Final

Revised Work Plan Addendum

Abandon and Plug Artesian Wells #68 and #69
Fort Wingate Depot Activity,
McKinley County, New Mexico

Contract Number: W912PP21C0025

Submitted to:

United States Army Corps of Engineers
Albuquerque District
4101 Jefferson Plaza Northeast
Albuquerque, New Mexico 87109

Prepared for:

Base Realignment and Closure Division

March 2023

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REPORT DOCUMENTATION PAGE

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Huntsville, AL 35808

8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

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U.S. Army Corps of Engineers, Albuquerque District
4101 Jefferson Plaza NE
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Project Manager: Alan Soicher, PG (CESPA)

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USACE

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Unlimited.

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N/A

14. ABSTRACT
This Revised Work Plan Addendum accompanies the Final Work Plan to Abandon and Plug Artesian Wells #68 and #69 at Fort Wingate Depot Activity, McKinley County, New Mexico. Based on downhole video surveys performed in October 2022, additional activities are required to complete the abandonment and plugging process for artesian wells #68 and #69 at Fort Wingate Activity Depot, McKinley County, New Mexico.

15. SUBJECT TERMS
Fort Wingate Depot Activity, Abandon and Plug Artesian Wells #68 and #69.

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Alan Soicher, PG
U	U	U	SAR	23	**19b. TELEPHONE NUMBER (*Include area code*)** (817) 789-0453

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

API	American Petroleum Institute
ASTM	American Society of Testing of Materials
bgs	below ground surface
BRAC	Base Realignment and Closure
CESPA	U.S. Army Corps of Engineers, Albuquerque District
DAWSON	Dawson Solutions, LLC
ft	Feet
FWDA	Fort Wingate Depot Activity
Layne	Layne, A Granite Company
NMOSE	New Mexico Office of the State Engineer
TD	Total Depth
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION

This Revised Work Plan Addendum accompanies the Final Work Plan for Abandonment and Plugging of Artesian Wells #68 and #69 at the Fort Wingate Depot Activity (FWDA) in McKinley County (DAWSON, 2022) in support of the Base Realignment and Closure (BRAC) Division under the guidance of the U.S. Army Corps of Engineers (USACE), Albuquerque District (CESPA), Contract Number W912PP21C0025. Dawson Solutions, LLC (DAWSON) completed a condition assessment of both wells in October 2022. Observed conditions differ from those described in previous documents and require modification of procedures described in the approved Final Work Plan. The proposed revised approach required to address the differing site conditions along with additional technical concerns raised by the USACE in recent communications are provided herein.

1.1 PURPOSE AND SCOPE

The objective of this task order is to abandon and plug artesian Wells #68 and #69 at FWDA with no safety incidents in compliance with regulatory requirements, achieving regulatory approval from the New Mexico Office of the State Engineer (NMOSE). This Revised Work Plan Addendum outlines additional activities required for abandonment and plugging of artesian Wells #68 and #69 at FWDA based on downhole video surveys performed in October 2022.

2.0 DESCRIPTION OF WORK

During the initial condition assessments in October 2022, downhole video surveys showed significant scaling on the inside casings of Wells #68 and #69, preventing collection of the cement bond logs. In addition, the downhole surveys identified obstructions in both wells which prevented the equipment from accessing the total well depths. Figures 1 and 2 include photographs of the well condition assessments from the downhole survey.

DAWSON will contact the NMOSE to update the Well Plugging Plan of Operations with the following procedures. NMOSE has previously indicated that a new plan submittal is not required. DAWSON can provide email notification of the new procedures and NMOSE will update the existing plan prior to issuing approval.

2.1 PERFORATION ZONES AND RATIONALE

DAWSON will perforate both wells from a depth of 500 feet (ft) below ground surface (bgs) to a depth of 750 ft bgs as discussed with USACE. Figures 3 and 4 show the perforation zones for wells 68 and 69, respectively. Perforations will also be installed from 0 to 100 feet below ground surface. A geologic cross-section of the administrative area was included as Figure 2-3.5B in the *Final Northern Area Groundwater RCRA Facility Investigation Report* prepared by HDR in December 2022 and is included as Figure 5 of this Revised Work Plan Addendum. The cross-section indicates that the Sandstone of the Painted Desert Member of the Petrified Forest Formation underlies the alluvium in the administrative area at a depth of approximately 180 to 220 ft bgs. This unit is not depicted on the well construction logs. This bedrock unit is described as sandstone with interbedded sandstone and siltstone. It has been noted that where the saturated sandstone unit is overlain by mudstone/claystone, groundwater becomes confined and the potentiometric surface elevation in bedrock is higher than the water table elevation of the overlying unconfined alluvial aquifer (HDR, 2022). Installing perforations at the surface will help ensure that there is no leaking from the sandstone unit through the annular seal to the surface.

2.2 ABANDONMENT AND PLUGGING PROCESS

To complete the well abandonment, the following tasks will be performed:

WELL 68

1. A four-person team will remove and dispose of the well covering.

2. Prior to commencing well decommissioning operations, accumulated water in the cistern will be pumped out and discharged to the concrete swale on Palomino Drive to maximize storage capacity in the cistern.

3. Using a wire brush assembly on a 5.5-inch outer-diameter reverse circulation drill pipe, DAWSON subcontractor, Layne Christensen (Layne) will simultaneously

brush and airlift within the 500 to 750-foot depth intervals. The removed sediment and water will flow to a baffled holding tank prior to discharge to Palomino Drive.

4. Layne will lower tooling to the obstruction at 760 feet bgs (see Figure 1) and complete a TV survey to determine its orientation and identify appropriate fishing tools.

5. Attempts will be made to remove the obstruction from Well #68 using grapples and/or spears. Recovery operations will cease after 20 hours or if loss of equipment is a significant risk.

6. If the obstruction is removed, repeat step 3 to brush the inside casing and remove sediment to the bottom of the well (1,215 feet bgs). If the obstruction is not removed, proceed to Step 7.

    a. Install tremie to the bottom of the well, using a pressure control head to stop the upward flow of water. Pump ASTM Type I/II or API Class C cement from total depth (TD) to approximately 850’ bgs and trip back the tremie pipe. The type of cement used will be based on NMOSE approval. Hold pressure on cement for four hours. Trip the tooling out of well.

7. Using a star wheel perforator and the RD20 rig, Layne will perforate the well casing from 500 to 750 feet bgs (see Figure 3). Layne has allocated 250 feet of perforations (i.e., four passes of the perforator over each 250-foot interval). Layne will then perforate the casing from 0 to 100 feet bgs.

    a. A bridge plug or packer will be installed at 500 ft bgs and ASTM Type I/II or API Class C cement will be pumped via tremie and an oilfield cement pump until the pressure reaches approximately 500 psi. The tremie will then be disconnected and cement will be pumped to surface.
    b. Cementitious water will be diverted to the nearby cistern for settling and discharged to Palomino Drive. Once grouting operations begin, water will not be discharged directly to the ground and will instead be diverted to the cistern. If needed, the cistern will first be dewatered by pumping to create capacity. The amount of water in the cistern will be managed and the pH of the water discharged during grouting will be neutralized with water already in the cistern. A pH meter will be on-site to collect field measurements of water discharged from grouting operations. A pH neutralizer will be available on site and may be used if pH remains too high (above 8) after mixing with water in the cistern.

8. The grout volume used in the well will be compared to the anticipated volume of 24 cubic yards based on the volume inside the casing. If needed, the well will be topped off with grout after removing the plug, tremie line, and any other tooling.

9. DAWSON will remove the well vault using a backhoe and transport the material for off-site disposal as construction waste; the former well vault void will be backfilled with clean fill from an off-site source.

WELL 69

1. A four-person team will remove and dispose of the well covering.

2. Prior to commencing well decommissioning operations, accumulated water in the cistern will be pumped out and discharged to the concrete swale on Palomino Drive to maximize storage capacity in the cistern.

3. Using a wire brush assembly on a 5.5-inch outer-diameter reverse circulation drill pipe, DAWSON will simultaneously brush and airlift within 500 to 750-foot, and as required to pass tooling through the well to the top of the obstruction at 893 ft bgs. The removed sediment and water will flow to a baffled holding tank prior to discharge to Palomino Drive.

4. Layne will lower tooling to the obstruction at 893 feet and complete a TV survey to determine its orientation and identify appropriate fishing tools.

5. Attempts will be made to remove the obstruction from Well #68 using grapples and/or spears. Recovery operations will cease after 20 hours or if loss of equipment is a significant risk.

6. If the obstruction is removed, repeat step 3 to clean casing and remove sediment to the bottom of the well (1,350 ft bgs). If the obstruction is not removed, proceed to Step 7.

    a. Install tremie to bottom, using a pressure control head to stop the flow. Pump ASTM Type I/II or API Class C cement from TD to approximately 850’ and trip back tremie pipe. Hold pressure on cement for 4 hours. Trip tooling out of hole.

7. Using a star wheel perforator, the RD20 rig will perforate the well casing from 500 to 750 feet. Layne has allocated 250 feet of perforations (i.e., four passes of the perforator over each 250-foot interval). The casing will then be perforated from 0 to 100 feet bgs.

    a. A bridge plug or packer will be installed at approximately 500 ft bgs and ASTM Type I/II or API Class C cement will be pumped via tremie and an oilfield cement pump until the pressure reaches 500 psi. The tremie will then be disconnected and cement will be pumped to surface.

    b. Cementitious water will be diverted to the nearby cistern for settling and discharged to Palomino Drive. Once grouting operations begin, water will not be discharged directly to the ground and will instead be diverted to the cistern. If needed, the cistern will first be pumped to create

capacity. The amount of water in the cistern will be managed and the pH of the water discharged during grouting will be neutralized with water already in the cistern. A pH meter will be on-site to collect field measurements of water discharged from grouting operations. A pH neutralizer will be available on site and may be used if pH remains too high (above 8) after mixing with water in the cistern.

8. The grout volume used in the well will be compared to the anticipated volume of 24 cubic yards based on the volume inside the casing. If needed, the well will be topped off with grout after removing the plug, tremie line, and any other tooling.

9. DAWSON will remove the well vault using a backhoe and transport the material for off-site disposal as construction waste; the former well vault void will be backfilled with clean fill from an off-site source.

The following activities will be communicated, via telephone, as follows:

- Obstruction removal efforts for Wells #68 and #69 - If removal of the obstructions is not successful, DAWSON will notify the USACE Project Manager, seek to obtain their confirmation of notification, and continue the abandonment process, as described above.
- DAWSON will notify the USACE Project Manager immediately of any issues with implementation or deviations of the processes described herein are encountered.

3.0 REFERENCES

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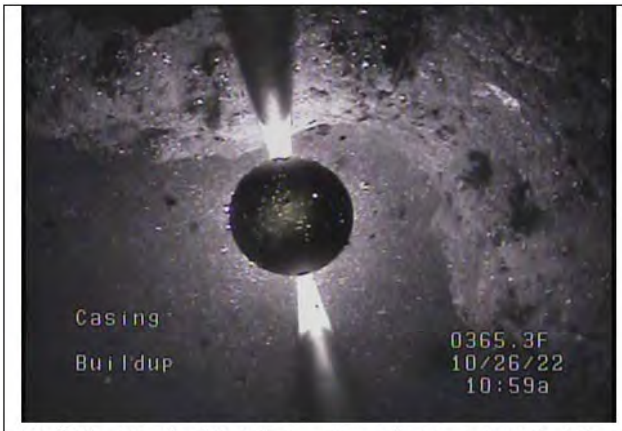
FIGURES

FIGURE 1

Well 68 – Depth of 147 feet, note casing scaling

Well 68 – Depth of 760 feet, image of conical, scaled obstruction

FIGURE 2

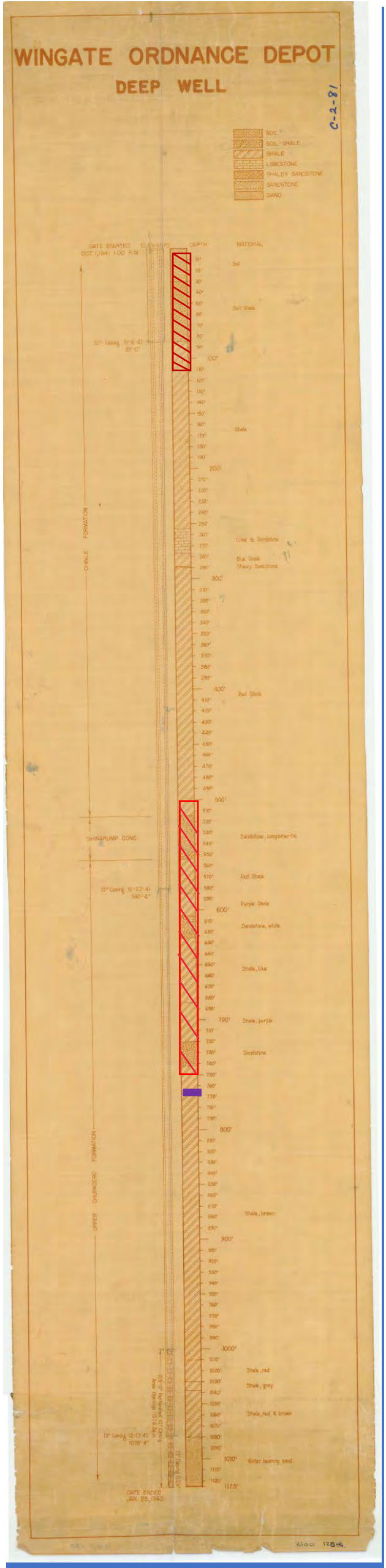


Well 69 – Depth of 365 feet, note scaling to extent that the casing is not visible and appears constricted.

Well 69 – Depth of 431 feet, note poor visibility

FIGURE 3

WELL 68 PROPOSED PERFORATION ZONES

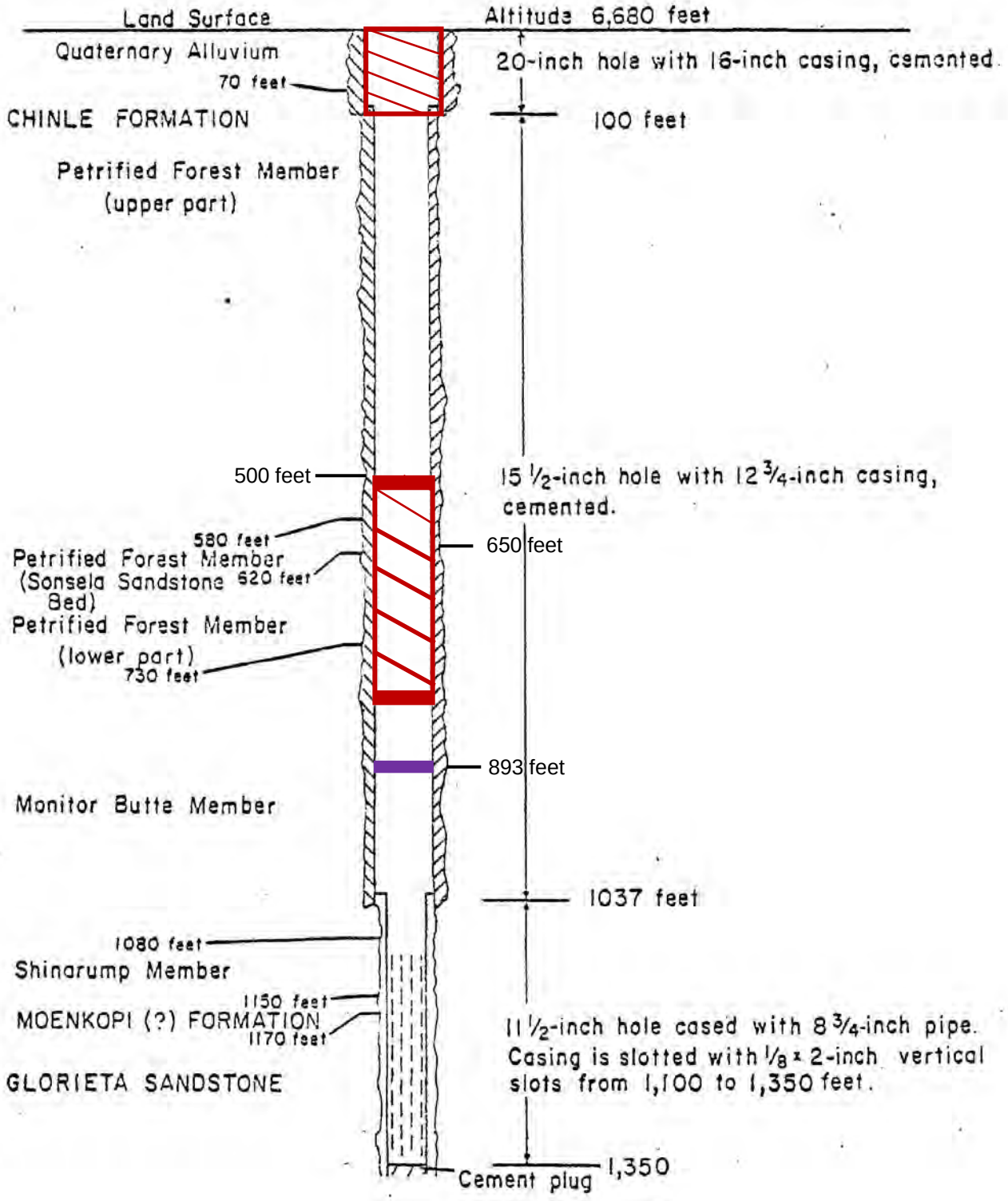


Key

- Well Casing Perforations
- Obstruction

FIGURE 4

WELL 69 PROPOSED PERFORATION ZONES



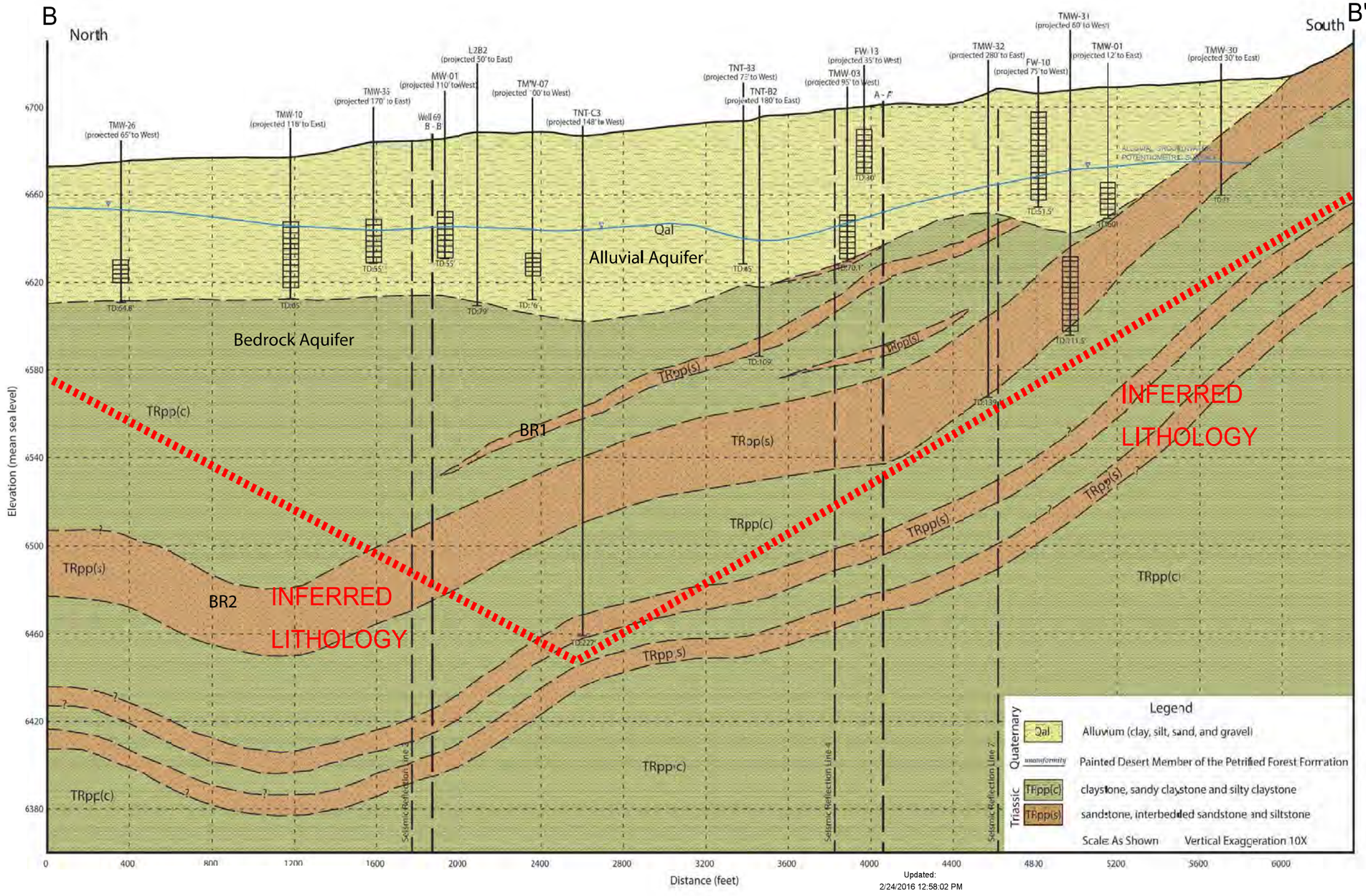
Key

Well Casing Perforations

Obstruction

FIGURE 5

GEOLOGIC CROSS-SECTION (FIGURE 2-3.5B FROM THE FINAL NORTHERN AREA GROUNDWATER RCRA FACILITY INVESTIGATION REPORT, HDR, 2022)



Notes

FWDA = Fort Wingate Depot Activity
RFI = RCRA Facility Investigation

Data generated by:
AMEC Environment & Infrastructure, Inc.

Figure **2-3.5b**

Cross Section B to B'

Northern Area Groundwater RFI

Fort Wingate Depot Activity
McKinley County, New Mexico

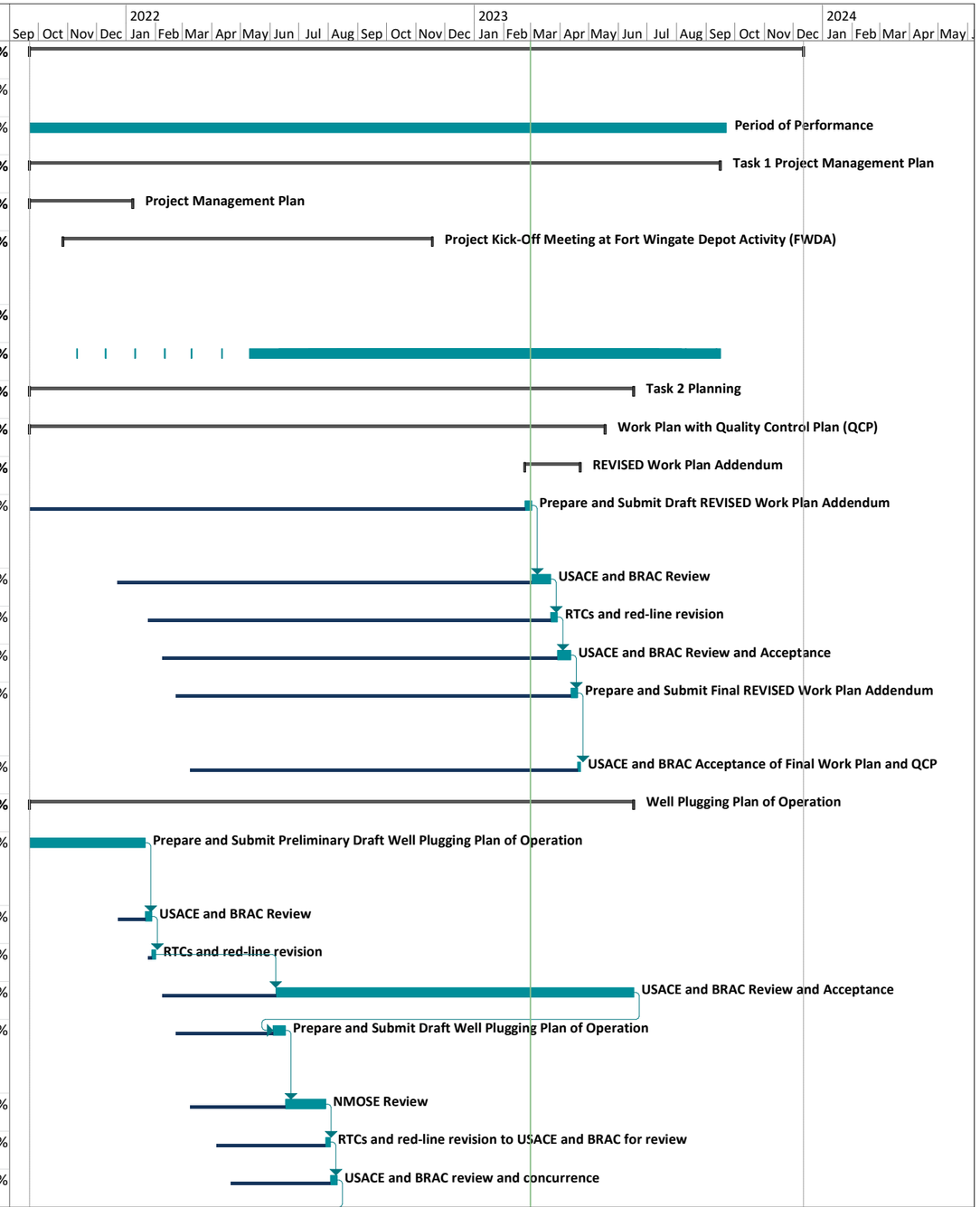
HDR

Updated on: 7/8/2021

Author: T. Ritter Document Path: C:\FortWingate\GIS\NorthernArea\GIS\MXD\Figure Cross Section Temp.mxd Document Name: Figure Cross Section Temp

SCHEDULE

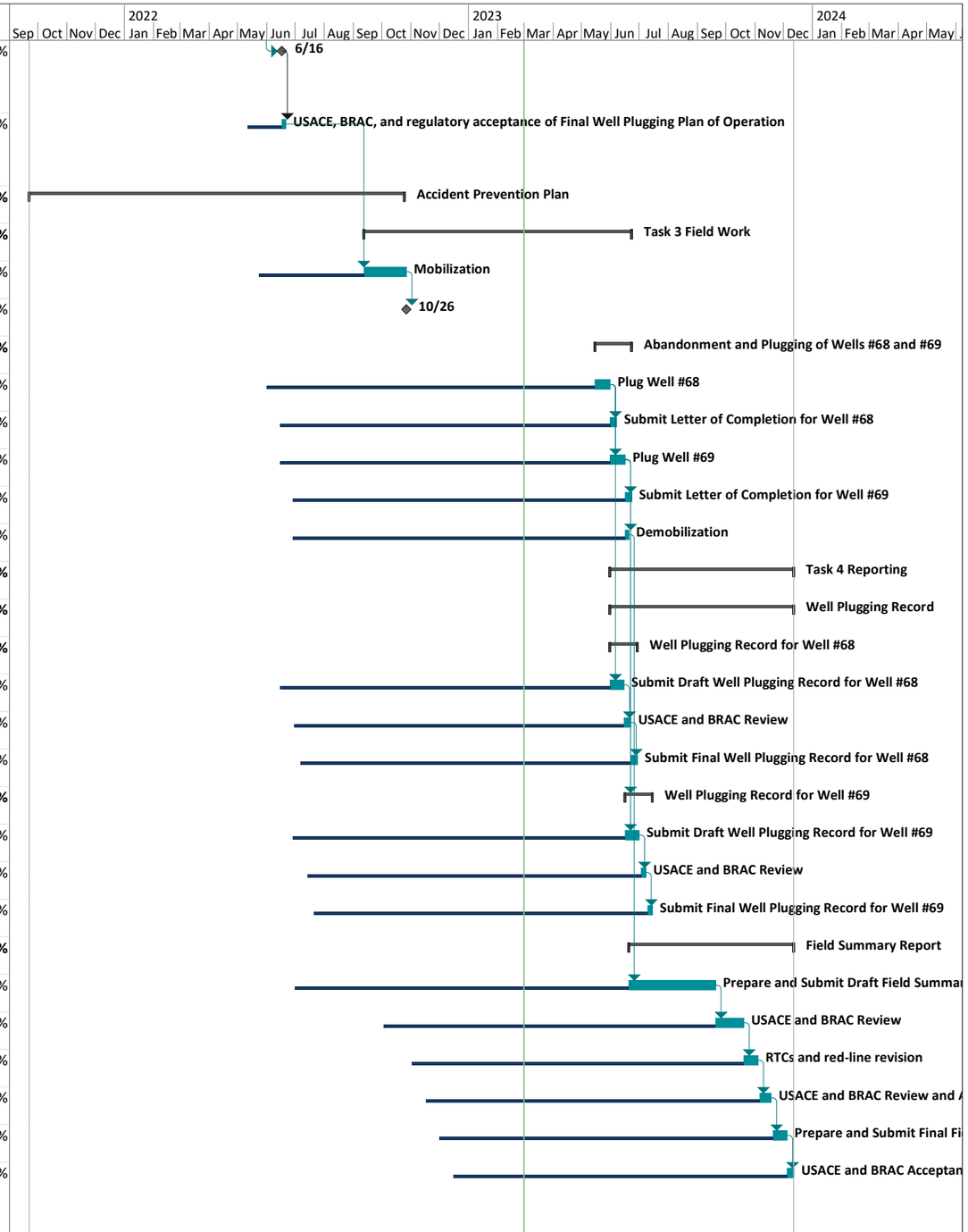
ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Actual Finish	% Complete
1	**oes**	**579 days**	**Wed 9/22/21**	**Mon 12/11/23**			**NA**	**78%**
2	Contract Award	0 days	Wed 9/22/21	Wed 9/22/21			NA	0%
3	Period of Performance	522 days	Wed 9/22/21	Thu 9/21/23	2		NA	0%
4	**Task 1 Project Management Plan**	**518 days**	**Wed 9/22/21**	**Fri 9/15/23**			**NA**	**99%**
5	**Project Management Plan**	**78 days**	**Wed 9/22/21**	**Fri 1/7/22**			**Fri 1/7/22**	**100%**
11	**Project Kick-Off Meeting at Fort Wingate Depot Activity (FWDA)**	**277 days**	**Wed 10/27/21**	**Thu 11/17/22**			**Thu 11/17/22**	**100%**
19	**Project Management Review (PMR) Meeting**	**481 days**	**Tue 11/9/21**	**Tue 9/12/23**			**NA**	**67%**
43	**Contractor's Progress, Status, and Management Rep**	**483 days**	**Wed 11/10/21**	**Fri 9/15/23**			**NA**	**99%**
67	**Task 2 Planning**	**453 days**	**Wed 9/22/21**	**Fri 6/16/23**			**NA**	**92%**
68	**Work Plan with Quality Control Plan (QCP)**	**431 days**	**Wed 9/22/21**	**Wed 5/17/23**			**Wed 5/17/23**	**100%**
75	**REVISED Work Plan Addendum**	**42 days**	**Thu 2/23/23**	**Fri 4/21/23**			**NA**	**2%**
76	Prepare and Submit Draft REVISED Work Plan Addendum	5 days	Thu 2/23/23	Wed 3/1/23	2		NA	20%
77	USACE and BRAC Review	14 days	Thu 3/2/23	Tue 3/21/23	76		NA	0%
78	RTCs and red-line revision	5 days	Wed 3/22/23	Tue 3/28/23	77		NA	0%
79	USACE and BRAC Review and Acceptance	10 days	Wed 3/29/23	Tue 4/11/23	78		NA	0%
80	Prepare and Submit Final REVISED Work Plan Addendum	5 days	Wed 4/12/23	Tue 4/18/23	79		NA	0%
81	USACE and BRAC Acceptance of Final Work Plan ar	3 days	Wed 4/19/23	Fri 4/21/23	80		NA	0%
82	**Well Plugging Plan of Operation**	**453 days**	**Wed 9/22/21**	**Fri 6/16/23**			**NA**	**89%**
83	Prepare and Submit Preliminary Draft Well Plugging Plan of Operation	87 days	Wed 9/22/21	Thu 1/20/22	2		Thu 1/20/22	100%
84	USACE and BRAC Review	5 days	Fri 1/21/22	Thu 1/27/22	83		NA	0%
85	RTCs and red-line revision	2 days	Fri 1/28/22	Mon 1/31/22	84		NA	0%
86	USACE and BRAC Review and Acceptance	269 days	Tue 6/7/22	Fri 6/16/23	85		Fri 6/16/23	100%
87	Prepare and Submit Draft Well Plugging Plan of Operation	9 days	Fri 6/3/22	Thu 6/16/22	86		Thu 6/16/22	100%
88	NMOSE Review	30 days	Fri 6/17/22	Thu 7/28/22	87		NA	0%
89	RTCs and red-line revision to USACE and BRAC for	3 days	Fri 7/29/22	Tue 8/2/22	88		NA	0%
90	USACE and BRAC review and concurrence	5 days	Wed 8/3/22	Tue 8/9/22	89		NA	0%



Project: Abandon and Plug Artesian Wells #68 and #69
Fort Wingate Depot Activity, McKinley County, New Mexico
Updated: Wed 3/1/23

Task | Split | Milestone | Summary | Project Summary | Manual Task | Slippage

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Actual Finish	% Complete
91	Prepare and Submit Final Well Plugging Plan of Operation	0 days	Thu 6/16/22	Thu 6/16/22	90		Thu 6/16/22	100%
92	USACE, BRAC, and regulatory acceptance of Final Well Plugging Plan of Operation	2 days	Fri 6/17/22	Mon 6/20/22	91		NA	0%
93	**Accident Prevention Plan**	**284 days**	**Wed 9/22/21**	**Mon 10/24/22**			**Mon 10/24/22**	**100%**
100	**Task 3 Field Work**	**204 days**	**Mon 9/12/22**	**Thu 6/22/23**			**NA**	**48%**
101	Mobilization	33 days	Mon 9/12/22	Wed 10/26/22	92FS+2 days		Wed 10/26/22	100%
102	Condition Assessment	0 days	Wed 10/26/22	Wed 10/26/22	101		Wed 10/26/22	100%
103	**Abandonment and Plugging of Wells #68 and #69**	**29 days**	**Mon 5/15/23**	**Thu 6/22/23**			**NA**	**0%**
104	Plug Well #68	12 days	Mon 5/15/23	Tue 5/30/23			NA	0%
105	Submit Letter of Completion for Well #68	5 days	Wed 5/31/23	Tue 6/6/23	104		NA	0%
106	Plug Well #69	12 days	Wed 5/31/23	Thu 6/15/23	104		NA	0%
107	Submit Letter of Completion for Well #69	5 days	Fri 6/16/23	Thu 6/22/23	106		NA	0%
108	Demobilization	2 days	Fri 6/16/23	Mon 6/19/23	106		NA	0%
109	**Task 4 Reporting**	**139 days**	**Wed 5/31/23**	**Mon 12/11/23**			**NA**	**0%**
110	**Well Plugging Record**	**139 days**	**Wed 5/31/23**	**Mon 12/11/23**			**NA**	**0%**
111	**Well Plugging Record for Well #68**	**21 days**	**Wed 5/31/23**	**Wed 6/28/23**			**NA**	**0%**
112	Submit Draft Well Plugging Record for Well #68	11 days	Wed 5/31/23	Wed 6/14/23	104		NA	0%
113	USACE and BRAC Review	5 days	Thu 6/15/23	Wed 6/21/23	112		NA	0%
114	Submit Final Well Plugging Record for Well #68	5 days	Thu 6/22/23	Wed 6/28/23	113		NA	0%
115	**Well Plugging Record for Well #69**	**21 days**	**Fri 6/16/23**	**Fri 7/14/23**	**106**		**NA**	**0%**
116	Submit Draft Well Plugging Record for Well #69	11 days	Fri 6/16/23	Fri 6/30/23	106		NA	0%
117	USACE and BRAC Review	5 days	Mon 7/3/23	Fri 7/7/23	116		NA	0%
118	Submit Final Well Plugging Record for Well #69	5 days	Mon 7/10/23	Fri 7/14/23	117		NA	0%
119	**Field Summary Report**	**125 days**	**Tue 6/20/23**	**Mon 12/11/23**			**NA**	**0%**
120	Prepare and Submit Draft Field Summary Repor	66 days	Tue 6/20/23	Tue 9/19/23	108		NA	0%
121	USACE and BRAC Review	22 days	Wed 9/20/23	Thu 10/19/23	120		NA	0%
122	RTCs and red-line revision	11 days	Fri 10/20/23	Fri 11/3/23	121		NA	0%
123	USACE and BRAC Review and Acceptance	10 days	Mon 11/6/23	Fri 11/17/23	122		NA	0%
124	Prepare and Submit Final Field Summary Report	11 days	Mon 11/20/23	Mon 12/4/23	123		NA	0%
125	USACE and BRAC Acceptance of Final Field Summary Report	5 days	Tue 12/5/23	Mon 12/11/23	124		NA	0%



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Task | Split | Milestone | Summary | Project Summary | Manual Task | Slippage