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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	12.393	40.745	40.083	-	40.083	45.239	40.922	38.264	8.993	Continuing	Continuing
EX8: <i>Future Unmanned Aircraft System (FUAS)</i>	-	12.393	40.745	40.083	-	40.083	45.239	40.922	38.264	8.993	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO) concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The Army Requirements Oversight Council (AROC) approved the FUAS Initial Capabilities Document (ICD) on 6 Mar 2019. The FUAS ICD includes requirements for Future Tactical UAS (FTUAS), Air Launched Effects (ALE), and Scalable Control Interface (SCI). Manned, optionally-manned, and unmanned systems will penetrate defense-in-depth environments by employing ALE with teaming and swarming effects to detect, decoy, jam radar and communications, conduct cyber-attack, spoof and jam Global Positioning System (GPS), and kinetic engagement.

The Future Vertical Lift Cross Functional Team (FVL CFT) FUAS line of effort is comprised of multiple components including the FTUAS for the Brigade Combat Team (BCT), and ALE. The FTUAS seeks to replace the RQ-7Bv2 Shadow assets within the BCTs. Key attributes of the FTUAS BCT focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, programmatic support. ALE extends tactical and operational reach, lethality, and protection to the advanced team as an attritable or optionally recoverable aerial capability that detects, identifies, locates, and reports threats; represents a credible decoy; disrupts threat communication, targeting and acquisition systems; and delivers lethal and non-lethal effects against those threats across Multi-Domain Operations.

Justification: Fiscal Year (FY) 2021 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$40.122 million will be utilized for the following: 1) \$16.797 million to support the FTUAS early development, 2) \$20.000 million to support ALE Systems Analysis, 3) \$3.325 million provides Systems Engineering and Program Management (SEPM) to support FTUAS.

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	12.393	40.745	20.122	-	20.122
Current President's Budget	12.393	40.745	40.083	-	40.083
Total Adjustments	0.000	0.000	19.961	-	19.961
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-10.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	19.961	-	19.961

Change Summary Explanation

FY 2021 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$40.122 million will be utilized for the following: 1) \$16.797 million to support the FTUAS early development, 2) \$20.000 million to support ALE Systems Analysis, 3) \$3.325 million provides SEPM to support FTUAS.

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Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>				Project (Number/Name) EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
EX8: <i>Future Unmanned Aircraft System (FUAS)</i>	-	12.393	40.745	40.083	-	40.083	45.239	40.922	38.264	8.993	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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Justification: Fiscal Year (FY) 2021 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$40.122 million will be utilized for the following: 1) \$16.797 million to support the FTUAS early development, 2) \$20.000 million to support ALE Systems Analysis, 3) \$3.325 million provides Systems Engineering and Program Management (SEPM) to support FTUAS.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Multi-Domain Task Force (MDTF) Demonstration	10.800	18.079	-
Description: Funding for United States Army Pacific (USARPAC) Multi-Domain Task Force (MDTF) Demonstration supports UAS aircraft, payload and Multi-Function Electronic Warfare (MFEW) demonstration, which will inform FTUAS requirements.			
FY 2020 Plans:			

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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Funding was used for USARPAC MDTF Demonstration supports UAS aircraft, payload and MFEW demonstration which informs FTUAS requirements.				
FY 2020 to FY 2021 Increase/Decrease Statement: Decrease to \$0 in FY 2021 due to FVL CFT direction to begin FTUAS early development.				
Title: Air Launched Effects (ALE) Systems Analysis		-	20.000	20.000
Description: ALE systems analysis in preparation for a Materiel Development Decision (MDD), and to inform requirements. The PM will conduct market research, systems engineering analyses and conduct an assessment of how the proposed candidate materiel solution approaches are technically feasible and have the potential to effectively address capability gaps, desired operational attributes, and associated external dependencies.				
FY 2020 Plans: Funded ALE market research, early systems engineering analyses and assessment of candidate materiel solution approaches through air vehicle and payload, and mission systems architecture demonstrations.				
FY 2021 Plans: Continue to fund ALE Increment 1a demonstrations, engineering analysis, integration, prototyping, assessment of proposed material solution approaches in support of host platform integration. Continue to support the development of the Modular Open Systems Architecture and SCI required for ALE.				
Title: System Engineering/Program Management		1.593	2.666	3.325
Description: SEPM				
FY 2020 Plans: Funded SEPM to support FTUAS pre-milestone decision requirements such as independent cost estimates and other required milestone documents.				
FY 2021 Plans: Funding to continue SEPM to support FUAS milestone decision requirements.				
FY 2020 to FY 2021 Increase/Decrease Statement: Increase of \$0.659 million in FY 2021 required to support systems engineering and milestone decision requirements.				
Title: Future Tactical Unmanned Aircraft System (FTUAS)		-	-	16.758

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Description: This is a New Effort in FY 2021. The FTUAS platform is intended to be a runway independent Group 2/3 unmanned aircraft that provides the Brigade Combat Teams with expeditionary, intelligence, surveillance, and reconnaissance (ISR) with improved target location and designation.</p> <p>FY 2021 Plans: Funds will development / integration of required FTUAS components (Miniaturized Type 1 Encryption, Miniaturized Mode 5/S IFF, Scalable Control Interface (SCI), and Tactical Data Link).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase \$16.797 million in FY 2021 due to FVL CFT direction to begin FTUAS early development.</p>			
Accomplishments/Planned Programs Subtotals	12.393	40.745	40.083

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• A01310: <i>Tactical Unmanned Aircraft System (TUAS)</i>	-	12.100	1.101	-	1.101	25.345	38.100	55.400	90.752	0.000	222.798

Remarks
FY 2021 base procurement dollars in the amount of \$1.101 million supports the FVL CFT FTUAS Demonstration: Specifically, the Program Management (PM) support necessary to conclude the FTUAS Demonstration.

D. Acquisition Strategy
The Aviation Platform - Requirements Development Division (AP-RDD) prepared an Initial Capabilities Document (ICD) that was approved by the AROC on 6 Mar 2019.

The FVL CFT is overseeing a demonstration effort in FY 2019 - 2021 that will inform the FTUAS requirement to develop capability that will ultimately replace the RQ-7Bv2 Shadow TUAS within the BCT formation. The Demonstration effort will focus on conducting analysis and obtaining field data that will inform the FTUAS Capability Development Document (CDD). A MDD review will be held in FY 2021.

AP-RDD - Prepared ALE Initial Capability Refinement Document (ICRD) that was approved by GEN John M. Murray, CG, AFC on 21 Oct 2019.

The plan to acquire ALE is through an incremental approach that allows rapid prototyping and fielding of technology to field available capabilities while continuing S&T efforts to mature and transition emerging technologies to fully realize required capabilities. This is accomplished through multiple prototype development activities for the air vehicle, payloads, and mission system architecture through, experiments, simulations, and demonstrations conducted in parallel and/or sequential timelines. The objective of this incremental effort is to develop and exhibit multiple ALE prototypes to enable a rapid transition from prototype to operational implementation in the

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force. Increment 1A will be a COTS/GOTS system to enable technology maturation, systems integration, and potential initial capabilities. ALE program of record will be purpose built utilizing parallel efforts informed by S&T investments and information learned from the demonstration and testing of Increment 1A. Additional increments will leverage the mission system architecture, payload technologies and interfaces from the initial increment and seek to extend the range of ALE for missions in support of LRPF.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering and Program Management (SEPM)	Various	PM TUAS : Redstone Arsenal	-	1.593		2.666		3.325		-		3.325	Continuing	Continuing	-
Subtotal			-	1.593		2.666		3.325		-		3.325	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Air Launched Effects (ALE) Systems Analysis	Various	PM TUAS : Redstone Arsenal	-	-		20.000		20.000		-		20.000	0.000	40.000	-
Future Tactical Unmanned Aircraft System (FTUAS)	Various	PM TUAS : Redstone Arsenal	-	-		-		16.758		-		16.758	0.000	16.758	-
Subtotal			-	-		20.000		36.758		-		36.758	0.000	56.758	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Multi Domain Task Force (MDTF) UAS Demonstration	Various	Various : Various	-	10.800		18.079		-		-		-	10.000	38.879	-
Subtotal			-	10.800		18.079		-		-		-	10.000	38.879	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals		-	12.393	40.745	40.083	-	-	40.083	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
FTUAS Multi Domain Task Force Demonstration (MDTF)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS System Engineering/Program Management (SEPM)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS Demonstration (APA Funded)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS Materiel Development Decision (MDD)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS Milestone C	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS LRIP (APA Funded)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS IOTE	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS FRP Decision	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
FTUAS FRP (APA Funded)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
ALE RFI	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
ALE A-CDD AROC	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
ALE OTA 1	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
ALE Technical Assessment	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
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Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025																																																																																																											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																																																																																																								
ALE Multi-Vendor Demonstrations																																																																																																																																				
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ALE System Integration																																																																																																																																				
ALE RFP																																																																																																																																				
ALE Milestone B																																																																																																																																				
ALE Engineering and Manufacturing Development																																																																																																																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FTUAS Multi Domain Task Force Demonstration (MDTF)	1	2019	4	2020
FTUAS System Engineering/Program Management (SEPM)	1	2019	4	2025
FTUAS Demonstration (APA Funded)	3	2020	4	2021
FTUAS Materiel Development Decision (MDD)	3	2021	3	2021
FTUAS Milestone C	3	2022	3	2022
FTUAS LRIP (APA Funded)	3	2022	2	2024
FTUAS IOTE	3	2023	4	2023
FTUAS FRP Decision	1	2024	1	2024
FTUAS FRP (APA Funded)	1	2024	4	2028
ALE RFI	2	2019	2	2019
ALE A-CDD AROC	3	2020	3	2020
ALE OTA 1	3	2020	3	2020
ALE Technical Assessment	3	2020	2	2022
ALE Multi-Vendor Demonstrations	4	2020	4	2021
ALE RFI 2	3	2021	3	2021
ALE OTA 2	3	2022	3	2022
ALE System Integration	3	2022	1	2024
ALE RFP	3	2023	3	2023
ALE Milestone B	3	2024	3	2024
ALE Engineering and Manufacturing Development	3	2024	3	2027