

# CHATFIELD STORAGE REALLOCATION PROJECT

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## TECHNICAL ADVISORY COMMITTEE (TAC) TAC RECOMMENDATION DOCUMENT - No. 05

SUBJECT: Borrow Area Refinement Rev 03 (Signed)

Date: July 11, 2016

### Purpose:

This document serves as the basis of the TAC recommendation on the subject noted above.

### Background:

Mitigation of impacts to Chatfield Reservoir recreational and environmental features includes the relocation of State Park facilities that will require fill material. In addition, on-site environmental mitigation will also require excavation and fill. Fill materials are proposed to be acquired on-site, in part, through the development of borrow areas. Appendix 8, Borrow Area Plan, of the FR/EIS Appendix M, Recreation Facilities Modification Plan (Recreation Plan) identifies five locations for fill materials borrow within the Park (shown in pink on the attached figure). These locations have been maintained during the development of the RM1 and RM2 preliminary designs. The quantity of material being generated at each location has been refined during the design process as the needs of the project have become more defined. These refined borrow areas are subject to the USACE guidance document entitled, Engineering and Design Land Development Guidance at Corps Reservoir Projects, NWDR 1110-2-5, dated April 30, 2004, which specify that cut and fill quantities are to be balanced within defined elevation zones of a Corps-owned and operated reservoir and that cuts are to be made at a lower elevation than the proposed fill location within a zone. In accordance with this guidance, the USACE has specified Chatfield Reservoir elevation zones in which cut/fill will need to be balanced and fill placed higher than the cut from which it originated, including:

- The CSRP Fluctuation Zone, also known as the joint use zone since it can be used for both water supply and flood storage, from el. 5,432 to 5,444 ft-mean sea level (msl);
- The USACE Flood Control Zone from el. 5,444 to 5,500 ft-msl;
- The dam overflow zone from the spillway invert to the dam crest, el. 5,500 to 5,521.6 ft-msl.

With the exception of portions of Borrow Areas 3 and the lower part of Borrow Area 5 that are located in the Fluctuation Zone, all the remaining borrow area locations identified in the Recreation Plan to be used in RM2's preliminary design to generate fill material are located within the Flood

Control Zone. Therefore, fill material excavated from these locations will be used in the relocation of recreation facilities above el. 5,444 ft-msl.

Due to the existing topography of Borrow Area 3 and the lower part of Borrow Area 5 in the Fluctuation Zone, they provide reasonable locations to generate material to be used in that zone. However, quantities of cut material from these borrow areas may not be sufficient to fulfill Fluctuation Zone fill requirements. To try to meet all fill requirements from just Borrow Area 3 and the lower part of Borrow Area 5 could result in deep cuts that would have an adverse impact on Park landscape aesthetics.

During preliminary design, it was recognized that additional environmental mitigation and on-site EFU lift could be obtained by locating Borrow Areas adjacent to the South Platte River and Plum Creek riparian zones that upon excavation can be reclaimed as Preble's meadow jumping mouse habitat. This is particularly true for parts of Borrow Area 4 and the upper part of Borrow Area 5. Locating parts of these borrow areas adjacent to the South Platte River and Plum Creek will not only provide mitigation opportunities but also preserve high quality upland grasslands and protect important upland habitat. Both of these current borrow areas include native upland grasslands. In addition, upper Borrow Area 5 also supports a black-tailed prairie dog colony and is potential nesting habitat for the western burrowing owl, a Federal species of conservation concern and listed by the State of Colorado as threatened. Furthermore, relocating a portion of Borrow Area 4 and all of the upper part of Borrow Area 5 will provide RM2 with a greater ability to meet the USACE land use cut/fill guidance.

The EM2 preliminary design has identified two locations that can generate fill material for use by RM1 and RM2 in the flood control zone, while providing additional opportunity for on-site environmental mitigation, referred to as EM2 Borrow Areas 4 and 5 and shown in yellow on the attached figure; EM2 Borrow Area 4 is adjacent to the South Platte River riparian zone, while EM2 Borrow Area 5 is adjacent to the Plum Creek riparian zone. Muller Engineering Company's June 21, 2016 Borrow Area Memorandum includes attached figures that identify these locations. Both areas are located in upland areas. However, these potential EM2 borrow areas lack the native grassland species diversity; consisting largely of smooth brome, an imported, non-native grass species used for grazing and hay production. In addition, the EM2 Borrow Area 5 proposed location will have no impact on the black-tailed prairie dog colony or western burrowing owl nesting habitat.

### Referenced Documents (attached):

Existing and proposed borrow areas from Muller Engineering Company, TAC Meeting 3 borrow area presentation, June 30, 2016

Muller Engineering Company memorandum, Earthwork Borrow Areas for Chatfield Reallocation Project, dated June 21, 2016

### Requested Action:

The TAC is requested to accept the refined borrow locations 4 and 5 as proposed in the Muller Engineering Company's June 21, 2016 memorandum.

**Requested Rationale:**

EM2's proposed Borrow Areas 4 and 5 provide an opportunity to generate additional onsite EFU credits in areas with lesser uplands habitat value and no impact to upland wildlife habitat. In addition, revegetation and restoration of the current Borrow Areas 4 and 5 locations would likely be more difficult than EM2's proposed borrow area locations due to the loose, dry, sandy soils in the current locations. Due to their location close to roads and high use areas, current Borrow Areas 4 and 5 would be much more visible to park visitors than EM2's proposed borrow area locations adjacent to Plum Creek and the South Platte River. In addition, the areas proposed by EM2 provide greater ability to meet USACE cut/fill guidance within the Fluctuation Zone. It is anticipated at this time that the proposed refinements in Borrow Area 4 and 5 locations will not result in an increase in on-site areal disturbance. Although not expected to occur at this time, RM2, requests flexibility to use a portion of the current Borrow Area 4, should additional borrow material be required for fill in the Flood Control Zone. There is no intent at this time to utilize the current upper Borrow Area 5 location due to its encroachment on the prairie dog colony.

**TAC Recommendation:**

The TAC recommends adjustment of Borrow Area 4 and the upper part of Borrow Area 5 locations to reflect EM2 recommendations. The TAC further recommends that portions of the current Borrow Area 4 be retained if additional fill material is needed within the Flood Control Zone.

**TAC Voting**

The TAC members in attendance voted on this Recommendation, in accordance with the TAC Charter Section C. The vote tally was 12 votes to "agree"; 0 votes to "accept"; and 0 votes to "reject" the Recommendation. The recommendation is based on the total votes for "agree" and "accept". TAC adopted voting procedures also require that any Member voting to "reject" a recommendation to propose alternative(s) for consideration to move the issue forward.

**TAC Rationale:**

The proposed Borrow Areas 4 and 5 provide an opportunity to generate additional onsite EFU credits in areas with lesser uplands habitat value and no impact to upland wildlife habitat. In addition, revegetation and restoration of the current Borrow Areas 4 and 5 locations would likely be more difficult than the proposed borrow areas. Due to their location close to roads and high use areas, current Borrow Areas 4 and 5 would be more visible to Park visitors than the proposed borrow area locations. In addition, the proposed areas provide greater ability to meet USACE cut/fill guidance within the Fluctuation Zone. It is anticipated at this time that the proposed refinements in Borrow Area 4 and 5 locations will not result in an increase in on-site areal disturbance. The designer requests flexibility to use a portion of the current Borrow Area 4, should additional borrow material be required for fill in the Flood Control Zone. Upper Borrow Area 5 will not be used due to its encroachment on a prairie dog colony.

On behalf of the TAC:



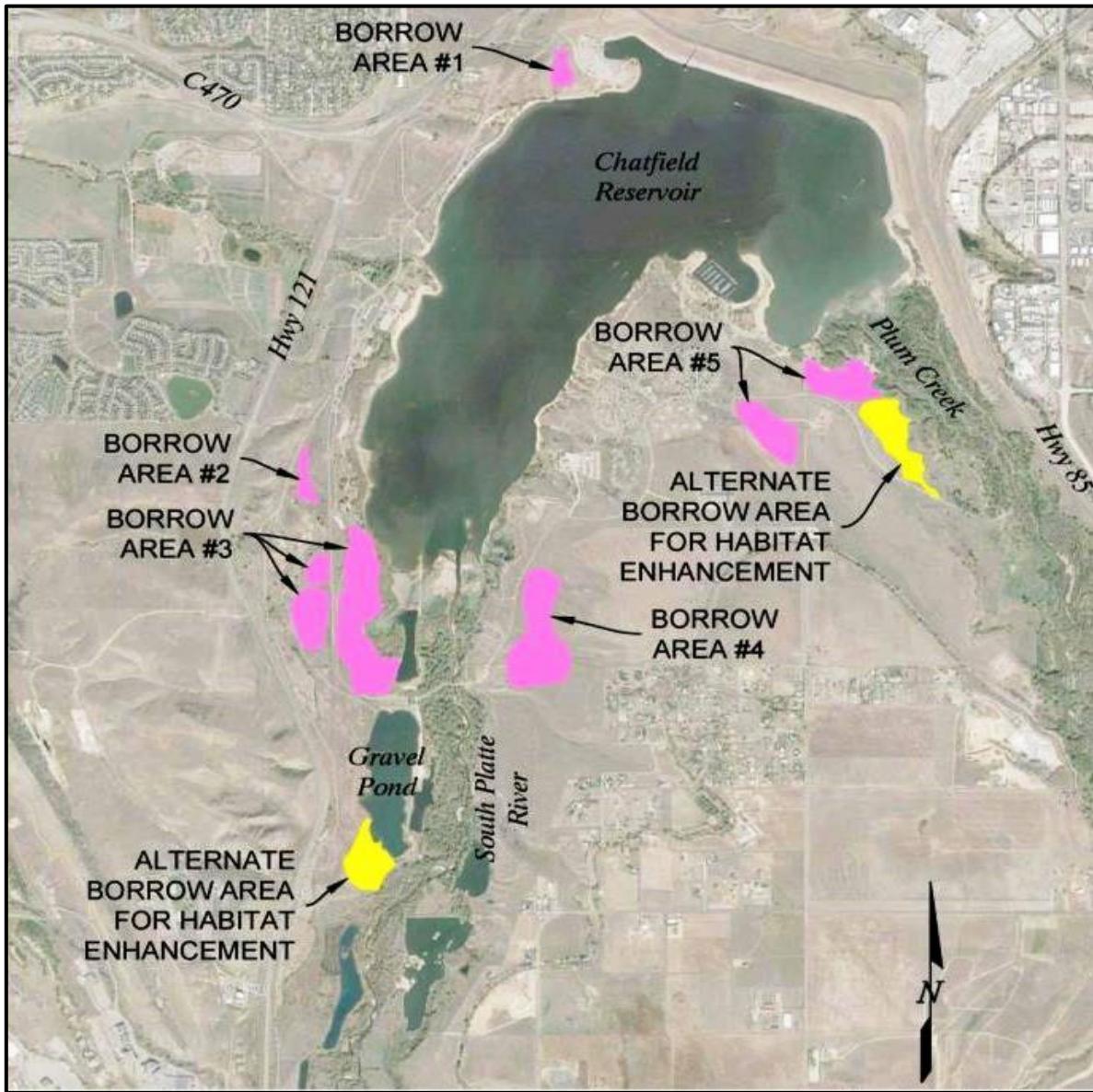
Kevin Urie  
Chair



Jennifer Anderson  
Vice-Chair

## Referenced Documents

Existing and proposed borrow areas from Muller Engineering Company, TAC Meeting 3 borrow area presentation, June 30, 2016



Muller Engineering Company memorandum, Earthwork Borrow Areas for Chatfield Reallocation Project, dated June 21, 2016



## MEMORANDUM

**Project:** Chatfield Storage Reallocation Project

**To:** Barbara Biggs, Program Manager, CDM Smith  
Steve Lowry, Program Manager, CDM Smith

**CC:** Ted Johnson, CDM Smith  
Brian Murphy, CDM Smith

**From:** Tracy Bolger, Muller Engineering Company (EM2)  
Jim Wulliman, Muller Engineering Company (EM2)

**Date:** June 21, 2016

**Subject:** Earthwork Borrow Areas for Chatfield Reallocation Project

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This memorandum provides a discussion of opportunities to coordinate earthwork borrow areas for use in the reconstruction of recreation facilities (marina, access roads, swim beach, etc.) for the Chatfield Reallocation Project. It may be that providing borrow material from areas adjacent to the EM2 work will provide greater benefits, including greater habitat enhancement, than generating the borrow from areas disconnected from the EM2 work.

### **BACKGROUND**

Appendix M of the Chatfield Reservoir Storage Reallocation FR-EIS (July 2013) consists of a document entitled *Chatfield Reservoir Recreation Facilities Modification Plan*, prepared by EDAW and AECOM and dated January 2010 (herein referred to as the Recreation Plan). This document summarizes the results of a study conducted to determine opportunities and costs associated with the modification of recreation facilities to accommodate an increased water level in Chatfield Reservoir as a result of the Chatfield Storage Reallocation Project.

Appendix 8 of the Recreation Plan identifies five locations for earthwork borrow around the perimeter of Chatfield. A copy of the borrow area map from the Recreation Plan is included at the end of this memo. For preliminary design, the recreation consultants (RM1 and RM2) have maintained the locations of the borrow areas as defined in the Recreation Plan. The quantity of material being generated at each location has been refined as part of the preliminary design process to meet the needs of the project. Borrow Areas 3 and 5 are the main source of fill material to be used within the joint use pool (elevation 5432 to 5444). These areas have a mitigation component which is included as part of EM2's preliminary design. The intent of the on-site mitigation at these two borrow locations is to enhance habitat and generate EFU credits within the joint use pool (also known as the fluctuation zone).

With the exception of the fluctuation zone portion (5432-5444) of Borrow Areas 3 and 5, all borrow areas identified in the Recreation Plan are used in RM2's preliminary design to generate material for the flood

control zone of Chatfield Reservoir (5444 and above). Material excavated from these locations are used in the preliminary design of recreation facilities above the 5444 elevation.

As the Chatfield Reallocation Project progresses from preliminary to final design, it is important to take a closer look at the proposed borrow pit locations and determine the economic and ecological benefit of using the identified locations. Due to the existing topography adjacent to the Reservoir, Borrow Areas 3 and 5 provide reasonable locations to generate material for the joint use zone (5432 to 5444). Opportunities may exist to reduce and/or replace borrow areas located in the flood control zone (5444 and above). Borrow Areas of particular interest are 4 and 5; relocating these borrow areas to locations adjacent to Plum Creek and S. Platte Creek provide opportunities for on-site environmental mitigation while generating EFU credit for the benefit of the project.

### **DESCRIPTION OF BORROW AREAS 4 AND 5 SHOWN IN RECREATION PLAN**

Borrow Area 4 is located on a plateau above the South Platte River floodplain. It is generally a flat grassland. Based on historic aerial imagery, the area was cultivated prior to construction of the dam and development of Chatfield State Park. Most of the plateau was reclaimed as native grasslands and vegetation in the borrow pit area is currently dominated by sand dropseed (*Sporobolus cryptandrus*). Other species include common mullein (*Verbascum thapsus*), cheatgrass (*Bromus tectorum*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and plains prickly pear cactus (*Opuntia polyacantha*). The soil surface is very sandy and loose. Although weedy species are present, the grassland community has a strong native component and likely provides habitat for a variety of ground-nesting birds and small mammals.

Borrow Area 5 is also located on the plateau on the Plum Creek side. This area is generally flat but includes parts of an upper terrace and a slope down to, and parts of, a lower terrace. Historic aerial imagery indicates that this area was also used for agriculture and appears to have been irrigated pasture. It was reclaimed to a native grassland and is now dominated by blue grama (*Bouteloua gracilis*). Other species present include cheatgrass, sideoats grama (*Bouteloua curtipendula*), buffalograss (*Buchloe dactyloides*), alyssum (*Alyssum minus*), and rubber rabbitbrush. The area also includes part of a black-tailed prairie dog colony, the majority of which is west of the road. The colony provides potential nesting habitat for western burrowing owl (*Athene cunicularia*).

### **DESCRIPTION OF ALTERNATIVE EM2 BORROW AREAS**

The EM2 preliminary design plans identify two locations that have opportunities to generate fill material for use by RM1 and RM2 in the flood control zone (5444 and above) while providing a location for on-site environmental mitigation (herein referred to as EM2's Borrow Sites). Attached to this memo are two plan sheets from EM2's preliminary design plans that identify these locations by yellow outline (one along Plum Creek and one along S. Platte River).

EM2's Borrow Sites are located on generally flat, relict flood terraces above the South Platte River and Plum Creek. As with Borrow Areas 4 and 5, prior to development of Chatfield State Park, these sites were used for agricultural purposes and were cultivated and irrigated. Unlike Borrow Areas 4 and 5, reclamation of EM2's Borrow Sites has resulted in grasslands dominated by the introduced pasture grass smooth brome (*Bromus inermis*). Plant species diversity in these areas is quite low.



## **ECOLOGICAL COMPARISON OF BORROW AREAS**

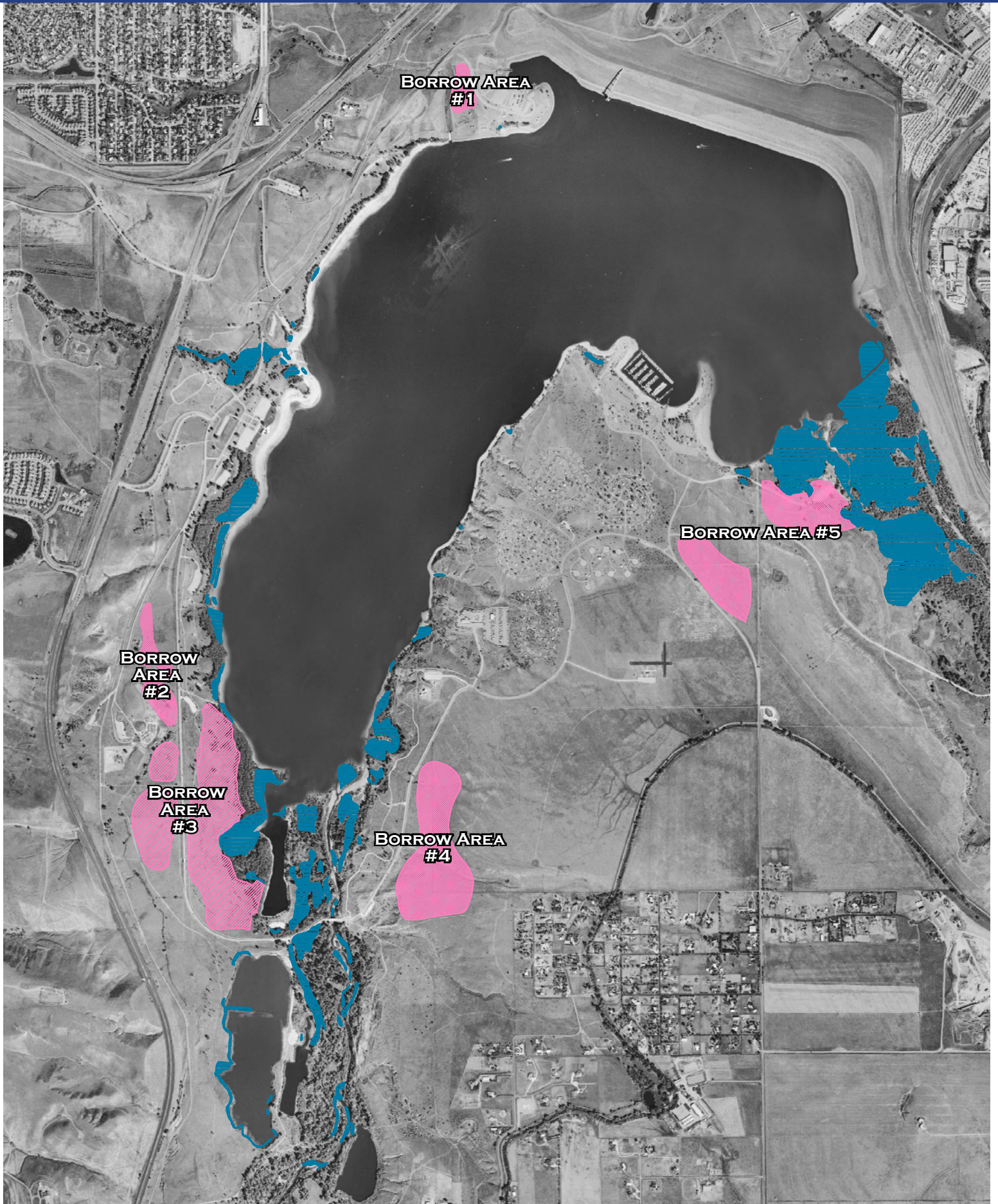
Borrow Areas 4 and 5 and EM2's Borrow Sites are similar in that they occur on flat terraces or plateaus, were previously used for agriculture, and were reclaimed as upland grasslands. That said, whether because of soils, species used for reclamation, or other reasons, the areas differ in plant community composition. Borrow Areas 4 and 5 have more native species and have more species diversity than EM2's Borrow Sites.

The ecological value of Borrow Areas 4 and 5 and EM2's Borrow Sites are fairly comparable in that they are upland grasslands located on high terraces near active river floodplains. The value Borrow Areas 4 and 5 is slightly higher due to the more diverse and native character of the vegetation and the presence of active black-tailed prairie dog burrows in Borrow Area 5.

## **CONCLUSIONS**

Moving forward into final design, EM2's Borrow Sites provide an opportunity to generate additional onsite mitigation areas with contiguous riparian habitat and a potential for EFU lift. Borrow Areas 4 and 5 create a disturbance footprint to upland grasslands with no EFU lift. Additionally, attempting to revegetate Borrow Areas 4 and 5 would likely be more difficult than EM2's Borrow Sites because of the loose, dry, sandy soils. Due to their location close to roads and high use areas, Borrow Areas 4 and 5 would be much more visible to park users than EM2's Borrow Sites which are located along the Plum Creek and S. Platte channel corridors.

In addition to the two borrow locations identified in EM2's preliminary design plans, opportunities exist to generate fill material in conjunction with onsite environmental mitigation further upstream along both Plum Creek and the South Platte River. The challenge with using these locations is meeting the requirements set forth in the Corps of Engineers *Land Development Guidance at Corps Reservoir Projects* (NWDR 1110-2-5). The Corps Land Development Document states that any fill volume placed in the flood control pool must "balanced" by an equivalent cut volume at or below the fill volume. RM1 and RM2's fill needs end at approximately 5454. Per the Corps Land Development Document, all cut material must occur at or below 5454. Most additional areas (beyond EM2's Borrow Sites mentioned above) that would provide both borrow material for RM1/RM2 and onsite mitigation opportunities are located above the 5454 elevation.



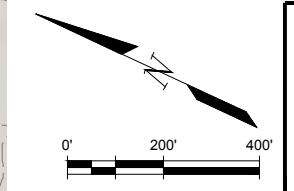
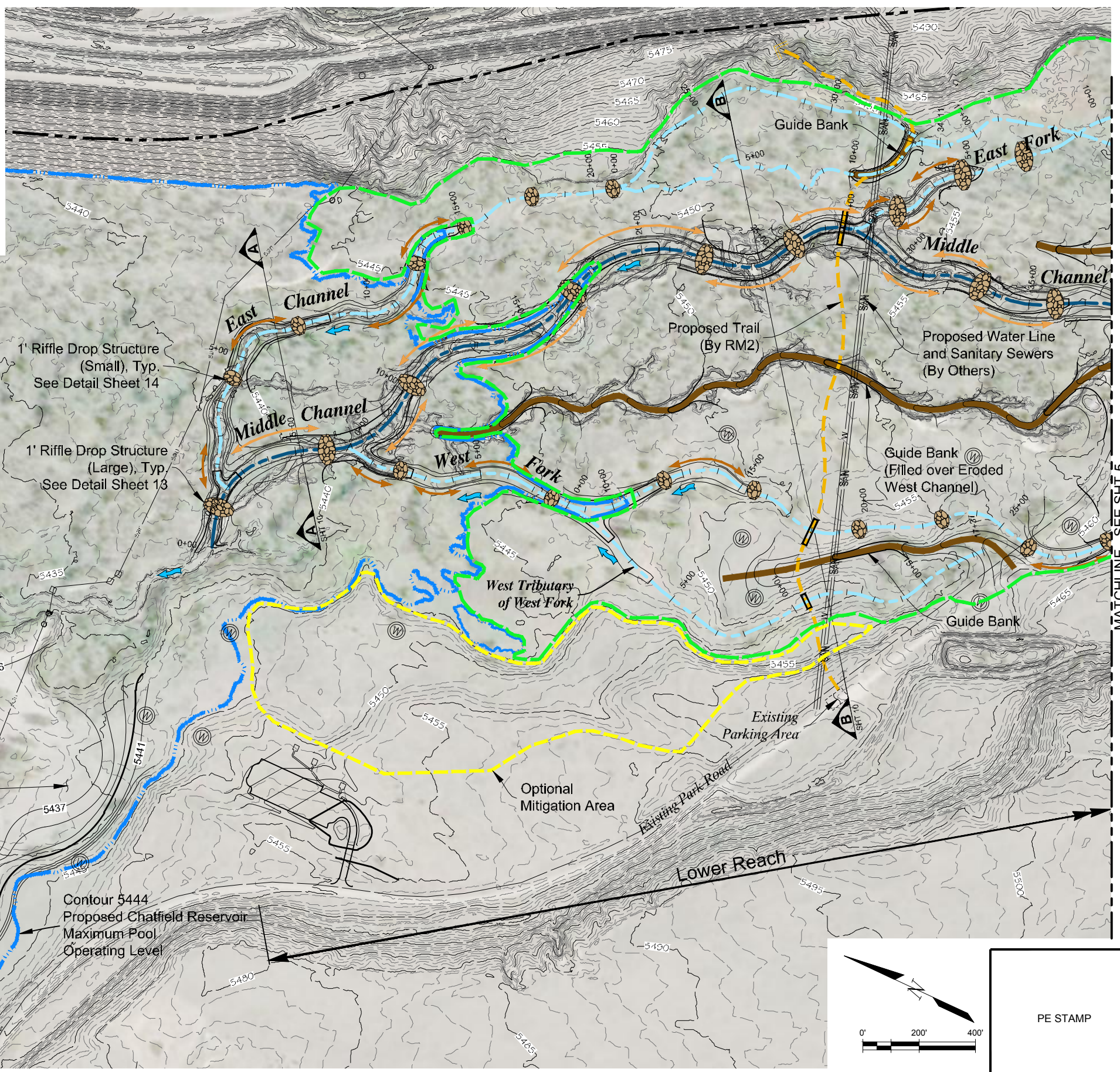
OVERALL BORROW AREA LOCATION MAP



- MAIN CHANNEL PROPOSED ALIGNMENT
- SECONDARY CHANNEL PROPOSED ALIGNMENT
- PROPOSED RIFFLE DROP STRUCTURE (LARGE)
- PROPOSED RIFFLE DROP STRUCTURE (SMALL)
- BANK PROTECTION 1 & 3
- BANK PROTECTION 4

- LEGEND**
- CONTOUR 5444
  - PROPOSED MAINTENANCE TRAIL (BY OTHERS)
  - PROPOSED MAINTENANCE TRAIL CROSSING (BY OTHERS)
  - PROPOSED GUIDE BANK
  - EFU MITIGATION BOUNDARY
  - OPTIONAL EFU MITIGATION AREA

**NOTE:** ALL DISTURBED BANKS OUTSIDE THE EXTENTS OF BP 1, 3, & 4 WILL BE PROTECTED WITH BP 2 AND BP 5.



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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: SAR  
 DRAWN BY: JHK  
 SHEET CHK'D BY: JPJ  
 CROSS CHK'D BY: DDJ  
 APPROVED BY: DDJ  
 DATE: JUNE 17, 2016

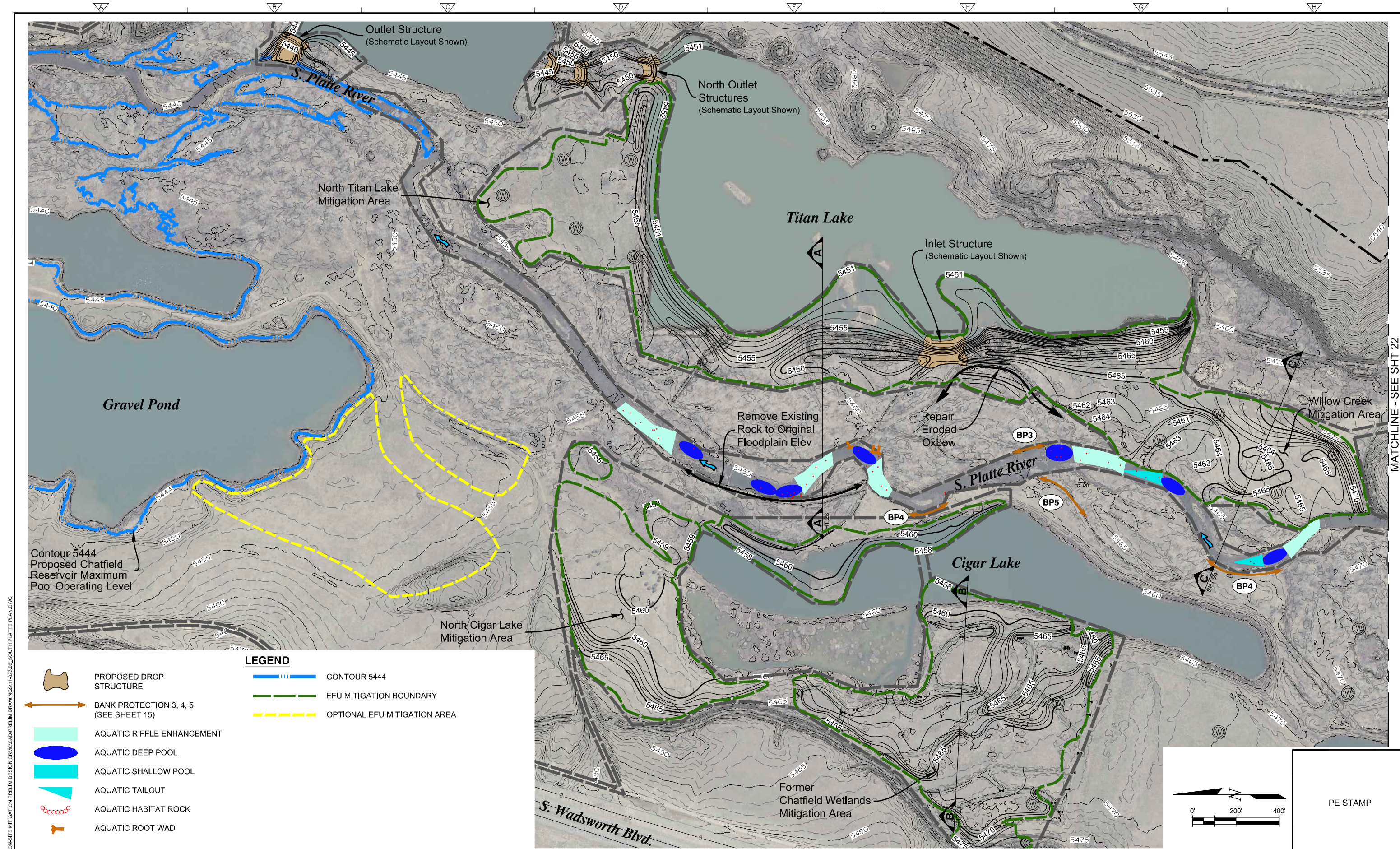


CHATFIELD RESERVOIR MITIGATION COMPANY  
 CHATFIELD STORAGE REALLOCATION PROJECT  
 EM2 - ONSITE ENVIRONMENTAL MITIGATION

PLUM CREEK MITIGATION  
 GRADING PLAN

PROJECT NO. 11-023.06  
 FILE NAME:  
 SHEET NO. 4





**LEGEND**

- PROPOSED DROP STRUCTURE
- BANK PROTECTION 3, 4, 5 (SEE SHEET 15)
- AQUATIC RIFFLE ENHANCEMENT
- AQUATIC DEEP POOL
- AQUATIC SHALLOW POOL
- AQUATIC TAILOUT
- AQUATIC HABITAT ROCK
- AQUATIC ROOT WAD
- CONTOUR 5444
- EFU MITIGATION BOUNDARY
- OPTIONAL EFU MITIGATION AREA

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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: TAB  
 DRAWN BY: JHK  
 SHEET CHK'D BY: TAB  
 CROSS CHK'D BY:  
 APPROVED BY: DDJ  
 DATE: JUNE 17, 2016

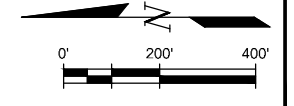
**MULLER**  
 ENGINEERING COMPANY  
 777 S. WADSWORTH BLVD. 4-100  
 LAKEWOOD, COLORADO 80226

CHATFIELD RESERVOIR MITIGATION COMPANY  
**CHATFIELD STORAGE REALLOCATION PROJECT**  
 EM2 - ONSITE ENVIRONMENTAL MITIGATION

SOUTH PLATTE MITIGATION  
**GRADING PLAN**

PROJECT NO. 11-023.06  
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 SHEET NO.  
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