CHAPTER 5

PLANNING AND SITING OF EXPLOSIVES FACILITIES AND ALTERATIONS TO EXISTING FACILITIES

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1 PLANNING AND SITING

1.1 Introduction

1.1.1 Industry is not generally aware of the implications and specialist requirements involved in explosives related safety designs, or in the consequences of getting it wrong. Accordingly, MOD has determined through the Explosives Storage and Transport Committee (ESTC) that mandatory key stage approvals are necessary to ensure compliance with these Regulations.

1.2 Approvals

1.2.1 Key stage approvals for Works Services and Projects must be obtained from the relevant ESTC Technical Advisors.

1.2.2 For all projects that will require an Explosives Licence (PES) or that have an impact on a current Explosives Licensed facility (ES) a Tasking Request Form (see Annex B) must be completed and passed to the relevant Technical Advisor.

The Defence Ordnance Safety Group use an online Tasking Request Form for Technical Advisor (Electrical Safety) TA (Elec). Applicants must first contact TA (Elec) for further information before using this system. The CEstO/SETL/ESR on behalf of the HOE is to inform the Compliance Office of the Chief Inspector of Explosives (CIE) of this request so that the details may be entered into an audit programme to help ensure compliance with these regulations.

1.2.3 Formal approval will be required at certain key stages, detailed below, before proceeding:

Key Stages:	**Responsibility of:**
(1) Completion of User Requirement Document (URD)	CEstO/SETL
(2) Siting Board – Prior to any works. (See para 3)	HOE
(3) Full detailed design prior to commencing construction	DIO
(4) Pre-handover Inspection	DIO

1.2.4 In order to avoid rejection of designs or works at a late stage (and consequential delays and costs), liaison with the relevant Inspector of Explosives (IE) throughout the design and construction stages is required.

1.3 General Considerations

1.3.1 The procedures for planning and siting of new explosives facilities vary depending on whether the requirement is for:

(1) A major new facility, such as a Depot.

(2) An individual new facility such as a Potential Explosion Site (PES).

(3) An alteration to an existing PES.

1.3.2 All aspects of proposed works are to be carefully considered and agreed by the appropriate stakeholders and Technical Advisors before being authorised to proceed. Notwithstanding the instructions contained in JSP 462 (Financial Management Policy Manual), JSP 434 (Defence Construction In The Built Environment) and Defence Estates Technical Bulletin 01/06: The regulations are to be strictly applied regardless of the monetary value of the work being undertaken.

1.3.3 The requirement to site a new major explosives facility such as a complete depot in the UK will be rare; however, the principles of siting are retained for periods of tension or use in Out of Area (OOA) locations or for extensions to existing depots. These same principles are applicable to the siting of individual new explosives facilities at depots or units.

1.3.4 The proposed site and facilities are to be formally accepted by a Siting Board, see para 3. The IE is to ensure the appropriate ESTC Technical Advisors, if necessary, are involved at an early stage in the proceedings so that consistency may be achieved across the MOD estate.

1.3.5 When siting any explosives facility, whether above ground or underground, all factors that may affect its operation under all conditions are to be considered. Although it is unlikely that one area or site will be found which meets all requirements, the best combination of desirable features is to be aimed for. The need for possible future expansion may be a primary requirement, and even roads in the vicinity could be considered for use as emergency storage areas.

1.3.6 The careful and correct planning, siting and construction of major explosives facilities is essential to:

(1) Ensure that they can be operated safely, efficiently and economically.

(2) Keep the risks to Exposed Site (ES) at a level that is tolerable and As Low As Reasonably Practical (ALARP) (see Chapter 9).

(3) Prevent loss of stocks due to an accidental or deliberate explosive event and limit the consequences of fire or explosion.

(4) Provide a storage and handling environment in which stocks can be maintained in a fully serviceable condition to enable users to be supplied with reliable explosives natures at the right time and place.

(5) Ensure that the explosives licences of existing PES are not compromised.

1.3.7 The main considerations when siting PES are to ensure that the quantity distances, both inside and outside, are adequate (see Chapter 10) and that the best use is made of the area available. To achieve these aims, and minimize the amount of ground outside the area that will be subject to Safeguarding restrictions (see Chapter 22), the PES for the most hazardous stores (HD 1.1) should normally be sited at the centre of the area, whilst those for the least hazardous (HD 1.4) should be nearest the perimeter.

1.3.8 In planning explosive storage facilities, maximum safety and flexibility of use can be achieved by traversing all non-earth covered explosives buildings. Care must be exercised on sites with processing buildings not to mix earth-covered, medium-walled or heavy construction with light-weight process buildings (see Chapter 6).

1.3.9 The selection of the optimum combination of types of construction of PES, Quantity Distances (QDs) and degree of protection (see Chapter 10) involves a balance between the cost of construction, the availability and cost of land and the economic and operational values of the explosives stock that might be rendered unserviceable in the event of an accidental explosion. The HDs and CGs, and the need for flexibility in the use of the facilities must also be taken into account.

1.3.10 The requirements of the (MACR) Major Accident Control Regulations JSP 498 must also be met.

1.3.11 Further detailed considerations that are to be used in the planning for major new facilities are contained in Annex A to this Chapter. Many of these considerations are also applicable to the siting of minor facilities or individual PES and shall be used as appropriate to the circumstances.

2 PROCUREMENT OF EXPLOSIVES FACILITIES WORKS

2.1 General

2.1.1 The procurement of works within the Defence Estate, including explosives facilities will generally follow MOD/Defence Infrastructure Organisation (DIO) procedures detailed in JSP 434 (Defence Construction in the Built Environment). The principal stages in a works project are:

(1) Stage 1 Survey

Develop:	URD
	Rough Order Estate Information (ROEI)
	Tasking Letter to DIO
	Assessment Brief
Carry Out:	Assessment Study
	Siting Board

(2) Stage 2 Design

Develop: Preferred Option to Royal Institute of British Architects (RIBA) Stage C

Strategic Brief

Main Gate Approval

(3) Stage 3 Construction

Final Design, Construct, Complete and Accept for Occupation

Handover/Takeover Board

(4) Stage 4 Operation

Manage Compliance Period and Close Contract

2.1.2 The key stakeholders involved in the procurement of works on explosives facilities and their individual roles are:

(1) The Head of Establishment (HOE) who is the site's Duty Holder.

(2) The Project Sponsor[1] and Project Manager (PM).

(3) The Compliance Office who will audit specific elements of a project to provide assurance to CIE (MOD) of compliance with these regulations.

(4) IEs, who advise Sponsors/Customer Estates Organisation (CEstOs) and Site Estates Team Leaders (SETLs) on explosives licensing matters and who ultimately licence compliant facilities.

(5) The Site Estates Representative (SER)/ Property Manager (PROM), Establishment Works Consultant (EWC) and the Works Services Manager (WSM).

(6) Defence Infrastructure Orginisation, Facility Manager (DIO(FM) or Project Manager DIO (PM), who advise sponsors and SERs on general design, project management, contractual, construction and maintenance works matters, and their Regional Prime Contractor (RPC) responsible for carrying out the works.

(7) The ESTC Technical Advisor (Structures) (TA(Structures)), who provides advice to the IE on specialist civil/structural designs and their response to blast loading and weapons effects.

(8) The ESTC Technical Advisor (Electrical) (TA(Electrical)), who provides advice to the IE on the electrical design, lightning protection and suitability of electrical equipment for explosives related facilities.

2.2 **New Works**

2.2.1 When a new requirement is first identified, CEstO/SETL must arrange for discussions to take place between all interested parties to define the extent of the works required, and the feasibility of the IE being able to issue an Explosives Licence on completion. A site visit at this stage is normally essential and the following factors are to be considered:

(1) Calculation of the Net Explosives Quantity (NEQ) by nature(s), HD and CG to be accommodated.

(2) The type, number and size of facilities required (including any supporting administrative or amenity buildings) and, where necessary, the requisite associated area and layout, taking into consideration:

[1] Or Requirements Manager

(3) Suitability of the planned facilities for their current task.

(4) Suitability of the planned facilities for possible future tasks.

(5) Economy, both short-term and long-term.

(6) Technical specifications (e.g. construction, traversing, heating, lighting, LPS, security features etc)

(7) Proximity of 'Listed' buildings/trees, Sites of Special Scientific Interest (SSSIs), etc.

(8) Proximity of Vulnerable Buildings or Sites of Sensitive Use.

(9) Proximity of radio masts (inside and outside the site).

(10) Suitability of existing construction and buildings at sited Inside Quantity Distances (IQD's) (see Chapter 6).

(11) Control and protection of contractors' staff during construction (see Chapter 18).

2.2.2 Following completion of the foregoing discussions, the URD will be finalised.

2.2.3 The proposals are to be presented to a formal Siting Board before commencing Stage 2 for formal approval.

2.3 Alterations to Existing Facilities and Maintenance Work

2.3.1 Because many of the explosives facilities on the MOD Estate are old and built before current safety standards, they may not fully comply with current regulations. As a result, like-for-like replacement must not be assumed to be acceptable.

2.3.2 It is therefore essential when refurbishment, or any other modification, irrespective of size or value of the works is planned a formal assessment of the existing facility against the requirements of JSP 482 is carried out by person(s) with suitable and sufficient experience, see Chapter 6 para 11.1, in order to identify:

(1) Appropriate and compliant standards to be used.

(2) Any non-compliances.

(3) Un-necessary over-provisions (e.g. legacy standards such as category "B" electrical fittings in a facility now requiring only category "C" or "D" fittings).

(4) Whether any further minor works are required which could be cost-effectively achieved whilst the facility is empty.

2.3.3 Where the existing facility (or part thereof) is assessed to be non-compliant, with these Regulations, the proposals must be co-ordinated with the relevant IE and recorded in the PES Log Book.

2.3.4 Where the existing facility is assessed to be compliant with these Regulations, routine maintenance and compliant like-for-like replacement may be carried out without further consultation.

2.3.5 The control and protection of contractors' staff during construction must be considered (see Chapter 18).

2.3.6 When the planned refurbishment involves alteration to an existing facility, a formal Siting Board must be held, and the procedures in paragraphs 3 onwards followed. Examples of substantial alterations include:

(1) Adoption of an existing non-explosives facility as a PES.

(2) Change of use (storage to processing, etc).

(3) Major structural alterations to, or refurbishment of, a PES or change to electrical status.

(4) Change of frangible materials or alterations to designed venting arrangements (see Chapter 6).

2.3.7 It is not intended that works services action should always be undertaken immediately to modify existing buildings to achieve conformance with any changes to applicable standards. Neither is it normally necessary to carry out surveys to establish the extent to which existing facilities fail to meet the latest standards. Such work and surveys should only be considered when they are necessary and arise for other reasons. For example:

(1) When there has been a change to UK or EU statutory legislation which requires retrospective action.

(2) When CIE (MOD) directs improvements on safety grounds.

(3) When building refurbishment or modification is being carried out.

(4) When the building fails to pass any inspection or test and it is more economic to replace all or part of the failure than to rectify the defects.

2.3.8 Provided buildings pass periodic inspections and tests, and comply with the standards or regulations that were in force at the time of construction, it is considered that they are adequate for continued use and not unsafe. However, any extensive work on the building is likely to warrant an upgrade to the latest standard.

2.3.9 Any such work carried out on a PES shall require a Siting Board to ensure that all relevant parties, including the appropriate Technical Advisors have the opportunity to express their concerns/opinions. The CIE relevant IE shall always be contacted in the first instance.

2.3.10 TA (Structures) shall also be approached by the HoE in consultation with the responsible IE in advance of such projects. This requirement is to determine the extent of upgrading work necessary during refurbishment.

2.3.11 Further guidance on electrical modification is given in Chapter 8.

2.4 **Non-Explosives Facilities**

2.4.1 When it is proposed to site, or change the use of, a non-explosives facility within the Safeguarded yellow line, a Siting Board shall be convened and the consequences of the proposal reviewed. Additionally, for substantial new facilities proposed within the purple line, care must be taken to ensure they are not vulnerable. Failure to do so may render neighbouring PES un-licensable and thus unusable.

3 **SITING BOARDS**

3.1 **Introduction**

3.1.1 A Siting Board is a board of officers made up of representatives of the relevant stakeholders, which is convened by the HOE to approve the location of new explosives facilities or planned substantial alterations to an existing explosives facility on an Establishment, or provision or change in use of non explosives facilities within the yellow or purple lines.

3.1.2 Due to the large estate area hazarded by an accidental explosion, and the consequent risks to life and damage to assets, the requirement for a formal Siting Board is an obligation of these Regulations and of the associated Works processes in JSP 434. The Siting Board shall be convened before commencement of Stage 2, of the Works Project.

3.2 Siting Board Members

3.2.1 The following are key stakeholders and are to be represented on the Siting Board:

3.2.2 Key Stakeholders (or their nominated representatives):

(1) Convenor / Chairman – HoE (normally delegated to SETL)

(2) Project Sponsor (CEstO, when not SETL)

(3) Explosives Safety Representative

(4) Security Authority

(5) Health & Safety Advisor

(6) IE (with ESTC Technical Advisors in support as necessary)

(7) Air Traffic Control (where appropriate)

(8) Fire Officer

3.2.3 Other Stakeholders in the process that may be represented on the Siting Board include:

(1) Compliance Office of the Chief Inspector of Explosives

(2) User

(3) DIO Facilities Manager / EWC according to site

(4) DIO Project Manager (when not DIO FM)

3.3 Siting Board Requirements

3.3.1 The following information is the minimum required for consideration by the Board on suitably scaled OS Maps or survey drawings showing:

(1) The site and purpose of each PES/building, including the numbers of persons employed therein, NEQs, HDs (& SsDs), CGs and QDs.

(2) The site perimeter, MOD boundary, Safeguarded area, Yellow and Purple Lines (existing and proposed).

(3) The extent of any MOD owned land leased for non MOD use.

(4) Local Authority, National and International boundaries.

(5) Any Vulnerable Construction or Sites of Sensitive Use within the purple line created by the proposed facility.

(6) Any other site specific issue.

3.3.2 Additionally, where necessary, signed written exhibits from specialist advisors should be provided for consideration by the Board.

3.3.3 For the findings of explosives facilities' Siting Boards to be deemed valid, MOD Form 1924[2] – Proceedings of Siting/ Handover Board of Officers - shall be raised and endorsed by all key stakeholders. Failure to do this will result in refusal to approve at a later stage.

3.3.4 For smaller works or projects a virtual Siting Board may be held with the findings submitted by post on a MOD Form 1924.

3.3.5 Once approved by the Board, the MOD Form 1924, together with the supporting documents shall constitute the formal findings of the Siting Board and is to be sent to the SETL for HOE.

3.3.6 Additionally a copy of the MOD Form 1924 only shall be sent to the appropriate IE.

[2] RAF Form 2 is acceptable until such times as RAF Queens Regulations adopt MOD Form 1924.

4 HANDOVER/TAKEOVER OF PES

4.1 Process

4.1.1 Before a new PES is taken into use for the storage or processing of explosives, or an existing PES which has had works carried out and requires re-licensing, a formal Handover/Takeover Board is required before it is licensed in accordance with Chapter 9 and 10. ESTC Standard 6 must be used to Commission and Test any new installations.

4.1.2 The Handover/Takeover Board must include those stakeholders identified at the Siting Board.

CHAPTER 5

ANNEX A

SITING CONSIDERATIONS

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1 GENERAL SITING CONSIDERATIONS

1.1 Storage and Handling Capacity

1.1.1 The area or site selected is to be capable of accommodating a specified quantity of explosives, and should also have the facilities for handling the requirements of maximum operational effort. Guidance on the calculation of storage capacity and space requirements are given in Chapter 13 Annex B.

1.2 **Accessibility**

1.2.1 Depending on the type of facility being sited, the locations selected are, as far as possible, to be accessible to/from:

(1) The sources from which stocks are likely to be received, i.e. manufacturers, ports and other explosives storage facilities.

(2) The units which the facility is intended to supply.

(3) Ports and airfields from which shipments will be made.

(4) A civilian labour force, if the facility is to be manned, or partially manned, by civilians.

1.3 **Isolation**

1.3.1 Notwithstanding the requirements of para 1.2, the site is to be sufficiently isolated to comply with the outside quantity distances laid down in Chapter 10. No PES is normally to be sited closer than 20 m from the ESA fence or MOD boundary. This distance shall be increased to 50m to the MOD boundary where there is an external road giving access for lorries to the fence-line.

1.3.2 Encroachment within the outside quantity distances is always possible where such quantity distances extend beyond the perimeter of the MOD property. Where this is a possibility, the land in question should be purchased to secure the Safeguarded area (see Chapter 22).

1.3.3 Power supply authority overhead systems and associated networks and installations are to be sited in accordance with Chapter 8.

1.3.4 To reduce the risk of aircraft force-landing in explosives areas, the sites selected should not normally be within an airfield circuit. Cases of doubt are to be referred to the relevant Headquarters. At MOD airfields, PES are not to form an obstruction to flying. They are not to be sited within the flight strips or approach funnels to runways, nor are they to be within 35 m from the centre line of an aircraft taxiway. The full details of flight strips and approach funnels are given in AP 3384, 'Lay-Out Specifications and Safeguarding Criteria for Permanent Airfields'. In addition to the horizontal dimensions of the flight strips and approach funnels, no building, fence, pole, etc, is to project above a plane inclined at a gradient of 1:7 rising to either side of the flight strip and approach funnel. Therefore, if facilities are to be sited at an airfield, the unit Senior Air Traffic Control Officer is to be approached for approval at an early stage.

1.3.5 Due consideration is to be given to the effects on the explosives of radiation hazards (RADHAZ) from mobile and fixed transmitters (see Chapter 24), and the risk to these facilities from the explosives. For sites on airfields, the senior CIS Eng Officer is to be approached for approval at an early stage in the siting process.

1.4 **Terrain and Climate**

1.4.1 Dry storage conditions are highly desirable. The land should therefore be well drained and as dry as climatic conditions permit. Areas with high incidence of electrical storms or other atmospheric abnormalities, or terrain that is liable to flooding, are to be avoided. Local records or Met Office data may indicate whether such a liability exists. Areas in which the roads become blocked by snow are also to be avoided.

1.4.2 The subsoil should be firm and stable, otherwise subsidence of traverses, roads and hardstandings may result.

1.4.3 Thickly wooded sites are usually unsatisfactory owing to the excessive fire risk in dry weather and the consequent effort and expenditure necessary in clearing undergrowth and firebreaks. Such sites are normally poorly ventilated and excessively humid as well as making access for cranes and heavy vehicles difficult.

1.4.4 Dry, gently undulating country provides natural traverses, assists concealment, and is in every way most suited to the storage of explosives.

1.5 Road and Rail Communications

1.5.1 The area selected should be served by good roads of sufficient width and strength to permit their use by a constant flow of heavy traffic, with due cognisance of Public Traffic Route Distances (see Chapter 10).

1.5.2 Access roads should not pass through congested towns and the hazard and inconvenience resulting from a possible accident to a vehicle carrying explosives or toxic materials should be borne in mind.

1.5.3 The possibility of introducing one-way traffic systems to obviate 'bottle-necks' should be studied, and the maximum traffic density is to be assessed.

1.5.4 Roads within an explosives area should serve all stacks and buildings and should generally be planned on a one-way system. They are to be of sufficient width and strength to permit the use of the largest and heaviest vehicles likely to be used. No gradient is to exceed 1:20 and, where trolleys without brakes are used, e.g. alongside buildings or open bomb bays, the gradient is not to exceed 1:100. The minimum inside radius at corners is to be not less than 9 m for normal road vehicles, but if towed vehicles are to be used, this should be increased to cater for the longer vehicle. Lengths of road will probably be required within the facility to afford stabling or 'lay-bys' for vehicles awaiting loading/unloading. Traverses should be considered to reduce QDs.

1.5.5 Unless a railway system exists, or can be constructed that will enter the facility, good road communication with the nearest railhead is essential.

1.5.6 Major explosives facilities should be served by rail as well as road systems, both inside the explosives area (in the case of larger depots), and connecting the depots with the public main lines. An assurance should be obtained from the appropriate railway authorities that the public railway system is capable of handling the required amount of traffic.

1.5.7 In areas abroad particularly, it is important that adequate rail communications exist between docks and the facility, or between docks and the railheads serving such facilities.

1.5.8 In order to reduce delays in loading and unloading, adequate provision is to be made for marshalling and shunting trucks. The railway layout within the facility should include exchange sidings, sorting sidings, emergency alternative lines, turning facilities, etc, in addition to lines serving storehouses, storage bays and process buildings. Railway systems are not usually practicable inside minor facilities.

2 TYPES OF FACILITY

2.1 Use of Igloos

2.1.1 A storage site comprising igloos gives the simplest, safest and most compact set of Inter-Magazine Distances (IMD - see Chapter 10) when it is a rectangular array with the axes of the igloos parallel and the doors all facing in one direction. A front-to-front configuration should be avoided as this requires large separation of the igloos. It may be expedient to arrange the igloos back-to-back in two rows, but this configuration may be less flexible for further development of the storage area.

2.2 Protective Structures

2.2.1 Close attention should be paid to the problems that will be encountered if it is envisaged that protective and non-protective structures are to be mixed, especially roofs (see Chapter 6).

2.3 Explosives Storehouses

2.3.1 These buildings are to be sited with due regard to the quantity distances laid down in Chapter 10 to meet the known storage requirement. In smaller facilities in forward areas, the construction of storehouses will probably be impracticable.

2.4 Process Buildings

2.4.1 Ideally, these buildings should be sited in an area separate from explosives storage facilities. If this is not possible, they are to be positioned within the facility, paying due regard to the quantity distances for processing activities (see Chapter 10), such that the greatest convenience is achieved in handling the stores being processed. Where the construction of buildings is impracticable, a process area is to be located into which mobile facilities may be positioned.

2.5 Siting of Vehicular Staging Facilities on Units

2.5.1 When the unit explosives facility is not available for consideration as the unit Staging Facility, any fenced area outside the domestic area of the unit, which is patrolled or controlled under unit security arrangements may be considered. The inability to provide a fenced area does not preclude an area being selected, provided the security arrangements are agreed by the unit Security Officer and, if necessary, the appropriate HQ Security Staff. Areas adjacent to domestic accommodation are to be avoided.

2.6 Administration Buildings and Workshops

2.6.1 Administrative offices and workshops for the maintenance of Ground Support Equipment (GSE), Mechanical Transport (MT), etc, connected with the operation of the explosives facility, are usually to be sited outside that facility, but as close to the perimeters as QDs, with the applicable minima, permit. Those facilities not directly connected with the presence of the explosives are normally sited at greater distances (see Chapter 10, Section 7).

2.7 Demolition Areas

2.7.1 Wherever possible, the site for a major facility is to include space for a demolition area to enable unserviceable or dangerous explosives to be destroyed on site. The demolition area is to be remote from the storage area to ensure complete safety, but is to be easily accessible.

2.8 Street Lighting

2.8.1 Street lighting to the standard required in built up areas should be provided for reasons of safety and security (see Chapter 8 and JSP 440).

2.9 Emergency/Field Explosives Facilities (Overseas)

2.9.1 The primary requirements for an explosives area/depot overseas are similar to those indicated above. In addition, such a facility should normally be in a defended area, and should be, if possible, within a reasonable distance of a source of civilian labour.

2.9.2 Existing rail facilities may not be as efficient as at home and it is possible that roads will, therefore, have to carry a greater proportion of traffic. Owing to the greater distances involved, parking facilities for large convoys should be available and this is to be determined when siting this type of depot. Further details can be found in Chapter 10, Section 3 and Chapter 11.

2.10 **Road Storage**

2.10.1 It may be necessary in time of tension to utilise public roads as a means of the expansion for a major explosives facility. This type of storage is, however, undesirable owing to lack of security, restriction of civilian rights and general inaccessibility.

2.10.2 Where it is necessary to site roadside storage, only roads having a width of at least 5 m should be considered. Roads of lesser width are of little value, owing to insufficient handling and manoeuvring space for cranes, MHE and MT vehicles.

3 **UNDERGROUND STORAGE**

3.1 **General**

3.1.1 The parameters for the use for explosives storage of either existing underground caves or caverns, whether natural or artificial, or for the construction of new underground facilities are complicated and many factors must be considered. Therefore, ESTC are to be consulted if this course of action is being considered.

3.2 **Advantages of Underground Storage**

3.2.1 Advantages of underground storage are:

(1) A smaller total land area is usually required in comparison with above ground storage.

(2) A degree of protection is provided against bombing.

(3) The area is easier to camouflage and guard.

(4) In the event of an explosive event in a chamber, damage to explosives in other chambers can be prevented. In contrast, above ground storehouses, other than those that are earth covered, are expected to be severely damaged in similar circumstances.

(5) The temperature in underground sites remains fairly constant.

(6) Climatic events, such as snow and ice, which may cause difficulties in above ground storage, are avoided.

(7) Better protection is afforded against an external fire.

(8) Maintenance of underground infrastructure is less expensive than for that aboveground. The initial high costs of providing underground storage may thus be recouped in the longer term.

3.3 **Disadvantages of Underground Storage**

3.3.1 Disadvantages of underground storage are:

(1) Restrictions imposed by the locality of the site due to the limitations imposed by unsuitable terrain features.

(2) The costs of the excavation or modification of an existing excavation, and the installation and maintenance of special equipment, which may increase the initial costs in comparison with above ground facilities.

(3) The need to provide blast doors in a connected chamber storage site, or to accept the possibility of total loss of personnel and stocks.

3.4 **Other Considerations**

3.4.1 Connected chamber storage sites with a single entrance should be avoided due to the risk of total blockage in the event of an explosion. It is advantageous if adjacent chambers are parallel to each other and the axes of the chambers are perpendicular to the axis of the main passageway rather than inclined. Adjacent junctions of branch passageways in connected chamber storage sites with chambers on both sides of the main passageway should be separated as much as possible.

3.4.2 Before a cavern storage site is taken into use, the roof should be cleared of loose material and any weak parts should be pinned or otherwise supported. Faults and fissures in the walls should be filled with concrete to prevent the passage of hot gasses or blast. Lofty caverns should be avoided because of the danger of roof falls and the difficulty of inspecting the roof. The advice of a Mining Engineer is essential in these matters.

3.4.3 Material excavated during construction may be of use in the construct of any massive barricades that may be required.

3.4.4 Relatively high humidity underground may cause deterioration of stocks or packaging. Special attention may have to be given to controlling humidity where valuable or humidity sensitive items are to be stored.

3.4.5 It may be necessary to provide special MHE unless the facility is designed to accommodate normal MT (but see Chapter 16).

3.5 **Suitability of Terrain for Underground Storage**

3.5.1 The following types of terrain are considered unsuitable for the construction of underground facilities:

(1) Sand, clay or broken rock, because of lack of structural strength.

(2) Coal bearing strata, because of the risk of combustion.

(3) Rock which is steeply dipping, because of the potential instability during construction.

(4) Areas with extensive underground workings, where serious subsidence may occur.

(5) Permeable rock with a high water table or fissured rock with underground water channels, even if dry as in limestone country.

3.5.2 Massive igneous rocks such as granite, though technically suitable, may give rise to prohibitive excavation costs.

3.5.3 Directional explosion effects from a potential incident place serious limitations on the orientation of an underground facility. This is obviously applicable to the direction of the adit but also applies to crater projections particularly where the cover surface is inclined.

CHAPTER 5

ANNEX B

TASKING REQUEST FORM
For Technical Advice
Revised April 2012

To:
Relevant TA.

Requesting Authority:

Requesting Authority's Reference:

Date:

1. REQUESTING AUTHORITY'S DETAILS**:**

   a. Name:

   b. Post Title:

   c. Postal Address:

   d. E-mail Address:

   e. Telephone No:

   f. TLB:

2. TASK SUMMARY:

   A. BACKGROUND (TO INCLUDE THE REASON(S) FOR THE TASK:

   B. BRIEF DESCRIPTION OF THE TASK REQUIRED:

3. THE DETAILS OF THE SITE ASSOCIATED WITH THE TASK ARE**:**

   A. SITE:

   B. BRIEF DESCRIPTION OF THE SITE:

4. **Task Administration:**

A. THE SECURITY CLASSIFICATION OF THE EXISTENCE OF THE PROJECT IS:

B. TASK PRIORITY CATEGORY (SEE NOTE 1):

C. REQUESTING AUTHORITY'S POINTS OF CONTACT (IF DIFFERENT FROM ABOVE):

5. REFERENCE DOCUMENTS (IF APPLICABLE):

A. SYSTEM REQUIREMENTS DOCUMENT: DATED

B. USER REQUIREMENTS DOCUMENT: DATED

C. PREVIOUS DSEA CORRESPONDENCE: DATED

6. **Task Deliverables:**

A. PLEASE COMPLETE THE FOLLOWING TABLE (SEE NOTES 2 AND 3):

Serial	**Task** **(See Note 4)**	**Deliverable** **(See Note 5)**	**Start Date** **(See Notes 6, 7 and 8)**	**Completion Date**	**Remarks** **(See Note 9)**
1					
2					
3					

Signature:_____ on behalf of the Requesting Authority

On Completion, please e-mail a copy of this form to the relevant TA (for action) and the Compliance Office of CIE MOD (for information)

Notes

1 - Task Priority – The TA will endeavour to satisfy the task request by the requested completion date. Where necessary, tasks will be prioritised based on the task due date and a 'task priority category'. The task priority categories used by the TA are as follows (in order of priority – high to low):

Urgent Operational Requirement (UOR)
Operations Support (Ops)

2 - This section will ideally be filled out in consultation with your TA point of contact (POC). If you don't have a TA POC then please contact DSEA for guidance.

3 - The table is for you to articulate what deliverables you expect the TA to provide and to what timeline. If required, a more detailed plan will be developed when the TA formally considers the proposal. Revisions to your proposed timelines will be negotiated prior to task acceptance.

4 – A one sentence description of the task element. May be a repeat of the information provided at 2b if this is a straightforward task request.

5 – A TA Deliverable is typically a specific report (eg safety advice, technical assessment, audit report). For instances where a specific output is not required (eg you want the TA to attend a meeting) then the 'deliverable' is 'Support'.

6 – For 'Support' tasks the start and completion dates should indicate the period during which you require the support. Assuming task acceptance, the TA will endeavour to provide the support during the period indicated using a 'best endeavours' principle. For example, attendance at meetings during the period will be based upon receiving reasonable warning time of the actual meeting.

7 - For tasks with a deliverable the start date should be set to when you expect to provide the enabling information to the TA. The completion date should be set to when you require the final output from the TA.

8 – A date of TBA is acceptable where the task element has not been fully scoped / scheduled. Such tasks will be managed by the TA as 'pending' tasks and will require further negotiation as the task becomes better defined.

9 – Include any additional information you think appropriate here (eg Information to be provided by you prior to task commencement, emphasis on task priority etc)

FOR TA USE

To:

TA Lead Officer:

TA Task Number:

1. If the task is rejected please outline the reason for the rejection for the purpose of informing the customer.

2. Please inform the originator if any additional information is required.

Relevant TA

Primary Tasks (Initial entries taken from the table at Paragraph 6).

Task Number	Task Description	Task Role	Task Deliverable	Start Date (See Notes 6, 7 and 8 above)	Planned Completion Date	Estimated Effort (Man Days)
1						
2						
3						

Sub-Tasks

Parent Task No.	Sub Task No.	Sub Task Desk Officer	Requirement	Date to complete by[3]	Estimated Effort (Man Days)	Signature of Acceptance[4]

Task is Accepted / Rejected (delete as appropriate).

Signature (TA Lead Officer): _____

On completion please return to the originator (for action as necessary) and the Compliance Office of CIE MoD (for information).

[3] The start date for sub-tasks will be set to the same start date as the primary task.
[4] Local arrangements apply for each Team as to what level of sign off is required for sub-tasks.