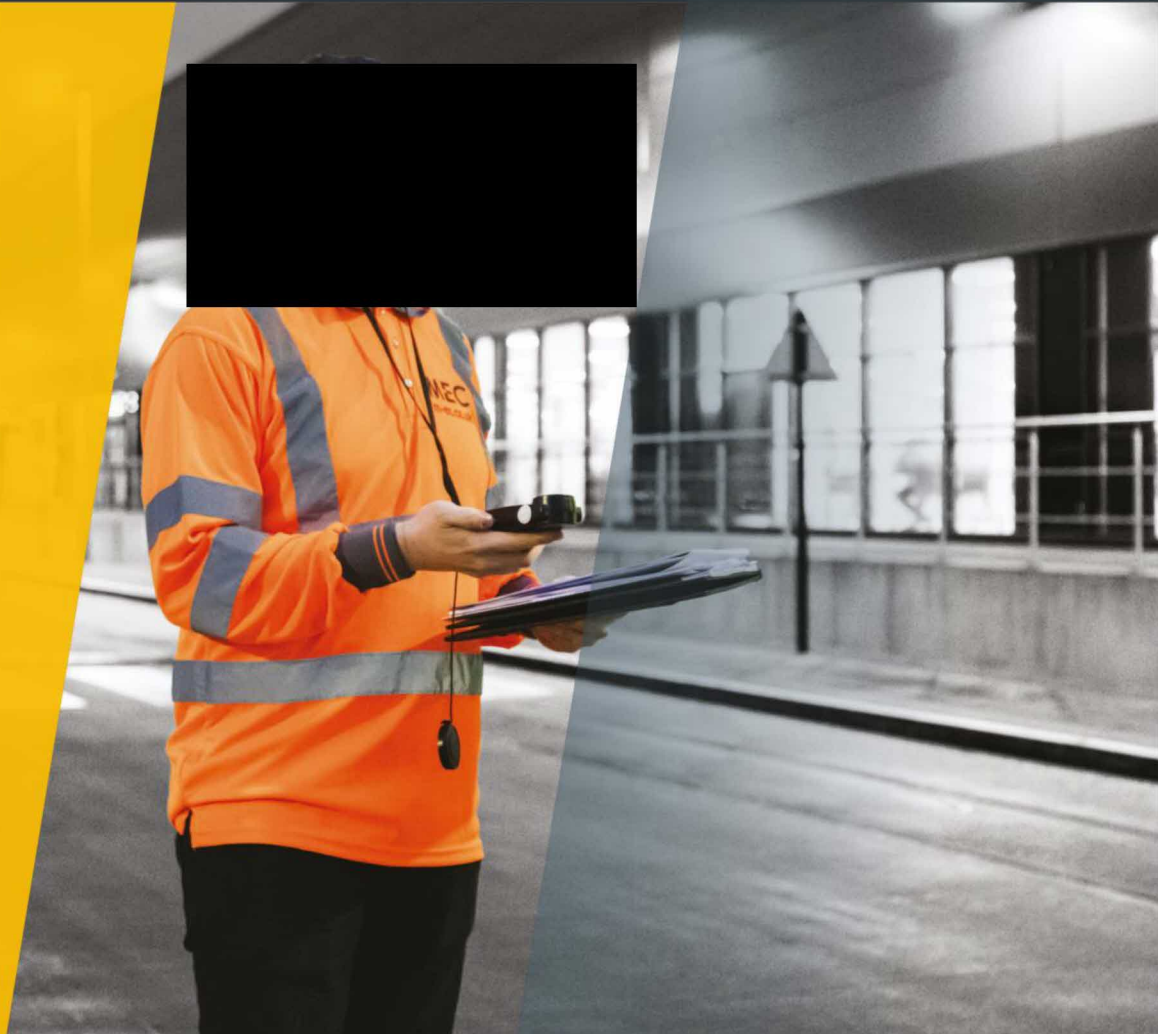
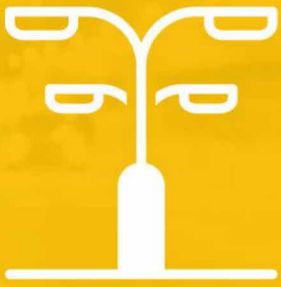




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LIGHTING



Penstrowed Quarry, Caersws, Powys
Lighting Impact Assessment
May 2023

Report Ref: 26308-LIGH-0401 Rev A

Penstrowed Quarry, Caersws, Powys

Lighting Impact Assessment

May 2023

REPORT REF: 26308-LIGH-0401 Rev A

CLIENT: GF Grigg Ltd

ENGINEER: Mewies Engineering Consultants Ltd
The Old Chapel
Station Road
Hugglescote
Leicestershire
LE67 2GB

Tel: 01530 264 753
Email group@m-ec.co.uk

REGISTRATION OF AMENDMENTS

Date	Rev	Comment	Prepared By	Checked By	Approved By
May 2022	-	First issue	Nathan Allen MEnvSci Senior Environmental Consultant	Alexander Bennett BSc(Hons) MCIHT MTPS Director	Alexander Bennett BSc(Hons) MCIHT MTPS Director
May 2023	-	Second Issue – Update in layout	Nathan Allen MEnvSci Senior Environmental Consultant	Tim Rose BA(Hons) MCIHT MTPS Director	Tim Rose BA(Hons) MCIHT MTPS Director

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APPENDICES

A.	PROPOSED LIGHTING LAYOUT
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1.0 INTRODUCTION

General

- 1.1 Mewies Engineering Consultants Ltd (M-EC) has been commissioned by GF Grigg Ltd to undertake an External Lighting Impact Assessment for proposed holiday lodge park at Penstrowed Quarry, Caersws, Powys. A site location plan is provided in Figure 2.1.
- 1.2 This version of the report considers an updated layout shown in Figure 2.2 and to address comments from Natural Resources Wales on the original assessment as shown below;
- “We note the report makes no recommendations with regards to exterior security lighting required to avoid disturbing bat activity, however full consideration of the impacts of artificial lighting on bats has been given in the Lighting Impact Assessment dated May 2022 by MEC. Since the lux levels at the sensitive woodland edges will remain below 1, we are supportive of the lighting scheme as submitted”.*
- 1.3 It should be noted that no security lighting is proposed and the only artificial lighting proposed on site has been included within the assessment and is shown in the lighting layout shown in Appendix A.
- 1.4 This report assesses, in terms of artificial lighting, the likely effects of the proposed development. The lighting assessment includes information on the baseline lighting conditions within the area, quantitatively assess the potential effects of the proposed lighting on surrounding sensitive receptors and if required considers possible mitigation measures to reduce potential light spill onto ecological receptors and upward light (which can create sky glow). Indicative illuminance calculations for exterior areas of the proposed development are included in Appendix A.
- 1.5 M-EC accepts no responsibility or liability for:
- a) The consequence of this documentation being used for any purpose or project other than that for which it was commissioned;
 - b) The issue of this document to any third party with whom approval for use has not been agreed.

2.0 SITE DESCRIPTION

Existing Site

- 2.1 The proposed site is currently comprised of woodland and the existing Penstrowed Quarry Recycling Centre. The site is surrounded by woodland as well as arable and green fields with no major sources of light. The site also has considerable tree coverage on all sides as shown in Figure 2.1.
- 2.2 A site location plan is provided in Figure 2.1 and project proposals are shown in Figure 2.2 below.

Figure 2.1: Site Location Plan

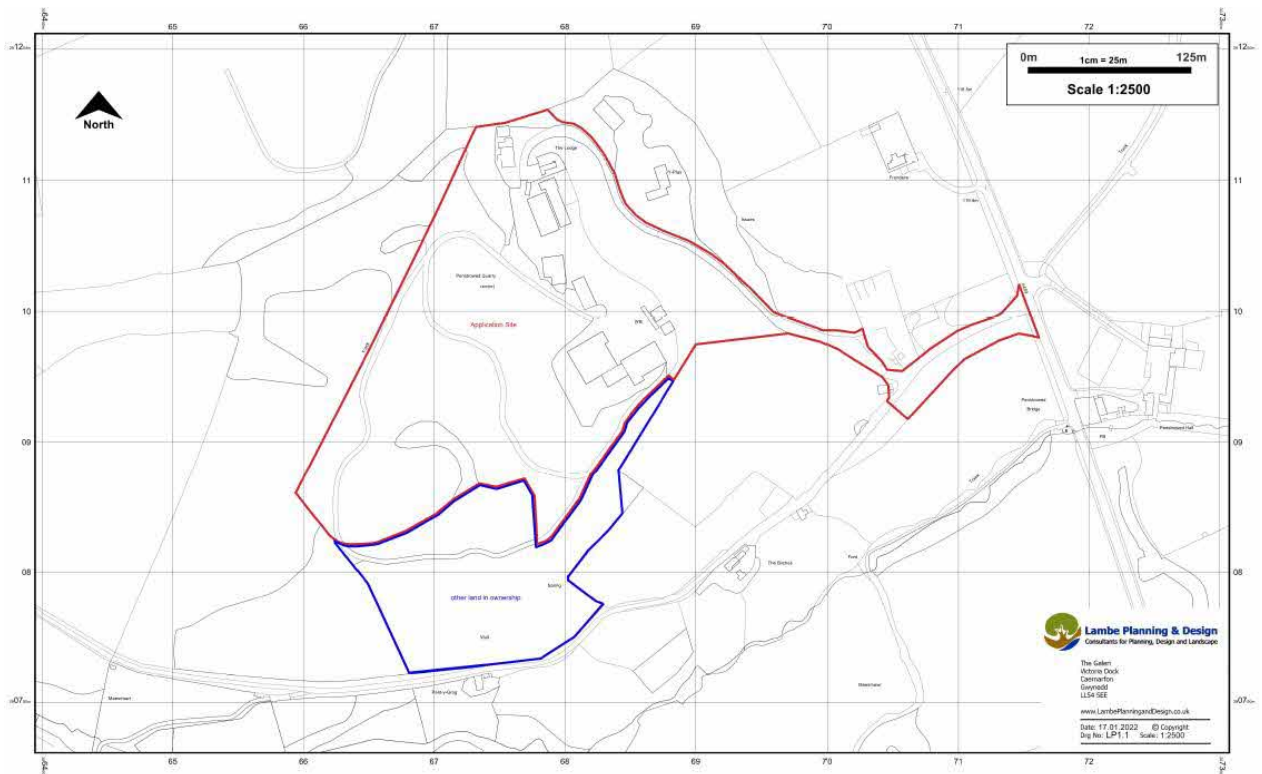


Figure 2.2: Project Proposals



3.0 POLICY AND GUIDANCE

Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

- 3.1 Light pollution was introduced within the Clean Neighbourhoods and Environment Act (2005) as a form of statutory nuisance under the Environmental Protection Act (the 'EPA', 1990), states: "artificial light emitted from premises so as to be prejudicial to health or nuisance."

Planning Policy Wales Edition 11 Lighting

- 3.2 There is a need to balance the provision of lighting, to enhance safety and security to help in the prevention of crime, and to allow activities like sport and recreation to take place with the need to:

protect the natural and historic environment including wildlife and features of the natural environment such as tranquillity;
retain dark skies where appropriate;
prevent glare and respect the amenity of neighbouring land uses; and
reduce the carbon emissions associated with lighting.

Relevant British Standards and Design Mitigation

- 3.3 The most applicable British Standards for lighting that relates to the proposed development are:

BS EN 12464-2 Lighting of Work Places – Outdoor Work Places, 2014

BS 5489-1:2020 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas

- 3.4 Along with complying the guidance listed above, any potential lighting design will include the following mitigation:

Lighting solutions will be selected to reduce light pollution. Specifically, designed luminaires will be selected to minimise upward spread of light. The optics in the lanterns will control the distribution of light to avoid overspill, sky glow and glare.

Lighting will be restricted to the task area using horizontal cut-off optics and zero tilts.

A curfew will be operated and the duration of any lighting will be minimized.

Institute of Lighting Professional Documents

- 3.5 The following Institute of Lighting Professional (ILP) guidance documents have been consulted with regards to lighting from the proposed development;

PLG 04- Guidance on Undertaking Environmental Lighting Impact Assessments, ILP, 2013;

Guidance Note 08/18 Bats and artificial lighting in the UK ILP, 2018

Guidance Notes for the Reduction of Obtrusive Light, ILP, 2020;

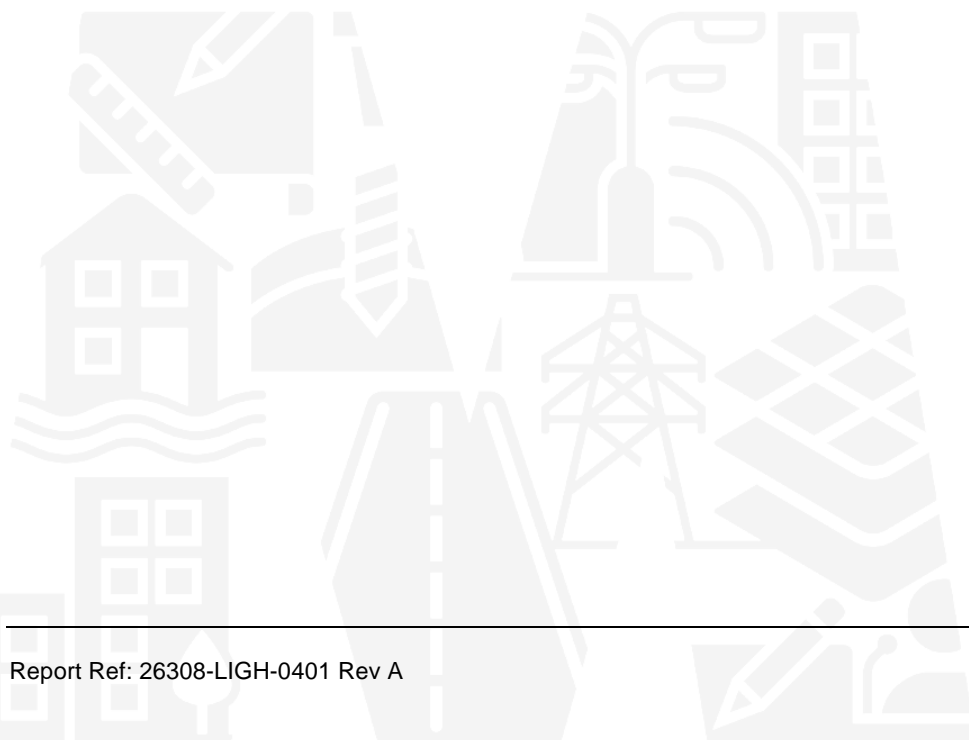
Local Policy – Powys Local Development Plan 2011-2026

3.6 The following Local policy has been identified in relation to the site and lighting;

Policy DM7 Dark Skies and External Lighting.

Development proposals involving external lighting will only be permitted when a lighting scheme has been provided that demonstrates that the lighting will not individually or cumulatively cause:

1. Unacceptable levels of light pollution especially in the countryside.
2. An unacceptable adverse effect on the visibility of the night sky.
3. A nuisance or hazard to highway users including pedestrians, and local residents.
4. An unacceptable disturbance to protected species.



4.0 ASSESSMENT METHODOLOGY

4.1 Guidance notes produced by the Institution of Lighting Professionals are among the most commonly referenced guidance notes for good practice within the lighting design industry.

4.2 The methodology of this report is as follows:

Identify the environmental zone of the site and surrounding sensitive receptors in accordance with ILP GN01/20 and PLG 04;

Produce a detailed 3D model using industry-standard light modelling software and quantitatively assess the following parameters; light intrusion, and upward light spill/sky glow; and

If required, consider possible mitigation measures to reduce potential light intrusion onto ecological receptors and upward light (which can create sky glow) (glare).

4.3 In accordance with Guidance Notes for the Reduction of Obtrusive Light, the following definitions are used to describe lighting effects in this assessment:

Light intrusion – light intrusion into windows (the spilling of light beyond the boundary of a property which may cause a nuisance to others).

Skyglow – a combination of direct upward light and indirect upward light, (the upward spill of light into the sky which can cause a glowing effect and is often seen above cities when viewed from a dark area).

4.4 The ILP Guidance Notes for the Reduction of Obtrusive Light: GN01/20 define environmental zones appropriate to the location of the proposed development shown in Table 4.1:

Table 4.1: Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, villages or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small-town centres of suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

4.5 The environmental zone appropriate for the proposed development is considered to be Zone E1, as it is a relatively uninhabited rural location.

- 4.6 Skyglow is the brightening of the night sky caused by artificial lighting resulting from the reflection of radiation (visible and non-visible); ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky. The ILP limits for UPR are shown in Table 4.2 below.

Table 4.2: Maximum values of upward light ratio (ULR) of luminaries

Application conditions	Environmental Zone				
	E0	E1	E2	E3	E4
Upward Light ratio (ULR)/%	0	0	2.5	5	15

5.0 RECEPTORS

- 5.1 Following a desktop survey of the site and liaising with the project team, the following light-sensitive receptors have been identified:

Ecological

Figure 5.1: Ecological Receptor Locations



Ecological receptors

- 5.2 The ILP Guidance Note 08/18 specifies that when a planning application includes additional artificial lighting, developers should ensure that a lighting assessment is done alongside an ecological assessment. Lighting can impact light-sensitive species such as bats by impacting roosting, commuting and foraging behaviour.
- 5.3 Following consultation with project ecologists, there is potential that a number of bat species are anticipated to use the treeline surrounding the holiday lodges. Due to the downward-facing nature of all the lights used lighting levels above 4m will be 0.0lux. Therefore, ecology receptors have been located along the woodland

at a height of 1.5m. The locations of these receptors are visually presented in Figure 5.1, as well as in Table 5.1 below.

Table 5.1: Ecological Receptor Locations

Receptor	Location Description	Height (m)
Eco1	North of the site	1.5
Eco2	North of the site	1.5
Eco3	North of the site	1.5
Eco4	Centre of the site	1.5
Eco5	Centre of the site	1.5
Eco6	Centre of the site	1.5
Eco7	Centre of the site	1.5
Eco8	Centre of the site	1.5
Eco9	Centre of the site	1.5
Eco10	South of the site	1.5
Eco11	South of the site	1.5
Eco12	South of the site	1.5
Eco13	South of the site	1.5
Eco14	South of the site	1.5

6.0 LIGHTING ASSESSMENT

- 6.1 A site plan was provided by the project architect for this development and the lighting criteria was discussed with the project team. A 3D model was produced using a range of industry-standard light modelling software including Lighting Reality and Dialux, the model only considers the effect of solid structures so natural structures such as trees will be assessed qualitatively outside the model calculations.
- 6.2 A visualisation of the model can be found below in Figure 6.1.

Figure 6.1: 3D model visualisation



- 6.3 The assessment currently considers 24 hours operation of the light fittings as a worst-case scenario.

Ecology Receptors

- 6.4 The ILP Guidance Note 08/18 specifies that acceptable lux limits should be used to assess the impact of lighting upon ecological species including bats. Therefore, following consultation with project ecologists and the LPA, impacts will be considered significant where predicted vertical illuminance levels exceed 1 lux. The results of this assessment can be found in Table 6.1 below.

Table 6.1: Ecology Receptor Results

Receptor	Predicted model vertical illuminance
Eco1	0.11
Eco2	0.79
Eco3	0.01
Eco4	0.35
Eco5	0.85
Eco6	0.82

Receptor	Predicted model vertical illuminance
Eco7	0.03
Eco8	0.08
Eco9	0.10
Eco10	0.05
Eco11	0.09
Eco12	0.76
Eco13	0.30
Eco14	0.18

- 6.5 The results show that lux levels along the woodland surrounding the development will be below 1 lux, therefore lighting is not anticipated to have a significant impact on any light-sensitive species using this space.

SkyGlow

- 6.6 The model has been used to calculate the predicted Upward Lighting Ratio (ULR) of the proposed external lighting scheme. Model outputs predict a sky glow figure (ULR) of 0.0%. As illustrated in Table 4.2, the ILP sky glow limitation for an area classified as Environmental Zone E1 is 0.0% ULR. As such the indicative lighting scheme meets the ILP sky glow limitations and is therefore not considered to result in detrimental impacts on the dark sky landscape.

7.0 CONCLUSIONS

- 7.1 Mewies Engineering Consultants Ltd (M-EC) has been commissioned by GF Grigg Ltd to undertake an External Lighting Impact Assessment for proposed holiday lodge park at Penstrowed Quarry, Caersws, Powys.
- 7.2 With the proposed development in place, lighting from the site will not exceed the recommended ILP pre- and post-curfew criteria.
- 7.3 Lux levels along the woodland surrounding the holiday lodges will be below 1 lux therefore lighting is not anticipated to have a significant impact on any light-sensitive species using this space.
- 7.4 The proposed lighting scheme will comply with all relevant British Standards and the Institution of Lighting Professionals lighting guidelines and will serve to ensure safety and security of all areas of the development can be effectively maintained.



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APPENDICES



APPENDIX A



existing mature woodland / tree cover supplemented with buffer planting - please see detailed Landscape Design Scheme

58 Holiday Lodges
1 Managers Lodge
1 Reception / Shop

Twin Car Space per pitch @ 2.5m x 5.00m

access drive - 2 way @ 4.5m wide

access drive - 2 way @ 4.5m wide

existing mature woodland / tree cover supplemented with buffer planting - please see detailed Landscape Design Scheme

NOTES:

- DO NOT SCALE THIS DRAWING.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH REPORT 26308-04-ELA-01.

STREET LIGHTING KEY

PROPOSED DOWNLIGHT FROM CABIN ROOF
 LANTERN MANUFACTURER: THORN LIGHTING
 LANTERN NAME: D-CO LED MINI
 LAMP TYPE: LED 3000K WARM WHITE
 QUANTITY: 376
 WATTAGE: 1W
 OPTIC: 0.35KLM

PROPOSED LIGHTING BOLLARD
 HEIGHT: 1.2m
 LANTERN MANUFACTURER: COLLINGWOOD LIGHTING
 LANTERN NAME: WOODEN BESPOKE
 BOLLARD BLOS
 LAMP TYPE: LED 3000K WARM WHITE
 QUANTITY: 86
 WATTAGE: 5W
 OPTIC: 0.25KLM

PROPOSED DOWNLIGHT ADJACENT TO CABIN DOOR
 COLUMN HEIGHT: 2m
 LANTERN MANUFACTURER: THORN LIGHTING
 LANTERN NAME: CESAR
 INCLINATION: 17
 LAMP TYPE: LED 3000K WARM WHITE
 QUANTITY: 188
 WATTAGE: 6W
 OPTIC: 0.38KLM

10.0 LUX ISO CONTOUR
 5.00 LUX ISO CONTOUR
 2.00 LUX ISO CONTOUR
 1.00 LUX ISO CONTOUR
 0.50 LUX ISO CONTOUR

REV: A	DATE: 18/05/23	BY: NA	CHK: DM	APP: AS	SCALE: 1:500
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DRAWING TITLE: LIGHTING LAYOUT LUX PLOT					
CLIENT: GF GRIGG LTD					
DRAWING NUMBER: 26308_04_100_01					
REVISION: A	SHEET SIZE: A0	SCALE: 1:500			
STATUS: FOR INFORMATION / APPROVAL					
M-EC Consulting Development Engineers		Telephone: 01532 364753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015. ALL RIGHTS RESERVED. LICENSE NUMBER: 100055862			



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ACOUSTIC AIR



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UTILITIES



FLOOD RISK & DRAINAGE



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LIGHTING



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MEC

Development Technical
Consultants

The Old Chapel
Station Road, Hugglescote
Leicestershire LE67 2GB
T: 01530 264753
E: group@m-ec.co.uk
www.m-ec.co.uk