STATEMENT OF WORK

Modernized Bioplant

Design-Build

for

Radford Army Ammunition Plant (RFAAP)

1.0 INTRODUCTION

1.1 Objective

1.1.1 To design, construct, and successfully commission, a modernized industrial wastewater treatment facility (referred to as the Bioplant) capable of treating the full volume and variety of Radford Army Ammunition Plant (RFAAP) industrial wastewater influent while meeting or exceeding the environmental permit requirements. The design and engineering work on this contract will confirm the technical requirements, select the optimal treatment technology, refine siting, obtain required permitting, and produce Professional Engineer (PE)-sealed Issue for Construction (IFC) design documents for use in constructing the facility. Construction and commissioning will then produce a turnkey facility for handoff to the Operating Contractor after ensuring appropriate training and licensing of facility operators.

1.2 Background

1.2.1 RFAAP was built in the 1940s to support ammunition demand during World War II. Since then, RFAAP has become a national asset as the last remaining CONUS Government owned facility capable of manufacturing nitrocellulose (NC), nitroglycerin (NG), single-base, multi-base, and solventless propellants. The wastewater generated during the manufacture of these propellants must be treated in accordance with RFAAP's permits prior to release to the New River.

1.2.2 The legacy RFAAP Bioplant was constructed in the 1980s and is beyond its useful service life, located within the 100-year floodplain, and poses a single point failure for plant operations. It has experienced numerous environmental permit violations and a recent shutdown during Hurricane Helene in 2024. Funding has been accelerated to FY26 to address this critical risk. The existing RFAAP Bioplant treats industrial wastewater generated by propellant manufacturing. This wastewater contains solvents and propellant residue (i.e., any solid, dissolved, or suspended energetic material remaining in process wastewater as a byproduct of manufacturing, loading, or packing operations) that require remediation prior to discharge to the New River. This discharge is regulated by a permit issued by the Virginia Department of Environmental Quality (VDEQ) under the Clean Water Act. The Virginia Pollutant Discharge Elimination System (VPDES) permit identifies pollutants of concern and establishes discharge limits RFAAP must adhere to. Over the years, the current facility has had issues consistently treating the wastewater which have resulted in permit violations. During a 16-month period, there were 14 violations that resulted from three separate incidents. While there are multiple causes, the recent violations were largely related to biochemical oxygen demand (BOD) and chemical oxygen demand (COD) limitation violations and failure of Whole Effluent Toxicity (WET) testing.

1.3 Boundaries

1.3.1 The Bioplant shall receive wastewater influent from the Industrial Wastewater Collection system via pump station PS 906-17 at the headworks which is outside the boundary of the program. After treatment, water shall be discharged to the New River.

1.3.2 Pre-treatment shall be co-located with the primary treatment technology. Remote, point-source, production facility pre-treatment is outside the scope of the project.

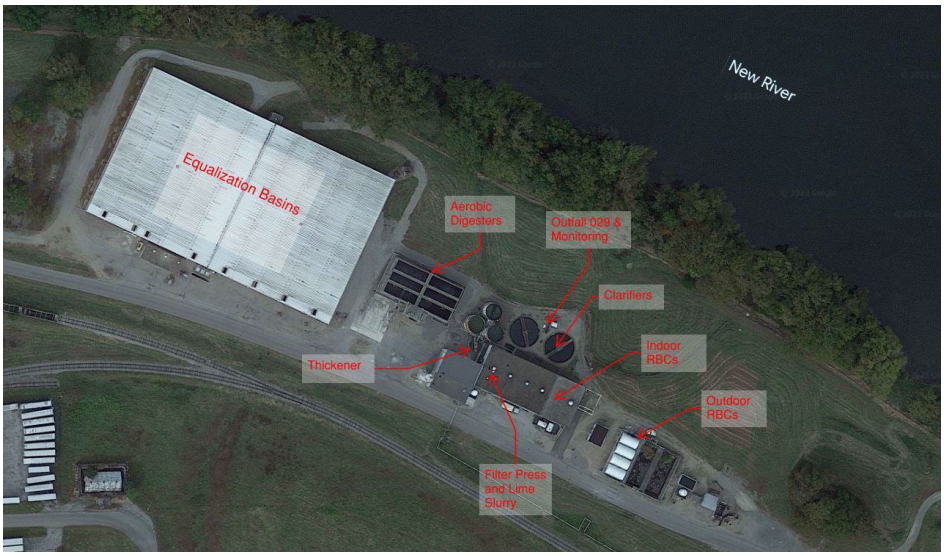

Figure 1: Legacy Bioplant Operations

1.3.3 The design will account for connection to existing utilities to make tie-in connections only, but the utilities upstream of the Modernized Bioplant facility will be outside the bounds of this project.

1.3.4 The approximate location for the Bioplant is shown in Figure 2 and will need to be finalized during the design phase to ensure compliance with explosives safety site (ESS) requirements when developing and ultimately obtaining Department of War Explosive Safety Office (DWESO) approval of the final explosive safety site plan (ESSP).

1.4 Execution Strategy

1.4.1 This program is divided into two phases: Phase I – shall include the design charrette, design development and package submittals, analysis, Pilot/Prototype Study for down-selected technology, site investigation, permitting (VDEQ and ESSP), surveys, risk analyses, procurement of Long Lead Equipment (LLE), and cost estimates; Phase II – shall produce a complete Issue for Construction (IFC) design package which will be used for site preparation, remaining equipment and material procurement, and construction and commissioning of the modernized Bioplant.

1.4.2 Turnover to RFAAP shall be accepted accomplished after successful prove-out and commissioning of the facility.

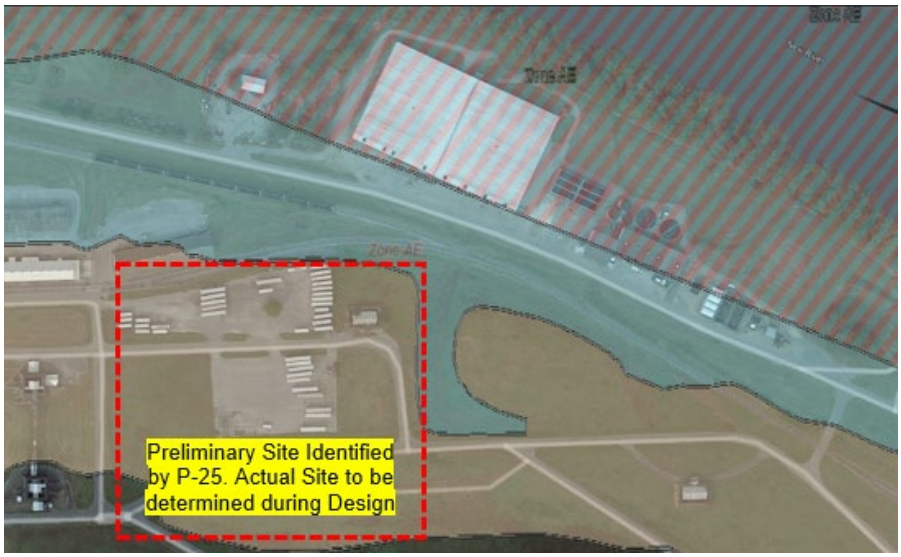

Figure 2: Approximate proposed location for modernized Bioplant

2 APPLICABLE DOCUMENTS *(Contractor shall comply with applicable aspects of the following documents. These are not considered holistically compliance documents. The following section headers are for reference and organization only and are not intended to limit the application of any documents specifically to its header).*

2.1 Federal and Military Regulations and Specifications Construction Standards

- **2.1.1** All applicable and most recent editions of the United Facilities Criteria (UFC) and Unified Facilities Guide Specifications (UFGS)
- **2.1.2** Unified Facilities Criteria (UFC): UFC 1-200-01: DoD Building Code: General Building Requirements.
- **2.1.3** API 653 – Tank Inspection, Repair, Alteration, and Reconstruction (access and maintenance provisions).
- **2.1.4** ASTM A36, A325, A572 & A992, Standards for structural materials and load ratings
- **2.1.5** ASTM E1557 – Standard Classification for Building Elements and Related Sitework – UNIFORMAT II
- **2.1.6** ASTM E2083 – Standard Classification for Building Construction Field requirements, and Office Overhead & Profit
- **2.1.7** Standard Classification MIL-STD-961 for Building Elements and Related Sitework

2.2 Life Cycle Management

- **2.2.1** DoD Risk, Issue, and Opportunity (RIO) Management Guide for Defense Acquisition Programs, September 2023
- **2.2.2** MIL-HDBK-502A – Product Support Analysis
- **2.2.3** MIL-HDBK-470A – Designing and Developing Maintainable Products and System
- **2.2.4** ISO/IEC/IEEE 15288 - Systems and Software Engineering

2.3 Energy and Environmental Standards

- **2.3.1** Virginia Pollution Discharge Elimination System Permit VA0000248
- **2.3.2** ISO 50001: Energy Management System.
- **2.3.3** AR 420-1: Army Facilities Management (Chapter 22).
- **2.3.4** EPAct 2005: Energy Policy Act of 2005.
- **2.3.5** EISA 2007: Energy Independence and Security Act of 2007.
- **2.3.6** (U) Army Regulation (AR) 200-1, "Environmental Protection and Enhancement", Updated 13 Dec 2007.
- **2.3.7** Virginia Department of Environmental Quality (VDEQ) and EPA Regulations.
  - 2.3.7.1 Virginia Department of Environmental Quality (VDEQ) Sewage Collection and Treatment Regulations (SCAT), Section 9VAC25-790-450
  - 2.3.7.2 Virginia Erosion and Stormwater Management Act, Virginia Erosion and Stormwater Management Regulation, Section 9VAC25-875
- **2.3.8** ANSI/ASQC E4: Specification and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs.
- **2.3.9** Department of Defense National Environmental Policy Act Implementing Procedures, 30 Jun 2025.
- **2.3.10** Army Directive 2014-10, Advanced Metering of Utilities, 4 Jun 2014.
- **2.3.11** April 2022 Environmental Assessment for Implementation of Master Planning Actions at the Industrial Core District

2.4 Explosives Safety

- **2.4.1** DDESB Technical Paper No. 26: Guidance for Explosives Safety Site Plans, dated 15 Sep 2025.
- **2.4.2** Defense Explosive Safety Regulation (DESR) 6055.09, Change 2, 25 Nov 2025
- **2.4.3** DA Pamphlet 385-64, Ammunition and Explosives Safety Standards, 24 Jul 2023
- **2.4.4** Department of Defense Instruction 6055.16: Explosives Safety Management Program, Change 3, 31 Aug 2018

2.5 Safety

- **2.5.1** (U) MIL-STD-882 Revision E, System Safety Program Requirements, dated 11 May 2012.
- **2.5.2** (U) CFR 1910.119, OSHA's Occupational Safety and Health Standards, Process Safety Management of Highly Hazardous Chemicals, July 1999.
- **2.5.3** AMC R-385-10.
- **2.5.4** OSHA Regulations and Process Safety Management Procedures.
- **2.5.5** (CUI) RFAAP Safety Site Plan.
- **2.5.6** ANSI A1264.1 – Safety Requirements for Workplace Walking/Working Surfaces.
- **2.5.7** OSHA 29 CFR 1910 Subpart D – Walking-Working Surfaces (guardrails, width, load capacity).

2.5.8 OSHA 29 CFR 1910.28 – Duty to Have Fall Protection and Falling Objects Protection.
2.5.9 OSHA 1910.119 (e) - Process hazard analysis

2.6 Cybersecurity
2.6.1 AR25-2, Information Management: Army Cybersecurity
2.6.2 NIST 800-82 Rev 3, Guide to Operational Technology (OT) Security
2.6.3 NIST SP 800-137, Information Security Continuous Monitoring (ISCM) for Federal Information Systems and Organizations
2.6.4 NIST SP 800-171 Rev 2, Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations
2.6.5 DOD Instruction 5000.97, Digital Engineering H.
2.6.6 NIST SP 800-53 Rev 5, Security and Privacy Controls for Information Systems and Organizations
2.6.7 DoD Instruction 8500.01, Cybersecurity, dated 14 Mar 2014.
2.6.8 NIST SP 800-171: Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations.
2.6.9 DoD Hazard Communication (HAZCOM) Program, DoD 6050.05
2.6.10 DoD Instruction 8510.01 Risk Management Framework (RMF) for DoD Information Technology (IT), dated 28 Jul 2017.

2.7 AT/OPSEC
2.7.1 DoD Instruction 5200.48 Controlled Unclassified Information (CUI), March 6, 2020.
2.7.2 Executive Order 13556, Controlled Unclassified Information, 4 Nov 2010.

2.8 Fire Protection
2.8.1 National Fire Protection Association (NFPA) 1, Fire Code.
2.8.2 NFPA 780, Standard for Installation of Lightning Protection Systems.
2.8.3 NFPA13, Standard for the Installation of Sprinkler Systems.
2.8.4 NFPA15, Standard for Water Spray Fixed Systems for Fire Protection.
2.8.5 NFPA 72, National Fire Alarm and Signaling Code.
2.8.6 NFPA 400, Hazardous Materials Code.
2.8.7 NFPA 497, Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.
2.8.8 National Electrical Code (NFPA 70)
2.8.9 UFC 3-600-01: Fire Protection Engineering for Facilities.

2.9 Cost Estimating
2.9.1 AACEI RP 18R-97 - Guidelines for defining cost Estimates for the Process Industry
2.9.2 ASTM E2514 – Standard Practice for Presentation Format of Elemental Cost Estimates, Summaries, and Analyses
2.9.3 ASTM E2516 - Standard Classification for Cost Estimate Classification System

2.10 Miscellaneous

2.10.1 United States National CAD Standard – V6

2.10.2 Project Design Phases, Architectural, Engineering, Design, Construction, and Commissioning.

2.10.3 INCOSE Guide to Writing Requirements

2.10.4 OSI-SE-0002 Requirements Management Plan

2.11 Historic Assessment References

2.11.1 Stevens, Appendix 4, Task 4: Laboratory Pilot Scale Nitrogen and Wastewater Treatment at RFAAP to Address the Bioplant and the AB Acid Waste Treatment Systems, 2025

2.11.2 Stevens, Appendix 9: TASK 9 – Evaluation of RFAAP Bioplant Performance, 2025

2.11.3 Haskell, Assessment of the Wastewater Systems at RFAAP in Radford, VA, 2023

2.11.4 Leidos, Appendix H Contract Modification 1, Sampling and Wastewater Streams Assessment at RFAAP, 2023

2.11.5 BAE Systems, Toxicity Reduction Evaluation for Industrial Wastewater Treatment System (Bioplant), 2022

2.11.6 Booz Allen Hamilton, Water Systems Assessment and Restoration Strategy: Radford Army Ammunition Plant, 2015

2.11.7 Virginia Tech, Evaluation of Industrial Wastewater Treatment Facility (Bioplant) at the Radford Army Ammunition Plant, 2010

3 REQUIREMENTS

Phase I

3.1 Project Management Requirements. The Contractor shall:

3.1.1 Program Execution and Management Plan: Prepare and submit a Program Execution & Management Plan (PEMP), (DI-MGMT-81797, A001), within 60 calendar days ACA. The PEMP shall include, at a minimum: a Level 3 baseline Integrated Master Schedule (IMS) (including critical path, in Microsoft Project and PDF) addressing the items presented below via a work breakdown structure (WBS) as the basis providing tie lines between the various activities and timelines. The Government will review and provide comments on the PEMP. If the PEMP (or any of the sub-bullets included below) changes during the execution of this program, the Contractor shall revise and resubmit the PEMP for Government review and concurrence. At a minimum, in addition to the requirements of the DID and the IMS, the PEMP shall include the following:

3.1.1.1 Statement of Objectives;

3.1.1.2 Narrative of the program overview and execution strategy;

3.1.1.3 Key activities and milestones (including subtasks);

3.1.1.4 Configuration management plan (as an Appendix);
3.1.1.5 Quality management plan;
3.1.1.6 Execution team assignments with clear division of roles and responsibilities for each contractor and subcontractor tied to the 3rd level of the WBS; and
3.1.1.7 Project execution risks and proposed mitigation strategies to include a formal risk register.

3.1.2 Kick-off Meeting: The Contractor shall host an in-person project kick-off meeting at RFAAP two weeks after submittal of the PEMP to discuss and review the information provided in the PEMP; indicate the information required by the Contractor to prepare the Pilot/Prototype Study, conduct the Charette, prepare the SRD; and discuss identified project risks and strategies to mitigate risks. The kick-off meeting shall also include a discussion of the Charrette outline to ensure project team alignment on goals, definition of a successful Charrette, and confirmation of the meeting attendee invite list. The Contractor shall submit to the Government an agenda for the project kick-off meeting at least three business days prior to the meeting (DI-ADMN-81249B, A002). Meeting minutes shall be submitted to the Government no later than five business days after the meeting (DI-ADMN-81505, A003).

3.1.3 IPT Meetings: Conduct virtual bi-weekly Integrated Project Team (IPT) meetings with the Government and any pertinent Subcontractor personnel to keep the team appraised of project progress including pilot/prototype study status, project execution, design challenges and accomplishments, issues, and System Engineering (SE) controls being used. Meetings shall change to a weekly cadence at the start of construction. An agenda along with documentation to be discussed during the meeting shall be sent to the Government at least three business days prior to the meeting (DI-ADMN-81249B, A002). The documentation shall summarize the work performed since the last meeting, activities accomplished, address any changes to the program schedule, address any changes to major milestones, state near term tasks to be completed, and summarize any anticipated problems and/or issues and provide proposed solutions. Meeting minutes shall be submitted no later than five business days after the meeting (DI-ADMN-81505, A003).

3.1.4 Schedule Report: Prepare and Submit the Monthly Schedule Performance Report NLT seven calendar days before the second IPT Meeting (DI-ADMN-81466A, A004) of each month for review. The Contractor shall submit an updated IMS that documents the work performed during the specific reporting period in the form of an updated monthly project schedule at the 4th WBS level (in Contractor's selected software and PDF format). The IMS shall include Baseline Start, Baseline Finish, Planned Start, Planned Finish, Actual Start, Actual Finish dates, and Critical Path.

The IMS shall maintain forecasted start dates for Activities that shall start within three months of the data date (date which data is reported from) and not rely on earliest start dates calculated by the scheduling program. Additionally, the IMS shall address any changes to the program schedule and significant milestones, explain any delays to key Activities, state near term tasks to be completed, and summarize any anticipated problems. The specific reporting period end date and IPT meeting are to be coordinated to allow reporting on the most recent activities (the data date of the IMS shall be no more than two weeks before the IMS delivery date). The report shall provide technical, and schedule status updates identified in the WBS. The report shall identify any problem that may have significant schedule and/or technical impacts.

3.1.5 The Contractor shall prepare and submit a Design Quality Control Plan in accordance with UFGS 01 45 00 Quality Control. The QC Plan shall be submitted 60 calendar days ACA (DI-QCIC-81794, A005).

3.1.6 The Contractor shall prepare and submit a Preliminary Final Report (electronically) and all required deliverables (DI-ADMN-80447A, A006) at the end of Phase I activities, 24 months ACA, and a revised Final Report at the conclusion of Phase II activities (with the exception of Close Out), 50 months ACA. At a minimum, the Final Report shall include:
3.1.6.1 Wastewater Treatment Process Description
3.1.6.2 The Contractor's PE-sealed Design Packages
3.1.6.3 The Final Systems Requirement Document (SRD) that demonstrates all requirements have been met.
3.1.6.4 Commissioning and Acceptance Report
3.1.6.5 Warranty Management Documentation
3.1.6.6 Permit Status Summary

3.1.7 Hold a project Close-Out meeting no later than ten business days after the submission of the Phase II Final Report. The Contractor shall prepare a meeting agenda (DI-ADMN-81249B, A002) and meeting minutes (DI-ADMN-81505, A003) for the Close-Out Meeting.

3.2 Technical Requirements

3.2.1 The Contractor shall design and construct a Modernized Bioplant capable of consistently and reliably treating 1.5 million gallons per day (MGD) with a surge capacity of up to 2.5 MGD and a minimal influent flow of 500 thousand gallons per day (all to be confirmed during the design phase), encompassing current and projected process modernization waste streams, while maintaining environmental compliance and preventive maintenance requirements that do not exceed industrial standard maintenance OEMs. The design shall include determination of the best technology applicable for the treatment of RFAAP wastewater (as

confirmed via influent characterization), and piloting/prototyping of recommended technology for optimal usability, maintainability, configuration, and sizing.

3.2.1.1 Design activities should consider the optimal sludge quantities required throughout the process and the impact each decision made has on this sludge quantity and quality.

3.2.2 Locate the modernized facility outside of the 100-year floodplain, and outside the 500-year floodplain if achievable, to mitigate operational impact to the Bioplant.

3.2.3 Design flexibility into the system to simultaneously collect and treat various types of wastewaters generated at RFAAP effectively at both the low (~0.5 MGD) and high (~2.5 MGD) ends of expected volume.

3.2.4 **Utility Requirements**: RFAAP has the utilities listed below available for use in the design and in support of the construction and operation of the Modernized Bioplant. Confirmation of availability at designed volumes, flows, pressures, etc. shall be the responsibility of the Contractor. Consideration shall be given to ways to reduce utility and resource use in operation of the facility. In support of the Modernized Bioplant, the Contractor shall identify tie-in points for the utilities and provide the design for bringing utilities from tie-in point to confirmed Modernized Bioplant site as needed:

3.2.4.1 Compressed air
3.2.4.2 Potable water
3.2.4.3 Filtered water
3.2.4.4 Fire suppression water
3.2.4.5 Industrial sewer
3.2.4.6 Sanitary sewer
3.2.4.7 Storm sewer
3.2.4.8 Steam
3.2.4.9 Electricity
3.2.4.10 Natural gas
3.2.4.11 Fiber optic communication

3.2.5 All utilities used in operation of this facility shall be metered, per reference 2.3.10.

3.2.6 The facility shall be designed with the following service lives:

3.2.6.1 Buildings shall have a minimum 50-year service life.
3.2.6.2 Tanks shall have a minimum 30-year service life.
3.2.6.3 All other process equipment shall have a minimum 20-year service life.
3.2.6.4 Programmable Logic Controller (PLC) used to run the process shall be designed with a minimum service life of ten years.

3.2.6.5 Computer equipment used to run the process shall be designed with a minimum service life of five years.

3.2.7 The facility shall be designed to maximize operator safety and ergonomics, by automating and removing the manual labor in the operation to the extent practical for all routine, repetitive, and/or hazardous operations.

3.2.8 The modernized Bioplant facility shall be designed and constructed to operate within an air-gapped Process Control Network and with all applicable active defense and monitoring systems. The facility shall be in compliance with applicable NIST 800-82R3 ICS Overlay requirements. Any outside connections required during design, construction, or operation, will be submitted to the US Government for approval.

3.3 Environmental Control and Compliance:

3.3.1 **Environmental Permitting.** The Contractor shall be responsible for the preparation of all required environmental permit applications, existing permit modifications, stormwater permit requirements, and Construction General Permit (CGP) associated with the modernized Bioplant Design. Permit application packages (DI-MISC-81274, A007) shall be submitted to the Army Staff and Operating Contractor for review and acceptance during development of the Advanced (90%) Design, when sufficient detail is determined for permit application acceptance by the appropriate regulatory office. Permitting packages shall be jointly submitted by the Plant Commander and Operating Contractor to VDEQ or other agency, as required.

3.3.1.1 The contractor shall be responsible for addressing all questions/comments posed by the Army Staff, Operating Contractor, and/or environmental agencies until all environmental permit applications, and modifications to existing permits, receive final approval.

3.3.1.2 The Contractor shall alert the Government of any difficulty and/or permit compliance issues that arise due to the design and/or planned operation of the Modernized Bioplant.

3.3.2 **Air Pollution Control**. The Contractor shall evaluate potential triggers for air permit requirements throughout the Bioplant treatment train (to include pump station at the head of treatment, storage of any required treatment supplements, and all treatment operations through discharge and sludge treatment). Design and construction shall incorporate any required pollution abatement or air pollution control systems to meet regulatory compliance.

3.4 System Performance and Capability Requirements:

3.4.1 The Contractor shall implement and utilize 'tailored conformance' Systems Engineering (SE) processes including all processes and controls described in the standard (ISO/IEC/IEEE 15288, Systems and Software Engineering); however, the Contractor shall specifically exclude requirements from Paragraph 6.4.14 within the reference document (Ref 2.2.4).

3.4.2 The Government shall have visibility and access to the various subcontractors involved in the project during each phase, as part of normal IPT meetings, in the various SE processes and controls being used by the Contractor. SE compliance, accomplishments, issues, and progress shall be presented and included as audits of all work performed in support of this project whether it is at the Contractor's, Subcontractor's, or vendor's workspace.

3.5 Siting Investigation:

3.5.1 The contractor shall conduct a study to determine the optimal location for the modernized facility, considering any completed geotechnical surveys, flood profiles, and any Quantity Distance (QD) arc implications from explosive safety regulations.

3.5.2 The study shall also determine if the April 2022 Environmental Assessment (EA) (2.3.11) can be leveraged to satisfy NEPA requirements. The Contractor shall submit the Siting Study upon completion, but no later than 120 calendar days ACA (Contractor Format, A008).

3.5.3 Prior to making a final selection of the location for the modernized facility buildings and equipment, the Contractor shall conduct a Geotechnical survey of the proposed modernized Bioplant location. The Contractor shall submit the Geotechnical report, including a siting recommendation, upon completion, but no later than 150 calendar days ACA (Contractor Format, A009).

3.6 Requirements & Technology Charette:

3.6.1 Within 90 calendar days of receipt of Government Furnished Information (GFI) requested by the Contractor as part of the Kick-off Meeting (para 3.1.2), the Contractor shall conduct a Charette at RFAAP. The purpose of the Charette is for the Contractor to present their understanding, based on the information received from the Government, waste influent characterization, and Contractor analysis, of: the defined current and potential future waste streams to be treated; how to best leverage findings from prior USG-funded Bioplant evaluations; an Analysis of Alternatives (AoA) for treatment technologies; identification and recommendations for

pre-treatment or point-source treatment (this project cannot direct changes to the RFAAP site outside of the modernized Bioplant boundaries); confirmation of and justification for a final design capacity, including inflow & infiltration (I&I) volumes. The Charrette activity shall include participation from the Operating Contractor personnel (i.e., Utilities, Facilities, Environmental, Maintenance, etc.) to guarantee RFAAP-based operational and compliance expertise and points of view on the useability of selected technologies. The Charrette report (Contractor Format, A010) shall be submitted 30 calendar days after conclusion of the Charrette. During the Charette, the Contractor shall clearly define:

3.6.1.1 The Bioplant modernization scope and all waste streams requiring treatment via the modernized facility;

3.6.1.2 Project boundaries, considerations of existing collection system footprint and geotechnical and flood profiles of the proposed site;

3.6.1.3 Federal and State codes and standards requirements;

3.6.1.4 RFAAP specific requirements;

3.6.1.5 Environmental requirements and concerns;

3.6.1.6 Design approach;

3.6.1.7 Presentation of historic evaluation summaries, with conclusions and recommendations from these reports vetted against the final Charrette conclusions within the Charrette report;

3.6.1.8 Presentation of AoA for technologies to employ at the modernized Bioplant, cross referenced with the identified waste streams for processing and any VPDES/Virginia Department of Health (VDH)/VDEQ permit requirements, to allow for flexibility in treating current and projected waste streams;

3.6.1.9 Any permit implications or modifications and their estimated timeline for application and issuance; address reasonably ascertainable potential upcoming regulatory changes that may require treatment modifications or additions

3.6.1.10 Initial construction strategy to maintain operations during construction;

3.6.1.11 Key reviews and how they will be managed;

3.6.1.12 Open issues and information/data required for the design to proceed.

3.7 System Requirements Document:

3.7.1 Within 60 calendar days after the Charette, the Contractor shall submit a System Requirement Document (SRD) that shall identify the performance, functional requirements, capability, and verification requirements of the facility and how it shall perform through systematic analysis and documentation (e.g., requirements analysis and decomposition, inputs, outputs, constraints, block diagrams) (DI-SDMP-81465A, A011). This shall include, but not be limited to, the establishment of interface requirements, influent compositions and treatment capacities, materials of

construction, service lives, secondary containment requirements, sampling and inspection requirements, environmental requirements, piping and instrumentation requirements, control requirements, maintenance requirements, and supporting analytical and administrative facility requirements.

3.7.2 The SRD shall include a requirements verification traceability matrix (RVTM) that maps Government requirements to measurable test results or documentation of successfully completed commissioning activities. The RVTM shall be updated at the 30%, 90%, and IFC Design submittals and included with verification of achieved requirements in the Final Report.

3.7.3 The SRD shall include the requirements for all functional areas at the level necessary to understand the performance, assumptions, constraints, and dependencies that drive design decisions. The SRD shall be organized, formatted, and numbered according to the structure defined in ASTM E1557, Standard Classification MIL-STD-961 for Building Elements and Related Sitework. The contractor shall format the SRD using INCOSE Guide to Writing Requirements and OSI-SE-0002 Requirements Management Plan. UNIFORMAT II and ASTM E2083, Standard Classification for Building Construction Field Requirements, and Office Overhead & Profit so that the system requirements are aligned with the cost estimate. The UNIFORMAT II standard shall be extended by addition of major group elements (Level 1, 2, 3, etc.) specific to process functions as agreed by the government-contractor IPT. The SRD shall be correlated with area, facility, and building for traceability.

3.7.4 The Government will provide comments to the SRD within fifteen (15) business days of receipt, and the Contractor shall submit a revised Initial SRD within fifteen (15) business days of receipt of the Government comments. After providing the revised Initial SRD to the Government, the Contractor shall host an SRD review meeting within ten (10) business days to review the document.

3.7.5 The SRD is considered a living document, and it shall be updated at the completion of each phase of the program and reviewed at each design phase review meeting.

3.8 Pilot/Prototype Study:

3.8.1 After approval of the PEMP by the Government, and within 30 calendar days after all SRD comments have been addressed and recommendations incorporated into the SRD, the Contractor shall submit a Draft Plan for conducting a pilot/prototype technology prove-out (Contractor Format A012). The Government shall have 14 calendar days to review the draft plan and provide concurrence or recommended revision.

3.8.2 Upon Government concurrence of the plan, the contractor shall conduct a pilot-scale test on treatment of Bioplant influent waste streams using up to two proposed technology solution(s) for a period of twelve months to

capture seasonal and influent characterization variations. The test shall inform the final design by assisting in right-sizing the facility (with recommendation for approach to potential future modular expansion); identifying confounding factors (e.g, graphite, etc.); potential "bad actor" influents that can have significant impact on treatment effectiveness (e.g, NG and byproducts, organic solvent residues, etc.) and their impacts; validate Stevens Institute of Technology (SIT) conclusion that RFAAP-derived acidic wastewater could be treated in concert with industrial wastewater (reference in paragraph 2.11.2), and identify any required pre-treatment or point source treatment for highly impactful influent streams. Point source treatment to address significant potential adverse efficiency impacts from particular process areas at RFAAP would be recommendation only as those areas are outside of this scope. This study shall incorporate proposed expansion projects (solvent propellant, NG, etc.) to the extent possible to identify risks to effectively modernize the Bioplant operation. The pilot study report shall include a characterization of influent streams from the various production sources that feed the industrial wastewater treatment facility. A Preliminary Pilot/Prototype Study report (DI-MISC-80508B, A013) shall be submitted along with the 30% design package, and a revised, final version of the Pilot/Prototype Study report (DI-MISC-80508B, A013) incorporating Government feedback and final study data, shall be submitted no later than 30 days after the conclusion of pilot operation.

3.9 Development of the Preliminary (30%) Design Package.

3.9.1 Upon completion of the SRD in paragraph 3.7, the Contractor shall prepare a Preliminary (30%) Design Package. The purpose of the Preliminary (30%) Design Package is to show the approach of the Contractor in meeting the functional and technical requirements of the program and present the designer's approach to solving any program technical problems. Narrative shall address how the design meets requirements at a high level as well as illustrate development of the operational philosophy for the Bioplant.

3.9.2 The Preliminary (30%) Design Package shall include the level of detail provided in paragraph 4.1 of Reference 2.10.2.

3.9.3 Utility tie points shall be identified and the design for providing utilities to the site shall be included as part of the Preliminary (30%) Design.

3.9.4 In preparing the Preliminary (30%) Design package, the Contractor shall follow the latest release of the US National CAD Standard (Reference 2.10.1) to the greatest extent practical and/or provide site-specific CAD standard by which the design shall be prepared). The design package shall be submitted electronically and one ½ size paper drawings hard copy.

3.9.5 The Contractor shall include in the Preliminary (30%) Design Package a list of all permit application packages and documentation required to be submitted to the Virginia Department of Environmental Quality (VDEQ)

to obtain environmental permits for the construction and operation of the modernized Bioplant.

3.10 Preliminary (30%) Design Phase Review.

3.10.1 The Preliminary (30%) Design Package (DI-SESS-81757, A014) shall be submitted to the Government at least 15 business days prior to the Design Review meeting for review and comments. The design package shall be submitted electronically and one ½ size paper drawings hard copy.

3.10.2 All drawings, calculations, models, and documents that support the Preliminary (30%) Design package shall be provided to the Government in native, active files as well as in PDF form as part of the Preliminary (30%) Design Package.

3.10.3 The Contractor shall hold a design review meeting to review the Preliminary (30%) Design Package at RFAAP. During the design review meeting the Contractor shall present each element of the design for discussion and review. All design comments shall be tracked with information on how the comment was resolved. As part of the Design Review there shall be a specific operability and maintainability review that shall include Operating Contractor engineers, operators, and maintenance staff. The recommendations from the operability/maintainability review shall be incorporated into Preliminary (30%) Design Package comments and tracked with the other comments.

3.11 Preliminary Explosives Safety Site Plan (ESSP):

3.11.1 During the development of the Preliminary (30%) Design package, the Contractor shall develop a preliminary ESSP (Contractor Format, A015) for submission to the Operating Contractor, local RFAAP Army Staff, USACE Huntsville Explosives Center, Army Sustainment Command (ASC), U.S. Army Technical Center for Explosives Safety (USATCES), and DWESO for their review and concurrence. The preliminary ESSP shall be submitted no later than 30 days after the 30% Design Review. The preliminary ESSP shall be prepared in accordance with (IAW) the latest revisions of the relevant Applicable Documents in paragraph 2.0. The ESSP shall include protective structure analyses as required or applicable analyses to support the determination whether protective structure design is or is not required. The Contractor shall perform all necessary electronic or written submissions required for the submittal process. The Contractor shall be responsible for addressing all questions/comments posed by the Operating Contractor, Army Staff, ASC Safety Office, USATCES, USACE Facilities Huntsville Explosives Center, and DWESO.

3.12 Preliminary Process Hazard Analysis (PHA):

3.12.1 After the Preliminary (30%) Design has been completed and the review meeting conducted, the Contractor shall perform a Preliminary PHA in accordance with OSHA 1910.119 (e). The PHA shall be conducted when the piping and instrumentation drawings (P&IDs) are sufficiently complete and mature to allow the analysis to be completed.

3.12.2 A PHA read ahead package containing all the required information (process flow diagrams (PFDs), P&IDs, equipment arrangements, process descriptions, life safety analysis, etc.) for the PHA shall be prepared and submitted to the Government ten business days prior to the PHA review meeting (Contractor Format, A016).

3.12.3 The Contractor shall hold an in-person PHA review meeting at RFAAP with active Government and Operating Contractor participation and key personnel from the Contractor design team.

3.12.4 Within 30 calendar days after completion of the PHA, the Contractor shall prepare a Preliminary PHA Report (DI-ILSS-81495, A017). The report shall clearly indicate how all recommendations will be addressed. The report shall clearly show the color-coded risk ranking of each scenario before and after the PHA recommendations are implemented, as appropriate.

3.12.5 The contractor shall incorporate the recommended changes as a result of the preliminary PHA as the design progresses from the Preliminary (30%) Design to the Advanced (90%) Design.

3.13 Equipment Specifications/Drawings:

3.13.1 Within 60 calendar days after the completion of the Preliminary (30%) Design Review, the Contractor shall provide the equipment engineering information, shop drawings, and specifications required to complete the design to the Government.

3.14 Preliminary Commissioning and Acceptance Test Plan (CATP):

3.14.1 Within 60 calendar days after completion of the Preliminary (30%) Design Review, the contractor shall submit a Preliminary Commissioning and Acceptance Test Plan (CATP) (DI-QCIC-80553A, A018). The version submitted after the Preliminary (30%) Design Review shall be at a high level but shall include a process narrative detailing how the process design is intended to work, an operational philosophy explaining how the integrated equipment and personnel are to be utilized during normal operation, indicate tests to be performed to ensure that the system meets all operational requirements, tests to ensure accuracy of pumps and metering devices, emergency shutdown procedures, operational tests to confirm control systems operate as intended, any testing required to confirm regulatory compliance, prove-out, etc. The CATP shall identify required sampling and data collection points to support commissioning. The CATP shall also identify if any surrogate materials are required for

commissioning prior to commissioning with RFAAP industrial wastewater. The CATP shall provide a list of recommended critical spare parts for commissioning, to include an estimated lead time for procurement.

3.14.1.1 The following major buildings, their critical ancillary systems, and processes are to be commissioned, at a minimum:

3.14.1.1.1 Operational Control Center
3.14.1.1.2 Upgraded pump station
3.14.1.1.3 Selected treatment technology
3.14.1.1.4 Sludge treatment system
3.14.1.1.5 Discharge to New River

3.14.2 Commissioning Phases: Pending an alternative approach proposed in the CATP, the Government recommends phasing similar to that detailed here:

3.14.2.1 Pre-commissioning: plans for proving mechanical completion of the facility.

3.14.2.2 Integrated facility trials (inert/water): testing the entire process as an integrated facility to evaluate proper operation of the control system, any safety interlocks, and the full treatment train(s). The Contractor and Government shall perform, or confirm via documentation, a walk-through of the operation completed and close any punch list items prior to these trials. Any new punch list items identified during the inert testing shall be completed prior to the introduction of RFAAP industrial wastewater streams.

3.14.2.3 Live facility trials: introducing RFAAP industrial wastewater to the Modernized Bioplant process to ensure all compliance requirements are met.

3.14.2.4 Throughput verification: demonstrate that the Modernized Bioplant is capable of reliably treating RFAAP industrial wastewater at the design volumes over extended periods of time and can achieve regulatory compliance via effluent discharged to the New River.

3.14.2.5 Each phase shall be addressed in the Commissioning and Acceptance Test Plan (CATP)

3.15 Development of Advanced (90%) Design Package

3.15.1 Upon completion of the Preliminary (30%) Design Review, associated tasks, and after Government comments have been addressed, the Contractor shall advance the Preliminary (30%) Design Package to the Advanced (90%) Design Package(s). The Advanced (90%) Design should be presented as laid out in the Construction Execution Plan.

3.15.2 The Advanced (90%) Design Package(s) shall include the level of detail required in Reference 2.10.2, para 6.1.

3.15.3 During the Advanced (90%) Design, the Contractor shall review all equipment, instrumentation, and materials to be used in the construction of

the Bioplant to identify equipment, instrumentation, and materials that shall require testing for compatibility with RFAAP influent characteristics. In some cases, this may require formal vendor selection for major equipment, instrumentation, or materials (e.g., gauges, pumps, flow meters, tank construction materials, etc.) and the purchase of engineering drawings/specifications from the vendor.

3.15.4 Control System. During the Advanced (90%) Design Phase, the Contractor shall begin the development of the control system for overall operation of the Bioplant. The control systems shall be designed to allow operations to be automated in accordance with the control room approach laid out in the design. The graphical user interface for the control system shall be designed to allow efficient operator control of the operation, minimize the opportunity for operator errors, and allow operators to quickly identify and correct issues that occur. Process and controls shall be monitored at the Modernized Bioplant and viewable from the Utilities Supervisor work station. Control equipment shall be selected based on Operating Contractor recommendations, as feasible, to maintain consistency across RFAAP.

3.16 Advanced (90%) Package Design Review:

3.16.1 The Contractor shall host an in-person Interim Advanced (90%) Design review meeting at RFAAP to review the Advanced (90%) Design Package(s). The Advanced (90%) Design Package (DI-SESS-81757A, A019) shall be submitted to the Government at least 15 business days prior to the design review for comments. In addition to the requirements of this paragraph, the Advanced (90%) Design Package shall include the level of detail provided in Reference 2.10.2. The design package shall be submitted electronically. All drawings, calculations, models, and documents that support the Advanced (90%) Design shall be provided to the Government in native, active files as well as in PDF form as part of the Advanced (90%) Design Package.

3.16.2 During the design review meeting(s) the Contractor shall present each element of the design for discussion and review of the Contractor's and Government's design comments. All design comments shall be tracked with information on how the comment was resolved. As part of the Design Review there shall be a specific operability and maintainability review that shall include the Operating Contractor engineers, operators, and maintenance staff.

3.16.3 The Contractor shall memorialize all comments from the Advanced (90%) Design Review and any changes required by the PHA review. These comments and changes shall be tracked and incorporated into the Issue for Construction (IFC) Design package and their disposition noted during the Design Review.

3.17 Final Explosives Safety Site Plan (ESSP):

3.17.1 The Contractor shall update the Preliminary ESSP (Para 3.11) to a Final ESSP (Contractor Format, A020) for submission to the Operating Contractor, local Army Staff, USACE Huntsville Explosives Center, ASC, USATCES, and DWESO for their review and concurrence. The Final ESSP shall be submitted no later than 30 days after the Advanced (90%) design review. The Final ESSP shall be prepared IAW the latest revisions of the Applicable Documents in paragraph 2.0. The ESSP shall include protective structure analyses as required or applicable analyses to support the determination that protective structure design is or is not required. The Contractor shall perform all necessary electronic or written submissions required of the submittal process. The Contractor shall be responsible for addressing all questions/comments posed by the Operating Contractor, Army Staff, ASC Safety Office, USATCES, USACE Facilities Huntsville Explosives Center, and DWESO. Contract item will be considered complete upon receipt of written approval of the Final ESSP by DWESO.

3.18 Preliminary Construction Execution Plan (CEP)

3.18.1 With submission of the Advanced (90%) Design Package, the Contractor shall submit a Preliminary Construction Execution Plan (CEP) (Contractor Format, A021) for advancing the design to construction for the Bioplant. The plan shall be high-level and at a minimum shall provide:

3.18.1.1 Proposed plan for constructing the Modernized Bioplant Facility.

3.18.1.2 Current technical unknowns and recommendations for resolving them.

3.18.1.3 Construction methods and possible phasing plan to implement and maintain a construction schedule.

3.18.1.4 List of currently known long lead equipment with recommendation on when to place the order to alleviate schedule slippage risk.

3.18.1.5 Criteria that shall be used to determine when a system is ready to be turned over to Commissioning from construction.

3.18.1.6 List of the major technical, design, construction, and operational risks with proposed mitigations. These risks shall be prioritized and include recommendations to reduce their impact to the program. Risks that are interrelated and cannot be treated as a “stand-alone” risk shall be identified.

3.18.1.7 Schedule that identifies a critical path for completing and submitting the IFC drawing packages, construction activities, anticipated long lead procurement items and their relationship to the critical path. The schedule shall include, at a minimum, any necessary demolition, construction,

equipment acquisition and lead times, equipment calibration, and installation.

3.18.1.8 If feasible, the Contractor shall identify opportunities to phase the construction of the Modernized Bioplant facility into smaller severable construction projects to provide funding options. Each project shall be capable of providing improved industrial wastewater treatment and incrementally reduce reliance on the legacy Bioplant; for example: installation of new sequencing batch reactors (SBRs) while potentially utilizing sludge treatment (aerobic digesters, thickeners, etc.) at the current Bioplant until execution of a sludge treatment phase. For each severable construction project, the Contractor shall develop and fully define boundaries as well as provide clear interface points between the appropriate legacy and/or modernized operations.

3.19 Final PHA:

3.19.1 After the Interim Advanced (90%) Design Review has been successfully completed, the Contractor shall conduct a Final PHA in accordance with OSHA 1910.119 (e).

3.19.2 A PHA/HAZOP read ahead package containing all the required information (process flow diagrams (PFDs), P&IDs, equipment arrangements, process descriptions, life safety analysis, etc.) for the PHA shall be prepared and submitted to the Government ten business days prior to the PHA meeting (Contractor Format, A022).

3.19.3 The Contractor shall host an in-person PHA with Operating Contractor and Government participation and key personnel from the design and the technology providers teams.

3.19.4 Within 30 calendar days after completion of the PHA review meeting, the Contractor shall submit a Final PHA Report (DI-ILSS-81495, A023). The report shall clearly indicate how all recommendations will be addressed. The report shall clearly show the color-coded risk ranking of each scenario before and after the PHA recommendations are implemented, as appropriate.

3.20 Class 1 Cost Estimate:

3.20.1 Within 30 calendar days after the Final Advanced (90%) Design has been submitted, the Contractor shall submit a Class 1 Cost Estimate (Contractor Format, A024) that shall include at a minimum: the cost to advance from the Advanced (90%) Design to IFC maturity; constructing the facility; commissioning the facility, and turning the facility over to the operating contractor. The cost estimate shall be based on, at a minimum, semi-detailed unit costs with items representative of a Class 1 Estimate as

defined in AACEI RP 18R-97 (2.9.1). The Contractor shall incorporate relevant known, historical, and analogous cost information if available. Additionally, the Contractor shall prepare the elemental cost estimate analysis, reports, and summaries in accordance with the formats specified in ASTM E2514 (2.9.2), with applicable cost elements according to ASTM E1557 (2.1.5), and ASTM E2516 (2.9.3) describes the UNIFORMAT II structure for construction cost estimating. The Contractor shall extend the UNIFORMAT II standard by addition of major group elements (Level 1, 2, 3, etc.) to adapt the cost estimate structure to include all process equipment and related costs separate from the building and sitework groups as agreed by the Government-Contractor IPT. Subtotal costs for design, field requirements, sitework, building, and process functions.

3.21 Updated Commissioning and Acceptance Test Plan:

3.21.1 Within 30 calendar days after completion of the Advanced (90%) Design Review, the contractor shall submit an updated version of the CATP (DI-QCIC-80553A, A025. The updated version shall address any changes to the CATP based on refinement of the design during the Advanced (90%) Design Phase and include updates to the process narrative and operational philosophy to incorporate off-normal operations (e.g., emergency shutdown). The plan shall clearly provide evidence of the Modernized Bioplant's capability to process and treat all industrial wastewater generated at RFAAP while meeting permit requirements.

Phase II

3.22 Development of Issue for Construction (IFC) Design Package

3.22.1 Upon completion of the Advanced (90%) Design Package Review Meeting and after all Government design comments and Final PHA comments have been addressed, the Contractor shall advance the 90% Design package using the shop drawings/specifications to the IFC. The IFC shall be used as the basis for construction.

3.22.2 The IFC design packages shall be developed and submitted to the Government in a logical fashion to allow for the advancement of construction activities. The approach shall be provided in the Construction Execution Plan (CEP).

3.22.3 The Contractor shall be responsible for any costs associated with correcting errors and/or omissions (E&O) found in the IFC design package(s).

3.22.4 The contractor shall submit the IFC design package(s) and allow 15 business days for Government review and comments prior to a scheduled Design Review (DI-SESS-81757A, A026).

3.22.5 The Final IFC design package(s) shall be signed and sealed by a Professional Engineer (PE) licensed in the Commonwealth of Virginia.

3.22.6 In support of preparing the IFC Design packages, the Contractor shall procure any necessary engineering data not included in the Advanced (90%) Design to advance the design to IFC.

3.22.7 The Contractor shall update the Construction Execution Plan (CEP) and the Commissioning and Acceptance Test Plan (CATP) if any substantive revisions are necessary from engineering and design changes.

3.22.8 The Government shall not incur any additional costs due to delays, deconstruction, alterations, repairs, or re-construction arising from correction of the original design.

3.23 Construction Phase Requirements

3.23.1 The construction of the Modernized Bioplant facility shall be based on the IFC drawings completed under this contract.

3.23.2 Environmental compliance during Construction: the Contractor shall implement pollution prevention control measures, including Best Management Practices (BMPs), during construction activities to comply with requirements of Construction General Permit (CGP), to include applicable stormwater pollution prevention plan, erosion and sediment control plan, and stormwater management plan.

3.23.3 Prepare and submit a Construction Quality Assurance / Quality Control Plan (QA/QC Plan) no later than 90 business days after the submission of the IFC design (DI-QCIC-81794, A027). If the QA/QC Plan changes during execution of this project, the Contractor shall revise and resubmit the QA/QC Plan. The Final QA/QC Plan should be included in the project Final Report. The QA/QC Plan shall include, at a minimum, plans, procedures, roles and responsibilities, organization, and management necessary to produce an end product (structure/facility) which complies with the contract requirements. The Government shall be notified no less than five business days before the start of construction of critical points / Definable Features of Work (DFOW) so Government personnel can visit the site to observe the work product and/or execution of the corresponding work. BAE shall notify the Government of any significant deficiencies and corrective actions that may impact the program as they become available. If, at any time, deficiencies are discovered in the materials or workmanship, appropriate corrective action shall be taken and shall be discussed at the IPT weekly meetings.

3.23.4 All punch list items generated during construction and the status of corrective actions, repair and rework, shall be provided to the Government for review no later than two weeks prior to the start of commissioning to ensure necessary items are corrected in advance of commissioning (Contractor Format, A028).

3.23.5 The Government shall have unrestricted access to the site and/or facilities related to this effort for the purpose of project oversight, progress

monitoring, or inspections. The Government will comply with safety specific requirements.

3.23.6 The new facility, once constructed and commissioned, shall be complete, usable, and fully functional for its intended purpose.

3.23.7 The new facility will be in compliance with applicable State and Federal environmental regulations and OSHA safety regulations and standards.

3.23.8 All construction, delegated design, and design during construction shall adhere to the construction documents, specification standards, shop drawings, and manufacturer's installation instructions as well as the above Applicable Documents section. If a conflict occurs between the construction documents, specifications, shop drawings, or manufacturer's installation instructions and requirements of the UFCs above, the most applicable shall govern.

3.23.9 All design, delegated design, design during construction, and shop drawings shall be signed and sealed by the appropriate registered design professional(s) in responsible charge of the work who is (are) licensed to practice such architecture, engineering, etc. in the Commonwealth of Virginia. Prior to the start of the related construction activity, the registered design professional(s) shall affix their seal upon the drawings at no additional cost to the Government.

3.23.10 When parts of the design package are incrementally IFC, as in fast-track construction method of delivery, the Contractor shall be responsible for ensuring that future releases of the design package are not in conflict with already completed work. If such a conflict or oversight is found, the Contractor shall be responsible for making any necessary corrections without additional compensation. The Government shall not incur any additional costs due to delays, deconstruction, alterations, repairs, or re-construction arising from such oversights or conflicts between the design packages and/or already constructed work. The latest copy of the construction documents shall be made available to the Government upon request at any time during the contract.

3.23.11 The Contractor shall install equipment, valves, and instruments providing access and sight lines for normal operations and maintenance, access to all controls and adequate lighting throughout the buildings per approved IFC design.

3.23.12 During construction and after construction is complete, the Contractor shall perform an accessibility assessment of the facility to identify instruments and equipment that will require specialized equipment or for tie-offs to access the instrument/equipment. Where specialized equipment and tie-offs are required, the Contractor shall prepare a plan to access these instruments and equipment. Additionally, these assessments shall ensure that no piping or building structure impedes access to the instrument or equipment for maintenance.

3.23.13 Adequate access shall be interpreted per OSHA and maintenance requirements as clearances in accordance with manufacturer's recommendations.

3.23.14 The Contractor shall construct all parts of the facility to meet all applicable and current codes, including OSHA, at the time of award and in accordance with customary RFAAP construction standards and requirements.

3.23.15 Prepare and submit final as-built drawings package, operation and maintenance (O&M) manuals, warranties, and control system/instrumentation manuals for the new facility (DI-MISC-81489, A029) included with the final report. As-built documents shall be submitted in both Adobe PDF format and in their native CAD format.

3.23.16 Develop and prepare Standard Operating Procedures (SOPs) for the Modernized Bioplant (DI-MGMT-81580, A030) and submit no later than 10 business days prior to the start of commissioning. SOPs shall be updated based on commissioning activities, if necessary.

3.23.17 Develop and submit new preventive maintenance (PM) procedures/manuals for Government review and approval no later than 10 business days prior to the start of commissioning. Following approval, provide the PMs to the Operating Contractor for addition to their maintenance tracking system (DI-TMSS-81668A, A031). PMs shall be updated based on commissioning activities, if necessary.

3.23.18 Develop and submit draft training manuals no later than 5 business days prior to Contractor-led operator training (DI-PSSS-82210, A032). Training materials shall be updated based on commissioning activities, if necessary.

3.23.19 Provide a warranty management plan for all equipment to include a comprehensive warranty listing in excel format and include in the final report. The Contractor shall warrant that the work performed under this contract conforms to the contract requirements and is free from any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier for a period of one year after transition to production. The Contractor shall obtain, or cause to be obtained, and transfer to the Government all manufacturers' and installers' warranties for construction, materials, installations, and equipment supplied under this contract. The Contractor shall obtain or transfer all other warranties to the Government (DI-SESS-81639A, A033) upon completion of the Commissioning Phase

3.23.20 Perform all work in accordance with current OSHA, plant safety, and security requirements, and applicable environmental requirements.

3.23.21 Complete all tasks in accordance with and in consideration of all federal, state, and local regulations.

3.23.22 Comply with safety and security requirements of the existing Operating Contractor.

3.23.23 Prepare and submit a list of critical and commissioning recommended spare parts list with the Phase I (preliminary) final report, and a list of all recommended spare parts to support the daily operation of the new facility with the Phase II (updated) final report, including basis/rationale for each spare part and unit cost for potential funding within available funds (DI-ILSS-80134B, A034).

3.23.24 Execute the project with minimum impact to the Operating Contractor and production at RFAAP. The Contractor shall work with the Operating Contractor to ensure safe access to the location of the Modernized Bioplant, as well as the legacy facility, if needed.

3.24 Commissioning Phase Requirements

3.24.1 Commissioning during the construction phase is intended to achieve the following specific objectives. The commissioning process does not take away from or reduce the responsibility of the Contractor to meet the Contract Documents:

3.24.1.1 Verify that the applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.

3.24.1.2 Verify and document proper performance of equipment and systems.

3.24.1.3 Verify that operation and maintenance (O&M) documentation left on site is complete, to include any O&M summaries as potentially required by VPDES permitting.

3.24.1.4 Verify that RFAAP's operating personnel are adequately trained.

3.24.2 Commissioning team shall include the Commissioning Authority/Agent (CxA), the Contractor, the architect, design engineers, the mechanical contractor, the electrical contractor, the test and balance (TAB) representative, the temperature controls contractor, and any other installing subcontractors or suppliers of equipment. The Operating Contractor's building or plant operators and engineers should also be members of the commissioning team.

3.24.3 The CxA and Contractor will work to schedule commissioning activities and integrate those activities in the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

3.24.4 Commissioning meetings: Initial commissioning meeting will be led by the Contractor's selected CxA. Commissioning process will be reviewed with commissioning team members. The CxA will provide the initial schedule of primary commissioning events, or milestones, and will adjust accordingly as construction progresses and more detailed schedules are available from the Contractor. Additional meetings throughout construction will be scheduled by the CxA with necessary parties attending to plan, coordinate, schedule future activities, and resolve issues.

3.24.5 Equipment documentation will be distributed by the Contractor to the CxA during normal design submittal process, including detailed start-up procedures.

3.24.6 CxA will work with the Contractor in each discipline to develop start-up plans and start-up documentation formats, including providing the Contractor with construction checklists to be completed during the installation and start-up processes.

3.24.7 In general, checkout and performance verification should proceed from simple to complex; from component level to equipment to systems and intersystem levels with pre-functional checklists completed prior to functional testing.

3.24.8 The Contractor, under their own direction, will execute and document the completion of pre-functional checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed according to the approved plans. This may include the CxA witnessing start-up of selected equipment.

3.24.9 The CxA develops specific equipment and system functional performance test procedures. The functional tests shall test the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation. The functional test procedures are executed by the Contractor (and their subcontractors) under the direction of, and documented by, the CxA.

3.24.9.1 Systems will be tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation, and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing within Commissioning. Functional tests are performed after construction checklists and startup are complete.

3.24.9.2 Items of non-compliance in material, installation, or setup are corrected at the Contractor's expense, and the system is re-started.

3.24.10 The CxA reviews the O&M documentation for completeness.

3.24.11 Commissioning will include provision of revised, finalized training manuals and conducting all required training for operations and maintenance personnel which will allow proper, safe, and regulatory-compliant operation of all equipment within the Modernized Bioplant (DI-PSSS-82210, A035) 10 business days of completion of the commissioning phase. The CxA reviews and coordinates the training provided by the Contractor and verifies it was completed.

3.24.12 The project will not be considered substantially complete, and accepted, until the conclusion of the Commissioning functional testing procedures as defined in the accepted Commissioning Plan and verification of system performance under actual operating conditions demonstrating the facility meets requirements and is ready for operational use.

3.24.13 Deferred testing is conducted as specified or required.

3.24.14 The Contractor shall prepare and submit a final commissioning, compliance, and requirements verification report (DI-SESS-82197, A036) within fifteen business days of completion of the commissioning phase detailing successful commissioning of the facility, verification of the regulatory requirements and project requirements as well as any sampling data collected to support compliance assertions.

3.25 Turnover Phase Requirements

3.25.1 No later than 30 calendar days after completion of Commissioning, the Contractor shall submit a Transition Plan for the new Bioplant facility to support RFAAP operation that includes the following information (Contractor Format, A037):

3.25.1.1 All required operation procedures, preventative maintenance procedures, operator training, and transition schedule to full rate production.

3.25.1.2 General: system description; subsystem P&IDs; subsystem electrical one lines; operation walkdown notes; operation commissioning punchlist; vendor documentation (e.g, specifications, instructions, O&M manual, preventive maintenance (PM) list with frequencies); third-party documentation and sign-offs

3.25.1.3 Piping: piping Quality Verification Document (QVD) summary; subsystem piping list; piping quality packages; flushing/blowing/drying records

3.25.1.4 Mechanical: mechanical QVD summary; subsystem equipment list; preservation, preventive maintenance and inspection records; mechanical quality documentation; mechanical checkout documentation

3.25.1.5 Electrical: electrical QVD summary; subsystem electrical cable list; subsystem electrical component list; construction electrical QVDs

3.25.1.6 Instrumentation: instrumentation QVD summary; subsystem instrumentation list; instrumentation datasheets and QVDs; calibration records; loop verification records

3.25.2 Transfer all software licenses to RFAAP-dictated entity prior to project closeout. Decision whether ownership will be Government or Operating Contractor will be made during Commissioning Phase.

3.25.3 Update the installation Geospatial Information System (GIS) mapping compliant with GIS SDSFIE 3.0 formats, for construction of new facility and attendant utilities.

4 Deliverables

4.1 CDRL A001, Program Execution & Management Plan (ADI-MGMT-81797A)
4.2 CDRL A002, Meeting Agendas (DI-ADMIN-81249B)
4.3 CDRL A003, Meeting Minutes (DI-ADMIN-81505)
4.4 CDRL A004, Schedule Performance Report (DI-ADMIN-81466A)
4.5 CDRL A005, Design Quality Assurance/Quality Control Plan (DI-QCIC-81794)
4.6 CDRL A006, Final Report (DI-ADMIN-80477A)
4.7 CDRL A007, Environmental Permit Application Packages (DI-MISC-81274)
4.8 CDRL A008, Siting Study (Contractor Format)
4.9 CDRL A009, Geotechnical Report (Contractor Format)
4.10 CDRL A010, Charrette Report (Contractor Format)
4.11 CDRL A011, System Requirements Document (DI-SDMP-81465A)
4.12 CDRL A012, Draft Plan for Pilot/Prototype Prove Out (Contractor Format)
4.13 CDRL A013, Pilot Study Report (Preliminary and Final) (DI-MISC-80508B)
4.14 CDRL A014, Preliminary (30%) Design Package (DI-SESS-81757)
4.15 CDRL A015, Preliminary Explosives Safety Site Plan (ESSP) (Contractor Format)
4.16 CDRL A016, Preliminary Process Hazards Analysis Package (Contractor Format)
4.17 CDRL A017, Preliminary Process Hazard Analysis Report (DI-ILSS-81495)

4.18 CDRL A018, Preliminary Commissioning and Acceptance Test Plan (CATP) (DI-QCIC-80553A)
4.19 CDRL A019, Advanced (90%) Design Package (DI-SESS-81757A)
4.20 CDRL A020, Final ESSP (Contractor Format)
4.21 CDRL A021, Preliminary Construction Execution Plan (CEP) (Contractor Format)
4.22 CDRL A022, Final PHA Package (Contractor Format)
4.23 CDRL A023, Final PHA Report (DI-ILSS-81495)
4.24 CDRL A024, Class 1 Cost Estimate (Contractor Format)
4.25 CDRL A025, Updated CATP (DI-QCIC-80553A)
4.26 CDRL A026, Issued for Construction (IFC) Design Package (DI-SESS-81757A)
4.27 CDRL A027, Construction QA/QC Plan (DI-QCIC-81794)
4.28 CDRL A028, Construction Punch List (Contractor Format)
4.29 CDRL A029, Final As-Built Drawings, O&M Manuals, Warranties, Control Systems Manuals (DI-MISC-81489)
4.30 CDRL A030, Standard Operating Procedures (SOPs) (DI-MGMT-81580)
4.31 CDRL A031, Preventive Maintenance (PM) Plan (DI-TMSS-81668A)
4.32 CDRL A032, Training Manuals (DI-PSSS-82210)
4.33 CDRL A033, Warranty Management Plan (DI-SESS-81639A)
4.34 CDRL A034, Spare Parts List (DI-ILSS-80134B)
4.35 CDRL A035, Commissioning Training Manuals ((DI-PSSS-82210)
4.36 CDRL A036, Final Commissioning Report (DI-SESS-82197)
4.37 CDRL A037 Transition Plan (Contractor Format)
4.38 CDRL A038, Safety Incident Report (DI-SAFT-81563)

4.39 CDRL A039, OPSEC Standard Operating Procedure (SOP)/Plan (Contractor Format)

5 Technical Representatives & Change Authorization

5.1 Any technical advice provided by the Government which may affect changes in Government funding or scope for this project can only be implemented by the Procuring Contract Officer (PCO), U.S. Army Contracting Command – Rock Island Arsenal (ACC-RI), IL and must be in a written contract modification before becoming effective. The PCO is solely authorized to change the terms of this agreement.

6 Data Rights

6.1 The US Government expects Unlimited Rights in the Final Report, all process drawings, procedures, reports, and project documentation delivered under paragraphs 3.0 through 4.0. Vendor-specific drawings and equipment data used to develop the final project report, drawings, procedures, and project documentation shall be consolidated in a separate severable binder. The Government acknowledges that the technology provider(s), as the sole source provider of the processes selected for this project, retains right to its proprietary intellectual property.

6.2 Any licensing requirements shall be the property of the U.S. Government.

6.3 All design documentation and associated engineering reports shall be the intellectual property of the U.S. Government.

6.4 The U.S. Government shall retain ownership and rights to property acquired and/or developed under this SOW, including, but not limited to, all equipment and intellectual property. All design documentation, drawings, and deliverables shall be marked per requirements specified in the CDRLs and shall not contain Contractor Proprietary Markings.

6.5 All building and equipment modifications, additions and deletions shall be documented into the appropriate RFAAP property book records.

7 Acceptance Criteria

7.1 Final acceptance of the work performed under this SOW will be made by the Procuring Contract Officer (PCO) based on the written recommendation by PL JS and local Army staff technical concurrence. Acceptance will occur after all deliverables are reviewed and accepted and a determination is made that the requirements of the SOW have been satisfied. The Government acceptance of the individual deliverables is defined in the corresponding CDRL item. Government approval of milestone payments will be based on the documented authority associated with the verification of the specific payment.

7.2 Upon completion of all the tasks outlined in the SOW, the contractor shall submit a contract close-out letter to the PCO. The letter shall be supported with the applicable forms as annotated below. The forms shall contain an acquisition price which shall be equivalent to the total contract price and be traceable to the negotiated agreement to

support fiduciary records for auditability. The Contractor shall also ensure any existing assets dispositioned as excess and/or adjustments required as a result of the immediate SOW (i.e., size, quantity, location), are also identified.

8 Period of Performance

8.1 The Period of Performance for this program is 51 months ACA. The Contractor shall provide a schedule with confirmation of relationships between milestones in the execution of the program.

Program Execution Management Plan	60 days ACA
Design Quality Assurance/Quality Control Plan	60 days ACA
Kick-off Meeting	74 days ACA
OPSEC Plan	90 days ACA
Siting Study	120 days ACA
Geotechnical Investigation	150 days ACA
Requirements & Technology Charrette	164 days ACA
System Requirements Document	224 days ACA
Pilot Scale Test Plan	264 days ACA
Pilot Scale Preliminary Test Report	With 30% Design
Pilot Scale Final Test Report	30 days after completion
Preliminary (30%) Design Package	After completion of SRD
Preliminary ESSP	30 days after 30% DR
Equipment Specifications/Drawings	60 days after 30% DR
Preliminary Commissioning Plan	60 days after 30% DR
Preliminary Process Hazard Analysis (PHA)	After 30% Design
Advanced (90%) Design Package	After 30% Design
Construction Execution Plan	With 90% Design
Class I Cost Estimate	30 days after 90% DR
Updated Commissioning Plan	30 days after 90% DR
Final PHA	After 90% Design
Final PHA Report	30 days after PHA meeting
Final ESSP	30 days after 90% DR
Phase I (Preliminary) Final Report	24 months ACA
Critical/Commissioning Spares List	With Phase I Final Report
IFC Package	After Phase I, Start of Phase II
Construction QA Plan	90 days after IFC Pkg
SOPs	10 bus days prior to Commissioning
Preventative Maintenance Plan	10 bus days prior to Commissioning
Training Manuals	5 bus days prior to Training
Warranty Management Plan	With Phase II Final Report
Turnover Plan	30 days after Commissioning
As-Builts, O&M Manuals, Warranties, Manuals	With Phase II Final Report
Phase II (Revised) Final Report	50 months ACA
Operational Spare Parts List	With Phase II Final Report
Project Close-Out Meeting	51 months ACA

DR – Design Review

9 Government Furnished Property

9.1 There is no Government Furnished property for this effort.

10 General Requirements

10.1 The Contractor shall supply all labor, project management, engineering, materials, equipment, inspection, testing, documentation, certifications, permits, safety reviews/approvals, environmental compliance, transportation, and any other items necessary for execution of this project.

10.2 If an accident/incident occurs during this project, the Contractor shall prepare an Accident/Incident Report within five business days after the event (DI-SAFT-81563, A038). This document is required if any one or more of the following occurs:

- **10.2.1** Causing one or more fatalities or two or more disabling injuries
- **10.2.2** Damaging Government property exceeding $10,000
- **10.2.3** Affecting program planning or production schedules
- **10.2.4** Degrading the safety of the equipment under contract such that personnel injury or property damage may be involved
- **10.2.5** Identifying a potential hazard requiring corrective action

10.3 The Contractor shall execute project with minimum impact on current production operations.

11 Security

The security classification for this project is CONTROLLED UNCLASSIFIED INFORMATION (CUI).

11.1 Contractor OPSEC Program:
The contractor shall have an identified certified Level II OPSEC coordinator per AR 530-1. The contractor shall develop an OPSEC Standard Operating Procedure (SOP)/Plan (Contractor Format, CDRL A039) within 90 calendar days of contract award, to be reviewed and approved by the responsible Government OPSEC officer. This plan will include a process to identify critical information, where it is located, who is responsible for it, how to protect it and why it needs to be protected. Refer to AR 530-1 Appendix M for guidance on drafting an OPSEC Plan.

11.2 CTI and/or DoD Critical Program Technology:
DFARS 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting applies, DFARS 252.204-7021 Cybersecurity Maturity Model Certification (CMMC) Requirements applies. Contractor is required to be Level 2 CMMC via Self-Assessment with senior official affirmation in Supplier Performance Risk System (SPRS) prior to contract award. By 20 Nov 2026, the Contractor is

required to be Level 2 CMMC via Third Party Independent Certification with senior official affirmation in Supplier Performance Risk System (SPRS).

11.3 Controlled Unclassified Information (CUI):

Contractor employees that will require access to CUI will follow all DoD (DoDI 5200.48) and Army policies regarding access to CUI, and the handling, storage, transmission, and destruction of CUI. Contractor employees are required to complete initial CUI training (available at https://securityawareness.usalearning.gov/cui/index.html) within 30 days of start of performance on the contract, and then annually thereafter. All CUI must be transmitted via encrypted channels such as the DoD Safe Access File Exchange (SAFE) website (https://safe.apps.mil/) (CAC Required).