Conceptual Design and Safety Verification of a Greenfield Plastic Explosive Facility

Project Proposal

For

BEng (Hons) Ordnance, Munitions & Explosives

By Dan Garton (2219350)

2219350@student.uwtsd.ac.uk

Supervisor: TBC

17th June 2026

Contents

1. Introduction 3
2. Background to the Project / Literature Review 3
2.1 Material Context PE vs. Melt Cast and PBX 3
2.2 Operational Capabilities 3
2.3 Manufacturing Efficiency and Risk Mitigation 4
2.4 Lessons from Ukraine & Rapid Development 4
2.5 Selection of Models and Concepts 4
2.6 Ethical Issues 4
3. Aims, Objectives & Success Criteria 5
3.1 Aim: 5
3.2 SMART Objectives: 5
3.3 Success Criteria: 5
4. Project Design 5
4.1 Development Methods: 5
4.2 Tools: 5
4.3 Data Analysis: 6
5. Planning 6
5.1 Deliverables: 6
5.2 Timing and Resource Use: 6
Bibliography 7
Annex A 9
Annex B 10

Abbreviations list

Abbreviations	
PE	Plastic Explosive
PBX	Polymer Bonded Explosive
CAD	Computer aided Design
NEQ	Net Explosive Quantity
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
OME	Ordnance, Munitions and Explosives
SME	Subject Matter Expert
UWTSD	University of Wales Trinity Saint David
IP	Intellectual Property
PUWER	Provision and use of work equipment regulations
COSHH	Control of Substances Hazardous to Health
PFMEA	Process Failure Mode and Effects Analysis

PCP	Process Control Plan
EOD	Explosive Ordnance Disposal
DSTL	Defence Sciences and Technology Laboratory
HSE	Health and Safety Executive
PW	Pairwise
FMA	Function Means Analysis
QFD	Quality Function Deployment
KSB	Knowledge, Skills and Behaviours
NDA	Non-Disclosure Agreement
NRE	Non-Recurring Engineering cost

1. Introduction

The modern defence landscape requires agile, scalable manufacturing capabilities for bespoke munitions. However, retrofitting existing munitions facilities for Plastic Explosive (PE) [1] production risks disrupting other operations and breaching Intellectual Property (IP). To minimise these implications, this project will act as an independent project designing a theoretical, standalone PE facility that is entirely independent to any existing site. This clean sheet approach bypasses legacy bottlenecks in existing infrastructure and potential IP implications.

2. Background to the Project / Literature Review

2.1 Material Context PE vs. Melt Cast and PBX

To design an appropriate, clean-sheet manufacturing capability, the fundamental properties of Plastic Explosive (PE) must first be distinguished from other energetics, as its material properties dictates the required process machinery. PE is formulated by combining a crystalline high-explosive base with a polymeric binder and plasticizer [1], allowing it to remain highly malleable at ambient temperatures. In contrast, melt-cast explosives (e.g. TNT) consist of Explosive crystalline base and Wax [2], require significant thermal energy to liquefy and pour, solidifying into rigid structures. Similarly, while Polymer-Bonded Explosives (PBX) also utilize binders, they are often casted and cured in projectiles body [3]. Once cured the PBX cannot be reshaped.

2.2 Operational Capabilities

The primary difference of PE is its mechanical properties; it can be hand-moulded reducing the reliance on manufacturing facility allowing for in the field “manufacturing” [4]. However, transitioning to a dedicated manufacturing facility and scaling up production continues to offer significant operational advantages. PE lack of structural rigidity means it is yet to be used in high stress environments like artillery. Furthermore, manufacturing PE relies heavily on extrusion and manual packing, making it labour intensive compared to tradition PBX and melt cast operations. Consequently, PE is typically not utilised by large-scale commercial munitions manufacturers. Instead, it remains a critical asset for Explosive Ordnance Disposal (EOD) units [4]and research entities like DSTL, who require bespoke, low-volume explosive engineering solutions.

2.3 Manufacturing Efficiency and Risk Mitigation

The Non-Recurring Engineering (NRE) costs required to establish a PE facility are significantly lower than those for melt-cast or PBX operations, as the primary equipment consists solely of an extruder and a press [5]. In contrast, PBX production requires complex dosing equipment, large-scale mixers, and extensive oven facilities. Because PE does not require extended thermal cooling or chemical curing times, production is not bottlenecked by 12 to 72 hour oven cycles [6], drastically reducing operational running costs and operation constraints. Furthermore, similar to melt-cast operations, processing waste can be safely reused, reducing disposal requirements and overheads.

A critical advantage of this rapid manufacturing cycle is the reduction of operational risk. Traditional large-NEQ orders are often mixed and cured in single, massive batches, creating complex logistical hurdles regarding facility licensing and safe separation distances. By adopting a continuous material flow, processing smaller, active batches (e.g., 50kg per shift) drawn directly from the magazines as needed, the active Net Explosive Quantity (NEQ) within the processing buildings is drastically reduced. This inherently mitigates operational risk [7]and minimizes the strict licensing thresholds associated with high-NEQ bulk decanting facilities.

While these theoretical efficiencies present a strong preliminary business case, they currently serve as baseline assumptions. A primary objective of this dissertation is to rigorously evaluate and validate these operational advantages through the applied systems engineering framework.

2.4 Lessons from Ukraine & Rapid Development

Recent geopolitical conflicts, notably in Ukraine [8], have fundamentally shifted the literature and operational doctrine regarding munitions manufacturing. The conflict has demonstrated that cheap, rapid development and the ability to quickly pivot production are critical operational advantages. Fixed, single-purpose legacy facilities are proving too rigid to meet sudden, asymmetric demands. This project addresses this capability gap by conceptually designing a modular, greenfield PE facility that prioritizes rapid scalability over rigid, fixed-line legacy infrastructure.

2.5 Selection of Models and Concepts

To transition this need into a viable design, this project will utilize specific systems engineering models. The facility layout will be governed by Process Control Technology (PCT) [9]and a foundational Basis of Safety [10]. These concepts ensure that hazard controls such as managing static discharge during extrusion to dictate the spatial and workflow design, rather than retrofitting safety into an existing architectural footprint.

2.6 Ethical Issues

As this project acts as a conceptual engineering bid utilizing theoretical Process Control Technology data and assumed Net Explosive Quantity (NEQ) limits to protect commercial intellectual property, it does not involve human subjects or vulnerable groups. Therefore, it raises no ethical issues and strictly complies with the university's standard ethical approval requirements. The Ethics form is completed and attached in the Annex Below.

3. Aims, Objectives & Success Criteria

3.1 Aim:

To design and validate a greenfield PE manufacturing facility using systems engineering.

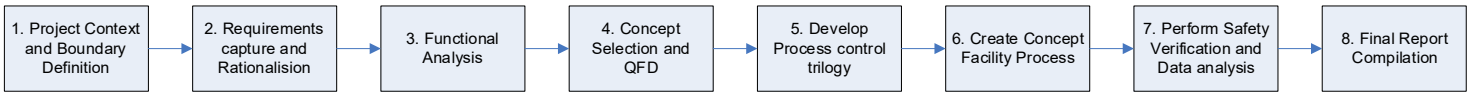
3.2 SMART Objectives:

- Establish Systems Engineering workbook outputs into design of the facility by November 2026
- Define the Process Control Trilogy (Process Flow, PFMEA, PCP) and Basis of Safety (PUWER, COSHH, ETC) by October 2026.
- Develop a 2D CAD layout for selected process by December 2026.
- Validate the facility design against regulations and Net Explosive Quantity (NEQ) limits by February 2027.
- Complete the Final report March 17th, 2027

3.3 Success Criteria:

The project will be considered a success if the theoretical design mathematically and spatially complies with explosive safety regulations.

4. Project Design



4.1 Development Methods:

This project employs the Systems Engineering methodology, structured as an independent theoretical engineering bid. The core method utilizes a requirements driven manufacturing framework. It systematically progresses from functional analysis into defining Process Control Technology (PCT) [11] parameters and a foundational Basis of Safety. This approach ensures that hazard controls and regulatory compliance dictate the physical architecture before any spatial modelling occurs.

4.2 Tools:

Primary tools include 2D Computer-Aided Design (CAD) software and Systems Engineering worksheets (PFMEA, PCP) [11]. PFMEAs will identify manufacturing failure modes. CAD will be used to draft a precise 2D floor plan of the building. This spatial map is essential for

plotting DSEAR [12]hazard zones, establishing safe operator walkways, ensuring ergonomic equipment spacing, and defining clear emergency evacuation routes.

4.3 Data Analysis:

Collected theoretical data will be analysed through mathematical and spatial validation. Assumed Net Explosive Quantity (NEQ) limits will be analysed using standard TNT equivalence formulas to calculate and prove that the proposed structural blast walls and external safe separation distances are legally compliant. Additionally, the CAD layout will be spatially evaluated against DSEAR zoning principles to verify safe hazard segregation and prevent cross-contamination.

5. Planning

5.1 Deliverables:

The project will produce the following conceptual engineering bid deliverables to satisfy the success criteria:

1. Functional Design Baseline: A comprehensive systems engineering data pack detailing rationalized stakeholder requirements, functional flow analysis, and concept selection metrics.
2. Process & Safety Justification Pack: Establishing the theoretical Process Control Technology (PCT) and Basis of Safety.
3. Concept Facility Layout: A modular 2D CAD model optimized for PE extrusion, pressing, and packing.
4. Safety Verification Report: Mathematical validation of NEQ safe separation distances and DSEAR hazard zoning.

5.2 Timing and Resource Use:

Physical resources include CAD software, systems engineering literature, and open-source HSE guidelines. Human resources require periodic peer-review consultations with SME's.

Task	Resource required
1. Project Context & Boundary Definition: Define facility system boundaries and map internal/external influence via a Stakeholder Influence Map	Systems Engineering workbook, SME peer-review consultations
2. Requirements Capture & Rationalisation: Establish theoretical client constraints, outline use cases, and prioritize requirements using a Pairwise (PW) matrix	Systems Engineering workbook, theoretical client specifications.
3. Functional Analysis: Break down facility operations using functional mapping, Function Means Analysis (FMA), and Functional Flow Diagrams.	Systems Engineering workbook, process engineering literature, SME Advice

4. Concept Selection & QFD: Translate rationalized requirements into technical features using Quality Function Deployment (QFD) and select optimal process designs via Pugh Diagrams.	Systems Engineering workbook, theoretical equipment data
5. Develop Process Control Trilogy (PCT): Draft Process Flows, complete PFMEA worksheets, and establish the Process Control Plan (PCP).	Systems Engineering worksheets (Excel), theoretical equipment data, and SME peer-review consultations
6. Create Concept Facility Layout: Draft modular 2D architectural floor plans, mapping DSEAR hazard zones and evacuation routes.	2D/3D CAD software (e.g., AutoCAD, SolidWorks, NX) and associated academic or industrial licenses.
7. Perform Safety Verification & Data Analysis: Mathematically validate assumed NEQ limits (TNT equivalence) and evaluate structural blast wall requirements.	Standard explosive safety manuals, TNT equivalence formulas, and calculation software.
8. Final Report Compilation: Synthesize the layout, calculations, and safety documents into the final dissertation, exposing KSBs.	Word processing software, referencing tools (IEEE format), and academic supervisor review.

The timeline spans from proposal approval to the final report deadline on March 17, 2027. Key phases are mapped in the Gantt Chart below to demonstrate resource allocation and scheduling: shown in annex A.

Bibliography

[1] "Plastic Explosive," Wikipedia, [Online]. Available: https://en.wikipedia.org/wiki/Plastic_explosive. [Accessed 17 26 2026].

[2] Z. L. a. X. Zhao, "Application of Melt-Cast Explosive with High Solid," Purpose-LEd Publishing, 2019.

[3] "Polmer-bonded explosvie," Wikipedia, [Online]. Available: https://en.wikipedia.org/wiki/Polymer-bonded_explosive. [Accessed 07 06 2026].

[4] E. O. D. (. o. I. M. C. a. Solutions, "Explosives Ordnance Disposal (EOD) of Insensitive Munitions: Challenges and Solutions," Defence R&D Canada - Valcartier Research Center.

[5] P. R. D. Wilde, "PLASTEC EXPLOSIVE AND METHOD OF MAKING IT," US Patent Office, 1962.

[6] D. Simic, "The effect of curing conditions on properties of cast thermobaric PBX explosive," Procesna tehnika, 2022.

[7] "What does ALARP mean?," Work Safe, [Online]. Available: https://www.worksafe.uk.com/risk-assessment/what-does-alarp-mean/. [Accessed 07 06 2026].

[8] O. Dunda, “The art of war is undergoing a technological revolution in Ukraine,” Atlantic Council, 24 12 2025. [Online]. Available: https://www.atlanticcouncil.org/blogs/ukrainealert/the-art-of-war-is-undergoing-a-technological-revolution-in-ukraine/. [Accessed 17 06 2026].

[9] “Process FMEA (PFMEA),” Quality One, [Online]. Available: https://quality-one.com/pfmea/. [Accessed 18 06 2026].

[10] “The Basis of Safety,” The chemical engineer, 8 02 2019. [Online]. Available: https://www.thechemicalengineer.com/features/the-basis-of-safety/. [Accessed 18 06 2026].

[11] “BAE Systems LAND UK BMS”.

[12] “The Dangerous Substances and Explosive Atmospheres Regulations 2002,” HSE, 2002. [Online]. Available: https://www.hse.gov.uk/fireandexplosion/dsear.htm. [Accessed 17 06 2026].

[13] P. C. Æ. F. H. Æ. Y. Ding, “Microstructure, deformation and failure of polymer,” Springer Science, 2009.

Annex A

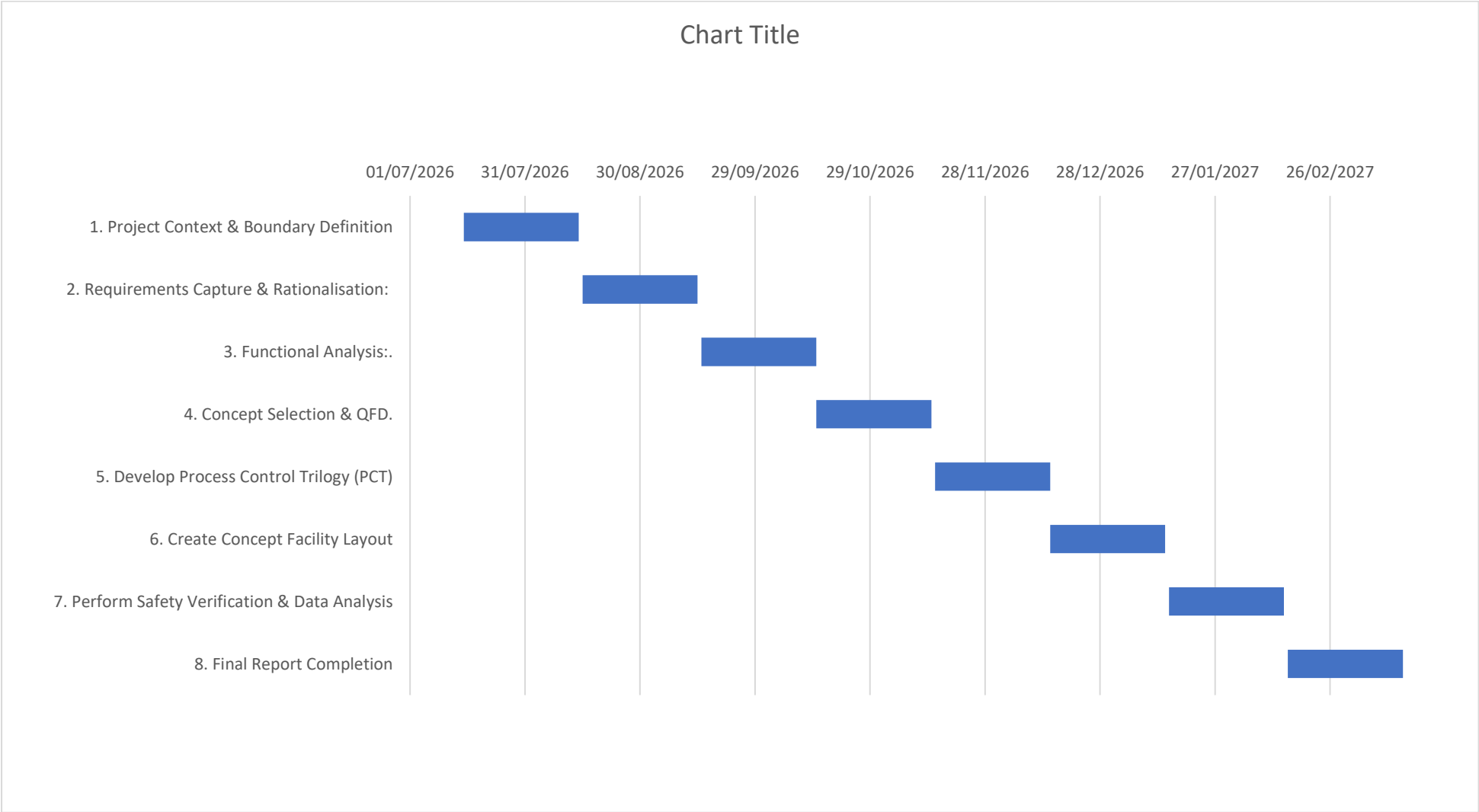


Chart Title
01/07/2026
31/07/2026
30/08/2026
29/09/2026
29/10/2026
28/11/2026
28/12/2026
27/01/2027
26/02/2027
1. Project Context & Boundary Definition
2. Requirements Capture & Rationalisation:
3. Functional Analysis:.
4. Concept Selection & QFD.
5. Develop Process Control Trilogy (PCT)
6. Create Concept Facility Layout
7. Perform Safety Verification & Data Analysis
8. Final Report Completion

Annex B

APPLICATION FOR ETHICAL APPROVAL

In order for research to result in benefit and minimise risk of harm, it must be conducted ethically.

The University follows the OECD Frascati manual definition of **research activity**: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

This form must be completed and approved prior to undertaking any research activity.

SECTION A: About You (Principal Researcher)

1	Full Name:	Dan Garton
2	Student Number:	2219350
3	Email address:	2219350@student.uwtsd.ac.uk
4	Programme of Study:	Ordnance, Munitions & Explosives Degree Apprenticeship
5	Director of Studies/Supervisor:	TBC

SECTION B: Internal and External Ethical Guidance Materials

	Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, location-specific dodes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines. You may add rows to this table if needed.	
1	**UWTSD Research Ethics & Integrity Code of Practice**	☒
2	**UWTSD Research Data Management Policy**	☒
3		☐

SECTION C: Details of Research Activity

1	Indicative title:	Conceptual Design and Safety Verification of a Greenfield Plastic Explosive Facility		
2	Proposed start date:	23/06/2026	Proposed end date:	17/03/2027
	Introduction to the Research (maximum 300 words in each section) **Ensure that you write for a <u>Non-Specialist Audience</u> when outlining your response to the three points below:** • *Purpose of Research Activity* • *Proposed Research Question* • *Aims of Research Activity* • *Objectives of Research Activity* Demonstrate, briefly, how **<u>Existing Research</u>** has informed the proposed activity and explain • *What the research activity will add to the body of knowledge* • *How it addresses an area of importance.*			
3	**Purpose of Research Activity** The purpose of this research activity is to demonstrate the practical application of industrial systems engineering and manufacturing frameworks within the defence sector. The project outlines the complete lifecycle required to conceptually design a manufacturing line for Plastic Explosives (PE). By acting as a theoretical, independent engineering report, the project establishes a clean-sheet facility model that completely isolates the work from site-specific commercial intellectual property. The final outcome will provide a validated 2D floor layout and safety control framework that demonstrates how a production facility can be systematically engineered from the ground up to achieve strict regulatory compliance			
4	**Research Question** N/A			
5	**Aims of Research Activity** • To establish a requirements driven framework for an independent, theoretical Plastic Explosive (PE) manufacturing facility utilizing systems engineering. • To develop and define a Process Control Trilogy (PCT) document set encompassing detailed Process Flows, a Process Failure Mode and Effects Analysis (PFMEA), and a Process Control Plan (PCP).			

	• To establish a foundational Basis of Safety that incorporates legislative compliance standards including PUWER, COSHH, and manual handling assessments. • To generate a precise 2D facility floor plan using Computer-Aided Design (CAD) software to plot DSEAR hazard zones, safe operator walkways, equipment spacing, and emergency evacuation routes. • To mathematically and spatially validate the facility design against Net Explosive Quantity (NEQ) limits and explosive safe separation distances using standard TNT equivalence formulas •
6	**Objectives of Research Activity** As Above
	Proposed data collection methods (maximum 600 words) Provide a brief summary of all the methods that **may** be used in the research activity to collect data, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed. You do not need to justify the methods here, but should instead describe how you intend to collect the data necessary for you to complete your project.
7	The data collection for this project relies entirely on open-source, non-proprietary, and unclassified technical literature. No primary data collection involving human participants or sensitive live industrial facilities will be used. Technical and regulatory parameters will be gathered from published guidelines provided by the Health and Safety Executive (HSE), Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) documentation, and established UK/international explosive safety standards. Engineering data regarding process machinery, throughput capabilities, and material characteristics will be compiled from open source manufacturing textbooks, academic journals, and open supplier technical specifications. The collected data will serve as theoretical baseline inputs for the Systems Engineering workbook. This data will be processed through established mathematical formulas, specifically standard TNT equivalence equations, to generate calculated parameters for structural blast walls and safe separation distances. These calculated parameters will then be modelled spatially using 2D Computer-Aided Design (CAD) software to verify that the facility floor layout physically conforms to all safety and regulatory criteria.

SECTION D: Scope of Research Activity

	Will the research activity include:	**YES**	**NO**
1	Use of a questionnaire or similar research instrument?	☐	☒
2	Use of interviews?	☐	☒
3	Use of focus groups?	☐	☒
4	Use of participant diaries?	☐	☒
5	Use of video or audio recording?	☐	☒
6	Use of computer-generated log files?	☐	☒
7	Participant observation with their knowledge?	☐	☒
8	Participant observation without their knowledge?	☐	☒
9	Access to personal or confidential information without the participants' specific consent?	☐	☒
10	Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive?	☐	☒
11	Performance of any acts which may cause embarrassment or affect self-esteem?	☐	☒
12	Investigation of participants involved in illegal activities?	☐	☒
13	Use of procedures that involve deception?	☐	☒
14	Administration of any substance, agent or placebo?	☐	☒
15	Working with live vertebrate animals?	☐	☒
16	Procedures that may have a negative impact on the environment?	☐	☒
17	Other primary data collection methods. Please indicate the type of data collection method(s) below.		
	Details of any other primary data collection method: (this box should expand as you type)	☐	☒

If you have ticked NO to every question then the research activity is (ethically) low risk and you may skip section E and continue to section F.

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

SECTION E: Intended Participants

	Who are the intended participants:	**YES**	**NO**
1	Students or staff at the University?	☐	☐
2	Adults (over the age of 18 and competent to give consent)?	☐	☐
3	Vulnerable adults?	☐	☐
4	Children and Young People under the age of 18? (Consent from Parent, Carer or Guardian will be required)	☐	☐
5	Prisoners?	☐	☐
6	Young offenders?	☐	☐
7	Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper?	☐	☐
8	People engaged in illegal activities?	☐	☐
9	Others. Please indicate the participants below, and specifically any group who may be unable to give consent.		
	Details of any other participant groups: Complete this only if your participants cannot give consent. This includes animals (this box should expand as you type)	☐	☐

	Participant numbers and source Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited?	
10	How many participants are expected?	Ballpark figures are fine, but make sure that you explain how you will identify and contact your participants. *(this box should expand as you type)*
11	Who will the participants be?	*(this box should expand as you type)*
12	How will you identify the participants?	

		(this box should expand as you type)

	Information for participants:	**YES**	**NO**	**N/A**
13	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	☐	☐	☐
14	Will you tell participants that their participation is voluntary?	☐	☐	☐
15	Will you obtain written consent for participation?	☐	☐	☐
16	Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)?	☐	☐	☐
17	If the research is observational, will you ask participants for their consent to being observed?	☐	☐	☐
18	Will you tell participants that they may withdraw from the research at any time and for any reason?	☐	☐	☐
19	With questionnaires, will you give participants the option of omitting questions they do not want to answer?	☐	☐	☐
20	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	☐	☐	☐
21	Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken?	☐	☐	☐
22	If NO to any of above questions, please give an explanation			
	You should be able to tick YES for all of these questions. If not, then explain why not in this box. *(this box should expand as you type)*			

	Information for participants:	**YES**	**NO**	**N/A**
24	Will participants be paid?	☐	☐	☐
25	Is specialist electrical or other equipment to be used with participants?	☐	☐	☐
26	Are there any financial or other interests to the investigator or University arising from this study?	☐	☐	☐

27	Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims?	☐	☐	☐
28	If YES to any question, please provide full details			
	You should be able to tick NO for most of these questions. For any cases that you have ticked YES then provide details in this box. If you are using cameras/voice recorders to record interviews then please state that in this box. *(this box should expand as you type)*			

SECTION F: Anticipated Risks

	Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them.	
1	**Risks to participants** For example: sector-specific health & safety, emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information. If you have identified in section D that there are no participants then enter N/A and go skip to question 3.	
	Risk to participants: N/A *(this box should expand as you type)*	*How you will mitigate the risk to participants:*
2	If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities	
	N/A	
3	**Risks to the investigator** For example: personal health & safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest	
	Risk to the investigator: Emotional Distress, Sleep Disruption, eye strain and headaches *(this box should expand as you type)*	*How you will mitigate the risk to the investigator:* *A Gantt chart has been established to pace the workload across the academic year. Milestones have been broken down into manageable phases (Requirements, Functional Analysis, PCT, CAD Layout, and Safety Verification) to ensure steady progress and prevent short-term workload spikes. Investigator will follow workplace station rules to minimise risk of eye strain and headaches.*
4	**University/institutional risks** For example: adverse publicity, financial loss, data protection	
	Risk to the University: Adverse Publicity due to content *(this box should expand as you type)*	*How you will mitigate the risk to the University:* Project is to be covered under an NDA and not published in the university library. Only individuals that require access to the dissertation to mark will ever see the project.

5	**Environmental risks** For example: accidental spillage of pollutants, damage to local ecosystems	
	Risk to the environment: N/A *(this box should expand as you type)*	*How you will mitigate the risk to environment:* N/A *(this box should expand as you type)*

SECTION G: Feedback, Consent and Confidentiality

If you have identified in section D that there are no participants then enter skip this section and continue to section H.

1	**Feedback** What de-briefing and feedback will be provided to participants, how will this be done and when?
	You don't need to email your participants with your final report. A good alternative is to set up an email address that they will be able to contact for further details or results. *(this box should expand as you type)*
2	**Informed consent** Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded in accordance with prevailing data protection legislation.
	If you are using a paper questionnaire then you should have the participants sign an appropriate consent form. These forms will count as personal data and should be noted as such in section J. If you are using an online questionnaire, then you should have a screen before the questions start that acts as a consent form, informing participants that by clicking on the NEXT button they are providing consent. *(this box should expand as you type)*
3	**Confidentiality / Anonymity** Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case.

	Do not collect names unless you really need them. Do not name participants or organisations in any research publications (including the thesis) without their explicit permission. *(this box should expand as you type)*

SECTION H: Data Protection and Storage

	Does the research activity involve personal data (as defined by the General Data Protection Regulation 2016 "GDPR" and the Data Protection Act 2018 "DPA")?	**YES**	**NO**
1	***"Personal data"*** *means any information relating to an identified or identifiable natural person ('data subject'). An identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. Any video or audio recordings of participants is considered to be personal data.*	☐	**X**
	If YES, provide a description of the data and explain why this data needs to be collected:		
2	This includes audio/video data of participants, but can also include IP addresses and usernames. Names, addresses and emails also count, as do consent forms. *(this box should expand as you type)*		
	Does it involve special category data (as defined by the GDPR)?	**YES**	**NO**
3	***"Special category data"*** *means sensitive personal data consisting of information as to the data subjects' –* *(a) racial or ethnic origin,* *(b) political opinions,* *(c) religious beliefs or other beliefs of a similar nature,* *(d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992),* *(e) physical or mental health or condition,* *(f) sexual life,* *(g) genetics,* *(h) biometric data (as used for ID purposes),*	☐	X
	If YES, provide a description of the special category data and explain why this data needs to be collected:		

	Will data from the research activity (collected data, drafts of the thesis, or materials for publication) be stored in any of the following ways?	**YES**	**NO**
5	Manual files (i.e. in paper form)?	☐	☒
6	University computers?	☐	☒
7	Private company computers?	☒	☐
8	Home or other personal computers?	☐	☒
9	Laptop computers/ CDs/ Portable disk-drives/ memory sticks?	☐	☒
10	"Cloud" storage or websites?	☐	☒
11	Other – specify:	☐	☒
12	For all stored data, explain the measures in place to ensure the security of the data collected, data confidentiality, including details of backup procedures, password protection, encryption, anonymisation and pseudonymisation:		
	Electronic or physical copies will not be retained by the university. All work completed will be stored on BAE Systems equipment which has multiple layers of protection. All physical copies will be destroyed after moderators mark.		

	Data Protection		
	Will the research activity involve any of the following activities:	**YES**	**NO**
13	Electronic transfer of data in any form?	☐	☒
14	Sharing of data with others at the University outside of the immediate research team?	☐	☒
15	Sharing of data with other organisations?	☐	☒
16	Export of data outside the UK or importing of data from outside the UK?	☐	☒
17	Use of personal addresses, postcodes, faxes, emails or telephone numbers?	☐	☒
18	Publication of data that might allow identification of individuals?	☐	☒
19	If YES to any question, please provide full details, explaining how this will be conducted in accordance with the GDPR and Data Protection Act (2018) (and/or any international equivalent):		
	N/A *(this box should expand as you type)*		
20	List all who will have access to the data generated by the research activity:		

	Dan Garton – Author Supervisor – TBC BAE Systems Stakeholders External Examiner
21	List who will have control of, and act as custodian(s) for, data generated by the research activity:
	Dan Garton – Author
22	Give details of data storage arrangements, including security measures in place to protect the data, where data will be stored, how long for, and in what form.
	All data will be stored on BAE Systems equipment which has multiple layers of protection. No data will be kept by the university or on electronic storage devices.

22	Confirm that you have read the UWTSD guidance on data management (see https://www.uwtsd.ac.uk/library/research-data-management/)	☒
23	Confirm that you are aware that you need to keep all data until after your research has completed or the end of your funding	☒

SECTION I: Declaration

	The information which I have provided is correct and complete to the best of my knowledge. I have attempted to identify any risks and issues related to the research activity and acknowledge my obligations and the rights of the participants**.** In submitting this application I hereby confirm that I undertake to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice which is published on the website: https://www.uwtsd.ac.uk/research/research-ethics/		
1	**Signature of applicant:**		**Date: 17/06/2026**
2	Director of Studies/Supervisor:	TBC	**Date:**
3	Signature:		

FOR INTERNAL USE ONLY:

	Ethical approval given		
1	**Signature of assessor:**		**Date:**
2	Name:		
3	Role:		