# **Claverton Neighbourhood Plan**

# TRANQUILLITY Noise and Speed Reduction; Safety

# A few thoughts...

The purpose of this presentation is to show current thinking on the issues and how other communities deal with the issue of speed reduction and road safety.

**Isabelle Flicker** 

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- C. Pedestrian and Cycle Safety
- D. Visual intrusion and enhancement

## A. NOISE REDUCTION

### Noise in Claverton comes principally from traffic

"TRAFFIC NOISE IN RURAL AREAS ... has become a big problem in rural areas due to the large rise in the amount of traffic on rural roads in recent years" (TRANSPORT FOR QUALITY OF LIFE 2008)



#### TRAFFIC NOISE is created by a combination of :

- vehicle weight and power
- rolling noise (from tyres interacting with the road)
- propulsion noise (comprising engine noise, exhaust systems, transmissions and brakes)

## TRAFFIC NOISE ...

... triggers a complex chain of responses affecting human health and well-being (DEN BOER and SCHROTEN 2007)

which can result in :

- heart disease
- high blood pressure; and
- mental illness

## A. 1. SOLUTIONS : A36 SPEED REDUCTION = NOISE REDUCTION

Noise from traffic on the A36 can be reduced by:

reducing the speed limit to

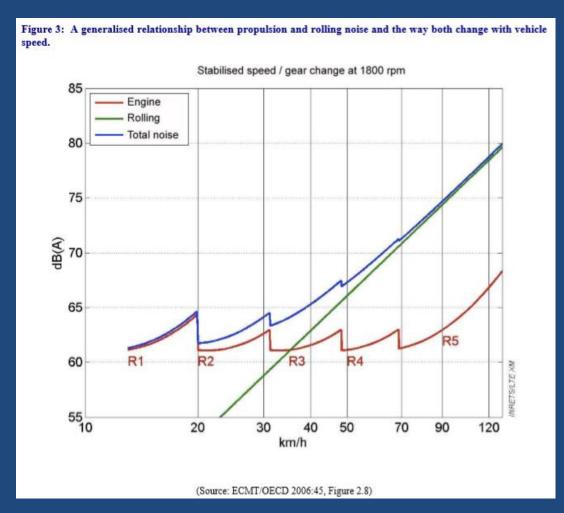


"Cutting speeds is the most immediate, the most cost-effective and most equitable way of reducing traffic noise" (PAIGE MITCHELL 2009)

There is a measurable link between traffic noise and speed (PAIGE MITCHELL 2009):

- Reducing speeds of 20 and 35mph by 6mph would cut noise levels by up to 40%
- Reducing 70mph and 60mph speeds would cut noise by up to 50%

### TABLE showing a generalised relationship between propulsion and rolling noise and the way both change with vehicle speed



## A REDUCTION OF SPEED FROM 50mph TO 40mph would further reduce...

- noise from DECELERATION into and ACCELERATION out of the bends to the north and south of the village
- VIBRATION from traffic

N.B. REDUCING THE SPEED LIMIT FROM 50mph to 40mph ...would only add approximately 20-30 seconds to the journey time (Bathampton to Watership Farm is approximately 2 miles)

#### NOISE CAN BE FURTHER REDUCED BY ...

- LAYING QUIET ROAD SURFACES: These can reduce noise levels by up to 5db. Some more specialised surfaces can achieve greater reductions.
- ENCOURAGING ALTERNATIVE AND COLLECTIVE MODES OF TRANSPORT (walking, cycling, bus, train, car share) to REDUCE TRAFFIC

## A. 2. HELICOPTERS AND MICROLIGHTS

- "Whilst the private use of aircraft, microlights etc., are not subject to planning control, the land used as landing fields and storage does require planning permission" (CCB Position Statement)
- "The Board (CCB) will oppose any change of use of land for private aircraft use unless suitable conditions can be imposed to mitigate the impact of the use on tranquillity. "
- Are helicopter companies etc entitled to fly commercial sight-seeing flights over the AONB?





## A. 3. DRONES



- Drones are discouraged.
  - The laws governing drone use can be found: www.caa.co.uk/Blog-Posts/Guidance-for-flyingdrones/

#### and

 further information on drone safety can be found : dronesafe.uk/

## **B. SPEED REDUCTION**

### 1. A36 : BLACK DOG TURNPIKE ROAD The A36 is a former turnpike road established in 1752



### DEPARTMENT FOR TRANSPORT GUIDANCE ON RURAL SPEED LIMITS (2006) RECOMMENDS ...



"for roads with a high number of bends, junctions or accesses...or (and) where there is a strong environmental landscape reason". (DfT 2006: 42, TABLE 2)

### **B. 1 A36**

From Bathampton to Watership Farm (40mph zone), a distance of approximately 1.75 miles, there are :

- 3 footpath crossings
- 7 field entrances
- 2 bus stops
- 3 home entrances

- 5 blind bends
- 2 lay-bys
- 3 lane turnings
- 2 farm entrances

### A REDUCTION FROM 50mph TO **40mph** WOULD ...

- improve safety for pedestrians crossing the A36
- improve safety of cyclists on the A36
- improve safety for drivers and cyclists turning into and out of the A36 from the numerous accesses along the road (lanes, fields, homes, lay-bys, bus stops and farms (see Slide 12 above)

## TRAFFIC AND SPEED ...

### ... also contribute to air pollution



## B. 2. CLAVERTON HILL

- Claverton Hill is de-controlled. Theoretically that means the speed limit is 60mph!
- University of Bath advice to staff and students states :"can all staff and students using this route ensure that they maintain a sensible speed (i.e. well below-30phpth) fan @aretim aliposition to stop safely should the need arise." (UNIVERSITY NEWS 7.10.2010)



• ...IS PLENTY FOR CLAVERTON HILL

## CLAVERTON HILL ...

- varies in width from 3m80 to 5m
- is 4m30 for most of its length ...
- although the pillars by the American Museum are just 3m40 apart. The pillars are Grade II listed.
- The 5m stretches in the middle section are effectively passing places
- There are several blind bends.
- N.B. Claverton Hill is open to traffic weighing less than 7.5t- approx overall dimensions Length 8.3m / Height 3.5m / Width 2.5m (inc. mirrors)

## BEING LESS THAN 5m WIDE, CLAVERTON HILL COULD BE ELIGIBLE FOR ... 'QUIET LANE' STATUS





## 'QUIET LANES' ARE ...

• ... a Countryside Agency initiative which has the support of the Department for Transport

and are ...

• supported by CPRE

The aim of quiet lanes is to maintain the character of minor rural roads by seeking to contain rising traffic growth that is widespread in rural areas.

Claverton Hill is historic, existing long before the university was established

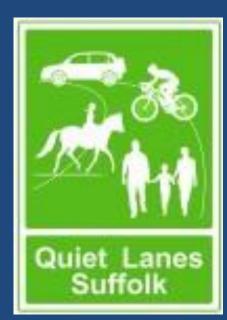
## QUIET LANES ATTRACT LOWER SPEED LIMITS

- a viable option for Claverton Hill and Ferry Lane?

#### THIS WOULD BENEFIT...



- Walkers
- Dog walkers
- Students
- Visitors to the American Museum
- Cyclists
- Riders



# THE QUIET LANE CONCEPT INVOLVES...

#### three key elements :

- Local community involvement to encourage a change in user behaviour;
- Area-wide direction signing strategy to re-route traffic;
- Quiet Lane network signing

n.b. Public Rights of Way should be included in the network.

As well as pursuing 'Quiet Lane' status there are a number of 'Shared Use' and speed limitation options that could be considered such as....

## SHARED USE

painted pavement- in need of repair!? (A36 to Freshford lane)



### VILLAGE ENTRANCES speed signs, road narrowing and cobbles (Wellow)



## ...and important junctions

#### Rumble strips (Wellow)



#### Cobbles at each 'entry point' and junction (Wellow)



### **SPEED REDUCTION** low-rise speed signs (Acton Turville)



### combined name and speed sign (SHOSCOMBE)



### Respect our Community Please drive carefully (Gloucestershire)



### Please watch your speed (Gloucestershire)



# COMMUNITY SPEED WATCH :

these can operate on roads with limits up to 40mph



## **PASSING SPACES**:

#### an unobtrusive option for Claverton Hill, 'formalising' the 5m passing

**SPACES** (B road, Wales)





## B. 3. SCHOOL PLACE IS ...

a shared use road by definition: children play, people walk their dogs and pass the time of day, homes give directly onto the street...



speed limit should apply

20 is more than plenty

### C. PEDESTRIAN AND CYCLE SAFETY

### MUCH IS COVERED ON PEDESTRIAN AND CYCLE SAFETY UNDER 'SPEED REDUCTION'

However, the safety of walkers crossing the A36 on the various footpaths could be addressed ...



This sign indicates the footpath crossing on the A36 near the Freshford turn

## D. VISUAL INTRUSION AND ENHANCEMENT

### A36: VISUAL INTRUSION





Ever-increasing signage :

- Is unaesthetic
- creates visual 'clutter'
- is confusing and difficult to read
- 'urbanises' an otherwise rural environment

### CREATIVE SOLUTIONS ...



 need to be found that respect the conservation and rural character of the area.

### TRADITIONAL FINGERPOSTS ...



are :

- part of our heritage
- redolent of the countryside

#### REMOVE ...

Right/Left turn signs to Claverton Down on green 'A' Road signs to discourage through traffic and/or add weight and width restriction





### REPLACE...

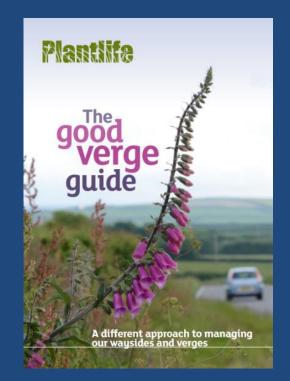
• White 'Claverton Down' sign *(right)* with a traditional fingerpost.

This would :

- slow traffic (harder to read)
- reduce the perceived importance of the road
- create a more rural feel

### ENHANCE

 In addition to reducing visual clutter, verges can be enhanced by sowing wildflower verges



### ROADSIDE VERGES...

- ... offer a vital wildlife corridor ...
- ... are a vital refuge for wild flowers driven out of our farmland by agricultural practices. Flowers and grasses...
- ... support our birds, bees and other wildlife

### ALL ROAD VERGES ...

• can be better managed while remaining safe for motorists



ROAD VERGES AND WILDLIFE MANAGEMENT GUIDELINES

April 2015

### SOME COUNCILS...

- are looking after their road verges in a way that benefits nature...
- they are in a minority but should become the norm.



MONMOUTHSHIRE COUNTY COUNCIL VERGE SPONSORSHIP POLICY

### SOURCES

- BRAKE/TRL
- Cotswold Conservation Board : Position Statement on Tranquillity and Dark Skies
- Department for Transport
- Highway Code
- Noise Association : Transport for Quality of Life Traffic Noise in Rural Areas: personal experiences of people affected (2008)
- Paige and Mitchell Report (2009)
- Plantlife
- Transport for Quality of Life

### **Claverton Neighbourhood Plan**

### Dark Skies Light Pollution

Controlling light spill for the benefit of the environment, the economy and health

Claverton does not have any street lights and therefore enjoys a good view of the night sky.

**Isabelle Flicker** 

### A. INTRODUCTION : Cotswold AONB

- Claverton is in the Cotswold Area of Natural Beauty (AONB)
- The AONB forms the setting to the World Heritage City of Bath
- The City of Bath forms the setting to the AONB
- 50% of the AONB is in the sky

### Supporting the Cotswold Conservation Board (CCB)

As part of the CAONB, Claverton aims to support the CCB in:

- Conserving and enhancing the natural beauty of the AONB
- Increasing understanding and enjoyment of the special qualities of the AONB

### Loss of the night sky

Our ability to see the stars is affected by sky glow from:

- surrounding towns and villages
- lights at the university (campus and sports fields)
- Warleigh Manor
- outdoor domestic lighting
- skylights

### Cumulative impact of lighting

"The cumulative impact of local lighting schemes ... i.e. security, leisure activities, street lighting, floodlighting, ... can lead to the loss of dark skies"

**N.B.**: Light emitted from buildings also contributes to ambient lighting

The Cotswold Conservation Board (CCB) Position Statement on Tranquillity and Dark Skies

### Lighting & Environmental Zones

#### Table 1 - Environmental Zones

Zone	Surrounding	Lighting Environment	Examples	
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks	
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc	
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations	
E3	Suburban	Medium district brightness	Small town centres or suburban locations	
E4	Urban	High district brightness	Town/city centres with high levels of night- time activity	

The parish is in E1/E2 and aims to be in E1.

### The Night Sky above Claverton



### **Darkness and Night-time Ecology**

# THE NIGHT SKY IS VITAL TO THE ECOLOGY OF THE AREA. LIGHT AFFECTS :

#### MOTHS AND INSECTS

loss of and impact on insectivorous birds, amphibians and mammals i.e. bats etc

 NIGHT-TIME FEEDING BIRDS AND MAMMALS i.e. Owls and Bats delayed feeding and change in foraging habits; vulnerability to predators)

### SLUGS AND SNAILS

increase in numbers

TREES AND OTHER FLORA

dependence on nocturnal creatures; early bud break, late Autumn

### Darkness, Human Health and Melatonin

Light at night (particularly blue-rich lighting) can harm health by suppressing melatonin.

**MELATONIN** has antioxidant properties and :

- Induces sleep
- Boosts the immune system
- Lowers cholesterol
- Helps the functioning of the thyroid, pancreas, ovaries, testes and adrenal glands

#### SUPPRESSION OF MELATONIN can increase the risk for inter alia

- Obesity
- Depression
- Sleep disorders
- Diabetes
- Breast and prostate cancer

# Key to CPRE Night Blight Map

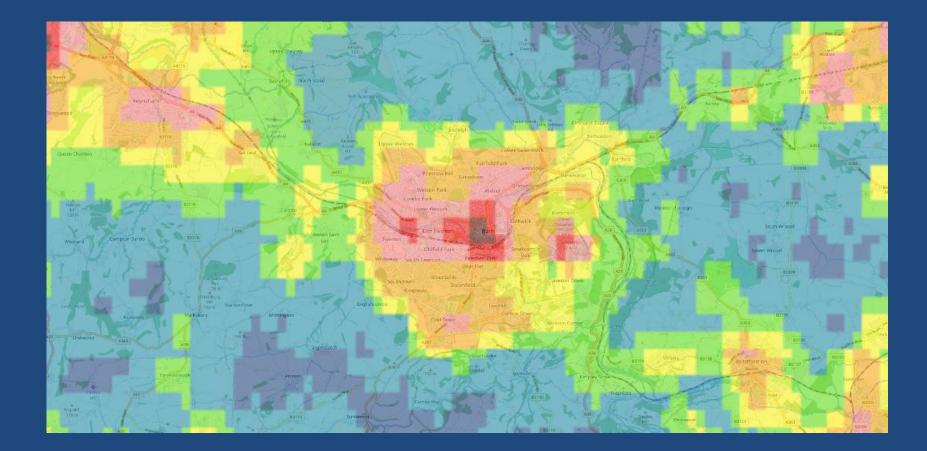
measured in NanoWatts/cm<sup>2</sup>/sr

Categories	Brightness values (in nw/cm?/si) <sup>12</sup>
Corour pano 1 (Darkest)	<0.25
Colour pand 2	0.25-0.5
Colour band 3	0.5-1
Colour band 4	1-2
Colour cand 5	2-4
Colour pand 6	4.8
Colour pand 7	8-16
Corpur scand 8	16-32
Coxour nano 9 (Brightest)	×32

The map is a composite of photographs taken over several nights in September 2015 at 1.30 a.m. Sports field lights are consequently not on.

### Light pollution in and around Bath





### Acting to protect the night sky for present and future generations by :

- working with the university
- working with the owners of Warleigh Manor
- opposing inappropriate lighting in new developments in the parish
- encouraging 'starlit sky' lighting within the parish
- working with the Bath Starlit Skies Conference which aims to reduce light pollution in and around Bath

# Principles of good external lighting

**Starlit Skies Alliance** 

The 5-Star principles of good external lighting are :

1. DESIGN EXCELLENCE : 💙

seek innovative lighting design solutions to light responsibly

- 2. DOWNWARD AND SHIELDED : 🔸 🛧 light only when and where it is needed
- USE WARM LIGHTING HUES : ★★★
   be good to ourselves and the rich biodiversity around us
- 4. LIMIT BRIGHTNESS : 🛛 🖈 🛧 🖈

dazzle is detrimental to safety, health, and our environment

5. ACTIVELY MANAGE: 🛛 🛧 🛧 🛧 🛧

sign up to a culture of continuous improvement in environmental management.

### B. BATH UNIVERSITY

- lighting on the campus is not just the result of lighting from the sports fields
- there are problems, but there are also solutions

For more background and supporting evidence please refer to the evidence base

### C. DOMESTIC LIGHTING

### The Good Neighbour Principle

A significant amount of light pollution comes rom the University of Bath, Warleigh Manor and surrounding towns and villages.

These are options

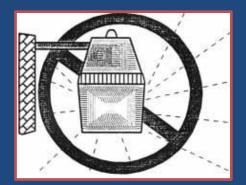
However, the cumulative effect of domestic lighting, however, can also take away our view of the stars.

There are options which can be used to retain our dark skies.

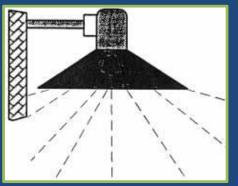
### Good and Bad Light Fixtures (1)

Diagrams : NELPAG (New England Light Pollution Advisory Group)

BAD: <u>Yard Light</u> waste light goes up and sideways



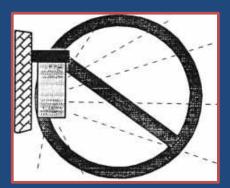
#### GOOD : <u>Opaque Reflector</u> (light inside) directs all light down





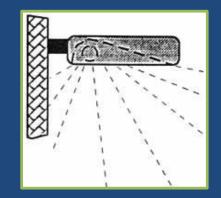
### Good and Bad Light Fixtures (2)

#### BAD: <u>Wall Pack</u> waste light goes up and sideways





GOOD : <u>Shoe Box</u> (forward throw) directs all light down

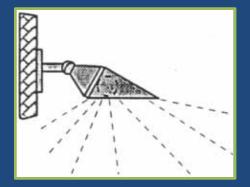




### Good and Bad Light Fixtures (3)

BAD : <u>Area Floodlight</u> waste light goes up and sideways GOOD : <u>Area Floodlight with Hood</u> directs all light down





### Good and Bad Light Fixtures (4)

unshielded uplighters send light up into the night sky and into the eyes of passers-by

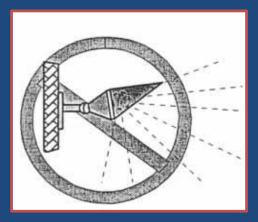
BAD : <u>Uplighter</u> Unshielded, sends light up GOOD : Remove! These lights are not necessary!



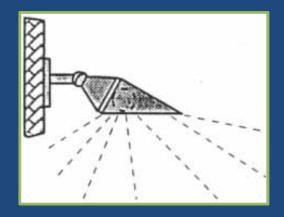


# Modifying existing fittings (1)

#### Change this...



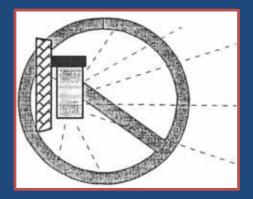
#### To this (aim downward)

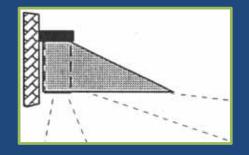


# Modifying existing fittings (2)

#### Change this...

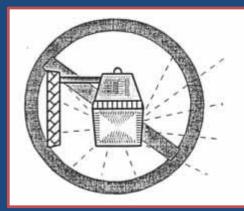
#### to this (install visor)



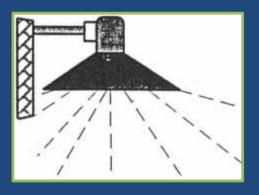


### Modifying existing fixtures

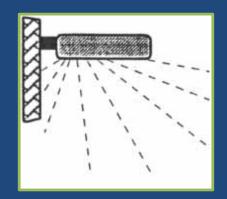
#### Change this...



#### to this...



#### or this







### **Skylights and Blinds**

• Left to right : (1) no blind; (2) internal venetian blind; (3) internal venetian blind and external blind



### Light Pollution and the Law

- Exterior lighting is subject to the same criminal law as noise and smells. (Environmental Protection Act 1990)
- It applies to "artificial light emitted from premises so as to be prejudicial to health or a nuisance."

### D. LEDs Advantages

### LEDs are :

- energy efficient
- cost less
- last longer
- easily remotely controlled
- switch on instantly

### In addition, they

- come in a wide range of colours and colour temperatures
- are dimmable
- do not produce noxious substances when discarded

### LEDs : Disadvantages

Often blue-rich and brighter than needed (ie > 3000K). This is:

- harmful to flora and fauna
- harmful to human health

and has led to :

 a 2.2% p.a. increase in light pollution globally between 2012 and 2016

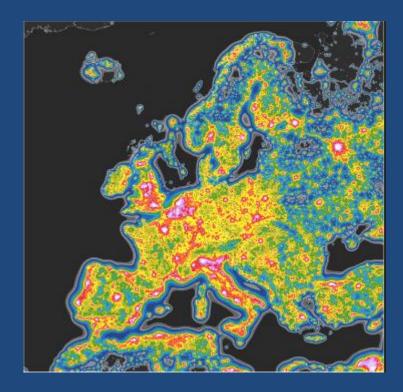
# Increase in light pollution 2012-2016

(Light pollution increased at a rate of 2.2% per annum) (Science Advances, Vol. 3, No. 11, 22.11.17 Falchi et al)

#### Pre-4000K LEDs

#### Post-4000K LEDs





### Watts, Lumens and Kelvins

- Watts = measure of power consumption (W)
- **Lumens** = measure of total light output (L)
- **Kelvins** = measure of colour temperature (K)

Outdoor lighting should not exceed 3000K. Blue-rich lighting is bad for health and the environment

### Think lumens and kelvins **not** Watts!

18W, 4000K Brighter than is needed for the task 18W, 2700K : Choose less than 3000K



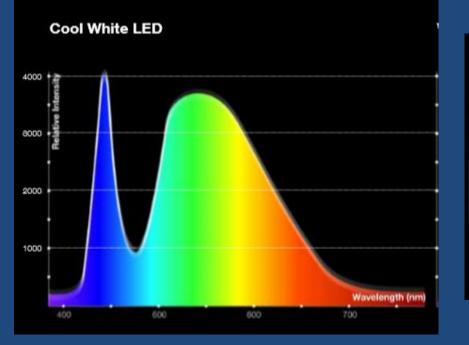
### Watt and Lumens aka Watt equivalence

Old Watts	Approx Lumens	
<u>25 W</u>	230 - 270 lamp	
<u>35 W</u>	250 - 280 spotlight	
	200-300 Useful Lumens (spotlight)	
	390 - 410 lamp	
<u>40 W</u>	440 - 460 lamp	
<u>50 W</u>	330 - 400 spotlight	
	350-450 Useful Lumens (spotlight)	
<u>60 W</u>	800 - 850 lamp	
<u>75W</u>	1000-1100 lamp	
<u>100W</u>	1500-1600 lamp	

### Colour temperature (Kelvins)

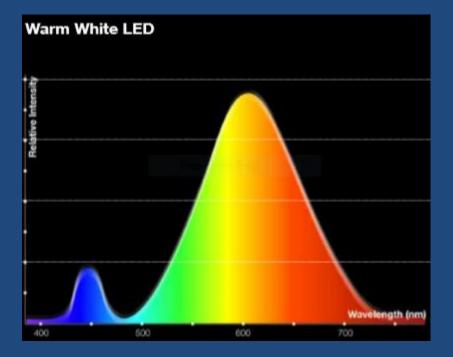


### **Cool White**





### Warm White





### Potential Custom 'Bath' LED





### Cool, warm and custom LEDs



### Let's do it!

Galloway Forest Park Dark Skies - we can all share such beautiful skies if we work together to cut sky-glow Photo James Hilder

### **Claverton Neighbourhood Plan**

Dark Skies Light Pollution and Bath University

Controlling light spill for the benefit of the environment, the economy and health

Isabelle Flicker

### Cumulative impact of lighting

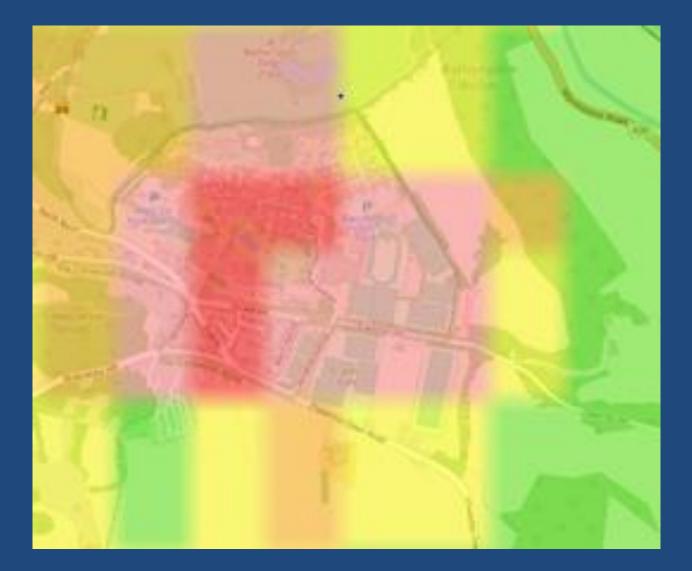
"The cumulative impact of local lighting schemes ... i.e.
security, leisure activities, street lighting, floodlighting, ...
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N.B. : Light emitted from buildings also contributes to ambient lighting

The Cotswold Conservation Board Position Statement on Tranquillity and Dark Skies

### BATH UNIVERSITY

- lighting on the campus is not just the result of lighting from the sports fields
- there are problems, but there are also solutions

### Bath University Campus and surrounding area CPRE Night Blight map (1.30 a.m. Sept. 2015)



### 1. The Campus

Lighting on the campus comes from :

- streetlamps
- the bus yard
- car parks
- walkways and
- buildings

which contribute to a background level of lighting ...

Any new development or sports field will add to that existing level of lighting

### Neon strip lights in the university bus shelter

**PROBLEM :** the strip lights scatter blue-rich light and can dazzle drivers and pedestrians

**SOLUTION :** shield lights and reduce lumens, and kelvins to > 3000K



### Street lights and car park lights

**PROBLEM :** the number of streetlamps and translucent lampshades

**SOLUTION :** switch off one in two streetlamps and paint the shades black





### Uplighters in the bus yard

unshielded uplighters send light up into the night sky and into the eyes of passers-by

PROBLEM : Unshielded

SOLUTION : Remove ! these lights are not necessary





### Wall-mounted floodlight in the bus yard

**PROBLEM :** dazzles passersby; brighter than needed; badly angled

**SOLUTION :** install lower level, warm white lighting, downward facing



### Floodlight alternative



### **Column lights**

# **PROBLEM :** no light control, bright and dazzling

**SOLUTION :** change the light fittings – getting things wrong is expensive!



### Light emanating from buildings



### 2. Sports Fields

Light from the sports fields :

- 'trespasses' on the American Museum
- affects the setting of the parish and AONB
- is made worse by the university's hill-top location
- Is made worse by cloud cover



#### PURPOSE

- To show the **differential** in light levels between a dark sky using only "natural" ambient light" and "Flood Lighting". **METHODOLOGY**
- The colour temperature (°K) was set to show the most natural appearance under the flood lighting, in this case 4000°K.
- The ASA (ISO) was set to allow some visible data to be recorded under "natural" light while at the same time controlling electronic digital noise which is present in higher ASA ratings. In this case 6400 ASA.
- The perspective has been maintained across all the photographs using a 24mm lens for all the photographs.
- Original files were recorded in a "RAW" format. De-mosaicing used identical software and identical software settings. While no additional manual adjustments have been made to any of the photographs, software developers default settings made during any of the processes will be consistent across each image.
- The Photographs have been taken in location groups of three, one under "flood lights" a second in "natural ambient light", the third picture is a "reference" to enable the viewer to identify a virtually black image taken at that location, apart from showing the viewer that the camera positions for the "flood lighting and natural light are similar, it has no other purpose and should not be taken in to account regarding any contrast differentials.
- Core Exif Data has been included for reference. Although the Exif data for the "reference" photograph is identical to the other two in a location, it has not been shown to assist with clarity.
- The same camera body and lens was used for all the photographs. The photographs (with and without floodlights) were taken at a date as close together as possible. The weather conditions were similar.

#### **ADVISORY**

- There is a very slight adjustment to the shutter speed between each group of three photographs; therefore the viewer should take care if comparing one location group directly to another, although in practice any difference, if one exists, will be very small.
- RAW file size is dependent on the picture complexity and will not affect the final photographs.

### Location map of photographs



## Bath University Sports Floodlights

NOTE : Sports clubs can be served with an abatement notice

If they have used the best practicable means to stop or reduce light nuisance, they may be able to use this as one of the following:

- a) grounds for appeal against the abatement notice
- b) a defence, if prosecuted for not complying with the abatement notice



### Bath University : Location 1 Reference



### **Bath University Location 1**

#### **Floodlighting : ON**

#### **Floodlighting : OFF**



#### Bath University : Location 1 Exif\* Data \* Exchangeable Image File

Exif Xmp Iptc	Maker ALL Custom
Workspace	
Tag name	Value
	System
FileName	_DSC3849.NEF
FileSize	28 MB
	File
FileType	NEF
	IFD0
BitsPerSample	888
Make	NIKON CORPORATION
Model	NIKON D5
SamplesPerPixel	3
Artist	
ReferenceBlackWhite	0 255 0 255 0 255
Copyright	Alex Hansen
DateTimeOriginal	2018:03:05 20:39:18
TIFF-EPStandardID	1000
	SubIFD1
BitsPerSample	14
SamplesPerPixel	1
	XMP-xmp
CreateDate	2018:03:05 20:39:18.78
	ExifIFD
ExposureTime	0.3
FNumber	4.0 Manual
ExposureProgram ISO	6400
SensitivityType	Recommended Exposure Index
RecommendedExposureIn	
DateTimeOriginal	2018:03:05 20:39:18
CreateDate	2018:03:05 20:39:18
Flash	No Flash
FileSource	Digital Camera
SceneType	Directly photographed
CFAPattern	[Red, Green][Green, Blue]
CustomRendered	Normal
ExposureMode	Manual
WhiteBalance	Manual
FocalLengthIn35mmForm	
Contrast	Normal
Saturation	Normal
	Nikon
Quality	RAW
WhiteBalance	4000K
WhiteBalanceFineTune	00
SerialNumber	6005233
ColorSpace	Adobe RGB
Contrast	+8
Brightness	-124
Saturation	Normal
HueAdjustment	-124
ISO	6400
BlackLevel	400 400 400 400
Lens	24-120mm f/4
ContrastCurve	(Binary data 578 bytes, use -b option to extract
FirmwareVersion	1.20c
NoiseReduction	Off
LensDataVersion	0204
LensiDNumber	170

Metadata GoogleMap	
Exif Xmp Iptc 1	Aaker ALL Custom
Workspace	
Tag name	Value
	System
FileName	_DSC3945.NEF
FileSize	22 MB
	File
FileType	NEF
	IFD0
BitsPerSample	888
Make	NIKON CORPORATION
Model	NIKON D5
SamplesPerPixel	3
Artist	
ReferenceBlackWhite	0 255 0 255 0 255
Copyright	
DateTimeOriginal	2018:03:10 22:10:40
TIFF-EPStandardID	1000
	SubIFD1
BitsPerSample	14
SamplesPerPixel	1
	XMP-xmp
CreateDate	2018:03:10 22:10:40.92
	ExifIFD
ExposureTime	0.3
FNumber	4.0
ExposureProgram	Manual
ISO	6400
SensitivityType	Recommended Exposure Index
RecommendedExposureIn	
DateTimeOriginal	2018:03:10 22:10:40
CreateDate	2018:03:10 22:10:40
Flash	No Flash
FileSource	Digital Camera
SceneType	Directly photographed
CFAPattern	[Red, Green][Green,Blue]
CustomRendered	Normal
ExposureMode	Manual
WhiteBalance	Manual
FocalLengthin35mmForma	
Contrast	Normal
Saturation	Normal
	Nikon
Quality	RAW
WhiteBalance	4000K
WhiteBalanceFineTune	0.0
SerialNumber	6005233
ColorSpace	Adobe RGB
Contrast	+8
Brightness	-124
Saturation	Normal
HueAdjustment	-124
ISO	6400
BlackLevel	400 400 400 400
Lens	24-120mm f/4
ContrastCurve	
FirmwareVersion	(Binary data 578 bytes, use -b option to extract) 1.20c
	0ff
NoiseReduction LensDataVersion	0204
LensIDNumber	170
	Composite
CFAPattern	[Red, Green][Green, Blue]

### Bath University : Location 2 Reference



### **Bath University Location 2**

#### **Floodlighting: ON**

#### **Floodlighting: OFF**



### Bath University : Location 2 Exif Data

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	SerialN

Exif Xmp Iptc I	Maker ALL Custom
Workspace	
Tag name	Value
	System
FileName	_DSC3862.NEF
FileSize	29 MB
	File
FileType	NEF IFD0
010 0 . C	IFD0 888
BitsPerSample Make	NIKON CORPORATION
Make Model	NIKON CORPORATION NIKON D5
SamplesPerPixel	3
Artist	3
ReferenceBlackWhite	0 255 0 255 0 255
Copyright	Alex Hansen
DateTimeOriginal	2018:03:05 20:44:30
TIFF-EPStandardID	1000
	SubIFD1
BitsPerSample	14
SamplesPerPixel	1
sempres en Mel	XMP-xmp
CreateDate	2018:03:05 20:44:30.14
	ExifIFD
ExposureTime	1/4
FNumber	4.0
ExposureProgram	Manual
ISO	6400
SensitivityType	Recommended Exposure Index
RecommendedExposureIn	
DateTimeOriginal	2018:03:05 20:44:30
CreateDate	2018:03:05 20:44:30
Flash	No Flash
FileSource	Digital Camera
SceneType	Directly photographed
CFAPattern	[Red,Green][Green,Blue]
CustomRendered	Normal
ExposureMode	Manual
WhiteBalance	Manual
FocalLengthIn35mmForm	
Contrast	Normal
Saturation	Normal
	Nikon
Quality	RAW
WhiteBalance	4000K
WhiteBalanceFineTune	00
SerialNumber	6005233
ColorSpace	Adobe RGB
Contrast	+8
Brightness	-124
Saturation	Normal
HueAdjustment	-124
ISO	6400
BlackLevel	400 400 400 400
Lens	24-120mm f/4
ContrastCurve	(Binary data 578 bytes, use -b option to extract)
FirmwareVersion	1.20c
NoiseReduction	Off
LensDataVersion	0204
LensIDNumber	170
	Composite
	[Red,Green][Green,Blue]

1	Metadata GoogleMap		
	Exif Xmp Iptc	Maker ALL Custom	
	Workspace		
	Tag name	Value	
	ling mille	System	
	FileName	DSC3941.NEF	
	FileSize	22 MB	
		File	
	FileType	NEF	
		IFD0	
	BitsPerSample	888	
	Make	NIKON CORPORATION	
	Model	NIKON D5	
	SamplesPerPixel	3	
	Artist		
	ReferenceBlackWhite	0 255 0 255 0 255	
<u> </u>	Copyright		
	DateTimeOriginal TIFF-EPStandardID	2018:03:10 22:08:49	
	TIFF-EPStandardID	SubIFD1	
C)	BitsPerSample	SubiFD1	
	SamplesPerPixel	14	
	SamplesPerPixel	XMP-xmp	
_	CreateDate	2018:03:10 22:08:49.20	
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50	ExposureTime	1/4	
=	FNumber	4.0	
	ExposureProgram	Manual	
at a	ISO	6400	
0	SensitivityType	Recommended Exposure Index	
7	RecommendedExposureIn	6400	
-ocation 2 - Natural Ligh	DateTimeOriginal	2018:03:10 22:08:49	
1	CreateDate	2018:03:10 22:08:49	
	Flash	No Flash	
$\sim$	FileSource	Digital Camera	
	SceneType	Directly photographed	
	CFAPattern	[Red,Green][Green,Blue]	
ā	CustomRendered	Normal Manual	
. <u> </u>	ExposureMode WhiteBalance	Manual	
<u> </u>	FocalLengthIn35mmForma		
σ	Contrast	Normal	
č5	Saturation	Normal	
×	Succession	Nikon	
0	Quality	RAW	
	WhiteBalance	4000K	
	WhiteBalanceFineTune	00	
	SerialNumber	6005233	
	ColorSpace	Adobe RGB	
	Contrast	+8	
	Brightness	-124	
	Saturation	Normal	
	HueAdjustment	-124	
	ISO	6400	
	BlackLevel	400 400 400 400	
	Lens	24-120mm f/4	
	ContrastCurve	(Binary data 578 bytes, use -b option to extract)	
	FirmwareVersion	1.20c	
	NoiseReduction	Off	
	LensDataVersion	0204	
	LensIDNumber		
	CFAPattern	Composite [Red, Green][Green, Blue]	
	Staration	Iner overall green pigel	

### Bath University : Location 3 Reference



### Bath University : Location 3

#### **Floodlighting : ON**

#### **Floodlighting : OFF**



### Bath University : Location 3 Exif Data

	Metadata GoogleMap	
	Exif Xmp Iptc #	Maker ALL Custom
	Workspace	
		Value
	Tag name	System
	FileName	_DSC3864.NEF
	FileSize	28 MB
	THE REAL	File
	FileType	NEF
		IFD0
	BitsPerSample	888
	Make	NIKON CORPORATION
	Model	NIKON D5
	SamplesPerPixel	3
_	Artist	
	ReferenceBlackWhite	0 255 0 255 0 255
$\cap$	Copyright	Alex Hansen
U	DateTimeOriginal	2018:03:05 20:46:48
10	TIFF-EPStandardID	1000
05		SubIFD1
Ŧ	BitsPerSample	14
2	SamplesPerPixel	A second s
D	CreateDate	XMP-xmp 2018:03:05 20:46:48.35
. <u> </u>	CreateDate	ExifIFD
	ExposureTime	1/15
_	FNumber	40
$\overline{\mathbf{D}}$	ExposureProgram	Manual
õ	ISO	6400
<u>S</u>	SensitivityType	Recommended Exposure Index
0	RecommendedExposureIn	6400
	DateTimeOriginal	2018:03:05 20:46:48
ш	CreateDate	2018:03:05 20:46:48
-ocation 3 - Flood Lights On	Flash	No Flash
	FileSource	Digital Camera
$\sim$	SceneType	Directly photographed
0.7	CFAPattern	[Red, Green][Green, Blue]
~	CustomRendered	Normal
5	ExposureMode	Manual
0	WhiteBalance	Manual
	FocalLengthIn35mmForma Contrast	Normal
T	Saturation	Normal
i i i	Saturation	Nikon
0	Quality	RAW
0	WhiteBalance	4000K
~	WhiteBalanceFineTune	00
_	SerialNumber	6005233
	ColorSpace	Adobe RGB
	Contrast	+8
	Brightness	-124
	Saturation	Normal
	HueAdjustment	-124
	ISO	6400
	BlackLevel	400 400 400 400
	Lens	24-120mm f/4
	ContrastCurve	(Binary data 578 bytes, use -b option to extract)
	FirmwareVersion	1.20c
	NoiseReduction	Off
	LensDataVersion	0204
	LensiDNumber	170
		Composite

CFAPattern

[Red, Green][Green, Blue]

	Metadata GoogleMap	
	Exif Xmp lptc I	Maker ALL Custom
	Workspace	and the second se
	And the second s	
	Tag name	Value
		System
	FileName	_DSC3916.NEF
	FileSize	22 MB
	FileType	NEF
	ractype	IFD0
	BitsPerSample	888
	Make	NIKON CORPORATION
	Model	NIKON D5
	SamplesPerPixel	3
	Artist	
	ReferenceBlackWhite	0 255 0 255 0 255
-	Copyright	
5	DateTimeOriginal	2018:03:10 21:48:04
-	TIFF-EPStandardID	1000
0		SubIFD1
-ocation 3 - Natural Ligh	BitsPerSample	14
_	SamplesPerPixel	1
_		XMP-xmp
μ Π	CreateDate	2018:03:10 21:48:04.39
2		ExifIFD
=	ExposureTime FNumber	1/6
1	ExposureProgram	4.0 Manual
T	ISO	6400
	SensitivityType	Recommended Exposure Index
7	RecommendedExposureIn	
_	DateTimeOriginal	2018:03:10 21:48:04
1	CreateDate	2018:03:10 21:48:04
	Flash	No Flash
က	FileSource	Digital Camera
	SceneType	Directly photographed
	CFAPattern	[Red, Green, Blue]
0	CustomRendered	Normal
.≃	ExposureMode	Manual
F	WhiteBalance	Manual
σ	FocalLengthIn35mmForma	
0	Contrast	Normal
õ	Saturation	Normal
9	00	Nikon RAW
	Quality WhiteBalance	4000K
	WhiteBalanceFineTune	4000K
	SerialNumber	6005233
	ColorSpace	Adobe RGB
	Contrast	+8
	Brightness	-124
	Saturation	Normal
	HueAdjustment	-124
	ISO	6400
	BlackLevel	400 400 400 400
	Lens	24-120mm f/4
	ContrastCurve	(Binary data 578 bytes, use -b option to extract)
	FirmwareVersion	1.20c
	NoiseReduction	Off
	LensDataVersion	0204
	LensiDNumber	170
		Composite
	CFAPattern	[Red, Green, Blue]

### Bath University : Location 4 Reference



### **Bath University Location 4**

#### **Floodlighting : ON**

#### **Floodlighting : OFF**





### Bath University : Location 4 Exif Data

<ul> <li>System</li></ul>	Tag name	Value
isision 2 MB and	-	
inicio <	FileName	
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strai direncella.vitement (bernecella.vitement) (bernecella.vi	Model	NIKON D5
birder-collabolitation         0.50.235 0.255           birder-collabolitation         Afex Harrows           birder-collabolitation         2018.035 0.248.31           birder-collabolitation	SamplesPerPixel	3
Appendix         Appendix           Copyright         Ale Ansam           2018.035.03.04.31         Ale Ansam           187.475.476.01         10.00.01           187.475.476.01         1           Ample Performed         2010.005.20.43.11.47           Ample Performed         4.0           ApposumeTime         1.66.00           Ample Performed         4.00           ApposumeTime         4.00	Artist	
Jachmen/spin4l         2010:05: 20:43:11           IFF-EPSanduroll         10:00           IFF-EPSanduroll         10:00           IFF-EPSanduroll         10:00           InstPerSample         14           InstPerSample         12           SpoureProgram         16           Number         16           Number         20           SpoureProgram         Manual           SpoureProgram         10           SpoureProgram         Digit/Cameal           Scattant         Digit/Cameal           Scattant         Digit/Cameal           Scattant         Normal           Scattant         4000           Scattant         4000           Scattant         4000           Scattant         41           Scattant         4000           Scattant         4000      Scattant         4000	ReferenceBlackWhite	0 255 0 255 0 255
IPF-EPSandurdD         000	Copyright	Alex Hansen
indersfample isidersfample isi	DateTimeOriginal	2018:03:05 20:48:31
BibPirSamplen         1           SimpleAPeRiot         1           CreatEdate         2           SipsuarEmergin         1           SipsuarEmergin         16           SipsuarEmergin         16           SipsuarEmergin         6400           SipsuarEmergin         6400           SipsuarEmergin         6400           SignarEmergin         6400           SignarEmergin         6400           SignarEmergin         6400           SignarEmergin         6400           SignarEmergin         6400           SignarEmergin         0500           SignarEmergin	TIFF-EPStandardID	1000
iample/PePlue) 1 → Marenesses isource 2016/03/52/04/31.47 isource 2016/03/52/04/31.47 isource 2016/03/52/04/31.47 isource 2016/03/52/04/31 isource 2016/04/31 isource		SubIFD1
	BitsPerSample	14
	SamplesPerPixel	1
Editfo           Non		XMP-xmp
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kacomandedEpocurle 640 ZahrimoChigni Instrum	SensitivityType	Recommended Exposure Index
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CucomRendered         Normal           SupportMode         Manual           CocalLengthisTismiFormi 24 mm         Manual           CocalLengthisTismiFormi 24 mm         Normal           Constant         Normal           Support         Admain           Support         RAW           MitheBalance         40000           MitheBalance         40000           MitheBalance         600533           Caloristat         40000           MitheBalance         600533           Caloristat         40           Caloristat         40           Support         124           Support         6400           Support         6801, 430, 400, 400, 400, 400, 400, 400, 400	CFAPattern	
bipouroMode Manual WhiteBulance Manual Contrast Nermal Contrast Nermal Contrast Nermal Contrast Nermal	CustomRendered	
Manual         Manual           Vinensia         A monal           Contrast         Normal           Contrast         Normal           Statuation         International           Valide         Advance           Quality         RUW           Monal         4000           Vihateliance         4000           Contrast         4000           Contrast         -142           Contrast         -142           Staturation         Normal           Staturation         Normal           Staturation         Normal           Staturation         4000           Risklevel         4000           Staturation         Normal           Risklevel         6400           Staturation         24           Risklevel         6800           Staturation         24           Romon / 4         2000           Romon / 4	ExposureMode	
incallengthin3femForm 24 m Contest Normal Statution Normal 	WhiteBalance	
Centrari Normal atturation Normal atturation Normal Datily RAW MikeBalance 4000 MikeBalance 4000 MikeBalance 6005233 CelorSpace Adobe RGB CelorSpace Adobe RGB Centrat -8 Staturation Normal turadjournet 124 Staturation Normal HackLevel 400.4000.400 MickLevel 400.4000.400 MickLevel 400.4000.400 CentratsCurve (Binary data 378 bytes, use -b timmare/bine/bine/bine/bine/bine/bine/bine/bin		
Normal           Jauliny         RAW           Audion         RAW           WhiteBlance         4000C           WhiteBlance         6005233           beiniNumber         605233           Conforact         -8           Conforact         -9           Statution         Normal           Huid-Systemet         -124           Solo         6400           BlackLevel         404040040           LinextGurung         24-120mmt/4           ContrastCurve         Binary data 578 bytes, use -b           ImmareVersion         1.26	Contrast	
	Saturation	
Judity         RAW           Judity         RAW           Metellances         4000C           Vhetellances         4000C           Unterfactor         0           Catorybace         600533           Catorybace         Adote RGB           Catorybace         -3           Kinghtness         -124           So         640           Istachguttmet         -134           So         640           Istackizet         -404           Vallackizet         -404           Catrastacurve         -124           Gentrastacurve         -124           Gentrastacurve         -124           Gentrastacurve         -124           Gentrastacurve         -124           Gentrastacurve         -124		
Mhardialusc         4000C           VhhateBulanceGhraTume         0           0         0         0           clearSpace         Adobe RGB           clearSpace         Adobe RGB           clearSpace         Adobe RGB           staturation         Normal           staturation         Normal           staturation         6400           SQ         6400           Grantatt         24-120mm fr/4           contrastLowne         124-120m fr/4           immareVersion         120c           stienReduction         120c	Quality	
WhiteBalanceFineTume         00           HeiniNumber         6005233           Colorbysce         Adobe RGB           Contrast         +8           Instrument         -124           Istance         -6400           Store         -6400           Istack-end         -6400           Istack-end         -000 400 400           Lexin         -24-120mm f/4           ContrastCrive         (Binary data 378 bytes, use -b- timmareVersion           LipeReduction         -120	WhiteBalance	
ViewBMmber         6005233           CelorSpace         Adobe RGB           CelorSpace         Adobe RGB           Centrat         +8           Ingintress         -124           Statutation         Normal           HutAdjustment         -124           SO         6400           BisckLevel         40:40:400-400           cent         22-120mm K/4           ContrastCurve         (Binary data 378 bytes, use -b)           ImmareVersion         1.20c		
Clorifysic         Adole RGB           Contrast         -8           highbres         -124           startation         Normal           SO         640           SO         640           Issisteret         -124           Issisteret         404           SO         640           Contrast         620           Issisteret         78           Issisteret         126	SerialNumber	
-8           Irightness         -124           sturation         Normal           Handjustnent         -124           50         6400           Black.Evel         40400.40400           Lens         24-120mm (4           ContrastCurve         (Binary data 578 bytes, use -b)           ImmareVersion         1.26           UseReduction         Off		
Hightness         -124           stantation         Normal           Haukdjustment         -124           S0         640           Kalkele         400-400-400-400           Kalkele         24120mm (4           Carsta         24120mm (4           CarstaCurve         (Binary data 7/8 bytes, use -b           ImmareVersion         1.20c	Contrast	
aturation         Normal           Head-djuttment         -124           Old         6400           Black Level         400.000.4000           envi         24-120mm f/4           ContrastCurve         (Binary data 378 bytes, use -b           immare/Evension         1.20c           UseReduction         Off		
+lueldjustment         -124           SD         6400           Iskkevel         400 400 400 400           ens         24-120mm f/4           ContrastCurve         (Binary data 578 bytes, use - binarware/Version           VeiseReduction         Off		
SO         6400           StackLevel         400 400 400 400           Lens         24-120mm f/4           ContrastCurve         (Binary data 578 bytes, use -b- immwareVersion           LoseReduction         Off		
BlackLevel         400 400 400 400           .ens         24-120mm f/4           ContrastCurve         (Binary data 578 bytes, use -b immwareVersion           NoiseReduction         Off	ISO	
Lens 24-120mm f/4 ContrastCurve (Binary data 578 bytes, use -b FirmwareVersion 1.20c NoiseReduction Off		
ContrastCurve (Binary data 578 bytes, use -b FirmwareVersion 1.20c NoiseReduction Off		
FirmwareVersion 1.20c NoiseReduction Off		
NoiseReduction Off		
	NoiseReduction	0304

170

····· Composite ·····

[Red,Green][Green,Blue]

LensIDNumber

CFAPattern

Metadata GoodeMap

Metadata GoogleMap	
Exif Xmp Iptc M	aker ALL Custom
Workspace	
	Value
	System
	DSC3921.NEF
	22 MB
	File
	NEF
	IFD0
BitsPerSample	888
Make	NIKON CORPORATION
Model	NIKON D5
SamplesPerPixel	3
Artist	
ReferenceBlackWhite	0 255 0 255 0 255
Copyright	
DateTimeOriginal	2018:03:10 21:49:56
TIFF-EPStandardID	1000
	SubIFD1
BitsPerSample	14
SamplesPerPixel	1
	XMP-xmp
	2018:03:10 21:49:56.62
	ExifIFD
	1/6
	4.0
	Manual
	5400
	Recommended Exposure Index
RecommendedExposureIn	
	2018:03:10 21:49:56
	2018:03:10 21:49:56
	No Flash
	Digital Camera
	Directly photographed
	[Red, Green][Green, Blue]
	Normal
	Manual
	Manual
FocalLengthIn35mmForma	
	Normal
	Normal
	Nikon
	RAW
	4000K
	0.0
	6005233 Adobe RGB
	+8
	-124
	-124 Normal
	-124
	-124 5400
	400 400 400 400
	400 400 400 400 24-120mm f/4
	(Binary data 578 bytes, use -b option to extract) 1.20c
	1.20c
	UTT
NoiseReduction	1000
NoiseReduction LensDataVersion	0204
NoiseReduction LensDataVersion LensIDNumber	0204 170 Composite

### Bath University : Location 5 Reference



### **Bath University Location 5**

#### **Floodlighting : ON**

#### **Floodlighting : OFF**





# Bath University : Location 5 Exif Data

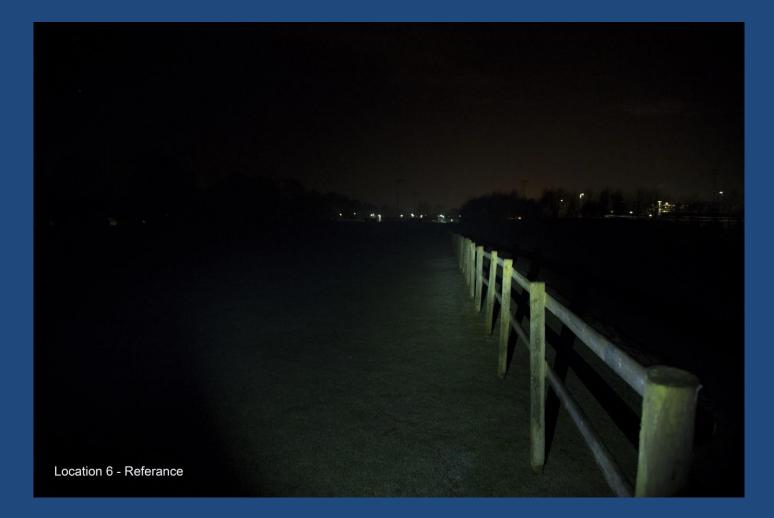
1	Exif Xmp Iptc I	
	Workspace	Maker ALL Custom
	Tag name	Value
	ragname	System
	FileName	DSC3872.NEF
	FileSize	25 MB
	1000000	File
	FileType	NEF
		IFD0
	BitsPerSample	888
	Make	NIKON CORPORATION
	Model	NIKON D5
	SamplesPerPixel	3
	Artist	
	ReferenceBlackWhite	0 255 0 255 0 255
ā	Copyright	Alex Hansen
O	DateTimeOriginal	2018:03:05 20:53:18
-	TIFF-EPStandardID	1000
S		SubIFD1
ا ت	BitsPerSample	14
C	SamplesPerPixel	1
-		XMP-xmp
0	CreateDate	2018:03:05 20:53:18.83
- T - L		ExifIFD
	ExposureTime	1/15
	FNumber	4.0
0	ExposureProgram ISO	Manual 6400
0	SensitivityType	Recommended Exposure Index
õ	RecommendedExposureIn	
$\underline{\neg}$	DateTimeOriginal	2018:03:05 20:53:18
<b>II</b>	CreateDate	2018:03:05 20:53:18
-	Flash	No Flash
- I - I	FileSource	Digital Camera
-ocation 5 - Flood Lights On	SceneType	Directly photographed
ß	CFAPattern	[Red, Green][Green, Blue]
	CustomRendered	Normal
	ExposureMode	Manual
~	WhiteBalance	Manual
0	FocalLengthIn35mmForma	24 mm
÷	Contrast	Normal
m	Saturation	Normal
- X		····· Nikon ·····
<u> </u>	Quality	RAW
0	WhiteBalance	4000K
	WhiteBalanceFineTune	00
_	SerialNumber	6005233
	ColorSpace	Adobe RGB +8
	Contrast Brightness	+8
	Saturation	- 124 Normal
	HueAdjustment	-124
	ISO	6400
	BlackLevel	400 400 400 400
	Lens	24-120mm f/4
	ContrastCurve	(Binary data 578 bytes, use -b option to extract)
	FirmwareVersion	1.20c
	NoiseReduction	Off
	LensDataVersion	0204
	LensIDNumber	170
		Composite

CFAPattern

[Red, Green][Green, Blue]

	Maker ALL Custom
Workspace	
Tag name	Value
	System
FileName	_DSC3926.NEF
FileSize	22 MB
	File
FileType	NEF
BitsPerSample	888
Make	NIKON CORPORATION
Model	NKON D5
	3
Artist	
ReferenceBlackWhite	0 255 0 255 0 255
Copyright	
DateTimeOriginal	2018:03:10 21:54:12
TIFF-EPStandardID	1000
	SubIFD1
BitsPerSample	14
SamplesPerPixel	1
Contribute	XMP-xmp
CreateDate	2018:03:10 21:54:12.32
ExposureTime	1/15
FNumber	40
ExposureProgram	Manual
ISO	6400
SensitivityType	Recommended Exposure Index
RecommendedExposureIn	6400
DateTimeOriginal	2018:03:10 21:54:12
CreateDate	2018:03:10 21:54:12
Flash	No Flash
FileSource	Digital Camera
SceneType	Directly photographed
CFAPattern	[Red, Green, Blue]
CustomRendered	Normal
ExposureMode	Manual
WhiteBalance FocalLengthIn35mmFormi	Manual 24 mm
Contrast	Normal
Saturation	Normal
	Nikon
Quality	RAW
WhiteBalance	4000K
WhiteBalanceFineTune	00
SerialNumber	6005233
ColorSpace	Adobe RGB
Contrast	+8
Brightness	-124
Saturation	Normal
HueAdjustment	-124
ISO	6400 400 400 400 400
BlackLevel	400 400 400 400 24-120mm f/4
ContrastCurve	(Binary data 578 bytes, use -b option to extract)
FirmwareVersion	1.20c
NoiseReduction	Off
LensDataVersion	0204
LensiDNumber	170
	Composite
CFAPattern	[Red, Green][Green, Blue]

### Bath University : Location 6 Reference



### **Bath University Location 6**

#### **Floodlighting : ON**

#### **Floodlighting : OFF**





### Bath University : Location 6 Exif Data

......

1	Metadata GoogleMap	
	a second s	Maker ALL Custom
	Workspace	
	Tag name	Value
	FileName	System _DSC3875.NEF
	FileSize	25 MB
	rilesize	File
	FileType	NEF
	rinerype	IFD0
	BitsPerSample	888
	Make	NIKON CORPORATION
	Model	NIKON D5
	SamplesPerPixel	3
	Artist	
5	ReferenceBlackWhite	0 255 0 255 0 255
O	Copyright	Alex Hansen
-	DateTimeOriginal	2018:03:05 20:54:44
S	TIFF-EPStandardID	1000
نټ	50 5 C 1	SubIFD1
C	BitsPerSample SamplesPerPixel	14
5	SamplesPerPixel	XMP-xmp
.0,	CreateDate	2018:03:05 20:54:44.27
	createbate	ExifIFD
_	ExposureTime	1/13
7	FNumber	4.0
<u>S</u>	ExposureProgram	Manual
0	ISO	6400
0	SensitivityType	Recommended Exposure Index
$\simeq$	RecommendedExposureIn	
11	DateTimeOriginal	2018:03:05 20:54:44
	CreateDate	2018:03:05 20:54:44
- L - L	Flash	No Flash
10	FileSource	Digital Camera
$\Theta$	SceneType CFAPattern	Directly photographed [Red,Green][Green,Blue]
ocation 6 - Flood Lights On	CustomRendered	Normal
	ExposureMode	Manual
0	WhiteBalance	Manual
· <u> </u>	FocalLengthin35mmForma	24 mm
Ħ	Contrast	Normal
(U)	Saturation	Normal
0		Nikon
0	Quality	RAW
4	WhiteBalance	4000K
	WhiteBalanceFineTune	00
	SerialNumber	6005233
	ColorSpace	Adobe RGB
	Contrast Brightness	+8
	Saturation	Normal
	HueAdjustment	-124
	ISO	6400
	BlackLevel	400 400 400 400
	Lens	24-120mm f/4
	ContrastCurve	(Binary data 578 bytes, use -b option to extract)
	FirmwareVersion	1.20c
	NoiseReduction	Off
	LensDataVersion	0204
	LensiDNumber	170
	1000	Composite
	CFAPattern	[Red,Green][Green,Blue]

Metz	adata GoogleMap	
E	ixif Xmp lptc I	Maker ALL Custom
	Workspace	
1.000		
Tag	name	Value
	Name	System
	Size	_DSC3930.NEF 22 MB
File	SIZE	File
File	Туре	NEF
1.04	Type	IFD0
Bits	PerSample	888
Mai		NIKON CORPORATION
Mo	del	NIKON D5
San	nplesPerPixel	3
Arti	ist	
Ref	erenceBlackWhite	0 255 0 255 0 255
Cop	pyright	
Dat	eTimeOriginal	2018:03:10 21:56:14
	F-EPStandardID	1000
·=:		SubIFD1
Bits	PerSample	14
San	nplesPerPixel	1
_		XMP-xmp
C Cre	ateDate	2018:03:10 21:56:14.79
cocation 6 - Natural Ligh	-	ExifIFD
	osureTime	1/13 4.0
-	umber osureProgram	4.0 Manual
		6400
	sitivityType	Recommended Exposure Index
Z Rec	ommendedExposureIn	
. Dat	eTimeOriginal	2018:03:10 21:56:14
Cre	ateDate	2018:03:10 21:56:14
(O Flas		No Flash
File	Source	Digital Camera
C Sce	neType	Directly photographed
CF/	APattern	[Red, Green, Blue]
O Cus	tomRendered	Normal
Exp	osureMode	Manual
T Wh	iteBalance	Manual
Foc	alLengthIn35mmForma	
Cor	ntrast	Normal
O Sati	uration	Normal
	-	Nikon RAW
	ality iteBalance	4000K
	iteBalanceFineTune	40006
	ialNumber	6005233
	orSpace	Adobe RGB
	ntrast	+8
	phtness	-124
	uration	Normal
	eAdjustment	-124
ISO		6400
Blac	ckLevel	400 400 400 400
Len		24-120mm f/4
	ntrastCurve	(Binary data 578 bytes, use -b option to extract)
	nwareVersion	1.20c
	iseReduction	Off
	sDataVersion	0204
Len	sIDNumber	170
		Composite
CF4	APattern	[Red, Green][Green, Blue]

### Bath University : Location 7 Reference



### **Bath University Location 7**

### Floodlighting : ON (Orion not visible)

Floodlighting : OFF (Orion visible centre left)



### Bath University : Location 7 Exif Data

	Metadata GoogleMap	
		Maker ALL Custom
	Workspace	
	Tag name	Value
		System
	FileName	_DSC3885.NEF
	FileSize	27 MB
		File
	FileType	NEF
		IFD0
	BitsPerSample	888
	Make	NIKON CORPORATION NIKON D5
	Model SamplesPerPixel	NIKON DS
	Artist	3
	ReferenceBlackWhite	0 255 0 255 0 255
~	Copyright	Alex Hansen
$\mathbf{O}$	DateTimeOriginal	2018:03:05 21:00:10
-	TIFF-EPStandardID	1000
S	and the second sec	SubIFD1
-ocation 7 - Flood Lights On	BitsPerSample	14
4	SamplesPerPixel	1
0		XMP-xmp
. <u> </u>	CreateDate	2018:03:05 21:00:10.52
1		ExifIFD
_	ExposureTime	0.6
0	FNumber	4.0
ĕ	ExposureProgram ISO	Manual 6400
Q	SensitivityType	Recommended Exposure Index
0	RecommendedExposurel	
	DateTimeOriginal	2018:03:05 21:00:10
ш	CreateDate	2018:03:05 21:00:10
	Flash	No Flash
	FileSource	Digital Camera
	SceneType	Directly photographed
-	CFAPattern	[Red,Green][Green,Blue]
	CustomRendered	Normal
5	ExposureMode	Manual
0	WhiteBalance FocalLengthIn35mmForm	
-	Contrast	Normal
τ <b>Π</b>	Saturation	Normal
23	Junior	Nikon
ğ	Quality	RAW
0	WhiteBalance	4000K
	WhiteBalanceFineTune	00
	SerialNumber	6005233
	ColorSpace	Adobe RGB
	Contrast	+8
	Brightness	-124
	Saturation	Normal
	HueAdjustment	-124 6400
	BlackLevel	400 400 400 400
	Lens	24-120mm f/4
	ContrastCurve	(Binary data 578 bytes, use -b option to extract)
	FirmwareVersion	1.20c
	NoiseReduction	Off
	LensDataVersion	0204
	LensIDNumber	170
		Composite
	CFAPattern	[Red, Green][Green, Blue]

#### Fieldame Fieldame Fieldame Fieldame Make Model Sampled Date Tim Fieldame Model Fieldame Fieldame

letadata

Workspace Tag name

Exif Xmp Iptc Maker ALL Custom

Value ---- System

DSC3936.NEF

FileSize	22 MB
	File
FileType	NEF
	IFD0
BitsPerSample	888
Make	NIKON CORPORATION
Model	NIKON D5
SamplesPerPixel	3
Artist	
ReferenceBlackWhite	0 255 0 255 0 255
Copyright	
DateTimeOriginal	2018:03:10 21:59:52
TIFF-EPStandardID	1000
	SubIFD1
BitsPerSample	14
SamplesPerPixel	1
	XMP-xmp
CreateDate	2018:03:10 21:59:52.50
createbate	ExifIFD
ExposureTime	0.6
FNumber	4.0
ExposureProgram	Manual
ExposureProgram	6400
SensitivityType	Recommended Exposure Index
RecommendedExposureIn	
DateTimeOriginal	2018:03:10 21:59:52
CreateDate	2018:03:10 21:59:52
Flash	No Flash
FileSource	Digital Camera
SceneType	Directly photographed
CFAPattern	[Red, Green][Green, Blue]
CustomRendered	Normal
ExposureMode	Manual
WhiteBalance	Manual
FocalLengthIn35mmForm	
Contrast	Normal
Saturation	Normal
	Nikon
Quality	RAW
WhiteBalance	4000K
WhiteBalanceFineTune	00
SerialNumber	6005233
ColorSpace	Adobe RGB
Contrast	+8
Brightness	-124
Saturation	Normal
HueAdjustment	-124
ISO	6400
BlackLevel	400 400 400 400
Lens	24-120mm f/4
ContrastCurve	(Binary data 578 bytes, use -b option to extract
FirmwareVersion	(binary data 576 bytes, use -b option to extrac 1.20c
NoiseReduction	Off
nonereduction	0204
Land Data Marchen	
LensDataVersion	
LensDataVersion LensIDNumber	170 Composite

### New floodlighting technology

- DTU Fotonik in Denmark has developed a new type of lens that focuses light just on the field
- To the left, the old halogen lights
- To the right, the new LED lights
- Perhaps difficult to appreciate the difference... Watch this space nonetheless!
- N.B. Lights can usually be easily directed using correct mounting angle – usually horizontal – and especially shielding



### Looking west from Claverton Village Reference



### Looking west from Claverton Village

Uni Floodlighting ON : cloud and mist spread light Uni Floodlighting OFF : cloud and mist spread light





### Bath University from Claverton Village Exif Data

#### ON

Exif Xmp Iptc	Maker ALL Custom	
Wedness	Phaneter and Pha	
Workspace		
Tag name	Value	
	System	
FileName	Claverton Village_Panorama4.jpg	
FileSize	4.4 MB	
	IFD0	
Model	NIKON D5	
Software	Adobe Photoshop CS6 (Windows)	
	ExifIFD	
ExposureTime	0.8	
FNumber	4.0	
ExposureProgram	Manual	
ISO	6400	
DateTimeOriginal	2018:04:10 20:00:13	
ExposureCompensation	0	
FocalLength	24.0 mm	
CustomRendered	Normal	
ExposureMode	Manual	
WhiteBalance	Manual	
Contrast	Normal	
Saturation	Normal	
Sharpness	Normal	
SerialNumber	6005233	
LensModel	24.0-120.0 mm f/4.0	
	XMP-photoshop	
ICCProfileName	Adobe RGB (1998)	
	XMP-crs	
RawFileName	Claverton Village 10th April 2018 24.dng	
ColorTemperature	3950	
	File	
YCbCrSubSampling	YCbCr4:4:4 (1 1)	

#### OFF

Exif Xmp Iptc	Maker ALL Custom	
Workspace		
Tag name	Value	
and Planter receive	System	
FileName	Claverton Village 15th April 2018 08 No Floodlights.jpg	
FileSize	27 MB	
	IFD0	
Model	NIKON D5	
Software	Adobe Photoshop CS6 (Windows)	
	ExifIFD	
ExposureTime	0.8	
FNumber	4.0	
ExposureProgram	Manual	
ISO	6400	
DateTimeOriginal	2018:04:15 20:32:32	
ExposureCompensation	0	
FocalLength	24.0 mm	
CustomRendered	Normal	
ExposureMode	Manual	
WhiteBalance	Manual	
Contrast	Normal	
Saturation	Normal	
Sharpness	Normal	
SerialNumber	6005233	
LensModel	24.0-120.0 mm f/4.0	
	XMP-photoshop	
ICCProfileName	Adobe RGB (1998)	
	XMP-crs	
RawFileName	Claverton Village 15th April 2018 08.dng	
ColorTemperature	3950	
	File	
YCbCrSubSampling	YCbCr4:4:4 (1 1)	

### Looking south over Bath from Alexandra Park

### Uni Floodlighting : ON Uni Floodlighting : OFF



### Bath University from Sally in the Wood Reference



### Looking west from Sally in the Wood

#### **Uni Floodlighting : ON**

#### **Uni Floodlighting : OFF**



### Bath University from Sally in the Wood Exif Data

#### ON

Exif Xmp Iptc	Maker ALL Custom	
Workspace		
Tag name	Value	
	System	
FileName	Sally In The Wood_Panorama2.jpg	
FileSize	2.6 MB	
	IFD0	
Model	NIKON D5	
Software	Adobe Photoshop CS6 (Windows)	
	ExifIFD	
ExposureTime	0.8	
FNumber	4.0	
ExposureProgram	Manual	
ISO	6400	
DateTimeOriginal	2018:04:10 20:30:40	
ExposureCompensation	0	
FocalLength	24.0 mm	
CustomRendered	Normal	
ExposureMode	Manual	
WhiteBalance	Manual	
Contrast	Normal	
Saturation	Normal	
Sharpness	Normal	
SerialNumber	6005233	
LensModel	24.0-120.0 mm f/4.0	
	XMP-photoshop	
ICCProfileName	Adobe RGB (1998)	
	XMP-crs	
RawFileName	Sally In The Woods 10th April 2018 27.dng	
ColorTemperature	3950	
	File	
YCbCrSubSampling	YCbCr4:4:4 (1 1)	

#### OFF

Exif	Xmp	Iptc	Maker ALL	Custom
Worksp	200			
Tag name		Value		
			System	
FileName			Sally in the Woods 15th April 2018 10- no lights.jpg	
FileSize		19 MB		
		IFD0		
Model		NIKON D5		
Software		Adobe Ph	otoshop CS6 (Windows)	
		ExifIFD		
ExposureT	ime		0.8	
FNumber		4.0	4.0	
ExposureProgram		Manual		
ISO		6400		
DateTimeOriginal		2018:04:15 21:03:12		
ExposureCompensation		0		
FocalLength		24.0 mm		
CustomRe	ndered		Normal	
ExposureN	lode		Manual	
WhiteBala	nce		Manual	
Contrast			Normal	
Saturation			Normal	
Sharpness			Normal	
SerialNum	ber		6005233	
LensMode	ł		24.0-120.0 mm f/4.0	
			XMP-	photoshop
ICCProfileName		Adobe RGB (1998)		
			XMP-	crs
RawFileName		Sally in the Woods 15th April 2018 10.dng		
ColorTemperature		3950		
		File	22	
YCbCrSub	Sampli	ng	YCbCr4:4:4	4 (1 1)