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Engineering and Project Management
Project Proposal

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1 Introduction

1.1 Project Brief

The purpose of this proposal is to replace the lights in a room inside an old building to better suit the requirements of an office and modern standards and practices. The luminaires used will need to be LED, suitable for an office containing computer displays, and comply with British Standards.

1.2 Project Background

The necessity of this project is due to the tenants' wish to convert an existing room with fluorescent lights to an office with more modern luminaires. Since the UK government introduced legislation restricting the use of fluorescent lamps [1], there has been a shift towards LED luminaires as they are more energy efficient and environmentally friendly [2]. Therefore, as well as replacing the current fluorescent tubes to be more compatible with DSE (Display Screen Equipment) work, the business will also reduce its carbon footprint and environmental impact, and increase its energy efficiency.

1.3 Aims and Objectives

- Develop a high-efficiency LED luminaire that meets required performance, safety, and regulatory standards.
- Create and test a functional prototype to validate performance.
- Evaluate energy savings and cost benefits compared to traditional fluorescent fixtures.
- Identify project risks and implement mitigation strategies to ensure successful development and deployment.
- Ensure ethical sourcing, manufacturing, and end-of-life practices for materials and components.

2 Project Design

2.1 General

The design and luminaires of this project will need to comply with British Standards such as BS EN 12464-1. This standard states that the minimum lux required for the room should be 500 lx with a minimum uniformity of 0.6 and a UGR ≤ 19 [3]. The selected luminaire will also be LED rather than fluorescent, as they have lower running costs, longer lifespans, and are better for the environment, since fluorescents contain mercury, which requires special disposal [4]. The selected luminaire will be recessed, which integrates with the existing infrastructure, leading to minimal disruption.

2.2 Luminaire Specification

The luminaire shall be a 600 × 600 mm, 36 W recessed LED panel with a Unified Glare Rating (UGR) ≤ 19 , a 4000 K neutral-white colour temperature, and a minimum luminous efficacy of 120 lm/W. The fitting shall have a rated lifetime of at least 50,000 hours (L70/B50) and an IP40 ingress-protection rating. The light source shall provide CRI ≥ 80 , incorporate ultra-low-flicker performance for visual comfort, and be supplied with a 5-year warranty. The luminaire can also support additional features such as dimming, emergency lighting, and smart controls, should the client wish to include them in the future.

3 Resources

The total estimated cost of the project is approximately £20,840 ± 5%. The detailed breakdown of the project cost can be seen in the MHE (Man-Hour Estimate) below, listed as Table 1. The BoM (Bill of Materials) can also be seen below in Table 2. Additionally, the cost-benefit analysis for this project can be seen in Appendix C.

Table 1: Man-Hour Estimate

Activity	Discipline	Position	Hours	Rate (£/hr)
Site Survey	Electrical	Engineer	12	55
Design & Engineering		Designer	24	35
		Engineer	48	55
		Principal Engineer	24	75
Removal & Installation of Luminaires		Technician	40	40
		Senior Technician	48	50
		Engineer	16	55
Testing & Commissioning		Technician	12	40
		Senior Technician	12	50
Support	PM	Project Manager	80	60
	Management	Engineering Manager	40	90
			Total Hours	Total Cost
			356	£ 20,300

Table 2: Bill of Materials

Bill of Materials - EEL-BOM-0001			
<u>Description</u>	<u>Quantity (Units)</u>	<u>Cost per Unit (£)</u>	<u>Total Cost (£)</u>
600mm x 600mm, 27 W LED Luminaire	18	30	540

4 Planning

4.1 Design & Engineering Phase

The Design & Engineering Phase of this project is shown in the Gantt chart in Figure 1 below. Additionally, details of activities, such as their durations and who is assigned to them, are also included.

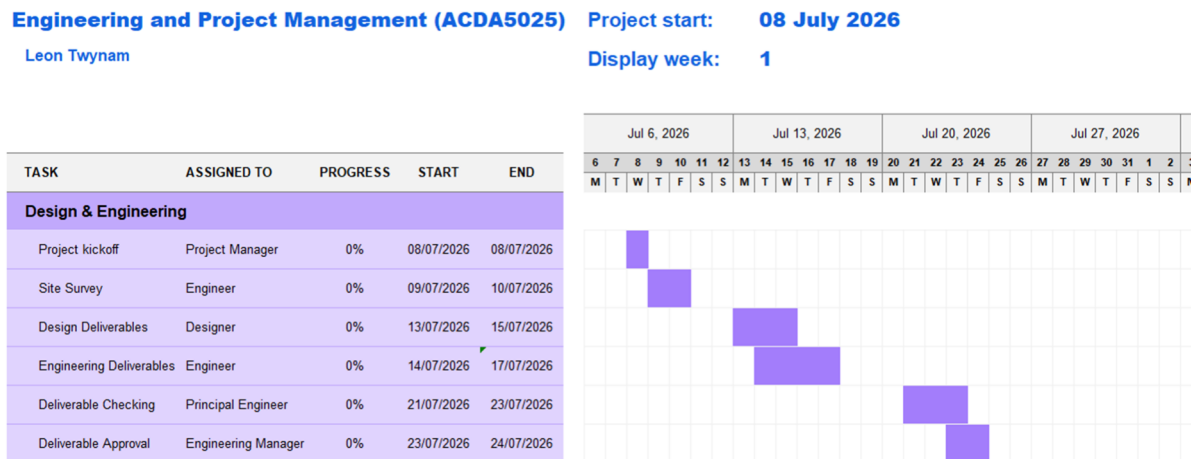


Figure 1: Design & Engineering Section of Gantt Chart

As can be seen in Figure 1 above, the Design & Engineering phase of this project is anticipated to take 2.5 working weeks to be completed. To begin the project, the project manager will arrange a project kick-off meeting, including all members of the team. The purpose of this meeting is to explain the scope of the project and to align all members of the team on the aims & objectives, duration of the project, etc.

After that, the engineer then conducts a site assessment so that they can inspect the existing fixtures, wiring, and retrieve any useful drawings of the existing infrastructure. Once all the necessary data has been obtained, the assigned project designer and engineer can begin working on deliverables such as lighting calculations, block diagrams, and updating the cable schedule.

Following the completion of the design & engineering deliverables, the principal engineer will then evaluate the created deliverables to ensure the quality and accuracy of the documents are up to standard. Furthermore, once the principal engineer has finished checking the documents, the engineering manager will apply one last check before they are then approved and sent to the client so that construction can commence.

4.2 Construction Phase

Figure 2 below illustrates the Gantt chart for the construction stage of the project. This phase begins once the Design & Engineering phase has been completed, so that the deliverables produced from this phase can be passed on to the technicians involved in the construction. The duration of this phase is estimated to be 2 weeks to complete.

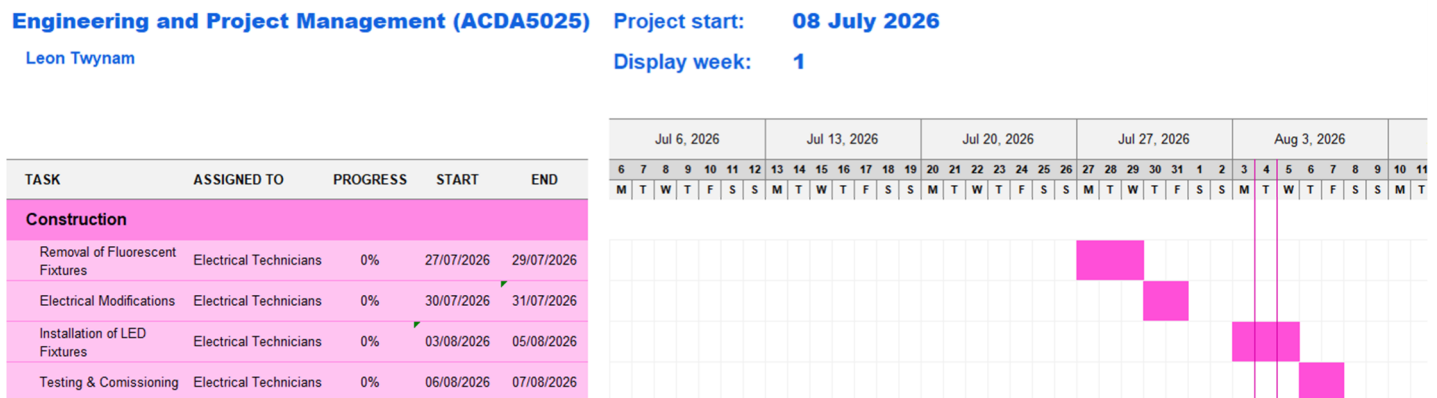


Figure 2: Construction Section of Gantt Chart

Figure 2 above portrays the construction phase of the project, which begins with the removal of the fluorescent luminaires. This process involves two technicians to isolate the circuit, remove the fluorescent luminaires, and then properly dispose them.

After that, the technicians will then need to inspect the existing wiring and infrastructure and modify the circuits as required. As most of the existing wiring and infrastructure can be kept for the LED luminaires, this task will only take 2 days for the technicians to complete. However, since an additional 12 fittings are due for installation to comply with standards, additional cable installation will be required, which will prolong the period of this task. Once this activity is completed, the installation of the LED fixtures can begin.

The installation of the LED fixtures will take approximately 3 days to be completed. This is due to no adjustments being made to the ceiling infrastructure and only minor wiring adaptations.

The final stage of the construction phase includes the testing and commissioning of the LED fixtures and associated equipment. This activity ensures that the functionality of the LED fixtures and associated equipment performs as intended. This will approximately take 1.5 - 2 days to complete.

4.3 Support Activities

The support activities of the project are a continuous effort throughout the project, which can be seen in Figure 3 below.

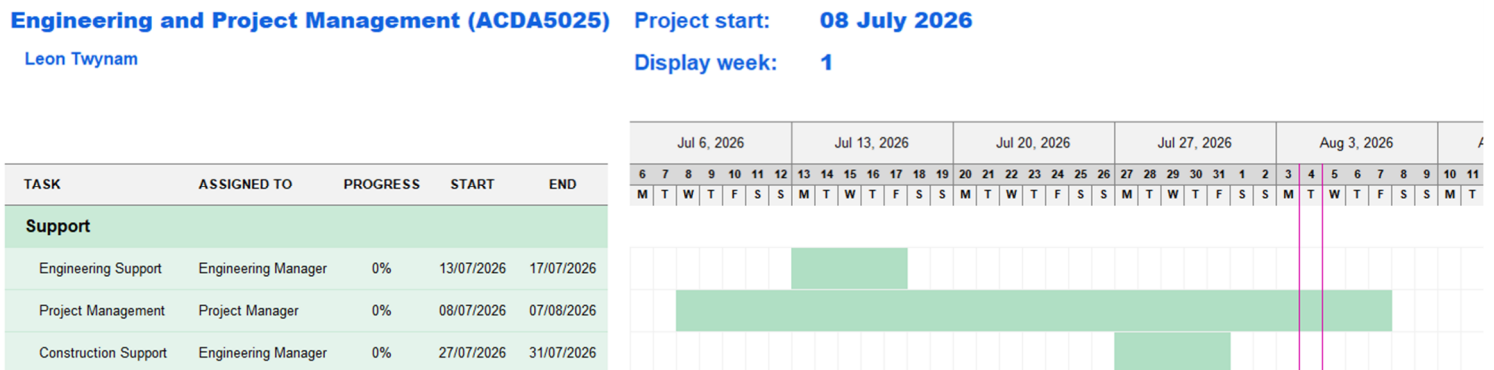


Figure 3: Support Section of Gantt Chart

As can be seen in the Gantt Chart above, the project manager is involved throughout the entire project. During the course of the project, the project manager is involved in communication with the stakeholder, resource and risk management, quality assurance, progress monitoring, and project close-out.

Additionally, the engineering manager is also involved throughout the project, but unlike the project manager, he is only involved when necessary and not continuously. The engineering manager will provide the team assistance when required and will also give the final approval of engineering deliverables.

Furthermore, the engineering manager will also oversee some of the construction to ensure that any issues are resolved if they arise. Moreover, if the technicians have any queries about the engineering documentation, then the engineering manager can answer them.

4.4 Critical Path Analysis

Critical Path Analysis is a technique used to identify the longest sequence of dependent tasks that must be completed on time for a project to finish by its planned completion date. Figure 4, 5, and 6 below shows the critical path analysis for each phase of this project.

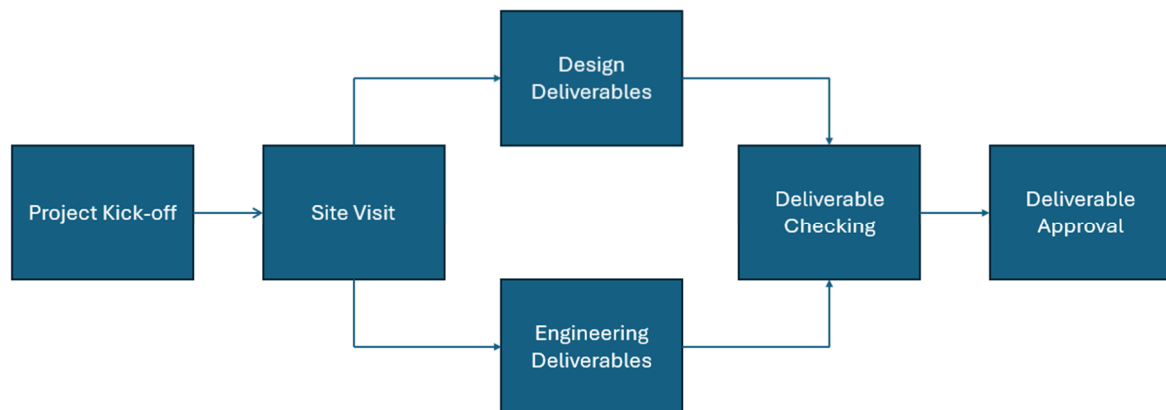


Figure 4: Critical Path Analysis for Design & Engineering Phase



Figure 5: Critical Path Analysis for Construction Phase

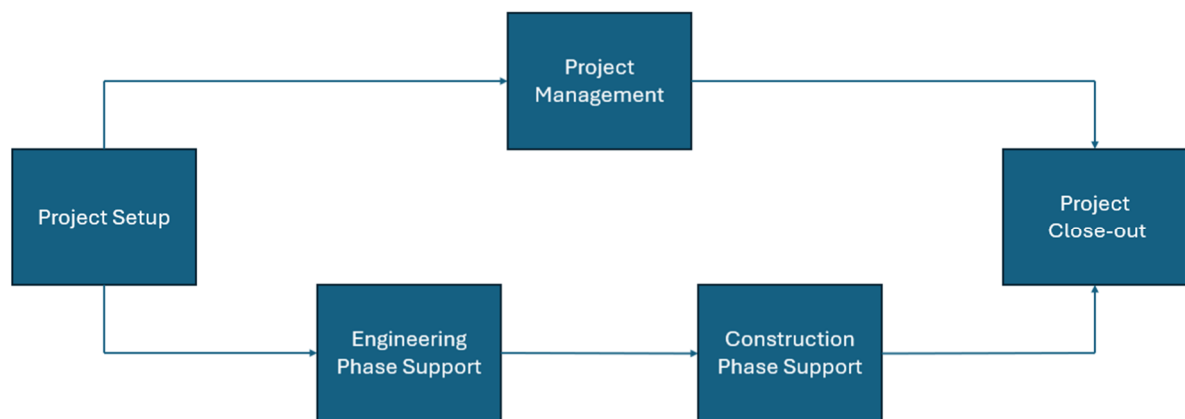


Figure 6: Critical Path Analysis for Support Activities

4.5 Project Outcome & Milestones

Upon successful completion of this project, all existing fluorescent luminaires will be replaced with LED's, which is expected to reduce energy consumption by up to 60%. Additionally, this will incur lower maintenance costs due to the longer lifespan of LED fittings and will provide improved illumination for employees. Furthermore, this project will reduce the environmental impact of the building by lowering carbon emissions and eliminating the use of fluorescent lamps, which contain mercury.

The first key milestone of the project is when the project kick-off is completed, as it marks the official start of the project. This milestone is achieved when the project team, stakeholders, and contractors have been briefed on the project objectives, scope, schedule, and responsibilities. The next milestone of this project is the completion of the site survey. This is important as once this is achieved, the design and engineering can begin with sufficient information gathered.

After that, the next milestone to be achieved is design and engineering approval. This then ensures that the new LED system meets the required operational and performance standards. The next milestone is for the replacement of fluorescent fittings and the installation of all LED luminaires. The penultimate milestone is then for testing and commissioning. This demonstrates that the installation meets the project specifications. Lastly, the final milestone is project handover and close-out, which marks the successful completion of the project.

4.6 Project Deliverables

Table 3 below lists the deliverables and documents that will be issued as part of the project's design and engineering activities.

Table 3: Deliverables list

Document No.	Title
EEL-BLD-0001	Electrical Block Diagram
EEL-LAY-0001	Electrical Routing and Layout Drawing
EEL-BOM-0001	Electrical Bill of Materials
EEL-CSC-0001	Lighting Calculation
EEL-CSC-0002	Electrical Cable Schedule
EEL-SOW-0001	Electrical Scope of Work

Project deliverables are the outputs produced during the project. These demonstrate that the project objectives have been successfully achieved and provide technicians with the necessary information required for installation. They help minimise errors and variations and are evidence that the new lighting system meets the required specifications. Figure 7 below shows the electrical routing and layout (EEL-LAY-0001) for the new LED luminaires.

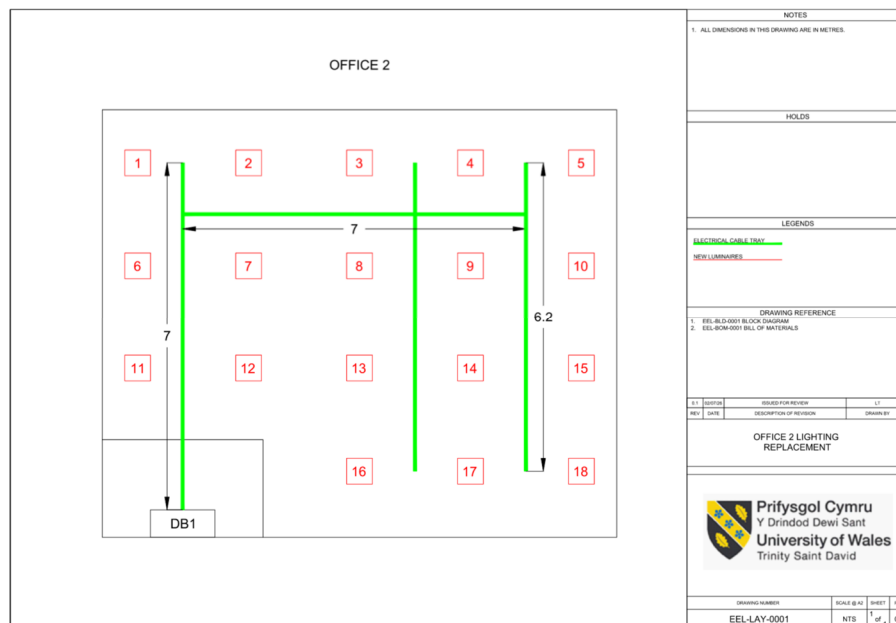


Figure 7: Electrical Routing & Layout

Figure 8 below shows the lighting calculation (EEL-CSC-0001) for the new LED luminaires.

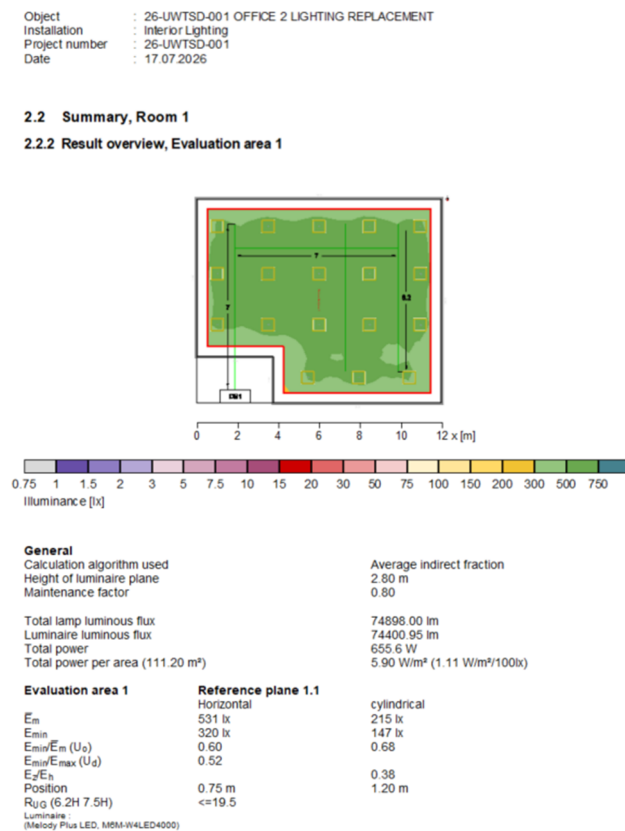


Figure 8: Lighting Calculation

5 Risks & Mitigation Methods

There are several risks that can impact this project, such as cost, schedule, quality and safety. Identifying these risks early can help implement the appropriate mitigation methods. Some of the potential risks in this project can be seen in Table 4 below.

Table 4: Project Risk Matrix

	Negligeable	Marginal	Moderate	Critical	Catastrophic
Certain					
Likely					
Possible			Budget overruns	Delay in delivery of luminaires	Working at height
Unlikely			Damage to existing infrastructure	Improper disposal of fluorescent luminaires. Poor quality installation.	
Rare					

As can be seen in the risk matrix above, the highest priority risk is working at height. The potential impact from this risk is a fall from ladders or access equipment during the replacement and installation of luminaires. This risk can be mitigated by ensuring that technicians have the correct working at height training and access equipment, as well as ensuring they comply to The Work at Height Regulations 2005 [5]. Another risk that could potentially impact this project is the delay in the delivery of luminaires. This risk can be mitigated by ordering supplies in advance and using a reliable supplier.

An additional potential risk is budget overruns. The obvious impact of this risk is that the cost of the project could exceed the budget. The mitigation method for this risk should be to include a contingency allowance of around 10-15%, and to regularly

monitor the budget during the project. A further potential risk is the improper disposal of the fluorescent luminaires. The impacts of this risk are environmental contamination due to the mercury contained in the luminaires and legal compliance issues. To mitigate this risk, the luminaires should be properly disposed of through licensed hazardous waste contractors, whilst also complying with environmental regulations such as Waste Electrical and Electronic Equipment (WEEE) regulations 2013 [6].

Another potential risk is damage to the existing infrastructure. This risk can lead to the impact of additional project costs, scope creep, and delays. This can be mitigated by conducting a site survey to inspect the existing infrastructure. The final risk identified is poor quality installation. The impacts of this risk can be reduced reputation, increased costs, and customer dissatisfaction. To mitigate this, there should be quality checks throughout the project, final testing and commissioning checks and compliance with the relevant standards such as BS 12464-1: 2021 [3]. Additionally, during the design and engineering phase, before deliverables are sent to the client, QA/QC documentation should be completed to ensure the standard of quality is at an acceptable level. An example of a QA/QC checklist can be seen in Figure 9 below.

CHECKLIST FOR ISSUED DOCUMENTS					
PROJECT NUMBER:					
PROJECT TITLE:					
TRANSMITTAL NUMBER:					
DOCUMENT(S):					
Use this checklist in conjunction with: Infinite Document Checking and Approval Guidance Note 10-IND-00-TP-002 Infinite Document Approval Authorisation					
No.	ITEM	CREATOR	CHECKER	APPROVER	DOC CTRL
1	CONTENTS OF TRANSMITTAL SHEET ARE SHOWN WITH CONTENTS OF TRANSMITTAL FOLDER				
2	ALL APPROPRIATE ATTACHMENTS INCLUDED IN TRANSMITTAL FOLDER				
3	ACCOMPANIED WITH DOCUMENT SPECIFIC CHECKLIST				
4	ACCOMPANIED WITH CHECKPOINTS				
5	CONFIRM IF SINGLE DELIVERABLE OR PART OF PACK (S)				
6	CORRECT FILE ATTACHMENT				
7	CORRECT CLIENT LOGO / NAME				
8	DATE				
9	CLIENT PROJECT NUMBER				
10	MAST PROJECT NUMBER IF APPLICABLE				
11	PROJECT TITLE				
12	DOCUMENT TITLE				
13	DOCUMENT NUMBER(S) MATCH SERIES				
14	DOCUMENT REVISION MATCHES REV VALUE				
15	DOCUMENT REVISION MATCHES CLIENT REQUIREMENTS (S)				
16	IS THE DATE OF ISSUE PRESENT ON DOCUMENT(S)				
17	REVISION STATUS PRESENT IN REVISIONS ON FRONT PAGE				
18	DETAILS OF REVISION INCLUDED ON RE-USED DELIVERABLES				
19	TRANSMITTAL SUBJECT ATTACHED WITH RESPONSE(S)				
20	OTHER DISCIPLINE TO SIGN				
21	CREATOR SIGNED				
22	CHECKER SIGNED (CHECKER MUST BE APPROPRIATE DISCIPLINE)				
23	APPROVER SIGNED				
24	APPROVER AUTHORISED TO SIGN				
25	DETAILS ADDED TO MASTER FILE AND PDF(S) SAVED				
26	FILE & PDF SAVED IN TRANSMITTAL FOLDER				
27	TRANSMITTAL SENT FROM COMMISSIONING/TECHNICAL/COM				
28	TRANSMITTAL SENT TO CLIENT DOCUMENT CONTROL ADDRESS				
29	TRANSMITTAL COPIED TO RELEVANT OTHER RECIPIENTS				
30	MASTER DOCUMENT INDEX UPDATED				
31	CLIENT COMMENTS INCORPORATED (S)				
32	COMMENTS ON AND NEW COPY INCORPORATED				
33	TECHNICAL CONTENT AND QUALITY CHECKED (S)				
34	NOTES AND HOLDERS CLEAR AND APPROPRIATE FOR THEY REV				
35	SPELLING AND GRAMMAR CHECKED				
36	MASTER DOCUMENT FILE UPDATED INCLUDING REV AND RFP FOLDERS				
37	IF DOCUMENT(S) ARE AN ADDITIONAL UNPLANNED REVISION/REUSE SELECT CHANGE TYPE (S)				
Comments:					
PROJECT ENGINEER / PM AUTHORISES TO ISSUE (S)		Digital Signature			
Tick this box if documents are to be issued on fixed track comment cycle					
NOTES					
1) Agree to issue document back only, and only if there are comments from client 2) Name Project PM relevant to issue document. This applies to specific document submittals 3) If documents are part of a pack then they should be referenced as a pack. If pack then confirm all docs present. Document attachments do not constitute a pack. 4) Documents should be issued at the appropriate revision and time, refer to Quality Submittal (S). Any 'extra revision' must have an explanation in the comments box. 5) Repeat changes to sign checklist authorising re-submission, and return DOCUMENTS to previous version and send to client					

Figure 9: QA/QC Checklist

6 Environmental & Societal Impact

This project has multiple environmental and societal impacts which are mostly positive. The first positive environmental impact of this project is reduced energy consumption. This is because LED luminaires are significantly more energy efficient than fluorescent lights. Additionally, this reduction in energy consumption also reduces the buildings overall carbon footprint.

A further positive environmental impact of this project is reduced waste generation. This is because LED's have a much larger lifespan compared to fluorescent luminaires, which means fewer replacements are needed, resulting in less waste being sent to recycling facilities or landfill. However, a potential negative environmental impact can be caused if the fluorescent tubes are broken during removal. This is because when they are broken, mercury vapour is released, which can pose a danger to workers and the environment [7].

One of the positive societal impacts of this project is enhanced employee wellbeing. This is because better quality lighting can help reduce eye strain, headaches, and fatigue, which then results in a more comfortable work environment for employees. This can also have the additional benefit of increasing productivity as employees will be able to complete visual tasks in the office more comfortably and effectively. A negative societal impact of this project is that the construction activities may disrupt the normal operations of the building.

7 Ethical Considerations

One of the key ethical considerations is worker health and safety. During construction, workers will be working at height, whilst also being potentially exposed to electrical hazards and manual handling risks. The project team therefore has the ethical responsibility of ensuring that appropriate training, PPE, and safe systems of work are in place. It is also important that they comply with regulations such as the Manual Handling Operations Regulations 1992 [8] and Provision and Use of Work Equipment Regulations 1998 (PUWER) [9].

Another key ethical consideration is where the LED's will be manufactured. Electrical components are usually manufactured using materials sourced from all around the world. It is then important to consider whether the supplier or manufacturer is committed to fair labour practices, safe working conditions, and responsible sourcing of raw materials.

Additionally, the project should also consider the wellbeing of the building occupants. Poor lighting can lead to eye strain, headaches, and discomfort. This can be mitigated by ensuring that the design of the new luminaire system complies with BS 12464-1. The office should have a minimum of 500 lux so that the room is the appropriate brightness, 0.6 uniformity so that the light is evenly distributed, and a Unified Glare Rating (UGR) of ≤ 19 so that computer displays can be viewed with comfort.

The final ethical consideration that should be taken into account is the potential misuse of the LEDs. LED lighting can contribute to excessive energy consumption and light pollution if not installed with the proper controls. The luminaires have the option to be installed with control features to mitigate this, such as dimming, time or daylight sensors, and other smart controls. The project should also aim to provide only the necessary amount of light required for the area.

8 Conclusion

To conclude, this project aims to provide the appropriate levels of lighting required whilst also considering environmental impacts such as the correct disposal of fluorescent lamps due to them including mercury. This project also considers societal impact such as the health and safety of the workers, and ethical considerations of energy consumption and light pollution. Finally, in addition to these considerations, this project also reduces the building's carbon footprint and increases its energy efficiency.

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Appendix A – Equality, Diversity & Inclusion Certificate



Appendix B – PREVENT Certificate



AN INTRODUCTION TO
THE PREVENT DUTY
AS IT AFFECTS
HIGHER EDUCATION

CERTIFICATE OF COMPLETION

THIS ACKNOWLEDGES THAT

Name: Leon Twynam

HAS SUCCESSFULLY COMPLETED THE INTRODUCTION TO PREVENT E-LEARNING

Date: 08/06/2026

Appendix C – Cost Benefit Analysis

Cost	Benefit
Project Cost – £20,840	Annual Savings - £485
Existing Annual Running Cost - £1,280	New Annual Running Cost - £795
Existing Annual Energy Consumption – 4,573 kWh	New Annual Energy Usage – 2,838 kWh
	Maintenance Saving - £180
	Payback period – 31 years
	Reduced Carbon Emissions