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DEFENCE EQUIPMENT & SUPPORT

ARTILLERY SYSTEMS DELIVERY TEAM

**GROUND BASED SURVEILLANCE RADAR (GBSR)
USE STUDY**

Contract Number: 701547527

Redacted Version

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Reference documents

Ref	Title
DefStan 00-600	Integrated Logistics Support requirements for MoD projects
DefStan 05-99	Managing Government Furnished Equipment.
DefStan 05-132	Unique Identification
DefStan 81-041	Packaging of Defence Materiel
DEFCON 514	DEFCON 514 (Edition 08/15) - Material Breach.
DEFCON 528	DEFCON 528 (Edn 07/17) - Import and Export Licences Application
DEFCON 611	DEFCON 611 (Edition 02/16) - Issued Property.
DEFCON 632	DEFCON 632 (Edition 08/12) - Third Party Intellectual Property - Rights and Restrictions Application.
DEFCON 644	DEFCON 644 (Edition 07/18) – Marking of Assets.

Ref	Title
DEFCON 656A	DEFCON 656A (Edition 08/16) - Termination for Convenience (Contracts Under £5m).
DEFCON 656B	DEFCON 656B (Edition 08/16) - Termination for Convenience (Contracts £5m and Over).
DEFCON 694	DEFCON 694 (Edition 07/18) - Accounting for Property of the Authority.
JSP 248	Assets Subject to Special Controls: Export Controlled Articles Subject to US Laws and Regulations.
JSP 440	The Defence Manual of Security, Resilience and Business Continuity Part 2: Guidance.
JSP 822	Defence Direction and Guidance for Training and Education
KiD	Knowledge in Defence.
GBSR BFM	GBSR Battlefield Mission - Reference: 20210222-GBSR_BFM_v1_0_JEInteg-OS
ASD S1000D	International specification for technical publications using a common source database
ASD S3000L	International procedure specification for Logistic Support Analysis
ASD S2000M	International specification for Materiel Management
BS 8888:2006	Technical Product Specification

Table 2 - Reference documents

Acronyms, Abbreviations and Definitions

Acronym / Abbreviation	Definition
APOD	Air Point of Disembarkation
APOE	Air Point of Embarkation
AESP	Army Equipment Support Publication
BUF	Basic Unit Fleet
Bn	Battalion
BG	Battle Group
BFM	Battlefield Mission
Bde	Brigade
CSS	Combat Service Support
CCL	Commerce Control list
COTS	Commercial Off The Shelf
CES	Complete Equipment Schedule

Acronym / Abbreviation	Definition
CLS	Contracted Logistic Support
COSHH	Control of Substances Hazardous to Health
DSN	Defence Support Network
DSAT	Defence Systems Approach to Training
DEFCON	Defence Conditions
DE&S	Defence Equipment & Support
DEFFORM	Defence Form
DefStan	Defence Standard
DSC	Defence Support Chain
DSCOM	Defence Support Chain Operations and Movements
DSG	Defence Support Group
DoS	Department of State
DSP	Department of State Publication
EMCON	Emission Control
ES	Equipment Support
EAR	Export Administration Regulations
ECJU	Export Control Joint Unit
FMECA	Failure Modes & Effects Criticality Analysis
FoS	Fall of Shot
FMS	Foreign Military Sales
FSG	Forward Support Group
GC	General Correspondence
GBSR	Ground Based Surveillance Radar
GFA	Government Furnished Assets
GMTI	Ground Movement Target Indication
HMNB	Her Majesty's Naval Base
IOC	Initial Operating Capability
ILS	Integrated Logistic Support
IP	Intellectual Property
IPR	Intellectual Property Rights
ISTAR	Intelligence, Surveillance, Target Acquisition & Reconnaissance
ITAR	International Traffic in Arms Regulations
JSP	Joint Service Publication
JSC	Joint Support Chain
KSA	Key Support Area

Acronym / Abbreviation	Definition
Lt Cav	Light Cavalry
LCS	Logistics, Commodities and Services
LCST	Logistic Commodities Services and Transformation
LDOC	Logistics Delivery Operating Centre
Log IS	Logistics Information Systems
MEA	Main Equipment Assembly
MSTAR	Man-portable Surveillance and Target Acquisition Radar
MHE	Mechanical Handling Equipment
MoD	Ministry of Defence
NSN	NATO Stock Number
OEM	Original Equipment Manufacturer
OSD	Out of Service Date
PM	Project Manager
PT	Project Team
RSG	Rear Support Group
R&M	Reliability & Maintainability
RSC	Reverse Supply Chain
RA	Royal Artillery
REME	Royal Electrical & Mechanical Engineers
RSA	Royal School of Artillery
SPOD	Sea Point of Disembarkation
SPOE	Sea Point of Embarkation
SPIS	Services Packaging Instruction Sheet
STCC	Special to Contents Containers
SCM	Supply Chain Management
Sp Dir	Support Directorate
SSE	Support Solutions Envelope
ST&TE	Support Tools & Test Equipment
SA	Supportability Analysis
SRD	System Requirement Document
TAHQ	Tactical Air Head Quarters
TCP	Trade Control Plan
USML	United States Munitions List

Table 3 - Acronyms, Abbreviations and Definitions

Ground Based Surveillance Radar (GBSR) Authority

1. Artillery Systems Project Team (PT), Delegated to Ground Based Surveillance Radar (GBSR) Project Manager (PM), has overall authority for the Integrated Logistic Support (ILS) Elements of the GBSR project.

GBSR Background

2. GBSR will deliver the capability which was previously provided by Man-portable Surveillance and Target Acquisition Radar (MSTAR) Mk IV radar. The capability provided by MSTAR and to be replaced by GBSR is a self-contained, man-portable, battlefield Ground Movement Target Indication (GMTI) radar system for detecting, tracking and classifying moving targets and for directing and monitoring subsequent engagement of the targets by artillery fire. The GBSR system shall detect and recognise moving heavy vehicles, light vehicles, personnel, (NATO target size standard required), refer to GBSR System Requirement Document (SRD) for details. Surveillance is provided over an arc of up to 6400 mils. A Fall of Shot (FoS) mode provides information to enable artillery and mortar fire to be adjusted onto target. It offers an all-weather 24/7 capability to the Battle Group (BG) and its specification will permit its use in a wide range of environmental conditions. MSTAR has been in service since the 1980's and has been through a number of upgrades, the last commencing in [REDACTED] on a rolling programme until [REDACTED]. The capability is used across Defence; by Royal Artillery (RA) Observers and Intelligence, Surveillance, Target Acquisition & Reconnaissance (ISTAR) detachments; by Light (Lt) Cavalry in the reconnaissance role; and by RAF Regiment Force Protection units. It was used extensively in Iraq and Afghanistan and is currently deployed on operations. GBSR will replace and improve on the capability provided by MSTAR. Initial Operating Capability (IOC) for GBSR is [REDACTED] with an Out of Service Date (OSD) of [REDACTED].

Project History

3. MSTAR Mk 1 entered service in Oct [REDACTED] to meet requirement GSR 3938 and replaced the then obsolete ZB-298. It has been through numerous upgrades, the last commencing in [REDACTED] on a rolling programme until [REDACTED], involving [REDACTED] systems. This brought the system to its current Mk IV status. MSTAR Mk IV OSD was due for Dec [REDACTED], but the capability was continued in an unsupported role.

4. GBSR is required to deliver greater precision, a more rapid sensor to shooter link (enabling better digitisation) and optimising Size, Weight and Power (SWaP).

Scope and Purpose

5. The purpose of the GBSR Use Study is to identify and document supportability factors related for the intended use of the Product. This Study is the integral part of Supportability Analysis (SA) and is the task which provides the basis for all the subsequent planning and execution of the Integrated Logistic Support (ILS) programme. The Use Study, therefore, provides the basis for the aims of the ILS programme to minimise the Acquisition and Through Life costs for GBSR. A key element to achieve this goal is to maximise standardisation opportunities in the design of the support solution, with full consideration to the Organic existing logistic resource facilities, infrastructure and capabilities with which the GBSR Product will need to be interoperable.

6. The scope of the Study is to analyse the Functional and Non-Functional Product behaviour requirements, specified in the Systems Requirement Document for exploiting the supportability factor criteria. This criterion will require analysis and modelling in the determination and design of the preferred optimal cost-effective through-life support solution. Factors considered in this Study to assist in the planning of the support solution are:

a. Quantitative Supportability Factors. This includes the intended operating requirement for the Product and how it will be representatively used.

b. Fielding and Deployment Factors. This includes the environmental factors that will need to be considered when the product is operated during In-Use and Out-of-Use phases. The scope of deployments is where the Product is operated and handled forward and where the Product is warehoused, handled and repaired in depth locations, either as a System or component part of the System.

c. Maintenance Factors. This includes the maintenance capability and skills that exist in the Organic infrastructure, which should be considered for the GBSR Product.

d. Supply Support Factors. This includes the Organic supply support infrastructure and processes, which the GBSR Product must be interoperable with. It will also include the Support Solutions Envelope (SSE) aspects, policy and constraints that should be considered when designing the Product's support solution.

e. Support Factors. These will cover the ILS elements relevant to GBSR.

f. Current System Use. This will cover a summary of the current system in use and broadly describe the maintenance and training concepts employed.

7. The Use Study will be updated to reflect the Product's system behaviour and support emergence requirements, as it evolves through the Product life Cycle. The Study provides support planning information and therefore it is not a Contractual requirements document.

Equipment Description

8. GBSR will be a highly versatile low-power, high-performance ground surveillance radar. The GBSR system will provide a wide-area surveillance out to a range of 24km or more (NATO target size standard required), day or night and in all weather conditions. The GBSR System shall be of a size and weight that it can be carried and operated by the target user population identified in the Target Audience Description (TAD) without imposing a high physical burden to the users. The GBSR system shall be Unpacked, setup, configured & calibrated rapidly, threshold MOP within ■ minutes, objective MOP within ■ minutes. It will also be easily integrated into larger security systems and will be used as the anchor for other surveillance sensors. GBSR will locate moving targets and uniquely classify them as personnel, tracked vehicles or wheeled vehicles. The simple-to-operate man-machine interface shall allow for rapid self-location and surveillance area set up.

9. A basic representation of the Key User Requirements (KURs) for GBSR are shown in the **Error! Reference source not found.**:

Ser:	UR ID:	User Requirement
01	UR-4.4	■
02	UR-4.5	■
03	UR-4.6	■
04	UR-4.8	■
05	UR-4.10	■

Ser:	UR ID:	User Requirement
06	UR-4.17	[REDACTED]
07	UR-4.19	[REDACTED]
08	UR-4.21	[REDACTED]
09	UR-5.1	[REDACTED]
10	UR-7.1	[REDACTED]

Table 4 - KURs

Equipment Dependencies

10.The Product's Capabilities and which ones that can be provided as Government Furnished Assets (GFA), including their employment, are contained in the SRD.

¹ GBSR Battlefield Mission Reference: 20210222-GBSR_BFM_v1_0_JEInteg-OS.

Section 2 - Quantitative Supportability Factors

Operating Requirements

11. This Section of the Study provides a representative view in how the Product will be used in its various scenarios of use. This enables the planning for determining the required level of logistic resources as well as providing a basis for testing the Product as part of the Integrated Test Evaluation and Acceptance Plan (ITEAP).

12.A Battlefield Day (BFD) is defined here as a 24hr period of activity. It will include all or part of a Battlefield Mission (BFM).

Battlefield BFD assumptions

13.BFD rates. The number of BFDs will depend upon the type of operation/training.

14. Peacetime BFD rate. This rate will vary between ■ BFDs and ■ BFDs depending on the training cycle to which a unit/formation is undertaking.

15. Wartime BFD rate. Maximum number of consecutive BFDs is three (3 hrs).

a. **Non-Enduring (NE) small deployment.** Small deployment of ■ BFDs at Steady State (SS).

b.Enduring medium deployment. Enduring brigade (minus) deployment of [REDACTED] BFDs per [REDACTED] days of which [REDACTED] days are at High Intensity Combat (HIC), [REDACTED] days at Moderate Intensity Combat (MIC) and [REDACTED] days at Normal Intensity Combat (NIC).

c. **Non-Enduring medium deployment.** Non-enduring brigade deployment of █ BFDs, of which █ days are at High Intensity Conflict, █ days at Medium Intensity Conflict and █ days at Steady State.

16.Battlefield Mission². The representative GBSR BFM is the primary representation of how the equipment will be used in the target acquisition event and is shown below in **Error! Reference source not found.**

Battlefield Mission (BFM) Definition

17.A BFM [REDACTED]

Battlefield Mission (BFM) Assumptions

18.Duration. [REDACTED]

19.Configuration. GBSR

20.Start state. Certain pre-BFM activity is assumed to have taken place:

² GBSR BFM Reference: 20210222-GBSR BFM v1 0 JEInteg-OS.

- a. GBSR will have been configured and optimised before the mission begins to allow for swift set-up and operation.
- b. GBSR will have been configured for use in the ground base role, which includes ability to unpack, set up and begin operation quickly, (Threshold MOE states within 15 minutes).
- c. The User has already confirmed serviceability of the product in its configuration of use, through performing a Before Use Check.

21.Types of operation. A BFM will be determined by the taskings given by the supported units, organisations or formations to the user. The BFM will vary according to which user is operating the equipment and what mission is being undertaken. Different tactical activities will place different demands on the equipment. These demands can be categorised as either static or mobile operations.

a. **Static operation.** Static operation can be characterised as involving a few cycles of setting up, taking down and subsequent movement but requiring longer periods of constant operation and emitting. Tactical activity such as defence will generally require static operation.

b. **Mobile operation.** Mobile operation requires far more frequent cycles of setting up, taking down and movement to another position but less time operating and emitting. Tactical activity such as reconnaissance and attack will generally require mobile operation.

22.Cycles. GBSR will be operated in separate cycles during the BFM:

a. **Set-up.** Remove equipment from vehicle, remove from transportation packaging / cases, initial fault finding complete, system is powered up, calibrated and ready to operate - provide preliminary scans for 'dead ground' etc for ISR planning and coordination purposes.

b. **Take-down.** Safely power system down, pack equipment in transportation packaging/cases, stow equipment on vehicle and check it is secure. Be ready to move.

c. **Surveillance.** [REDACTED]

d. **Engagement.** [REDACTED]

23.Activity. When using the GBSR capability the User will be able to conduct surveillance [REDACTED]

[REDACTED] . It is to provide an all-weather 24/7 capability to the user community (predominantly the BG HQ through the FSTs but also other HQs depending on user) and its specification will permit its use in a wide range of environmental conditions.

24.Pattern of usage. The characteristics of the pattern of usage are as follows:

a. **Static.** GBSR will be set-up in a static location and will be used to conduct surveillance

[REDACTED]

b. **Mobile.** GBSR will start stowed in vehicle. It will then be taken out, set up, used to conduct surveillance

[REDACTED]

. This will last for a period of approximately [REDACTED]. Then it is to be restowed, moved to another location, set up and ready for operation again. The tactical situation may require frequent movement: this has been estimated at approximately [REDACTED] during a BFD for daytime, and approximately [REDACTED] for night-time.

c. **Static and Mobile.** Users will require the ability to combine both static and mobile usage during the day and night i.e. move tactically to a location, setup quickly, conduct surveillance and engagement for a period (time dependent on tactical situation and tasking), take-down and move to another location and repeat.

25. Time variations.

a. **Day.** It is assumed that daytime operation of the capability will be the least demanding in terms of set-up of the equipment.

b. **Night.** It has been assumed that the time to complete tasks involving GBSR will increase by approximately [REDACTED]% due to the challenges of working with equipment in low light environments; and the requirement to avoid detection.

c. **Inexperienced user/safety involved.** An increase of [REDACTED]% should be applied to all activities for when the capability is being used by an inexperienced user; or when additional safety assurance is required on live firing exercise.

26. Representative BFM. These patterns and cycles of operation of the equipment will endure for the length of the BFM. There are a significant number of potential variations to the BFM; however, the table below seeks to provide elements of a BFM during a 24hr BFD for both daytime and night-time. The activity and timings are representative and are not definitive.

Table 5 - GBSR Battlefield Timings and Tasks:

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]					
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]					

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]					
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]					
[REDACTED]					

■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■					

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]					
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[illegible]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]					
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]	[REDACTED]		
	[REDACTED]	[REDACTED]	[REDACTED]		
	[REDACTED]	[REDACTED]	[REDACTED]		

Figure 1 – Logistic Footprint Representation:

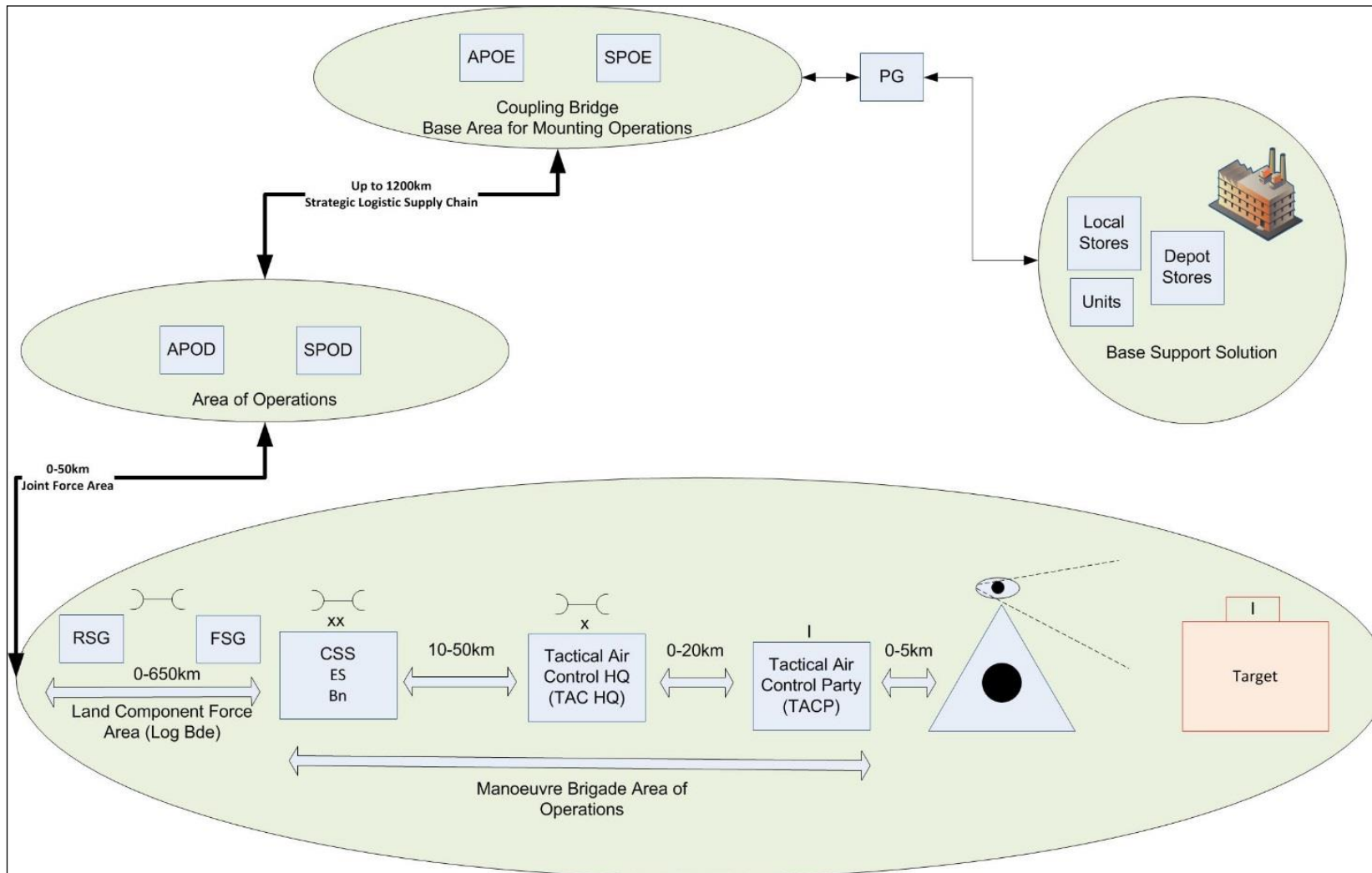


Figure 1

Section 3 – Fielding and Deployment Factors

Deployment Considerations

27.This Section of the Study provides a representative view in how the Product will be fielded and deployed over its anticipated service life of ■ years.

28.The purpose of this section is to articulate the environmental factors that will need to be considered when the Product is operated, used and maintained in its forward locations, in its two states of use; In-Use and Out-of-Use. Furthermore this section provides information in the understanding of the environmental factors that the Product is exposed to when transported to and from its depth locations, either as a complete System and/or as a component part of the Product, when being handled, warehoused, sentenced, conditioned, repaired and disposed.

29.The success of the fielding plan will be measured against the ability of the Product being fielded against the requirements of the key milestones:

- a. Initial Operating Capability (IOC),
- b. Full Operating Capability (FOC).

30.The environmental factors that need to be considered for the Product are climatic, Chemical Biological Radiological Nuclear (CBRN) and induced User environments, which includes Global Positioning System (GPS) denied and electronic warfare jamming:

Table 6: Climatic Factors.

CATEGORY	APPLIES TO:
A1 - EXTREME HOT DRY A2 - HOT DRY A3 - INTERMEDIATE	Areas which experience very high temperatures accompanied by high levels of solar radiation, namely, hot dry deserts of North Africa, Western Australia, parts of the Middle East and central Asia including parts of the Indian sub-continent, and parts of South Western USA/Mexico. Areas which experience high temperatures accompanied by high levels of solar radiation and moderately low humidity, namely, most of Australia, most of the middle East and Central Asia, most of the Indian sub-continent, most of the North African continent and parts of the South, South West USA, North Mexico, parts of the South American Continent and the most Southern parts of Europe. In strict terms, this definition applies only to those areas which experience moderately high temperatures and moderately low humidity for at least part of the

		year. It is particularly representative of conditions in Europe except the most Southern parts, Canada, the northern United States and the southernmost part of the Australian continent.		
B1 - WET WARM B2 - WET HOT B3 - HUMID HOT COASTAL DESERT		Areas which experience moderately high temperatures accompanied by continuous very high relative humidity. These conditions are found in rain forests and other tropical regions during periods of continuous cloud cover, where direct solar radiation is not a significant factor. Geographical regions covered include the Congo and Amazon basins, South East Asia including the East Indies, the North coast of Madagascar and the Caribbean Islands. Areas which experience moderately high temperatures accompanied by high humidity and high direct solar radiation. These conditions occur in exposed areas of the wet tropical regions, such as the coastal region of the Gulf of Mexico, Northern Australia, and Eastern China. Areas which experience high temperatures accompanied by high water vapour content of the air near the ground in addition to high levels of solar radiation. These conditions occur in hot areas near large expanses of water such as the Persian Gulf and the Red Sea.		
C0 - MILD COLD C1 - INTERMEDIATE COLD C2 – COLD C3 - SEVERE COLD C4 - EXTREME COLD		In strict terms, this definition applies only to those areas which experience mildly low temperatures such as the coastal areas of Western Europe under prevailing maritime influence, South East Australia and the lowlands of New Zealand. However, for the purposes of this standard, this definition is considered to apply to all land masses except those designated as Category C1, C2, C3 or C4 Areas which experience moderate temperatures such as central Europe, Japan and central USA. Colder areas which include northern Europe/Scandinavia, the prairie provinces of Canada, Tibet and much of Russia. The coldest areas of the North American continent are of Greenland and Siberia.		
Serial	High Range Operating	Low Range Operating	Storage Range	Remarks
1	■°C	■°C	■°C	Power Cells will be expected to operate to at least 10% of the full optimal specification between the ranges ■°C to ■°C.
M1 - MARINE HOT M2 - MARINE INTERMEDIATE M3 - MARINE COLD		The tropical bulk sea areas where high ambient air temperature is the predominant climatic characteristic. The warmer, mid-latitude, regions of the seas, particularly temperate sea areas where high humidity combined with moderately high temperatures are together the principal climatic characteristics. The colder regions of the seas, particularly the Arctic zone		

Table 7: Expected Temperatures.

Fielding Usage

31.GBSR systems will be fielded according to the BFM which will include but may not be limited to:

- Very High Readiness (VHR) Formations, (Ready (R) State 2 and 3),

- b. High Readiness (HR) Formations, (R4 and 5),
- c. Training (Trg) Establishments,
- d. Formations on Other Operations (OO),
- e. Whole Fleet Management (WFM) Assets, and
- f. Attrition fleet is to cater for when the System is either lost or damaged Beyond Economic Repair during time of hostility and/or while held at Unit lines.

Land Fleet Requirement (LFR)

32.The GBSR Land Fleet Requirement (LFR) will consist of a minimum quantity of [REDACTED] systems.

33.Costed options for additional increments of [REDACTED] systems up to a total of [REDACTED] systems, (ie [REDACTED], [REDACTED] and [REDACTED]) will be included within the Tender.

34.GBSR has a Not To Exceed (NTE) figure of [REDACTED]. The NTE is to include the first four years of support.

35.GBSR will have a costed option for a further two years of support.

36.The intended Land Fleet requirement (LFR) is shown in the table below:

Table 8: GBSR LFR:

Land Fleet Requirement (LFR)	
	[REDACTED]

Setion 4 – Maintenance Factors

Equipment Life Cycle

37.Anticipated Service Life. In accordance with Outline Business Case (OBC) GBSR has an anticipated Service Life of ■ years.

38.Maintenance Planning. Maintenance planning should be calculated on the usage rates derived from

39.

Figure 1 – Logistic Footprint Representation:

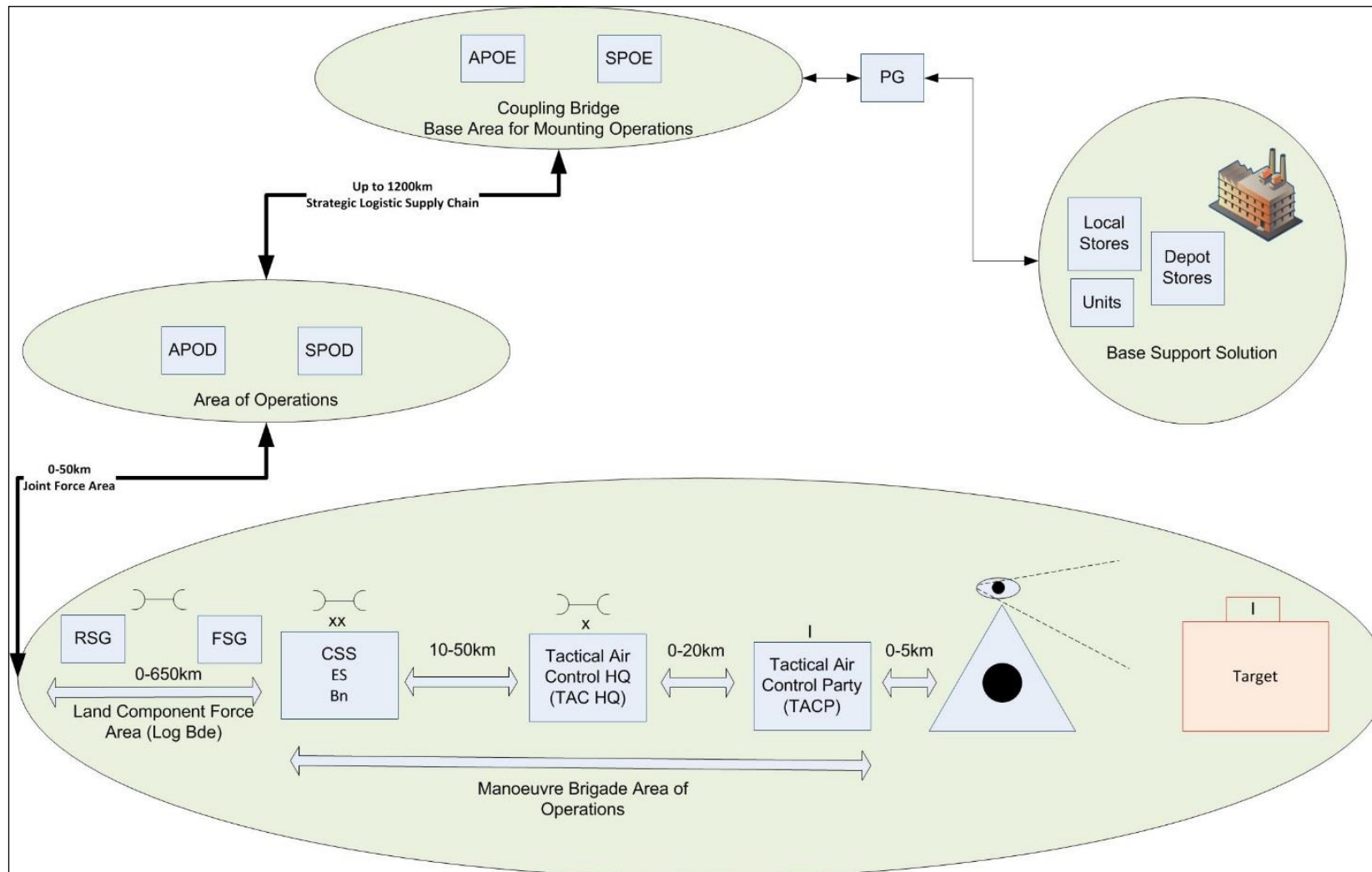


Figure 1

41. Section 3 – Fielding and Deployment . Furthermore, robust maintenance policies, which will be derived from the Level of Repair Analysis (LoRA), should be based on the worst-case usage rates.

42. Preventative Maintenance. Also referred to as scheduled maintenance. The outputs of the Failure Modes & Effects Criticality Analysis (FMECA) will identify which maintenance tasks are candidates for Reliability Centred Maintenance (RCM) analysis. The results of the RCM will be used to justify the preventative maintenance regime for the Product. In addition to the RCM the following constraints are applicable for the product:

- a. **Before Use Checks.** These are mandatory to confirm the serviceability of the product before it is used on a mission/BFM. This check will not take any longer than 5 mins in duration.
- b. **After Use Checks.** These are mandatory to confirm the serviceability of the product after it has been used on a mission/BFM. This check will not take any longer than 6 mins in duration.
- c. **Annual Inspection.** This is a mandatory comprehensive full functionality and physical check of the product, including its ancillaries and Complete Equipment Schedule (CES).
- d. **On Condition Maintenance.** Other on condition maintenance tasks will be as per the Supplier recommended tasks using the tools of FMECA and RCM, noting that the Product will not require any preventative tasks requiring the product to be shipped to Industry within 5-years of service.
- e. **Software.** Software, reloading and updating will also be performed by the User/Data Manager/Maintainer and therefore will not require shipping to Industry for software reloads or updates.
- f. **Out-of-Use Maintenance.** This is for Systems and its associated parts that are not in use, either held at Local Store Forward or Stores Depots at depth. Items that should be considered for this type of maintenance are:
 - (1) **Power Cells;** where identified a charging regime will be employed as recommended by the Supplier.
 - (2) **Radar Equipment;** where identified an inspection regime will be employed as recommended by the Supplier.
 - (3) **Shelf-Life Items;** such as seals and degradable components where identified an inspection regime is to be employed to check condition and replace parts where appropriate, as recommended by the Supplier.

43. Initial Support Period. This will be an initial ■-year contract with the option of two further ■-year options and will include a spares provision. The support option is not a firm decision as the optimal duration will be tested through appropriate Support Analysis.

44. Upgrade/Upkeep. GBSR shall be upgradeable to reflect changes to the Product's capabilities, support infrastructure and other interoperability capabilities. The Obsolescence planning shall consider both the technology growth of the Product as well as emerging component obsolescence issues.

45. Corrective Maintenance. The Maintenance Task Analysis (MTA) shall identify the details that the Authority's User / Maintainer will need to know how to perform the Upkeep of GBSR. These tasks shall be in agreement with the Authority against each candidate task listed below:

- a. Maintenance Level.
- b. Number of personnel, skill levels, skill specialities, man-hours and elapsed time.
- c. Spares, repair part and consumables required.
- d. Support equipment; Support Tools & Test Equipment (ST&TE); and test programme sets required.
- e. Training and training materiel required together with recommended training locations and rationale.
- f. Procedural steps required to perform the task including any safety and or environmental steps to be performed.
- g. Facilities required.

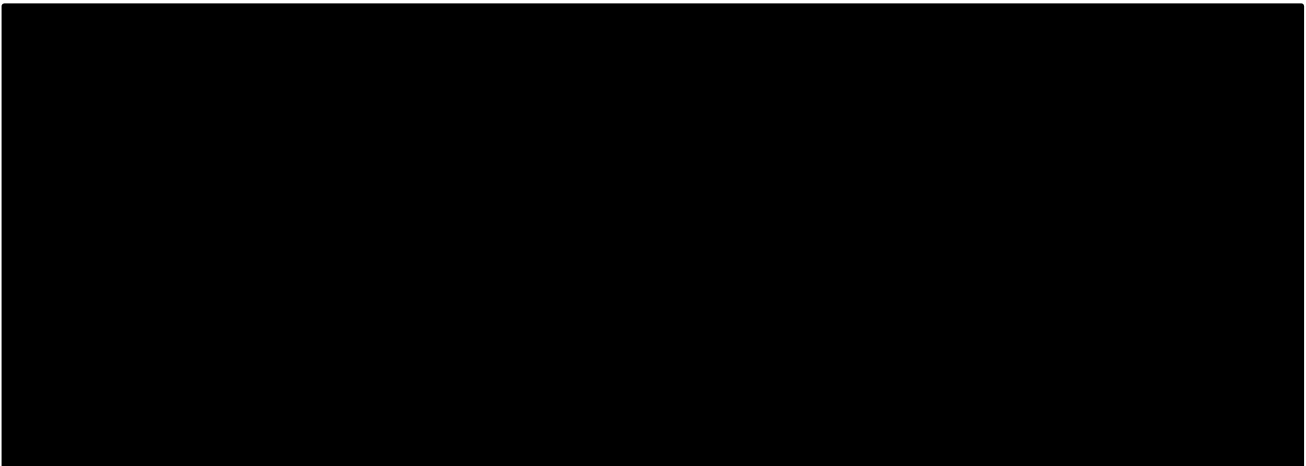
Repair Facilities

46.Levels of Equipment Support (ES). The table below describes the Definition of Maintenance Levels and where ES tasks are conducted and by whom. This includes the Levels of ES, which varies depending upon the engineering complexity of the repair task.

Table 9 – Definition of Maintenance Levels

47.ES Formation Levels show where each level of ES is conducted in an Area of Operations (AoO).

Figure 2 – ES Formation Levels:



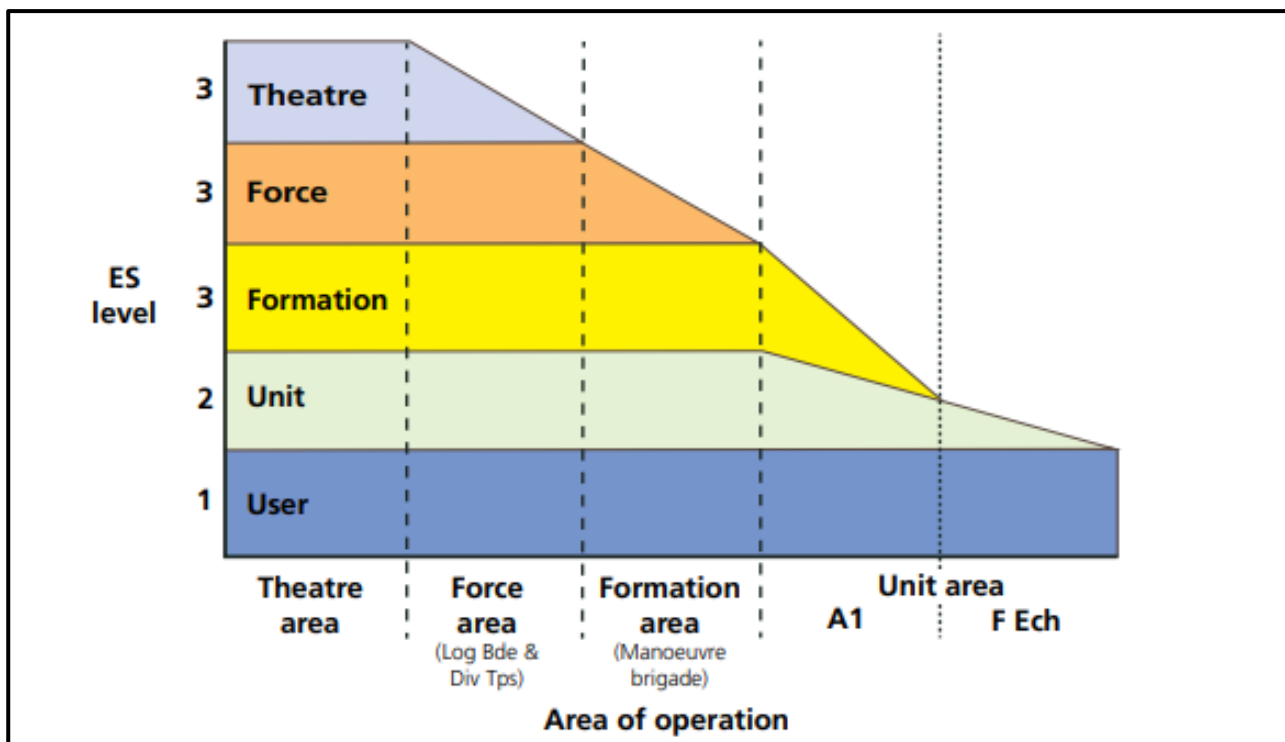


Figure 2

Reliability and Maintainability (R&M)

48.R&M is also referred to as ARM, AR&M or RAM to include availability (all of which are acceptable), but throughout this document the term R&M is used to embrace the entire field.

49.Inherent Availability (A_i). GBSR shall be inherently reliable and the A_i of the Product will be assured through the Reliability & Maintainability (R&M) Case.

50.The calculation for A_i will be as follows:

$$\frac{\text{Total Uptime or Mean Time Between Failure (MTBF)}}{\text{Total Downtime MTBF + Mean Time To Repair (MTTR)}}$$

51.On evaluating the parts count, that the Product will have to demonstrate in a R&M Case, the system level will give a MTTR based on the Usage and deployment factors. Working back from the current capability A_i of $\blacksquare\%$, this means the GBSR MTBF and Reliability probability can be calculated.

52.Reliability probability is defined as $R = e^{-\lambda t}$ and once we know the lambda (λ) failure rate and the Mission time the Reliability probability can be derived. This will give the Reliability Probability for the Product of successfully achieving the BFM.

53.A test plan will be produced to demonstrate that the Product meets the R&M specifications.

54.Restarts and Reboots. Learning From Experience (LFE) indicates the Product may have to be restarted and rebooted due to software glitches or bugs. The Product must be able to demonstrate that it can firstly perform restarts and reboots without compromising mission capability and secondly, demonstrate an ability to trace back the cause of why the Product had to be restarted or rebooted.

Section 5 – Supply Support Factors

Support Solutions Envelope (SSE)

55. The SSE is used by the Authority to articulate and validate all of the Key Support Areas (KSAs) of Defence Equipment and Support (DE&S) policy which are central to a good support solution and which drive coherence and avoid the known operational problems that arise when equipment is fielded with insufficient and / or incoherent support. The SSE represents best practice and is the primary vehicle through which delivery teams may identify and articulate support risks.

56. The SSE is broken down into four policy areas known as KSAs. Each KSA consists of several Governing Policies (GPs) which are critical to their area of operation. Supply Chain Management (SCM) is KSA 3 and consists of eight GPs. These are:

a. **Supply Chain Management (SCM).** To enable delivery teams to design their support solution to make sure that the processing of demands and the supply and distribution of materiel, including the use of the Reverse Supply Chain (RSC), use common SCM processes to guarantee a seamless interface with the Joint Support Chain (JSC).

b. **Codification & Item Ownership.** To ensure that identifying, tracking and managing items through the JSC is achievable, every item will be assigned a unique NATO Stock number (NSN). It will ensure a rationalised, efficient and operationally effective Single Defence Inventory is delivered by adherence to the Single Item Ownership (SIO) policy of one Item, one NSN and one Owner.

c. **Inventory & Supply Planning.** This ensures clear direction on effective and efficient through life inventory management in support of platform / equipment readiness and sustainability, including Initial Provisioning in accordance with Supportability Engineering (SE) activities, Re-Provisioning (RP), modification and inventory sustainability activities.

d. **Packaging & Labelling.** This ensures that all items entering the JSC are packaged and labelled to a consistent standard so that they arrive at the right place, at the right time in the right condition, with due regard to economy, and can be accurately recorded on MoD Consignment Tracking Systems.

e. **Materiel & Financial Accounting.** This will ensure that procedures and systems are in place to provide accurate Financial Accounting information relating to all assets and liabilities. It will enable the Materiel Accounting of equipment in accordance with Treasury guidance, leading to improved visibility of assets, item history, demand progression and tracking data, thereby providing an audit trail for Support Directorate (Sp Dir), Performance Management data.

f. **Fuels, Lubricants & Industrial Gases.** Cleaning compounds and fluids may be required as part of the maintenance programme and therefore may come under this area.

g. **Equipment Transportability.** This ensures that all equipment is designed so that it is transportable throughout the JSC without the use of bespoke / non-standard handling equipment and is suitable for safe transport as freight by air, land and sea. This GP is designed to protect the safety of individuals and the environment. Health and Safety (H&S) legislation demands that the MoD provide enough details for the load being moved ensuring the carrier fully understands the extent of load safety requirements.

h. **Storage and Distribution.** The DE&S Logistic Commodities Services and Transformation (LCST) Programme has managed significant investment into the Defence storage infrastructure and selected a Commercial Delivery Partner for its management with the intent of providing an efficient and effective service to Defence. Delivery teams within Defence are

to consider the LCST service as the first point of call for the provision of storage and distribution services within their Support Solution. LCST offers several compelling Value for Money arguments including potentially reduced costs from aggregation of the Defence requirement and harmonisation with Defence policy and practices.

Defence Support Network (DSN)

57.The DSN sets new standards for globally agile logistics. It is founded upon a strategically prepared and optimised strategic base, enabled by a whole force of versatile, professional military and civilian logisticians who are well led, supported by effective information services and empowered to draw upon strong partnerships with allies and industry in order to fully exploit the benefits of a responsive and efficient support chain linking the strategic base to the front line. The DSN is illustrated below:

Figure 3 – Defence Support Network:

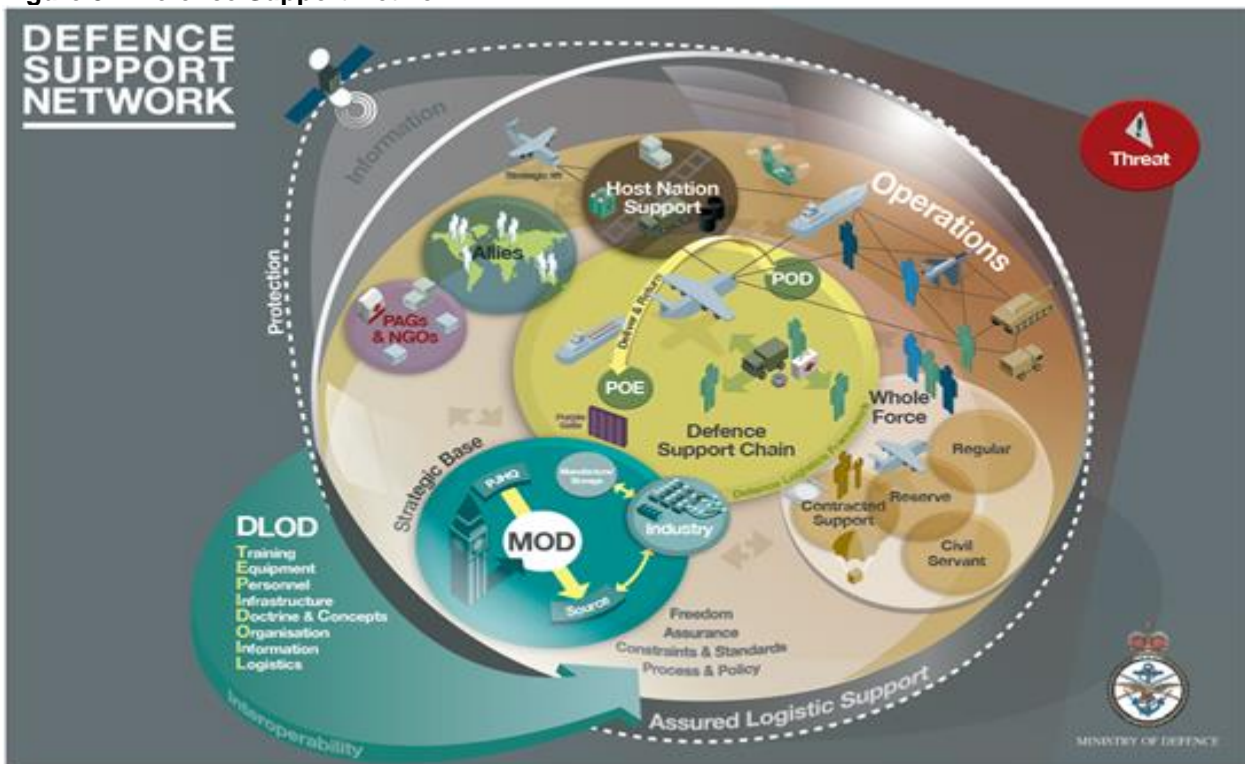


Figure 3

58. The DSN will require the way the MoD currently provides logistic support to evolve and develop new ways of operating, driving efficiency through innovation, enhancing the accuracy of demand forecasting, optimising the DSN to hold less stock but move it faster, enhancing support to the front line and enabling a minimised deployed footprint.

59.The Defence Support Chain (DSC) is a fundamental backbone of the sustainment and generation of military effort and forms a critical part of the DSN. The DSC encompasses equipment support and logistics support and is the activity that maintains military capability (Force Elements and enablers) at pre-planned availability, readiness and sustainability profiles through its whole life, and end-to-end. DSC is the entire materiel chain from procurement to provision of an item, to the point of consumption that comprises personnel; logistics; equipment; computer information system; infrastructure; legal; and, medical support.

60. Within DE&S, there are two key Operating Centres that support the DSC: The Sp Dir and the Logistics Delivery Operating Centre (LDOC):

a. Support Directorate (Sp Dir). The Sp Dir's primary role is providing a range of enabling processes, services and Logistics Information Systems (Log IS) solutions that improve the effectiveness of the DSC. The Sp Dir is responsible for the Inventory Management Transformation programme and is also the corporate home of the Integrated Logistics function. Sp Dir consists of five Business Units together with a range of centrally managed cross-cutting services:

- 1) **Support Chain Engagement.** Working with customers, the LDOC and Industry to deliver support improvements.
- 2) **Support Chain Information Services.** Deliver the integrated Log IS programme.
- 3) **Support Chain Processes.** Design the processes and provide support enabling services; such as National Codification services and Support Chain modelling.
- 4) **Support Chain Professional Development.** Provide the functional leadership to the Integrated Logistics function.
- 5) **Support Chain Finance.** Provide the pan-DE&S financial leadership, measurement, control and scrutiny.
- 6) **Cross-Cutting Services.** Includes Babcock Services Group (BSG), Finance and Commercial.

b. Logistic Delivery Operating Centre. LDOC is an organisation under the leadership of the Director of Logistics Delivery.

- 1) The LDOC oversees the transition of Logistics, Commodities and Services (LCS) to the Delivery Partner, Team Leidos; enables the Delivery Partner to link into the MoD; and, enables the operation of Defence Support Chain Operations and Movements (DSCOM).
- 2) Leidos has established Leidos Europe, Limited to manage the LCS contract. Team Leidos are responsible for delivery of the following services: commodity procurement and inventory management; food, operational ration packs, packed fuels oils and lubricants, medical, clothing and general stores, storage and distribution. Leidos represents the MoD's Main Stores Depot as part of the Organic Infrastructure. Any proposal in an innovative supply support solution must first consider the value for money argument of evidence for not using Leidos and its full suite of service support capabilities.
- 3) The LDOC provides a vital link in the DSC and in the global supply and provision of commodities to meet the changing needs of our Armed Forces whilst delivering it more cost effectively. The LDOC consists of a:
 - a) Change Management Team.
 - b) Commissioning and Managing Organisation for the LCS(T) contract.
 - c) LCS(T) Transition Team, which includes ongoing management of the Disposal Services Authority (DSA) and British Forces Post Office (BFPO).
 - d) DSCOM is a business unit within the LDOC. It is a joint organisation that supports the MoD, Permanent Joint Head Quarters (PJHQ) and the Front-Line Commands in the worldwide deployment, sustainment and recovery of materiel and personnel for Defence activity including operations, standing commitments, force generation, exercises, Defence engagement and routine movement.

DSCOM also acts as the DE&S Operations Centre, coordinating pan-DE&S support to Operations, and is the Regulating Authority for major Defence out-loads and-in loads through the UK strategic base.

Forward Logistic Network

61.Coupling Bridge. The Coupling Bridge is the strategic link between the strategic base and the Joint Operations Area through which all materiel and Force Elements flow utilising air, and surface assets in accordance with the Joint Task Force Commander's priorities. It supports the deployment, sustainment and redeployment phases, and involves all the strategic assets, infrastructure and facilities required.

62.Theatre Nodes for entry of material to the Joint Operating Area, as part of the Coupling Bridge have the main purpose to record and receipt materiel into Theatre via the Coupling Bridge and to act as the conduit for materiel returning to the UK through the RSC. In exceptional circumstances, where the materiel to be delivered into the Joint Operations Area does not originate from the UK and trans-shipment via the UK for entry into the supply chain is not practicable, then delivery direct in to the Joint Operations Area via the Theatre node can be authorised by DSCOM.

63.Joint Operations Area. An area of land, sea and airspace, in which a designated Joint Task Force Commander plans and conducts military operations to accomplish a specific mission. The area of operations consists of the Air Point of Disembarkation (APOD) and the Sea Point of Disembarkation (SPOD). The principal responsibility of this area is to support the land force and coordinate the delivery of joint logistics across the force components and direct and prioritise reverse supply shipments.

64.Strategic Base. Strategic base comprises military assets, industrial capacity both national and international, civilian contractors and National Health Service hospitals. Military assets include elements owned by the single-Services, Joint Forces Command and DE&S. This is the Base Support Solution, comprising both MoD organic supply support capabilities and also those supplemented by Industry. The Strategic base is required to sustain force deployments, including concurrent operations and training, in addition to the initial logistic surge for the initial deployment of the force. The base area of consists of the Air Point of Embarkation (APOE) and the Sea Point of Embarkation (SPOE).

65.Purple Gate. Purple Gate is the conceptual single point³ of entry from the strategic base into the DSC. The Purple Gate regulates materiel flow into the supply chain from DE&S project teams, through contractor logistic support arrangements, or directly from industry.

66.Tracking. All equipment, materiel and certain combat supplies consigned for transportation from one defence or defence-sponsored organisation to another are to be tracked from as close to the point of origin to as close to the point of use as the Defence consignment tracking information systems' availability allows. The conceptual single point of entry comprises several individually delegated physical locations: supply depots; RAF stations; naval bases; commercial ports (sea and air); and, Her Majesty's ships, when deployed.

a. Materiel flow through the Purple Gate is to be prioritised and tracked across the Coupling Bridge using common standards of preparation for all materiel including documentation, registration on consignment tracking systems and packaging prior to transportation by the selected mode.

b. DE&S PTs are to mandate that direct delivery of materiel and equipment from contractors for deployed units is to a nominated Purple Gate location. In exceptional circumstances,

³ The Defence Fulfilment Centre as managed by Team Leidos DSCOM Logistic Operations may nominate additional purple gate nodes and they can be located in Theatre.

DSCOM may approve direct delivery to the secondary Purple Gate at the APOE or SPOE on a case-by-case basis.

67.The Purple Gate is divided into Primary, Secondary and Theatre nodes:

a. **Primary Nodes.** Primary nodes are the main focus of Purple Gate activity and can be considered to be the focal point for all freight destined for an operational Theatre via the Coupling Bridge. The primary Purple Gate Node is located at the Defence Fulfilment Centre (DFC), Donnington, which is managed by the LCS Delivery Partner, Team Leidos. The Delivery Partner is permitted to nominate alternate LCS sites as the primary Purple Gate Node.

b. **Secondary Nodes.** Secondary Purple Gate Nodes⁴ will replicate the function of the primary node when it is expedient to deliver sustainment materiel directly to the Port of Embarkation to meet operational requirements, which will be authorised by DSCOM Log Ops. The major secondary Purple Gate Nodes are:

1) **RAF Brize Norton.** Operation of the secondary Purple Gate Node at RAF Brize Norton is the responsibility of HQ Air, who are responsible for the efficient operation of the Purple Gate process at this location. Day-to-day management of this secondary Purple Gate Node will be delegated to OC Air Port of Embarkation (APOE) Wing at RAF Brize Norton; Logistic Squadron will support APOE Wing where additional packing, labelling and documentation is required and who will also provide suitable storage, materiel handling and transportation assets to ensure the smooth preparation and transit of materiel passing through the Purple Gate Node.

2) **Her Majesty's Naval Base (HMNB) Portsmouth.** Operation of the secondary Purple Gate Node at HMNB Portsmouth is the responsibility of Chief of Materiel (Fleet), who are responsible for the efficient operation of the Purple Gate process at this location. Day-to-day management of the secondary Purple Gate Node at HMNB Portsmouth will be delegated to the Logistics Operations Manager, who will provide suitable storage, materiel handling and transportation assets to ensure the smooth preparation and transit of materiel passing through the secondary Purple Gate Node.

3) **Marchwood Military Port.** Operation of the secondary Purple Gate Node at Marchwood Military Port is the responsibility of Chief of Materiel (Fleet) in conjunction with HQ Land forces Port and Maritime staff which are responsible for the efficient operation of the Purple Gate process at this location.

68.Logistic Facets and Footprint. A representation of the intended logistic facets and forward logistic footprint supply planning parameters is shown at **Error! Reference source not found.**, (Page 20). The following storage constraints apply to the forward logistic footprint:

a. **Tactical Air Control Party (TACP) (Light Cavalry (Lt Cav))** – This could be a vehicle(s) with very limited spares storage capacity. Likely to have battery charging capability and spare battle winning essential critical CES items, such as batteries which will enable the User to conduct Level 1 repairs/maintenance in the BG Area.

b. **Tactical Air Head Quarters (TAHQ)** – This will be the BG HQ formation, with A2 Echelon support, which includes Technical spares and Combat Service Support (CSS) Level 2 repair. This will have limited Spares support of both CES and Technical items for up to 3-days.

c. **Royal Electrical & Mechanical Engineers (REME) CSS Battalion (Bn)** - This is the dedicated Level 3 repair capability which can be both in the Manoeuvre Brigade (Bde) area

⁴ RAF Brize Norton; HMNB Portsmouth; Marchwood Military Port; HM Ships when deployed; and, LS Ashchurch. DSCOM Log Ops maintains the authorised list of secondary Purple Gate Nodes.

and/or Log Bde area, depending on the nature and fluidity of the operation. This will have an increased capacity of spares storage capability of up to 5-days.

d. **Log BDE Area** - This is the deployed forward storage and distribution hub capability. This can have a Forward Support Group (FSG) and a Rear Support Group (RSG) operating over increased supply lengths. The combined storage capacity of the FSG and RSG will have a spares storage capability of up to 20-days.

e. **Total Forward Logistic** – is delivered through the Priming Equipment Pack (PEP). This seeks to provide the deployed GBSR User and/or force, with a preconfigured initial level of operating stock to enable its operation in the absence of an established supply chain. This allows the supply chain time to establish itself without being required to provide additional support to dependent units at the outset of an operation. Studies have shown that during the deployment phase of an operation the scale of stock that is deployed to theatre was too large and did not match the eventual requirements of the deployed units. This resulted in the following negative effects:

- 1) The supply chain, particularly in the force area, was overloaded with the receipt of an excessive amount of unneeded stock.
- 2) A significant proportion of materiel that was required was not held in theatre.
- 3) Units lost confidence in the supply chain resulting in over-demanding and hoarded stock.

f. The PEP seeks to rectify these occurrences by providing the forward logistic footprint for the deployed force with a usable base level of materiel. This means the total PEP of material requirement is for 28-days, which consists of Unit Spares of up to 3-days and the remainder 25-days spread between the REME CSS ES Bn, FSG and RSG. The level of effort for the PEP is as follows:

- 1) 3-days at High Intensity Combat (HIC).
- 2) 5-days at Moderate Intensity Combat (MIC).
- 3) 20-days at Routine Intensity Combat (RIC).

g. Expected timelines for the forward logistic footprint is as follows:

- 1) Between the GBSR User and the Lt Cav will be within 60mins but dependent on the tactical situation a supply window of availability for resupply once in every 24hr BFD.
- 2) Between the Lt Cav and TAHQ will be within 2hrs but dependent on the tactical situation this could stretch up to 24hrs.
- 3) Between the TAHQ and REME CSS ES Bn and/or FSG will be within 12hrs but dependent on the tactical situation this could stretch up to 72hrs.
- 4) Between the REME CSS ES Bn/FSG and the RSG will be within 48hrs but dependent on the tactical situation this could stretch up to 5 days.

h. PEPs can be for the:

- 1) Formation.
- 2) Force.

3) Unit.

69.Sustainment Stock is stock required to sustain the deployed forces once the initial PEP period of 28 days has passed and for the next 90 days until the routine supply chain can be implemented.

70.GP1.1 covers the Total Logistic Requirement (TLR), this will include the kit needed for 28 days (PEP), and for the next 90 days (Sustainment stock). The two figures of PEP and Sustainment Stocks then form the Contingent Operational Stock (COS).

71.Tenets of Supply. Set out below are the basic principles that apply to the supply of any commodity. Operational requirements will always be paramount in the operational/deployed supply chain whilst cost effectiveness will be the main driver in the base and non-deployable supply chain. The non-deployable supply chain must remain sufficiently robust and flexible to meet all sustainability and readiness requirements. The non-deployable supply chain is defined as those units and installations that have no deployable role away from their peacetime locations on operations.

a. Demand Procedures. There should be one method of demand. A common demand format should cover all commodities.

b. Information Technology Platforms. Units should have a single Information Technology (IT) platform for processing all supply chain activities. This could include several sub routines or integrated packages to manage specific areas. The system should incorporate, where possible, asset tracking, acquittal and resource management.

c. Supply Chain Activities. The supply chain activities behind a unit demand, or use of agency/purchase card, must be invisible to the unit and not require further input.

d. Direct Supply. Direct supply may only go from a supplier to either the base or a stockholding unit. Items may not be delivered direct to units unless a specific requirement exists. Where exceptions are granted there must be a planned contingency system that utilises the Services' supply chain. Exceptions may be granted on a case by case basis. Contractor bespoke delivery systems may not be able to extend into operational theatres, and only exceptionally beyond the APOD/SPOD. All contracts must have a built-in provision for items to be delivered to the base for load configuration, aggregation and onward movement to the appropriate theatre.

e. NATO Codification. Items demanded through the JSC must be codified. The UK National Codification Bureau (UKNCB) is the default route for all items of supply for codification.

f. Support Strategy. The envisaged Support Solution for GBSR is a blend of essential support from the Original Equipment Manufacturer (OEM), the use of existing MoD in-service support systems, procedures, processes, facilities covered under the LCST contract with Team Leidos and the use of elements of the Land Equipment (LE) Service Provision and Transformation Contract (SPTC) with Babcock Defence Support Group (DSG).

g. Logistic Information Repository (LIR). Contractor LIR is to be seamlessly interoperable with Services LIR at the point of connection. Additionally, all logistic data and information required contractually to be transferred by a contractor over the Army LIR is to conform to MoD data and information standards.

h. Supply Chain Pipeline Times. The provision of Supply Chain Pipeline Times ensure that the Standard Priority System remains fit for purpose and enables logistic support staff to sufficiently prepare, sustain and deliver the deployed inventory. Suppliers will be contractually bound to deliver materiel, packed and documented to the required standard, to the designated Purple Gate within a Standard Priority System compliant timeframe to allow the supply chain enough scope to complete the delivery within the overall Supply Chain

Pipeline Times. Pipeline times are determined depending on theatre. Theatre A (UK Mainland, N Ireland & Scottish Isles including all maritime elements located in a UK port or with a UK port as their next port of call) timings are shown in theError! Reference source not found. table below:

	FORWARD SUPPLY CHAIN			REVERSE SUPPLY CHAIN		
Standard Priority Code (SPC)	IMMEDIATE 01 & 05	PRIORITY 02 & 09	ROUTINE 03 & 13 04 & 16	IMMEDIATE 05	PRIORITY 09	ROUTINE 13 & 16
Demand Transmission Time (DTT)	Within 1 hour	3 hours	6 hours			
Demand Processing Time (DPT)		3 hours	18 hours			
Materiel Handling Time (MHT)	1 hour	18 hours	3 days	24 hours	3 days	10 days
Time for Distribution	22 hours	1 – 5 days	3 days	24 hours	5 days	10 days
Time for Receipt LCS/Unit				24 hours	14 days	35 days
Total SCPT	24 hours	2 – 6 days	7 days	3 days	22 days	55 days
Mode of Distribution	Fastest possible means	Fastest possible means	Scheduled transport	Fastest possible means	Fastest possible means	Scheduled transport

Table 10 - Supply Times

72.Standard Priority System. The Standard Priority System is used to enable demands to be satisfied based on the urgency of their need without placing undue stress on the Joint Supply Chain. Demand, selection and movement of Defence materiel will be governed by the Standard Priority System, which applies to demands for materiel available from the Defence inventory. Each demand shall be ascribed a Standard Priority Code (SPC) in accordance with the table below:

Priority	SPC	Description	Authority	Demand Transmission Time	Demand Processing Time	Materiel Handling Time
Operational						
IMMEDIATE	1	Fastest Possible Means	Command HQ PJHQ Op Theatre CO	Within 1 Hour	Within 1 Hour (including DTT)	1 Hour
PRIORITY	2	Fastest Economic Means / Fastest Scheduled Transport	SO2 / SO3 Level Logs Officers / QMs	3 Hours	3 Hours	18 Hours
ROUTINE	3/4	Routine Handling / Standard Scheduled Transport	Unit Logistics Personnel	6 Hours	18 Hours	3 days
Non-Operational						
IMMEDIATE	5	Fastest Possible Means	Command HQ or exceptionally Unit CO	Within 1 Hour	Within 1 Hour (including DTT)	1 Hour
PRIORITY	9	Fastest Economic Means / Fastest Scheduled Transport	SO2 / SO3 Level Logs Officers / QMs	3 Hours	3 Hours	18 Hours
ROUTINE	13/16	Routine Handling / Standard Scheduled Transport	Unit Logistics Personnel	6 Hours	18 Hours	3 days

Table 11 – Standard Priority Code

Reverse Supply Chain (RSC)/Backloading

Declaration of Unit Surpluses (Consumable and Repairable)

73. The return of unserviceable items via the RSC is normally only applied to repairable items subject to a planned repair programme or replacement through issue from stock. There may be exceptions to the rule e.g. ICC reclassification, items subject to recall/specific inspection, surplus stock or items identified for disposal but, only under controlled arrangements in the UK. The process is normally referred to as backloading and is covered in the Defence Logistics Framework (DLF), see extract from DLF below:

a. Any materiel held by a unit that is not required to meet forecast requirements or liabilities or is a storage embarrassment is to be deemed as surplus to requirement.

b. Units are to request return instructions using:

- 1) The appropriate Logs IS.
- 2) A manual request, using AF G8621, F4384.
- 3) Higher Authority/Delivery Team direction.

Section 6 – Support Factors

Support Tools & Test Equipment (ST&TE)

74. Requirements for tools and/or test equipment are to be kept to a minimum. Wherever a requirement exists for tools and/or test equipment associated with a repair level the Authority shall be consulted.

75. Details of tools currently available for use by REME Technicians are available if required.

Human Factors Integration (HFI)

76. HFI is an important area of the GBSR Project. Unless the equipment is simple to use and maintain it is unlikely to be operated effectively in the dismounted close combat environment. GBSR PT has commissioned an HFI Study to clarify requirements.

Training

77. Health and Safety Considerations. The MoD has no general exemptions from the provisions of the UK H&S at Work Act 1974 or the Factories Act 1961. They are equally applicable to civilian and service working environments under peacetime operating conditions. Inspection, maintenance or repair procedures must therefore comply with the appropriate requirements of both these Acts. This includes, (but not limited to), compliance with Control of Substances Hazardous to Health Regulations (COSHH) and Ionising Radiation Regulations.

78. Training Equipment. Training equipment is separated into.

a. **Current Equipment.** The equipment that provides the current capability is utilised to give practical based learning using outside areas. A programme has also been developed to enable fire missions to be input – see Section 7 – Current System Use for details.

b. **Future Equipment.** The Joint Fires Synthetic Trainer (JFST) is due to enter service in [REDACTED] and will be used to simulate Joint Fires processes with an element of GBSR being integrated into it. The level of GBSR integration is yet to be determined and is out of scope for this project.

79. Training User Groups. Training User Groups are as follows:

- a. Instructor
- b. RA tactical user.
- c. Light Cavalry user.
- d. RAF Regiment user.
- e. Maintainer (REME and RAF Authorised Maintainers).

Technical Publications

80. Technical Publications include all technical information relating to the system including:

- a. Plans and Drawings.
- b. Software Documentation includes the following:

1) Design information including, but not limited to, specifications, source code (if bespoke), structure charts and data flow diagrams.

2) System information.

3) Support environment and facilities information including:

a) Development process information including, but not limited to, codes of practice, programming guidelines and development standards.

b) Management information including, but not limited to, quality, configuration management, test/acceptance and safety plans.

c. User Instructions.

d. Maintenance Procedures.

e. Provisioning Documentation.

f. Urgent and temporary technical and supply information.

81.The mandate for the requirement of a full Interactive Electronic Technical Publications (IETP) derived from Electronic Documentation is not applicable for the Product. Technical documentation shall be produced to the DefStan 00-601, Part 4 - Business Rules – Contracting for Technical Documentation - Non S1000D Business Rules and Army Equipment Support Publication (AESP) 0100-P-001-010 AESP Policy Guide to System Management must be used in conjunction with the above DefStan. Technical Documents (TD) will be held in the MoD's Technical Documents On-Line (TDOL) information system. Evidence of how the AESPs were constructed from a Common Source Database (CSDB) of Data Modules is still required to ensure the through life configuration of the Product's technical information. The User community also includes the entire support community involved in the upkeep and update of GBSR; User, Maintainer, Army Head Quarters (AHQ), PT, Industry, Leidos, Babcock and other agencies requiring access to the planning & technical specifications and repair information.

82.Any technical publication for GBSR will adhere to the requirements of the Army Technical Publications Policy Board and be absorbed into the AESP system.

83.The AESP system provides equipment support information in a combination of categories and levels which give a logical organised presentation of information for the planning staff, the user/operator and the repair personnel for Army equipment and form the full set of OCTADS.

84.The AESP OCTADS are as follows:

a. 101 – Purpose and Planning.

b. 111 – Equipment Support Policy Directive, (Internally produced by Authority not Contractor).

c. 201 – Operating Information.

d. 302 – Technical Description.

e. 512 – Failure Diagnosis.

f. 522 – Repair Instructions – Maintenance Level 2.

g. 523 – Repair Instructions – Maintenance Level 3.

- h. 524 – Repair Instructions – Maintenance Level 4, (OEM Level 4 Repair Instructions).
- i. 532 – Inspection Standards.
- j. 601 – Maintenance Schedule.
- k. 711 – Illustrated Parts catalogue.
- l. 721 – Civilian Parts Catalogue.
- m. 741 – Complete Equipment Schedule – Simple Equipment.
- n. 751 – Complete Equipment Schedule – Complex Equipment.
- o. 811 – Modification Instructions.
- p. 821 – General Instructions.

85.Information levels are:

- a. **Level 1 – User Level.** Contains information required by the person who is to operate the equipment.
- b. **Level 2 – Unit Level.** Contains information of the maintenance and degree of repair to be carried out by tradesmen attached to the unit, or in the Light Aid Detachment (LAD) or equivalent.
- c. **Level 3 – Field Level.** Contains information of the maintenance and degree of repair to be carried out by tradesmen at Field Workshops and Land Command Support Group Workshops or equivalent.
- d. **Level 4 – Base Level.** Contains information of the maintenance and degree of repair to be carried out by tradesmen at the DSG workshops or equivalent.

Packaging Handling Storage And Transportability (PHS&T)

Packaging

86.Packaging Standards. All packages should be able to be transported throughout the JSC without the use of specialised equipment if possible. Where applicable, they must conform to national and/or international transportation regulations.

87.Packaging Waste Regulations. All packaging produced on behalf of the MoD must meet the relevant Packaging and Packaging Waste Regulations including certain UK essential environmental requirements. These include:

- a. Minimising packaging volume and weight in line with safety, hygiene and product/user acceptance
- b. Designing packaging to permit its reuse and/or recovery and to minimise the impact of packaging waste on the environment
- c. Manufacturing packaging to minimise the presence of hazardous substances in emissions, ash, or leachate when packaging waste is incinerated or landfilled

88.Serviceability. Defence Materiel delivered into the Military supply chain needs to be packaged to ensure that it reaches the end user in a serviceable condition.

89.Packaging materials. The choice of packaging materials and processes is left to the packaging supplier. However, the following points shall be considered:

- a. Provide adequate physical protection
- b. Not to make the item attractive
- c. Provide clear identification and marking
- d. Be the most cost-effective solution
- e. Provide a solution that is space efficient
- f. Be fit for purpose for the journey specified
- g. Be easily handled by in-service Mechanical Handling Equipment (MHE), if applicable.

90.Packaging Suppliers. Options for which packaging supplier to use need to be investigated. Consideration should firstly be given to commercial/trade packaging and the requirements of the envisaged supply chain. If there are doubts with the suitability offered by this type of packaging then the use of UK Military packaging levels should be investigated, where the Military Packager Approval Scheme (MPAS) system should be used. A register of the Organisations and MPAS Certificated Designers (Issue 11 Dated 29 January 2018) is maintained by DE&S SP DIR and will be provided to the successful Bidder post Contract Award.

91.Air Dispatch. There will be a necessity for the GBSR system to be delivered to deployed forces through air despatch. This means that the system will need to be packaged to withstand the impact associated with being dropped from an aircraft travelling at an undetermined height and speed. Impact force thresholds are contained within the SRD.

92.Military Packaging Levels (MPL). MPL are based upon defined storage and distribution requirements. These are designated P, N, and J according to the physical and climatic conditions which may be experienced within the military sphere of activity.

93.Packaging Design. Packaging needs to be designed for the envisaged handling e.g. Handles may be required for Manual Handling; lifting rings, pallet bases etc may be required for MHE. DefStan 81-041 refers.

Storage Requirements	Distribution Requirements	Military Packaging Level
Storage for a minimum of 5 years world-wide and in frost free permanent buildings. (See NOTES 1 and 2).	In store handling, overpack for issue.	P (See NOTE 3)
Storage for a minimum of 5 years world-wide and in frost free permanent buildings (See NOTES 1 and 2).	Movement by enclosed transport, handling usually by mechanical handling equipment. (See NOTES 4 & 8).	N
Storage for a minimum of 2 years world-wide with full weather protection. (See NOTES 5 and 6).	Movement and handling by any means within the transportation budget. (See NOTES 7 & 8).	J
<p><i>NOTE 1 Permanent buildings may be heated or unheated.</i></p> <p><i>NOTE 2 In extreme cases, items may be stored outside, with full weather protection for a maximum period of 60 days.</i></p> <p><i>NOTE 3 When an order or contract specifies packaging to Level P, the supplier shall overpack the packaged article(s) in the most economical commercial form to provide for ease of handling and to ensure delivery to MoD in an undamaged and serviceable condition. Articles of only one MoD stock reference, domestic management code, and vocabulary section or class group may be bulked together.</i></p> <p><i>NOTE 4 The distribution requirements of Level N include unavoidable exposure to weather for very short periods (less than 10 minutes) for example when transporting stores from a building to a vehicle or aircraft.</i></p> <p><i>NOTE 5 Temperature range for world-wide storage and distribution shall be taken as -13°C to +55°C.</i></p> <p><i>NOTE 6 Full weather protection means avoidance of direct exposure to rain, sun, or wind. This may involve no more protection than that afforded by a tarpaulin properly lashed down.</i></p> <p><i>NOTE 7 Movement and handling by any means includes unavoidable exposure to weather, e.g. in uncovered transport or storage on docksides for periods up to 12 hours.</i></p> <p><i>NOTE 8 Distribution transportation budget means:</i> Road Service/commercial wheeled vehicles 20,000 km Rail Western European Standard 5,000 km Air A total of 10 air journeys may occur totalling 175 hours distributed as follows: Fixed wing jet aircraft 100 hours Fixed wing propeller aircraft 50 hours Helicopter (internal) 20 hours Helicopter (under-slung) 5 hours Sea At sea within unventilated containers 4 months Storage in port within unventilated containers 12 months Forklift trucks and trolleys 2 hours Cranes and hoists 50 lifts</p>		

Table 12 – Military Packing Levels

94.Special to Contents Containers (STCC). A special to contents container is a uniquely configured container designed for multiple journeys whilst supporting and protecting its prescribed contents during handling, storage, and transportation throughout the Supply Chain. The container shall protect personnel and equipment from any hazardous contents.

95.STCC Codification. It is a requirement that STCC are codified by allocation of an NSN for accountability and identification purposes. An NSN will be needed for each system configuration container and the container used for managing the equipment spares.

96.Working Drawings. A full set of working drawings are required, prepared in accordance with BS 8888 for each container.

97.Spares. The spares container will be reusable in order that it can be utilised within the reverse supply chain. Therefore, it will need to be durable and may necessitate the use of stronger materials. Any closure and closure reinforcement should be such that the container can be opened and re-closed without damage.

98.Services Packaging Instruction Sheet (SPIS). A SPIS⁵, as shown in the table below. A Services Packaging Instruction Sheet is to be included with each container, DefStan 81-041 refers.

⁵ Defence Standard 81-041 Part 4 - Packaging of Defence Materiel - Part: 4 - Service Packaging Instruction Sheet (SPIS).

NATO Stock No.		Services Packaging Instruction Sheet (See Def Stan 81-041 Parts 1 to 6)		Packaging Level J N P H	
Makers Part No.		Item Name:		Nett Weight (kg)	
Other drawings / Standards Associated with this SPIS:					
Markings – Additional					
Preparation & Preservation			Container & Packing Details		
Cleaning		Detail	Inner Cont.	Outer Cont.	
		No. Items per Container			
Drying		Type of Container			
Protective		Drawing or Standard No.			
Wrapping		Internal Dimensions			
		External Dimensions			
Dunnage:	Desiccant Climatic: Total:	Internal packing			
Barrier		Closure			
G Factor					
Remarks & Special Packaging Details		Gross Package Mass (kg)			
		Designed By: Of: Dated:			
		Certified By: Of: Dated:			
		MPAS Registration Number:			
		For Further Information Apply to:			
		Initials	Reason for Amendment	Date	Issue No.
					0 0 1
All Dimensions are in mm unless otherwise specified		SPIS Sheet Pkg Form 0673a Issue 05/18		Sheet of	

Table 13 – Services Packaging Instruction Sheet

99.Dangerous Goods

a. **Lithium Batteries** – It is anticipated that some components of the System will be powered by Lithium battery. Due to the power and heat they generate and the possible risk they pose to life and equipment, lithium batteries are classed as dangerous goods. They must therefore be packaged, handled, stored and transported in accordance with Dangerous Goods legislation.

b. **Nickel-Metal Hydride Batteries** - Nickel-Metal Hydride batteries may also be used to power components of the GBSR system. This type of battery is classified as a dangerous good but is only regulated when transported by sea and if it is not packed with or contained in equipment. If it is not packed with or contained in equipment, it will need to be securely packed and protected against short circuit.

1) **Road and Rail Transport** - Nickel-Metal Hydride are not subject to European agreement concerning the international transport of Dangerous Goods by Road (ADR) or International Carriage of Dangerous Goods by Rail (RID).

2) **Air Transport** - Nickel-Metal Hydride must be protected against short circuit and accidental activation. The Air Waybill must be annotated 'Not Restricted – A123' in the 'Description of Substance' part of the Waybill.

100.Bar Code Marking – Every component of the GBSR system will need to be 2D barcoded to ensure the safe tracking of the systems and parts within the supply chain.

Handling

101.Manual Handling - All packages designed to be handled manually, or that may be manually handled, must meet the H&S Manual Handling Operating Regulations (MHOR).

102.Mechanical Handling - There is a need to identify any special lifting requirements and/or MHE to enable the correct packaging design to be selected. (Health & Safety (H&S) Regs/ Provision and Use of Work Equipment Regulations (PUWER)).

103.Centre of Gravity Markings - All offset centre of loads are to be clearly marked to show the centre of gravity. These markings are equally important whether the item concerned is to be moved manually or by any means of mechanical handling equipment (DefStan 81-041 Pt 6).

Storage

104.Climatic & Physical Conditions – Complete systems will be stored at the Defence Fulfilment Centre and at Unit level under cover and in a temperate climate. Parts will be stored under the same conditions but will remain unopened and within their individual packaging unless in-store maintenance is required.

105.Magnetic Material - Materiel Sensitive to Magnetic Fields - Must be clearly marked to show it contains magnetic material and must not be stowed near compasses that could be a hazard to navigation or any other equipment of a sensitive nature. Equipment that is magnetically and susceptible to alteration of its magnetic signature, should be stored away from strong magnetic fields.

106.In Store Maintenance - Some packs require regular in-store maintenance to ensure the equipment remains in a serviceable condition, e.g. Desiccant renewal. Wherever possible the packaging should be designed to make access to the equipment easy. This will depend on the type of in-store maintenance required.

107.Despatch & Re-packaging - Where items held in store are re-directed to an environment or are to be transported in a different mode for what they were initially packaged for then the initial pack will need to be over-packed or re-packed in order to satisfy the new environmental and/or transport requirements.

108.COSHH Certificates – Certificates will need to be provided for any equipment that is subject to COSHH. This includes any laser certification.

109.Shelf Life Items/Quality Control - DefStan 81-041 Pt 6 details how items are to be managed in respect of shelf life and quality control.

110.Classified Stores - Classified stores, confidential and secret must be stored in a secure store with limited access to named individuals. Stores are not marked to show the security classification and should always be escorted when issues and returns are made.

111.Storage – Complete packaged systems will be stacked and placed on pallets for ease of lifting by MHE.

Transportation

112.Hazard Data Sheets - In accordance with Dangerous Goods Regulations the Transportation of Dangerous Goods will need a hazard data sheet provided by the Contractor.

113.Manufacturer or Supplier. More information regarding the transportation of dangerous goods can be found at serial 6.25 above.

114.Transportability – The system and its ancillaries will be transported by air, land and sea. Packaging will need to be designed to ensure safe and secure transportation.

Software Support

115.Commercial Off The Shelf (COTS) Support Factors. It is envisaged that GBSR will be a COTS solution therefore the following significant factors will require consideration:

- a. Provision of a COTS upgrade programme to continually counter the problem of obsolescence and to accommodate MoD driven capability requirement changes.
- b. Plan for COTS upgrade covering backwards compatibility assurance and where appropriate development environment sustainment.
- c. Utilisation of Open Standards to assist with the introduction of new functionality and interface changes.
- d. Plan for changes in the suitability and utilisation of Open Standards.
- e. Conduct the full range of SA for bespoke system interfaces.
- f. Reduce the occurrence and impact of system certification and accreditation by separating high integrity functionality from expected areas of change.
- g. Plan for change management. Limit the occurrence of change unless vital to capability sustainment or are proven to be cost effective.
- h. Plan for through life System Integrator capability evaluation.

116.The ability to modify COTS software products will be highly constrained therefore unlikely to happen. However, where COTS are modified the support provider will be required to detail how the long-term capability sustainment would be achieved. This should include strategies that:

- a. Detail how system capability will be sustained in response to reported faults and enhanced to meet emerging requirements.
- b. Detail the approach for replacing any COTS components that become obsolete, are withdrawn from the market, or are no longer supported.

Security and Intellectual Property

117.A key factor of support continuity is the content, structure and ownership of the Bill of Materials (BoMs). The ownership of the BoM will be held by the Authority. The Supplier is expected to structure the BoM to reflect information for the Product as shown in the table below:

LCN	Part No.	Drawing No.	Mother Item	Qty Fit Per Mother	NSN (if applicable)	OEM	OEM Part No.

Table 14 – Bill of Material

118.In order to manage future costs, ensure Support Continuity and mitigate any risk of Contract exit the Authority will also hold ownership of the complete System Maintenance Data Pack.

Section 7 – Current System Use

System Summary

119. MSTAR is a self-contained, man-portable, battlefield GMTI radar system for detecting, tracking and classifying moving targets and for directing and monitoring subsequent engagement of the targets by artillery fire. MSTAR has been in service since the [REDACTED] and has been through a number of upgrades, the last commencing in [REDACTED] on a rolling programme until [REDACTED]. The capability is used across Defence; by RA Observers and ISTAR detachments; by Light (Lt) Cavalry in the reconnaissance role; and by RAF Regiment force protection units. MSTAR was used extensively in Iraq and Afghanistan and is currently deployed on operations.

120. MSTAR is capable of detecting Individual and multiple moving target [REDACTED]. Surveillance is provided over an arc of up to 6400 mils. A Fall of Shot (FoS) mode provides information to enable artillery and mortar fire to be adjusted onto target. It offers an all-weather 24/7 capability to the BG and its specification will permit its use in a wide range of environmental conditions.

121. The System comprised of the following modular equipment:

- a. **Control and Display Assembly (CDA)** – The CDA comprises 3 modules contained within a single frame assembly. The modules are Electroluminescent Display Panel; Keyboard Assembly; and Control and Display Panel Electronic Circuit.
- b. **Aerial Head Assembly (AHA)** – The AHA comprises a compartmented Frame Assembly containing the Radio Frequency (RF) processing and antenna systems. The unit is mounted on the Main Equipment Assembly (MEA).
- c. **Main Electronics Assembly (MEA)** – The MEA comprises a lightweight aluminium frame assembly containing the module electronics. The frame assembly has 3 main compartments, a central compartment to accommodate the Angulation Head and two outer compartments each having guides to accept double Eurocard circuit boards.
- d. **Ancillary Items:**
 - 1) Tripod, (GFA).
 - 2) Headphones.
 - 3) Sight.
 - 4) Battery System.
 - 5) Combat Containers.

Maintenance Concept

122. The logistic support policy for the current capability MSTAR which was brought into service in 1982 as a safety/mission critical capability for the RA requiring minimal forward logistic effort and maintenance.

123. The maintenance levels adopted are:

a. **Level 1 - User** - These tasks related to maintenance upkeep either; Corrective and/or Planned maintenance types, forward at the deployed operating site.

b. **Level 4 – Base Level (Industry)** – Maintenance tasks considered above the skill level of the Service Maintenance Staff. These tasks related to maintenance upkeep either; Corrective and/or Planned maintenance types at depth through an agreed arrangement.

124. The scope of maintenance types adopted were:

a. **Functional** – Related to the User Operator performing a series of physical and functionality checks in order to confirm proper system operation. These checks are carried out 'Before Use' conducted as part of the User Operator maintenance checks in the Setup of System before-use. These detail the instructions the User Operator are required to check, with the expected result associated with each check.

b. **Servicing** – Related to quarterly calendar service tasks to check the power performance of power cells of the System. In addition, Power cells and lithium-ion batteries held in storage were identified as requiring re-charging every two months.

c. **Inspections** – Annual Inspections of equipment are conducted as part of the Army's equipment care directive.

d. **Calibration** – Line Replacement Units (LRUs) identified requiring calibration was conducted as part of the CLS contracted arrangement.

Training

125. Operator training is provided at a single location, Joint Fires Section, Royal School of Artillery. The training is embedded in both 'Fire Support Team Assistant's' course and 'Fire Support Team Commanders' course. The embedded Training Objectives, Enabling Objectives and Key Learning Points are a mixture of classroom theory and practical based learning using outside areas and live firing. Validation is provided by a practical exam.

126. MSTAR training is also provided by Joint Fires Section Royal School of Artillery (RSA) to infantry units who may be issued with the equipment for Recce and Surveillance purposes. This training [REDACTED].

127. Training materials are delivered by RA Sergeant Major Instructor Gunnery (SMIG) staff at RSA.

128. A Training Needs Analysis (TNA) was not conducted for the equipment being brought into service. Defence Systems Approach to Training (DSAT) is the mandated process that must be used by those who are involved in the analysis, design, delivery, assurance, management and governance of training across Defence ensuring the guidelines set out in JSP 822 are adhered to. DSAT is designed to generate a Training System that allows trainers⁶ to deliver appropriate, effective, efficient, accountable, safe and risk-focussed training to trainees⁷.

129. RSA provided Element 4 of the DSAT process giving Assurance that the training activity being delivered met the training requirements.

⁶ The term 'trainer' encompasses all those engaged in delivering training across Defence, for both individual and collective training.

⁷ The term 'trainee' encompasses all those in the receipt of across Defence, for both individual and collective training, and encompasses such terms as 'recruit', 'student', 'learner', 'exercising troops' etc.

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130.The cascade of training was utilised by the Contractor providing Train-The-Trainer (T3) courses for the Authority to cascade to the User community.

Manpower

131.Operator Manpower

132.MSTAR takes 2/3 personnel to carry and set up but then one person to operate at any one time.

133.Maintainer Manpower

134.MSTAR has no maintainer manpower due to the support contract being a fully level 1-4 OEM support option.

Physical Dimensions

135.Dimensions and weights are given in the Table below for the individual man-carried packs and for the assembled radar in its operational state. When in use, the control and display assembly is within its combat container which is extended to form a canopy.

Equipment state	Item	Height	Length	Width	Weight
Operational	Erected AHA, MEA and tripod	1925 mm maximum	N/A	N/A	34 kg
	CDA (in combat container)	330 mm	450 mm	410 mm	6.75 kg
Stowed	Backpack 1 (AHA + telescope + 20 metre	585 mm	310 mm	675 mm	13.7 kg
	Backpack 2 (MEA)	480 mm	410 mm	370 mm	15.00 kg
	Backpack 3 (CDA + headset + battery cables	260 mm	740 mm	410 mm	16.6 kg
	Carrying bag with tripod kit	255 mm	900 mm	255 mm	10.5 kg

Table 15: MSTAR Dimensions and weights

MSTAR Supportability Cost Drivers

136.Level 2 repairs for MSTAR were originally done by Army but it was decided that there was a cost saving to be had by removing this option (in terms of no longer needing to provide training courses/equipment). TNA will need to explore this option to better understand the impact of Level 2/3 repair.

137.Collimation – With MSTAR this is currently a manual process – Automatic Self Collimating will save the need for provision & maintenance of collimation test sets, training and performing annual collimation.

138.Batteries – usually an expensive item, if these are a variety that fall under an existing SIO arrangement then that will likely be cheaper than if they are unique GBSR. Originally MSTAR used rechargeable Clansman batteries – now the chargers are obsolete, MSTAR uses disposable batteries.

139.Previously MSTAR Units had a tendency to backload whole systems i.e. all LRUs returned as E0, rather than fault find down to LRU level and only backload the faulty LRU as E0 – this became apparent when the support contract ended and there were no more repairs/spares and stocks levels were being scrutinised very closely – there was a big push to get units to fault find (as detailed in the AESP) to sustain spares stocks as long as possible.

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