



## Appendix 5.4

### Lighting Design Scheme (Hoare Lea, July 2022)

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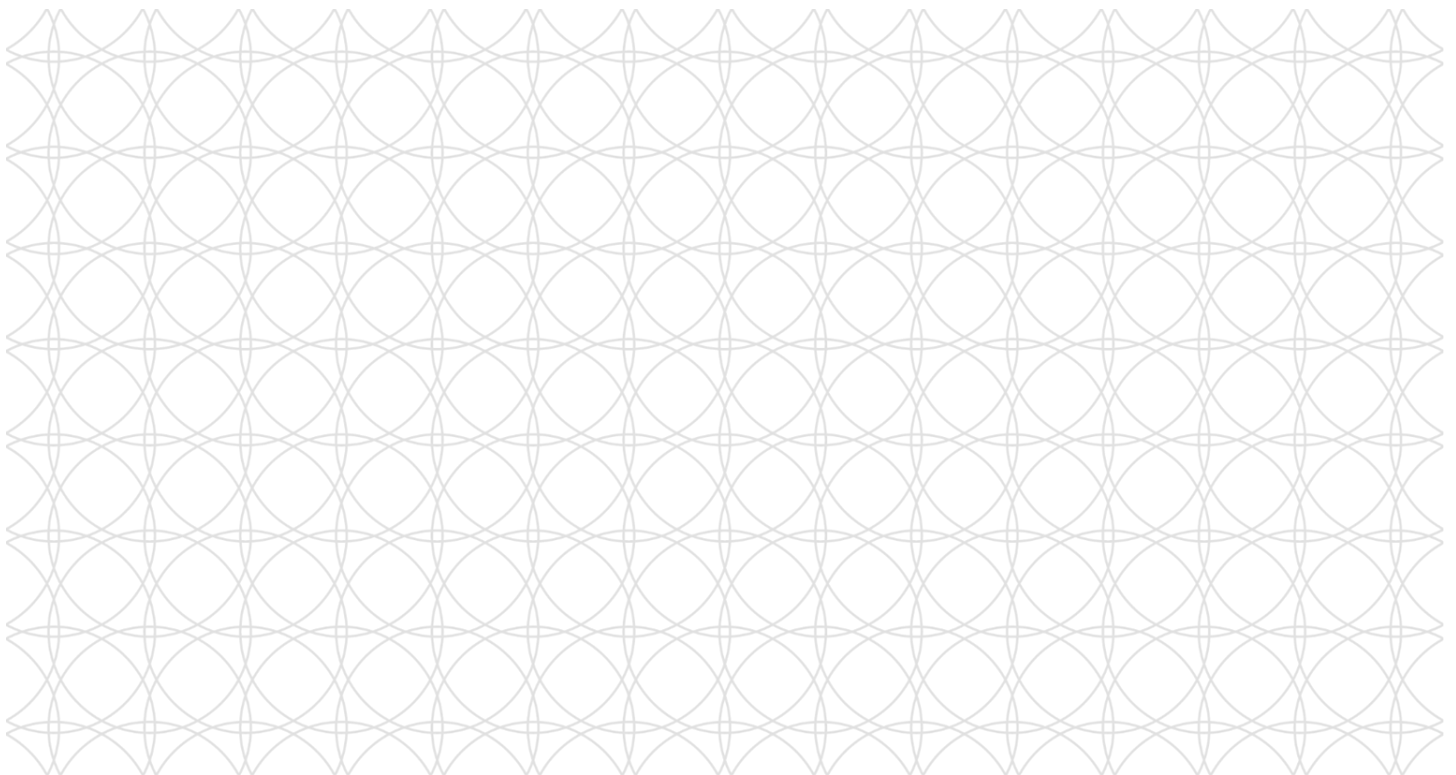
# Barry Biomass. Luminaire datasheets.

**BB-HLEA-SW-XX-SP-E-70805 - LUMINAIRE DATASHEETS**

**STATUS: S3**

**REVISION: P01**

21 JUNE 2022



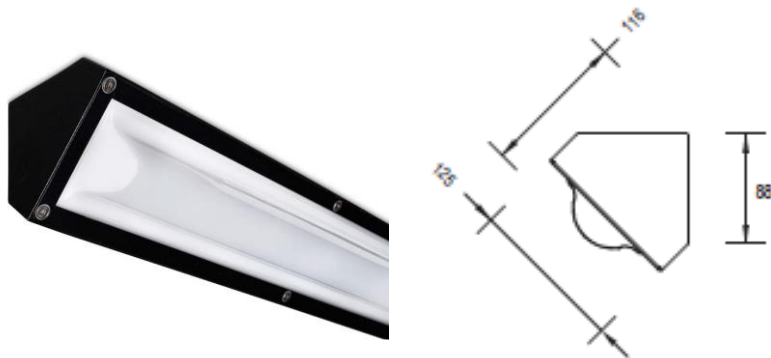
**Audit sheet.**

Rev	Date	Description	Prepared	Verified	Authorised
P1	24/06/22	Stage 2 Issue	EFR	SMK	DDM
P2	30/06/22	Corrections to datasheets & schedule	EFR	DDM	DDM

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Luminaire reference : A1



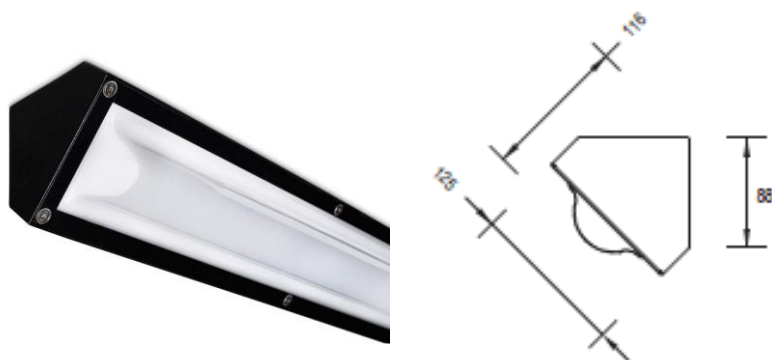
Polar curve omitted due to modification to CFC chip position

<b>Manufacturer</b>	Aether Lighting 0208 254 0094	<b>Product code</b>	TAB45/2/2250/3000/AS/O PP
<b>Product name</b>	TABOR45	<b>Dimensions - Width</b>	125mm
<b>Product description</b>	Building mounted batten light	<b>Dimensions - Length</b>	620mm
<b>Mounting type</b>	Wall or Under Stairs	<b>Dimensions - Height</b>	88mm
<b>Lamp type</b>	LED, 3000K, 80CRI	<b>Emergency</b>	N/A
<b>Optic</b>	Opal	<b>Accessory</b>	
<b>Luminaire performance</b>	Connected load: 18W Lumen output: 2250 lm Efficacy: 125 Llm/W	<b>Notes</b>	
<b>Finish</b>	Painted Textured Black	<b>Budget cost (each)</b>	£420
<b>Control gear</b>	N/A	<b>Emergency</b>	No as standard/emergency available to be confirmed by client
<b>IP/IK rating</b>	IP65, IK18		

Note: Prices quoted are manufacturers trade price (£Sterling) excluding V.A.T. Product codes, quantities and prices are for reference only and should be confirmed prior to order placement. Dimensions and technical details are for information only. Installation data should be obtained direct from manufacturer.

## Barry Biomass.

### Luminaire reference : A2



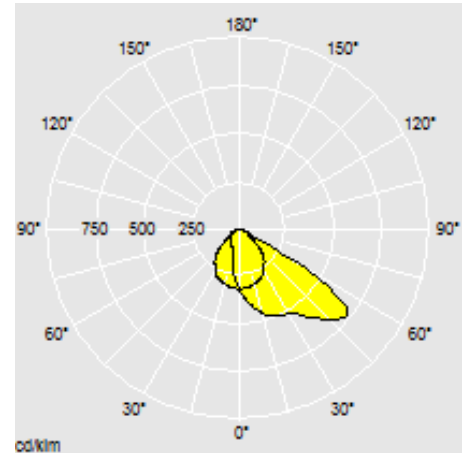
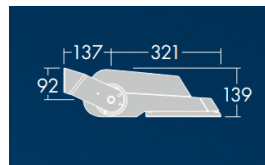
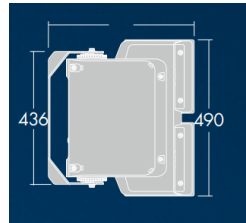
Polar curve omitted due to modification to CFC chip position

<b>Manufacturer</b>	Aether Lighting 0208 254 0094	<b>Product code</b>	TAB45/4/5800/3000/AS/O PP
<b>Product name</b>	TABOR45	<b>Dimensions - Width</b>	125mm
<b>Product description</b>	Building mounted batten light	<b>Dimensions - Length</b>	1200mm
<b>Mounting type</b>	Wall or Under Stairs	<b>Dimensions - Height</b>	88mm
<b>Lamp type</b>	LED, 3000K, 80CRI	<b>Emergency</b>	N/A
<b>Optic</b>	Opal	<b>Accessory</b>	
<b>Luminaire performance</b>	Connected load: 48W Lumen output: 5800lm Efficacy: 120.8 Llm/W	<b>Notes</b>	
<b>Finish</b>	Painted Textured Black	<b>Budget cost (each)</b>	£440
<b>Control gear</b>	N/A	<b>Emergency</b>	No as standard/emergency available to be confirmed by client
<b>IP/IK rating</b>	IP65, IK18		

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Luminaire reference : B

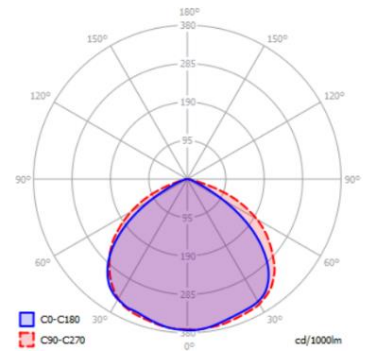
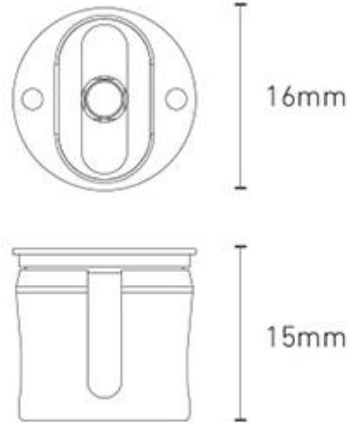


<b>Manufacturer</b>	Thorn Lighting	<b>Product code</b>	AFP M 72L70-740 A4 BS 3550 CL1 GY
<b>Product name</b>	Areaflood Pro	<b>Dimensions - Width</b>	490mm
<b>Product description</b>	General purpose LED area floodlight	<b>Dimensions - Length</b>	458mm
<b>Mounting type</b>	Stirrup mounted from 10 meters	<b>Dimensions - Height</b>	139mm
<b>Lamp type</b>	LED, 3000K, 70CRI	<b>Emergency</b>	N/A
<b>Optic</b>	40°	<b>Accessory</b>	
<b>Luminaire performance</b>	Connected load: 150W Lumen output: 23339 lm Efficacy: 156 lm/W	<b>Notes</b>	
<b>Finish</b>	Light grey 150 sanded textured (close to RAL9006)	<b>Budget cost (each)</b>	£435
<b>Control gear</b>		<b>Emergency</b>	No
<b>IP/IK rating</b>	IP66, IK08		

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Barry Biomass.

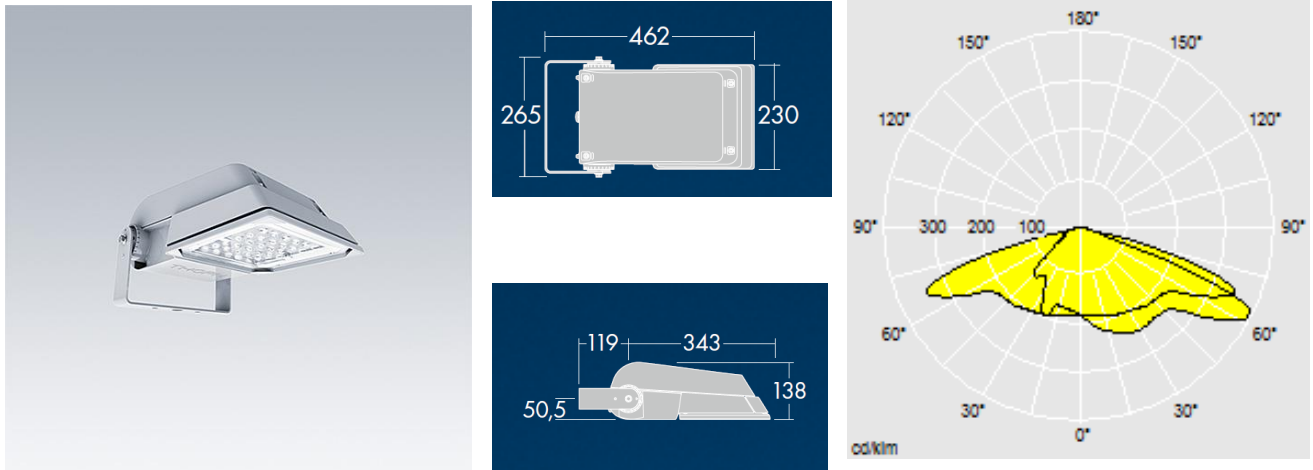
Luminaire reference : C



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Luminaire reference : D



<b>Manufacturer</b>	Thorn Lighting	<b>Product code</b>	AFP S 36L70-740 EWR BS 3550 CL1 GY
<b>Product name</b>	Areaflood Pro	<b>Dimensions - Width</b>	265mm
<b>Product description</b>	General purpose LED area floodlight	<b>Dimensions - Length</b>	462mm
<b>Mounting type</b>	Building stirrup mount	<b>Dimensions - Height</b>	138mm
<b>Lamp type</b>	LED, 3000K, 70CRI	<b>Emergency</b>	N/A
<b>Optic</b>	Extra wide road optic	<b>Accessory</b>	
<b>Luminaire performance</b>	Connected load: 77W Lumen output: 11488lm Efficacy: 149Lm/W	<b>Notes</b>	
<b>Finish</b>	Light grey 150 sanded textured (close to RAL9006)	<b>Budget cost (each)</b>	£410
<b>Control gear</b>		<b>Emergency</b>	No
<b>IP/IK rating</b>	IP66, IK08		

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## Barry Biomass. Costing & Budgeting

Costing is indicative and could be subject to either manufacturer and/or designer change

Qty	Label	Manufacturer	Description	Lumens	Watts	Unit Price	Total (£)
28	A1	Aether	Tabor 45 - 600mm	2250	18	420	11760
50	A2	Aether	Tabor 45 - 1200mm	5800	48	440	22000
23	B	Thorn	96644988 AFP M 72L70-740 A4 BS 3550 CL1 GY	23339	150	435	10005
16	C	Optelma	Puck 30 Wide	172	1.4	140	2240
1	C (Driver)	Optelma	Driver C/W IP box and emergency gear	N/A	N/A	250	250
2	D	Thorn	96644826 AFP S 36L70-740 EWR BS 3550 CL1 GY	11488	77	410	820

Total	47075
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## Barry Biomass.

### Luminaire Design Expectation

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Final selections of lighting equipment must meet a wide range of criteria. Below a list of basic criteria from Arup Stage 2 documentation that Hoare Lea would recommend to be followed :

All luminaires shall be subject to EMC emission and immunity testing and provided with EMC compliance certification.

The following requirements apply to all LED luminaires:

- All LED luminaires shall undergo a minimum 24-hour burn-in test during manufacturing.
- Unless specified otherwise, minimum luminaire lifetime shall be 50,000 hours at L80/F10. Note this is the complete luminaire, not the LED source.
- Unless specified otherwise, the maximum failure fraction of LED luminaires at the end of luminaire lifetime shall be 10%, F10.
- All LED luminaires shall have lumen maintenance code 9 according to IEC/PAS 62717, where maintained luminous flux at 6,000 hours shall be in excess of 90% of initial luminaire lumens.
- All hardwired connections to LED luminaires shall be reverse polarity protected.
- All LED luminaires shall provide a cover or other suitable protection of LED chips to allow for cleaning.
- Audible noise from luminaire and/or drivers when at full lumen output or at any dimming level shall not be acceptable.
- White light LED output power at 400nm and below shall be 0 (zero).
- Unless specified otherwise, LED luminaires shall have a power factor > 0.9.
- The specified colour temperature variation applies to the initial colour temperature variation and at any time prior to the end of the warranty period. If not specified, this shall be 3-step MacAdam ellipse.
- CRI ≥80.
- ≥ IP65
- The luminaire shall be constructed from material suitable for external environments and the location of the site along the coast.

LED drivers shall comply with the following:

- LED driver lifetime shall match or exceed the LED luminaire lifetime.
- LED drivers shall be RoHS compliant.
- LED drivers shall have a minimum efficiency of 85%.
- LED drivers shall have a total individual luminaire Harmonic Distortion (THD) of < 20%.
- The Contractor shall ensure complete system compatibility where different manufacturers of drivers and LED sources are used.
- Unless specified otherwise, where dimming is specified the LED luminaire shall dim smoothly to 10% or less of full lumen output.
- The Contractor shall ensure the LED driver is fully compatible with the lighting control system and dimming protocol.
- Dimmable LED drivers shall dim via Pulse Width Modulation (PWM) or using a hybrid combination of PWM and Constant Current Reduction (CCR).

#### Warranty

The Contractor shall warrant the luminaire, its finishes and all of its component parts, including drivers, to be free of defects for a period of 5 years from the date of acceptance. The warranty shall be provided by the luminaire manufacturer as the sole source of service.

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## Barry Biomass.

### Luminaire Design Expectation

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Final selections of lighting equipment must meet a wide range of criteria. Below a list of basic criteria that Hoare Lea would recommend to be followed :

Optical performance - Based on two main parameters efficiency and light distribution.

Glare - Avoid discomfort glare intrinsic to the luminaire.

Aspect - Relevant scale and integrated product.

Aiming and tilting - Required post construction although glare should be avoided in final projection angle.

Easy integration and installation.

RAL Colour - Luminaire finish to match or suit architectural finishes. (needs to be confirmed by the architectural team in all cases).

Quality finish - Must be guaranteed by the selected manufacturer to avoid discolouration.

Construction quality – Robust.

Degree of protection from dust and water ingress (IP rating) as were required.

Ease of integration and installation.

Colour Rendering Index (CRI) - Minimum 80ra.

Colour stability (MacAdam ellipse) – maximum 3 SDCM shift over life span.

Independent photometry - to be provided for all luminaires before final manufacturer selection.

Luminaires to be independently tested to recognised industry methods such as IESNA LM79 / LM80 / LM-82 / ANSI C78.377-2011 / IES TM21.

Warranty required for luminaires, control gear and lamps - TBC confirmed by selected manufacturer.

Luminaire samples - To be viewed and agreed by design team.

Spares - Long term availability.

Cleaning - Easy cleaning and maintenance.

Value.

Flicker free drivers are required in accordance with IEEE1789.

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## Barry Biomass.

# Lighting Control Methodology

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### Lighting Control Functionality:

All lighting is based on the DALI protocol to allow all lighting to be controlled centrally via the head-end system and web based application.

The lighting control is zoned in such a way to allow individual control of the separate routes and areas.

The main site is controlled via the following strategy:

- All building mounted and column lighting is connected to the head end control system.
- All lighting will be triggered by the central photocell or astronomical time clock via the head-end control system.
- The head end control system will allow manual override and daytime testing.

The lighting around the lake edge is controlled as follows

- All column mounted lighting to be controlled via photocells to ensure fixtures only operate in hours of darkness.
- All column lighting is connected to the head end control system.
- All column mounted lighting will have individual PIR motion sensors to trigger lighting in post curfew hours to a higher lighting level when it detects motion.
- Motion sensor to be programmed onsite to ensure sensitivity do not detect nocturnal wildlife movements.
- All lighting will be triggered by the photocell or astronomical time clock via the head-end control system.
- The head end control system will allow manual override and daytime testing.

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## Barry Biomass.

### General Design Expectations – Lighting Controls

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The overall objective is to achieve the most energy efficient lighting, with the lowest cost of ownership, without compromising user comfort or convenience.

Flexibility through software configuration and programming shall enhance lighting design freedom to maximise the aesthetic potential whilst facilitating energy saving measures.

The lighting control shall provide effective energy management and reporting of lighting load status throughout the installation. It shall provide convenient and intuitive manual control, supported by appropriate automatic operation to minimise energy consumption.

In case the design requires it the lighting system shall allow control of DALI emergency fittings by facilitating automation of Emergency Function and Duration Testing and generation of test reports.

To ensure simplicity and reliability, it is a requirement that the system network controllers / routers handle network connections directly. Systems that utilise additional converters or similar intermediary devices are not acceptable unless is deemed as a safe solution.

System intelligence shall be distributed and reside within the lighting ballasts, LED drivers, load controllers, input devices, gateways and network routers.

The system shall be capable of processing command instructions from switches, sensors and other devices with sufficient speed that the user of the system sees the resulting action as a direct response to a switch being operated, or sensor triggered.

The installation shall be capable of forming a building wide lighting control system. Integration to BMS/BAS shall be via the Ethernet TCP/IP backbone infrastructure. The driver shall allow connection and communication with the system network controllers / routers and provide automatic discovery of system devices.

Changes to the system shall be made by an Operator Workstation consisting of either a desktop PC or commissioning (temporarily connected) laptop computer. However, the PC shall not be an active control component within the system. After commissioning, the control system routers and devices shall retain all configuration and programming information required for the system to operate automatically without the PC being present. The actual PC is to be provided by others

The lighting control system should be able to process and command the luminaires listed on this document as per control protocols selected.

The lighting control system should be located in an accessible place and connected to the wider scheme controls system.

## Barry Biomass.

### LED testing information to be considered

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The enclosed information is based on the document "Guidelines for Specification of LED Lighting Products" by the Lighting Industry Liaison Group. This represents some of the information required in order to make a considered and well-judged LED specification. The data required in the guide represents the outcome of a rigorous testing procedure – necessary for LED products due to the inherent complications associated with the LED manufacturing processes and applications.

Luminaire manufacturers design data, made available for traceability

#### Life

Life should always be stated as:

1. Light Loss - Usually either L90 or L70 (L50 for decorative luminaires) – no. of hours; and
2. Physical Failures - LED Life F10 – no. of hours

e.g. If the rated life of a product is 50,000 hours, this means light loss of L70 and physical failures of Fx (where x is the percentage no. of failures) at the rated life of 50,000 hours.

(Note: it should be assumed that the manufacturer has tested to a maximum of 6000 hrs and extrapolated beyond that – unless they explicitly state differently)

#### Rated Lumen Output

The initial luminous flux shall be measured after thermal stabilisation of the LED luminaire.

#### *Light Loss Maintenance Factor (LLMF)*

This will be the light lost at rated life.

#### *Rated Luminaire Efficacy*

Properly measured, Luminaire Efficacy combines both the light source system efficacy and luminaire efficiency, allowing for a true comparison of a luminaire regardless of the light source. Luminaire efficacy is the preferred metric for LEDs because it measures the net light output from the luminaire divided by power into the system, accounting for driver, optical, and thermal losses.

Therefore each luminaire should be supplied with;

- Initial total lamp lumen output
- Initial total lamp lumen output per circuit watt
- Total lamp lumen output with thermal & optical losses
- Total lamp lumen output (with thermal & optical losses) per circuit watt

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#### Colour Temperature

The initial colour point (x & y) of the LED and the colour temperature derived from it or bin class related to C78.377-2008 where colour temperature values are recommended as 2700K, 3000K, 3500K, 4000K, 5000K, 6500K

#### Colour Maintenance

The colour shift is judged by the colour point shift at 6,000 hours compared to the initial colour point (x & y) of the luminaire.

#### Lumen Depreciation

The lumen depreciation rate is judged by the light output at 25% of rated life (with a maximum duration of 6000 h) compared to the initial output.

Light output > 90% of initial Cat 1  
Light output > 80% of initial Cat 2  
Light output > 70% of initial Cat 3

#### Colour Rendering Index (CRI)

##### *CRI of the LED*

The initial Colour Rendering Index (CRI) of the LED. The preferred measure of CRI is Ra14 as the additional test colours compared to Ra8 will give a more accurate representation of the LEDs ability to reproduce colours.

##### *The Initial CRI and CRI change.*

The initial Colour Rendering Index (CRI) of a luminaire is measured. A second measurement is made after a total operation time of 25% of rated life (with a maximum duration of 6000 h). The measured CRI values shall not have decreased by more than 3 points from the rated CRI value for initial CRI values and 5 points from the rated CRI value for maintained CRI values. The preferred measure of CRI is Ra14 as the additional test colours compared to Ra8 will give a more accurate representation of the LEDs ability to reproduce colours.

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#### Stability of Colour Temperature

Within a 1-step ellipse  
Within a 3-step ellipse  
Within a 5-step ellipse  
Within a 7-step ellipse  
Greater than a 7-step ellipse

Tolerance (categories) on nominal x & y values measured for both initial and at 25% of rated life (with a maximum duration of 6000 h)

All measured x & y's within a 1-step ellipse  
All measured x & y's within a 3-step ellipse  
All measured x & y's within a 5-step ellipse  
All measured x & y's within a 7-step ellipse  
All measured x & y's > 7-step ellipse

Tolerances beyond a 4-step ellipse are considered unacceptable for general illumination purposes.

#### Photometric Distribution

Candelas (cd) and degrees

Photometric data is available in two formats. Absolute Photometry does not require the use of a separate lumen output for the light source. Relative Photometry requires the LED package flux to be quoted. Both methods produce the same result. The manufacturer should state the format in which the photometric data is supplied.

Absolute photometry of LED luminaires should be conducted according to IES LM-79-08 Photometric Measurements of Solid-State Lighting Products. Relative photometry should be conducted according to EN13032-1 (2004) Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 1: Measurement and file format

These standards contain advice on measurement uncertainty. Luminaire performance data to be quoted at operating temperature (Tboard).

Photometric results that are calculated by deviation from the tested sample by the use, for example of higher or lower drive currents or dies from bins other than the bin used for the tested device are to be clearly identified as such. Correction factors used are to be provided with the results.

Temperature cycling shock test:

The non-energised LED luminaire shall be stored firstly at - 10 °C for 1 hour. The luminaire is then immediately moved into a cabinet having a temperature of + 50 °C (see 1.2) and stored for 1 hour. 250 such cycles shall be carried out. At the end of the test the LED luminaire shall operate and remain alight for 15 min.

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#### Supply voltage switching test:

At test voltage the luminaire shall be switched on and off for 30 seconds. The cycling shall be repeated for a number equal to half the rated luminaire life in hours (example: 10K cycles if rated luminaire life is 20 000 hours). At the end of the test the LED luminaire shall operate and remain alight for 15 min.

#### Thermal endurance test (nominal)

The LED luminaire shall be operated at nominal voltage and at an ambient temperature of + 35 ° C for outdoor luminaires, + 25 ° C for indoor luminaires and + 35 ° C for recessed luminaires until a test period equal to 25 % of the rated luminaire life (with a maximum of 6 000 hours) has passed. At the end of this time, and after cooling down to room temperature, the luminaire shall remain alight for at least 15 min.

(NOTE: Higher temperature for testing as only testing to 25% life)

Suitable operating temperature to ME maximum temperature environment should be required for this project.

#### Driver current

The current at which the LED's are driven measured in mA

#### Power Factor

The power factor for the whole circuit 0.85 or better.

#### Ambient temperature for measurement

For indoor 25°C for outdoor 15 °C

#### LED Drivers

LED drivers shall conform to IEEE P1789 standards. Alternatively, manufacturers must demonstrate conformance with product literature and testing which demonstrates this performance.

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## Barry Biomass.

### End of life - recycling

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#### Adoptable EU Directives:

Thanks to the WEEE Directive, the EU and the countries of the European Union are considered pioneers in the collection and recycling of old electrical equipment. However, similar proposals are currently being developed or have already been implemented across the world.

Please refer to : EU Directive 2002/96/EC WEEE (Waste Electrical and Electronic Equipment)

#### Recycling principles:

Avoid waste wherever possible.

Where possible use lamps, luminaires and control gear that only contain none environmentally damaging substances.

Do not use unnecessary packaging materials.

Prioritize products that are as recyclable as possible.

#### Lamp Recycling Considerations :

There are no other lamps stated in the scheme than LED lamps although HL understand that some old sources might be removed from the scheme and therefore : Fluorescent lamps and discharge lamps contain small amounts of mercury and valuable raw materials such as rare earths. LED lamps and luminaires also contain valuable raw materials as well as electronic components. That is why these products should not be thrown out with the garbage or other glass, but have to be collected separately and recycled or be disposed of safely in accordance with the WEEE directive. Lamps are ideal for recycling as more than 90% of a lamp's components can be reused.

#### Importance of Recycling LEDs

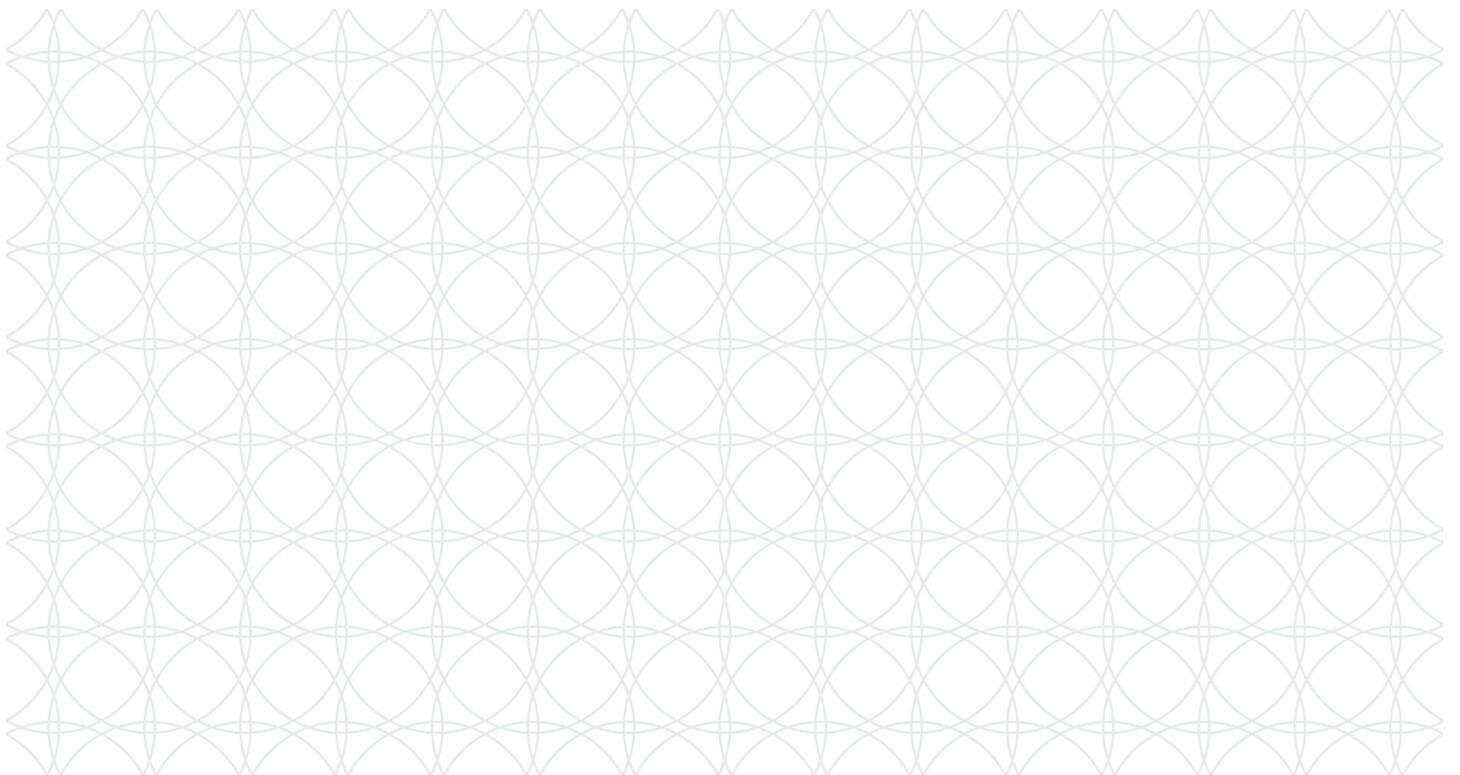
LED lights are environmental-friendly, but they will have less negative impact on the environment if recycled correctly. According to the recent research, most LEDs contain a great amount of nickel, and the coloured LEDs could contain lead and arsenic. These substances are harmful to the environment and the health of human beings. Despite the fact that LEDs are a more environmental-friendly choice compared to traditional lights, they still can not be simply thrown away after they expired.

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**Thank you.**  
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N1C 4AB

020 3668 7100



This drawing shall not be scaled.  
Work from the dimensions shown in the drawing or given in relevant specifications

CDM Regulations:  
In addition to any information included in this drawing or the model from which it is derived, refer also to the project CDM Risk Register for information on residual risks.



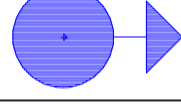


- General Notes:**
- The drawing does not necessarily show all the information needed to interpret the design intent or the construction details.
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**Project Notes:**  
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**Simplified Legend.**

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- A2: Tabor 45 (1200mm).
- B: Thom AreaFlood 40 degree (96644988).
- C: Puck - Handrail - Remote driver location (C/W with emergency function) TBD by contractor, IP rated box by others required. Remote PIR required. Connection between driver and fittings to be 0.75mm<sup>2</sup> cable.
- D: Thom AreaFlood EWR (96644826).

Luminaire Schedule						
Symbol	Qty	Label	Description	LLF	Lumens	Watts
	28	A1	Tabor 45 - 600mm	0.750	2250	18
	50	A2	Tabor 45 - 1200mm	0.750	5800	48
	23	B	96644988 AFP M 72L70-740 A4 BS 3550 CL1 GY	0.750	23339	150
	16	C	Puck 30 Wide	0.750	172	1.4
	2	D	96644826 AFP S 36L70-740 EWR BS 3550 CL1 GY	0.750	11488	77

P2	Additional luminaires and details	ER	SMK	DDM	30/06/22
P1	For comment	ER	RM	DDM	22/06/22

**REVISIONS:**

**HOARE LEA (H.)**

ARCHITECT:

CLIENT:  
PCML

PROJECT TITLE:  
Barry BioMass

DRAWING TITLE:  
Ground Level External Lighting Design

**PRELIMINARY ISSUE**

PERSON RESPONSIBLE FOR:		
Design:	Review:	Authorising Issue:
ER	SMK	DDM
Project No:	Date:	Scale @ A0:
16/17123	30/06/2022	NTS
DRAWING NUMBER:		Status: Rev:
BB-HLEA-XX-00-S-E-708001		S3   P02



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Image 3.1 showing batten type luminaires on northern ash silo annotated with circles. First ladder level luminaires in blue, mid ladder level luminaire in yellow, top of silo in green

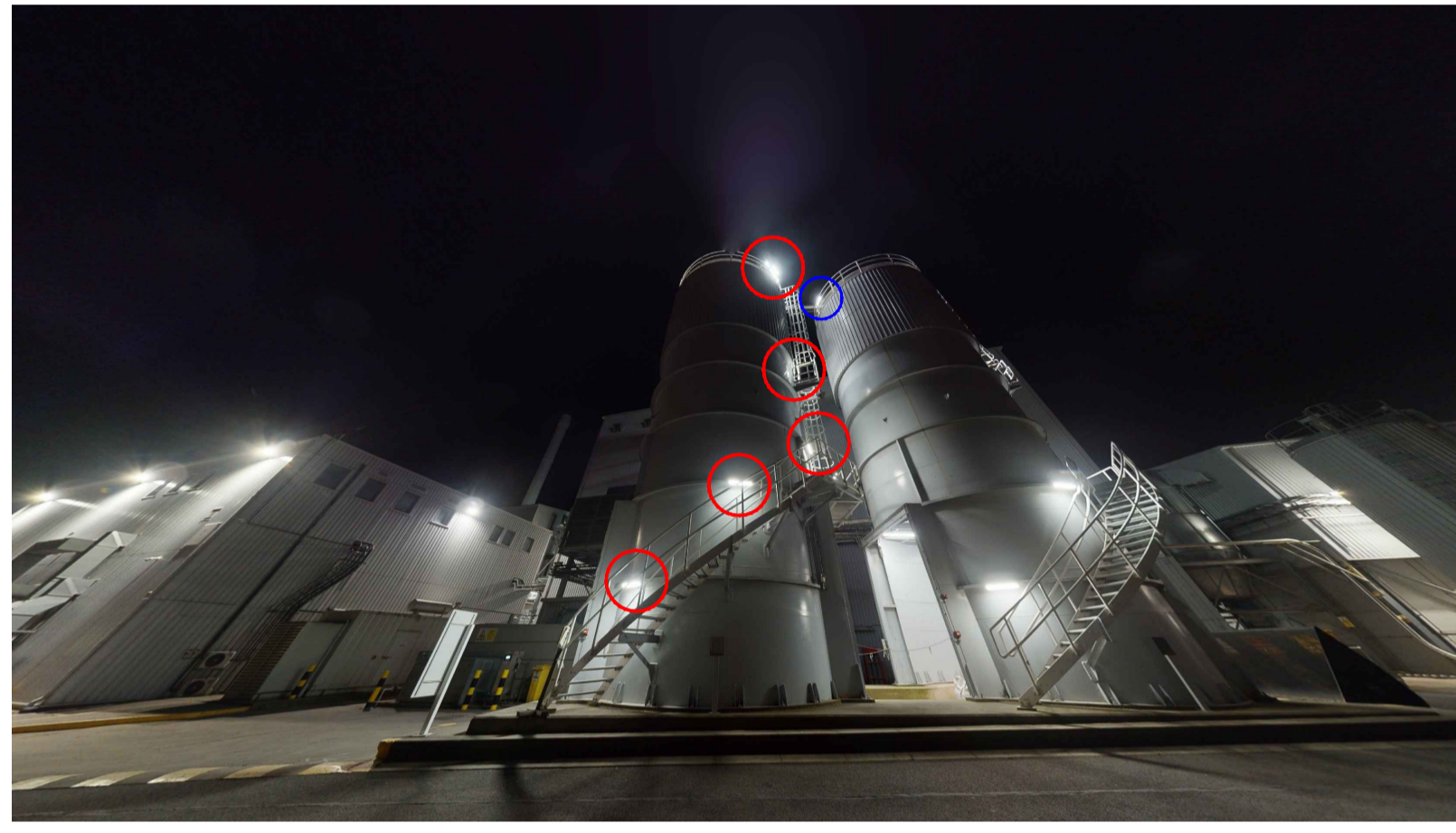


Image 3.2 showing batten type luminaires on southern ash silo annotated with circles with roof level fitting visible on northern ash silo (blue circle)

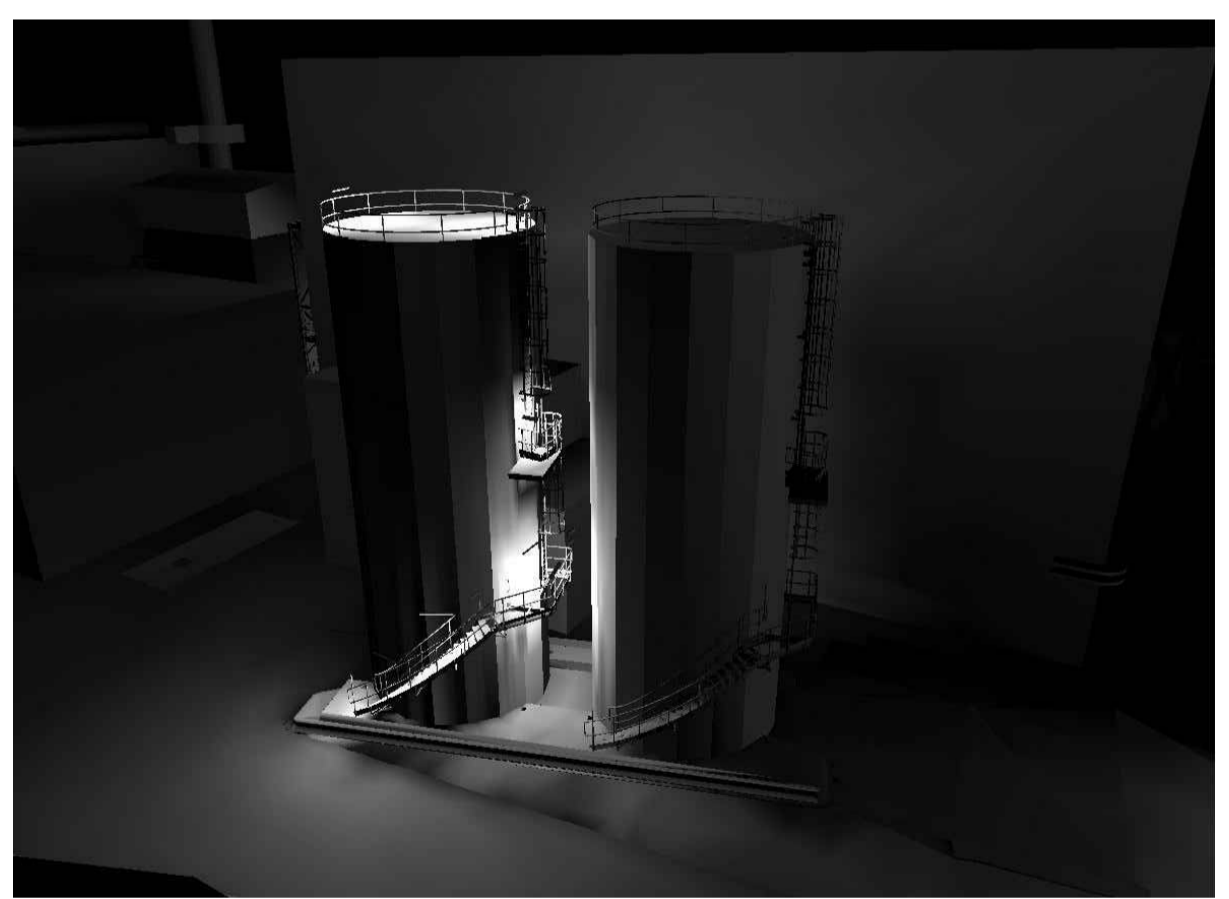


Image 3.3 rendered view of lights on southern silo in Relux

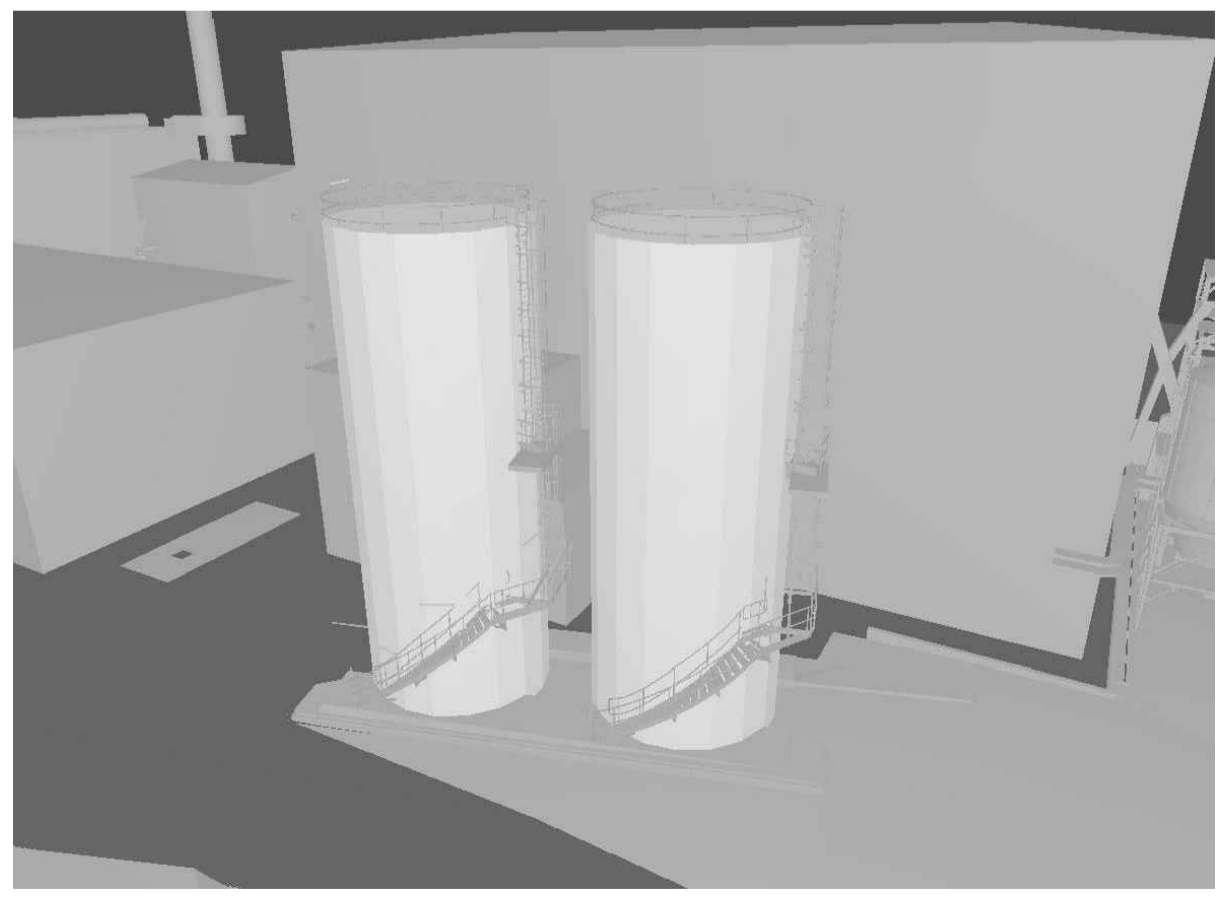


Image 3.4 showing ash silos in Relux

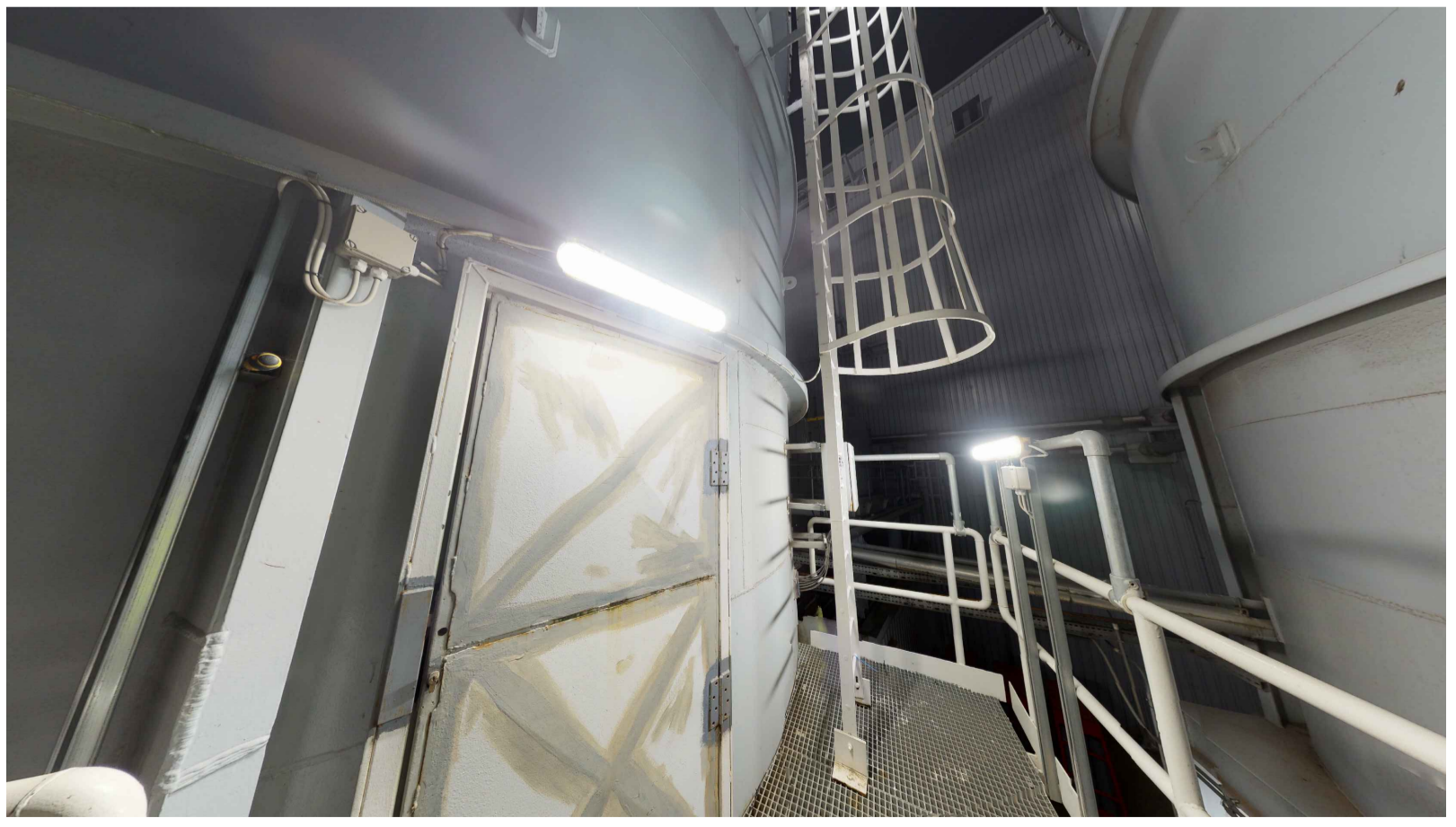
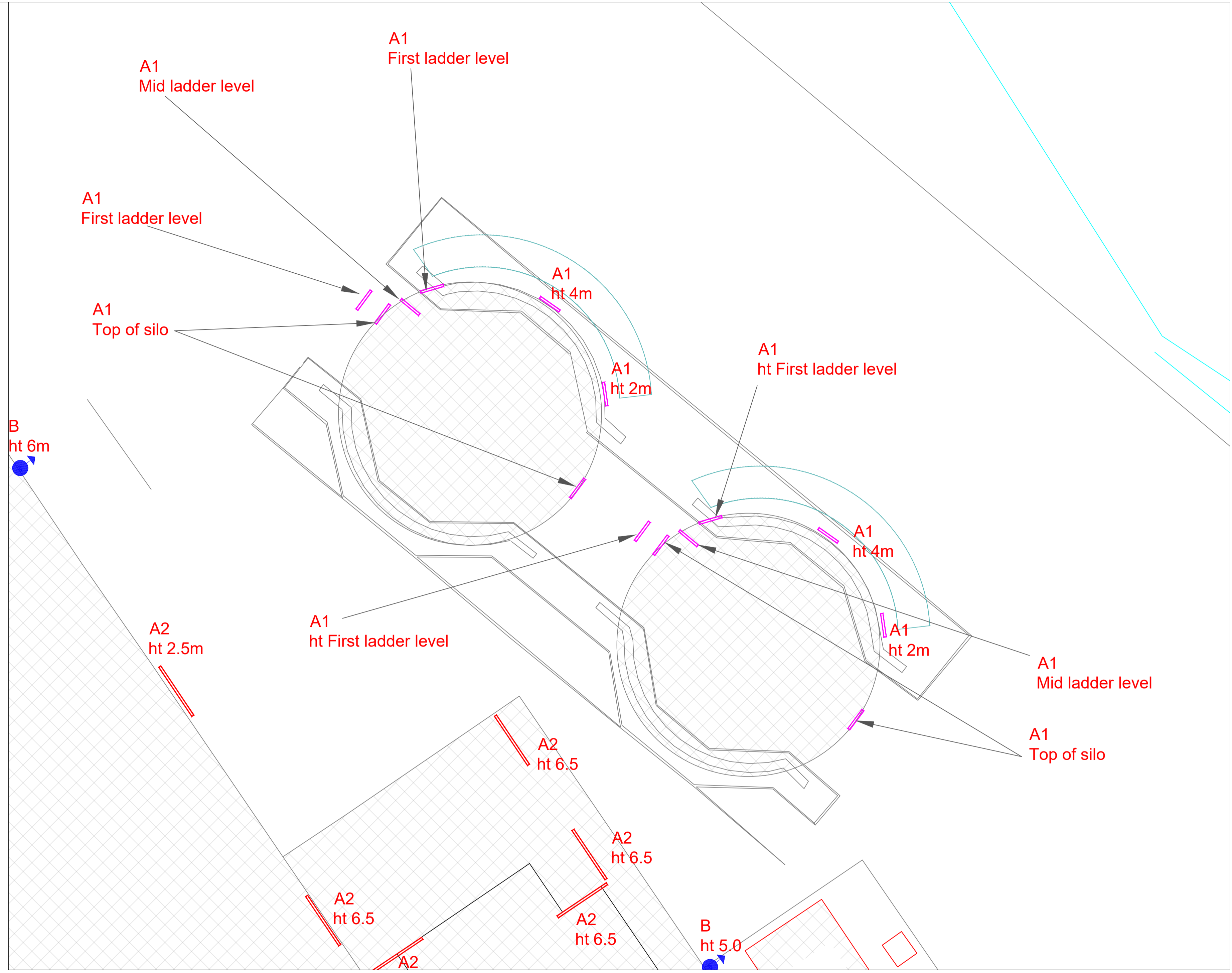


Image 3.5 showing A1 600mm luminaires on southern ash silo annotated with A1 6m luminaire on left and A1 5.5m luminaire on right

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Project Notes:  
Layouts based on Navis Works model Reference: Barry\_01\_DWG\_01\_20191.DWG & SLR Drawing Reference: 401.13039.00001.09.0\_Barry\_Biomass\_Topo\_0322-Overview  
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- D: Thorn AreaFlood EWR (96644826).

P2	Additional luminaires and details	ER	SMK	DDM	30/06/22
P1	For comment	ER	RM	DDM	22/06/22

**REVISIONS:**

**HOARE LEA (H)**

ARCHITECT:

CLIENT:  
PCML

PROJECT TITLE:  
Barry BioMass

DRAWING TITLE:  
Barry Biomass External Lighting Design Plan  
Ash Silos

**PRELIMINARY ISSUE**

PERSON RESPONSIBLE FOR:		
Design:	Review:	Authorising Issue:
ER	SMK	DDM
Project No:	Date:	Scale @ A0:
16/17123	30/06/2022	NTS
DRAWING NUMBER:	Status:	Rev:
BB-HLEA-XX-00-AS-E-708001	S3	P02

Luminaire Schedule						
Symbol	Qty	Label	Description	LLF	Lumens	Watts
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—	23	B	96644988 AFP M 72L70-740 A4 BS 3550 CL1 GY	0.750	23339	150
—	16	C	Puck 30 Wide	0.750	172	1.4
—	2	D	96644826 AFP S 36L70-740 EWR BS 3550 CL1 GY	0.750	11488	77



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Image 4.1 showing multitude of batten type luminaires and floodlight annotated with red circle

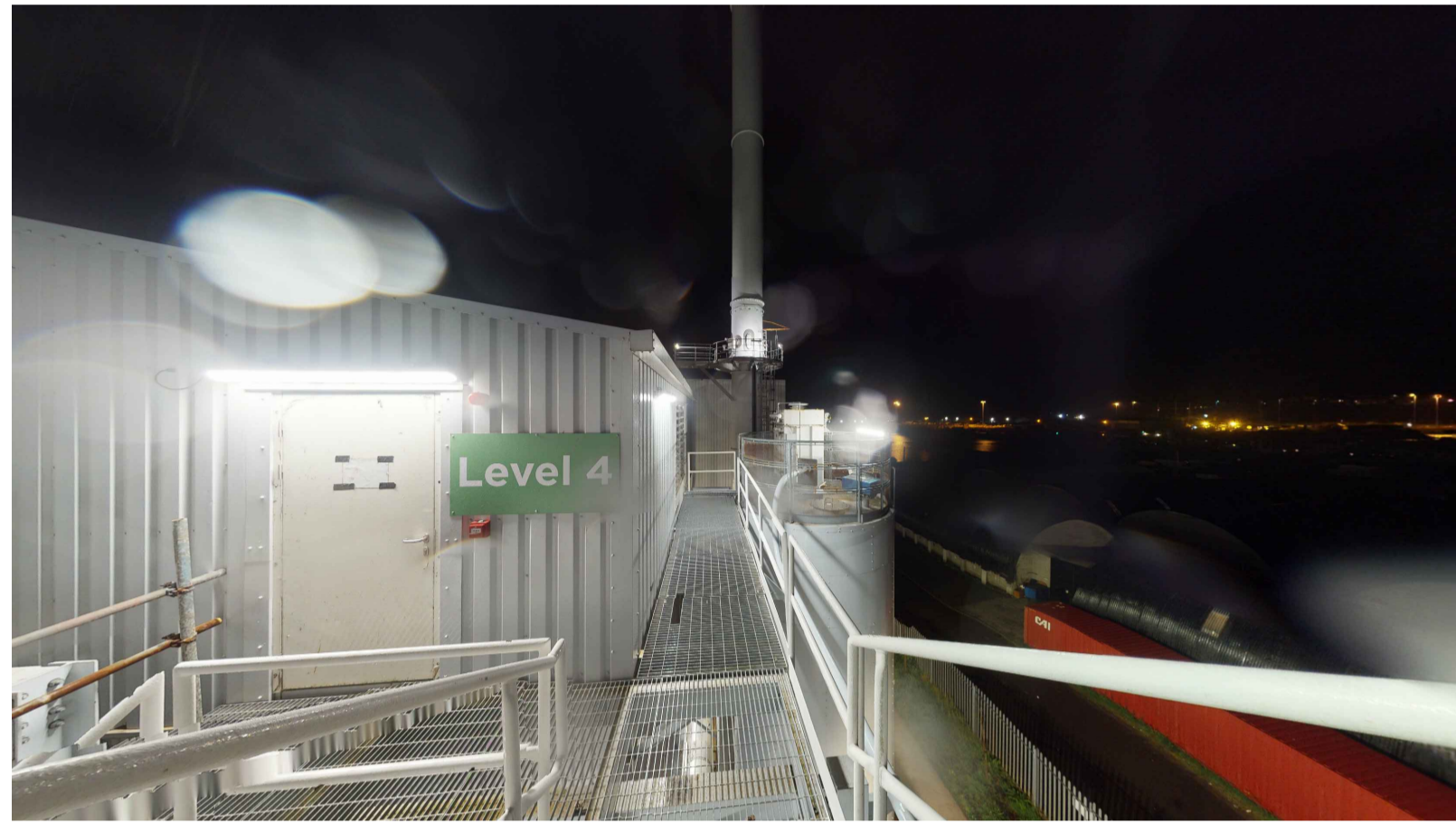


Image 4.2 showing multitude of batten type fittings at Level 4 of Bag House in foreground and fitting on tower in background.



Image 4.3 showing floodlight mounted on third floor of bag house

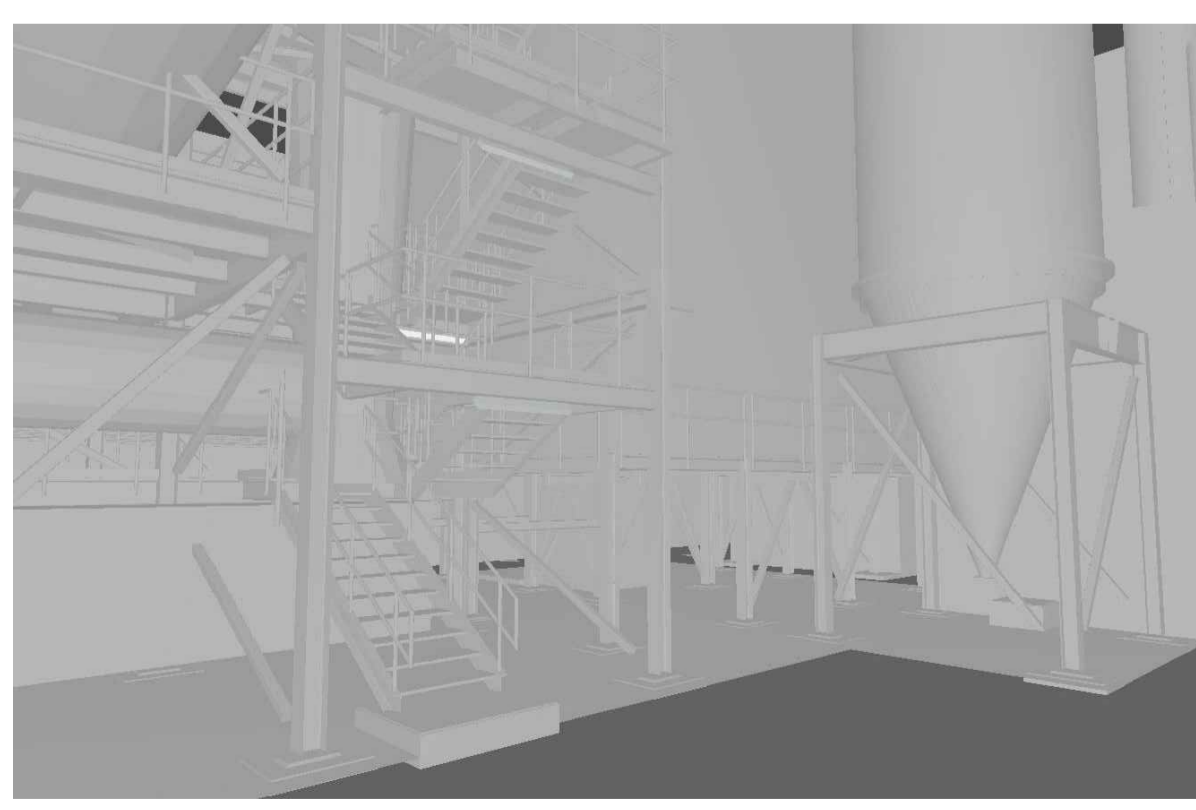
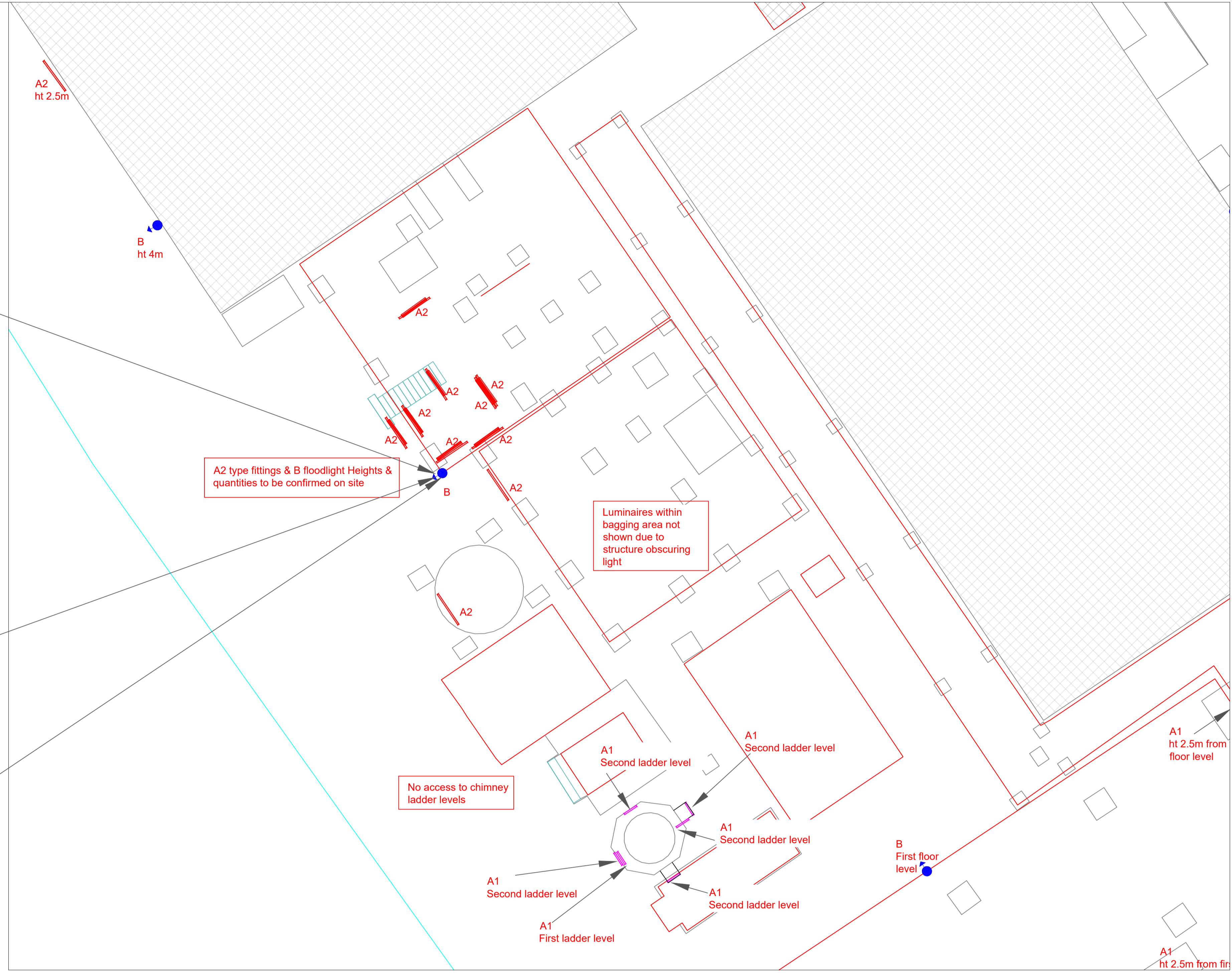


Image 4.4 showing rendered image of Bag House ground floor

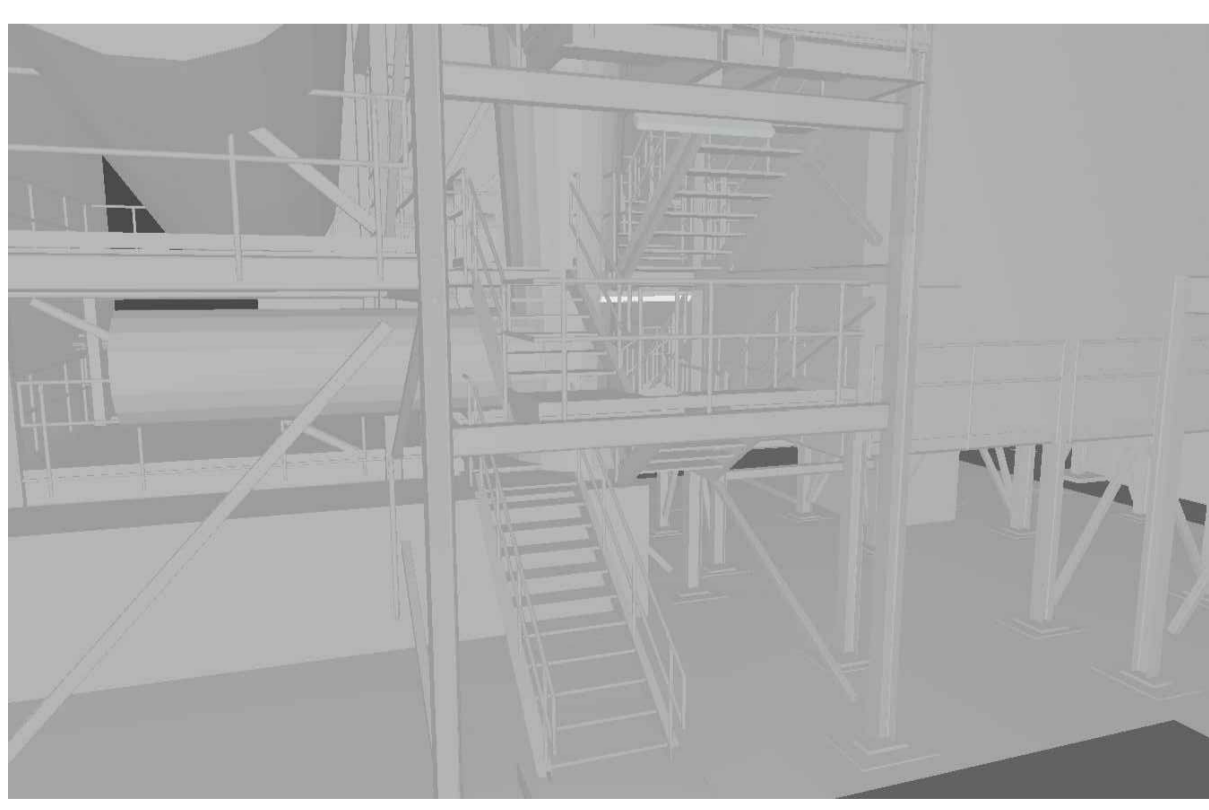


Image 4.5 showing rendered image of Bag House first floor

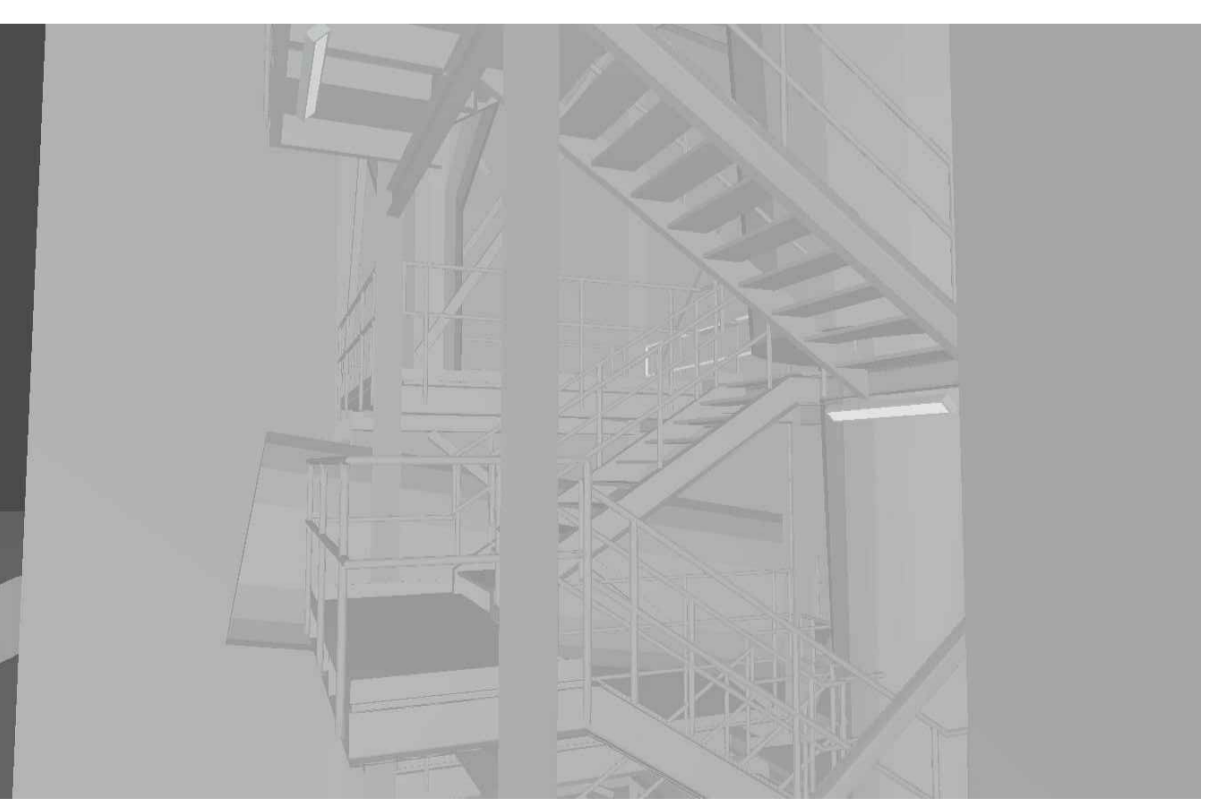


Image 4.6 showing rendered image of Bag House third floor

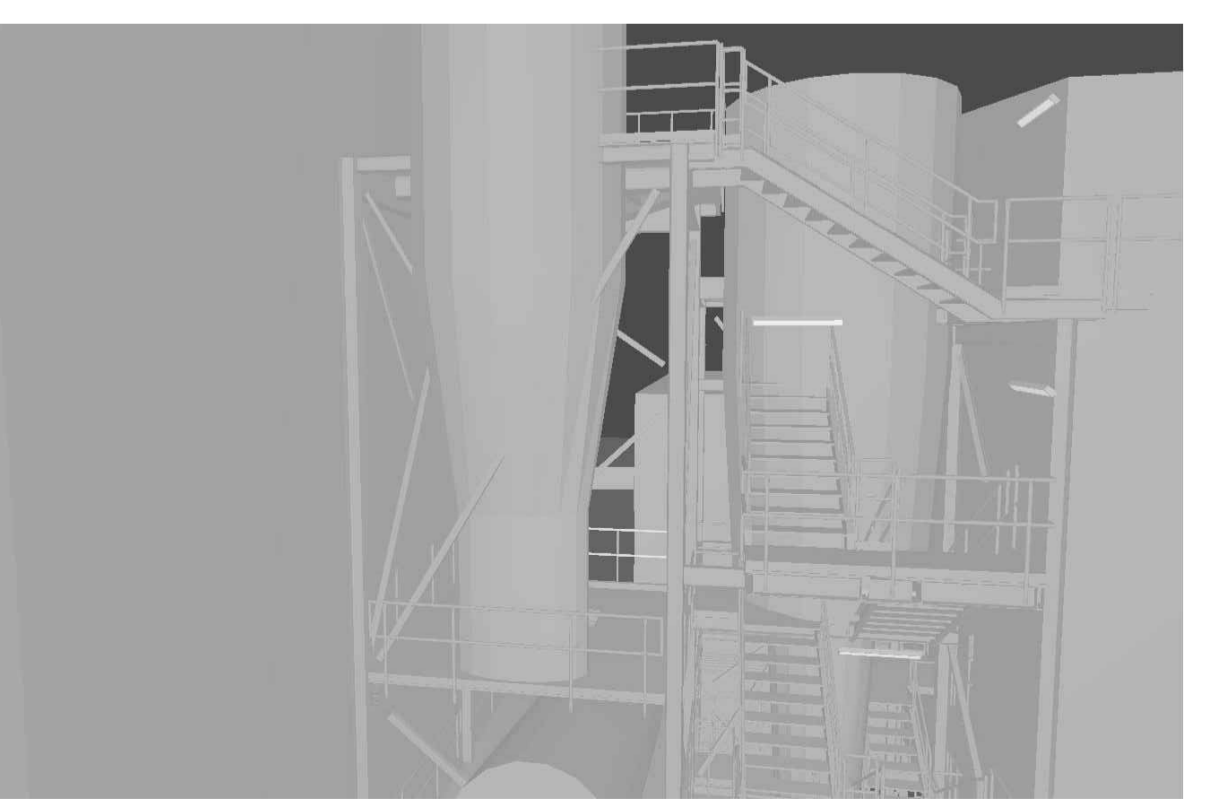


Image 4.7 showing rendered image of Bag House third and fourth floors

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- C: Puck - Handrail - Remote driver location (C/W with emergency function) TBD by contractor, IP rated box by others required. Remote PIR required. Connection between driver and fittings to be 0.75mm<sup>2</sup> cable.
- D: Thom AreaFlood EWR (96644826).

Rev	Description	By	Check	Appr	Date
P2	Additional luminaires and details	ER	SMK	DDM	30/06/22
P1	For comment	ER	RM	DDM	22/06/22

REVISIONS:

**HOARE LEA (H)**

ARCHITECT:

CLIENT:  
PCML

PROJECT TITLE:  
Barry BioMass

DRAWING TITLE:  
Barry Biomass External Lighting Design Plan  
Bag House

**PRELIMINARY ISSUE**

PERSON RESPONSIBLE FOR:		
Design:	Review:	Authorising Issue:
ER	SMK	DDM
Project No:	Date:	Scale @ A0:
16/17123	30/06/2022	NTS
DRAWING NUMBER:	Status:	Rev:
BB-HLEA-XX-00-BH-E-708001	S3	P02

Luminaire Schedule						
Symbol	Qty	Label	Description	LLF	Lumens	Watts
—	28	A1	Tabor 45 - 600mm	0.750	2250	18
—	50	A2	Tabor 45 - 1200mm	0.750	5800	48
—	23	B	96644988 AFP M 72L70-740 A4 BS 3550 CL1 GY	0.750	23339	150
—	16	C	Puck 30 Wide	0.750	172	1.4
—	2	D	96644826 AFP S 36L70-740 EWR BS 3550 CL1 GY	0.750	11488	77







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Image 5.1 showing floodlight mounted over batten luminaire above first floor doorway into fan units

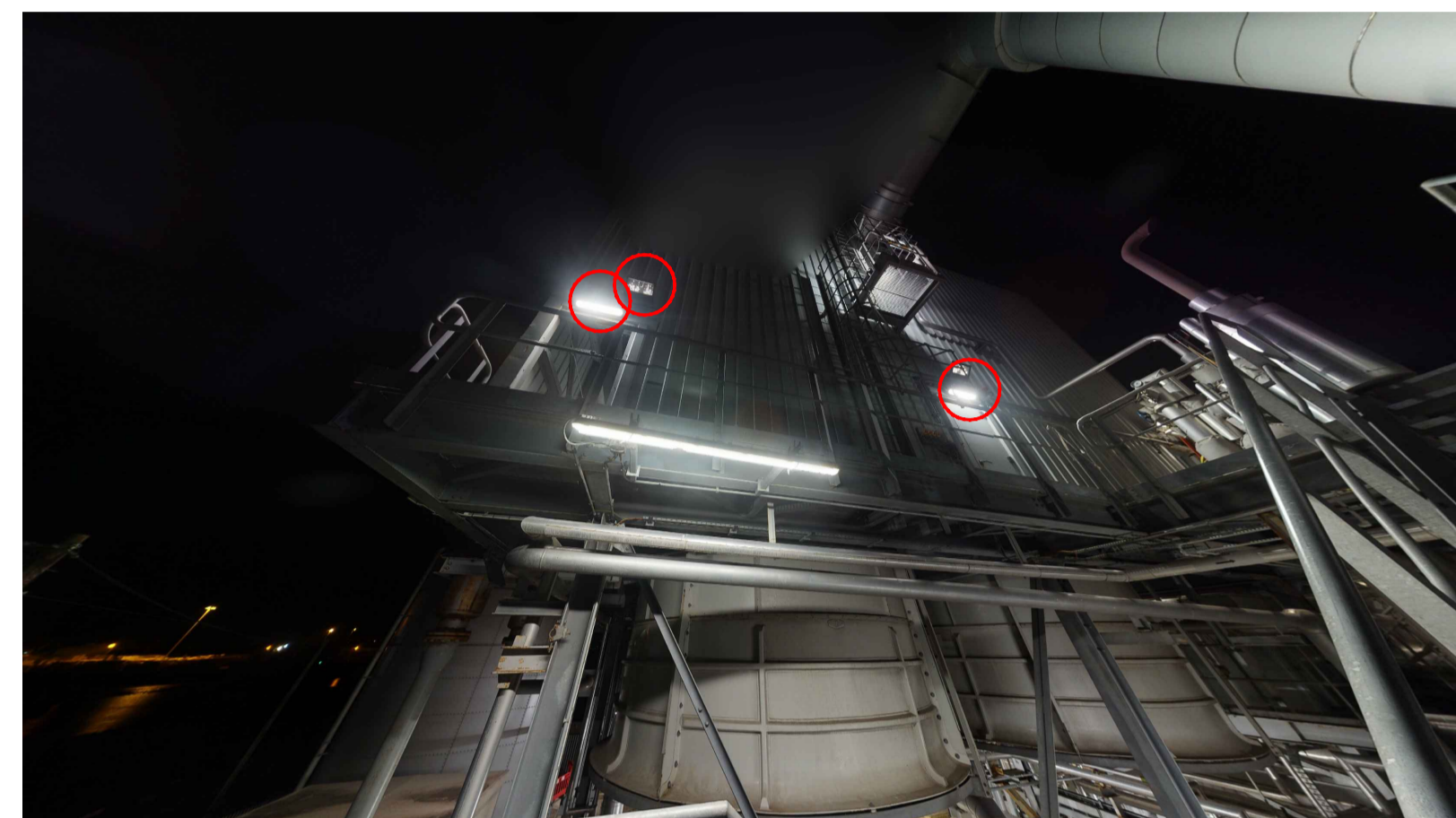


Image 5.2 showing batten type luminaire mounted at finished floor level of first floor, batten type luminaire mounted above doorways 2.5 meters from first floor level and floodlight

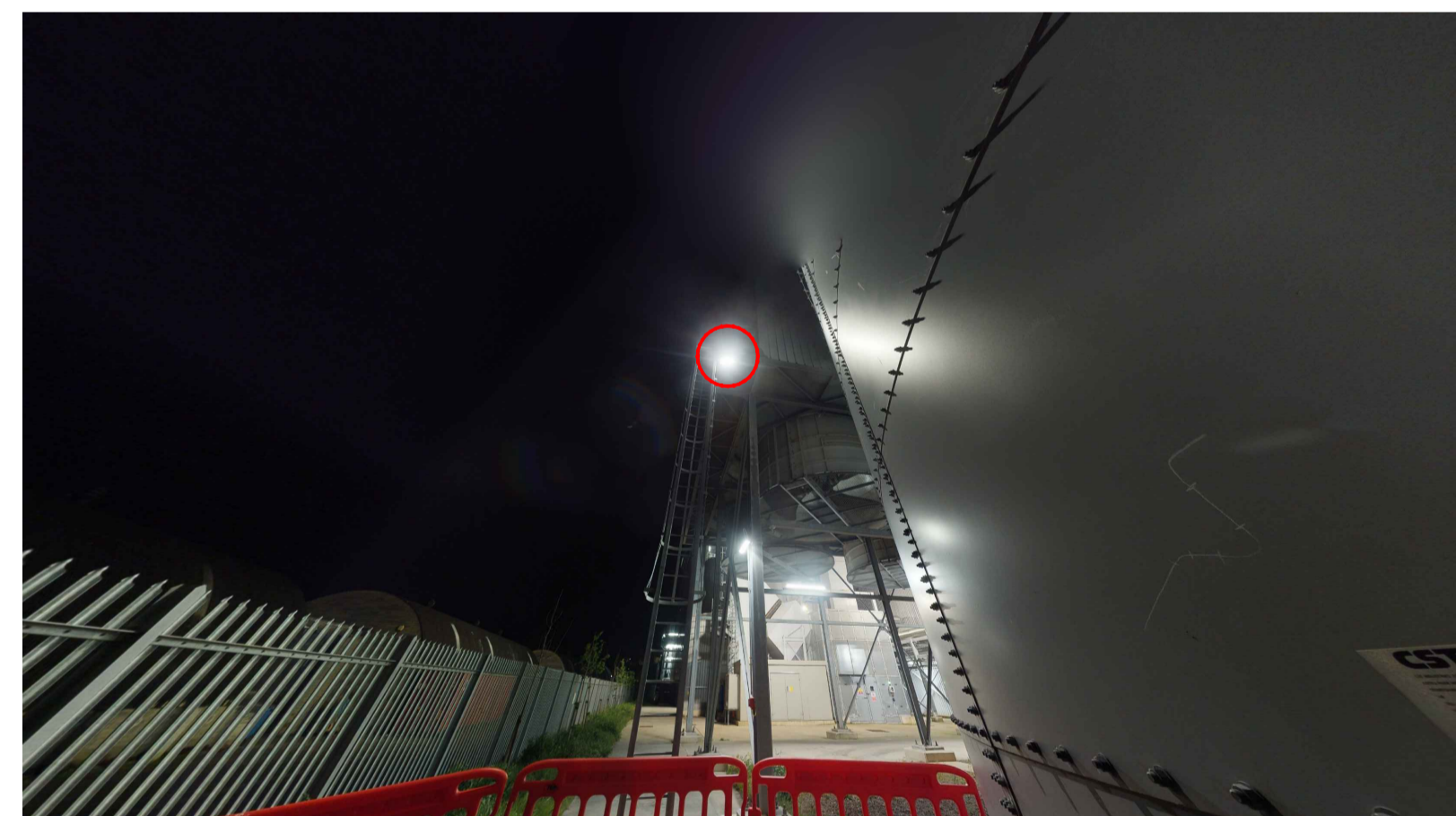


Image 5.3 showing floodlight (circled) mounted at floor level of first floor

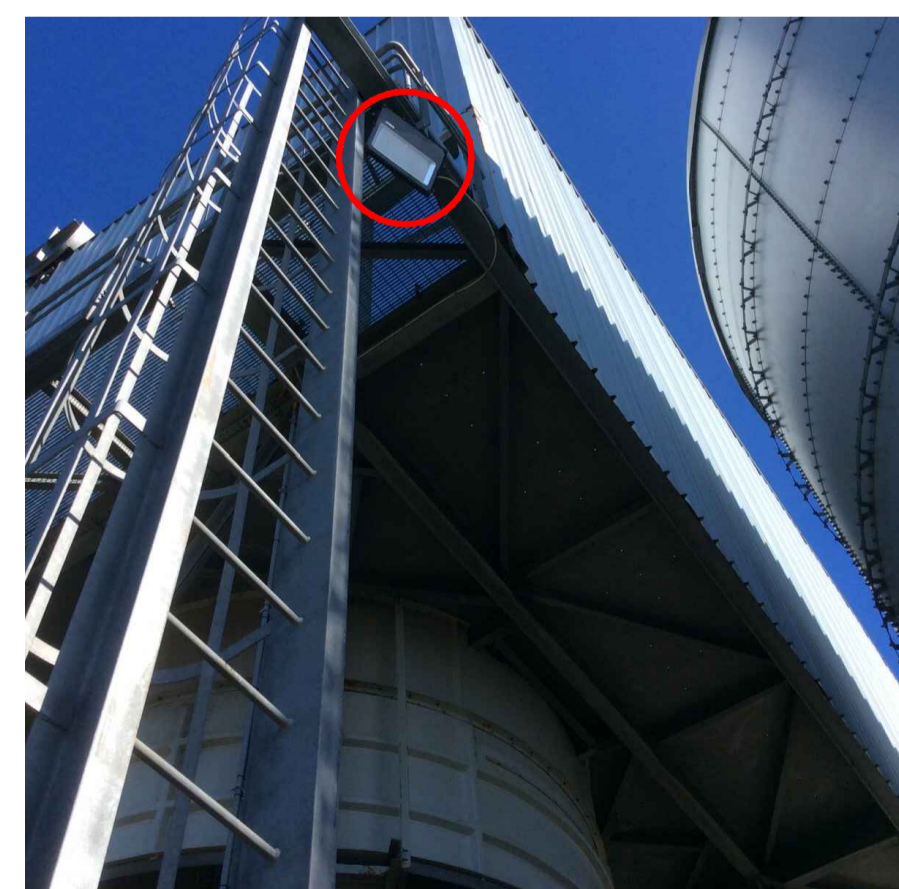
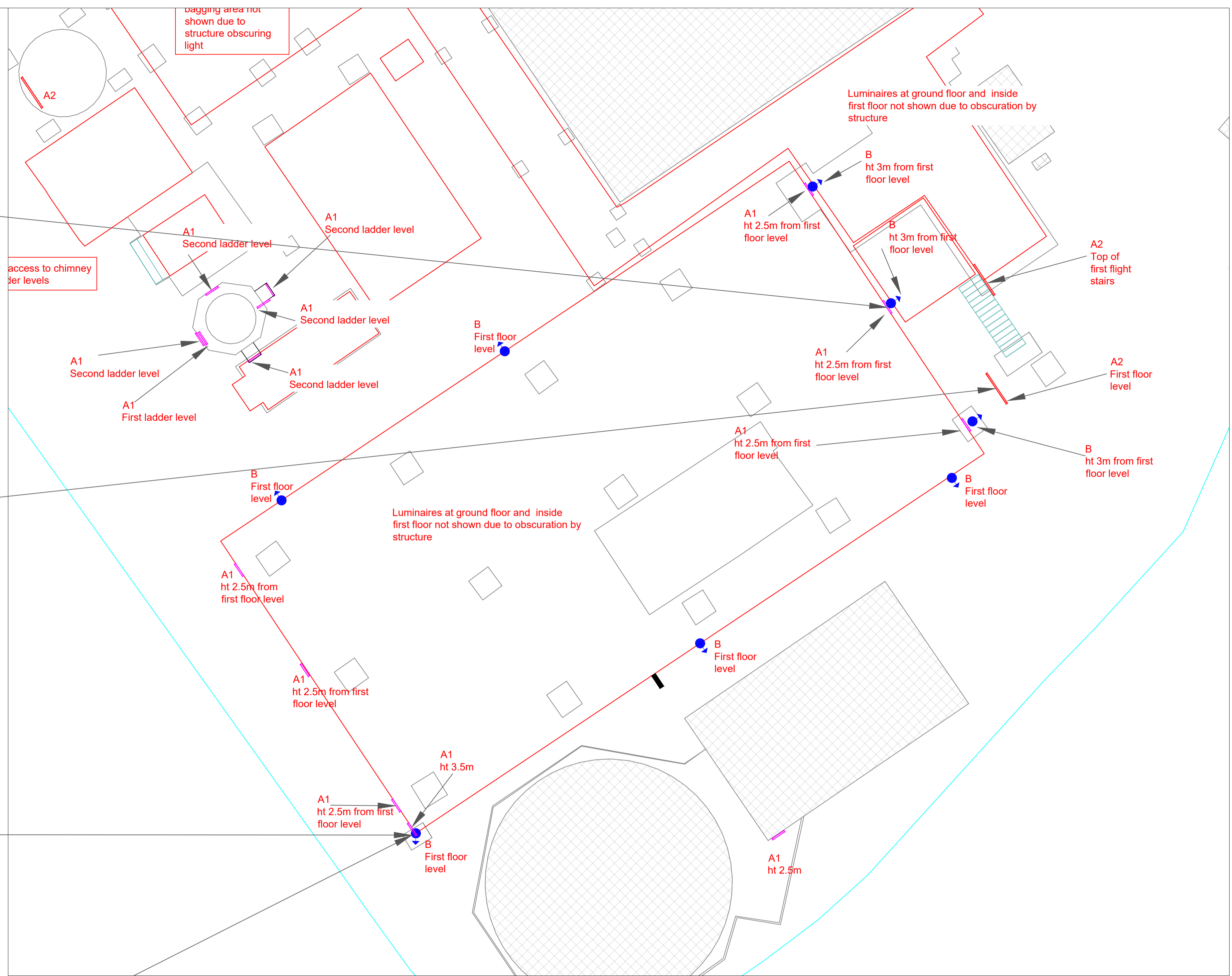


Image 5.4 showing floodlight (circled) mounted at floor level of first floor during daytime hours



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D: Thorn AreaFlood EWR (96644826).

Mounting heights measured from floor level of first floor fan units building.

P2	Additional luminaires and details	ER	SMK	DDM	30/06/22
P1	For comment	ER	RM	DDM	22/06/22

REVISIONS:

**HOARE LEA (H)**

ARCHITECT:

CLIENT:  
PCML

PROJECT TITLE:  
Barry BioMass

DRAWING TITLE:  
Barry Biomass External Lighting Design Plan  
Fan Units First Floor

PRELIMINARY ISSUE

PERSON RESPONSIBLE FOR:		
Design:	Review:	Authorising Issue:
ER	SMK	DDM
Project No:	Date:	Scale @ A0:
16/17123	30/06/2022	NTS
DRAWING NUMBER:		Status: Rev:
BB-HLEA-XX-00-F-E-708001		S3   P02

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●	2	D	96644826 AFP S 36L70-740 EWR BS 3550 CL1 GY	0.750	11488	77



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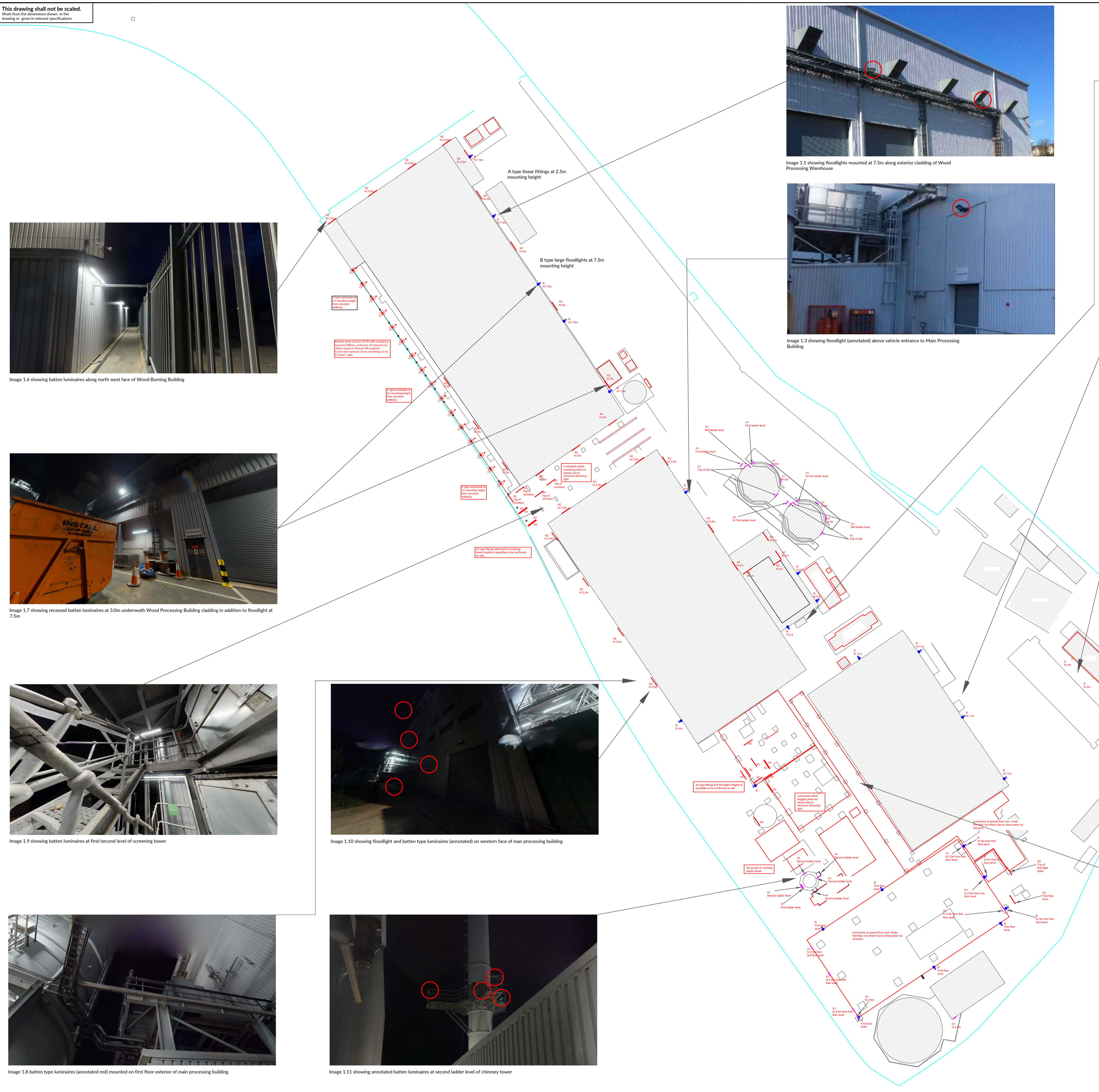


Image 1.1 showing floodlights mounted at 7.5m along exterior cladding of Wood Processing Warehouse

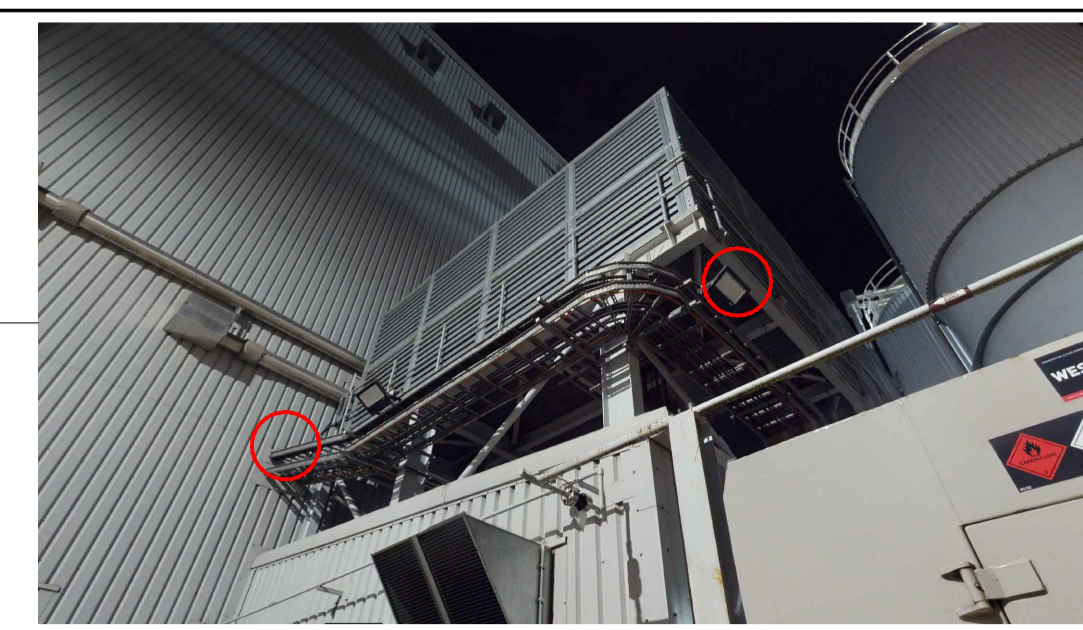


Image 1.2 showing floodlights mounted at 7.5m mounted above units on first floor exterior of main processing building



Image 1.3 showing floodlight (annotated) above vehicle entrance to Main Processing Building

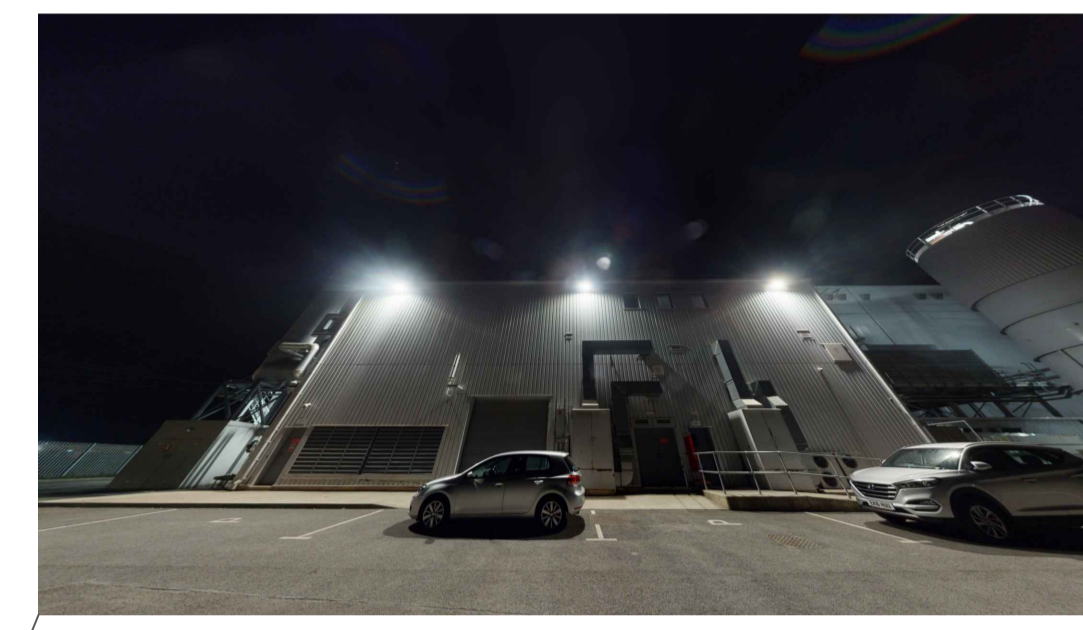


Image 1.4 showing floodlights mounted at 11m on exterior of Office building

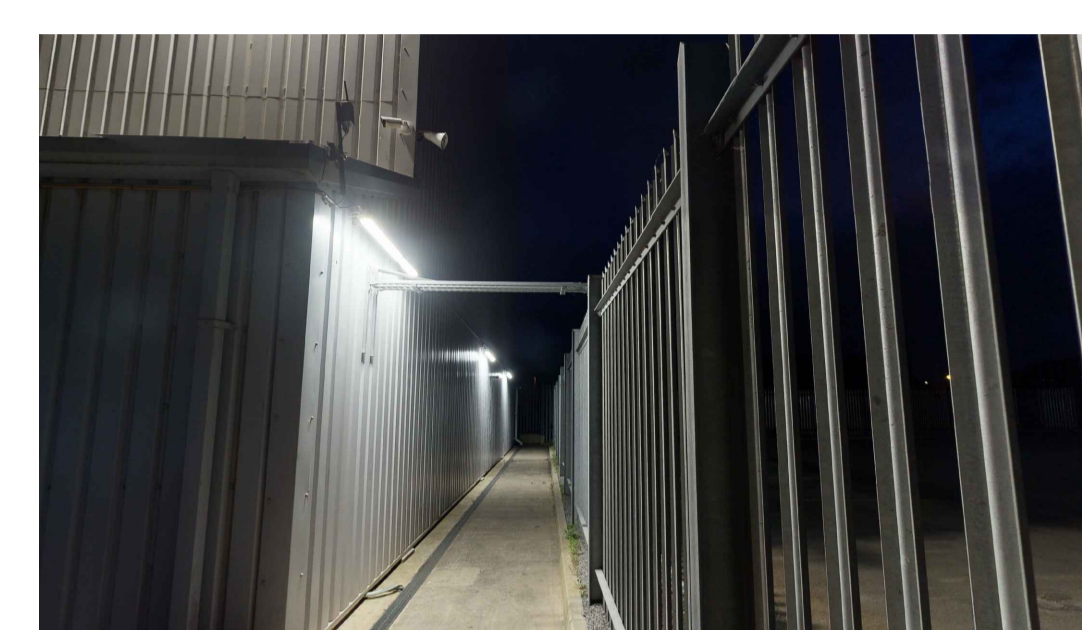


Image 1.6 showing batten luminaires along north west face of Wood Burning Building

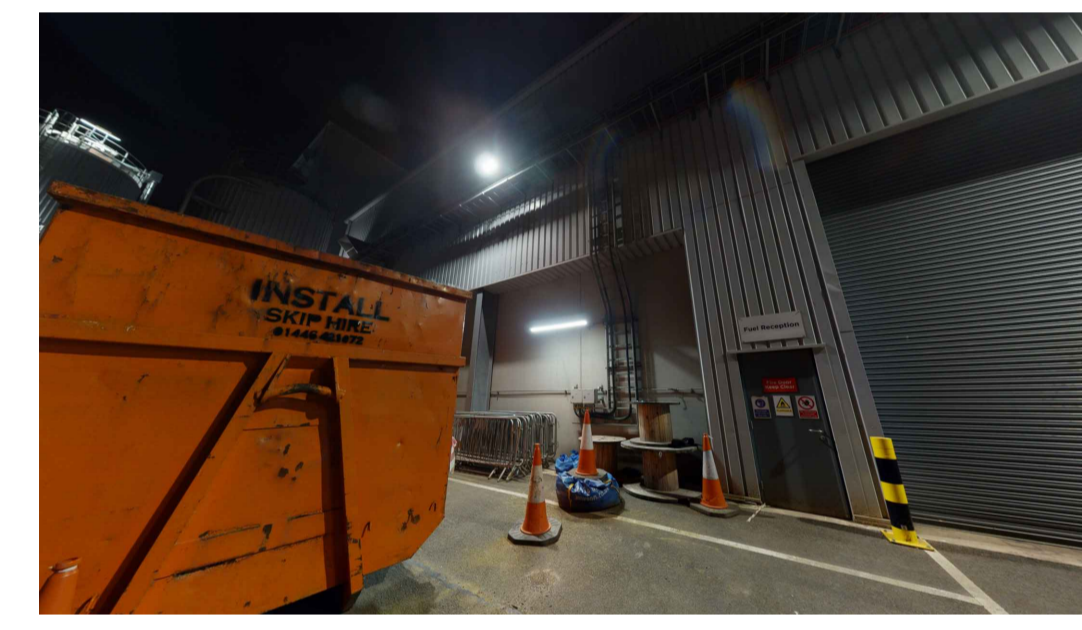


Image 1.7 showing recessed batten luminaires at 3.0m underneath Wood Processing Building cladding in addition to floodlight at 7.5m

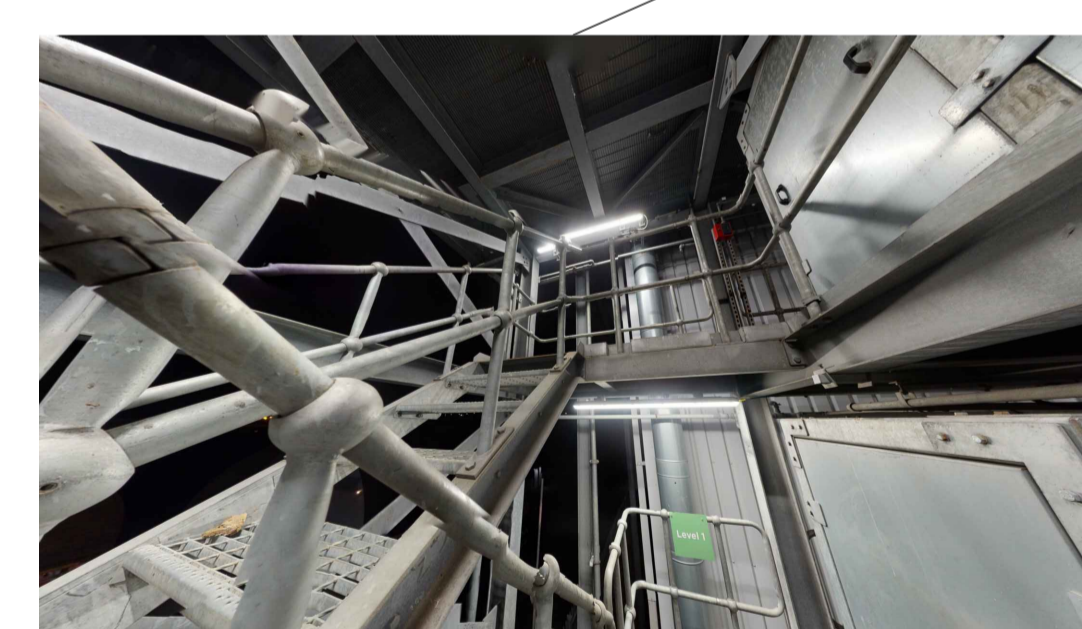


Image 1.9 showing batten luminaires at first/second level of screening tower

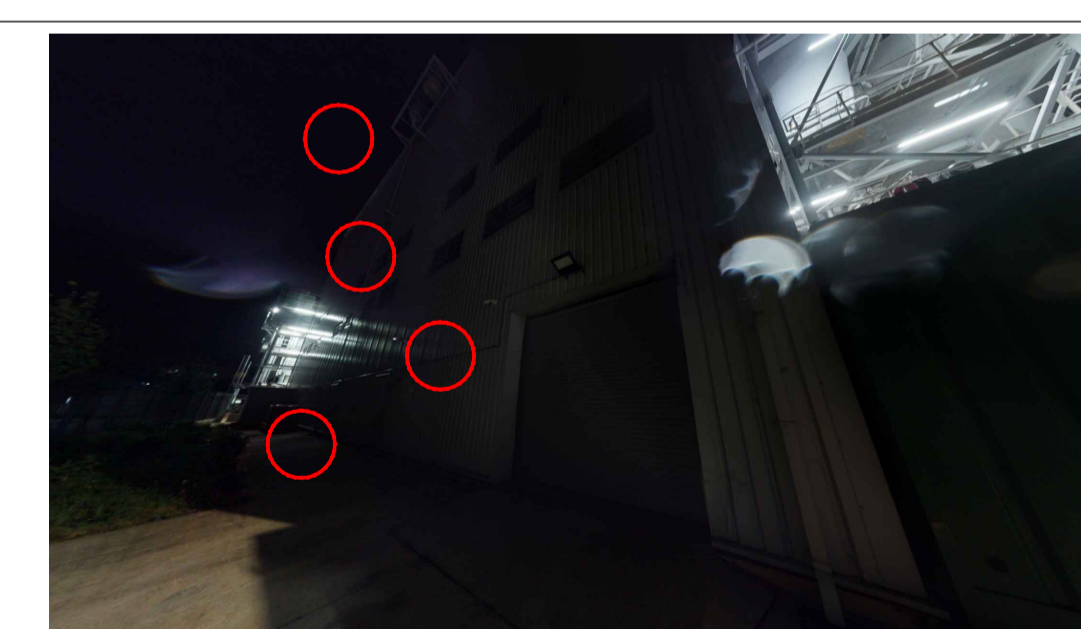


Image 1.10 showing floodlight and batten type luminaires (annotated) on western face of main processing building

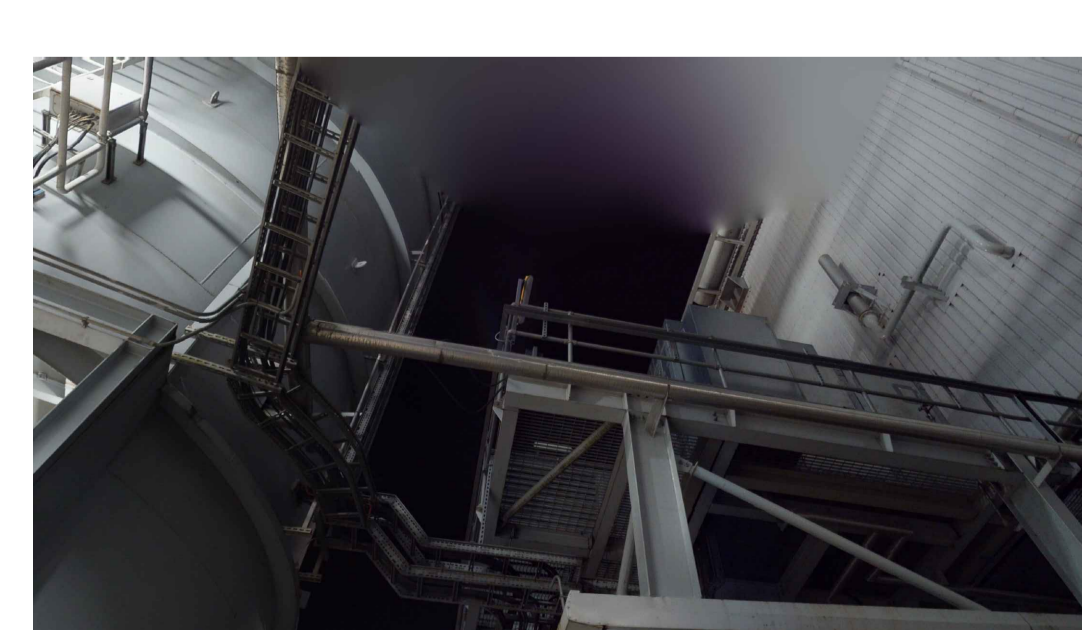


Image 1.8 showing batten type luminaires (annotated red) mounted on first floor exterior of main processing building

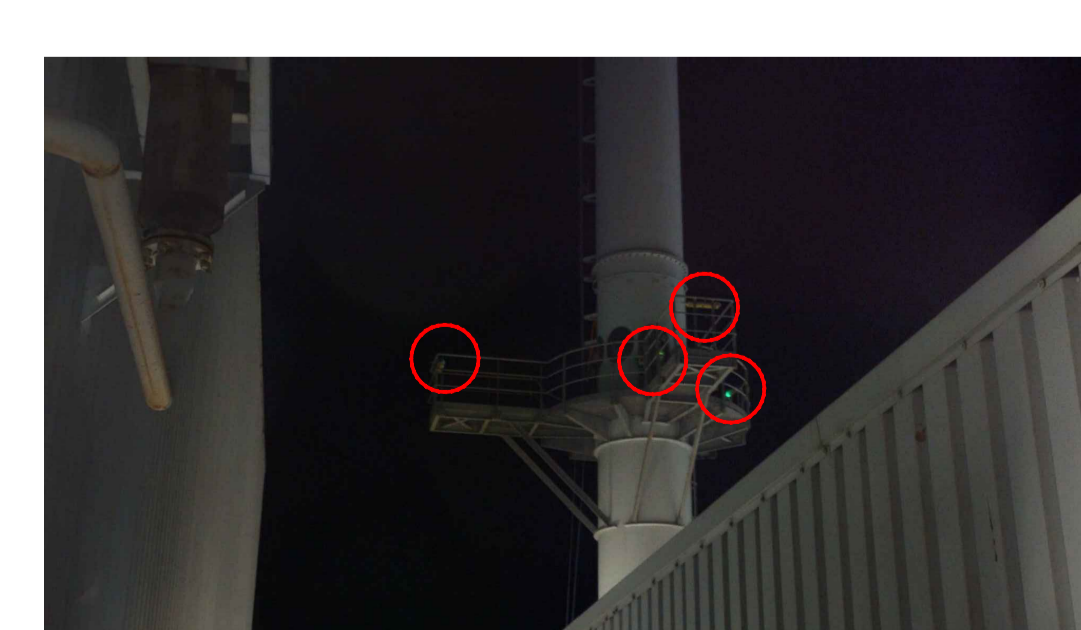


Image 1.11 showing annotated batten luminaires at second ladder level of chimney tower

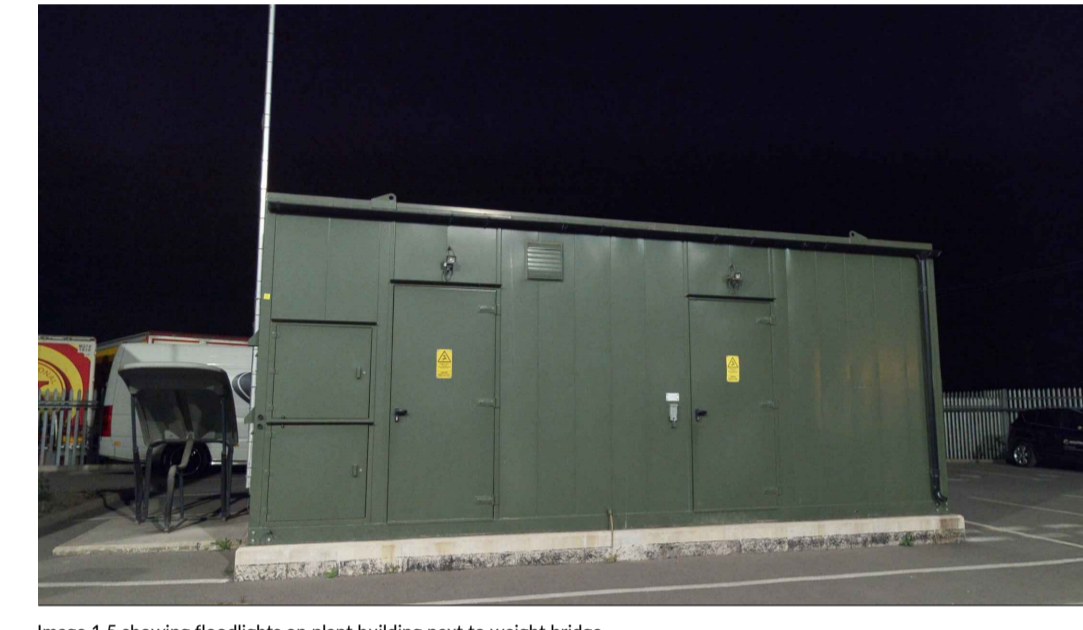


Image 1.5 showing floodlights on plant building next to weight bridge

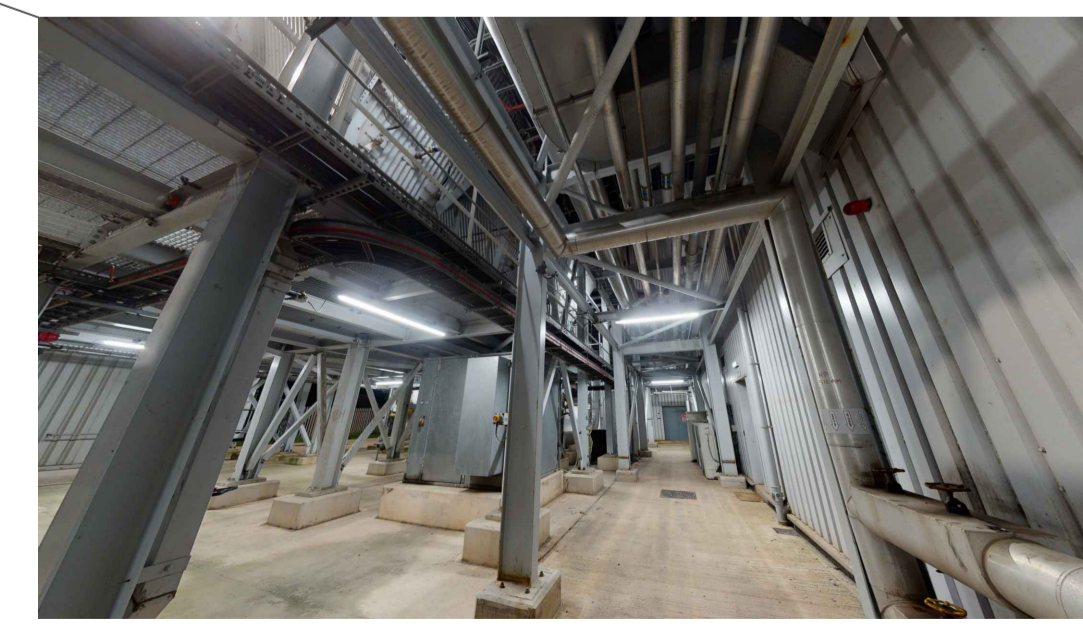


Image 1.12 showing external batten luminaires at ground floor bagging area not shown on plan due to obscuration by structure/machinery

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D: Thorn AreaFlood EWR (96644826).

Rev.	Description	By	SMK	DDM	Date
P2	Additional luminaires and details	ER	SMK	DDM	30/06/22
P1	For comment	ER	RM	DDM	22/06/22

**REVISIONS:**

**HOARE LEA (H)**

ARCHITECT:

CLIENT:  
FCML

PROJECT TITLE:  
Barry BioMass

DRAWING TITLE:  
Barry Biomass External Lighting Design Plan  
Plan Landscape

**PRELIMINARY ISSUE**

PERSON RESPONSIBLE FOR:		
Design:	Review:	Authorising Issue:
ER	SMK	DDM

Project No:	Date:	Scale @ A0:
16/17123	30/06/2022	NTS

DRAWING NUMBER:	Status:	Rev.
BB-HLEA-XX-00-DR-E-708001	S3	P02

Symbol	Qty	Label	Description	LLF	Lumens	Watts
—	28	A1	Tabor 45 - 600mm	0.750	2250	18
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—	23	B	96644988 AFP M 72L70-740 A4 BS 3550 CL1 GY	0.750	23339	150
—	16	C	Puck 30 Wide	0.750	172	1.4
—	2	D	96644826 AFP S 36L70-740 EWR BS 3550 CL1 GY	0.750	11489	77