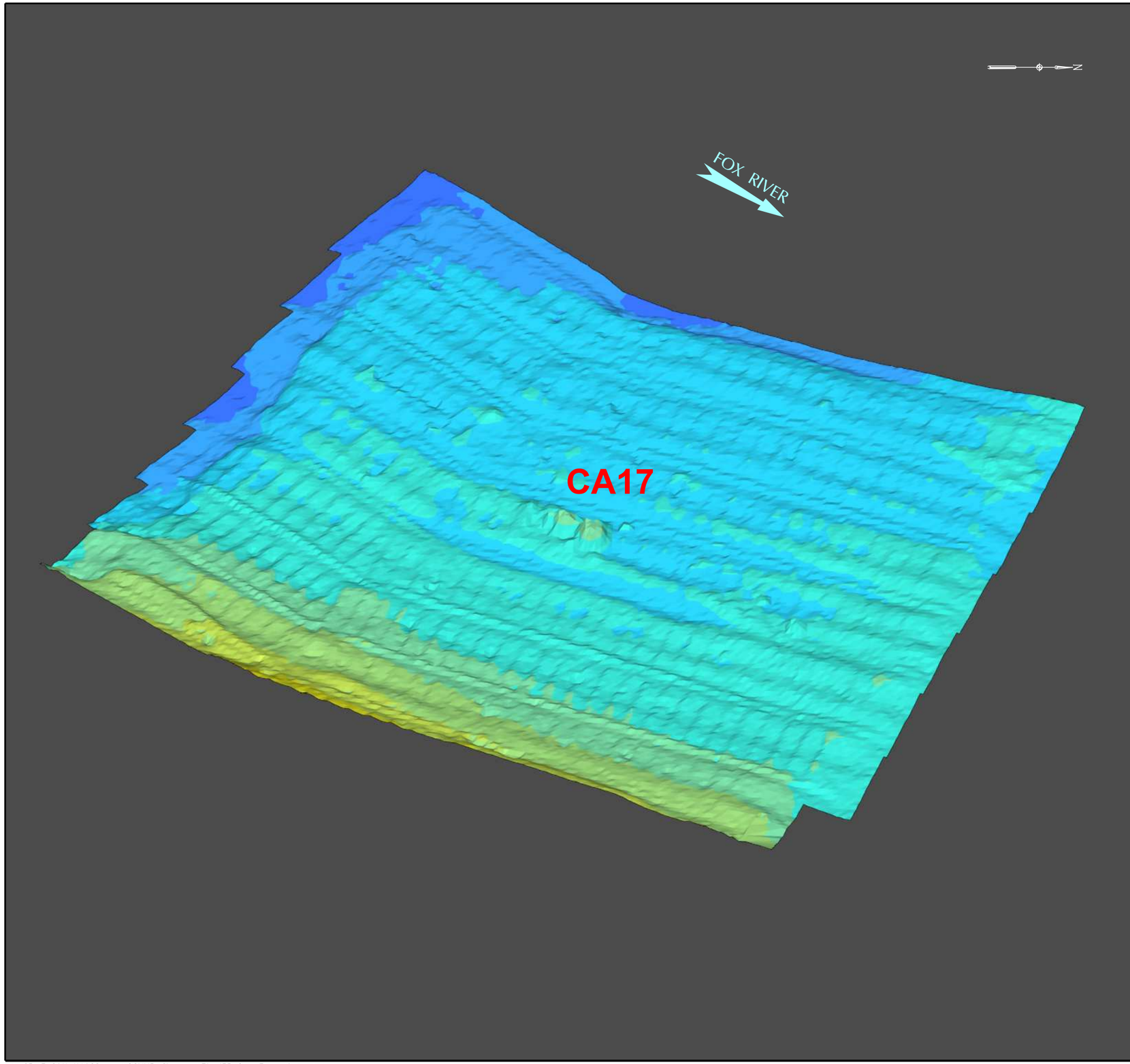
1/23/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 13B

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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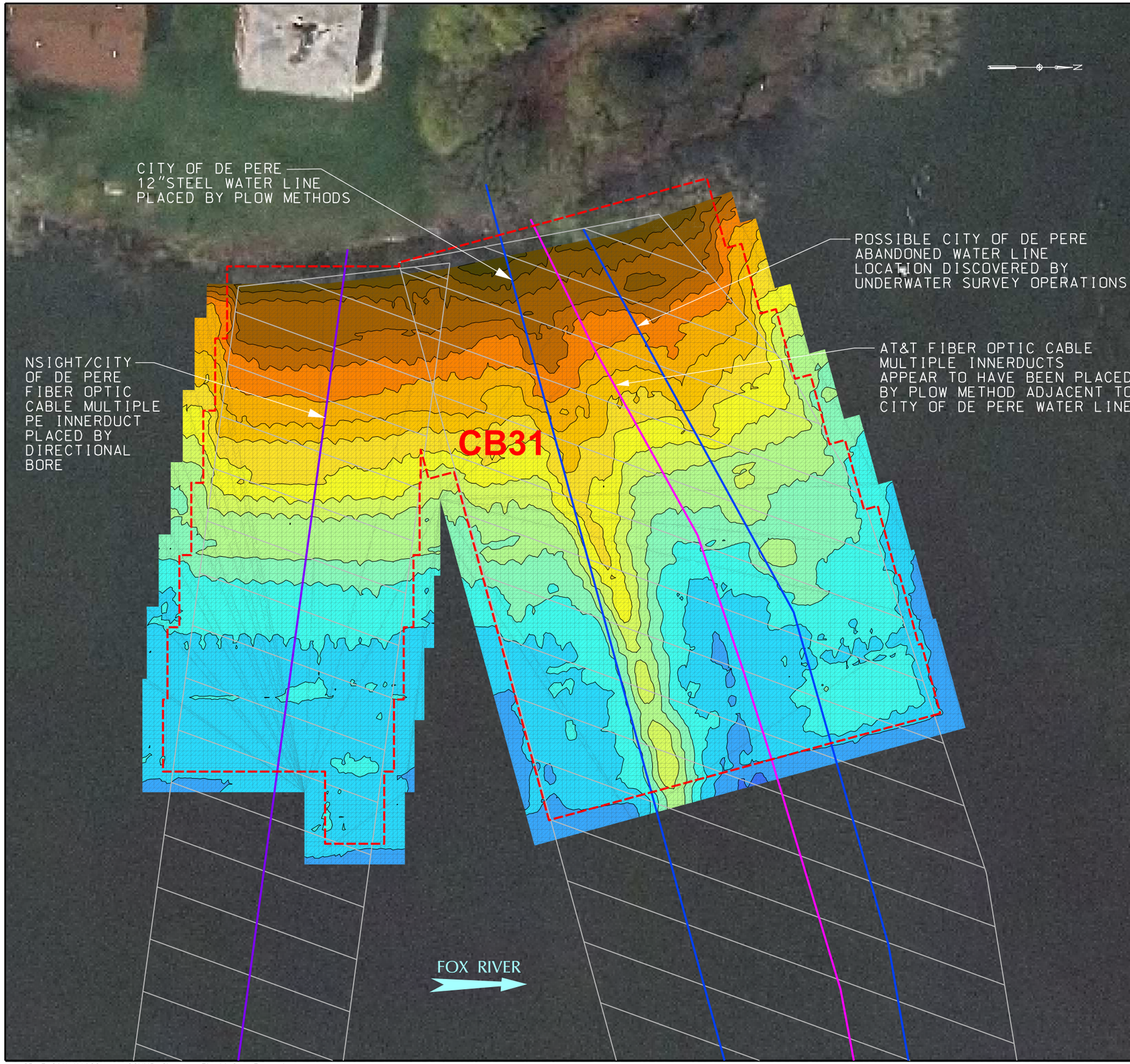
1/23/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY ANCHOR QEA, L.L.C.. COMPILED IN NOVEMBER 2004.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
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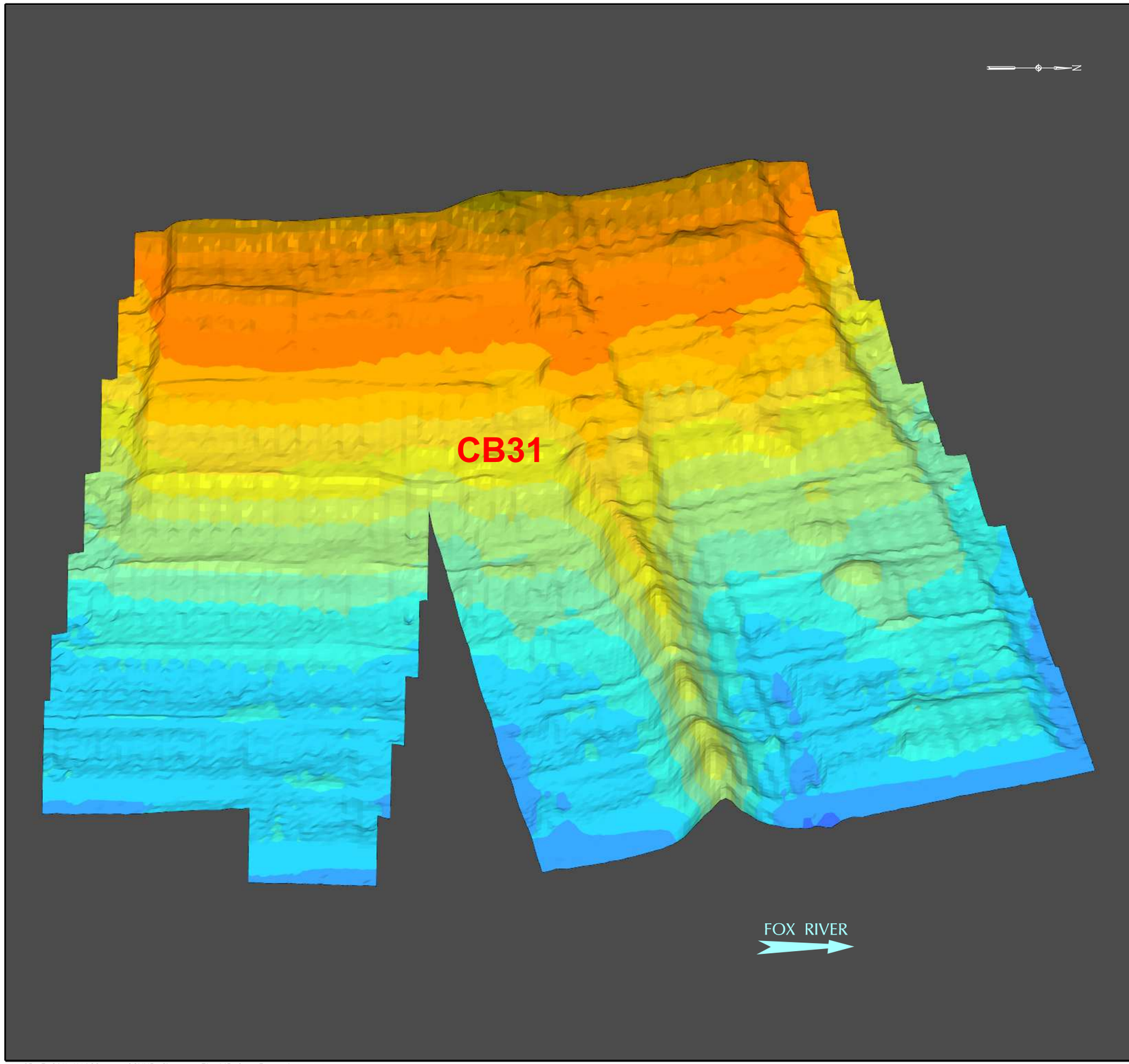
FIGURE 14A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-14 Cap Elevations.dgn
1/23/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 14B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

NOT TO SCALE	Date: JANUARY, 2012	Revision Date:	
	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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1/23/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER	ELEVATION 585 - 586
	ELEVATION 584 - 585
	ELEVATION 583 - 584
	ELEVATION 582 - 583
	ELEVATION 581 - 582
	ELEVATION 580 - 581
	ELEVATION 579 - 580
	ELEVATION 578 - 579
	ELEVATION 577 - 578
WATER DEPTH	ELEVATION 576 - 577
	ELEVATION 575 - 576
	ELEVATION 574 - 575
	ELEVATION 573 - 574
	ELEVATION 572 - 573
	ELEVATION 571 - 572
	ELEVATION 570 - 571
	ELEVATION 569 - 570
	ELEVATION 568 - 569
	ELEVATION 567 - 568
DEEPER	ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHZ) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: NOVEMBER 2, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 15A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-15 Cap Elevations.dgn
1/23/2012 jrb2

Attachment 1

Notes from COMMP Meeting (June 29, 2011)
and
Approval of the Notes from the A/OT

Gawronski, Troy A

From:	George.Berken@boldt.com
Sent:	Thursday, August 04, 2011 8:47 AM
To:	Al Toma; Bryan Heath; Jeff Lawson; John Heyde; Paul Montney; Roger Kaminski; Bill Coleman; Bill Hartman; Clay Patmont; Roznowski, Denis M; George Willant; Greg Smith; Hutchison, Jim; Jason Thaxton; Kelly Krabbe; Kevan McCaslin; Paul LaRosa; Richard Feeney; Rudy Driessen; Terri Blackmar; Gawronski, Troy A; Vic Buhr
Cc:	AgenciesLFRTeam@boldt.com; LFR.OverSightTeam@boldt.com; jkern@KernStat.com; kernstat@gmail.com; Mike Palermo; Beth Olson
Subject:	87500 OU2-5 - Fw: Notes from COMMP Meeting held on 6/29/11
Attachments:	Meeting Notes from COMMP Meeting_AOT_072911.DOC; LFRR_11_0537_Meeting Notes for COMMP Mtg_AOT_072911.pdf

Terri, the notes for the COMMP Meeting held on 6/29/11 are acceptable.

Thanks,
George...

George A. Berken, PE
Engineering Project Manager
Technical Services

The Boldt Company
2525 N. Roemer Road
P.O. Box 419
Appleton, WI 54912-0419
920-225-6141 Phone
920-858-5449 Cell
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----- Forwarded by George Berken/Boldt on 08/04/2011 08:45 AM -----

"Blackmar, Terri" <Terri.Blackmar@tetratech.com>

07/29/2011 02:50 PM

To "AgenciesLFRTeam@boldt.com" <AgenciesLFRTeam@boldt.com>, "LFR.OverSightTeam@boldt.com" <LFR.OverSightTeam@boldt.com>, Mike Palermo <mike@mikepalermo.com>, "jkern@KernStat.com" <jkern@KernStat.com>, '"d0nal3a@gmail.com"' <d0nal3a@gmail.com>, '"donalea.dinsmore@wisconsin.gov"' <donalea.dinsmore@wisconsin.gov>

cc Jeffrey Lawson <JLawson@project-control.com>, "Heath, Bryan" <Bryan.Heath@ncr.com>, "Roznowski, Denis M" <Denis.Roznowski@Foth.com>, "Gawronski, Troy A" <Troy.Gawronski@Foth.com>, "Van Hoof, Tara M" <Tara.VanHoof@Foth.com>, "Coleman, Bill" <Bill.Coleman@tetratech.com>, "Willant, George" <George.Willant@tetratech.com>, "Feeney, Richard" <Richard.Feeney@tetratech.com>, "McCaslin, Kevan" <Kevan.McCaslin@tetratech.com>, "Krabbe, Kelly" <Kelly.Krabbe@tetratech.com>, "Thaxton, Jason" <Jason.Thaxton@tetratech.com>, Bill Hartman <BHartman@JFBrennan.Com>, Greg Smith <gsmith@jfbrennan.com>, Paul LaRosa <plarosa@anchorgea.com>

Fax to

Subject Notes from COMMP Meeting

George,

Attached are meeting notes from the 6/29 meeting on the COMMP. Please review these notes and let me know if you have any questions or comments.

Thanks,

Terri

Terri Blackmar, PE | Vice President, Great Lakes Operations
Direct: 630.470.4217
Terri.Blackmar@tetratech.com

Tetra Tech | Fox River Site
1611 State Street | Green Bay, WI 54304 | www.tetratech.com

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Think Green - Not every email needs to be printed.

TETRA TECH EC, INC.

Lower Fox River Remedial Action OUs 2-5

DOCUMENT CONTROL FORM

CONTRACTOR:	Tetra Tech EC Inc.
PROJECT NO.:	106-3876
PROJECT NAME:	Lower Fox River Remediation of OUs 2-5
DOCUMENT CONTROL NO.	LFRR-11-0537
WORK PHASE:	2B
DATE OF DOCUMENT:	July 29, 2011
DOCUMENT TITLE:	Notes from June 29, 2011 Meeting on the Cap Operations, Maintenance and Monitoring Plan
DOCUMENT RECIPIENT:	A/OT
DOCUMENT SENDER:	T. Blackmar
SPECIFICATION SECTION AND PARAGRAPH NO. OF REQUIREMENT:	n/a
SUBCONTRACTOR (IF APPLICABLE):	Name
	Address
	Phone
METHOD OF DELIVERY:	E-Mail
SUBMITTED MATERIALS:	Revised Work Group Meeting Notes
FILE NO.:	9.3.1 Work Group – Meeting Minutes

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Lower Fox River Remedial Action OUs 2-5
Notes from June 29, 2011 Meeting on the Cap Operations, Maintenance and Monitoring Plan (COMMP) and Long Term Monitoring Plan (LTMP) Requirements
LFRR-11-0537
July 29, 2011

Attendees

Tetra Tech	
Richard Feeney	George Willant
Terri Blackmar	Eric Bauer
Kevan McCaslin	Jason Thaxton
Lower Fox River Remediation LLC	
Jeff Lawson , PCC	Sue O'Connell, PCC
Bryan Heath, NCR	
A/OT	
Rick Fox, NRT	Steve Jaeger, WDNR
Jay Grosskopf, Boldt	
Gary Kincaid, WDNR	
George Berken, Boldt	
Foth	
Denis Roznowski	
Troy Gawronski	
JF Brennan	
Bill Hartman	

Meeting Agenda

The following topics were discussed at this meeting held on June 29, 2011:

- Requirements of the COMMP with regard to baseline surveys
- Possible action that may be required during the 2011 season to prepare for future COMMP and LTMP activities
- Schedule for COMMP activities and EPA Guidelines for Long Term Monitoring Schedules (dated June 28, 2011)
- Updates needed to the COMMP document.

A summary of the discussion related to each topic is presented below.

COMMP Requirements

The requirements for determining baseline cap conditions were discussed. The text of the COMMP states the following:

In addition to the cap thickness measurements performed as part of the CQAPP, a geophysical sub - bottom profiler/seismic reflection survey will be performed to obtain a profiler 'response signature' of the armor layer within a designated CCU immediately following placement of the armor layer. This record will be compared to the response signature of a sub - bottom profiler survey of a portion of the capped area (one time pre - placement) as well as a designated area outside of the capping areas (i.e., area with no cap materials) to determine the appropriate baseline signature for future long - term monitoring surveys of the caps. During postconstruction cap surveys, the sub - bottom profiler records can be referenced to the baseline signatures to assess the cap conditions along with bathymetric survey data. These data will be used to determine areas of the CCU that may have been eroded. It should be noted that it is not the intent of the sub - bottom profiling to map the thickness of the armor layer, but instead to verify that armor material remains in place. The capped areas are anticipated to have a signature that is different from the native river bottom, due to the acoustic roughness of the gravel, to show enough difference in its signature to allow for monitoring cap integrity.

The need for a sub-bottom profiler/seismic reflection survey immediately following placement of the armor stone was discussed. The Agencies agreed that performing a post-cap baseline bathymetric survey (together with physical cap material thickness measurements at the time of placement) should be sufficient, along with pre-placement bathymetric survey information to establish initial cap thickness and integrity, and that the bathymetric surveys from one monitoring year to the next (e.g., year 0 to year 2) can be compared to determine if there are any obvious changes evident in the cap. The differences in bathymetry should allow identification of potential cap erosion, punch-through, and other disturbances that may affect the integrity of the cap. If an area appears to be disturbed, the sub-bottom profile/seismic reflection survey could be performed to better understand the mechanism(s) responsible for the disturbance. No baseline sub-

bottom profile survey should be needed as the response signature for the top and bottom of armor stone should be evident in the later survey. Alternatively, the area of suspected disturbance could be poled or investigated using other means, for example, inspection by divers. The COMMP will therefore be revised to indicate that there are alternative methods to bathymetry or sub-bottom profiling (e.g., poling, physical inspection, etc.) for evaluating caps during the long-term monitoring program should conditions warrant employing alternative methods.

Possible Actions to Prepare for Future COMMP Activities

As a follow-up to the previous discussion, the Agencies suggested that the LLC perform multi-beam surveys of final caps rather than single-beam surveys, since the multi-beam survey will provide a more detailed surface for comparison during cap monitoring activities. This would eliminate the need for two surveys after completion of the caps. This is the only action that should be needed for caps completed in 2011.

A multi-beam survey should be run before sand is placed, after the sand is placed, and again after the armor stone is placed. These surveys would tell us how much settlement has occurred.

Schedule for COMMP and LTMP Activities

George Berken summarized the schedule for monitoring activities described in the COMMP. He also distributed a modified monitoring schedule proposed by the agencies for long-term monitoring prior to the meeting (revised 6/28/11, attached) showing the relationship between COMMP-related bathymetric surveys and Long Term Monitoring Plan (LTMP) required monitoring. The modifications to the OU1 schedule were limited to: 1) adding the bathymetric surveys triggered by the 5-year recurrence flow rate to be performed in 2011; and 2) the LTM Year 2 survey to potentially be waived depending on the results of the 2011 survey. In OU1, fish, water and cap monitoring began in 2010 as part of the LTMP. Jim Hahnenberg requested that the schedule for COMMP and LTMP activities be coordinated to ensure that the monitoring is performed in time for the 5-year report. It was also suggested that COMMP and LTMP activities for OU1 and OUs 2-5 be coordinated to the extent possible. The next report is due in 2012. However, these surveys are for OU1, which is not part of this project.

Year 0 for cap monitoring purposes in OU2-5 is the year after installation of the caps. For OU2 and OU3, 2012 will be year 0. The schedule for COMMP monitoring is presented in the plan, and includes trigger events. A summary of the frequency of these monitoring requirements is as follows:

Planned events: Years 2, 4, and every 5 years thereafter for CCUs completed within the same year of construction.

Other events: Within one year following a 20-year flow and seiche discharge event, within one year following a river construction event (e.g., a new bridge), and within one year following an event in which the water level falls one foot below the design low water datum. Follow-on events are for the 100-year flow event and for a low water datum that falls 2 feet below the design low water datum.

It takes a while to line up staff and equipment, and about 3 days to obtain samples from each area, so that should be considered when planning for field work.

Updates Needed to the COMMP

Tetra Tech (Terri Blackmar) indicated that, in reviewing the COMMP before the meeting, it was evident that some updating was needed. George Berken agreed, and said he noticed some out-of-date references to the CQAPP Addendum, etc. Tetra Tech will update the document and clarify the information on the sub-bottom profiling and other surveys to indicate that these are options for cap investigation if a bathymetric survey comparison indicates a potential problem with a cap area.

Action Items

The following are action items for this meeting:

- Consider the use of multi-beam rather than single-beam surveys for all post-cap documentation (LLC)
- Review the schedule provided by the Agencies for COMMP and LTMP monitoring and provide feedback to the Agencies (LLC and Tetra Tech Team)
- Update the COMMP per the meeting discussion (Tetra Tech Team)

Attachment 2

Hydrographic Survey Observation Reports

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU 2-5 Hydrographic Survey
Prepared by: Brad Kussman
Checked by: Troy Gawronski

Project #: 11A029
Page: 1 of 2
Date: 11-2-11
Date: 3/6/12

Hydrographic Survey Observation Report

Location OU3-Cap Areas

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Wind	
	Low	High			Rain	Snow	Waves	Direction
	45	48	Cloudy				>1'	NNE @ 4 mph

Contractors on site *(include no. of personnel per contractor)*

Other personnel on site:	***Purpose***
Mike Wyatt - JF Brennan	Survey Boat Captain
Brad Kussman (BLK) - Foth	Auditor

Work observation report, comments:

0755 - BLK arrived at Bomier Boat Launch site.

0800 – Mike Wyatt arrived at launch with multi-beam Survey boat.

0815 – Mike Wyatt successfully checked in at survey control point OU3-07R for the post-cap multi-beam survey.
N 228500.356 Delta H = 0.032
E 2474907.625 Delta V =- 0.038
EL 594.845

0817 – Mike Wyatt obtained a tide elevation of 588.728' at the Bomier boat docks.

0819 – 0950 JF Brennan multi-beam survey vessel was starting up and configuring settings at Bomier boat dock.

0950 – Started Patch Test for multi-beam survey.

1000 – Mike Wyatt performed a speed of sound cast.

1100 – Mike Wyatt performed performance test and evaluated results.

1120-1630 - Performed OU3 cap survey.

1630-1710 – Pollings were performed (Min. 3 per survey area).

1730 - JF Brennan multi-beam survey vessel returned to Bomier boat dock.

1735 – Mike Wyatt obtained check-out tide elevation of 588.733' at Bomier Boat Launch.

1740 – Mike Wyatt performed the survey check-out at survey control point OU3-07R. BLK completed the survey check-out procedures.
N 228500.320 Delta H = 0.031
E 2474907.644 Delta V = 0.008
EL 594.891

Hydrographic Survey Observation Report

1750 - BLK departed the Bomier Street Boat Launch for the Foth office.

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU 2-5 Hydrographic Survey
Prepared by: Brad Kussman
Checked by: Troy Gawronski

Project #: 11A029
Page: 1 of 1
Date: 11-3-11
Date: 3/6/12

Hydrographic Survey Observation Report

Location OU3-Cap Areas

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Wind	
	Low	High			Rain	Snow	Waves	Direction
	45	48	Cloudy				>1'	NNE @ 4 mph

Contractors on site *(include no. of personnel per contractor)*

Other personnel on site:	***Purpose***
Mike Wyatt - JF Brennan	Survey Boat Captain
Brad Kussman (BLK) - Foth	Auditor

Work observation report, comments:

1350 - BLK arrived at Bomier Boat Launch site.

1350 – Mike Wyatt arrived at launch with multi-beam Survey boat.

1355 – Mike Wyatt successfully checked in at survey control point OU3-07R for the post-cap multi-beam survey.
N 228500.352 Delta H = 0.051
E 2474907.657 Delta V = 0.015
EL 594.898

1402 – Mike Wyatt obtained a tide elevation of 588.776' at the Bomier boat docks.

1405 - JF Brennan multi-beam survey vessel was starting up and configuring settings at Bomier boat dock.

1405 – Mike Wyatt performed a speed of sound cast.

1405-1424 – Mike Wyatt performed performance test and evaluated results.

1424-1450 - Performed OU3 cap survey.

1450-1455 – Pollings were performed.

1500 - JF Brennan multi-beam survey vessel returned to Bomier boat dock.

1500 – Mike Wyatt obtained check-out tide elevation of 588.694' at Bomier Boat Launch.

1510 – Mike Wyatt performed the survey check-out at survey control point OU3-07R. BLK completed the survey check-out procedures.
N 228500.351 Delta H = 0.025
E 2474907.617 Delta V = 0.002
EL 594.885

1530 - BLK departed the Bomier Street Boat Launch for another survey.

Attachment 3

Cap Thickness Verification Data
(prepared by Tetra Tech EC, Inc.)

Appendix M
Table M-1
Cover/Cap Sand Sampling Results

OU2-CA1-1-1											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-1-C1	8/31/2009	6.0	0.0	6.0	3	203966.63	2457997.96	203966.85	2457998.38	-0.22	-0.42
OU2-CA1-1-1-C2	8/28/2009	7.2	0.0	7.2	3	203875.32	2458058.24	203874.18	2458058.36	1.14	-0.12
OU2-CA1-1-1-C3	8/28/2009	3.6	0.0	3.6	3	203917.51	2458088.71	203917.01	2458087.99	0.50	0.72
OU2-CA1-1-1-C4	8/28/2009	4.8	0.0	4.8	3	203952.71	2458181.17	203952.75	2458181.30	-0.04	-0.13
OU2-CA1-1-1-C5	8/25/2009	4.8	0.0	4.8	3	204055.74	2458295.34	204055.97	2458296.56	-0.23	-1.23
Average		**5.3**	**0.0**	**5.3**							

OU2-CA1-1-2											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-2-C1	8/26/2009	6.0	0.0	6.0	3	204123.24	2458376.40	204121.82	2458375.99	1.42	0.41
OU2-CA1-1-2-C2	8/28/2009	7.2	0.0	7.2	3	204044.67	2458459.58	204045.09	2458460.01	-0.42	-0.43
OU2-CA1-1-2-C3	8/26/2009	3.6	0.0	3.6	3	204188.75	2458484.16	204188.68	2458481.63	0.08	2.52
OU2-CA1-1-2-C4	8/27/2009	4.8	0.0	4.8	3	204102.76	2458509.80	204101.04	2458510.59	1.72	-0.79
OU2-CA1-1-2-C5	8/26/2009	4.8	0.0	4.8	3	204276.83	2458612.24	204276.04	2458612.89	0.79	-0.65
OU2-CA1-1-2-C6	8/28/2009	6.0	0.0	6.0	3	204179.17	2458644.68	204178.43	2458644.82	0.74	-0.14
OU2-CA1-1-2-C7	8/26/2009	4.8	0.0	4.8	3	204315.73	2458730.32	204314.94	2458730.27	0.79	0.05
OU2-CA1-1-2-C8	8/28/2009	6.0	0.0	6.0	3	204231.84	2458729.62	204231.64	2458729.20	0.20	0.42
OU2-CA1-1-2-C9	8/28/2009	8.4	0.0	8.4	3	204271.79	2458806.63	204272.88	2458807.53	-1.09	-0.90
OU2-CA1-1-2-C10	8/26/2009	4.8	0.0	4.8	3	204384.06	2458815.07	204381.46	2458816.15	2.60	-1.08
OU2-CA1-1-2-C11	8/27/2009	4.8	0.0	4.8	3	204347.51	2458918.76	204347.56	2458919.48	-0.05	-0.72
OU2-CA1-1-2-C12	8/26/2009	1.2	0.2	1.4	3	204438.72	2458931.34	204438.37	2458929.57	0.35	1.77
OU2-CA1-1-2-C13	8/27/2009	6.0	0.0	6.0	3	204402.95	2459004.60	204401.15	2459005.00	1.80	-0.40
Average		**5.3**	**0.0**	**5.3**							

Appendix M
Table M-1
Cover/Cap Sand Sampling Results

OU2-CA1-1-3											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-3-C1	8/25/2009	6.0	0.0	6.0	3	204206.85	2458332.82	204207.87	2458334.11	-1.02	-1.29
OU2-CA1-1-3-C2	8/25/2009	7.2	0.0	7.2	3	204270.09	2458401.64	204271.02	2458401.75	-0.93	-0.11
OU2-CA1-1-3-C3	8/25/2009	6.0	0.0	6.0	3	204268.98	2458494.99	204267.70	2458495.45	1.28	-0.46
OU2-CA1-1-3-C4	8/25/2009	6.0	0.0	6.0	3	204325.69	2458504.98	204324.36	2458504.48	1.33	0.50
OU2-CA1-1-3-C5	8/25/2009	3.6	0.0	3.6	3	204384.31	2458595.57	204384.76	2458594.48	-0.45	1.09
OU2-CA1-1-3-C6	8/25/2009	4.8	0.0	4.8	3	204345.44	2458660.78	204346.45	2458662.59	-1.01	-1.81
OU2-CA1-1-3-C7	8/25/2009	6.0	0.0	6.0	3	204416.27	2458686.19	204415.59	2458686.35	0.68	-0.16
OU2-CA1-1-3-C8	8/25/2009	9.6	0.0	9.6	3	204472.79	2458696.33	204473.23	2458695.84	-0.44	0.49
OU2-CA1-1-3-C9	8/25/2009	7.2	0.0	7.2	3	204441.74	2458759.18	204440.08	2458760.23	1.66	-1.05
OU2-CA1-1-3-C10	8/25/2009	8.4	0.0	8.4	3	204556.73	2458760.50	204556.61	2458761.24	0.12	-0.74
OU2-CA1-1-3-C11	8/25/2009	7.2	0.0	7.2	3	204477.21	2458847.97	204477.10	2458846.66	0.11	1.31
OU2-CA1-1-3-C12	8/25/2009	8.4	0.0	8.4	3	204605.18	2458839.80	204604.58	2458840.98	0.60	-1.18
OU2-CA1-1-3-C13	8/25/2009	7.2	0.0	7.2	3	204544.50	2458886.04	204545.83	2458884.29	-1.33	1.75
OU2-CA1-1-3-C14	8/25/2009	8.4	0.0	8.4	3	204632.55	2458913.10	204633.57	2458912.42	-1.02	0.68
OU2-CA1-1-3-C15	8/25/2009	7.2	0.0	7.2	3	204568.59	2458966.79	204569.63	2458967.26	-1.04	-0.47
Average		**6.9**	**0.0**	**6.9**							

OU2-CB1-1-1											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CB1-1-1-C1	8/31/2009	9.6	0.0	9.6	6	204120.19	2458253.26	204121.11	2458252.67	-0.92	0.59
OU2-CB1-1-1-C2	8/31/2009	9.6	0.0	9.6	6	204087.86	2458216.39	204088.52	2458215.84	-0.66	0.55
OU2-CB1-1-1-C3	8/31/2009	7.2	0.0	7.2	6	204089.39	2458249.78	204090.35	2458250.47	-0.96	-0.69
OU2-CB1-1-1-C4	8/25/2009	12.0	0.0	12.0	6	204099.53	2458282.58	204100.52	2458280.72	-0.99	1.86
OU2-CB1-1-1-C5	8/31/2009	6.0	0.0	6.0	6	204124.01	2458300.90	204125.03	2458300.20	-1.02	0.70
Average		**8.9**	**0.0**	**8.9**							

Appendix M
Table M-1
Cover/Cap Sand Sampling Results

OU3-CA3-1-1											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU3-CA3-1-2-C1	10/7/2009	5.00	0.75	5.75	3	209100.47	2461116.99	209103.07	2461119.94	-2.59	-2.95
OU3-CA3-1-2-C2	10/7/2009	8.25	0.50	8.75	3	209127.81	2461110.75	209127.79	2461115.12	0.02	-4.37
OU3-CA3-1-2-C3	10/7/2009	4.25	0.25	4.50	3	209123.15	2461169.21	209117.75	2461159.13	5.40	10.07
OU3-CA3-1-2-C4	10/7/2009	6.00	0.75	6.75	3	209144.50	2461139.93	209134.89	2461140.03	9.61	-0.10
OU3-CA3-1-2-C5	10/7/2009	4.50	0.75	5.25	3	209143.77	2461184.67	209138.09	2461187.15	5.68	-2.49
OU3-CA3-1-2-C6	10/7/2009	5.75	1.00	6.75	3	209164.38	2461145.63	209169.47	2461146.82	-5.09	-1.19
OU3-CA3-1-2-C7	10/7/2009	5.25	0.50	5.75	3	209166.87	2461193.17	209166.18	2461199.56	0.69	-6.39
OU3-CA3-1-2-C8	10/7/2009	4.50	0.50	5.00	3	209179.23	2461165.46	209182.27	2461172.32	-3.04	-6.86
OU3-CA3-1-2-C9	10/7/2009	4.00	0.25	4.25	3	209186.93	2461212.81	209191.23	2461207.96	-4.30	4.85
OU3-CA3-1-2-C10	10/7/2009	6.00	0.75	6.75	3	209214.40	2461187.35	209211.27	2461187.41	3.13	-0.06
OU3-CA3-1-2-C11	10/7/2009	5.75	0.00	5.75	3	209221.08	2461216.56	209217.74	2461221.19	3.35	-4.62
Average		**5.39**	**0.55**	**5.93**							

Appendix M
Table M-2
Armor Cap Sampling Results

OU2-CA1-1-1									
Sample ID	Sample Date	Gravel Thickness (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-1-G1	9/21/2009	9.5	4	203966.63	2457997.96	203966.16	2457997.93	0.47	0.03
OU2-CA1-1-1-G2	9/21/2009	5.0	4	203875.32	2458058.24	203875.12	2458057.47	0.20	0.78
OU2-CA1-1-1-G3	9/21/2009	6.0	4	203917.51	2458088.71	203918.60	2458087.91	-1.08	0.80
OU2-CA1-1-1-G4	9/21/2009	5.0	4	203952.71	2458181.17	203952.65	2458180.46	0.06	0.72
OU2-CA1-1-1-G5	9/18/2009	5.0	4	204055.74	2458295.34	204056.90	2458296.18	-1.16	-0.84
Average		**6.1**							

OU2-CA1-1-2									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-2-G1	8/26/2009	12.0	4	204123.24	2458376.40	204123.02	2458377.25	0.22	-0.85
OU2-CA1-1-2-G2	8/28/2009	12.0	4	204044.67	2458459.58	204045.04	2458458.17	-0.37	1.41
OU2-CA1-1-2-G3	8/26/2009	11.0	4	204188.75	2458484.16	204189.56	2458484.40	-0.81	-0.25
OU2-CA1-1-2-G4	8/27/2009	No Recovery	4	204102.76	2458509.80	204103.07	2458510.48	-0.31	-0.68
OU2-CA1-1-2-G5	8/26/2009	10.0	4	204276.83	2458612.24	204275.73	2458612.15	1.09	0.09
OU2-CA1-1-2-G6	8/28/2009	No Recovery	4	204179.17	2458644.68	204179.66	2458644.93	-0.48	-0.25
OU2-CA1-1-2-G6 (resample)	9/21/2009	8.0	4	204179.17	2458644.68	204179.66	2458644.93	-0.48	-0.25
OU2-CA1-1-2-G7	8/26/2009	8.5	4	204315.73	2458730.32	204316.65	2458730.80	-0.91	-0.48
OU2-CA1-1-2-G8	8/28/2009	No Recovery	4	204231.84	2458729.62	204230.99	2458730.36	0.85	-0.74
OU2-CA1-1-2-G9	8/28/2009	12.0	4	204271.79	2458806.63	204272.08	2458806.83	-0.29	-0.20
OU2-CA1-1-2-G10	8/26/2009	5.5	4	204384.06	2458815.07	204383.46	2458814.59	0.60	0.48
OU2-CA1-1-2-G11	8/27/2009	4.0	4	204347.51	2458918.76	204346.69	2458918.08	0.82	0.68
OU2-CA1-1-2-G12	8/26/2009	4.5	4	204438.72	2458931.34	204439.01	2458930.14	-0.28	1.20
OU2-CA1-1-2-G13	8/27/2009	6.0	4	204402.95	2459004.60	204401.98	2459003.61	0.97	0.99
Average		**8.5**							

Appendix M
Table M-2
Armor Cap Sampling Results

OU2-CA1-1-3									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-3-G1	8/25/2009	No Recovery	4	204206.85	2458332.82	204206.68	2458332.62	0.17	0.19
OU2-CA1-1-3-G2	8/25/2009	10.5	4	204270.09	2458401.64	204270.27	2458402.01	-0.18	-0.37
OU2-CA1-1-3-G3	8/25/2009	8.0	4	204268.98	2458494.99	204268.32	2458495.55	0.66	-0.56
OU2-CA1-1-3-G4	8/25/2009	8.0	4	204325.69	2458504.98	204325.68	2458505.57	0.01	-0.59
OU2-CA1-1-3-G5	8/25/2009	No Recovery	4	204384.31	2458595.57	204383.61	2458595.13	0.71	0.45
OU2-CA1-1-3-G6	8/25/2009	14.4	4	204345.44	2458660.78	204346.56	2458666.25	-1.12	-5.47
OU2-CA1-1-3-G7	8/25/2009	9.0	4	204416.27	2458686.19	204416.20	2458687.11	0.07	-0.92
OU2-CA1-1-3-G8	8/25/2009	12.0	4	204472.79	2458696.33	204472.37	2458695.91	0.43	0.42
OU2-CA1-1-3-G9	8/25/2009	9.0	4	204441.74	2458759.18	204441.37	2458759.02	0.38	0.16
OU2-CA1-1-3-G10	8/25/2009	11.0	4	204556.73	2458760.50	204557.40	2458759.66	-0.67	0.83
OU2-CA1-1-3-G11	8/25/2009	7.0	4	204477.21	2458847.97	204479.27	2458851.71	-2.05	-3.75
OU2-CA1-1-3-G12	8/25/2009	10.0	4	204605.18	2458839.80	204605.77	2458840.26	-0.59	-0.46
OU2-CA1-1-3-G13	8/25/2009	12.0	4	204544.50	2458886.04	204544.09	2458886.93	0.41	-0.89
OU2-CA1-1-3-G14	8/25/2009	No Recovery	4	204632.55	2458913.10	204632.81	2458913.06	-0.27	0.04
OU2-CA1-1-3-G15	8/25/2009	8.0	4	204568.59	2458966.79	204573.26	2458967.11	-4.67	-0.32
Average		**9.9**							

OU2-CB1-1-1									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CB1-1-1-G1	9/21/2009	6.0	4	204120.19	2458253.26	204120.54	2458252.63	-0.35	0.64
OU2-CB1-1-1-G2	9/21/2009	4.0	4	204087.86	2458216.39	204087.07	2458215.51	0.79	0.88
OU2-CB1-1-1-G3	9/21/2009	12.0	4	204089.39	2458249.78	204088.57	2458248.89	0.83	0.89
OU2-CB1-1-1-G4	9/21/2009	No Recovery	4	204099.53	2458282.58	204100.36	2458282.64	-0.83	-0.06
OU2-CB1-1-1-G5	9/18/2009	12.0	4	204124.01	2458300.90	204124.41	2458301.88	-0.40	-0.98
Average		**8.5**							

Appendix M
Table M-2
Armor Cap Sampling Results

OU3-CA3-1-1									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU3-CA3-1-1-G1	10/13/2009	9.0	4	209103.23	2461120.88	209103.07	2461119.94	0.17	0.94
OU3-CA3-1-1-G2	10/13/2009	6.5	4	209130.34	2461115.52	209127.79	2461115.12	2.55	0.40
OU3-CA3-1-1-G3	10/13/2009	9.0	4	209116.64	2461166.59	209117.75	2461159.13	-1.11	7.46
OU3-CA3-1-1-G4	10/13/2009	7.0	4	209141.08	2461142.91	209134.89	2461140.03	6.19	2.88
OU3-CA3-1-1-G5	10/13/2009	7.0	4	209139.09	2461189.06	209138.09	2461187.15	1.00	1.91
OU3-CA3-1-1-G6	10/13/2009	7.0	4	209167.55	2461149.44	209169.47	2461146.82	-1.92	2.62
OU3-CA3-1-1-G7	10/13/2009	8.0	4	209164.96	2461199.80	209166.18	2461199.56	-1.22	0.24
OU3-CA3-1-1-G8	10/13/2009	7.0	4	209177.44	2461172.81	209182.27	2461172.32	-4.82	0.49
OU3-CA3-1-1-G9	10/13/2009	8.0	4	209194.06	2461210.86	209191.23	2461207.96	2.83	2.91
OU3-CA3-1-1-G10	10/13/2009	10.0	4	209218.48	2461185.73	209211.27	2461187.41	7.21	-1.68
OU3-CA3-1-1-G11*	10/13/2009	7.5	4	209220.76	2461218.60	209217.74	2461221.19	3.03	-2.59
Average		**7.8**							

**Bucket was dropped, but observed thickness between 7" & 8" before dropped.*

Appendix M-3

Sand Cover/Armor Cap Verification Results (2011)

OU3-CA6-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA6-1-1-C1	6/7/2011	3.0	4.0	0.0	4.00	218419.41	2467705.15	
OU3-CA6-1-1-C2	6/7/2011	3.0	4.5	0.0	4.50	218465.64	2467684.47	
OU3-CA6-1-1-C3	6/7/2011	3.0	3.5	0.0	3.50	218485.11	2467765.94	
OU3-CA6-1-1-C4	6/7/2011	3.0	5.0	0.0	5.00	218545.45	2467784.76	
OU3-CA6-1-1-C5	6/7/2011	3.0	3.5	0.0	3.50	218581.36	2467753.13	
Average			4.1	0.0	4.10			

OU3-CA6-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA6-1-1-G1	8/17/2011	4.0	6.0	218441.26	2467686.84	
OU3-CA6-1-1-G2	8/17/2011	4.0	7.5	218453.85	2467738.76	
OU3-CA6-1-1-G3	8/17/2011	4.0	9.0	218513.01	2467724.19	
OU3-CA6-1-1-G4	8/17/2011	4.0	9.0	218522.70	2467799.89	
OU3-CA6-1-1-G5	8/17/2011	4.0	8.5	218580.13	2467736.17	
OU3-CA6-1-1-G6	8/17/2011	4.0	7.0	218592.75	2467791.78	
Average			7.8			

OU3-CA9A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA9A-1-1-C1	6/29/2011	3.0	3.0	0.5	3.25	220966.64	2469912.75	
OU3-CA9A-1-1-C2	6/29/2011	3.0	4.5	1.0	5.00	221069.09	2470010.89	
OU3-CA9A-1-1-C3	6/29/2011	3.0	4.5	0.5	4.75	221174.54	2470102.57	
OU3-CA9A-1-1-C4	6/29/2011	3.0	6.0	0.5	6.25	221138.95	2470190.09	
OU3-CA9A-1-1-C5	6/29/2011	3.0	4.0	1.0	4.50	221243.04	2470200.11	
OU3-CA9A-1-1-C6	6/29/2011	3.0	3.5	1.0	4.00	221296.53	2470287.72	
Average			4.3	0.8	4.63			

OU3-CA9A-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA9A-1-1-G1	8/18/2011	4.0	6.0	220900.64	2469918.60	
OU3-CA9A-1-1-G2	8/18/2011	4.0	6.0	220977.87	2469897.36	
OU3-CA9A-1-1-G3	8/18/2011	4.0	11.0	220996.09	2469999.15	
OU3-CA9A-1-1-G4	8/18/2011	4.0	5.0	221067.25	2469997.08	
OU3-CA9A-1-1-G5	8/18/2011	4.0	7.0	221084.46	2470072.49	
OU3-CA9A-1-1-G6	8/18/2011	4.0	7.5	221114.69	2470132.89	
OU3-CA9A-1-1-G7	8/18/2011	4.0	6.0	221172.62	2470100.26	
OU3-CA9A-1-1-G8	8/18/2011	4.0	7.0	221149.96	2470186.29	
OU3-CA9A-1-1-G9	8/18/2011	4.0	7.5	221239.42	2470208.04	
OU3-CA9A-1-1-G10	8/18/2011	4.0	7.5	221294.02	2470292.19	
OU3-CA9A-1-1-G11	8/18/2011	4.0	9.0	221379.37	2470315.64	
Average			7.2			

Appendix M-3

Sand Cover/Armor Cap Verification Results (2011)

OU3-CA9B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA9B-1-1-C1	6/30/2011	3.0	5.0	0.5	5.25	221149.61	2470316.45	
OU3-CA9B-1-1-C2	6/30/2011	3.0	4.0	1.0	4.50	221238.29	2470429.28	
OU3-CA9B-1-1-C3	6/30/2011	3.0	3.5	0.5	3.75	221332.98	2470404.57	
OU3-CA9B-1-1-C4	6/30/2011	3.0	5.0	0.5	5.25	221528.39	2470437.83	
OU3-CA9B-1-1-C5	6/30/2011	3.0	5.0	0.5	5.25	221712.92	2470545.40	
OU3-CA9B-1-1-C6	6/30/2011	3.0	3.0	1.0	3.50	221649.00	2470639.64	
OU3-CA9B-1-1-C7	6/30/2011	3.0	4.5	0.5	4.75	221837.33	2470680.87	
OU3-CA9B-1-1-C8	6/30/2011	3.0	4.5	1.0	5.00	221862.42	2470758.20	
Average			4.3	0.7	4.66			

OU3-CA9B-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA9B-1-1-G1	8/19/2011	4.0	5.0	221115.03	2470249.08	NA	NA	NA	
OU3-CA9B-1-1-G2	8/19/2011	4.0	6.5	221145.27	2470319.47	NA	NA	NA	
OU3-CA9B-1-1-G3	8/19/2011	4.0	8.0	221217.32	2470340.73	NA	NA	NA	
OU3-CA9B-1-1-G4	8/19/2011	4.0	5.0	221241.36	2470427.74	NA	NA	NA	
OU3-CA9B-1-1-G5	8/19/2011	4.0	No Recovery	NA	NA	221336.60	2470426.00	5.2	Unable to locate Tt bucket. JFB QC bucket
OU3-CA9B-1-1-G6	8/19/2011	4.0	8.0	221307.52	2470468.98	NA	NA	NA	
OU3-CA9B-1-1-G7	8/19/2011	4.0	6.5	221410.73	2470500.06	NA	NA	NA	
OU3-CA9B-1-1-G8	8/19/2011	4.0	7.0	221528.65	2470438.30	NA	NA	NA	
OU3-CA9B-1-1-G9	8/19/2011	4.0	No Recovery	221675.15	2470569.38	221464.30	2470558.00	6.2	Tt QA bucket was moved approximately 200 ft. during stone placement, but showed 6.0" of stone, which is
OU3-CA9B-1-1-G10	8/19/2011	4.0	6.5	221586.96	2470492.04	NA	NA	NA	
OU3-CA9B-1-1-G11	8/19/2011	4.0	7.5	221561.06	2470598.00	NA	NA	NA	
OU3-CA9B-1-1-G12	8/19/2011	4.0	12.0	221636.76	2470553.86	NA	NA	NA	
OU3-CA9B-1-1-G13	8/19/2011	4.0	No Recovery	NA	NA	221704.00	2470555.00	7.2	Unable to locate Tt bucket. JFB bucket
OU3-CA9B-1-1-G14	8/19/2011	4.0	8.5	221650.31	2470638.25	NA	NA	NA	
OU3-CA9B-1-1-G15	8/19/2011	4.0	6.5	221717.28	2470678.88	NA	NA	NA	
OU3-CA9B-1-1-G16	8/19/2011	4.0	5.0	221772.05	2470622.71	NA	NA	NA	
OU3-CA9B-1-1-G17	8/19/2011	4.0	No Recovery	NA	NA	221848.20	2470704.00	7.3	Unable to locate Tt bucket. JFB bucket
OU3-CA9B-1-1-G18	8/19/2011	4.0	6.0	221863.08	2470760.66	NA	NA	NA	
Average			7.0						

Appendix M-3
Sand Cover/Armor Cap Verification Results (2011)

OU3-CA13A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13A-1-1-C1	8/1/2011	3.0	3.0	0.0	3.00	222426.80	2471001.13	
OU3-CA13A-1-1-C2	8/1/2011	3.0	6.0	0.0	6.00	222527.61	2471005.63	
OU3-CA13A-1-1-C3	8/1/2011	3.0	5.5	0.5	5.75	222652.82	2470994.86	
OU3-CA13A-1-1-C4	8/1/2011	3.0	7.0	0.5	7.25	222639.16	2471092.76	
OU3-CA13A-1-1-C5	8/1/2011	3.0	4.5	0.5	4.75	222751.72	2471088.06	
OU3-CA13A-1-1-C6	8/1/2011	3.0	7.0	0.5	7.25	222820.20	2471207.33	
OU3-CA13A-1-1-C7	8/9/2011	3.0	5.0	0.5	5.25	222943.24	2471187.52	
OU3-CA13A-1-1-C8	8/9/2011	3.0	5.5	1.0	6.00	223010.45	2471092.91	
OU3-CA13A-1-1-C9	8/9/2011	3.0	5.0	0.5	5.25	222961.24	2471265.77	
OU3-CA13A-1-1-C10	8/9/2011	3.0	5.0	1.0	5.50	223087.97	2471161.40	
OU3-CA13A-1-1-C11	8/9/2011	3.0	5.0	0.5	5.25	223108.61	2471282.53	
OU3-CA13A-1-1-C12	8/9/2011	3.0	4.5	1.0	5.00	223220.39	2471268.50	
OU3-CA13A-1-1-C13	8/9/2011	3.0	4.5	0.5	4.75	223169.41	2471383.58	
OU3-CA13A-1-1-C14	8/9/2011	3.0	5.5	0.5	5.75	223281.26	2471360.84	
OU3-CA13A-1-1-C15	8/9/2011	3.0	4.0	0.0	4.00	223488.67	2471432.76	
OU3-CA13A-1-1-C16	8/9/2011	3.0	3.5	0.0	3.50	223452.06	2471510.89	
Average			5.0	0.5	5.27			

OU3-CA13A-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA13A-1-1-G1	8/25/2011	4.0	8.0	222430.30	2470999.44	NA	NA	NA	
OU3-CA13A-1-1-G2	8/25/2011	4.0	8.5	222524.00	2471007.09	NA	NA	NA	
OU3-CA13A-1-1-G3	8/26/2011	4.0	5.5	222652.66	2470997.60	NA	NA	NA	
OU3-CA13A-1-1-G4	8/24/2011	4.0	No Recovery	NA	NA	222613.00	2471074.00	6.2	Unable to retrieve Tt bucket. JFB bucket measurements collected 31 ft. from proposed bucket location
OU3-CA13A-1-1-G5	8/24/2011	4.0	8.5	222776.02	2471093.68	222784.40	2471107.00	5.7	Bucket was displaced approximately 25 ft. from placed location. JFB bucket measurements collected 39 ft. from proposed bucket location. Results are for information only and not included in the average
OU3-CA13A-1-1-G6	8/24/2011	4.0	7.0	222823.87	2471207.24	NA	NA	NA	
OU3-CA13A-1-1-G7	8/24/2011	4.0	8.0	222862.33	2471107.26	NA	NA	NA	
OU3-CA13A-1-1-G8	8/24/2011	4.0	No Recovery	NA	NA	222917.60	2471161.00	5.5	Unable to retrieve Tt bucket. JFB bucket measurements collected 29 ft. from proposed bucket location
OU3-CA13A-1-1-G9	8/25/2011	4.0	No Recovery	NA	NA	223038.60	2471098.00	4.8	Unable to retrieve Tt bucket. JFB bucket measurements collected 28 ft. from proposed bucket location
OU3-CA13A-1-1-G10	8/24/2011	4.0	8.0	222969.26	2471266.19	NA	NA	NA	
OU3-CA13A-1-1-G11	8/26/2011	4.0	No Recovery	NA	NA	223101.80	2471180.00	4.3	Unable to retrieve Tt bucket. JFB bucket measurements collected 22 ft. from proposed bucket location
OU3-CA13A-1-1-G12	8/25/2011	4.0	See Comments	NA	NA	223112.50	2471273.00	5.2	Bucket was displaced approximately 200 ft. and filled with sand. JFB bucket measurements collected 11 ft. from proposed bucket location
OU3-CA13A-1-1-G13	8/26/2011	4.0	7.0	223219.84	2471267.66	NA	NA	NA	
OU3-CA13A-1-1-G14	8/24/2011	4.0	6.0	223165.81	2471379.83	NA	NA	NA	
OU3-CA13A-1-1-G15	8/25/2011	4.0	6.0	223281.02	2471363.95	NA	NA	NA	
OU3-CA13A-1-1-G16	8/25/2011	4.0	7.5	223375.01	2471425.68	NA	NA	NA	
OU3-CA13A-1-1-G17	8/26/2011	4.0	See Comments	NA	NA	223490.80	2471411.00	6.0	Brennan removed bucket due to navigational buoy interference. JFB bucket measurements collected 5 ft. from proposed bucket location
OU3-CA13A-1-1-G18	8/25/2011	4.0	10.5 See Comments	223062.68	2471202.10	223445.90	2471508.00	6.3	Bucket was displaced approximately 500 ft. from placed location with 10.5" of stone. The 10.5" was not included in the average. JFB bucket measurements collected 9 ft. from proposed bucket location
Average			7.3						

Appendix M-3
Sand Cover/Armor Cap Verification Results (2011)

OU3-CA13B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13B-1-1-C1	8/11/2011	3.0	5.5	1.0	6.00	223523.96	2471599.41	
OU3-CA13B-1-1-C2	8/11/2011	3.0	5.5	0.5	5.75	223671.36	2471553.71	
OU3-CA13B-1-1-C3	8/19/2011	3.0	4.5	0.5	4.75	223831.93	2471649.64	
OU3-CA13B-1-1-C4	8/11/2011	3.0	4.5	0.0	4.50	223945.60	2471789.23	
OU3-CA13B-1-1-C5	8/11/2011	3.0	5.5	0.5	5.75	224096.90	2471898.99	
OU3-CA13B-1-1-C6	8/19/2011	3.0	4.5	0.5	4.75	224210.49	2471915.02	
OU3-CA13B-1-1-C7	8/11/2011	3.0	6.5	0.0	6.50	224181.46	2472006.46	
OU3-CA13B-1-1-C8	8/31/2011	3.0	7.0	0.0	7.00	224326.37	2472025.37	
OU3-CA13B-1-1-C9	8/31/2011	3.0	6.0	0.0	6.00	224464.51	2472108.84	
OU3-CA13B-1-1-C10	8/31/2011	3.0	5.0	0.0	5.00	224565.47	2472212.27	
OU3-CA13B-1-1-C11	8/31/2011	3.0	5.5	0.0	5.50	224713.72	2472236.29	
OU3-CA13B-1-1-C12	9/2/2011	3.0	7.5	0.0	7.50	224898.81	2472235.21	
OU3-CA13B-1-1-C13	9/2/2011	3.0	6.5	0.0	6.50	224994.83	2472329.31	
OU3-CA13B-1-1-C14	9/2/2011	3.0	7.0	0.0	7.00	225117.16	2472328.48	
Average			5.8	0.2	5.89			

OU3-CA13B-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA13B-1-1-G1	8/26/2011	4.0	6.5	223524.48	2471453.54	
OU3-CA13B-1-1-G2	8/25/2011	4.0	8.0	223526.69	2471601.75	
OU3-CA13B-1-1-G3	8/26/2011	4.0	6.0	223671.73	2471558.54	
OU3-CA13B-1-1-G4	8/30/2011	4.0	7.0	223722.56	2471705.08	
OU3-CA13B-1-1-G5	8/30/2011	4.0	6.0	223830.62	2471649.96	
OU3-CA13B-1-1-G6	8/30/2011	4.0	6.0	223837.58	2471771.39	
OU3-CA13B-1-1-G7	8/30/2011	4.0	7.0	223947.65	2471790.10	
OU3-CA13B-1-1-G8	8/30/2011	4.0	No Recovery	NA	NA	Unable to locate bucket.
OU3-CA13B-1-1-G9	9/7/2011	4.0	6.0	224096.48	2471897.94	
OU3-CA13B-1-1-G10	9/7/2011	4.0	7.5	224217.41	2471915.58	
OU3-CA13B-1-1-G11	8/30/2011	4.0	7.0	224178.95	2472021.80	
OU3-CA13B-1-1-G12	9/8/2011	4.0	7.5	224323.10	2472030.46	
OU3-CA13B-1-1-G13	9/7/2011	4.0	6.5	224472.55	2472102.19	
OU3-CA13B-1-1-G14	9/8/2011	4.0	5.5	224565.86	2472216.49	
OU3-CA13B-1-1-G15	9/9/2011	4.0	6.5	224711.30	2472237.47	
OU3-CA13B-1-1-G16	9/8/2011	4.0	6.0	224896.79	2472226.77	
OU3-CA13B-1-1-G17	9/9/2011	4.0	7.0	224997.37	2472328.95	
OU3-CA13B-1-1-G18	9/8/2011	4.0	7.0	225113.24	2472327.09	
Average			6.6			

OU3-CA13C-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13C-1-1-C1	8/9/2011	3.0	5.0	0.5	5.25	222934.65	2470986.42	
OU3-CA13C-1-1-C2	8/9/2011	3.0	4.5	0.5	4.75	222996.25	2470999.75	
Average			4.8	0.5	5.00			

OU3-CA13C-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA13C-1-1-G1	8/24/2011	4.0	7.5	222925.21	2470980.99	NA	NA	NA	
OU3-CA13C-1-1-G2	8/24/2011	4.0	No Recovery	NA	NA	222998.70	2471043.00	4.5	Unable to retrieve Tt bucket. JFB bucket
OU3-CA13C-1-1-G3	8/24/2011	4.0	7.0	223005.15	2470988.11	NA	NA	NA	Although the retrieval location was 11.1 ft. from the proposed coordinate location, and outside of the CCU foot print, the bucket placement location was 4.0 ft. from the proposed coordinate location. The 9.7 ft. drift from the placement to the retrieval location is attributed to the bucket being dragged
OU3-CA13C-1-1-G4	8/24/2011	4.0	7.5	223016.33	2471041.63	NA	NA	NA	Bucket placement was made within the tolerance criteria, however; the bucket placement was outside the CCU foot print.
Average			7.3						

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA13D-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13D-1-1-C1	9/20/2011	3.0	5.5	0.0	5.50	225252.86	2472627.92	
OU3-CA13D-1-1-C2	9/20/2011	3.0	5.5	0.0	5.50	225407.64	2472666.91	
OU3-CA13D-1-1-C3	9/20/2011	3.0	9.0	0.0	9.00	225513.90	2472667.54	
OU3-CA13D-1-1-C4	9/20/2011	3.0	4.5	0.0	4.50	225606.10	2472699.19	
OU3-CA13D-1-1-C5	9/20/2011	3.0	5.5	0.0	5.50	225672.70	2472696.45	
Average			6.0	0.0	6.00			

OU3-CA13D-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA13D-1-1-G1	10/4/2011	4.0	7.5	225261.18	2472630.60	
OU3-CA13D-1-1-G2	10/4/2011	4.0	9.0	225409.58	2472669.63	
OU3-CA13D-1-1-G3	10/4/2011	4.0	7.0	225519.71	2472668.65	
OU3-CA13D-1-1-G4	10/4/2011	4.0	6.5	225677.34	2472695.88	
Average			7.5			

OU3-CA13E-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13E-1-1-C1	9/22/2011	3.0	6.0	0.0	6.00	225588.70	2472523.67	
OU3-CA13E-1-1-C2	9/22/2011	3.0	5.5	0.0	5.50	225605.94	2472441.94	
OU3-CA13E-1-1-C3	9/22/2011	3.0	5.0	0.0	5.00	225726.30	2472491.97	
OU3-CA13E-1-1-C4	9/22/2011	3.0	5.0	0.0	5.00	225742.67	2472540.24	
OU3-CA13E-1-1-C5	9/22/2011	3.0	11.5	0.0	11.50	225807.49	2472487.54	
OU3-CA13E-1-1-C6	9/22/2011	3.0	5.0	0.0	5.00	225886.00	2472530.34	
OU3-CA13E-1-1-C7	9/22/2011	3.0	5.0	0.0	5.00	225899.59	2472575.37	
Average			6.1	0.0	6.14			

OU3-CA13E-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA13E-1-1-G1	10/5/2011	4.0	8.0	225587.57	2472525.94	
OU3-CA13E-1-1-G2	10/5/2011	4.0	6.0	225605.69	2472437.03	
OU3-CA13E-1-1-G3	10/5/2011	4.0	5.5	225645.62	2472502.63	
OU3-CA13E-1-1-G4	10/5/2011	4.0	8.0	225725.71	2472492.12	
OU3-CA13E-1-1-G5	10/5/2011	4.0	7.0	225806.84	2472486.53	
OU3-CA13E-1-1-G6	10/5/2011	4.0	10.0	225818.85	2472533.15	
OU3-CA13E-1-1-G7	10/5/2011	4.0	7.0	225885.90	2472534.63	
OU3-CA13E-1-1-G8	10/5/2011	4.0	5.0	225943.03	2472552.09	
Average			7.1			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA15-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA15-1-1-C1	9/23/2011	3.0	10.0	0.0	10.00	226348.94	2472664.35	
OU3-CA15-1-1-C2	9/28/2011	3.0	5.0	0.0	5.00	226481.94	2472803.61	
OU3-CA15-1-1-C4	9/28/2011	3.0	5.5	0.0	5.50	226640.16	2472846.36	
OU3-CA15-1-1-C5	9/23/2011	3.0	5.5	0.0	5.50	226829.36	2472856.81	
Average			6.5	0.0	6.50			

OU3-CA15-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA15-1-1-G1	10/6/2011	4.0	6.0	226359.26	2472660.50	
OU3-CA15-1-1-G2	10/6/2011	4.0	7.5	226365.87	2472736.93	
OU3-CA15-1-1-G3	10/6/2011	4.0	5.5	226430.25	2472799.19	
OU3-CA15-1-1-G4	10/6/2011	4.0	7.0	226491.54	2472718.58	
OU3-CA15-1-1-G5	10/6/2011	4.0	6.5	226516.44	2472808.29	Offset due to pipeline with concurrance with all entities on boat
OU3-CA15-1-1-G6	10/6/2011	4.0	7.0	226575.71	2472717.62	
OU3-CA15-1-1-G7	10/6/2011	4.0	6.0	226631.55	2472867.42	Offset due to pipeline with concurrance with all entities on boat
OU3-CA15-1-1-G8	10/6/2011	4.0	8.0	226686.45	2472791.74	
OU3-CA15-1-1-G9	10/6/2011	4.0	6.0	226710.97	2472901.53	
OU3-CA15-1-1-G10	10/6/2011	4.0	7.5	226799.46	2472823.46	
OU3-CA15-1-1-G11	10/6/2011	4.0	6.0	226804.90	2472888.32	
Average			6.6			

OU3-CA15-1-2-C3								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA15-1-2-C3	9/28/2011	3.0	4.5	0.0	4.50	226541.56	2472662.11	
Average			4.5	0.0	4.50			

OU3-CA15-1-2						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA15-1-2-G1	10/31/2011	4.0	9.0	226393.27	2472599.58	
OU3-CA15-1-2-G2	10/31/2011	4.0	10.5	226473.36	2472647.09	
OU3-CA15-1-2-G3	10/31/2011	4.0	11.0	226575.98	2472643.08	
OU3-CA15-1-2-G4	10/31/2011	4.0	7.0	226649.24	2472707.81	
OU3-CA15-1-2-G5	10/31/2011	4.0	9.0	226729.55	2472763.62	
OU3-CA15-1-2-G6	10/31/2011	4.0	10.5	226830.31	2472797.23	
Average			9.5			

Appendix M-3
Sand Cover/Armor Cap Verification Results (2011)

OU3-CA16A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA16A-1-1-C1	10/3/2011	3.0	9.5	0.0	9.5	226994.70	2473062.31	
OU3-CA16A-1-1-C2	10/3/2011	3.0	6.5	0.0	6.5	227081.33	2472949.20	
OU3-CA16A-1-1-C3	10/3/2011	3.0	5.5	0.0	5.5	227204.67	2473038.15	
OU3-CA16A-1-1-C4	10/3/2011	3.0	5.0	0.0	5.0	227171.18	2473187.20	
OU3-CA16A-1-1-C5	10/3/2011	3.0	8.5	0.0	8.5	227330.73	2473091.12	
OU3-CA16A-1-1-C6	10/3/2011	3.0	5.5	0.0	5.5	227394.95	2473191.75	
OU3-CA16A-1-1-C7	10/3/2011	3.0	5.5	0.0	5.5	227386.38	2473329.06	
OU3-CA16A-1-1-C8	10/3/2011	3.0	5.0	0.0	5.0	227505.56	2473262.18	
Average			6.4	0.0	6.4			

OU3-CA16A-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA16A-1-1-G1	10/10/2011	4.0	7.0	226990.20	2473066.84	
OU3-CA16A-1-1-G2	10/7/2011	4.0	9.0	227089.82	2472947.97	
OU3-CA16A-1-1-G3	10/10/2011	4.0	7.0	227067.17	2473015.28	
OU3-CA16A-1-1-G4	10/7/2011	4.0	7.0	227140.72	2472989.07	
OU3-CA16A-1-1-G5	10/7/2011	4.0	7.5	227077.54	2473125.88	
OU3-CA16A-1-1-G6	10/10/2011	4.0	8.0	227126.39	2473073.99	
OU3-CA16A-1-1-G7	10/10/2011	4.0	7.0	227206.86	2473038.30	
OU3-CA16A-1-1-G8	10/10/2011	4.0	7.0	227201.42	2473134.06	
OU3-CA16A-1-1-G9	10/7/2011	4.0	6.5	227171.99	2473182.88	
OU3-CA16A-1-1-G10	10/10/2011	4.0	5.0	227252.42	2473089.34	
OU3-CA16A-1-1-G11	10/7/2011	4.0	6.0	227244.48	2473231.00	
OU3-CA16A-1-1-G12	10/10/2011	4.0	7.0	227304.72	2473147.59	
OU3-CA16A-1-1-G13	10/10/2011	4.0	6.0	227331.63	2473087.46	
OU3-CA16A-1-1-G14	10/10/2011	4.0	7.0	227347.98	2473238.30	
OU3-CA16A-1-1-G15	10/10/2011	4.0	7.0	227395.95	2473194.51	
OU3-CA16A-1-1-G16	10/10/2011	4.0	8.0	227383.31	2473326.35	
OU3-CA16A-1-1-G17	10/7/2011	4.0	8.5	227426.91	2473257.22	
OU3-CA16A-1-1-G18	10/7/2011	4.0	6.5	227507.81	2473266.62	
Average			7.1			

OU3-CA16B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA16B-1-1-C1	10/3/2011	3.0	5.0	0.0	5.0	227189.56	2473501.64	
OU3-CA16B-1-1-C2	10/3/2011	3.0	5.0	0.0	5.0	227292.72	2473409.37	
Average			5.0	0.0	5.0			

OU3-CA16B-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA16B-1-1-G1	10/10/2011	4.0	6.5	227188.65	2473505.79	
OU3-CA16B-1-1-G2	10/10/2011	4.0	7.0	227289.97	2473410.11	
OU3-CA16B-1-1-G3	10/10/2011	4.0	6.5	227287.48	2473484.06	
OU3-CA16B-1-1-G4	10/10/2011	4.0	6.0	227360.19	2473405.07	
Average			6.5			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA17-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA17-1-1-C1	10/21/2011	3.0	5.5	0.0	5.5	228375.08	2474243.94	
OU3-CA17-1-1-C2	10/21/2011	3.0	6.0	0.0	6.0	228345.14	2474331.54	
OU3-CA17-1-1-C3	10/21/2011	3.0	4.0	0.0	4.0	228446.19	2474178.28	
OU3-CA17-1-1-C4	10/21/2011	3.0	6.0	0.0	6.0	228474.16	2474378.05	
OU3-CA17-1-1-C5	10/21/2011	3.0	4.0	0.0	4.0	228515.45	2474311.01	
OU3-CA17-1-1-C6	10/21/2011	3.0	5.0	0.0	5.0	228568.95	2474230.36	
OU3-CA17-1-1-C7	10/21/2011	3.0	5.5	0.0	5.5	228608.16	2474317.17	
Average			5.1	0.0	5.1			

OU3-CA17-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA17-1-1-G1	10/27/2011	4.0	8.0	228375.22	2474244.16	NA	NA	NA	
OU3-CA17-1-1-G2	10/27/2011	4.0	6.5	228343.75	2474332.17	NA	NA	NA	
OU3-CA17-1-1-G3	10/31/2011	4.0	8.5	228447.19	2474177.29	NA	NA	NA	
OU3-CA17-1-1-G4	10/27/2011	4.0	9.0	228378.16	2474403.39	NA	NA	NA	
OU3-CA17-1-1-G5	10/27/2011	4.0	7.0	228445.01	2474308.66	NA	NA	NA	
OU3-CA17-1-1-G6	10/28/2011	4.0	8.5	228492.78	2474241.66	NA	NA	NA	
OU3-CA17-1-1-G7	10/27/2011	4.0	8.5	228473.79	2474378.90	NA	NA	NA	
OU3-CA17-1-1-G8	10/27/2011	4.0	6.5	228515.72	2474310.81	NA	NA	NA	
OU3-CA17-1-1-G9	10/28/2011	4.0	8.5	228568.69	2474231.65	NA	NA	NA	
OU3-CA17-1-1-G10	10/27/2011	4.0	8.5	228567.79	2474392.29	NA	NA	NA	
OU3-CA17-1-1-G11	10/28/2011	4.0	No Recovery	NA	NA	228556.70	2474303.00	4.8	Unable to retrieve Tt bucket. JFB QC bucket measurements collected 52 ft. from proposed Tt bucket location
Average			8.0						

OU3-CA69-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA69-1-1-C1	9/16/2011	3.0	7.0	0.0	7.0	223558.99	2472071.36	
OU3-CA69-1-1-C2	9/16/2011	3.0	5.5	0.0	5.5	223640.47	2472104.08	
OU3-CA69-1-1-C3	9/16/2011	3.0	5.0	0.0	5.0	223871.00	2472282.61	
Average			5.8	0.0	5.8			

OU3-CA69-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA69-1-1-G1	10/28/2011	6.0	12.0	223532.35	2472057.19	
OU3-CA69-1-1-G2	10/28/2011	6.0	12.0	223571.66	2472125.06	
OU3-CA69-1-1-G3	10/28/2011	6.0	10.5	223629.81	2472086.23	
OU3-CA69-1-1-G4	10/28/2011	6.0	11.0	223686.43	2472156.44	
OU3-CA69-1-1-G5	10/28/2011	6.0	12.0	223772.31	2472236.22	
OU3-CA69-1-1-G6	10/28/2011	6.0	11.0	223878.22	2472298.82	
Average			11.4			

Appendix M-3

Sand Cover/Armor Cap Verification Results (2011)

OU3-CB2-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB2-1-1-C1	6/24/2011	6.0	6.5	1.0	7.0	220575.88	2469726.94	
OU3-CB2-1-1-C2	6/24/2011	6.0	10.0	0.0	10.0	220638.51	2469700.53	
OU3-CB2-1-1-C3	6/24/2011	6.0	9.0	0.0	9.0	220708.39	2469780.95	
OU3-CB2-1-1-C4	6/24/2011	6.0	5.5	1.5	6.3	220679.55	2469844.27	
OU3-CB2-1-1-C5	6/24/2011	6.0	7.0	0.0	7.0	220778.71	2469727.09	
OU3-CB2-1-1-C6	6/24/2011	6.0	8.5	0.0	8.5	220848.97	2469785.07	
Average			7.8	0.4	8.0			

OU3-CB2-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB2-1-1-G1	8/16/2011	4.0	11.0	220577.72	2469725.66	
OU3-CB2-1-1-G2	8/17/2011	4.0	7.5	220642.07	2469701.45	
OU3-CB2-1-1-G3	8/17/2011	4.0	12.0	220633.82	2469773.95	
OU3-CB2-1-1-G4	8/17/2011	4.0	6.5	220706.36	2469784.14	
OU3-CB2-1-1-G5	8/16/2011	4.0	9.0	220683.89	2469852.18	
OU3-CB2-1-1-G6	8/17/2011	4.0	6.0	220779.02	2469728.64	
OU3-CB2-1-1-G7	8/17/2011	4.0	8.5	220777.58	2469814.52	
OU3-CB2-1-1-G8	8/16/2011	4.0	9.5	220726.89	2469878.12	
OU3-CB2-1-1-G9	8/17/2011	4.0	7.0	220844.52	2469789.33	
OU3-CB2-1-1-G10	8/17/2011	4.0	7.5	220799.85	2469900.66	
OU3-CB2-1-1-G11	8/17/2011	4.0	7.0	220868.82	2469839.40	
Average			8.3			

OU3-CB3A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB3A-1-1-C1	9/20/2011	6.0	10.0	0.0	10.0	225377.50	2472516.59	
OU3-CB3A-1-1-C2	9/20/2011	6.0	9.5	0.0	9.5	225437.99	2472570.89	
OU3-CB3A-1-1-C3	9/20/2011	6.0	8.5	0.0	8.5	225524.26	2472532.88	
Average			9.3	0.0	9.3			

OU3-CB3A-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB3A-1-1-G1	10/4/2011	4.0	8.0	225326.99	2472603.30	
OU3-CB3A-1-1-G2	10/4/2011	4.0	7.0	225382.62	2472514.95	
OU3-CB3A-1-1-G3	10/4/2011	4.0	7.0	225397.61	2472625.31	
OU3-CB3A-1-1-G4	10/4/2011	4.0	7.0	225441.72	2472567.30	
OU3-CB3A-1-1-G5	10/4/2011	4.0	10.0	225501.08	2472624.68	
OU3-CB3A-1-1-G6	10/4/2011	4.0	7.0	225526.54	2472528.17	
Average			7.7			

OU3-CB3B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB3B-1-1-C1	9/22/2011	6.0	9.5	0.0	9.5	225800.76	2472627.39	
OU3-CB3B-1-1-C2	9/22/2011	6.0	8.0	0.0	8.0	225841.02	2472644.48	
OU3-CB3B-1-1-C3	9/22/2011	6.0	10.5	0.0	10.5	225895.96	2472623.30	
Average			9.3	0.0	9.3			

OU3-CB3B-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB3B-1-1-G1	10/5/2011	4.0	6.0	225800.02	2472625.86	
OU3-CB3B-1-1-G2	10/5/2011	4.0	8.0	225847.96	2472589.52	
OU3-CB3B-1-1-G3	10/5/2011	4.0	6.0	225894.12	2472622.80	
OU3-CB3B-1-1-G4	10/5/2011	4.0	7.5	225925.44	2472628.81	
Average			6.9			

Appendix M-3
Sand Cover/Armor Cap Verification Results (2011)

OU3-CB5-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB5-1-1-C1	10/3/2011	6.0	8.0	0.0	8.0	227506.59	2473352.40	
Average			8.0	0.0	8.0			

OU3-CB5-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB5-1-1-G1	10/10/2011	4.0	7.0	227412.27	2473360.23	
OU3-CB5-1-1-G2	10/10/2011	4.0	6.0	227441.82	2473298.86	
OU3-CB5-1-1-G3	10/10/2011	4.0	6.5	227471.74	2473372.03	
OU3-CB5-1-1-G4	10/10/2011	4.0	6.5	227508.64	2473331.44	
Average			6.5			

OU3-CB31-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB31-1-1-C1	10/21/2011	6.0	9.5	0.0	9.5	229282.84	2474036.13	
OU3-CB31-1-1-C2	10/21/2011	6.0	9.0	0.0	9.0	229270.57	2474226.19	
OU3-CB31-1-1-C3	10/21/2011	6.0	9.5	0.0	9.5	229307.77	2474128.20	
OU3-CB31-1-1-C4*	10/21/2011	6.0	5.0	0.0	5.0	229371.45	2474081.50	Additional samples collected around the perimeter of the vessel to determine thickness
OU3-CB31-1-1-C4A	10/21/2011	NA	4.0	0.0	4.0	NA	NA	4.75 is the average of the original sample and the three additional samples
OU3-CB31-1-1-C4B	10/21/2011	NA	5.5	0.0	5.5	NA	NA	
OU3-CB31-1-1-C4C	10/21/2011	NA	4.5	0.0	4.5	NA	NA	
OU3-CB31-1-1-C5	10/21/2011	6.0	6.0	0.0	6.0	229419.55	2474220.04	
OU3-CB31-1-1-C6*	10/21/2011	6.0	5.0	0.0	5.0	229428.73	2473982.46	Additional samples collected around the perimeter of the vessel to determine thickness
OU3-CB31-1-1-C6A	10/21/2011	NA	4.0	0.0	4.0	NA	NA	5.88 is the average of the original sample and the three additional samples
OU3-CB31-1-1-C6B	10/21/2011	NA	7.0	0.0	7.0	NA	NA	
OU3-CB31-1-1-C6C	10/21/2011	NA	7.5	0.0	7.5	NA	NA	
OU3-CB31-1-1-C7	10/21/2011	6.0	8.0	0.0	8.0	229451.12	2474101.36	
OU3-CB31-1-1-C8	10/21/2011	6.0	9.0	0.0	9.0	229501.00	2474170.96	
OU3-CB31-1-1-C9	10/21/2011	6.0	9.0	0.0	9.0	229522.70	2474021.32	
OU3-CB31-1-1-C10	10/21/2011	6.0	9.0	0.0	9.0	229558.74	2474092.72	
OU3-CB31-1-1-C11	10/21/2011	6.0	7.5	0.0	7.5	229573.13	2474194.92	
Average			7.0	0.0	7.9			

OU3-CB31-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB31-1-1-G1	10/26/2011	4.0	8.5	229284.41	2474035.57	
OU3-CB31-1-1-G2	10/26/2011	4.0	7.5	229270.57	2474226.19	
OU3-CB31-1-1-G3	10/26/2011	4.0	10.0	229308.94	2474129.81	
OU3-CB31-1-1-G4	10/26/2011	4.0	9.5	229372.69	2474081.61	
OU3-CB31-1-1-G5	10/26/2011	4.0	11.5	229419.51	2474220.41	
OU3-CB31-1-1-G6	10/26/2011	4.0	11.0	229433.56	2474002.97	
OU3-CB31-1-1-G7	10/26/2011	4.0	7.5	229452.30	2474101.82	
OU3-CB31-1-1-G8	10/26/2011	4.0	9.0	229501.85	2474168.04	
OU3-CB31-1-1-G9	10/26/2011	4.0	7.0	229522.79	2474020.29	
OU3-CB31-1-1-G10	10/26/2011	4.0	7.5	229559.04	2474092.81	
OU3-CB31-1-1-G11	10/26/2011	4.0	7.0	229573.77	2474196.44	
Average			8.7			

Attachment B

Lower Fox River OU3 2012 Cap Warranty Survey Evaluation
(Foth memorandum dated December 14, 2012)

DRAFT Memorandum

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December 14, 2012

TO: Jeff Lawson, LFRR LLC
Bryan Heath, NCR

CC: Sue O'Connell, LFRR LLC

FR: Steve Lehrke, Foth
Denis Roznowski, Foth
Troy Gawronski, Foth

RE: Lower Fox River OU3 2012 Cap Warranty Survey Evaluation

Background

The *Agreement For Environmental Remediation Services* between LFRR LLC and TETRA TECH EC INC (TTECI) includes a Section 11.02 Cap Warranty that stipulates …"should any such cap fail or become damaged within the Cap Warranty Repair Period, TTECI shall be required to repair such cap." This memorandum describes the methods used by Foth to evaluate the 27 acres of engineered caps placed in OU3 through 2011 for damage or failure and presents the findings of the evaluation.

Evaluation Methods

On October 23, 2012, a multi-beam hydrographic survey was completed over the approximate 27 acres of engineered caps placed in OU3 during 2010 and 2011, with the exception of Cap Area CA69. Cap Area CA69 was surveyed using single-beam survey technology due to the water being too shallow for multi-beam survey equipment, on October 29, 2012. The hydrographic survey observation reports are provided in Attachment 1. The multi-beam survey work was conducted using a 400 kilohertz (KHz) acoustical system and the single-beam work a 200 KHz system. All survey work was performed by JF Brennan and audited by Foth. The survey work was carried out in compliance with the project specifications and SOPs. Foth obtained raw survey files and gridded survey files (2 feet x 2 feet) from JF Brennan in a format consistent with the 2011 Year Zero survey of the same area. It should be noted that the multi-beam survey for the 2011 Year Zero COMMP work in OU3 was performed by JF Brennan using a 200 KHz multi-beam system rather than the 400 KHz multi-beam system used in 2012. While this frequency difference is not likely to cause more than an average 0.0 to 0.2 feet

difference in survey elevation of capped areas, it does present some uncertainty in our analysis. The difference in KHz between the 2011 and 2012 surveys is not further considered in this evaluation.

The 2012 Warranty Survey information was processed and plotted by Foth for visual review to identify any failing or damaged cap areas. Additionally, the 2012 top of cap elevations were compared to the 2011 Year Zero top of cap elevations and an elevation difference drawing was created, again to visually identify any failing or damaged cap areas.

Finally, the 2012 Warranty Survey was compared to the 2011Year Zero survey to statistically assess average change in elevation and determine areas where greater elevation change occurred.

Results

Figure 1 illustrates the cap placement areas of CA3 and CA6, and Figure 2 illustrates the remainder of the OU3 cap placement areas, totaling 27 acres in OU3.

Figures 3 through 15 illustrate the top of cap elevations for the 2012 Warranty Survey, and the elevation differences between the 2011 and 2012 surveys. Each figure set includes an "A" figure, which depicts the top of cap elevations, a "B" figure which depicts the top of cap elevations in a three-dimensional isometric view (as an added visual aid to assess cap integrity), and a "C" figure which depicts the 2011 and 2012 differences in elevation (isopachs). For some Cap areas, "D" and "E" series figures were added to offer cross sections to better depict anomalous conditions.

In viewing the 27 acres of capped areas in OU3, there are several areas of interest as described below:

- A small depressed area is visible in the mid-section of CB2 (Figure 4B). Comparing this with the isopach difference (Figure 4C), it appears the depressed area may have accumulated sediment between 2011 and 2012.

- A small depressed area is visible in the west to northwest edge of CA13E (Figure 10B). Little correlation is found, however, with this area when comparing to the same area in the isopach difference (Figure 10C). Therefore, the depressed area in Figure 10B may be a reflection of the river bottom topography. Supporting this conclusion is the chemical isolation layer sample for CB2 which indicates no cap abnormality in this location.

- Areas near the west shore of Cap area CB31 (Figure 14C) exhibit 0.4 to 0.6 feet lower elevation in 2012 than in 2011, whereas eastern areas of CB31 show higher elevation in 2012 than in 2011, on the order of 0.1 to 0.2 feet. This evaluation of elevation surfaces warranted a field evaluation to determine if capping materials are sloughing on the western sloped portions on CB31, moving toward the east. A description of the evaluation is presented below.

- The Cap area CA69 has shallow water (on the order of a few feet) and as a result was surveyed with single-beam equipment. Of all the OU3 capped areas, it shows the greatest drop in top of cap elevation from 2011 to 2012, with some areas as much as 1.2 to 1.4 feet (see Figure 15C). This evaluation of elevation surfaces warranted a field evaluation to determine if capping materials are settling more than other areas, or if scour has occurred and moved the cap materials off of the area. A description of the evaluation is presented below.

- General elevation decreases less than 0.4 feet between the 2011 and 2012 surveys are noted throughout the OU3 cap areas, particularly in areas more towards the river center. This may indicate cap settling or consolidation continues to occur, which is expected given the short duration since completion of capping activities.

A field evaluation was completed in areas CB31 and CA69 to determine if the differences in top of cap elevations are attributed to cap failure or simply the cap and underlying sediment settling/consolidating. To evaluate the field conditions, TtEC implemented a poling survey to determine if the armor stone was still in place at the suspect areas identified by this evaluation.

Foth reviewed the cap elevation difference isopachs (Figures 14C and 15C) and located proposed poling points in areas of interest within the two cap areas. Ten (10) proposed poling points were selected for CB31 and six (6) proposed poling locations for CA69 (Figures 14F and 15F).

On December 5, 2012, the TtEC field team, along with a Foth auditor, completed the poling survey in both cap areas. The poling survey consisted of the field team navigating their sampling vessel to each proposed poling location using RTK GPS. Upon reaching the proposed location the sampling vessel was spudded. At each location, the field team acquired a surface water elevation, a depth to the top of sediment/armor stone, a thickness of sediment (deposition over the underlying cap armor stone), and recorded field observations describing the conditions encountered. The Foth auditor recorded all of the pertinent information on a poling field log (Attachment 2).

The poling survey indicated that armor stone still exists at each of the 16 locations visited. Further, the poling survey indicated little to no sediment deposition has occurred over the armor stone in these areas.

To quantifiably assess general elevation changes, and also assess areas where greater changes occurred, the distribution of isopach differences was evaluated statistically. Figure 16 presents the cumulative distribution of differences between the 2011 and 2012 surveys for all OU3 cap areas. In Figure 16, a negative difference implies a decrease in top of cap elevation occurred between 2011 and 2012, while a positive difference implies an increase occurred. Five percent of the OU3 cap area exhibited a decrease of 0.34 feet or more from 2011 to 2012 (5th percentile in Figure 16). Five percent of the OU3 cap area exhibited an increase of 0.08 feet or more from 2011 to 2012 (95th percentile in Figure 16).

The median of the isopach differences was a decrease of 0.15 feet, and the average of the differences after trimming off the lower and upper 5th percentiles was a decrease of 0.146 feet. This average decrease reflects the observation made above of the general settling or consolidation noted in the isopach figures (Figure 3 through Figure 15).

The areas representing the tails of the distribution are spatially plotted in Figures 17A and 17B. In Figures 17A and 17B, isopach grid nodes with the 2012 survey illustrating a decrease of at least 0.34 feet (lower 5th percentile) are plotted as red nodes. Isopach grid nodes with the 2012 survey illustrating an increase of at least 0.08 feet (upper 95th percentile) are plotted as green nodes.

The green isopach nodes representing the upper 95th percentile (increase of at least 0.08 feet) generally occur in most of the OU3 cap areas. The highest concentration appears in the most upstream Cap area CA3 (Figure 17A).

The red isopach nodes representing the lower 5th percentile (decrease of at least 0.34 feet) are more concentrated in the areas of CA69, CA13A, CA13B, CB3A, CB3B and CA15 (Figure 17B). Another area near the shoreline of CB31 also contains a higher concentration of these nodes.

The average of the differences between the 2011 and 2012 surveys by each cap area are presented in Table 1 below. The average differences presented in Table 1 reflect the observations noted above from Figures 17A and 17B.

Table 1

Average Difference Between 2011 and 2012 Surveys by Cap Area

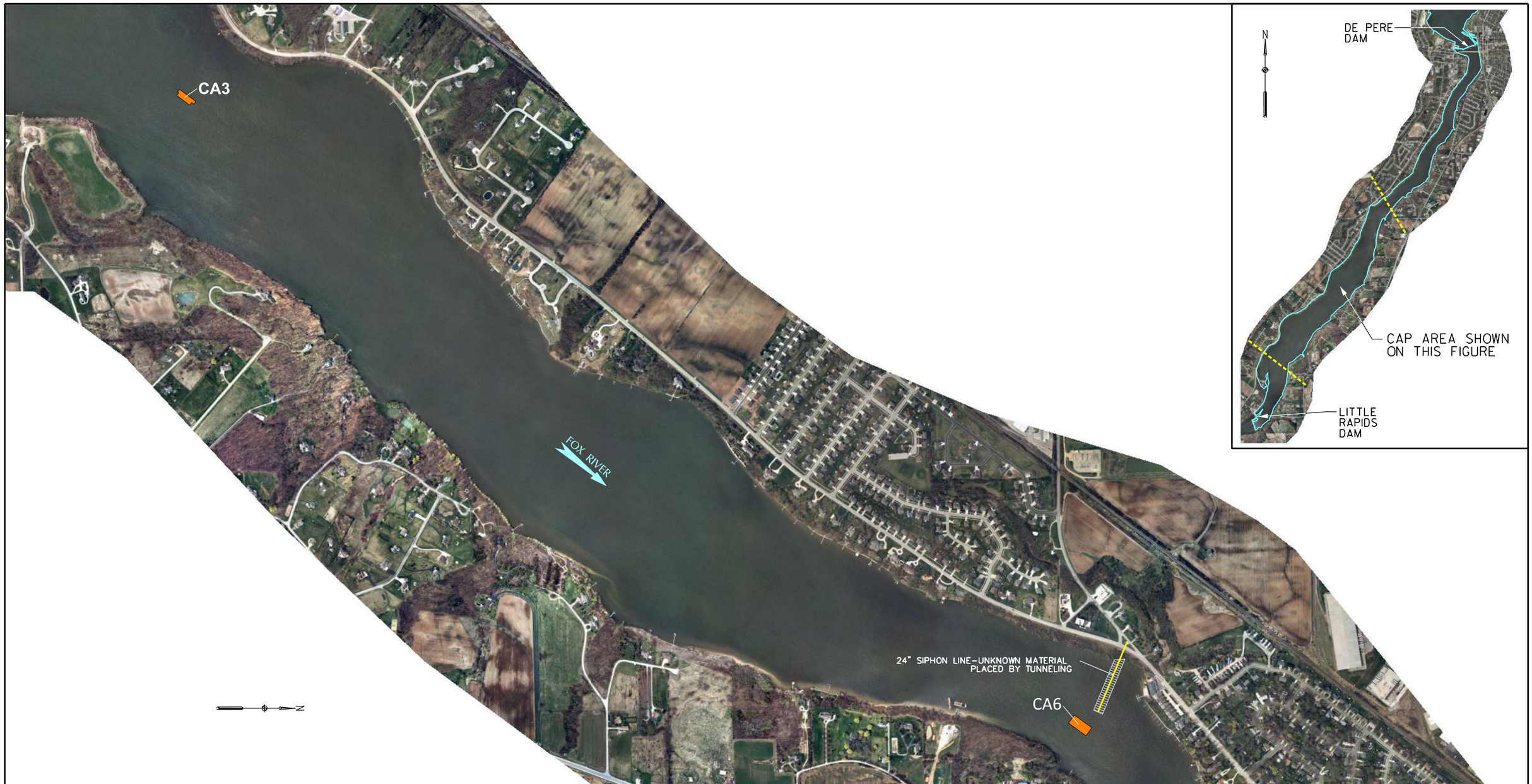
Area	Average Difference (Ft.)		Area	Average Difference (Ft.)
CB2	-0.16		CA13C	-0.07
CA3	0.09		CA13D	-0.05
CB3A	-0.24		CA13E	-0.16
CB3B	-0.27		CA15	-0.24
CB5	-0.15		CA16A	-0.11
CA6	-0.08		CA16B	-0.06
CA9A	-0.01		CA17	-0.04
CA9B	-0.11		CB31	-0.13
CA13A	-0.17		CA69	-0.39
CA13B	-0.17			

Note: Positive difference implies increase in elevation in 2012 over 2011 and negative difference implies decrease in elevation.

Conclusions

The results of the 2012 Warranty Survey collected on October 23 (and October 29 for Cap area CA69) were compared to the 2011 bathymetric survey results for review and identification of any potentially failing or damaged cap areas. Results showed general cap settling, or consolidation as noted, particularly in areas CA13A, CA13B, CB3A, CB3B and CA15. Cap areas CB31 and CA69 exhibit anomalously higher values of elevation change (2012 elevations more than 0.4 feet below 2011 elevations over broad areas). The poling survey completed in these areas confirmed that the armor stone is still in place at all locations measured. The results of this survey provide high confidence that the placed armored caps have not failed in these locations. Further, the identified settlement (consolidation) for the OU3 caps is similar to the observed consolidation at the OU1 site. Deposition (identified as an increase in top of cap elevation in 2012 over 2011) was noted in scattered areas throughout the cap regions, particularly in the upstream Cap area of CA3.

Figures



LEGEND

CA6 DESIGN CAP PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS and UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 500' 1000'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 1

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-1 All Caps.dgn
11/29/2012 ckv

LEGEND

CA15 ''A'' CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

CB31 ''B'' CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 500' 1000'
BAR SCALE

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LOWER FOX RIVER REMEDIATION LLC

FIGURE 2

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

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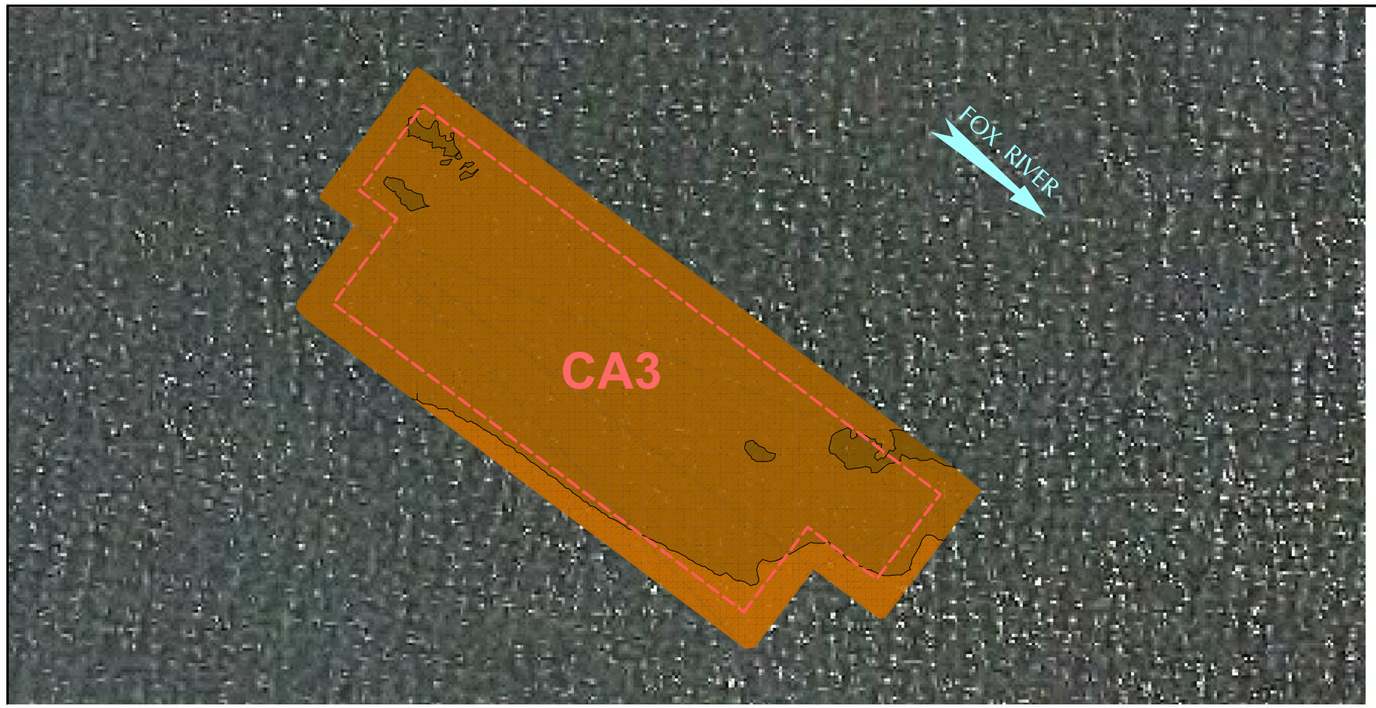
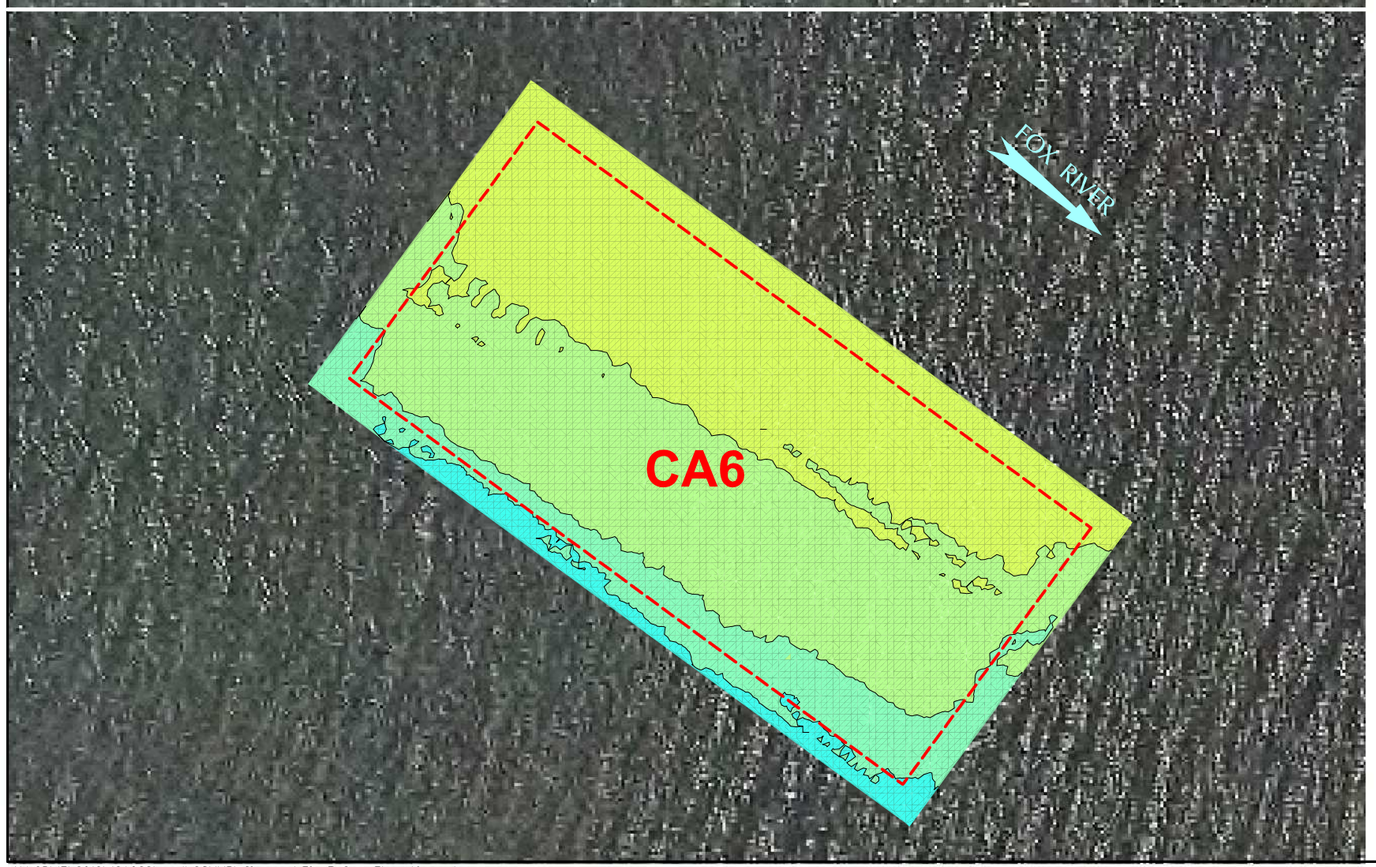
11/29/2012 ckv





LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
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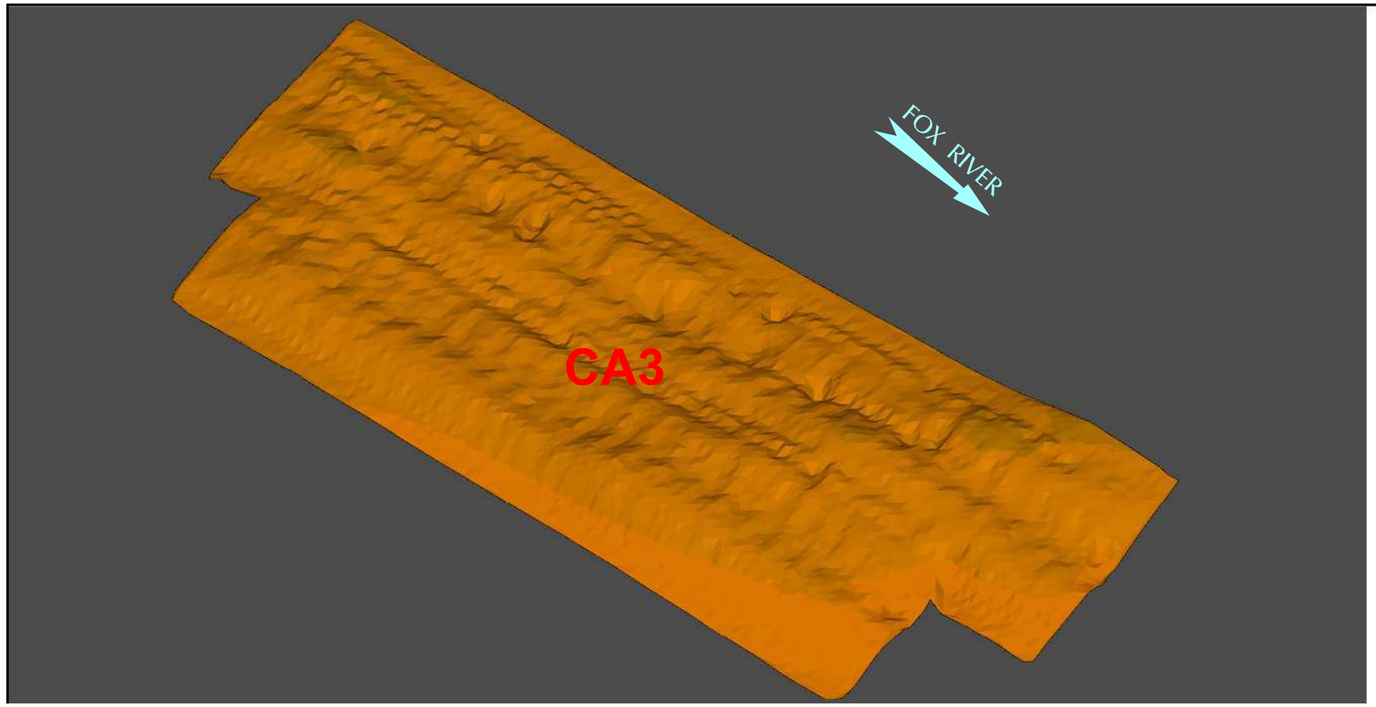
LOWER FOX RIVER REMEDIATION LLC

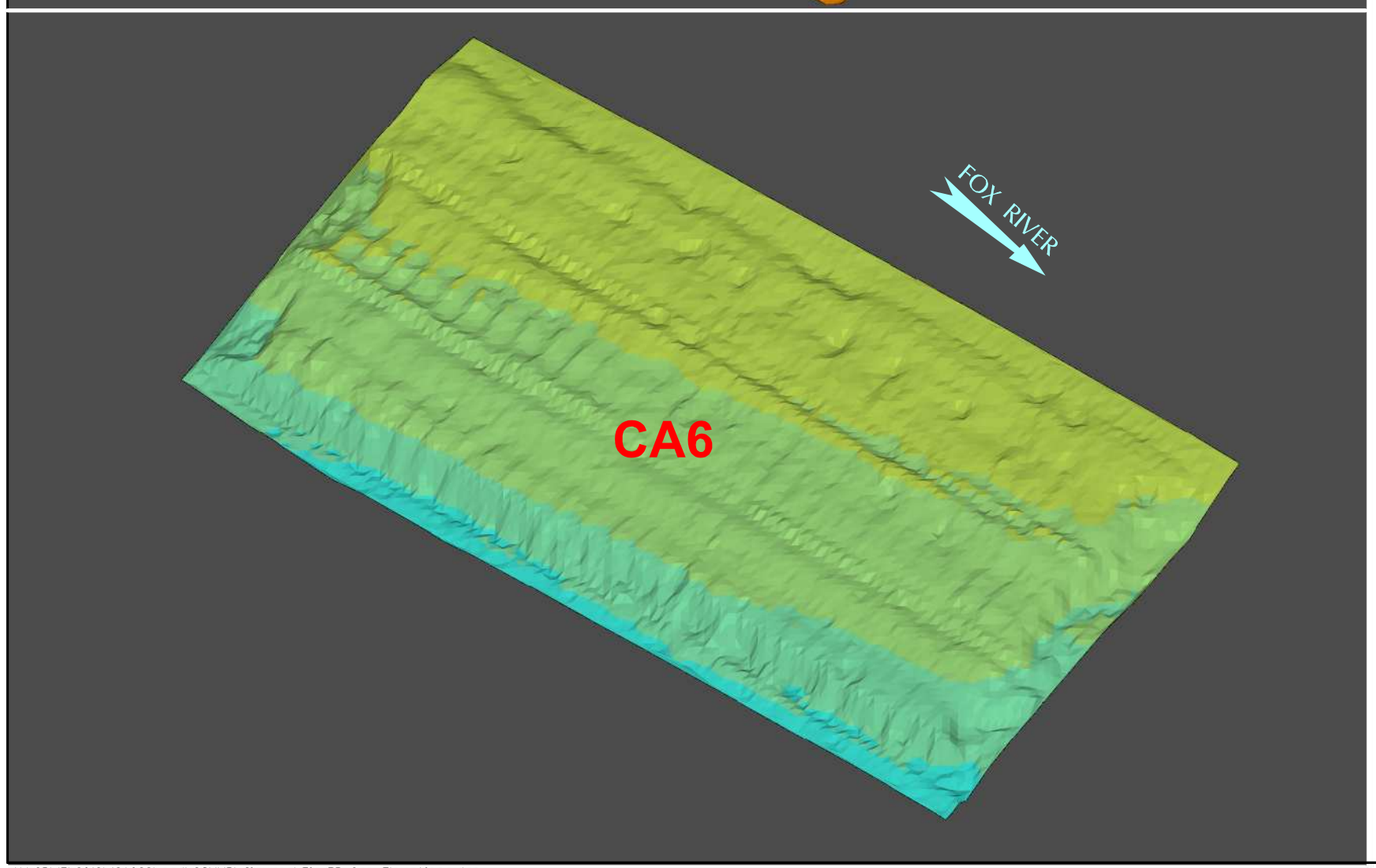
FIGURE 3A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-3 Cap Elevations.dgn
12/4/2012 jrb2





COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 3B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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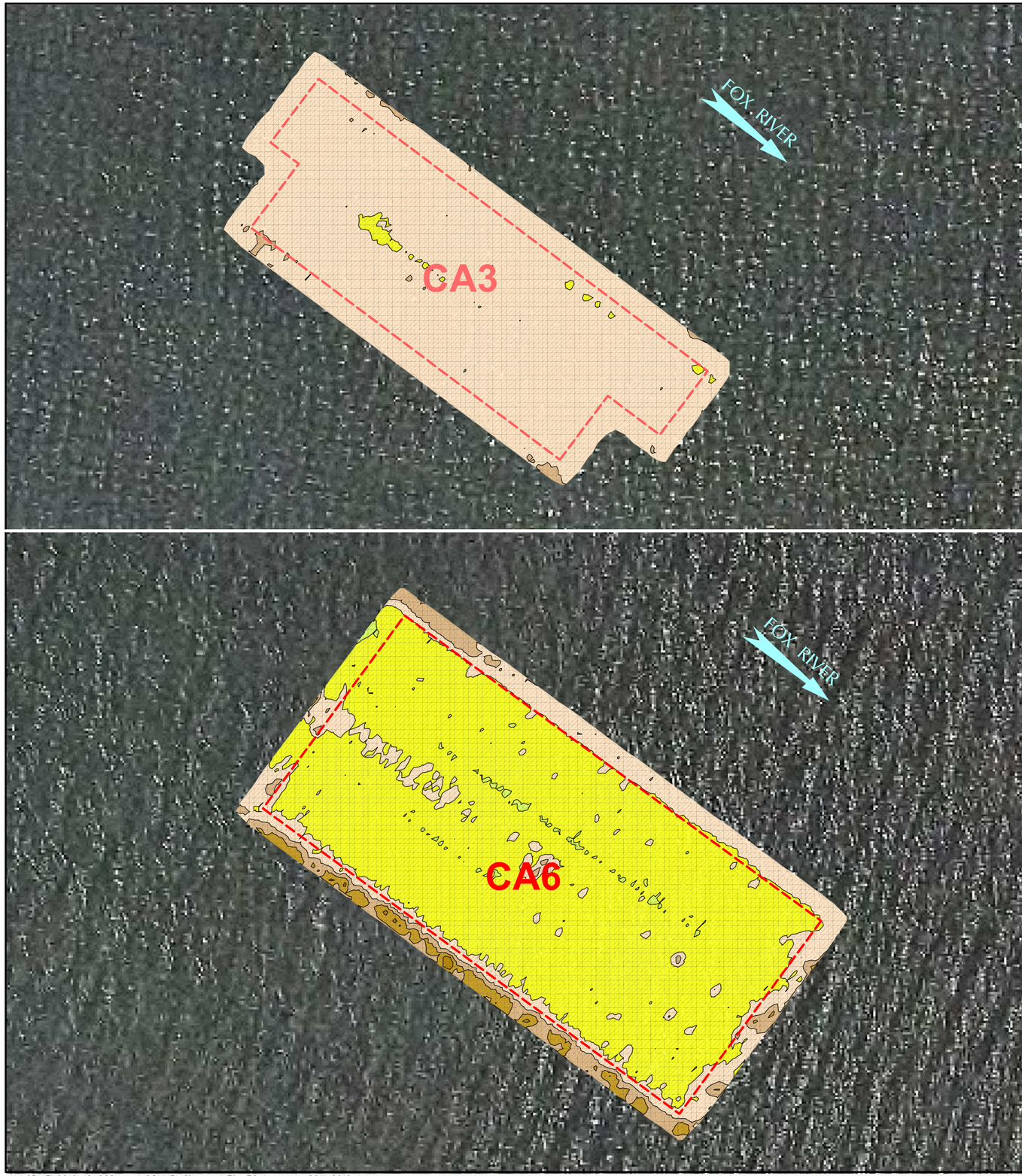
12/4/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25′ 50′
BAR SCALE

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LOWER FOX RIVER REMEDIATION LLC

FIGURE 3C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/4/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

CIL SAMPLE LOCATION

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

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LOWER FOX RIVER REMEDIATION LLC

FIGURE 4A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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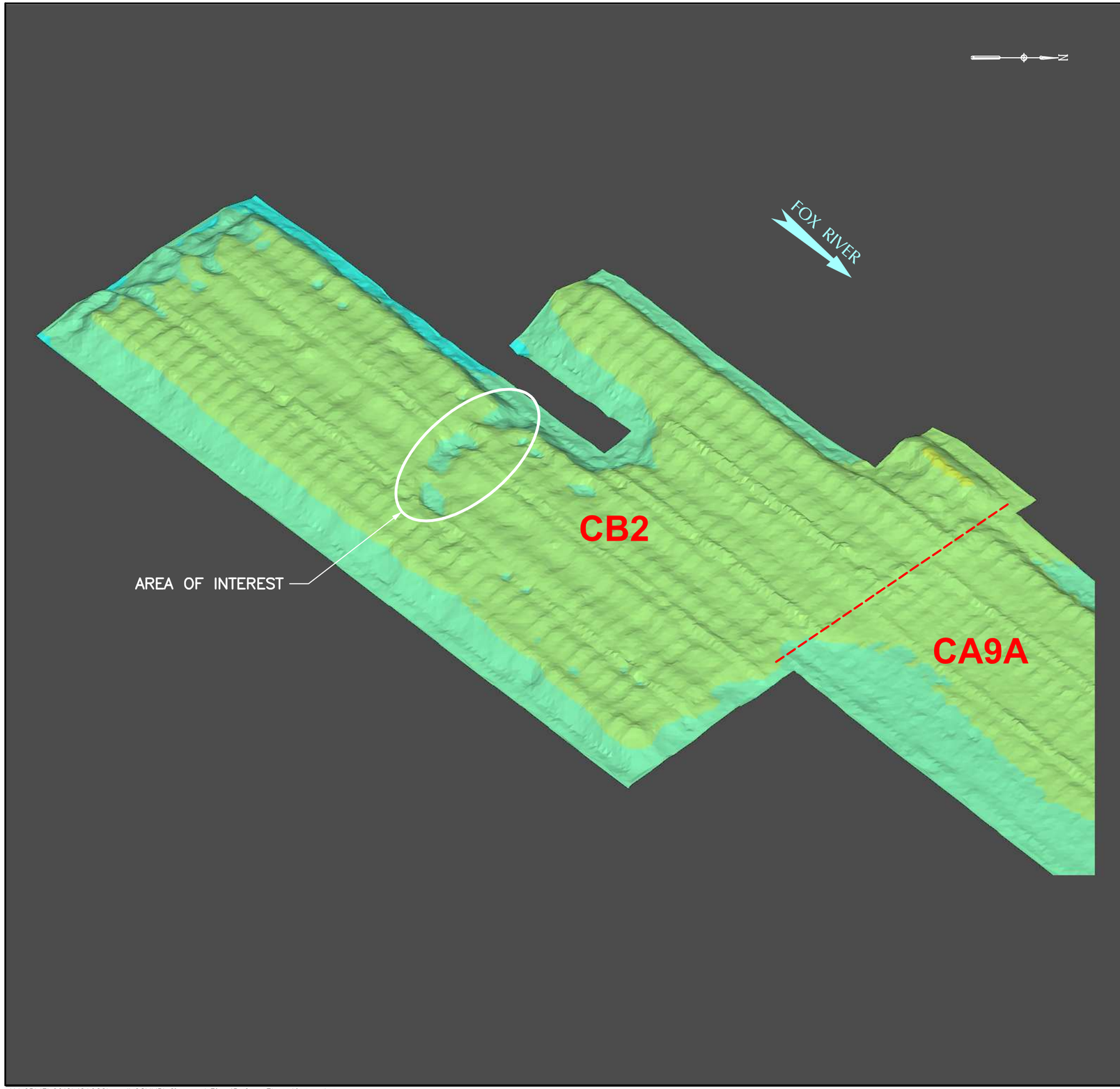
12/6/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 4B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/14/2012 jow

LEGEND

DESIGN CAP PLACEMENT LIMITS

CIL SAMPLE LOCATION

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
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3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25′ 50′
BAR SCALE

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FIGURE 4C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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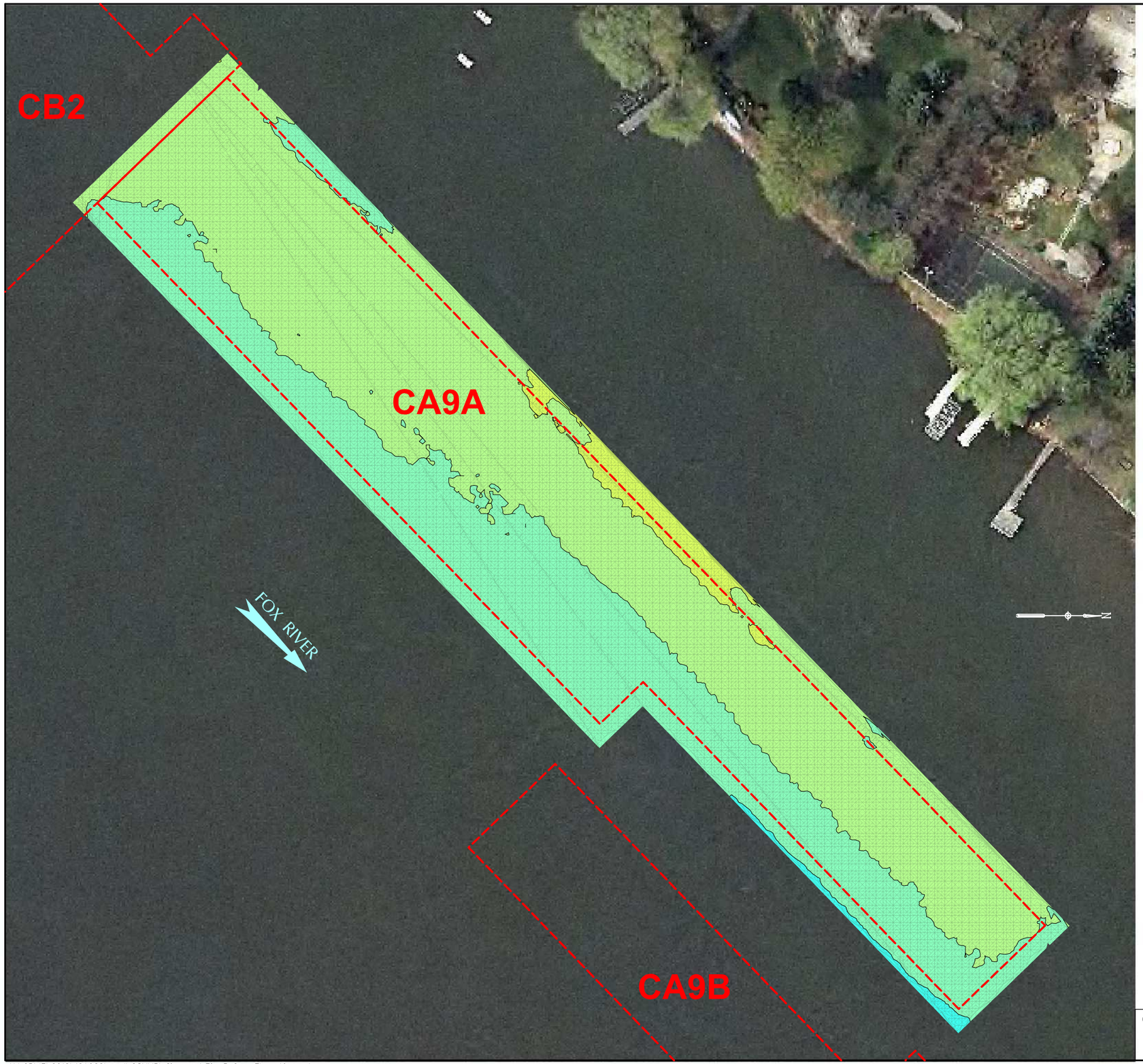
12/17/2012 jow



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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FIGURE 5A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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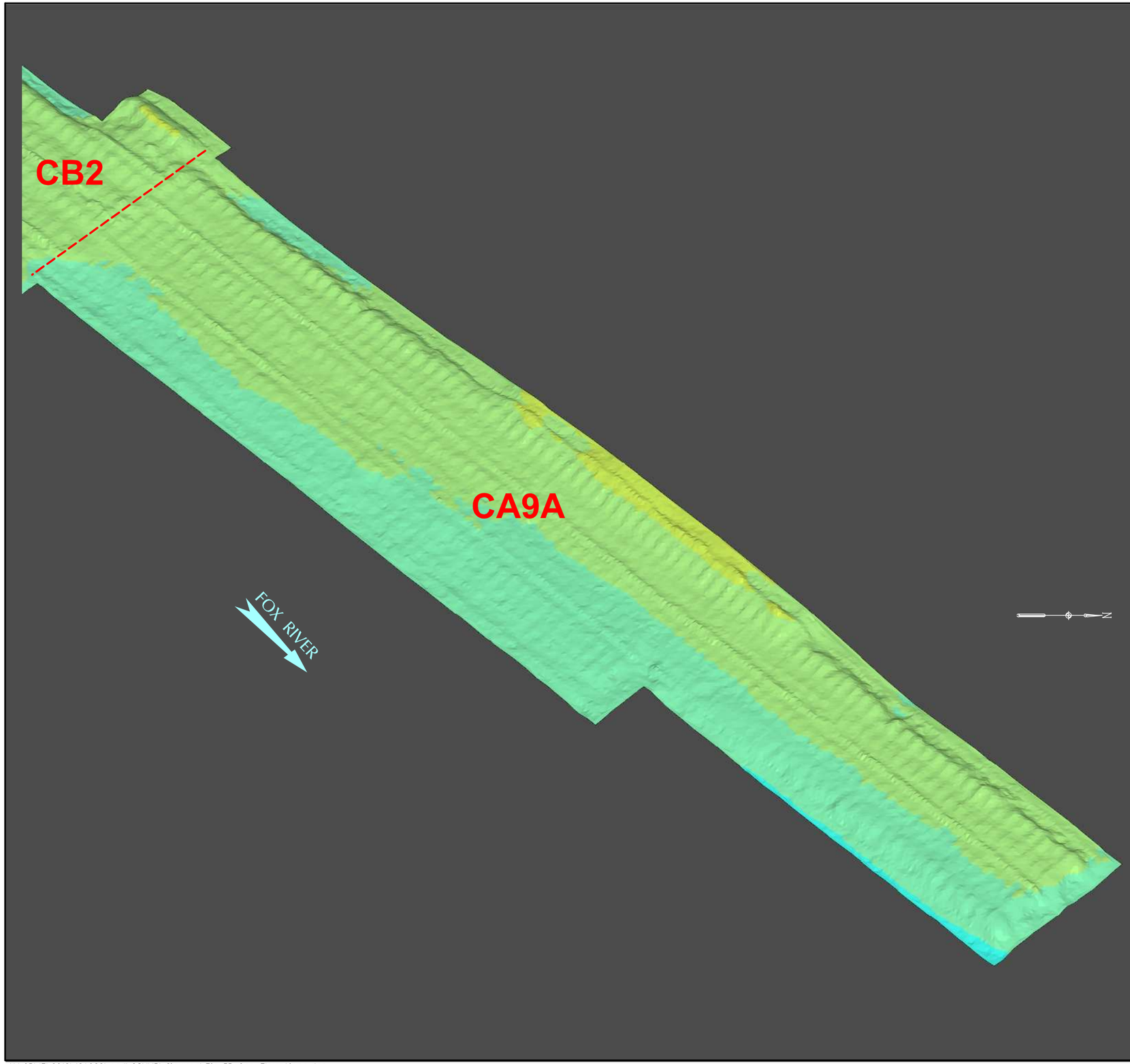
12/4/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 5B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/4/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30′ 60′
BAR SCALE

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FIGURE 5C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/4/2012 jrb2

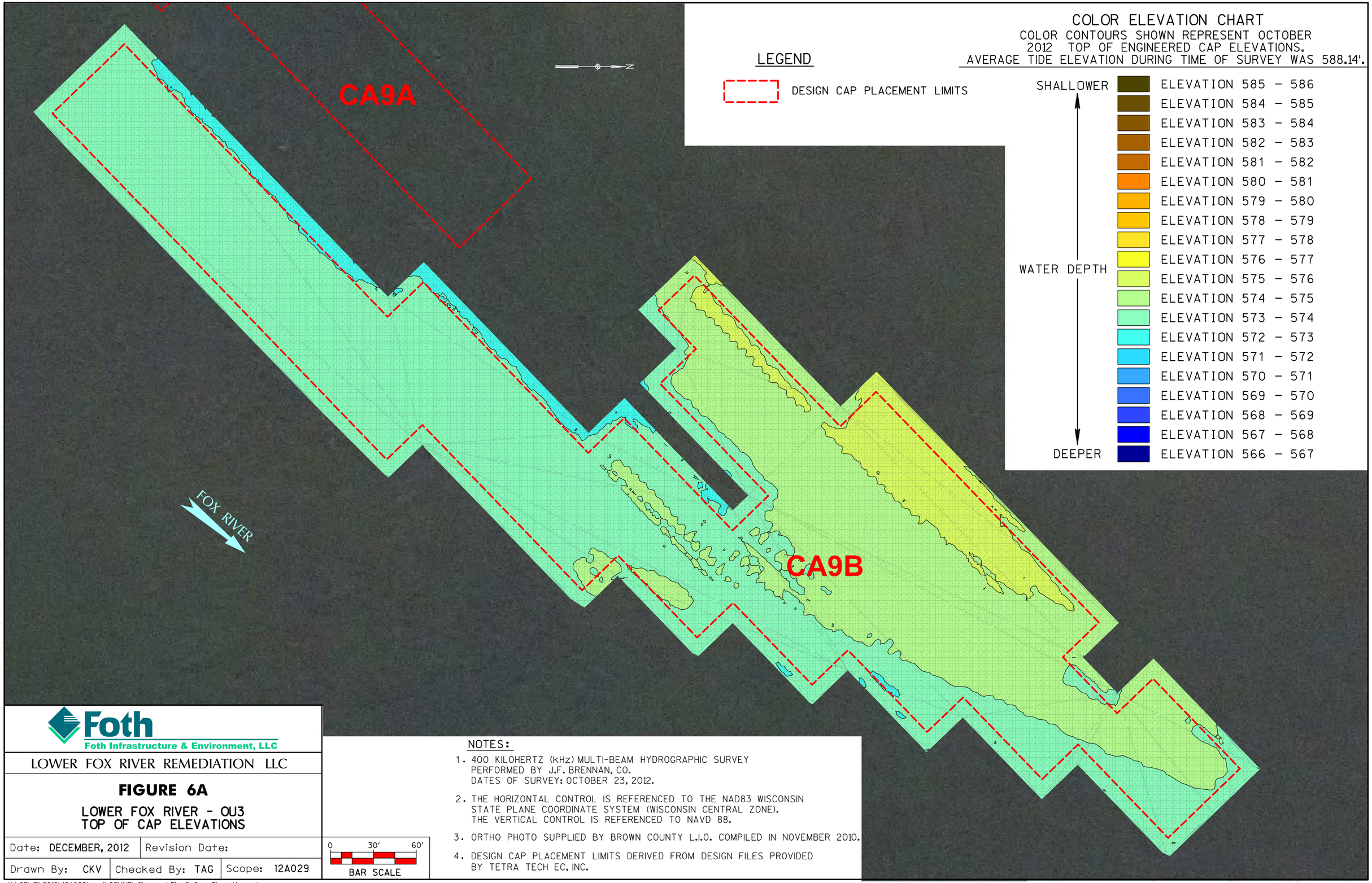

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FIGURE 6A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 30' 60'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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12/4/2012 jrb2

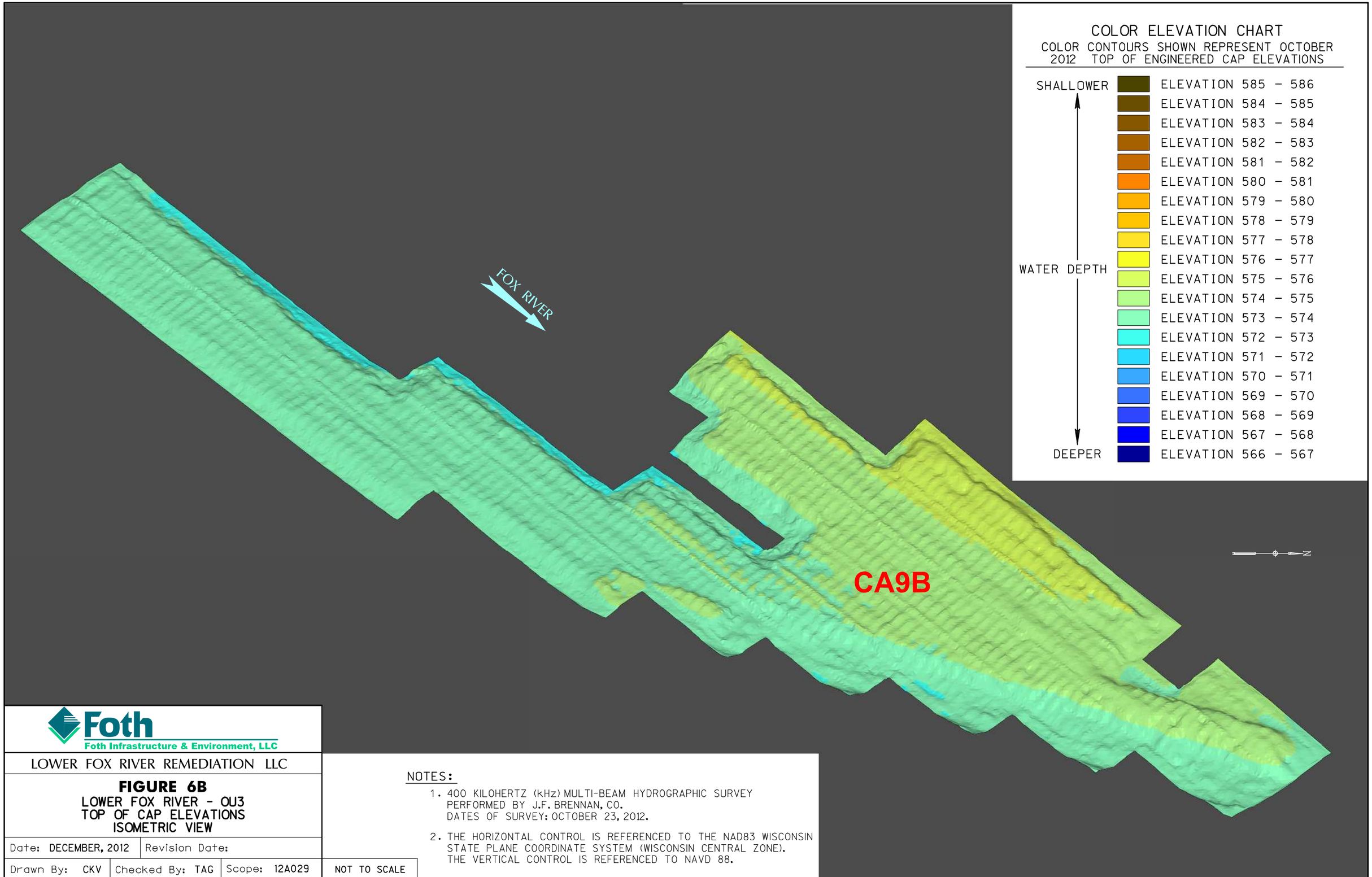

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FIGURE 6B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2012	Revision Date:		
Drawn By: CKV	Checked By: TAG	Scope: 12A029	NOT TO SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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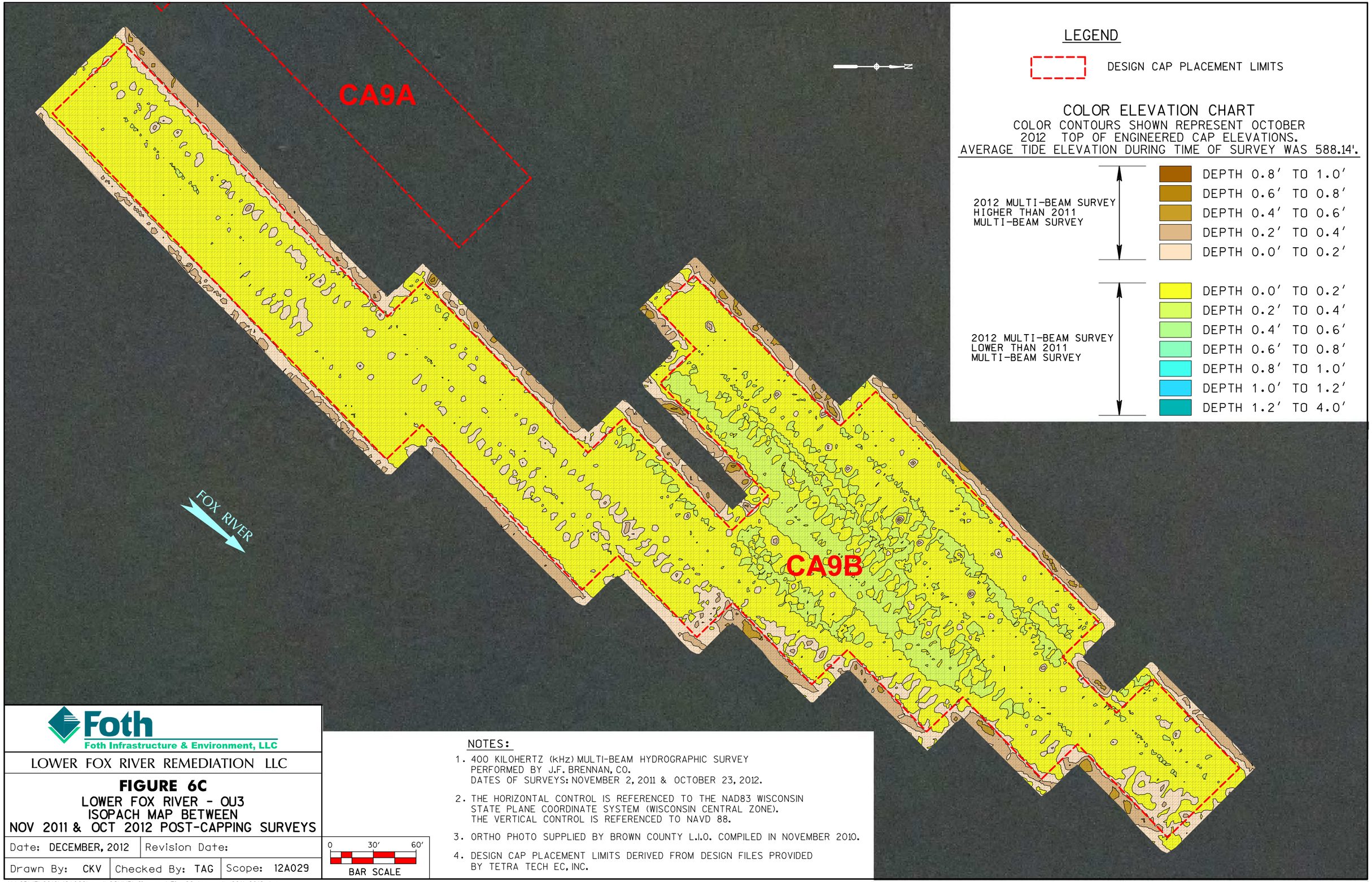
12/4/2012 jrb2



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Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 6C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

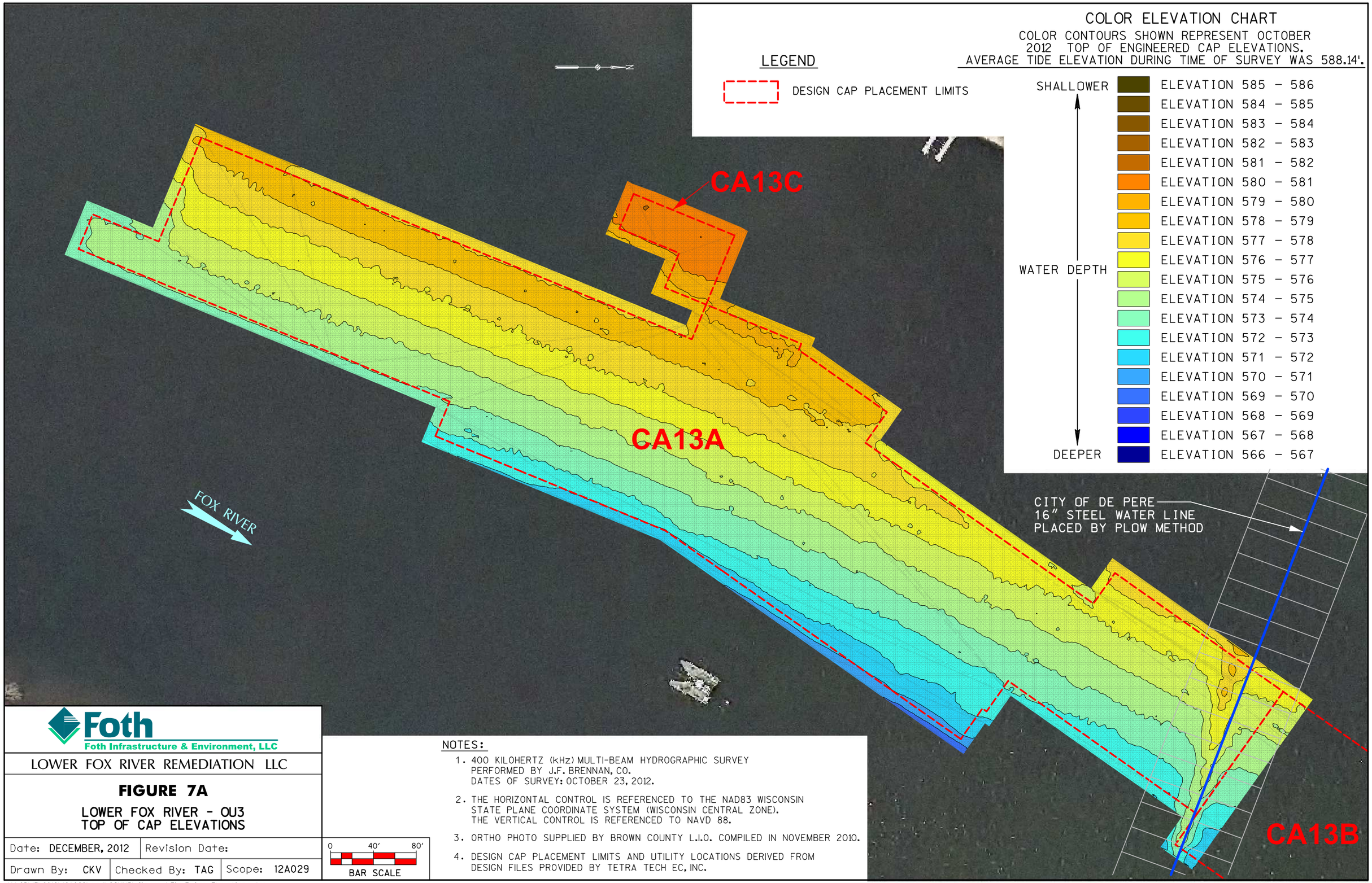
Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 30' 60'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-6C Isopach 2011-2012.dgn
12/4/2012 jrb2



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LOWER FOX RIVER REMEDIATION LLC

FIGURE 7A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-7 Cap Elevations.dgn
12/4/2012 jrb2

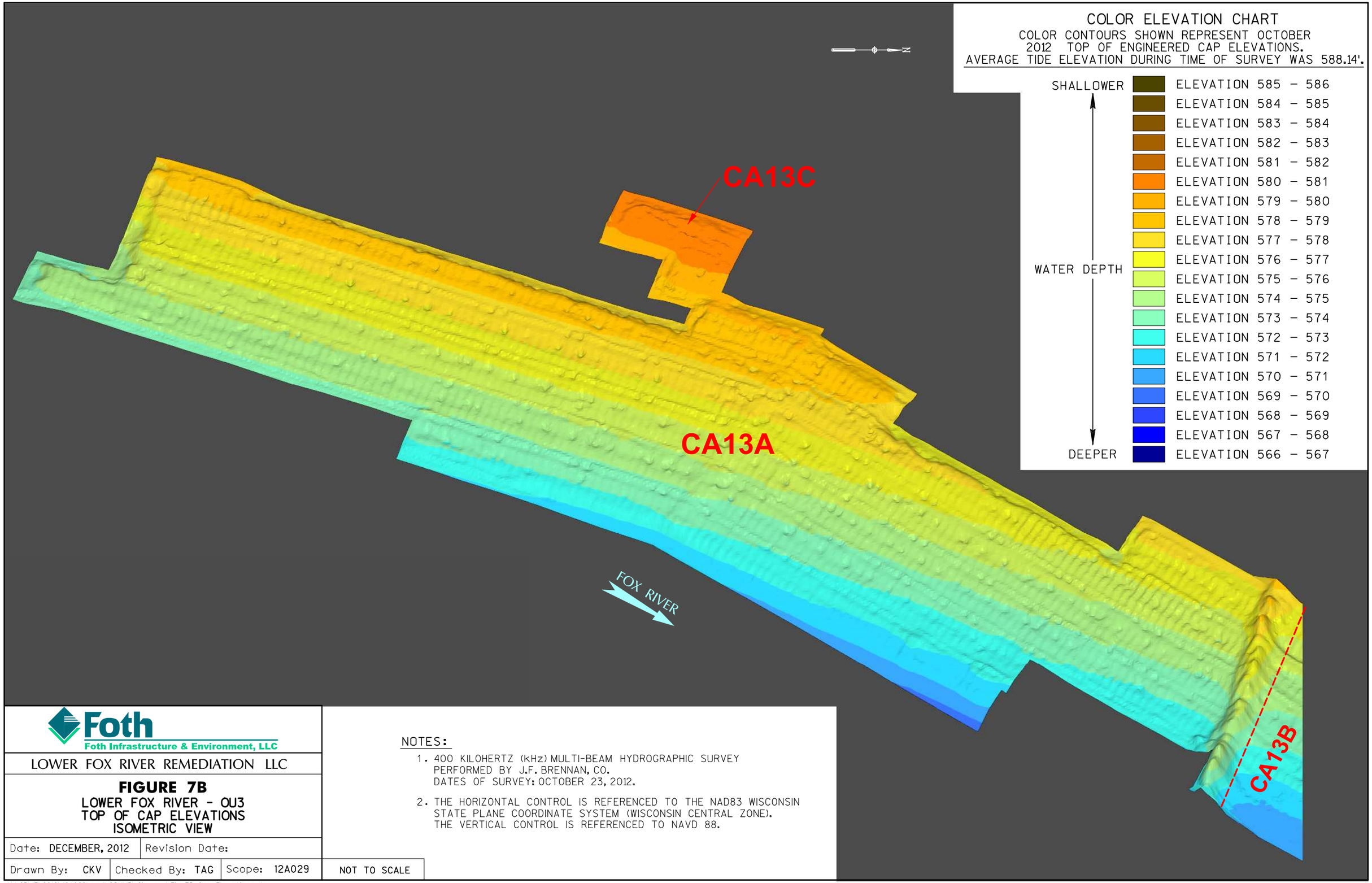

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FIGURE 7B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2012	Revision Date:		
Drawn By: CKV	Checked By: TAG	Scope: 12A029	NOT TO SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-7B Cap Elevations.dgn
12/4/2012 jrb2

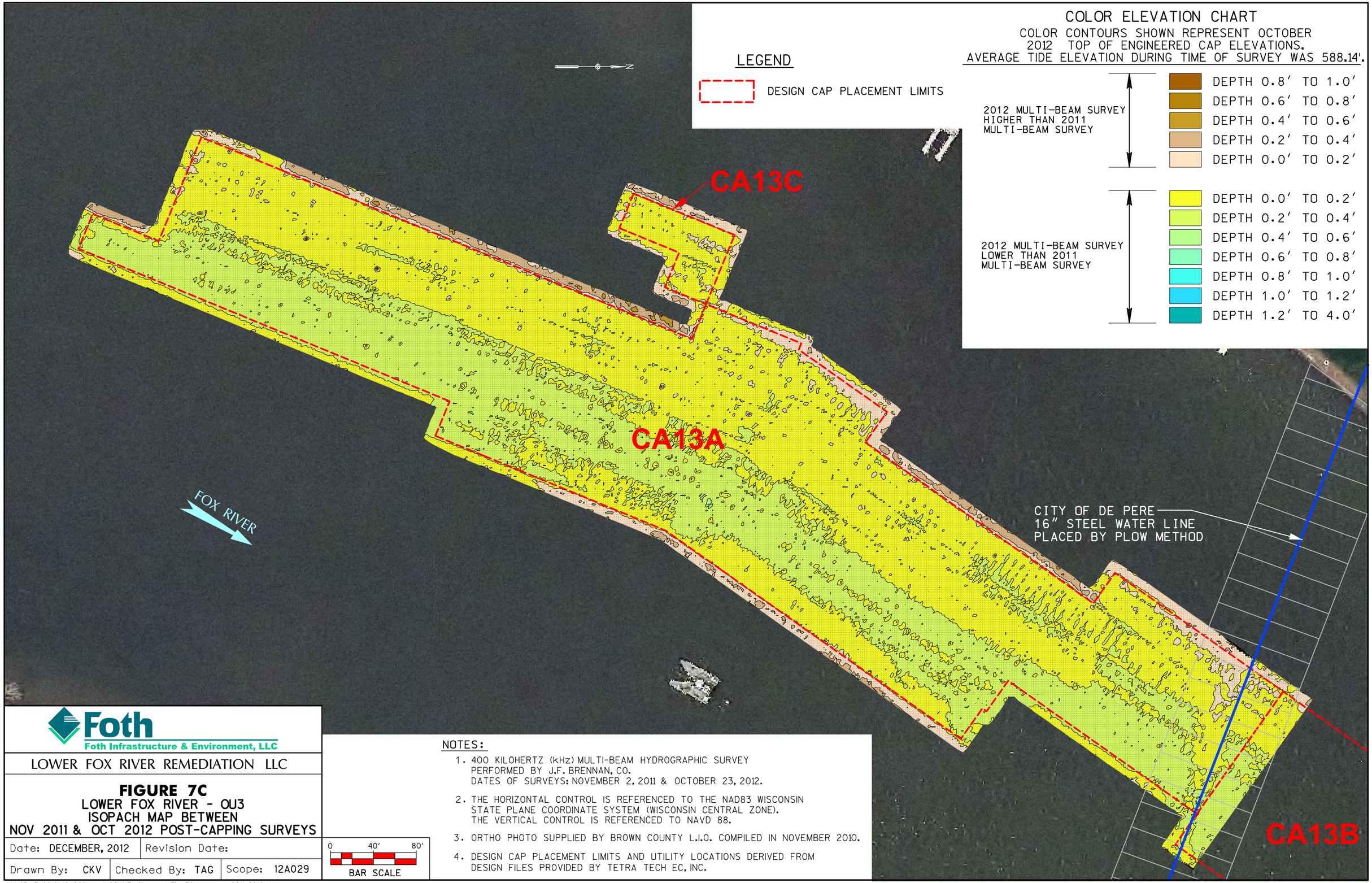

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FIGURE 7C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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12/4/2012 jrb2

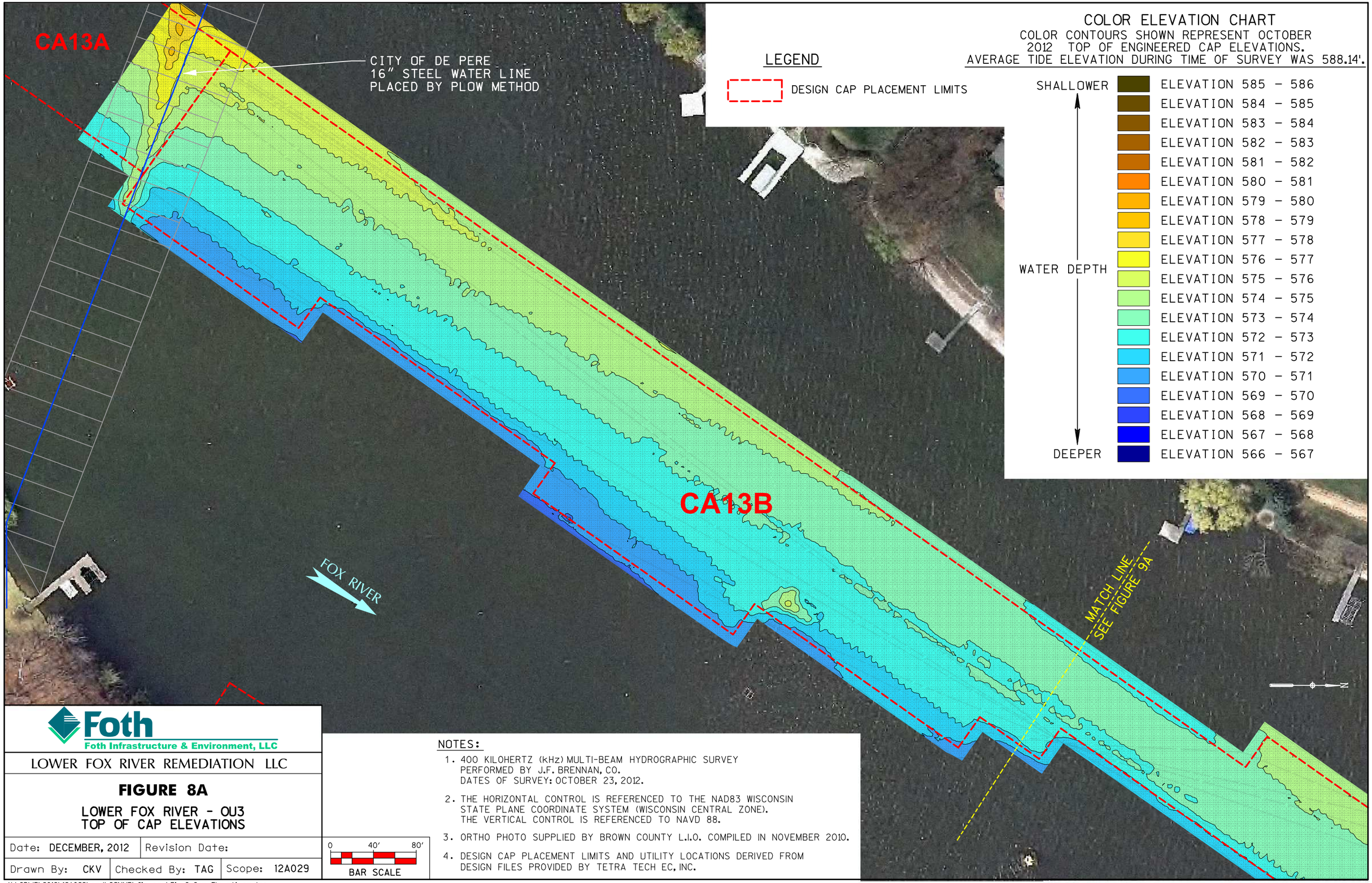

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FIGURE 8A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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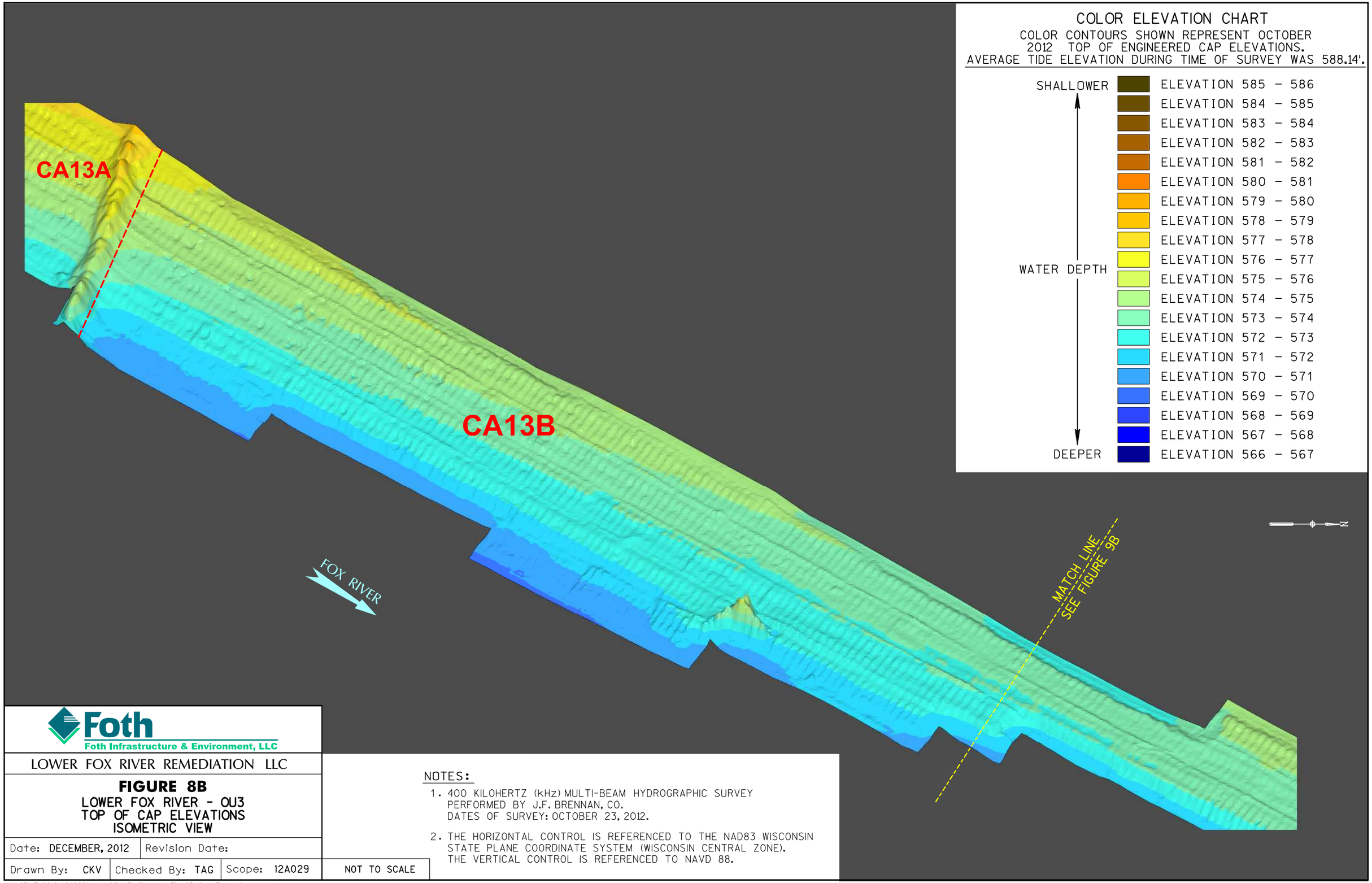
12/4/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER
ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
WATER DEPTH
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
DEEPER
ELEVATION 566 – 567

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FIGURE 8B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2012	Revision Date:		
Drawn By: CKV	Checked By: TAG	Scope: 12A029	NOT TO SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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12/4/2012 jrb2

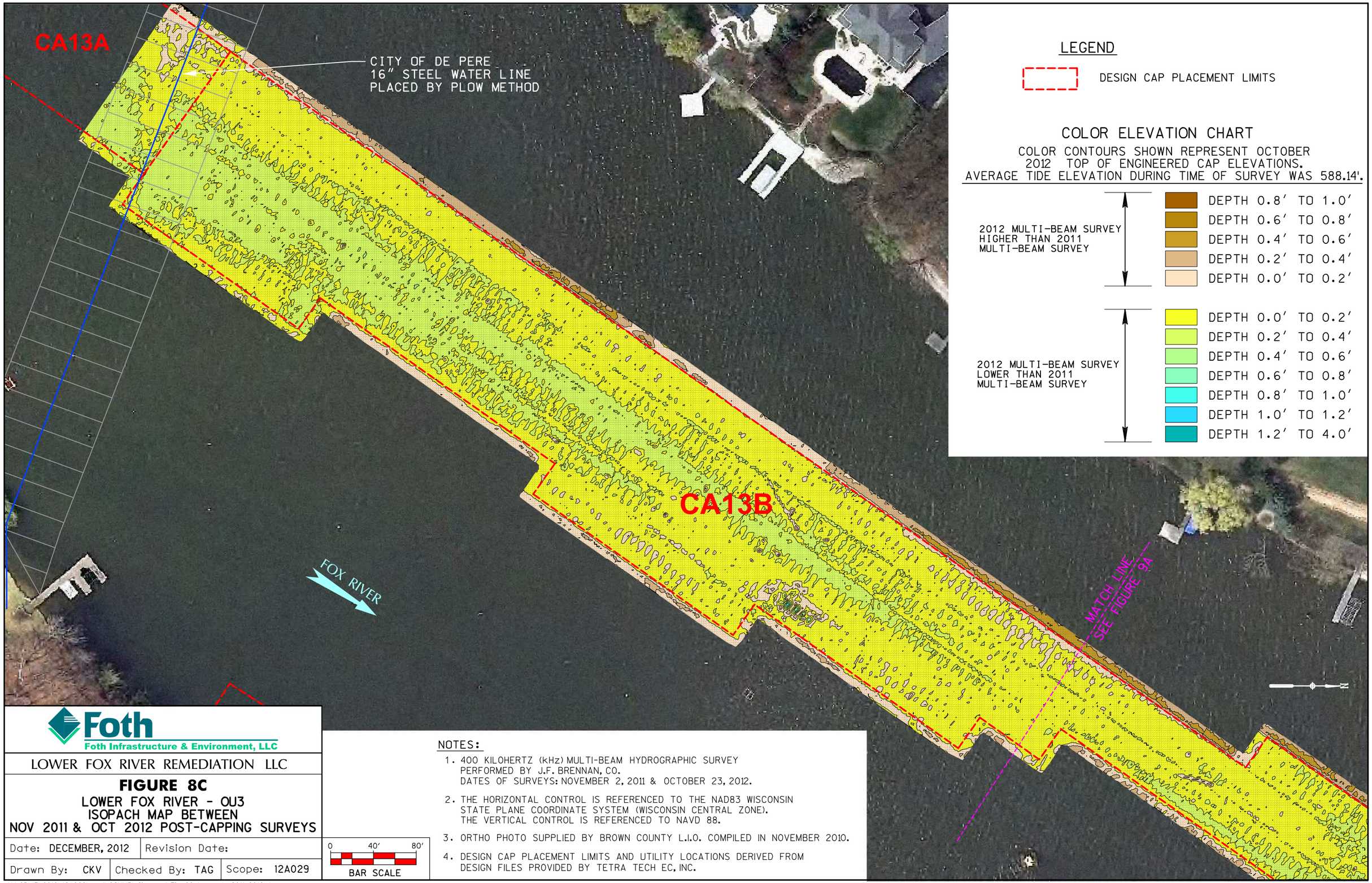

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FIGURE 8C

LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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12/4/2012 jrb2

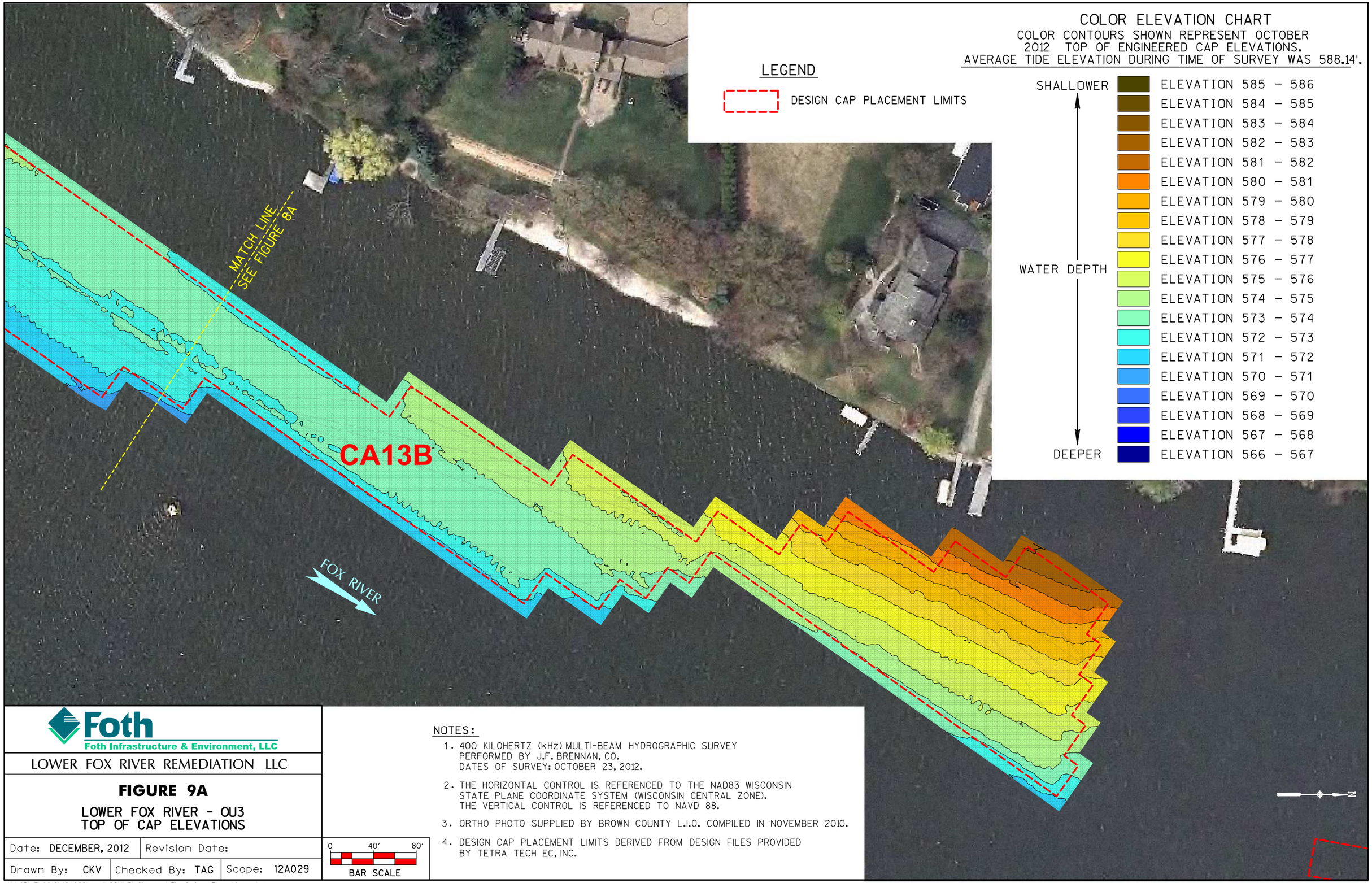

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FIGURE 9A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-9 Cap Elevations.dgn
12/4/2012 jrb2

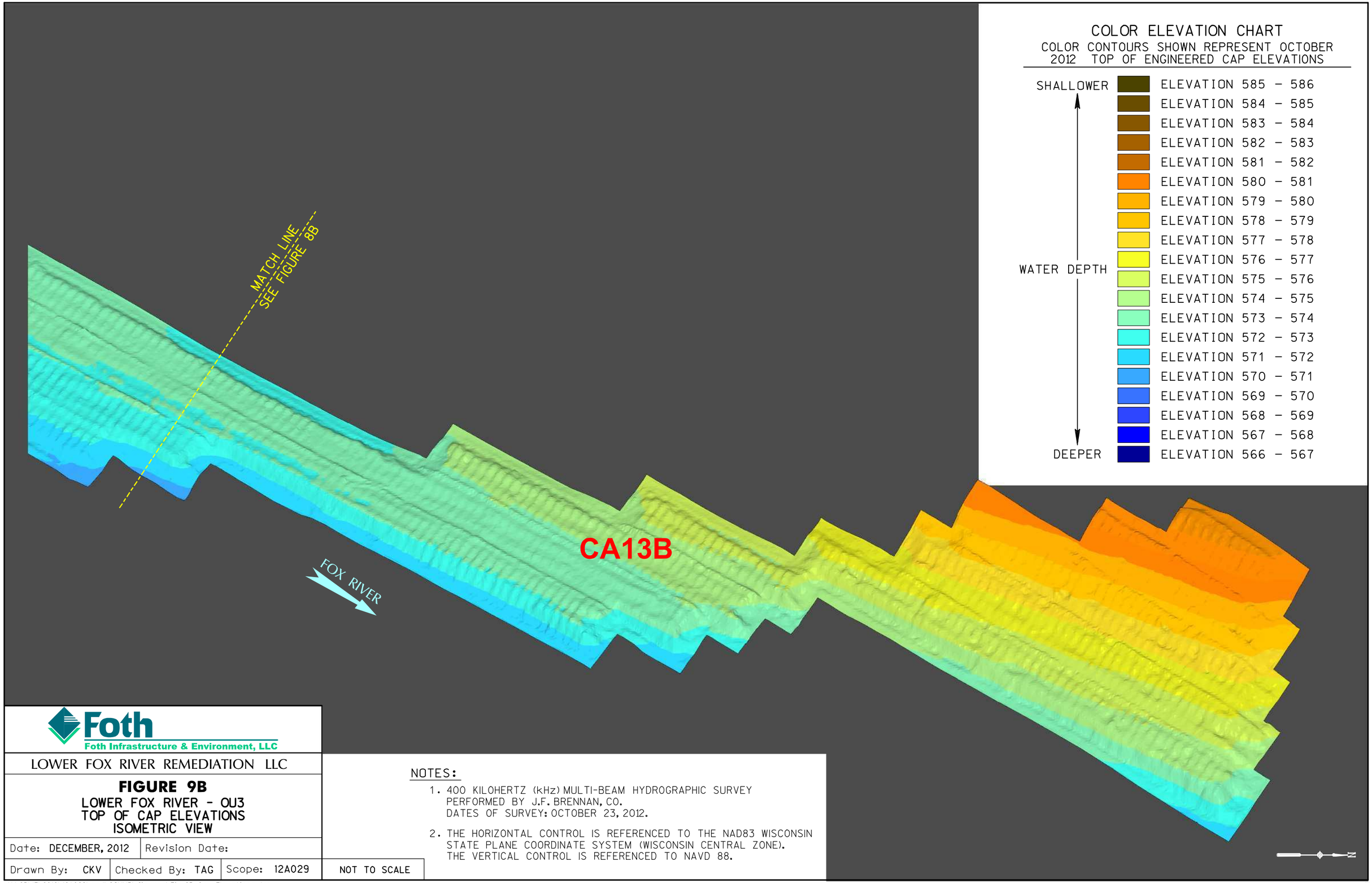

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FIGURE 9B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: DECEMBER, 2012	Revision Date:		
Drawn By: CKV	Checked By: TAG	Scope: 12A029	NOT TO SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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12/4/2012 jrb2

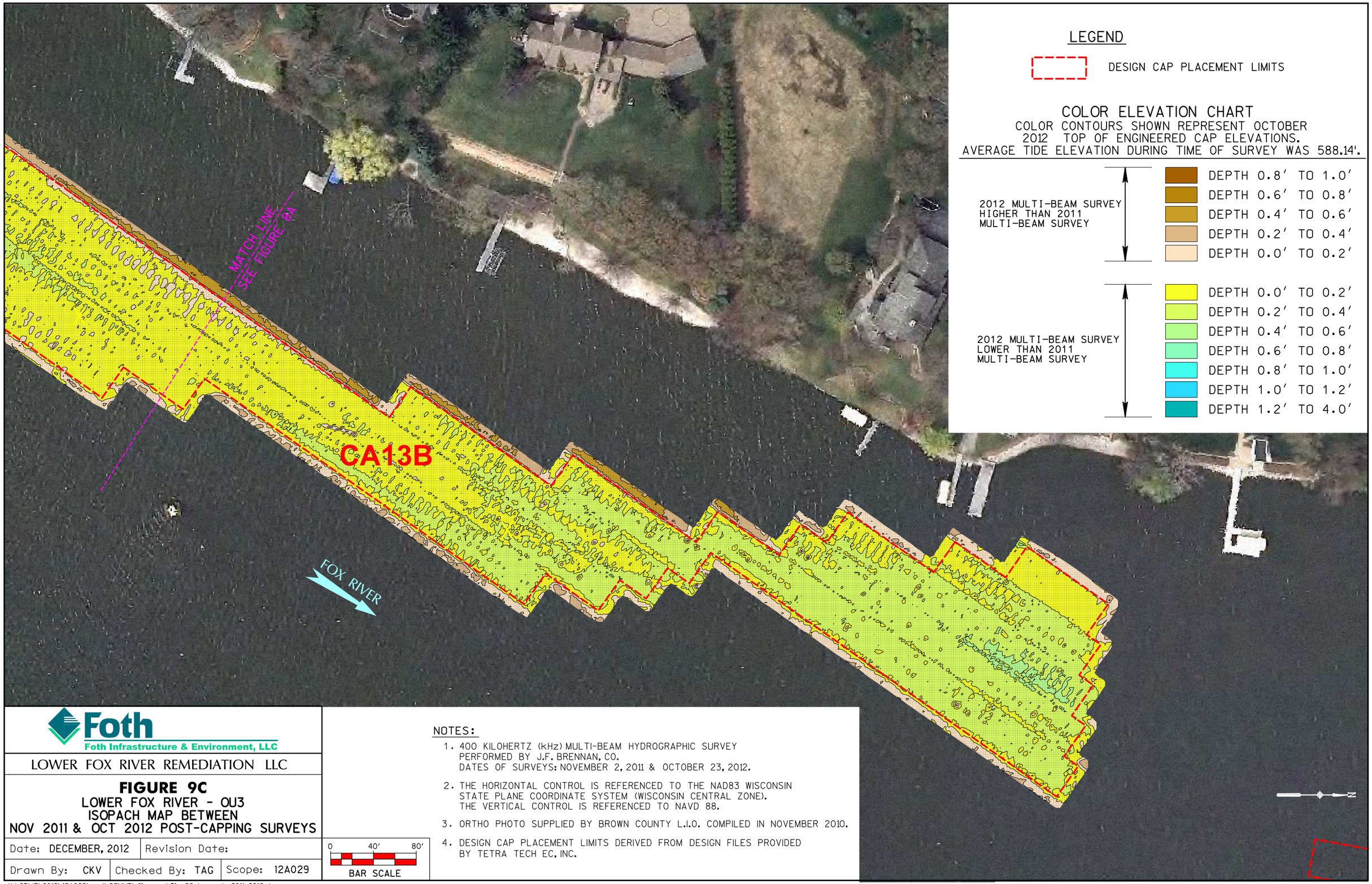

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FIGURE 9C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

0 40' 80'
BAR SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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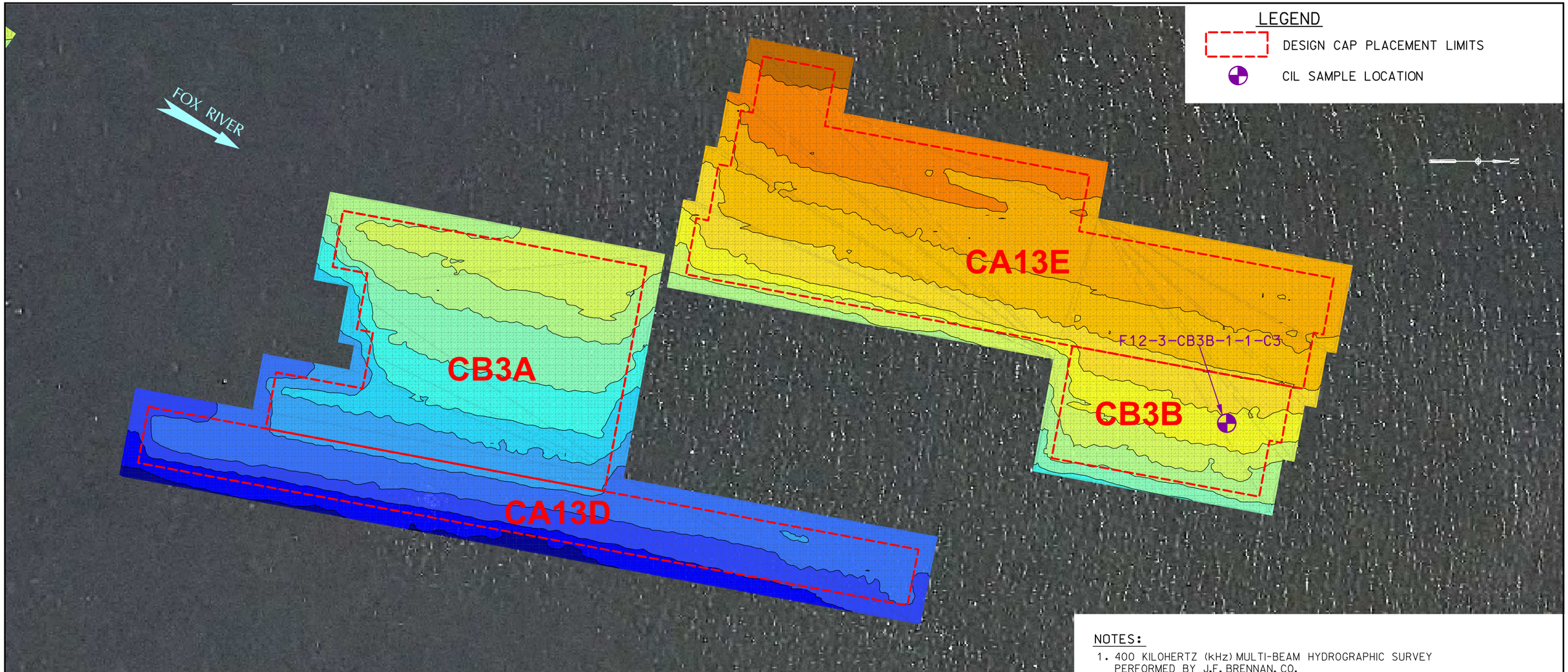
12/4/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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LOWER FOX RIVER REMEDIATION LLC

FIGURE 10A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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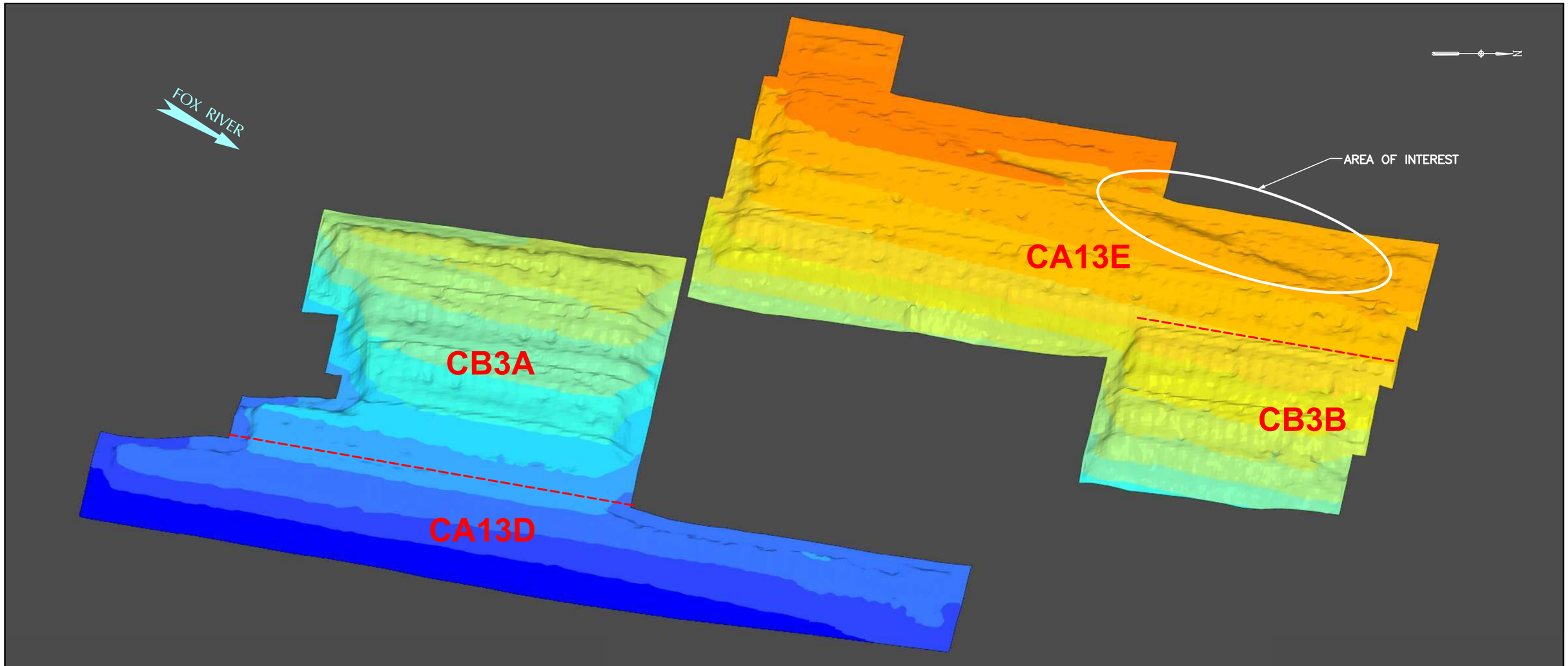
12/6/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER ↑ / WATER DEPTH

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577

WATER DEPTH ↓ / DEEPER

- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 10B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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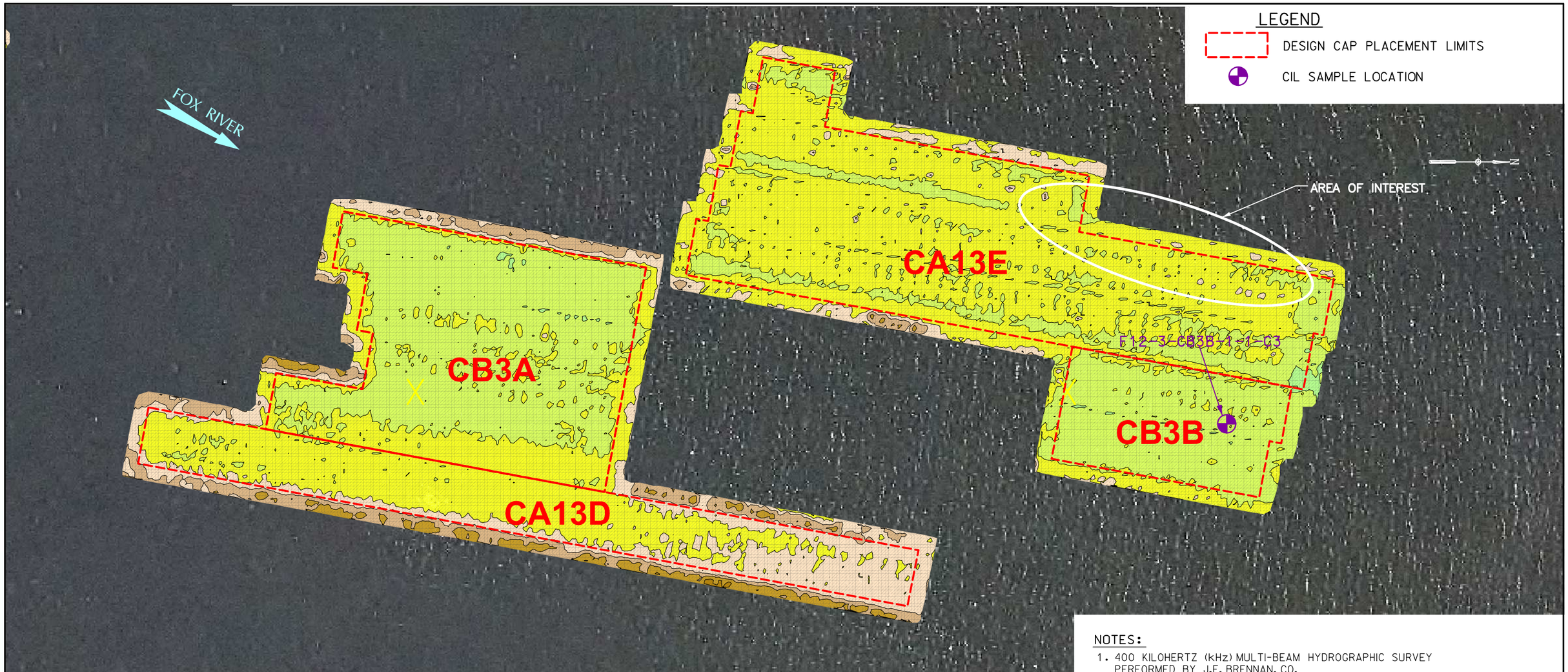
12/14/2012 jow



NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

0 30' 60'
BAR SCALE

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FIGURE 10C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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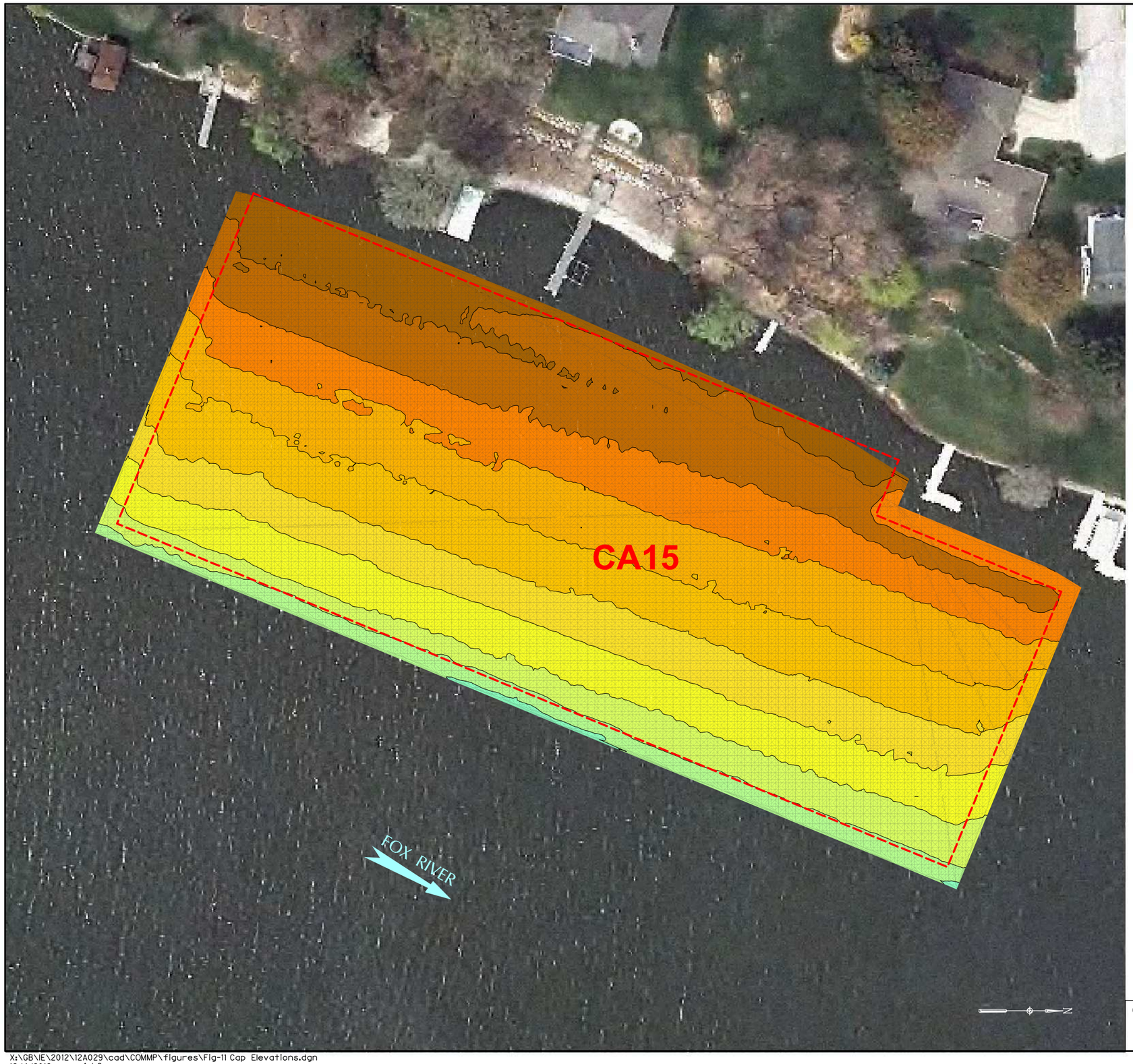
12/14/2012 jow



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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FIGURE 11A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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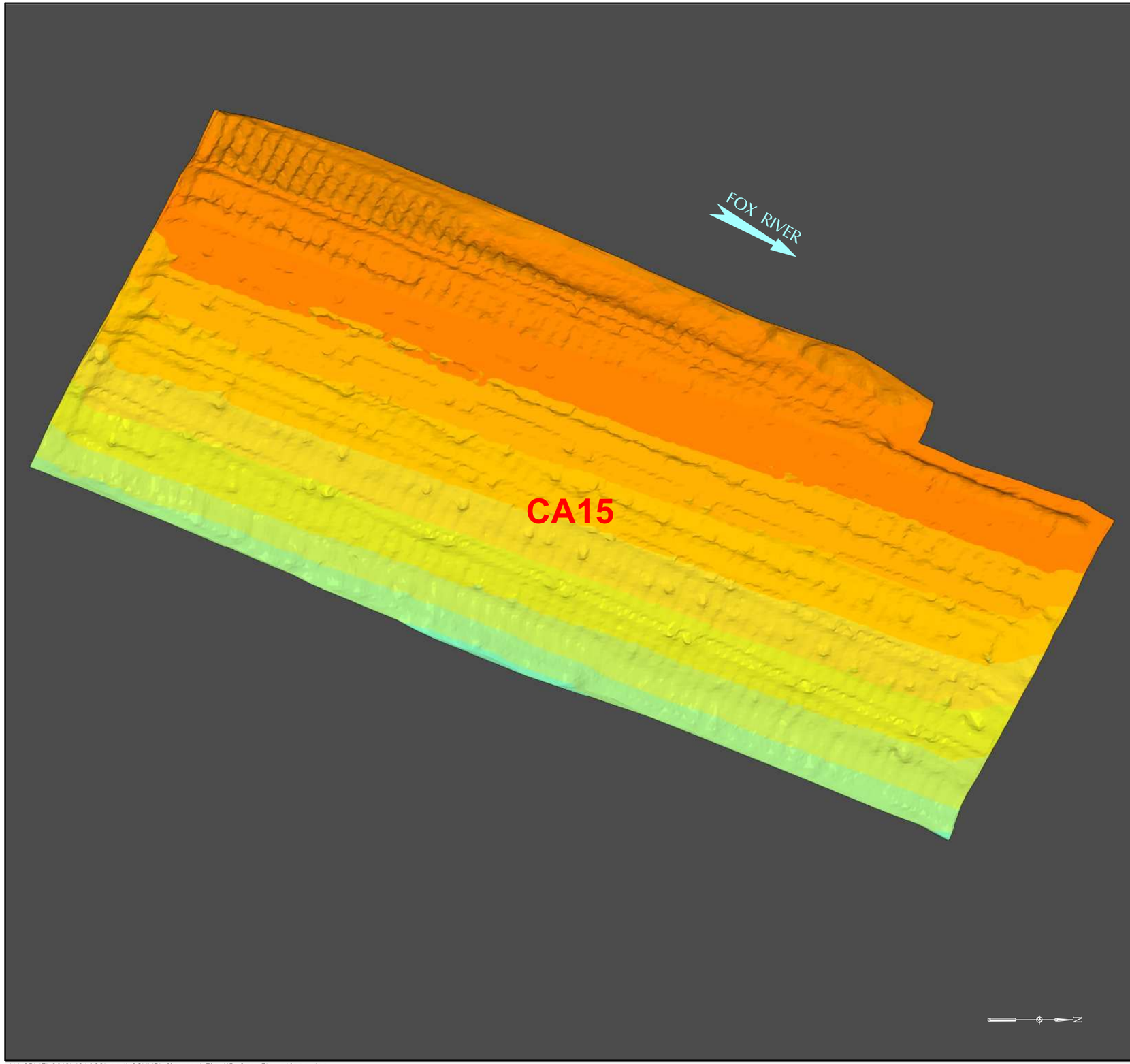
12/4/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 11B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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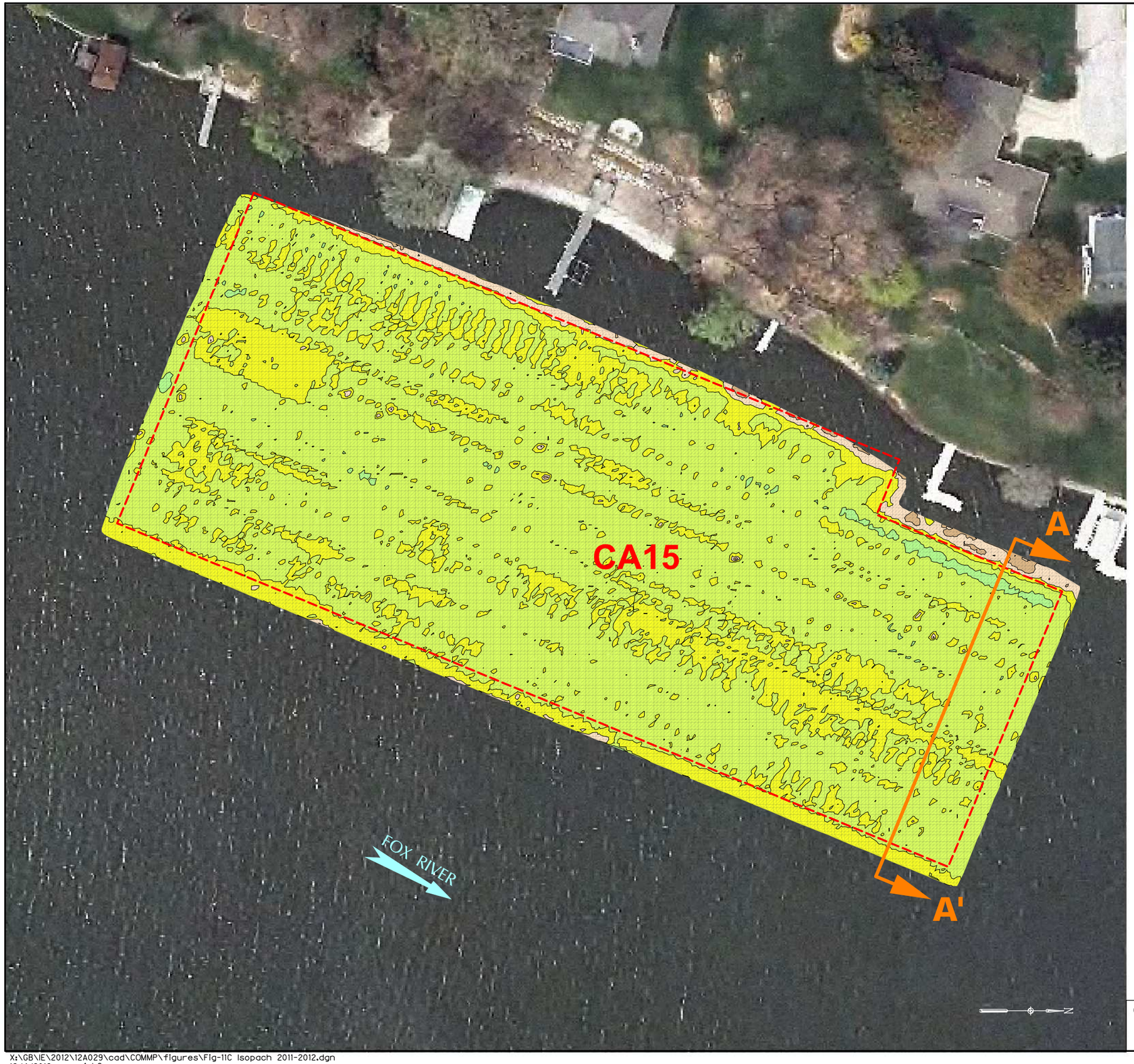
12/4/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8′ TO 1.0′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.0′ TO 0.2′

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0′ TO 0.2′
- DEPTH 0.2′ TO 0.4′
- DEPTH 0.4′ TO 0.6′
- DEPTH 0.6′ TO 0.8′
- DEPTH 0.8′ TO 1.0′
- DEPTH 1.0′ TO 1.2′
- DEPTH 1.2′ TO 4.0′

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30′ 60′
BAR SCALE

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FIGURE 11C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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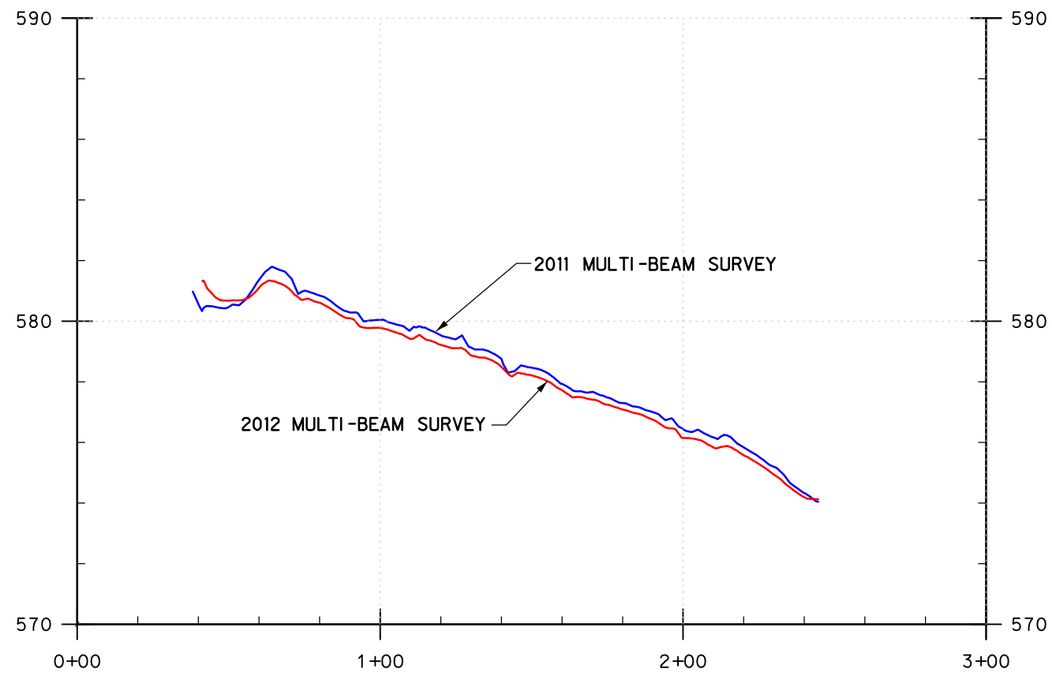
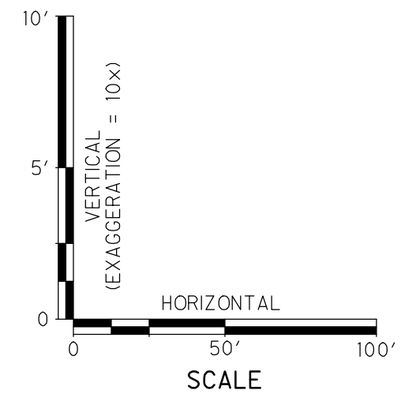
12/4/2012 jrb2



SECTION A – A′



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LOWER FOX RIVER REMEDIATION LLC

FIGURE 11D
LOWER FOX RIVER - OU3
CROSS SECTIONS A - A′
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

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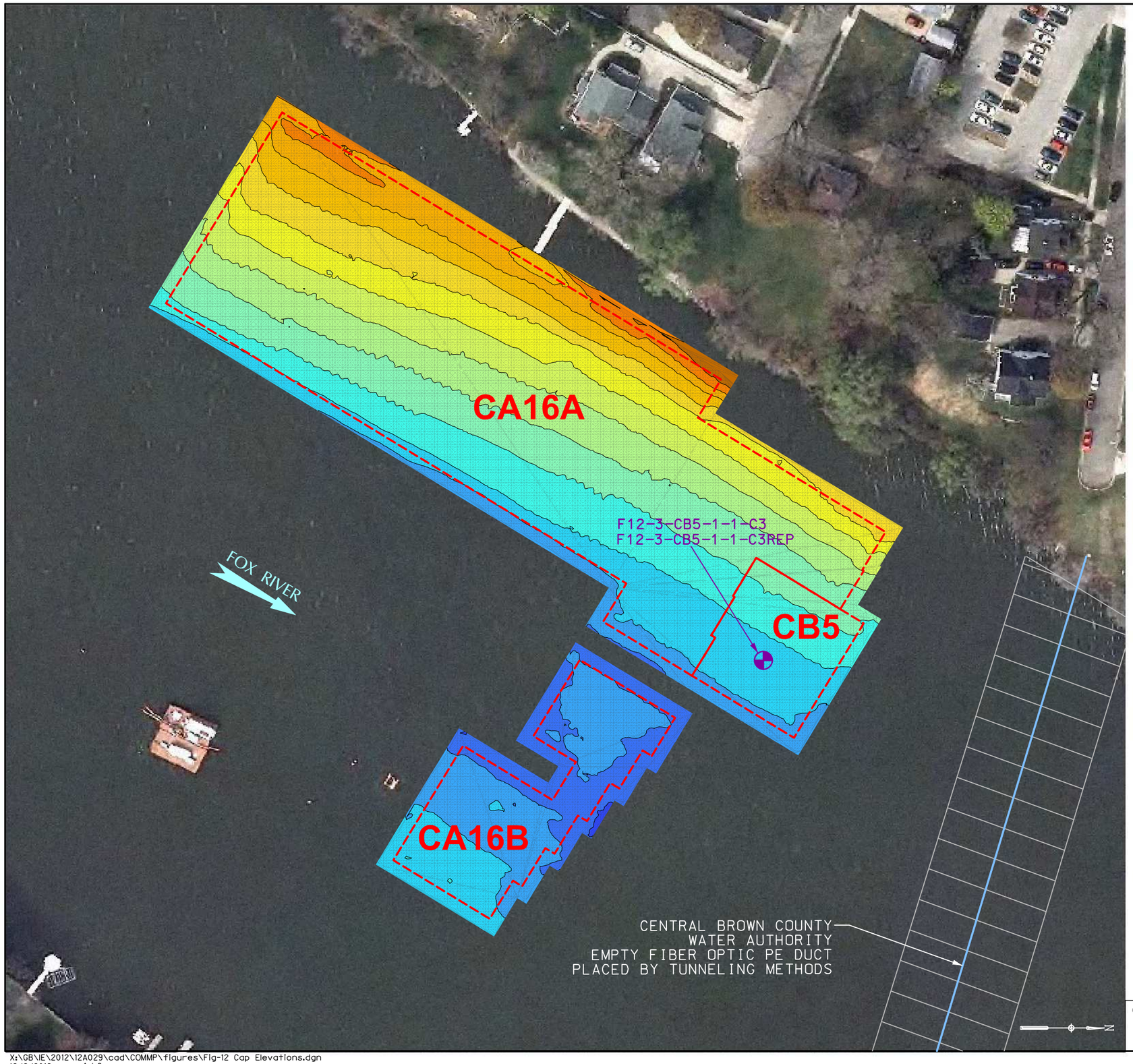
12/4/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

CIL SAMPLE LOCATION

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 40' 80'
BAR SCALE

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LOWER FOX RIVER REMEDIATION LLC

FIGURE 12A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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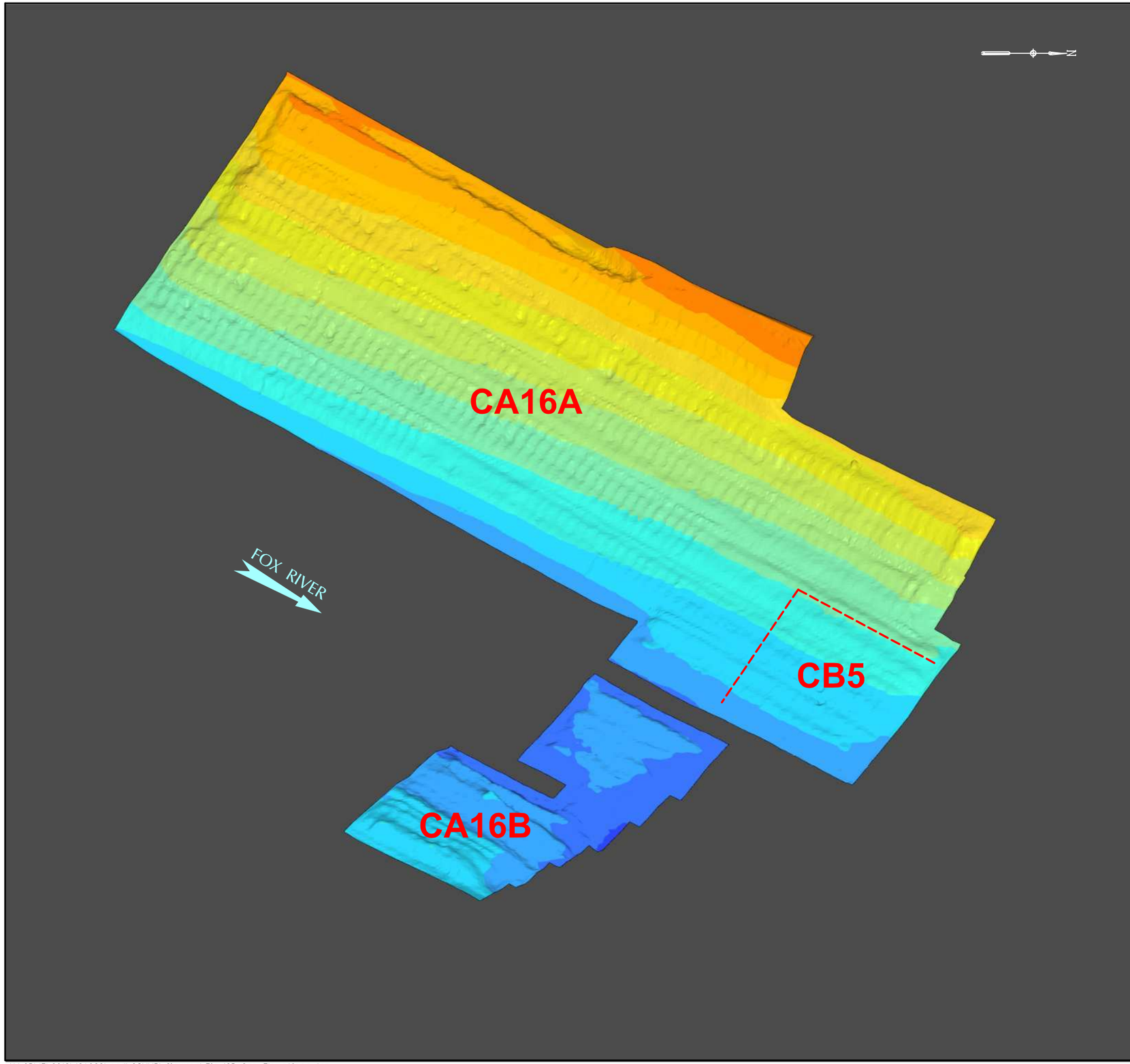
12/6/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 12B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/4/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

CIL SAMPLE LOCATION

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
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3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 40' 80'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

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FIGURE 12C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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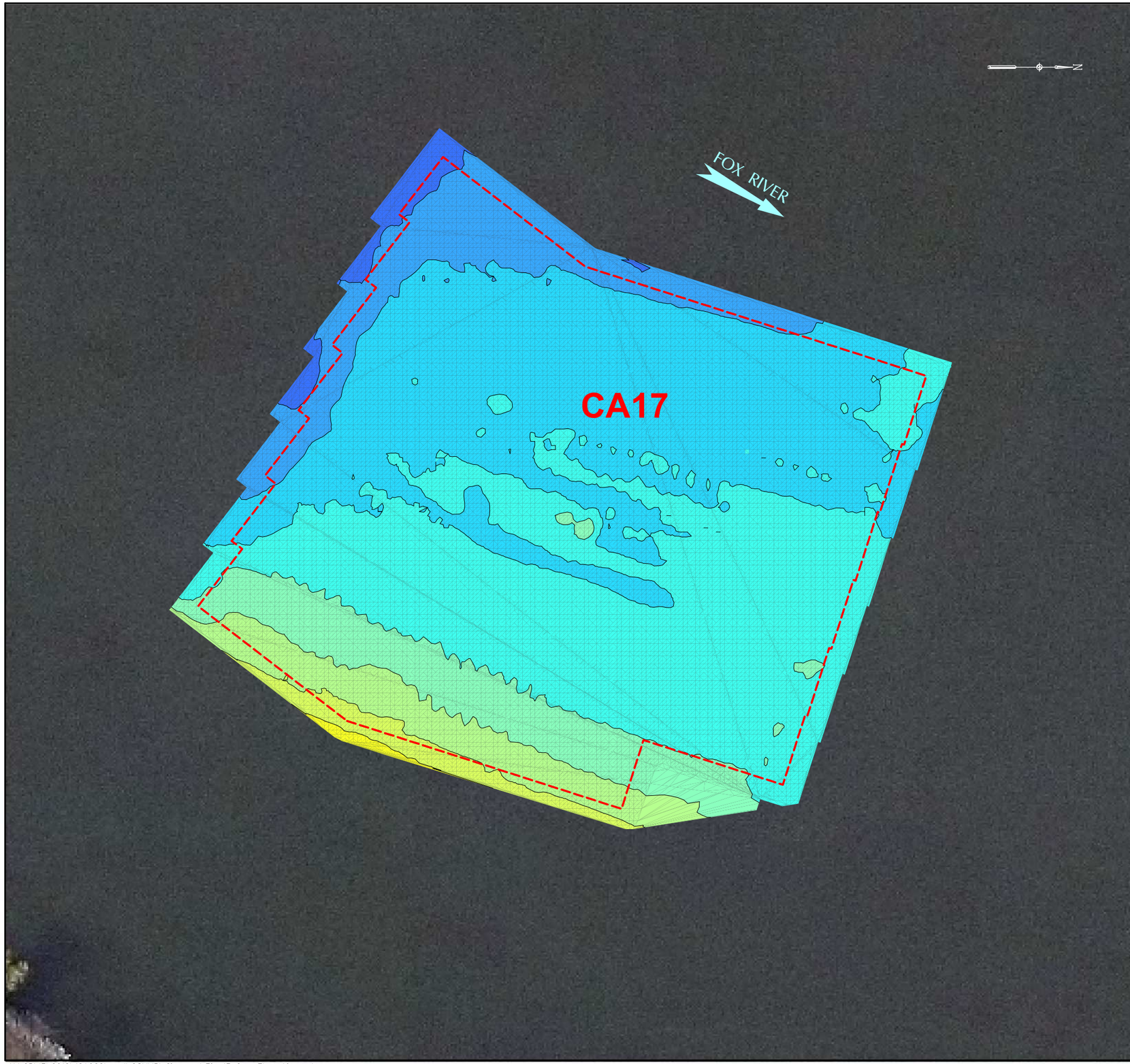
12/6/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

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LOWER FOX RIVER REMEDIATION LLC

FIGURE 13A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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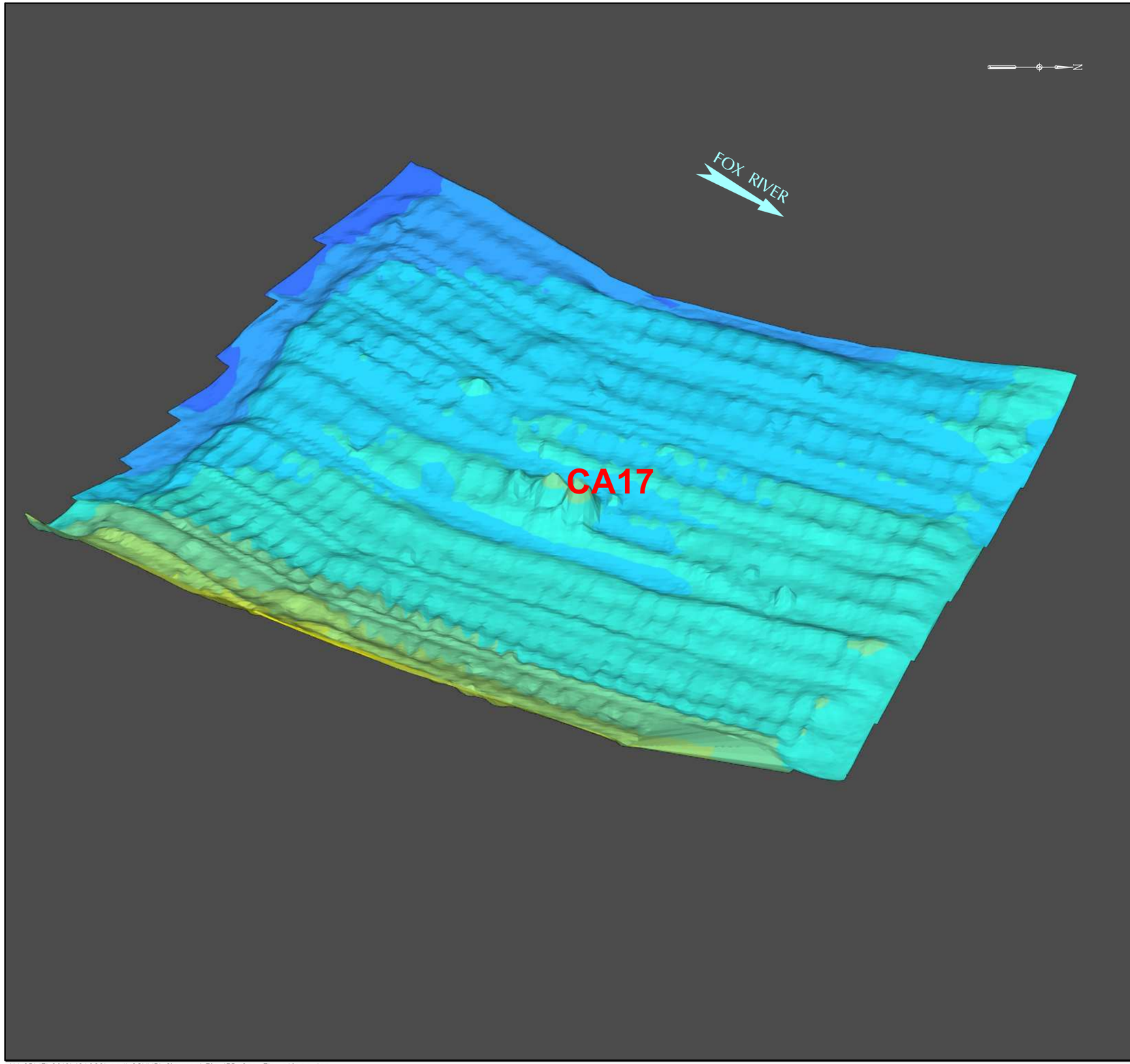
12/4/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
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   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 13B

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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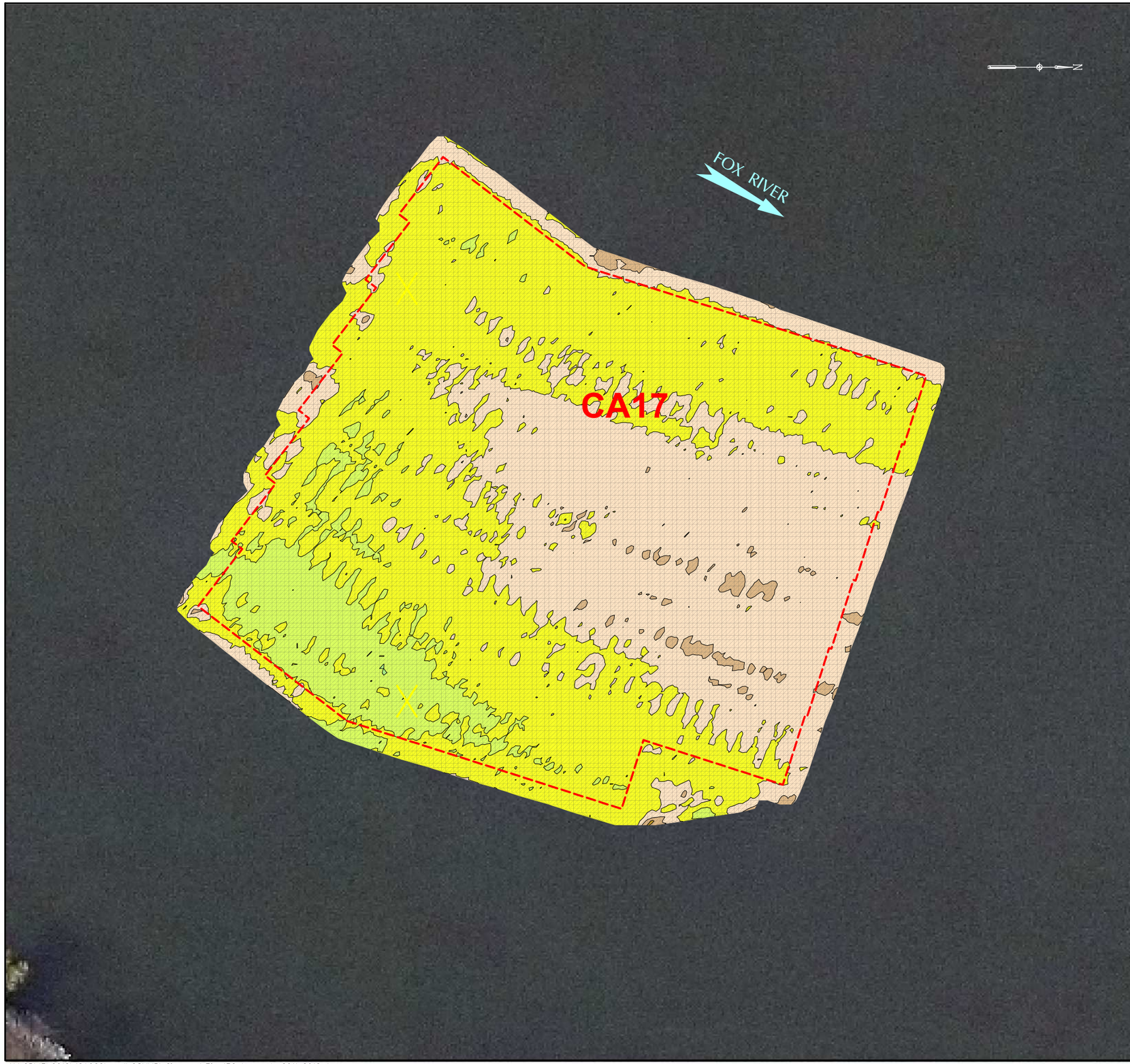
12/4/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
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3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
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FIGURE 13C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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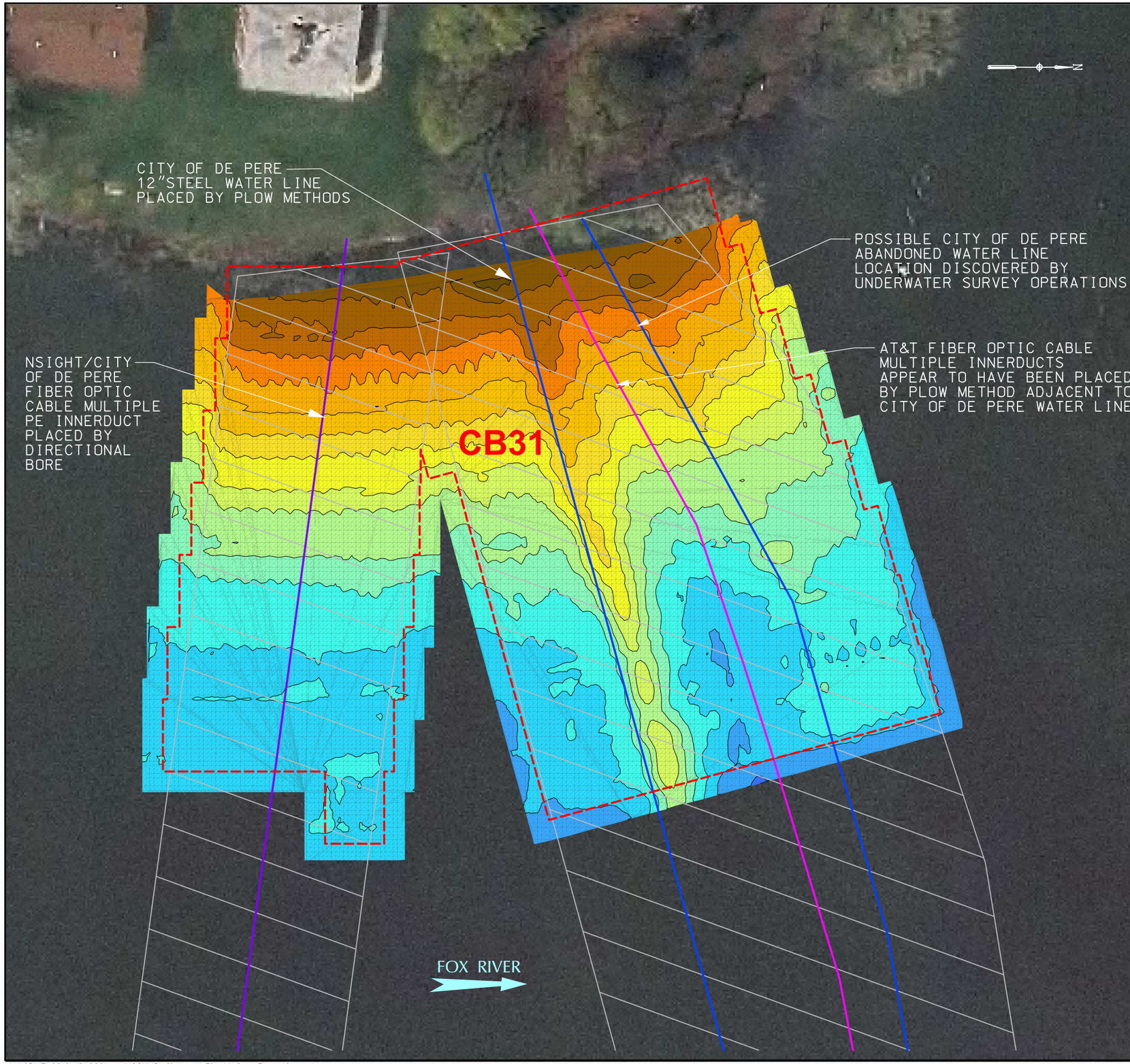
12/4/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 23, 2012.
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3. ORTHO PHOTO SUPPLIED BY ANCHOR QEA, L.L.C.. COMPILED IN NOVEMBER 2004.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
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LOWER FOX RIVER REMEDIATION LLC

FIGURE 14A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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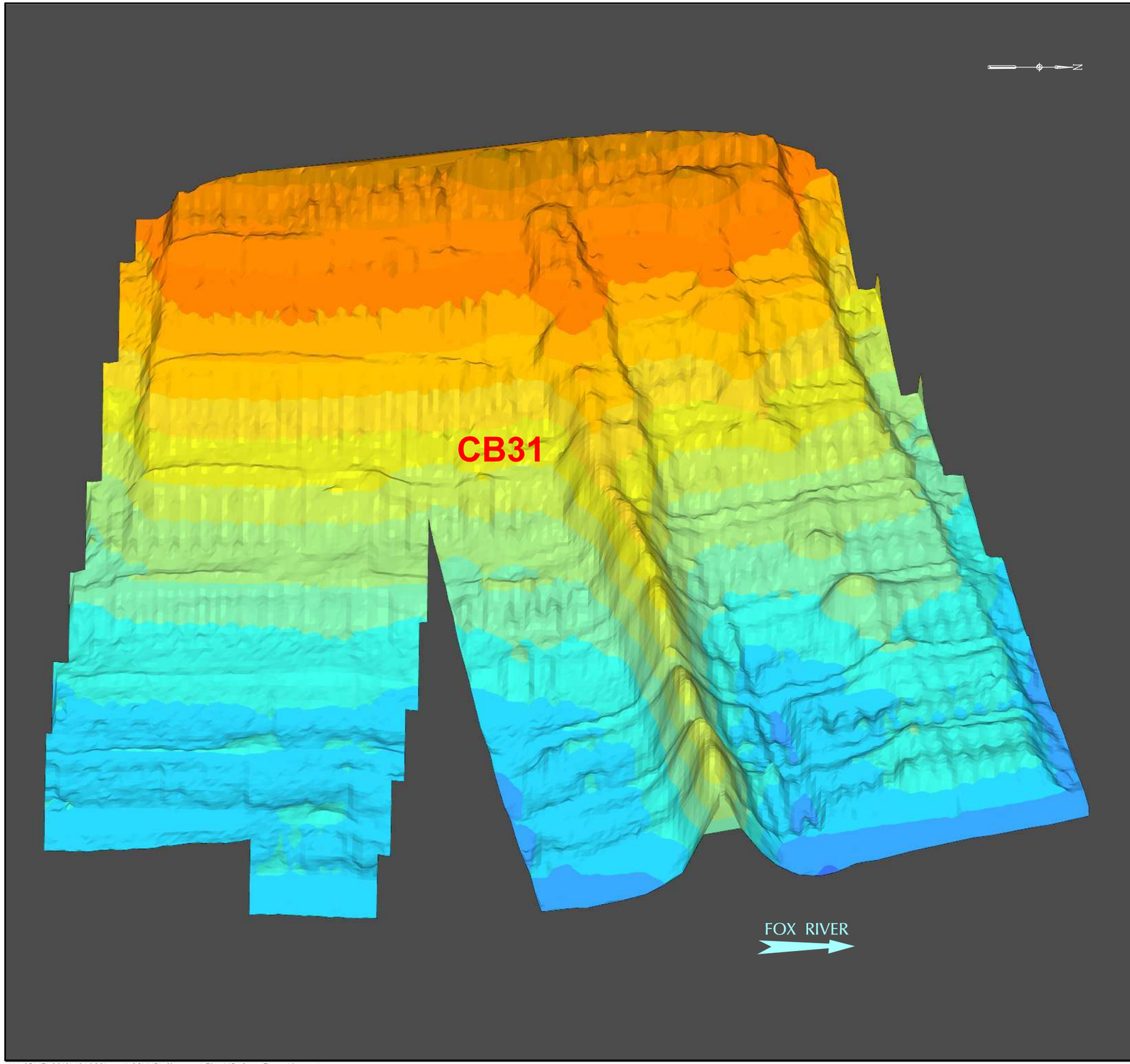
12/4/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

SHALLOWER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEY: OCTOBER 23, 2012.
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   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 14B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: DECEMBER, 2012	Revision Date:	
NOT TO SCALE	Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/4/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

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- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

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3. ORTHO PHOTO SUPPLIED BY ANCHOR QEA, L.L.C.. COMPILED IN NOVEMBER 2004.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 14C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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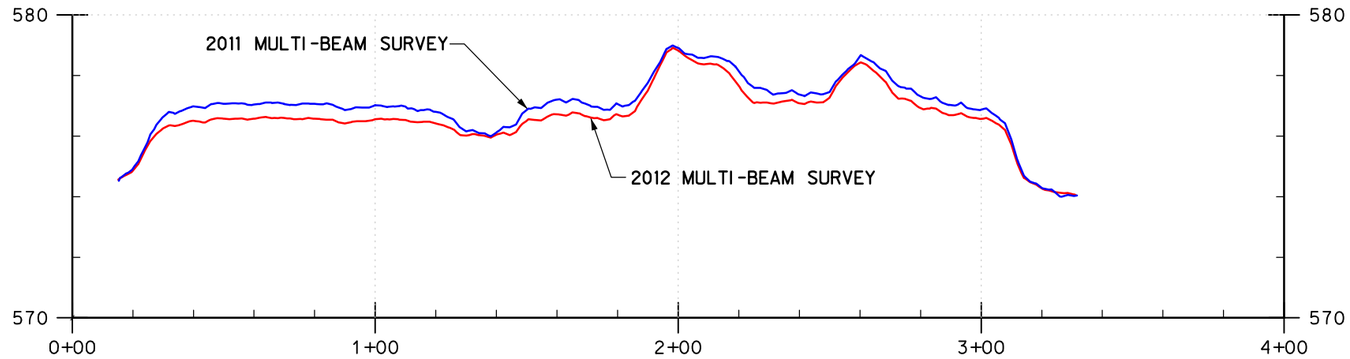
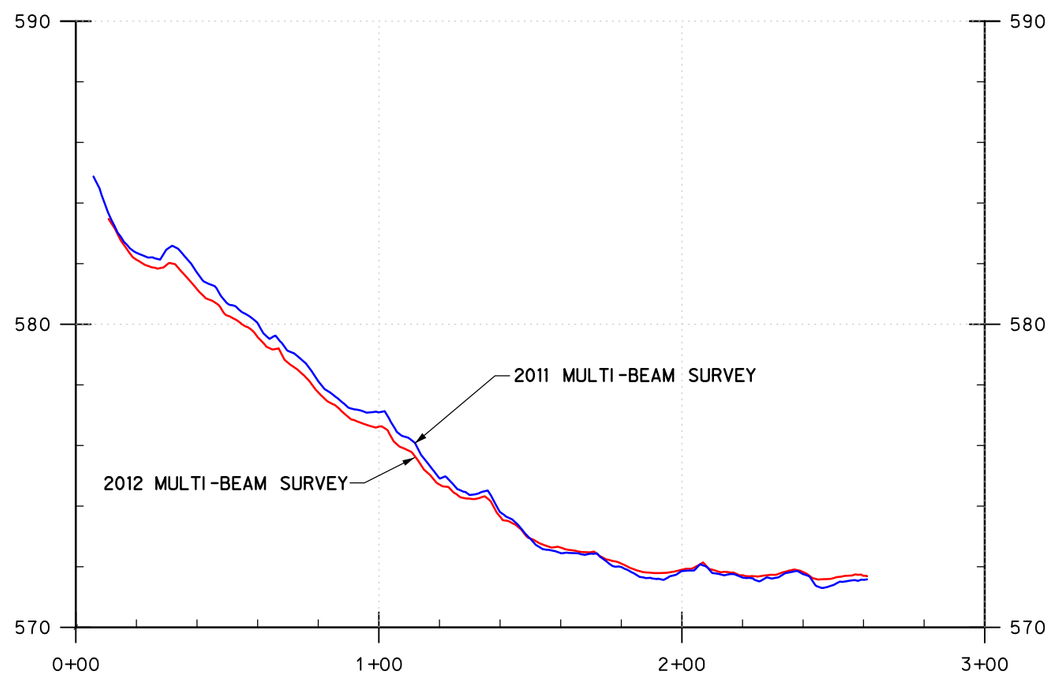
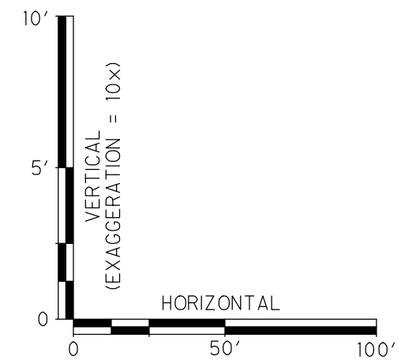
12/17/2012 jow



SECTION A – A′



SECTION B – B′



SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 14D
LOWER FOX RIVER - OU3
CROSS SECTIONS A - A′ & B - B′
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

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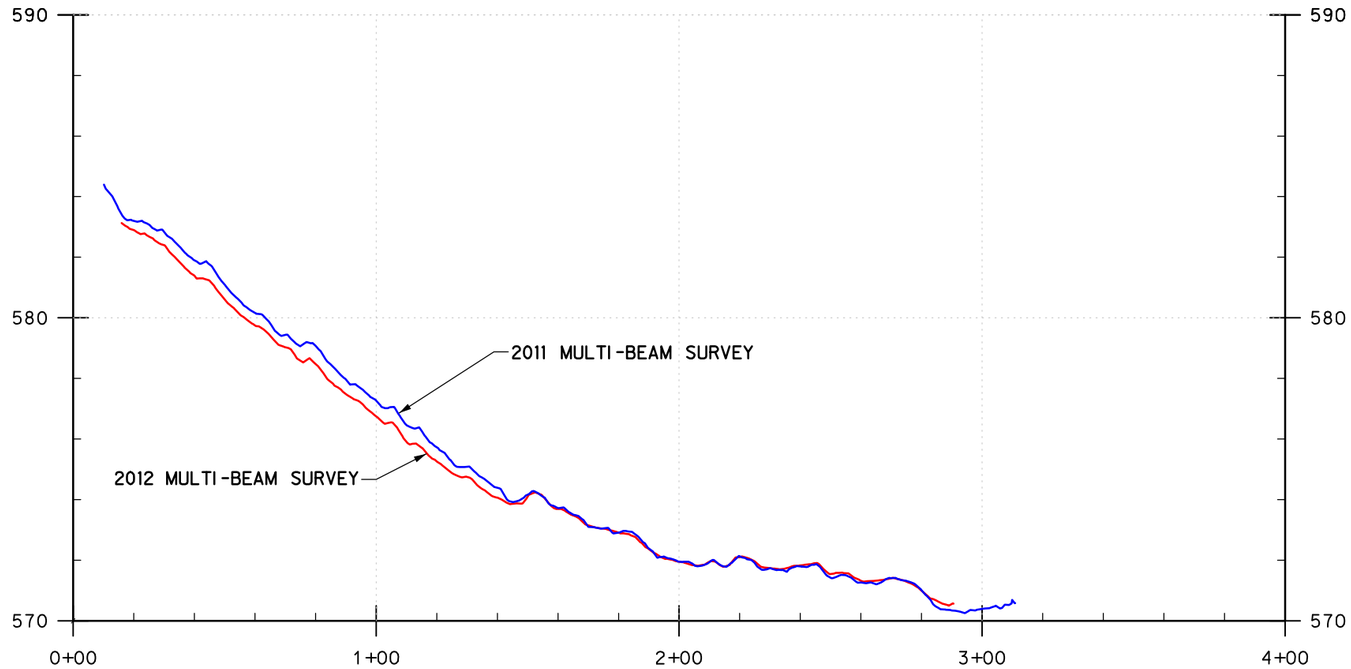
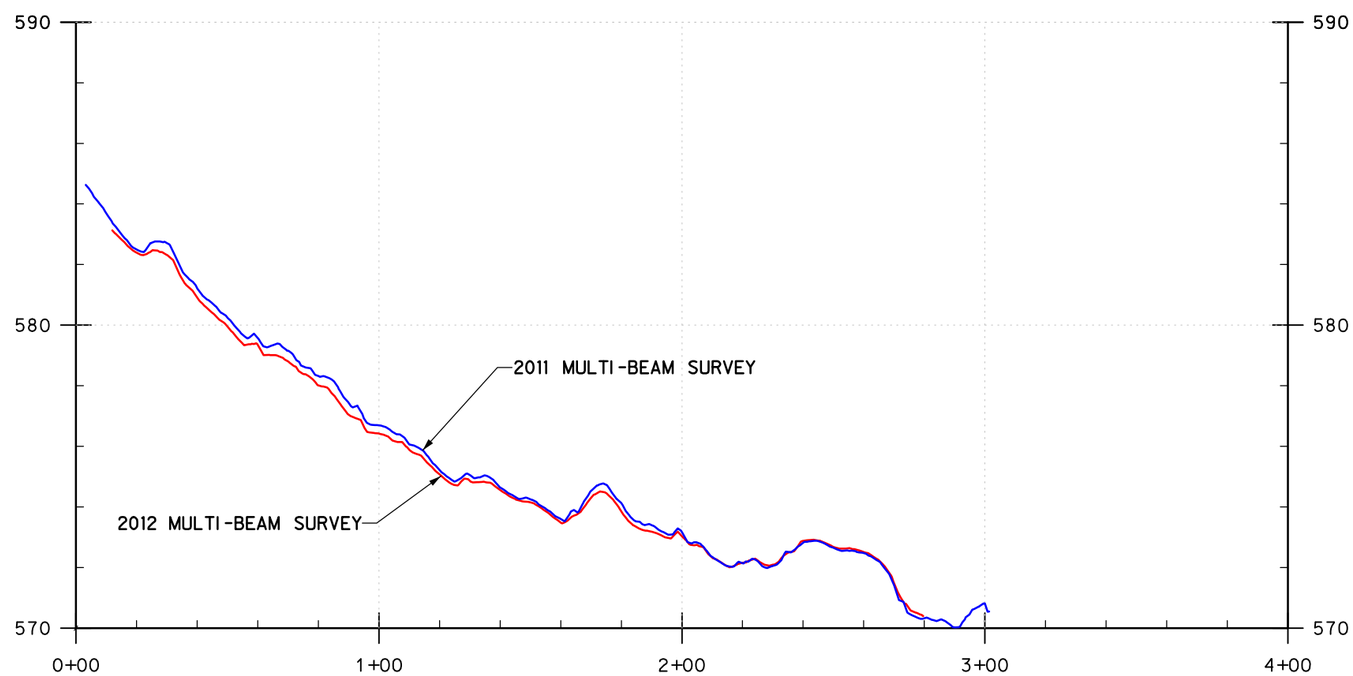
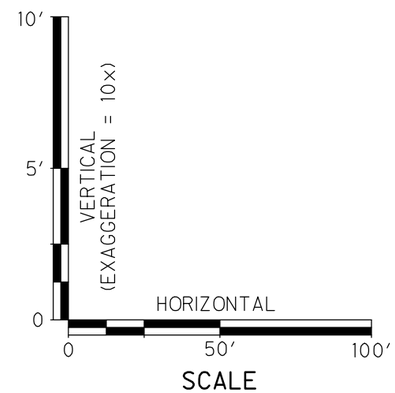
12/17/2012 jow



SECTION C – C′



SECTION D – D′



Foth
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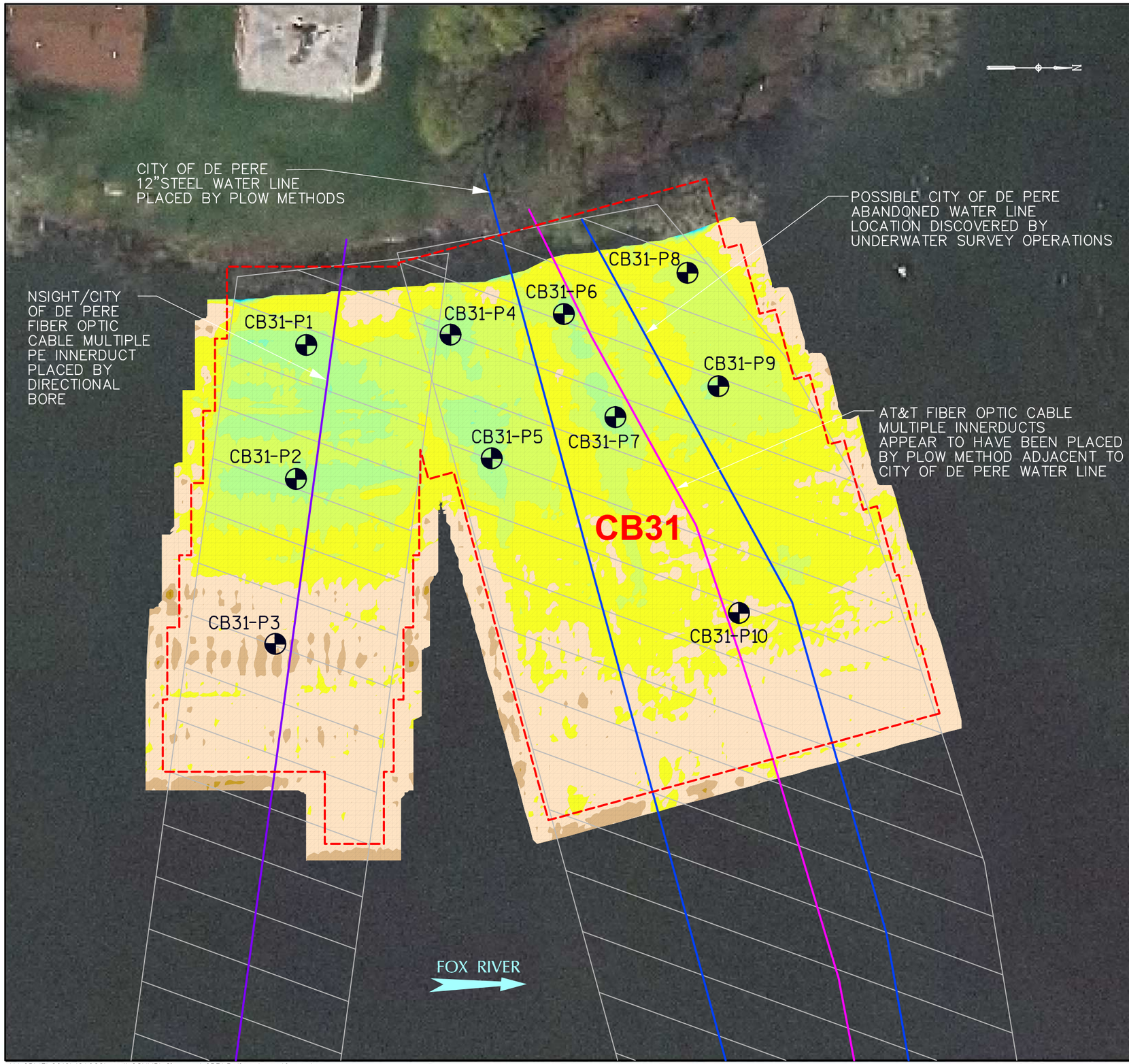
LOWER FOX RIVER REMEDIATION LLC

FIGURE 14E

LOWER FOX RIVER - OU3
CROSS SECTIONS C - C′ & D - D′
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-14D Profiles.dgn
12/17/2012 jow



LEGEND

DESIGN CAP PLACEMENT LIMITS

CB31-P7 PROPOSED POLING LOCATION

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 23, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY ANCHOR QEA, L.L.C.. COMPILED IN NOVEMBER 2004.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 14F

LOWER FOX RIVER - OU3
CB31 CAP POLING LOCATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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12/14/2012 jow

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT OCTOBER 2012 TOP OF ENGINEERED CAP ELEVATIONS.
AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.7'.

SHALLOWER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHZ) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: OCTOBER 29, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 15A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

X:\GB\IE\2012\12A029\cad\COMMP\figures\Fig-15 Cap Elevations.dgn
12/4/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.7'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

1. 200 KILOHERTZ (kHZ) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 29, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 15C
LOWER FOX RIVER - OU3
ISOPACH MAP BETWEEN
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

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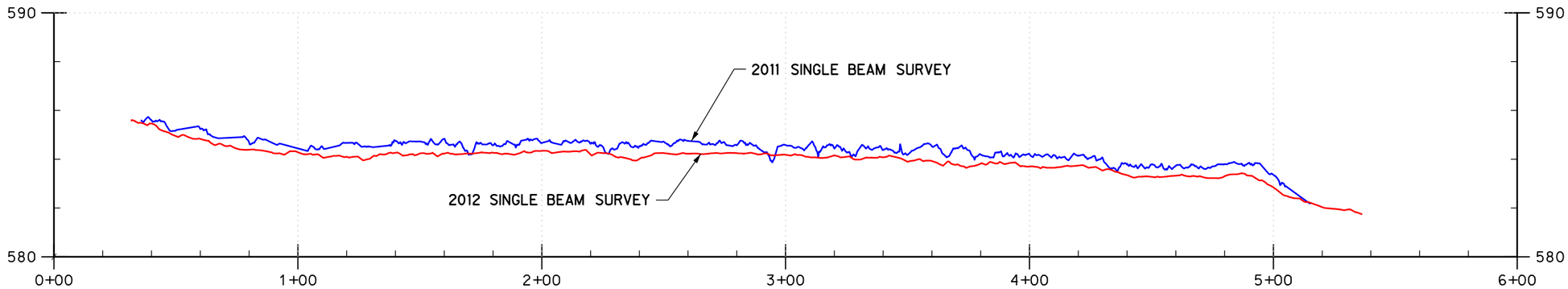
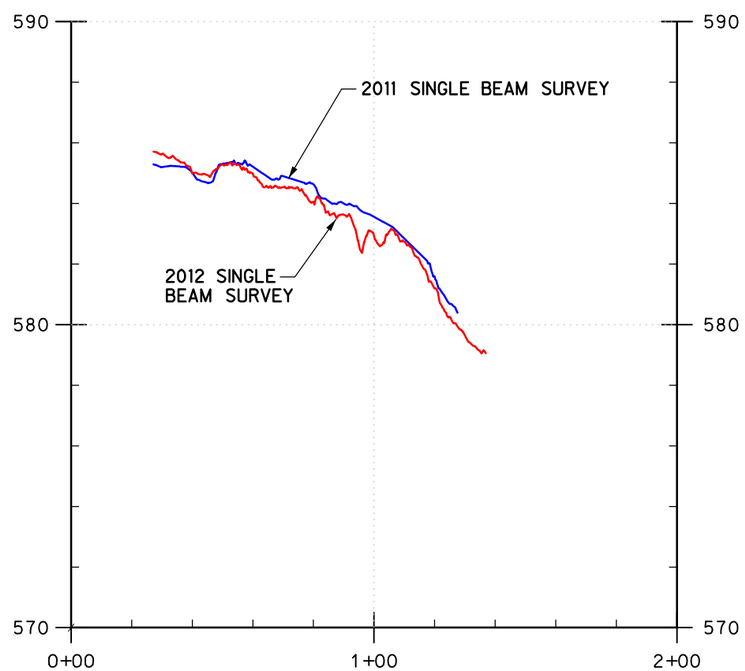
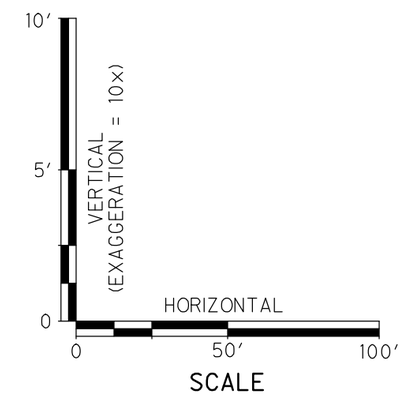
12/17/2012 jow



SECTION A – A′



SECTION B – B′



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LOWER FOX RIVER REMEDIATION LLC

FIGURE 15D
LOWER FOX RIVER - OU3
CROSS SECTIONS A - A′ & B - B′
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

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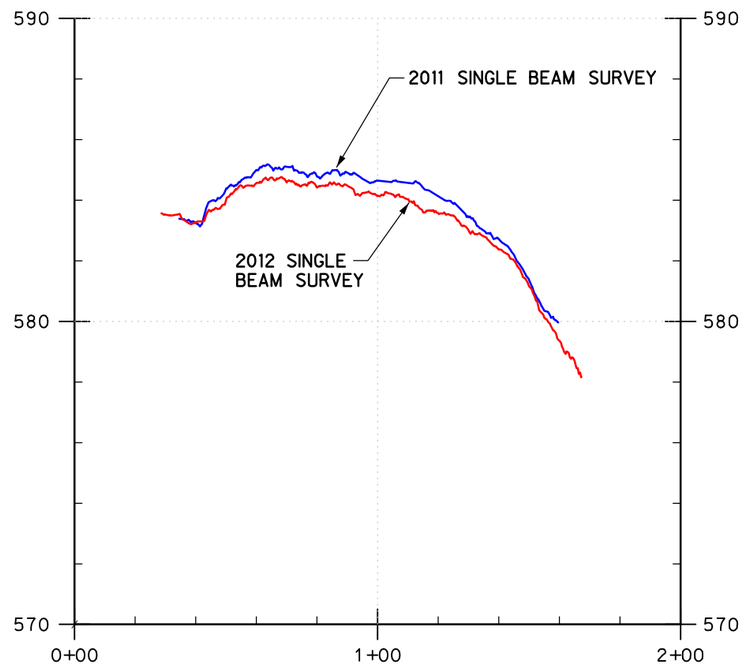
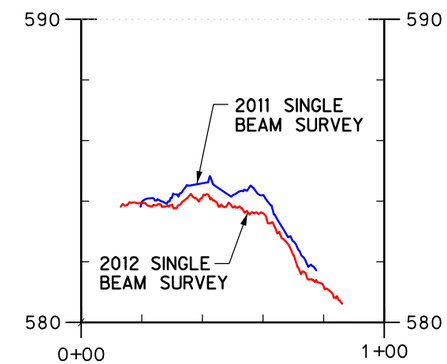
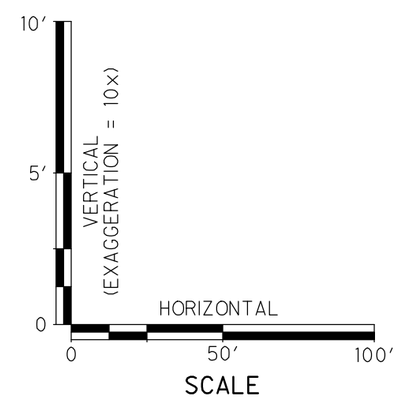
12/17/2012 jow



SECTION C – C′



SECTION D – D′



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LOWER FOX RIVER REMEDIATION LLC

FIGURE 15E
LOWER FOX RIVER - OU3
CROSS SECTIONS C - C′ & D - D′
NOV 2011 & OCT 2012 POST-CAPPING SURVEYS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 12A029

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12/17/2012 jow

LEGEND

DESIGN CAP PLACEMENT LIMITS

CB69-P3 PROPOSED POLING LOCATION

COLOR ELEVATION CHART

COLOR ISOPACH CONTOURS SHOWN REPRESENT DEPTH CHANGE FROM NOVEMBER 2, 2011 TO OCTOBER 23, 2012 SURVEYS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 588.14'.

2012 MULTI-BEAM SURVEY HIGHER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.8' TO 1.0'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.0' TO 0.2'

2012 MULTI-BEAM SURVEY LOWER THAN 2011 MULTI-BEAM SURVEY

- DEPTH 0.0' TO 0.2'
- DEPTH 0.2' TO 0.4'
- DEPTH 0.4' TO 0.6'
- DEPTH 0.6' TO 0.8'
- DEPTH 0.8' TO 1.0'
- DEPTH 1.0' TO 1.2'
- DEPTH 1.2' TO 4.0'

NOTES:

1. 400 KILOHERTZ (kHZ) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2, 2011 & OCTOBER 29, 2012.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

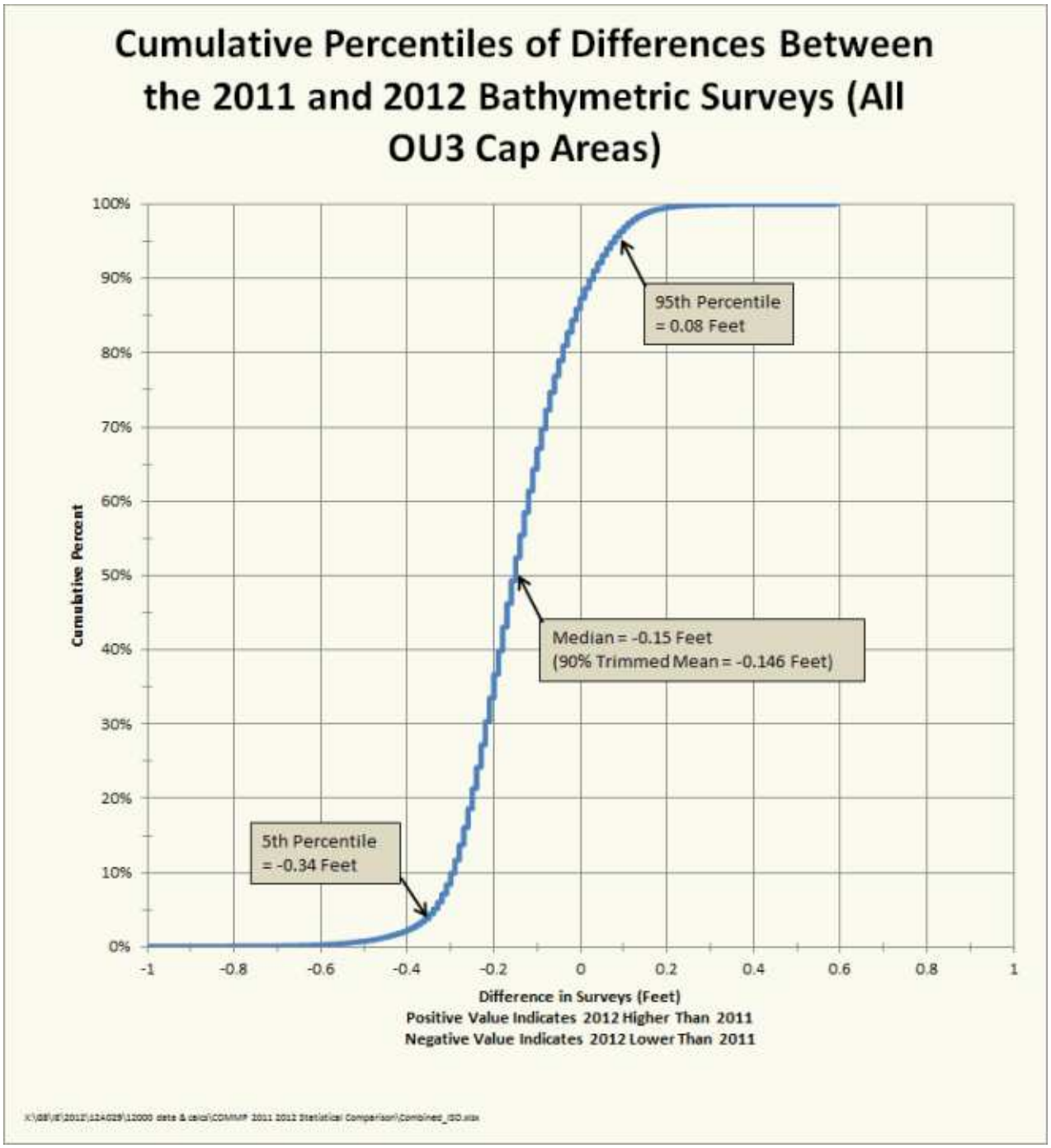
LOWER FOX RIVER REMEDIATION LLC

FIGURE 15F

LOWER FOX RIVER - OU3
CB31 CAP POLING LOCATIONS

Date: DECEMBER, 2012	Revision Date:	
Drawn By: CKV	Checked By: TAG	Scope: 12A029

X:\GB\IE\2012\12A029\cad\COMMP\figures\CA69 Poling Locations.dgn
12/14/2012 jow



NOTES:

1. Graph depicts cumulative distribution of differences (in feet) between the 2011 and 2012 bathymetric surveys of all OU3 cap areas. A positive difference indicates that the 2012 survey was at a higher elevation than the 2011 survey. A negative difference indicates the 2012 survey was at a lower elevation than 2011. Data points are on a 2-foot grid.
2. The 90% trimmed mean is the average of all data points greater than the 5th percentile and less than the 95th percentile.

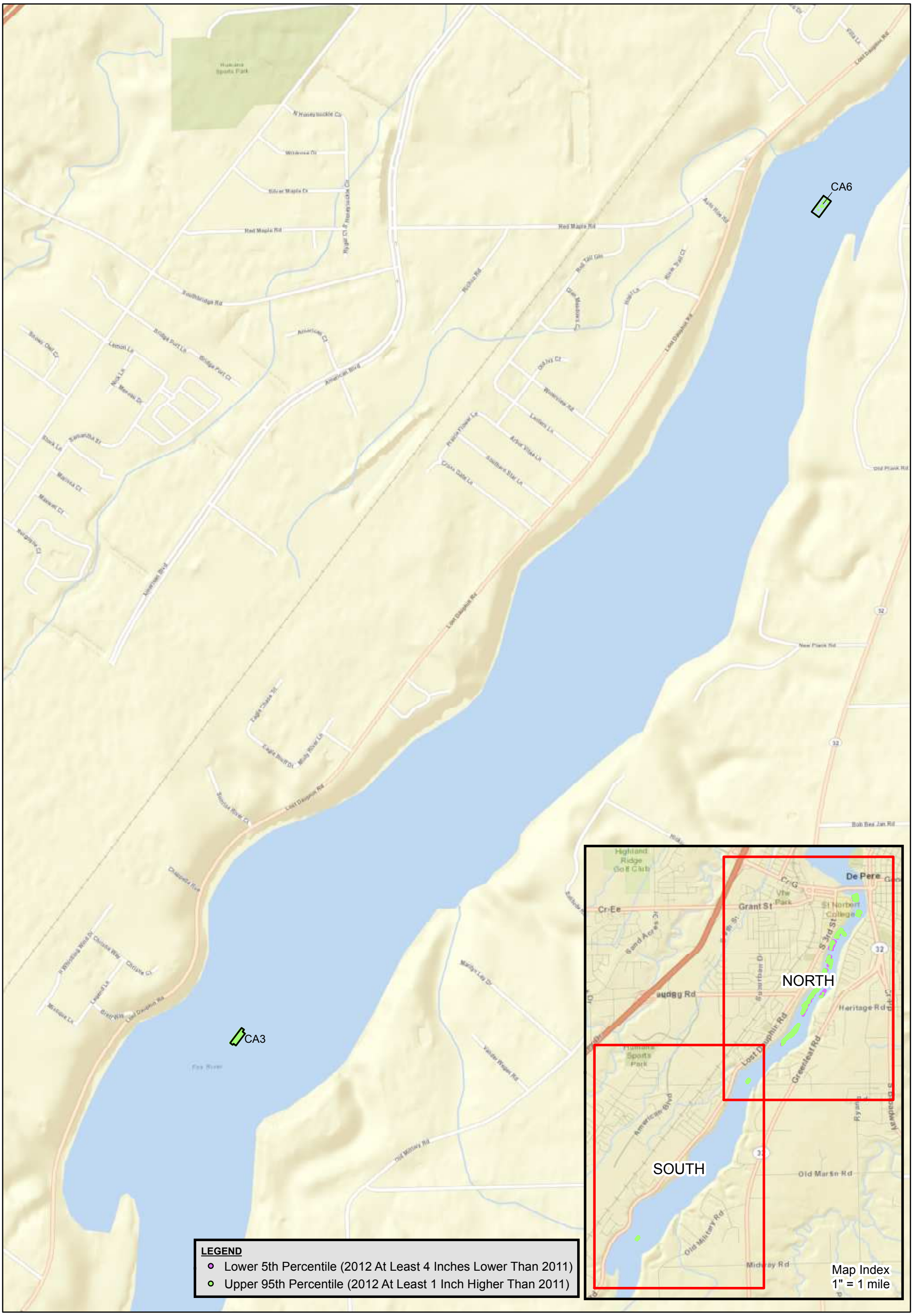
N

Foth

NOT TO SCALE

LOWER FOX RIVER REMEDIATION LLC		
FIGURE 16 CUMULATIVE PERCENTILES OF SURVEY DIFFERENCES (ALL OU3 CAP AREAS)		
Date: NOVEMBER 2012	Revision Date:	
Drawn By: DAT	Checked By: SGL	Scope: 12A029

Path: X:\GB\IE\2012\12A029\GIS\mxd\Cumulative Percentiles of Survey Differences.mxd Date: 12/3/2012



Notes:
1. Base Map downloaded from ESRI. Copyright:© 2009 ESRI, AND, TANA, ESRI Japan, UNEP-WCMC
2. Figure illustrates points where the differences between the 2011 and 2012 bathymetric surveys were on the lower or upper tails of the overall distribution. Locations where the 2012 survey indicates more than a 0.34 foot decrease from the 2011 survey are indicated and represent the lower 5th percentile of the entire distribution. Locations where the 2012 survey indicates more than a 0.08 foot increase from the 2011 survey are also indicated and represent the upper 95th percentile of the entire distribution.

N

Foth

0 500 1,000 Feet

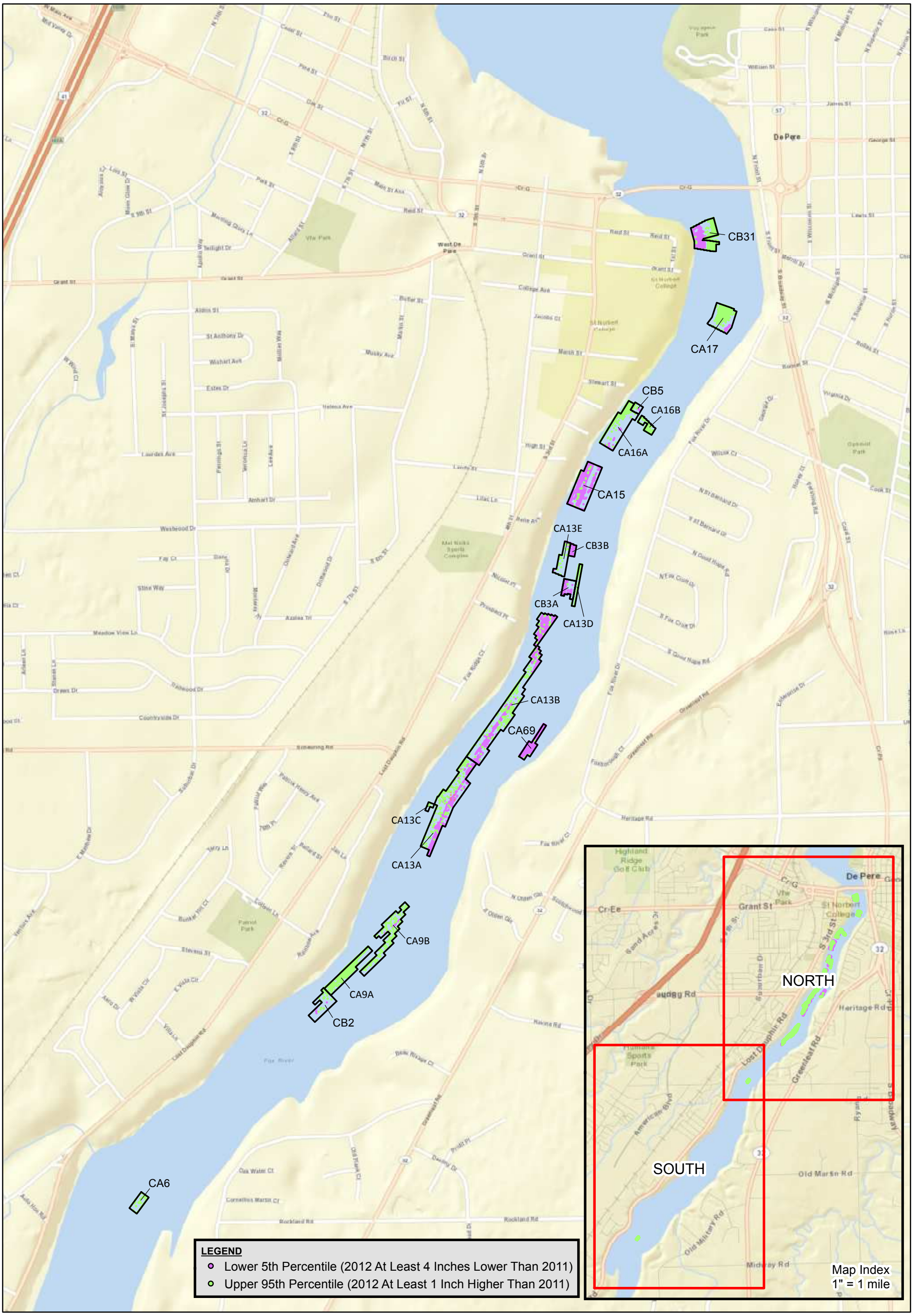
LOWER FOX RIVER REMEDIATION LLC

FIGURE 17A

SURVEY DIFFERENCE OUTLIERS
SOUTH AREA

Date: NOVEMBER, 2012	Revision Date:	
Drawn By: DAT	Checked By: SGL	Scope: 12A029

Path: X:\GB\IE\2012\12A029\GIS\mxd\COMMP Survey Percentiles AreaA.mxd Date: 12/3/2012



Notes:
1. Base Map downloaded from ESRI. Copyright:© 2009 ESRI, AND, TANA, ESRI Japan, UNEP-WCMC
2. Figure illustrates points where the differences between the 2011 and 2012 bathymetric surveys were on the lower or upper tails of the overall distribution. Locations where the 2012 survey indicates more than a 0.34 foot decrease from the 2011 survey are indicated and represent the lower 5th percentile of the entire distribution. Locations where the 2012 survey indicates more than a 0.08 foot increase from the 2011 survey are also indicated and represent the upper 95th percentile of the entire distribution.

N

Foth

0 500 1,000 Feet

LOWER FOX RIVER REMEDIATION LLC

FIGURE 17B

SURVEY DIFFERENCE OUTLIERS
NORTH AREA

Date: NOVEMBER, 2012	Revision Date:	
Drawn By: DAT	Checked By: SGL	Scope: 12A029

Path: X:\GB\IE\2012\12A029\GIS\mxd\COMMP Survey Percentiles AreaB.mxd Date: 12/3/2012

Attachment 1

Hydrographic Survey Observation Reports

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU3 Warranty Hydrographic Survey
Prepared by: BLK
Checked by: TAG

Project #: 12A029
Page: 1 of 2
Date: 10/29/12
Date:

Hydrographic Survey Observation Report

Location 10/29/12 OU3-Cap Single-Beam Warranty survey

	Temp (° F)		Sky Cond.	Precip. (in.)			Wind	
	Low	High			Rain	Snow	Waves	Direction
WEATHER	25	30	Sunny				none	none

Contractors on site *(include no. of personnel per contractor)*

Other personnel on site:	*Purpose:*
Dan Huyke – JF Brennan	Survey Boat Captain
Nick Atanasoff (BLK) – Foth	Auditor

Work observation report, comments:

0900 – BLK arrived at the Bomier St. Boat Launch and met with Dan Huyke (J.F. Brennan) to complete a single-beam survey of area OU3-CA69.

0905 – BLK observed Dan Huyke check in at Bomier St. Boat Launch control point OU3-07R.

N: 228500.273
E: 2474907.638
Elevation: 594.876
ΔH: 0.059
ΔV: -.007
Tide: 588.728

0915 – Team boarded survey vessel 7750.

0925 – Departed the boat launch and headed to OU3-CA69

0950 – Took speed of sound measurement and conducted bar check.

0955– Started survey in OU3-CA69.

1025 – Completed survey in OU3-CA69.

1034 – Conducted bar check, and 3 polings.

1040 – Headed back to Bomier St. Boat Launch.

1050 – Arrived back at Bomier St. Boat Launch.

Hydrographic Survey Observation Report

1055 – Checked out at control point OU3-07R.

N: 228500.273
E: 2474907.658
Elevation: 594.941
ΔH: .056
ΔV: 0.058
Tide: 588.688

1110– BLK departed the Bomier St. Boat Launch for the Foth office.

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU3 Warranty Hydrographic Survey
Prepared by: BLK
Checked by: TAG

Project #: 12A029
Page: 1 of 2
Date: 10/23/12
Date:

Hydrographic Survey Observation Report

Location 10/23/12 OU3-Cap Multi-Beam Warranty survey

	Temp (° F)		Sky Cond.	Precip. (in.)			Wind	
	Low	High			Rain	Snow	Waves	Direction
WEATHER	50	65	Cloudy				none	none

Contractors on site *(include no. of personnel per contractor)*

Other personnel on site:	*Purpose:*
Dan McAully – JF Brennan	Survey Boat Captain
Brad Kussman (BLK) – Foth	Auditor

Work observation report, comments:

0955 – BLK arrives at Bomier St. boat launch for multi-beam survey to meet Mike Wyatt and Dan McAully (J.F. Brennan).

1006 – BLK observed Mike Wyatt check in at Bomier St. boat launch control point OU3-07R.

N: 228500.286
E: 2474907.632
Elevation: 594.870
ΔH: 0.044
ΔV: 0.013

1009 – Dan McAully performed a sound velocity cast.

1025 – Start single-beam performance test survey.

1049 – Single-beam performance test complete.

1051– Started multi-beam patch test.

Patch test results-
Roll=1.28 Yaw=0.87 Pitch=5.50

1110– Start multi-beam performance test area.

1120 – Finish multi-beam performance test area.

1135 – Motor survey vessel down to south end of cap survey. Start multi-beam survey.

1550 – Completed multi-beam survey. Poling's were completed during survey at 1 poling per hour.

1555 – Arrived back at Bomier St. boat launch.

1605 – Checked out at control point OU3-07R.

Hydrographic Survey Observation Report

N: 228500.330
E: 2474907.636
Elevation: 594.885
ΔH: 0.023
ΔV: 0.002
Tide: 588.143

1610 – BLK departed the Bomier St. Boat Launch for the Foth office.

Attachment 2

Poling Field Activity Observation Report and Poling Logs

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU 2-5 RD
Prepared by: Dan Vachon
Checked by: Mark Ciardelli

Project #: 12A029
Page: 1 of 1
Date: 12/05/2012
Date: 12/06/2012

Field Activity Observation Report

RA Activity OU3 Cap Warranty Survey Poling Audit

Location OU3-CB31 and OU3-CA69

	Temp (° F)		Sky Cond.	Precip. (in.)			Site Conditions (describe)	
	Low	High			Rain	Snow	Dry	Muddy
WEATHER	30	35	Sunny	No			x	

Wind 5-10 MPH SE

Contractors on site *(include no. of personnel per contractor)*

Derrick Hughes (TtEC)	Sampling Crew
Mike Denneau (TtEC)	Sampling Crew
Korin Franklin (TtEC)	Sampling Crew

Other personnel on site:	***Purpose:***
Dan Vachon (DJV1) (Foth)	Auditor

Work observation report, comments:

1142 – DJV1 arrived at the Bomier Boat Launch and met with TtEC crew.

1201 – DJV1 observed Derek Hughes (TtEC) check into control point OU3-O7R.
ΔH: 0.062
ΔV: -0.042
Tide: 587.915

1221 – Team boarded the sampling vessel and departed the boat launch to begin sampling for the day.

1228-1417 – The team visited 16 poling location in OU3-CA69 and OU3-CB31 for cap investigation.

1422 – Sampling team headed back to dock.

1435– Arrived back at the Bomier Boat Launch.

1453 – DJV1 observed Derek Hughes checking out at control point OU3-O7R.
ΔH: 0.065
ΔV: -0.045
Tide: 587.867

1512 – DJV1 departed the Bomier Boat Launch.

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ - CO3 · CB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1240

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ Karin F.

Weather Conditions:

Sample Location ID: CB31-P1

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates

Northing:	
Easting:	
Datum:	Wisconsin SPC NAD 83

Offset from Proposed Coordinates

ft.		
ft.		

Actual Sampling Location

	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229301.7908	
Easting:		2474029.421	
Water Elev.:	6.0	587.6651	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	6.0	6.1		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23-~~ OU3-CB31

Foth

Sediment Core Collection and Processing Log

Date: 12/5/12 (~~11/15/12~~) Time: 1246

Sample Location ID: CB31-P2

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ KOLLEN FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229292.5646	
Easting:		2474092.492	
Water Elev.:	11.4	587 6837	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	11.4	11.6		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.2		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23-~~ CB3 - CB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1254

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman Korin F

Weather Conditions:

Sample Location ID: CB31-P3

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229286.6066	
Easting:		2474173.028	
Water Elev.:	16.0	587.6652	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	16.0	16.1		
Top of sediment depth from deck:				
Probed Sediment Thickness:				
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ OU3 CB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1201

Sample Location ID: CB31-~~4~~5

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229390.8189	
Easting:		2474089.169	
Water Elev.:	11.7	587.6938	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	11.7	11.9		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0	0.2		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: OU4-D23- CUS - UB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1308

Sample Location ID: UB31 - P4

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229368.6848	
Easting:		2474025.012	
Water Elev.:	6.7	587.8697	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	6.7	4.8		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ OU3 CB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1312

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman K. FRANKLIN

Weather Conditions:

Sample Location ID: CB31-PG

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229420.5527	
Easting:		2474012.572	
Water Elev.:	5.8	587.6843	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	5.9	5.9		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.1	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ OU3 - CB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1316

Sample Location ID: CB31 - P7

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates	
Northing:	
Easting:	
Datum:	Wisconsin SPC NAD 83

Offset from Proposed Coordinates		
ft.		
ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229453.4794	
Easting:		2474063.351	
Water Elev.:	10.6	587.6928	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	10.6	10.8		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.0		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: OU4-D23- 003 - CB 31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1333

Sample Location ID: CB 31 - P8

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229481.5599	
Easting:		2473995.022	
Water Elev.:	5.6	587.6273	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	5.7	5.8		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.1	0.2		
Probing Observation:	LEAVE			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: OU4-D23- CB3 - CB31

Foth

Sediment Core Collection and Processing Log

Date: 12/5/12 ~~11/15/12~~ Time: 1328

Sample Location ID: CB31 - 9

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229499.4297	
Easting:		2474053.087	
Water Elev.:	10.8	587.6042	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	10.9	11.0		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.1	0.2		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23-~~ OU3-CB31

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1335

Sample Location ID: CB31-10

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		229509.1524	
Easting:		2474162.621	
Water Elev.:	16.1	587.6978	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	16.1	16.2		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ 003-CA69

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1354

Sample Location ID: CA69 - P1

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates

Northing:	
Easting:	
Datum:	Wisconsin SPC NAD 83

Offset from Proposed Coordinates

ft.		
ft.		

Actual Sampling Location

	1st Attempt	2nd Attempt	3rd Attempt
Northing:		223548.6845	
Easting:		2472042.23	
Water Elev.:	5.0	587.6897	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	5.0	5.1		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23-~~ 2013 - CA69

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1359

Sample Location ID: CA69 - P2

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		223626.8254	
Easting:		2472093.105	
Water Elev.:	5.1	587.7443	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	5.3	5.4		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.2	0.3		
Probing Observation:	FG GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~- OU3 CA69

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time :

Sample Location ID: CA54-P3

Sampling Personnel: Derek Hughes, Mike Denneau, Craig Wieman K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X___ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		223583.6675	
Easting:		2472140.717	
Water Elev.:	3.1	587.7044	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	3.2	3.2		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.1	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ OU3 - CA69

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1407

Sample Location ID: CA69-P4

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		223660.8002	
Easting:		2472187.201	
Water Elev.:	2.9	587.6568	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	3.0	3.0		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.1	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ OU3 - CA69

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/5/12 Time: 1411

Sampling Personnel: Derek Hughes, Mike Denneau, ~~Craig Wieman~~ K. FRANKLIN

Weather Conditions:

Sample Location ID: CA69-P5

Vibrocore ____ Piston _X_ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		223778.0906	
Easting:		2472232.272	
Water Elev.:	4.0	587.6642	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	4.0	4.0		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.0		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Project Name: Lower Fox River Remediation LLC
Project Location: Green Bay, Wisconsin
Project ID: 12A029

DMU: ~~OU4-D23~~ OU3 - CA65

Foth

Sediment Core Collection and Processing Log

Date: ~~11/15/12~~ 12/9/12 Time: 1415

Sample Location ID: CA65-P6

Sampling Personnel: Derek Hughes, Mike Denneau, Craig ~~Wieman~~ K. FRANKLIN

Weather Conditions:

Vibrocore ____ Piston _X__ RPB ____ Check Valve Sampler ____

Proposed Location Coordinates			Offset from Proposed Coordinates	
Northing:				
Easting:		ft.		
Datum:	Wisconsin SPC NAD 83	ft.		

Actual Sampling Location	1st Attempt	2nd Attempt	3rd Attempt
Northing:		223894.8722	
Easting:		2472307.345	
Water Elev.:	5.0	587.7271	

	1st Attempt		2nd Attempt	
	Light Effort	To Refusal	Light Effort	To Refusal
Total Probed Length:	5.0	5.1		
Top of sediment depth from deck:				
Probed Sediment Thickness:	0.0	0.1		
Probing Observation:	GRAVEL			

	1st Attempt	2nd Attempt	3rd Attempt
Sediment Core Penetration:			
Sediment Recovered:			
% Recovery:			

Field Observation

Processing Personnel:

Core Length (in): Core Processing (Observations) Date Processed:

Core Intervals (in)	Core Description	Core Intervals (in) top	Core Intervals (in) bottom	Sample Number

Comments:

Entered by:

Checked by:

Attachment C

Foth Field Notes for:

September 12, 2014 Multi-Beam Year 3 Survey and October 29, 2014 Poling Survey

Table 1 – OU3 COMMP Cap Integrity Poling Survey

Owner: Lower Fox River Remediation LLC
Project: Lower Fox River OU2-5 RA
Prepared by: Brad Kussman
Checked by: Jim Buchberger

Project #: 14L029
Date: 9-14-14
Date: 10-14-14

Hydrographic Survey Audit Form

Date of Survey: 9-14-14

HYPACK Project Name: **140914 OU3 Multi-beam Cap Survey**

Area(s) Surveyed: **OU3 Cap**

Captain: Dan McCauley

Technicians: Brad Kussman

Boat Name: JFB7752

Trimble RTK GPS Equipment: R5/R7

Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [x] Post-Sand/Cap

Weather Conditions				
Time	**Wave Heights**	**Wind Spd/Dir**	**Temp °F**	**Cloud Cover**
1000	**<0.5'**	**1-5/North**	**50**	**Partly**

Control Data			
Pt. Name	**Northing**	**Easting**	**Elevation**
OU3-07A-in	228500.255	2474907.627	594.962
OU3-07A-out	228500.277	2474907.609	594.893

Minimum of 2 control points to be checked at both Start and End.	**Check IN (at start)**	**Check OUT (at end)**
Time	0750	1815
Point Name	OU3-07R	OU3-07R
Δ Horizontal:	0.073	0.049
V. Vertical:	0.079	0.010
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	588.382	588.106
Time:	0752	1811

Sonic Sounder Calibration/Bar Check Information
Sounder # 320
Transducer at 200/20 Hz w/ beam width of 9.0°

Latency: na **Date:** 9-14-14

Vertical Offset: na **Draft:** na

Plan Lines for Cross Lines: [ ] **(check when added)**

	Bar Check			
	(at start)		(at end)	
	Bar at	**Fatho-meter (0.1 ft)**	**Bar at**	**Fatho-meter (0.1 ft)**
Min. 2 ft below transducer (ft)				
Min. 5 ft below transducer (ft)				
Min 10 ft below transducer (ft)				
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)				
Speed of Sound Velocity Reading (ft/sec)				
Time when bar check made (hrs)				

Polings			
Poling points to be evenly distributed within the area of survey.	**Area:**		
	Pt. #	**Pole Depth (0.1 ft)**	**Pole Depth (0.1 ft)**
Pre-Dredge Surveys – Min. 1 poling per hour	1	6.3	(10) 8.0
	2	6.2	(11) 11.7
Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.	3	14.5	(12) 10.1
	4	14.3	
	5	14.2	
	6	10.9	
	7	13.0	
	8	4.8	
	9	10.9	

Additional Notes: Completed patch test from 0800-0930. Had GPS issues from 0930-1110. Completed survey from 1110-1655. 1655-1800 completed polings.

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU 2-5 COMMP
Prepared by: Nick Atanasoff
Checked by: Tara Van Hoof

Project #: 14L029
Page: 1 of 1
Date: 10/29/2014
Date: 10/31/2014

Field Activity Observation Report

RA Activity **OU3 COMMP Sediment Thickness Measurement/Cap Integrity Assessment**

Location OU3 Cap Areas

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Site Conditions (describe)	
	Low	High			Rain	Snow	Dry	Muddy
	40	49	M. Cloudy		-	-	-	-

Wind 10-20 MPH West

Contractors on site *(include no. of personnel per contractor)*

Nick Atanasoff (NRA)	Sampling Crew
Andy Pierre (AJP)	Sampling Crew
Cody Ebert (CBE)	Sampling Crew

Other personnel on site:	***Purpose:***
Phil Brochocki - NRT	Oversight

Work observation report, comments:

0645 – NRA, AJP, and CBE arrived at the Foth garage and began loading survey and poling equipment.

0700 – The team departed the Foth garage for the Riverway Marina.

0710 – Team arrived at the Riverway Marina and boarded the Foth sampling vessel.

0730 – Team departed the Riverway Marina for the De Pere Lock.

0800 – Team arrived at the Bomier St. boat launch and began preparing the sampling vessel for poling in OU3.

0900 – Phil Brochocki arrived at the boat launch.

0910 – NRA checked into control point OU3-07R.

Northing: 228500.374
Easting: 2474907.578
Elevation: 594.871
Δ Horizontal: 0.042
Δ Vertical: 0.059

0905 – NRA surveyed tide elevation (588.612').

0920-1400 – The team visited 102 poling locations. No sediment was observed at all locations, armor stone was confirmed.

Field Activity Observation Report

1430 – The team arrived at the Bomier St. boat launch.

1445 – NRA checked out at control point OU3-07R.

Northing: 228500.370
Easting: 2474907.582
Elevation: 594.875
Δ Horizontal: 0.054
Δ Vertical: -0.008

1450 – NRA surveyed tide elevation (588.610').

1510 – Phil Brochocki departed the boat launch for the day; the sampling team began breaking down the boat.

1545 – The sampling team arrived at the Riverway Marina and secured the boat for future activities.

1600 – The sampling team departed the Riverway Marina for the Foth garage.

1615 – The sampling team arrived at the Foth garage, unloaded survey equipment and departed for the day.

Table 1
OU3 COMMP Cap Integrity Poling Survey Data

Location	Proposed Northing	Proposed Easting	Actual Northing	Actual Easting	Date	Time	Top of Sediment (feet)	Top of Armor Layer (feet)
P1	229546	2474156	229548.31	2474157.74	10/29/2014	9:27:04	16	16
P2	229450	2474160	229453.19	2474159.90	10/29/2014	9:32:00	12.2	12.2
P3	229450	2474030	229450.94	2474030.59	10/29/2014	9:34:27	9	9
P4	229314	2474056	229315.49	2474055.52	10/29/2014	9:35:51	9	9
P6	229268	2474098	229271.61	2474098.42	10/29/2014	9:37:00	12.7	12.7
P5	229320	2474196	229323.36	2474197.92	10/29/2014	9:39:04	16.6	16.6
P7	228540	2474414	228541.96	2474414.81	10/29/2014	9:43:49	16.2	16.2
P9	228404	2474388	228406.35	2474388.71	10/29/2014	9:45:56	14.9	14.9
P8	228540	2474290	228537.99	2474292.35	10/29/2014	9:47:38	16.8	16.8
P11	228454	2474218	228456.38	2474217.63	10/29/2014	9:48:55	16.9	16.9
P10	228374	2474288	228373.76	2474289.22	10/29/2014	9:50:55	16.1	16.1
P12	227232	2473528	227233.37	2473525.88	10/29/2014	9:58:48	17.2	17.2
P13	227226	2473464	227229.12	2473464.31	10/29/2014	10:01:08	18	18
P14	227328	2473400	227326.78	2473402.38	10/29/2014	10:02:29	18.5	18.5
P15	227467	2473380	227470.26	2473378.70	10/29/2014	10:04:38	17.4	17.4
P16	227452	2473306	227454.99	2473302.27	10/29/2014	10:05:55	15.7	15.7
P17	227500	2473250	227504.65	2473248.71	10/29/2014	10:07:09	12.4	12.4
P18	227370	2473250	227369.33	2473251.44	10/29/2014	10:08:37	15.9	15.9
P19	227388	2473138	227385.10	2473139.00	10/29/2014	10:10:12	10.5	10.5
P20	227240	2473120	227241.57	2473118.11	10/29/2014	10:11:54	13.4	13.4
P22	227110	2473120	227109.57	2473122.24	10/29/2014	10:13:33	15.6	15.6
P21	227174	2473036	227174.64	2473036.90	10/29/2014	10:14:44	11	11
P23	227064	2472990	227063.30	2472989.59	10/29/2014	10:15:50	10.9	10.9
P24	226764	2472914	226759.47	2472915.38	10/29/2014	10:17:25	12.9	12.9
P25	226680	2472832	226680.33	2472833.60	10/29/2014	10:18:52	10.9	10.9
P26	226720	2472738	226721.73	2472739.31	10/29/2014	10:20:02	7.6	7.6
P27	226582	2472756	226581.58	2472754.66	10/29/2014	10:21:23	10.1	10.1
P28	226452	2472724	226451.86	2472722.23	10/29/2014	10:22:36	10.3	10.3
P29	226458	2472612	226456.70	2472614.01	10/29/2014	10:23:53	6.4	6.4
P30	226350	2472684	226348.83	2472684.73	10/29/2014	10:25:39	9.9	9.9
P31	225948	2472552	225946.01	2472547.70	10/29/2014	10:27:45	9.7	9.7
P32	225892	2472622	225894.36	2472622.69	10/29/2014	10:29:24	12.5	12.5
P33	225826	2472612	225825.94	2472613.26	10/29/2014	10:30:53	12.7	12.7
P34	225776	2472534	225775.77	2472536.39	10/29/2014	10:32:06	10.3	10.3
P35	225680	2472470	225680.04	2472468.97	10/29/2014	10:33:30	8.7	8.7
P36	225550	2472685	225551.38	2472686.31	10/29/2014	10:35:36	19.6	19.6
P38	225420	2472600	225418.88	2472600.49	10/29/2014	10:37:04	16.6	16.6
P39	225454	2472528	225453.78	2472530.27	10/29/2014	10:38:38	13.6	13.6
P37	225298	2472638	225300.41	2472634.56	10/29/2014	10:41:20	19.2	19.2
P40	225102	2472342	225103.51	2472344.10	10/29/2014	10:44:26	12.1	12.1
P41	225030	2472340	225027.88	2472340.38	10/29/2014	10:45:53	13.2	13.2
P42	224914	2472228	224910.24	2472229.82	10/29/2014	10:47:00	11	11
P43	224742	2472214	224741.93	2472213.67	10/29/2014	10:48:25	14	14
P44	224640	2472210	224638.56	2472211.01	10/29/2014	10:50:01	15	15
P45	224550	2472110	224549.41	2472106.79	10/29/2014	10:51:15	14.1	14.1
P46	224420	2472116	224419.65	2472116.28	10/29/2014	10:52:52	15.6	15.6
P47	224214	2472026	224212.29	2472026.86	10/29/2014	10:55:02	16	16
P48	224250	2471950	224251.05	2471951.23	10/29/2014	10:56:41	15.3	15.3
P49	224116	2471884	224117.68	2471885.35	10/29/2014	10:58:10	15.4	15.4
P50	224064	2471944	224063.81	2471945.66	10/29/2014	10:59:47	13.7	13.7
P51	224004	2471802	224004.63	2471804.56	10/29/2014	11:03:21	15.1	15.1
P60	223822	2472252	223823.16	2472254.13	10/29/2014	12:11:01	5.3	5.3
P61	223734	2472202	223732.63	2472201.52	10/29/2014	12:12:18	4.7	4.7
P62	223656	2472148	223656.38	2472146.77	10/29/2014	12:13:22	4.3	4.3
P63	223600	2472080	223597.45	2472081.95	10/29/2014	12:14:36	5.1	5.1
P52	223860	2471820	223862.80	2471822.92	10/29/2014	12:17:07	17.5	17.5
P53	223918	2471740	223919.97	2471741.76	10/29/2014	12:18:29	14.7	14.7
P54	223860	2471690	223859.97	2471689.20	10/29/2014	12:19:41	14.5	14.5
P55	223730	2471690	223728.57	2471689.15	10/29/2014	12:20:51	16.1	16.1

Table 1
OU3 COMMP Cap Integrity Poling Survey Data

Location	Proposed Northing	Proposed Easting	Actual Northing	Actual Easting	Date	Time	Top of Sediment (feet)	Top of Armor Layer (feet)
P56	223756	2471624	223758.10	2471623.17	10/29/2014	12:22:36	14.2	14.2
P57	223600	2471560	223599.81	2471557.19	10/29/2014	12:24:00	15	15
P58	223538	2471482	223537.55	2471484.88	10/29/2014	12:25:32	14.5	14.5
P59	223478	2471556	223476.58	2471557.95	10/29/2014	12:27:33	17	17
P64	223470	2471430	223468.36	2471431.66	10/29/2014	12:29:15	13.7	13.7
P65	223350	2471422	223347.35	2471421.62	10/29/2014	12:31:17	14.8	14.8
P66	223202	2471378	223204.47	2471375.42	10/29/2014	12:32:59	16.1	16.1
P67	223210	2471300	223211.27	2471300.23	10/29/2014	12:34:17	13.2	13.2
P68	223080	2471300	223081.55	2471302.86	10/29/2014	12:36:05	15.4	15.4
P69	223062	2471156	223060.11	2471157.63	10/29/2014	12:37:33	11	11
P70	222950	2471170	222949.05	2471171.55	10/29/2014	12:39:03	13	13
P71	222820	2471170	222817.17	2471170.85	10/29/2014	12:40:51	14.8	14.8
P72	222952	2470980	222956.64	2470978.83	10/29/2014	12:43:07	7.9	7.9
P73	222820	2471040	222819.10	2471042.95	10/29/2014	12:45:10	10.7	10.7
P74	222690	2471040	222690.92	2471041.80	10/29/2014	12:46:51	12.8	12.8
P75	222560	2471040	222561.65	2471040.53	10/29/2014	12:49:36	13.7	13.7
P76	222546	2470936	222545.48	2470934.40	10/29/2014	12:51:11	11.1	11.1
P77	221846	2470724	221844.46	2470724.83	10/29/2014	12:54:33	15.1	15.1
P78	221708	2470554	221706.82	2470552.71	10/29/2014	12:57:22	13.6	13.6
P79	221636	2470616	221633.78	2470615.61	10/29/2014	12:59:20	14.8	14.8
P80	221538	2470456	221539.76	2470456.01	10/29/2014	13:02:22	14	14
P81	221424	2470518	221425.91	2470518.85	10/29/2014	13:04:28	15.1	15.1
P82	221328	2470446	221327.74	2470447.43	10/29/2014	13:06:56	15.1	15.1
P84	221260	2470390	221261.55	2470390.54	10/29/2014	13:09:41	15.2	15.2
P83	221344	2470342	221341.51	2470342.92	10/29/2014	13:10:42	14.9	14.9
P85	221166	2470332	221165.03	2470333.08	10/29/2014	13:12:14	15	15
P86	221130	2470260	221130.92	2470260.50	10/29/2014	13:13:42	15.1	15.1
P87	221238	2470198	221238.21	2470199.09	10/29/2014	13:15:12	14.8	14.8
P88	221102	2470142	221102.82	2470142.55	10/29/2014	13:16:58	15.2	15.2
P89	221084	2470044	221082.33	2470043.74	10/29/2014	13:18:20	14.5	14.5
P90	221000	2470000	221001.44	2469999.14	10/29/2014	13:20:10	14.7	14.7
P91	220870	2469870	220869.99	2469868.56	10/29/2014	13:21:52	15.3	15.3
P92	220820	2469796	220820.83	2469795.99	10/29/2014	13:22:59	14.2	14.2
P93	220740	2469870	220739.20	2469869.92	10/29/2014	13:24:53	14.6	14.6
P94	220670	2469740	220668.97	2469741.08	10/29/2014	13:26:02	14.3	14.3
P95	220610	2469740	220609.88	2469740.58	10/29/2014	13:26:59	14.4	14.4
P96	218594	2467780	218594.44	2467781.01	10/29/2014	13:35:15	14	14
P97	218530	2467790	218529.51	2467791.75	10/29/2014	13:36:42	14.7	14.7
P98	218514	2467722	218515.61	2467723.32	10/29/2014	13:37:37	13.8	13.8
P99	218454	2467672	218454.31	2467672.59	10/29/2014	13:38:45	13.4	13.4
P100	209194	2461226	209193.36	2461226.90	10/29/2014	13:55:07	6.6	6.6
P101	209170	2461160	209171.61	2461159.21	10/29/2014	13:56:03	6.3	6.3
P102	209104	2461146	209105.54	2461148.03	10/29/2014	13:56:50	6.2	6.2

Prepared by: NRA
Checked by: MCC2

Attachment D

USGS Flow Data

Van Hoof, Tara M

From: Waschbusch, Robert <rjwaschb@usgs.gov>
Sent: Tuesday, December 02, 2014 10:51 AM
To: Van Hoof, Tara M
Subject: Re: Rapide Croche discharge data
Attachments: 2014.data.pdf

Tara,

I'd forgotten this but that site was discontinued after Sep. 30 last year.
The power company still sent us the data which I've attached - but we can't vouch for it.

On Tue, Dec 2, 2014 at 10:42 AM, Van Hoof, Tara M <Tara.VanHoof@foth.com> wrote:

Here's my info. As we discussed, I'm looking for updated discharge data for the Rapide Croche station 04084500.

Thanks!

Tara

Tara M. Van Hoof, P.E., Project Environmental Engineer

Foth Infrastructure & Environment, LLC

2121 Innovation Court, Suite 300

P.O. Box 5126

De Pere, WI 54115-5126

Ph: (920) 496-6920 / Fax (920) 497-8516

Cell Ph: (920) 562-0054

http://www.foth.com

KAUKAUNA UTILITIES

2014 River Flow Report
And River Temperature Averages

DAY	JAN	TEMP	FEB	TEMP	MAR	TEMP	APRIL	TEMP	MAY	TEMP	JUNE	TEMP	JULY	TEMP	AUG	TEMP	SEPT	TEMP	OCT	TEMP	NOV	TEMP	DEC	
1	3,119	32	3,950	32	4,523	31	8,942	41	14,431	44	9,427	72	9,101	76	2,306	74	7,946	74	6,648	62				
2	3,250	32	3,934	32	4,565	31	9,856	40	14,980	45	12,839	72	6,484	75	2,226	74	6,658	74	6,613	62				
3	3,348	32	3,942	33	4,529	32	9,858	40	14,119	45	12,486	71	5,467	74	2,309	75	4,724	74	6,992	62				
4	3,462	32	3,940	33	4,693	32	10,182	39	14,017	47	11,626	70	5,337	73	2,381	76	5,163	74	6,794	60				
5	3,333	32	3,898	33	4,860	33	10,275	38	14,488	48	11,197	71	5,407	74	2,295	75	5,006	74	6,772	57				
6	2,891	32	3,897	33	4,686	32	10,449	40	13,274	47	9,459	72	5,581	74	2,419	76	3,144	73	6,239	55				
7	3,213	32	3,897	33	4,772	33	10,432	42	12,028	50	9,090	72	4,616	74	2,286	76	3,503	72	5,606	55				
8	3,517	32	3,894	33	4,521	33	10,300	43	12,223	50	8,379	72	4,524	75	2,198	77	3,599	72	5,317	55				
9	3,376	32	3,973	33	4,513	34	10,393	43	12,053	52	7,808	72	4,568	74	2,157	76	3,252	72	4,468	54				
10	3,425	32	3,854	33	4,533	35	10,399	44	11,380	53	6,331	71	4,506	74	2,330	77	4,754	72	2,985	54				
11	3,596	32	3,854	33	4,449	36	10,320	43	11,404	55	6,490	70	4,500	74	2,141	77	3,764	69	3,239	54				
12	3,508	33	3,840	32	4,545	37	10,354	42	14,622	56	6,614	70	4,508	74	2,248	76	4,511	66	3,389	54				
13	3,549	33	3,875	33	4,687	36	12,006	41	14,866	57	6,495	69	4,535	74	2,034	75	4,586	63	3,393	54				
14	3,826	33	3,913	33	4,211	35	15,126	39	13,846	57	7,095	69	4,397	74	2,120	74	4,635	62	5,582	55				
15	3,591	33	3,942	33	4,177	36	14,590	37	13,614	56	7,196	68	2,560	73	2,063	74	4,691	62	6,687	54				
16	3,485	33	3,897	33	3,575	36	14,065	37	13,934	55	7,111	69	1,958	72	2,172	74	4,333	61	7,030	53				
17	3,434	33	3,987	33	3,519	35	13,662	37	13,593	54	8,412	71	2,133	71	2,296	74	4,371	62	6,639	53				
18	3,223	33	4,344	33	3,343	35	14,080	38	13,828	55	10,542	72	2,265	71	2,444	70	5,108	62	6,466	52				
19	3,354	33	4,126	34	3,641	36	13,340	40	12,511	56	12,356	71	2,136	72	3,341	72	5,989	62	6,477	52				
20	3,267	33	4,215	34	3,739	36	13,757	41	10,139	56	10,561	72	2,137	74	2,634	72	6,230	63	6,510	51				
21	3,732	33	5,393	35	3,877	37	13,525	41	10,288	59	10,902	71	2,181	75	3,488	73	6,146	63	6,314	51				
22	3,077	33	4,825	34	3,875	38	13,604	42	8,135	62	10,728	70	2,189	76	4,513	73	7,052	62	6,175	51				
23	3,230	32	4,533	33	3,848	38	13,602	44	6,763	62	10,680	71	2,348	77	4,454	74	7,064	62	6,458	50				
24	3,882	32	4,657	33	3,859	37	14,336	44	6,672	63	10,056	72	2,062	76	4,354	74	6,988	63	6,486	50				
25	4,055	33	4,527	33	4,933	37	13,623	43	6,735	65	10,960	73	2,095	76	4,390	76	6,949	63	6,461	51				
26	3,920	32	4,807	33	4,588	36	13,694	44	6,775	67	9,086	73	2,095	75	4,484	76	6,717	64	6,365	51				
27	3,912	32	4,403	33	5,699	36	13,577	44	7,078	68	9,181	73	2,106	75	5,550	76	6,978	65	6,287	51				
28	4,148	32	4,449	32	8,698	37	13,612	43	6,911	68	9,030	75	1,695	74	7,489	75	6,949	66	6,250	52				
29	3,953	32			8,292	38	13,755	43	7,198	68	9,001	76	1,863	73	8,678	74	7,073	67	6,546	51				
30	4,056	32			8,468	40	13,864	43	8,358	69	9,109	77	2,120	73	8,677	74	6,862	65	6,552	50				
31	3,967	32			8,647	41			8,958	71			2,177	73	7,594	74			6,288	49				
TOTAL	109,699		116,766		150,865		369,578		349,221		280,247		109,651		110,071		164,745		184,028		0		0	
AVE:	3,539	32	4,170	33	4,867	35	12,319	41	11,265	57	9,342	72	3,537	74	3,551	75	5,492	67	5,936	54	#DIV/0!	###	#DIV/0!	###
MAX.:	4,148	33	5,393	35	8,698	41	15,126	44	14,980	71	12,839	77	9,101	77	8,678	77	7,946	74	7,030	62	0	0	0	0

FIGURE 1
OU1 USGS 04084445 Fox River Appleton, WI

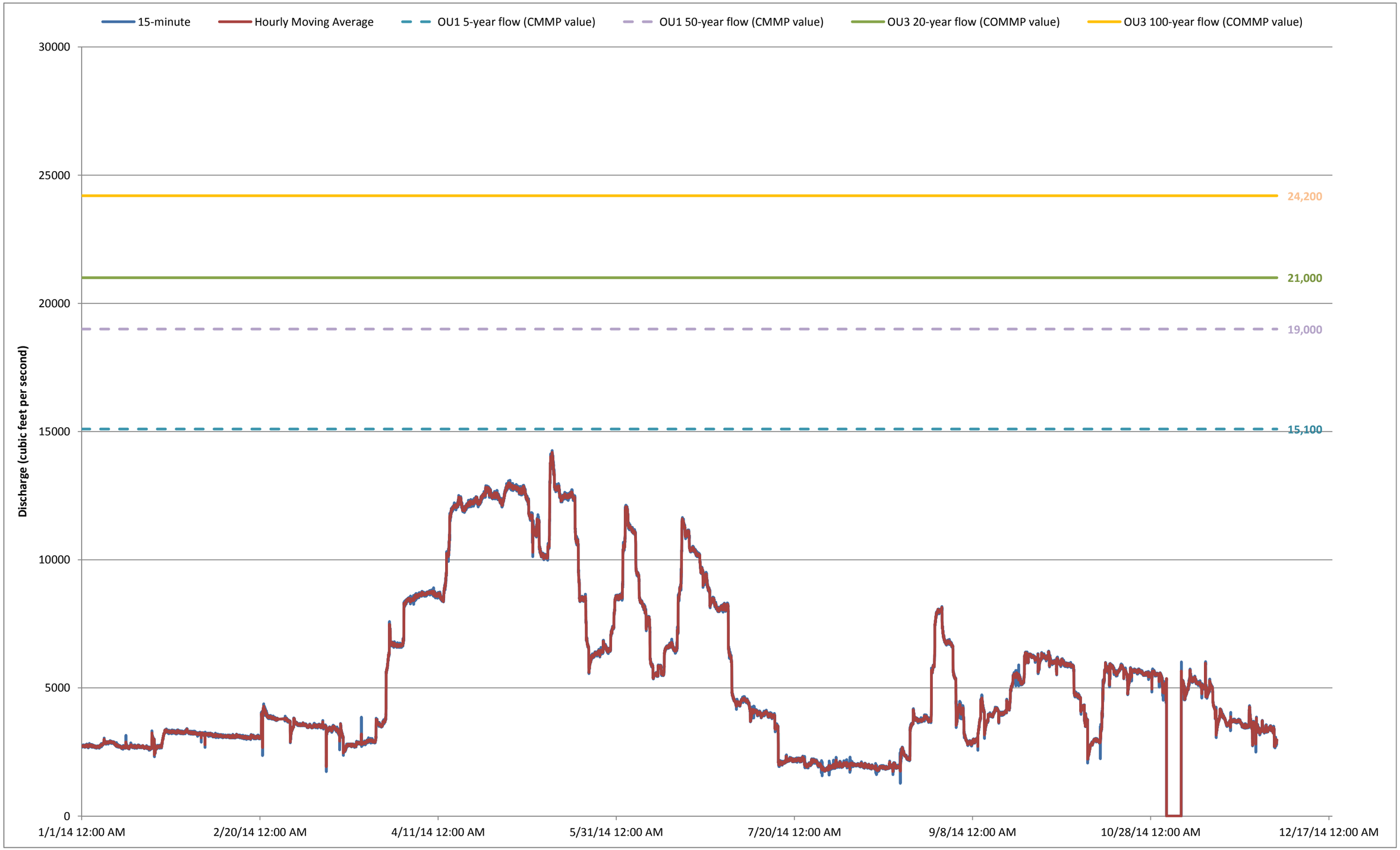


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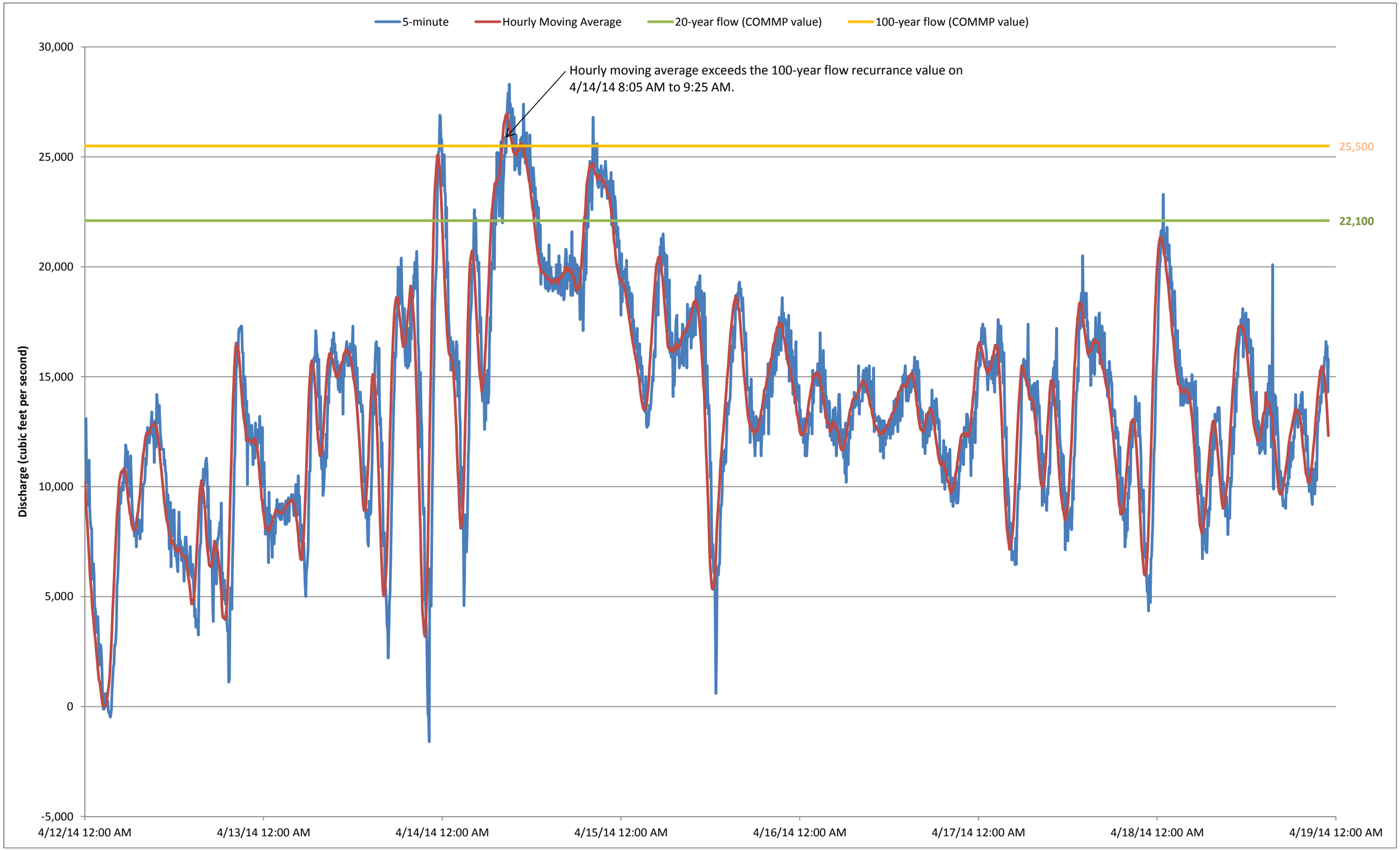
FIGURE 2

OU4 USGS 040851385 Fox River Oil Tank Depot at Green Bay, WI



X:\GB\IE\2014\14L032-00\12000 Design Data and Calcs\Stats Methods and Results\20-year flow event\USGS 040851385 FOX RIVER AT OIL TANK DEPOT AT GREEN BAY, WI Update.xlsx