MOFFAT - DARK SKY COMMUNITY

EXTERNAL LIGHTING MASTER PLAN

Prepared for – Dumfries and Galloway Council

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Moffat - Dark Sky Community Status

External Lighting Master Plan

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5.1.1 Community Preamble

The concept of a Lighting Management Plan for Dumfries and Galloway is covered in a generic document with four sections and several Appendices as listed below. These sections are applicable standards to follow when applying to the IDA for Dark Sky Community Status within Dumfries and Galloway only.

- Section 1 Concept of light pollution and electrical energy reduction
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- Planning Application Guidance Note

Section 5 and 6 contains Community specific data for the town of Moffat within the boundary of Dumfries and Galloway Local Authority and as such is the forerunning template for other Communities to follow in time.

The declaration of intent to submit a Dark Sky Community application was submitted to the IDA in March 2013 and at a point in time when the "Dark Sky Community" lumen cap was 5,000 lumens as shown on the following page. The street lighting relighting program and submission of the "Community" application was achieved within the 6 month period thereafter.

In May 2013 the IDA published new additional requirements for their Dark Sky Places programme and due to a delay in appraising the first application Moffat Community was asked to consider how it could comply with the new requirements.

Section 7 and 8 was added in 2014 following further new additional requirements and comments from the IDA.

International Dark-Sky Association

The Nightscape Authority

Process

- Nomination by IDA member in good standing with supporting signatures of at least three additional IDA members, two from outside the community receiving the nomination, and supporting information to demonstrate that the minimum requirements have been met;
- Official supporting letter for nomination from elected representatives of the community, such as mayor and/or council of a municipality;
- Approval of nomination by the IDA Board of Directors by a majority vote.

Minimum Requirements

1. **A quality comprehensive lighting code**
   with the following minimum standards:
   - Full shielding or full cutoff standard for all lighting fixtures over 5000 lumens initial lamp output (or equivalent wattages);
   - Restrictions on total amount of unshielded lighting, such as a limit on lumens per acre or total site lumens in unshielded fixtures (or equivalent wattages);
   - A method to address overlighting, such as energy density caps, lumens/acre caps, or illuminance specifications.

2. **Community commitment to dark skies and quality lighting**
   as shown by:
   - City-owned lighting conforming with, or committed to conforming with, the lighting code (if the latter, a published plan with a timeline for completion in no more than 5 years);
   - Municipal support of dark skies and good lighting as indicated through city publications, flyers, PSAs, funding of lighting upgrades, etc. (just to name a few).

3. **Broad support for Dark Skies from a wide range of community organizations**
   such as:
   - Chamber of Commerce
   - Local electrical utility
   - Local IDA section
   - Lighting retailers
   - Others

4. **Success in light pollution control**
   at least one of the following conditions must be demonstrated:
   - Examples of a minimum of ten projects built under the lighting code, demonstrating effective application of the local lighting code;
   - Alternative demonstration of success in light pollution control, to be discussed with IDA for compliance.

Benefits

Designation as an Interntional Dark Sky Community entitles the community to display the IDSC logo (see below) in official community publications and promotions, and use of this logo by commercial or other groups within the community when identifying the community itself (i.e., an organization can say "located in Star City, an International Dark-Sky Community" or other words to the same effect). IDA will maintain a Web page identifying and describing all IDSCs. Designation as an International Dark-Sky Community is permanent, but subject to review and possible revocation upon request of any IDA Board member.

After the submission of this LMP the IDA set a revised lumen cap of 3,000 lumens and the text in Issue 4 and onwards has been subsequently amended to encompass this and additional new IDA requirements in any future lighting schemes.

5.1.2 Summary of Moffat Community Plan Statements

Plan Statement Number DG10.01 **All retrofit (pre September 2013) luminaires using any light source greater than 5,000 lumens must be installed as a horizontal fully cut-off (fully shielded) example.** (see section 5.5)
Plan Statement Number DG10.02 **For all retrofitted lighting using any light source less than 5,000 lumens but greater than 3,000 lumens must be installed with electronic dimming control to provide a light output of less than 3,000 lumens between the hours of midnight and 6.00 am.**
Plan Statement Number DG10.03 **All new or damage replacement lighting using any light source greater than 3,000 lumens must be designed and installed as a horizontal fully cut-off (fully shielded) example (no luminaire tilt).** (see section 5.5)
Plan Statement Number DG10.04 **All new street lighting (except main arterial routes) shall include light output electronic dimming controls between midnight and 6.00 am.** (see section 5.5)

5.2 Introduction to Moffat

Moffat is located some 60 miles south of Glasgow and adjacent to the main arterial north / south motorway which runs from Glasgow to London. Its origins began as a village with a notable location in the wool trade. In the 17th Century, however, it's mineral springs provided a health giving reason for wealthy Glasgow and Edinburgh businessmen to visit and develop it a Spa town. The sulphurous waters of Moffat Spa were believed to have healing properties and several springs were piped down from the hills into a specially built bath house in the town centre. This building is now the Town Hall but an old tariff board still exists showing a hot bath cost of 1/- (shilling) and a cold bath costing 6d (pence). The town still retains many of the hotels which developed from this old tourist attraction, one of which is recorded as the narrowest in the world being only 20 feet (6 metres) wide. At the other end of the scale the town also had a 300 bedroom Hydropathic Hotel, built in 1878 but sadly destroyed by fire in 1922. However, Georgian and Victorian architecture can be seen in most of the buildings in the town and this has resulted in issuing preservation orders to capture the remaining grandeur of the past.

In the 17th and 18th Century Moffat was a good day journey by horse and carriage from Glasgow or Edinburgh, but today its main influx of visitors only stop for refreshment between more distant sources of departure or arrival.

This application seeks to revive some of the lost residential tourist trade but more importantly re-introduce an interest in the heavenly beauty of the night sky which has been eroded by today's night time illumination for a 24 hour society.

5.3 Moffat Community

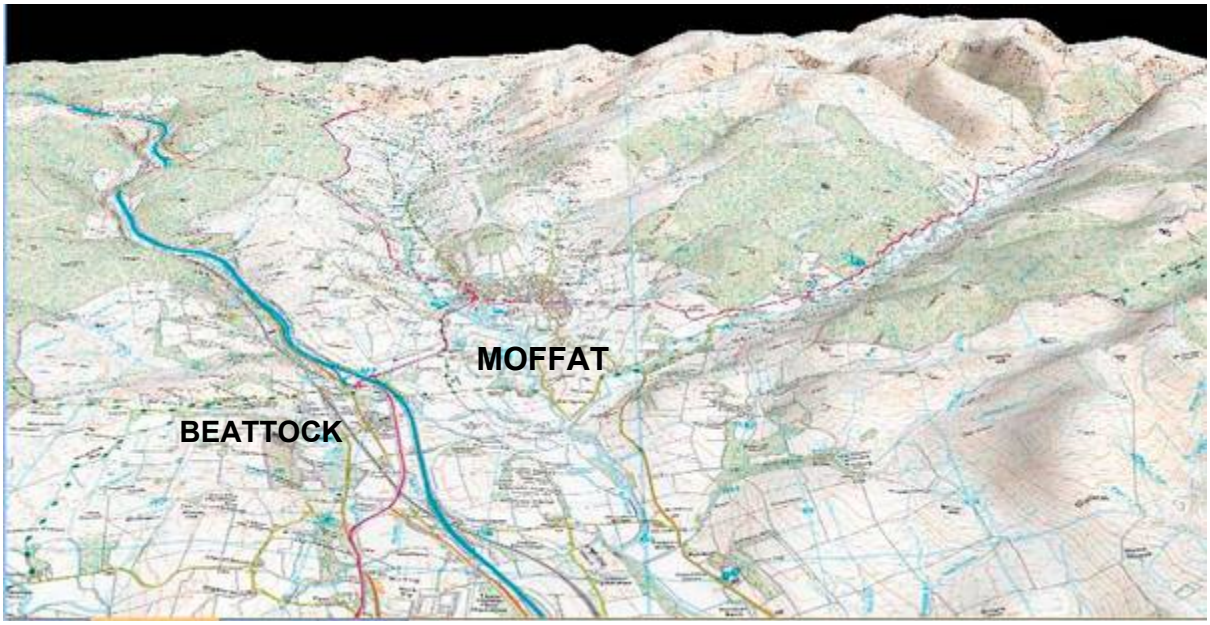

Figure 5.2 Topography in locality of Moffat and Beattock

Although the town of Moffat and the village of Beattock are separated by about 1½ miles they have their own separate Community Councils so that local issues can be addressed at source. Each Community Council has its own constitution and has an input to the Local Municipal Authority via the Elected Member allocated to each Community. Although the Local Municipal Authority has the legal powers to set standards and planning conditions, throughout the region, the Community Council have a channel to make input statements of interest, approval or rejection via the allocated Elected Member of the Local Authority cabinet who attends each Community Council meeting.

In the latter half of 2012 the Scottish Government offered The Authority an allocation of £240,000 to finance a large scale case study of energy reduction using the new technology of light emitting diodes (LED) as the primary light source in preference to high intensity discharge sources.

Since Moffat is the home of the author of six previously successful UK Lighting Master Plans for Dark Sky Status the concept of combining an electrical energy reduction with a Dark Sky Town application was presented to the Moffat Community Council meeting in November 2012. The concept was unanimously approved and an open letter from the Community Council invited the public to a lighting clinic in the Town Hall in February 2013.

In addition to the Scottish Government's small project grant for Moffat other Community Councils were advised, via their Elected Member meetings, of The Authority's £7.4M commitment to replace old street lighting units over the next 8 years as part of their carbon reduction commitment (see section 1.1.1) with Beattock receiving early attention due to its close proximity to Moffat.

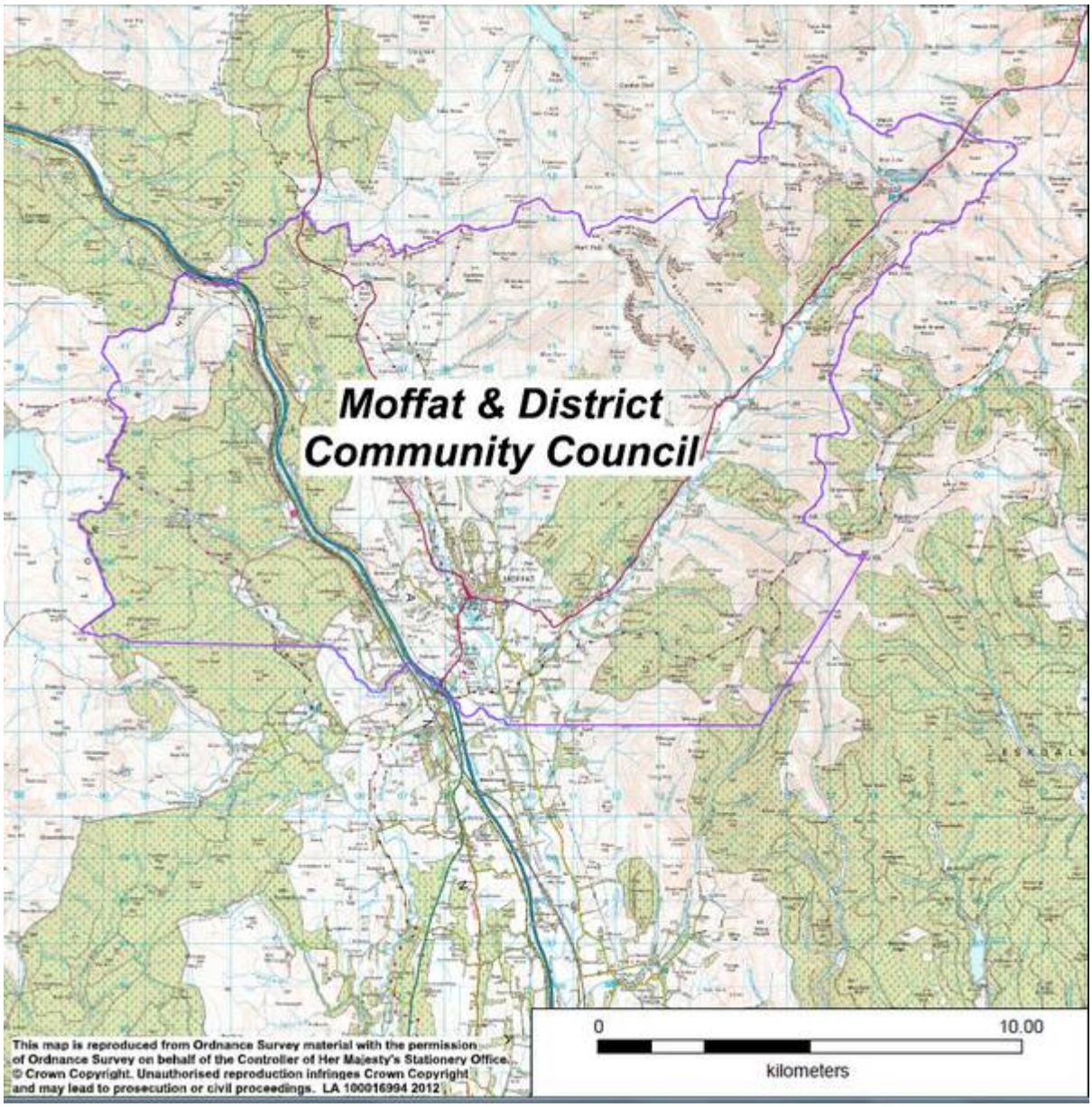

Figure 5.3 Moffat Community Council Boundary (purple line)

5.4 Pre-Application Public Lighting Infrastructure

With the major light source of low pressure sodium on all residential side streets and high pressure sodium on the main road network in Moffat it is clear to see in Figure 5.4 that the stray light effects of the old sodium infrastructure can illuminate chimney pots and tree tops. This sodium sky glow condition above Moffat will certainly not be acceptable as a Dark Sky Town without a complete overhaul or retrofitting with new luminaires providing zero intensity at and above the horizontal axis.

Figure 5.4 Example of upward light effects

Five typical areas in Moffat were chosen to model the illumination values of not only the upward light but also the effect on the public highway, the gardens behind and the house frontages. From these initial baseline calculations (see Table 5.1 for three of these locations) the existing side street luminaires emitted an Upward Light Ratio (ULR) of 7% and the lighting arrangement in the town centre emitted an average ULR of 15%. These values were clearly not in keeping with the objective of minimising stray upward light as set out by the IDA. In financial terms it is also a "luxury" no longer affordable.

Table 5.1 Table of Baseline Results

Model Test Area	St Ninians Road	Pringle Court	Town Centre
Highway Average	4.66 lux	9.75 lux	22.58 lux
Highway Minimum	1.27 lux	0.13 lux	2.03 lux
Overall Uniformity	0.27	0.01	0.09
House 1 Front Max.	5.8 lux	13 lux	
Garden 1 Max.	21 lux	12 lux	
House 2 Max	2.19 lux	19 lux	
Garden 2 Max	1.99 lux	14 lux	ULR WallPack 45%
ULR	7%		ULR average 15%
See Detail Calcs. in	Appendix 1	Appendix 2	Appendix 3

Table 5.2 Inventory of "pre-application" public street lighting

	Street Lighting Inventory			Pre Carbon Reduction / Dark Sky Conversion					
				35	45	55	70		
Road name	**Lamp**	**No.**	Profile	**SOX**	**CPO**	**SOX**	**SON**	**150SON**	**250SON**
Beechgrove	45 CPO	8	CTG		8				
Old Edinburgh Rd.	45 CPO	8	CTG		8				
Old Edinburgh Rd.	55 SOX	10	Refractor			10			
Hillside Terrace	55 SOX	4	Refractor			4			
Hydro Avenue	55 SOX	5	Refractor			5			
Edinburgh Road	150 SON	12	Bowl					12	
Northfield Park	70 SON	2	Refractor				2		
Mearsdale Drive	55 SOX	2	Refractor			2			
Mearsdale	55 SOX	5	Refractor			5			
Meadow Place	55 SOX	5	Refractor			5			
Reid Street	55 SOX	5	Refractor			5			
Gallows Well	55 SOX	1	Refractor			1			
The Whins	55 SOX	4	Refractor			4			
Harthope Place	55 SOX	5	Refractor			5			
Grange Place	55 SOX	2	Refractor			2			
Grange Road	55 SOX	7	Refractor			7			
Academy Road	150 SON	5	Bowl					5	
Moffat House Lane	55 SOX	1	Refractor			1			
High Street	250 SON	8	Bowl						8
	70 SON	9	Conical				9		
	150 SON	11	Bowl					11	
Westpark	No Public Lighting								
Eastgate	55 SOX	11	Refractor			11			
Dundanion Road	55 SOX	5	Refractor			5			
Old Well Road	55 SOX	6	Refractor			6			
	35 SOX	2	Refractor	2					
Hartfell Crescent	35 SOX	6	Refractor	6					
Buccleuch Place	35 SOX	2	Refractor	2					
Dixon Street	55 SOX	2	Refractor			2			
Causway Street	55 SOX	3	Refractor			3			
	70 SON	1	Refractor				1		
Well Street	55 SOX	4	Refractor			4			
Star Street	55 SOX	2	Refractor			2			
Mansfield Square	55 SOX	6	Refractor			6			
Mansfield Place	55 SOX	4	Refractor			4			
Annangate	55 SOX	2	Refractor			2			
Church Street	55 SOX	2	Refractor			2			
Annanside	55 SOX	6	Refractor			6			
Rae Street	55 SOX	3	Refractor			3			
Buccleuch Street	55 SOX	3	Refractor			3			
Church Place	55 SOX	1	Refractor			1			

Church Gate	150 SON	3	Bowl				3
The Glebe	55 SOX	2	Refractor		2		
Beatock Road	150 SON	31	Bowl				31
Station Park	70 SON	8	CTG			8	
	70 SON	3	Conical			3	
Golf Hill Drive	70 SON	5	F/Glass			5	
Holm Street	150 SON	4	Bowl				4
	70 SON	4	Refractor			4	
Ladyknowe	55 SOX	1	Refractor		1		
Osborne Row		0					
Burnside	70 SON	6	Bowl			6	
School Lane	55 SOX	2	Refractor		2		
Well Road	55 SOX	35	Refractor		35		
Hamilton Place	55 SOX	1	Refractor		1		
Greenwood Close	55 SOX	7	Refractor		7		
Millmeadows	55 SOX	2	Refractor		2		
Sidmount Avenue	55 SOX	5	Refractor		5		
Haywood Road	70 SON	7	F/Glass			7	
	70 SON	7	Heritage			7	
Cinder Path	35 SOX	1	Refractor	1			
Millgreen	55 SOX	6	Refractor		6		
Millburn	55 SOX	2	Refractor		2		
Park Circle	55 SOX	16	Refractor		16		
	150 SON	1	CTG				1
St. Ninians Road	55 SOX	23	Refractor		23		
Annandale Road	55 SOX	8	Refractor		8		
Annandale Place	55 SOX	5	Refractor		5		
Annandale Way	55 SOX	8	Refractor		8		
Warriston Road	55 SOX	7	Refractor		7		
Warriston Place	35/55 S	12	Refractor	1	12		
Fingland Court	55 SOX	10	Refractor		10		
Pringle Court	55 SOX	9	Refractor		9		
The Holm	150 SON	19	CTG				19
Duncan Drive	55 SOX	7	Refractor		7		
Jeff Brown Way	150 SON	10	CTG				10
Old Carlisle Road	55 SOX	23	Refractor		23		
Hartfell Homes	45 CPO	8	CTG	8			
Selkirk Road	55 SOX	12	Refractor		12		
Ettrick Drive	55 SOX	8	Refractor		8		
Frenchland Drive	55 SOX	6	Refractor		6		
Crosslaw Burn	55 SOX	8	Refractor		8		
	70 SON	4	Refractor			4	
Meadow Bank	55 SOX	1	Refractor		1		
	70 SON	7	Refractor			7	
Meadow Bank Rise	70 SON	3	Refractor			3	

Ballplay Road	55 SOX	24	Refractor		24
Holm Park	35/55 S	2	Refractor	2	2
Eastfield Rise	55 SOX	6	Refractor		6

SUMMARY of TABLE 5.2 TOTALS							
Pre Application light sources		**35 SOX**	**45 CPO**	**55 SOX**	**70 SON**	**150SON**	**250SON**
Pre Application individual Totals		**14**	**24**	**374**	**66**	**96**	**8**
Individual Circuit watts		45	52	74	80	169	276
Pre Application Load (watts)		630	1248	27676	5280	16224	2208
Connected Total Load	**53.27**	**kWatts**					

Figure 5.5 View of Moffat by night looking down from Golf Hill (Pre-Application)

5.5 Review of new light sources and luminaires

Table 5.3 (following) shows a series of calculated results on one test site obtained from various luminaires. Each luminaire was subjected to the same site parameters as that in the baseline (baseline results repeated in yellow highlight) with the exception that each new luninaire was tested at a 5 degree upward tilt, as in the baseline, and also at 0 degree upward tilt.

At the time of this LMP development the IDA recommend that in Dark Sky Parks or Reserves all luminaires using a light source greater than 1,000 lumens should be mounted "fully shielded"(see LMP section 1). In a Community setting, however, this cut-off limit was set at 5,000 lumens (pre September 2013). All the luminaires in Table 5.3, with the exception of the old baseline sodium source, use a light source less than 5,000 lumens but never the less provide a "flat glass" light distribution with very little visual distribution when elevated 5 degrees on existing brackets as in the case of a retrofit condition (ie luminaire change only on existing bracket).

Plan Statement Number DG10.01

For all retrofit (pre September 2013) luminaires using any light source greater than 5,000 lumens must be installed as a horizontal fully cut-off (fully shielded) example (no luminaire tilt).

Plan Statement Number DG10.02

For all retrofitted lighting using any light source less than 5,000 lumens but greater than 3,000 lumens must be installed with electronic dimming control to provide a light output of less than 3,000 lumens between the hours of midnight and 6.00am.

After the original submission of this LMP the IDA set a revised lumen cap of 3,000 lumens and the text in Issue 4 and onwards has been subsequently amended to encompass this new requirement in any future lighting schemes.

Plan Statement Number DG10.03

All new or damage replacement lighting using any light source greater than 3,000 lumens must be designed and installed as a horizontal fully cut-off (fully shielded) example (no luminaire tilt).

St Ninians Road test results with luminaires set on fixed geometry for spacing, height etc.	tilt 90	E average	E minimum	Uniformity	House 1 max.	House 1 min.	Garden 1 max.	Garden 1 min.	House 2 max.	House 2 min.	Garden 2 max.	Garden 2 min.	CCT degK	Upward Light	Installed I90	Installed I70	Total Lumens	Unit Watts
	deg	lux	lux		lux	lux	lux	lux	lux	lux	lux	lux			cd/1000 lm			
LP Sodium Baseline	**5**	**4.66**	**1.27**	**0.27**	**5.8**	**0.19**	**21**	**1.5**	**2.19**	**0.29**	**1.99**	**0.45**	**-18**	**7%**	**98**	**171**	**7800**	**74**
Mini Iridium CW	5	5.24	1.68	0.32	1.22	0	18	0.28	0.43	0.02	1.42	0.07		<1%	5.7	509	4524	41
Mini Iridium WW	0	3.87	0.87	0.22	1.17	0	15	0.42	0.11	0	0.59	0.03	3200	0	0	538	3480	41
Mini Iridium WW	5	4.04	1.3	0.32	0.86	0	14	0.21	0.33	0.01	1.1	0.06	3200	<1%	5.7	509	3480	41
Indal Luma R5	5	4.17	1.31	0.31	4	0	11	0.14	2.3	0.01	3.29	0.43		<1%	1.9	424	3600	
	0	4.37	1.25	0.29	3.6	0	12	0.24	0.92	0	1.98	0.19		0	0	450	3600	
Urbis Axia 32	5	5.78	1.48	0.26	1.79	0	12	0.4	1.18	0.01	2.2	0.33	4000	<1%	2.4	745	4160	38
	0	5.88	1.55	0.26	3.28	0	14	0.6	0.56	0	1.65	0.14	4000	0	0	825	4160	38
Holophane Mini Factor	5	5.05	1.2	0.24	1.15	0	15	0.2	0.91	0.16	2.03	0.2	4000	<1%	89	788	3260	
	0	4.89	0.78	0.16	1.37	0	15	0.26	0.69	0	1.25	0.17	4000	0	4.5	817	3260	
OrangeTEC Aria DKL	5	4.8	1.32	0.27	0.53	0	12	0.45	1.19	0.01	1.9	0.4	3500	<1%	3.8	544	3200	40
OrangeTEC Aria NL	5	4.9	1.27	0.26	1.78	0	15.3	0.64	0.31	0	1.29	0.03	3500	<1%	1.5	715	3200	40
OrangeTEC Tera 48	5	5.63	1.23	0.22	2.59	0	23	0.87	0.71	0.06	1.14	0.19	4800	<1%	9	394	4322	49
	0	5.27	0.94	0.18	3.28	0.03	25	1.05	0.5	0.03	0.75	0.11	4800	0	6.3	384	4322	49
OrangeTEC Tera 48 WW	5	4.45	1.07	0.24	2.26	0	18	0.5	0.6	0.06	15	0.19	3800	<1%	11.7	400	3367	51
Phil. Clearway BGP303D	5	5.29	1.13	0.21	1.23	0	18	0.09	0.29	0.01	0.64	0.07		<1%	1	645	3521	35
	0	6.92	0.68	0.1	2.06	0	27	0.17	0.29	0	0.5	0.06		0	0	629		
ITM Moonlight	5	4.39	0.95	0.22	0.62	0	11	0.4	1.34	0.02	1.5	0.26		<1%	4.9	375		56
WE-EF RFL534	5	5.29	0.62	0.12	0.85	0	9.5	0.05	0.51	0.04	0.88	0.14		<1%			4080	59
Phil. SGS451/45	5	4.5	0.5	0.11	3.8	0	15	0.08	0.68	0	0.87	0.14	3200				4300	52

Table 5.3 **Test Results from various new luminaires based on existing fixed geometry (not generic)**

Colour Key **Red** cells show unwanted condition }
Orange cells show borderline conditions }Based on a lighting objective of 4lux average & 0.8 lux minimum Ra>60 (table 5.6)
Green cells show good conditions }

Figure 5.6 Degree of "cut-off" from luminaire finally selected

The same calculation procedure as shown in Table 5.3 was also carried out in Pringle Court, The Holm and Beattock Road to ensure that the finally selected luminaires met all the requirements of the highway infrastructure at the same time as reducing upward light and intrusive light into bedroom windows.

Table 5.4		**POTENTIAL WATTAGE SAVING**					
Pre Application light sources		**35 SOX**	**45 CPO**	**55 SOX**	**70 SON**	**150 SON**	**250 SON**
Pre Application individual Totals		**14**	**24**	**374**	**66**	**96**	**8**
LED Retrofit Circuit watts		41	41	41	41	105	153*
New Application Load (watts)		574	984	15334	2706	10080	1224
New Connected Total Load	**30.9**	**kWatts**					* not LED

This equates to a potential saving of £9,722 in annual energy costs in addition to the long life maintenance savings using LED lighting.

The calculation process of the finally selected luminaire, the mini Iridium with 3,480 lumen warm white LED light source, for all the residential side streets in Moffat is shown in Appendix 4. Since the project was based on a retrofit principal the calculation allows for a 5 degree upward tilt. This tilt allowance was cleared with the IDA before progressing but without appreciating the power of the luminaire cut-off when installed in a light pollution free environment.

Following the completion of the retrofitting process only 3 complaints, out of a population of about 2,500, were voiced publically. One related to an area in which the new luminaires were installed on 5 metre columns and appeared to have zero tilt. Although the road and footpath appeared to be lit satisfactorily the house fronts appeared duller than others and a 5 degree upward tilt may have been more applicable to add a little more light particularly on the house fronts which are set back further than the general average of 15 metres.

The Park Circle is also another example of perceived reduction in stray illumination from the public street lighting system. This section of roadway has a circular arrangement of houses located on the inside of the circle. The lighting units are correctly located on the outside of the bend pointing in towards the houses. To the rear of the lighting units is an open park area.

From a pedestrian viewpoint in Park Circle illumination can be seen on garden paths and house fronts but from a distant view across the open park the houses are perceived to be in complete darkness. The position and colour of parked cars can be clearly seen but the dark brown roughcast finish on all the houses does not appear, from a distance, to reflect any light

Appendix 6 contains a vertical isolux distribution, from a Philips Mini Iridium luminaire tilted up 5 degrees, which shows that the computed prediction of 0.01 lux does not exist above the horizontal. (0.01 lux is about 1/10th of quarter moonlight)

As indicated in Section 1.1.1 the Authority is committed to adding dimming technology and all the lighting units in the residential streets dim by/to 1/3rd between mid-night and 6am. All the main roads in and out of Moffat and the town centre where CCTV cameras operate, however, maintain a constant light output throughout the night.

In addition to the public street lighting system dimming during the "quiet" hours one of the local fuel filling stations has introduced a 24 hour fuel availability facility and in doing so has changed their forecourt lighting to LED units with presence detection so that at unattended times the lighting operates at a reduced level and brightens to normal when fuel delivery is required.

Figure 5.7.1 Petrol Filling Station

Figure 5.7.2 LED Lighting Units located in Canopy

Figure 5.8 Example of new door lights installed during house renovation in Holm Street

5.6 Moffat Sky Quality (pre Retrofitting)

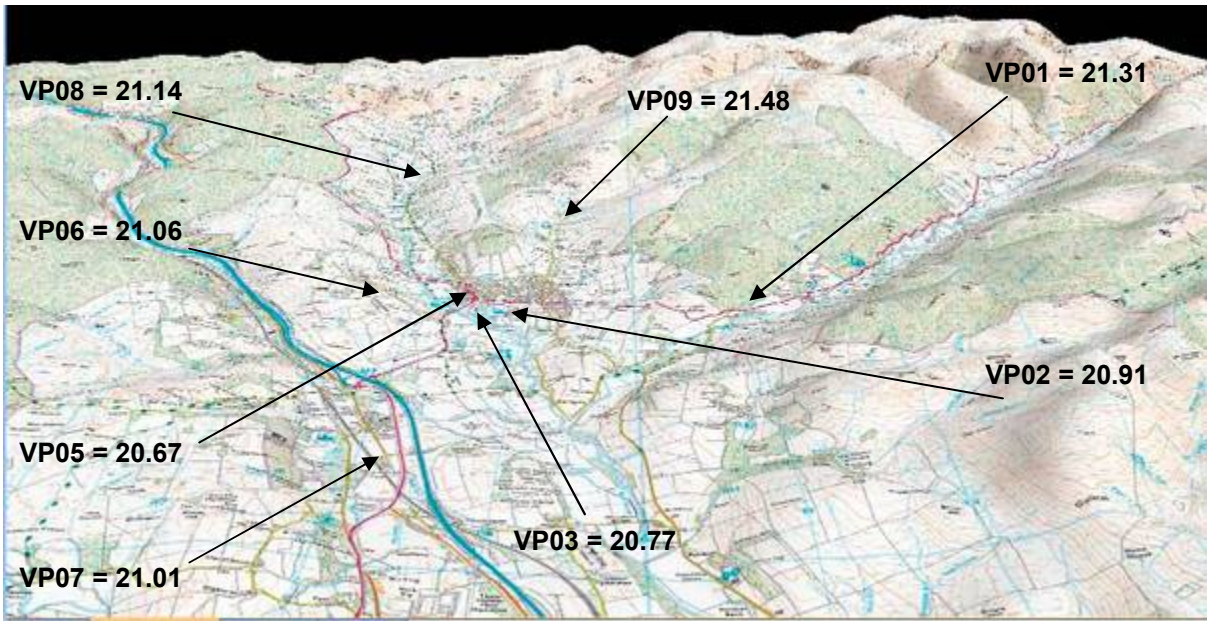

Figure 5.9 Viewing Points in and around Moffat with sky quality values pre-retrofitting

Figure 5.10 View South over Moffat from View Point 09 (Old Well Car Park, Well Road)

Ref.	**Pre Re-lighting Sky Quality Readings**							SQM		
No.	Location	Map Reference	Read 1	Read 2	Read 3	Read 4	Read 5	Average	Date	
VP01	**Hillend Turning Circle**	NY 10893 04682	20.78	20.88	21.3	21.46	21.43	21.17	01/02/2013	190m
21.31	Average of 4 averages		21.39	21.39	21.4	21.3	21.29	21.35	27/02/2013	good s
			21.41	21.37	21.33	21.27	21.23	21.32	29/03/2013	
			21.5	21.5	21.39	21.38	21.23	21.40	01/04/2013	
VP02	**Green Frog Car Park**	NT 08753 04648	21.45	21	21.11	21.12	21.14	21.16	06/02/2013	good a
20.91	Average of 4 averages		20.99	20.65	20.88	20.65	20.66	20.77	27/02/2013	school
			20.27	20.93	20.94	20.91	20.95	20.80	01/04/2013	patchy
			20.72	20.85	20.98	21	20.96	20.90	03/04/2013	
VP03	**EWM Car Park**	NT 08573 05019	20.73	20.05	20.72	21	21.07	20.71	04/02/2013	bulkhe
20.77	Average of 2 averages		21.01	20.56	20.87	20.9	20.83	20.83	03/04/2013	
VP04	**St Andrews Church C/Park**	NT 08415 05126	19.52	19.53	19.35	19	18.83	19.25	01/02/2013	poor al
19.68	Average of 3 averages		19.14	18.7	19.3	18.86	19.41	19.08	27/02/2013	hall in
			20.83	20.68	20.85	20.61	20.6	20.71	03/04/2013	
VP05	**MoffatCAN**	NT 08314 05131	19.54	20.79	20.48	20.62	20.51	20.39	27/02/2013	poor al
20.67	Average of 2 averages		21.03	21	20.95	20.92	20.9	20.96	03/04/2013	
VP06	**Golf Club Car Park**	NT 07679 04761	20.94	20.79	20.81	20.93	20.71	20.84	27/02/2013	good n
21.06	Average of 2 averages		21.18	21.47	21.21	21.21	21.32	21.28	03/04/2013	
VP07	**Beattock**	NT 08215 01674	20.9	21.01	20.91	20.99	20.92	20.95	27/02/2013	good a
21.01	Average of 4 averages		21.14	21.04	21.06	19.28	21.07	20.72	29/03/2013	
			20.8	20.83	20.79	20.63	20.75	20.76	01/04/2013	patchy
			21.59	21.73	21.6	21.58	21.55	21.61	03/04/2013	
VP08	**Annan Water Hall**	NT 07514 10325	21.51	20.26	21.27	20.12	21.04	20.84	01/02/2013	3miles
21.14	Average of 4 averages		20.78	20.76	20.77	20.76	20.73	20.76	27/02/2013	possib
			21.56	21.5	21.56	21.55	21.52	21.54	01/04/2013	
			21.6	21.38	21.4	21.34	21.34	21.41	03/04/2013	
VP09	**Well Road End Cattle Grid**	NT 09177 07213	21.43	21.48	21.49	21.41	21.42	21.45	06/02/2013	207m
21.48	Average of 3 averages		21.47	21.3	21.36	21.27	21.25	21.33	29/03/2013	
			21.73	21.66	21.67	21.63	21.64	21.67	01/04/2013	
VP10	**Rosemount Rear Terrace**	NT 09087 05509	21.22	21.2	21.04	21.02	21.04	21.10	01/02/2013	171m
	Reading Contrd Site		21.04	21.42	21.18	21.11	21.05	21.16	06/02/2013	
21.23	Average of 4 averages		21.22	21.41	21.25	21.32	21.23	21.29	01/04/2013	
			21.38	21.38	21.34	21.35	21.37	21.36	03/04/2013	

5.7 Future Design Objectives

Most of the street lighting in Moffat was installed to various British Standards which preceded the introduction of computerised lighting quality objectives and although it has been possible to predict baseline conditions on some of the test roads most of the results do not fall within current recommended design objectives. It was therefore deemed necessary to select a luminaire which provided similar quantity of light on the public highway.

Section 1.6 of the generic plan contains current advice on the reduced illuminance necessary when "white light" is used in comparison with the values needed when "yellow light" is used. This step reduction was not applied when the luminaire selection process was being considered since the ensuing reduction in light pollution was the main target and of unknown psychological acceptance in the community. A counterbalance was necessary and an equalling the illumination values could be used, if needed, as showing a betterment of public highway conditions.

There are plans however to develop a 200 house area in the near future and any new lighting will fall within the new British Standard recommendations as outlined in this section.

The Scotopic / Photopic (S/P) Ratio provided by Philips Lighting, the manufacturers of the new LED street lighting units are as follows in Table 5.5.

S/P Ratios for Philips LED Lanterns						
	CW (5700K typical)		NW (4000K typical)		WW (typical)	
Product	Current		Current		Current	
Range	Low	Nominal	Low	Nominal	Low	Nominal
Luma	1.73	1.96	1.37	1.61	1.18	1.43
Speedstar	2.00	2.01	1.60	1.61	?	?
Iridium 2	2.00	2.01	1.60	1.61	?	?
Stela	1.71	1.86	x	x	x	x
Stela 2	1.73	1.96	1.37	1.61	1.18	1.43
Clearway	x	x	1.61	1.63	x	x
Cit Soul	2.00	2.01	1.60	1.61	?	?
Milewide 2	2.00	2.01	1.60	1.61	?	?
Mini Iridium	2.04	2.09	1.68	1.75	1.35	1.37
Note: These values only apply to Philips products and should not be taken as generic values.						

Table 5.5 Manufacturer's published data

CPO - TW 45/140w = 1.15 Some existing 45w in Moffat. New 140w in town centre
Mini Iridium (Nominal) = 1.37 Majority of new side street lighting
Indal Luma = 1.43 Possible use in new development

Old side street lighting in Moffat equates to an average value of 5.0 lux and a minimum of 1 lux. This is equivalent to a classification in BS 13201:2003 as "S4" and may change to "P4 in a new revision. The old or new classification number or letter is not essential but the target design illuminance is essential and table 5.6 gives the correct design objectives for all new work with LED and CPO light sources in Moffat (assuming Philips equipment is maintained).

Table 5.6 Reduced Target Illuminance depending on S/P Ratio

Baseline Target Values in BS13201 $R_a < 60$		S/P = 1.15 Philips CPO-/728		S/P = 1.37 Philips Warm white		S/P = 1.43 Philips Warm white LED	
Eav (lux)	**Emin** (lux)	**Eav** (lux)	**Emin** (lux)	**Eav** (lux)	**Emin** (lux)	**Eav** (lux)	**Emin** (lux)
15.0	5.0	13.5	4.5	13.15	4.4	13.05	4.4
10.0	3.0	8.7	2.6	8.45	2.5	8.35	2.5
7.5	1.5	6.3	1.3	6.05	1.2	5.5	1.1
5.0	1.0	4.0	0.8	3.8	0.8	3.8	0.8
3.0	0.6	2.2	0.5	2.1	0.5	2.1	0.5
2.0	0.6	1.3	0.5	1.2	0.5	1.2	0.5

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All new street lighting (except main arterial routes) shall include light output dimming controls between midnight and 6.00 am.

6 Private Lighting Infrastructure

6.1 Lighting Audit - General

There are approximately 1000 properties in Moffat and a 25% property audit yielded a total of 913 lighting units. Included within this 25% survey were all commercial properties. From experience in other application surveys where lighting audit unit totals exceed the 1,000 mark the compliance rate tends to flatten regardless of further units being added to the list. In the case of Moffat the 25% mark was therefore deemed to represent the remainder of the town. The survey contains data from domestic and commercial properties and when analysed the combined compliance percentage equated to 85%. However, almost all of the domestic "non-compliant" floodlights are connected to presence detection devices and may not therefore be providing continuous illumination. Since this is the first application to the IDA from a town Community there are no other similar application statistics to compare figures. Table 6.1 contains data from other "community" applications but they are based on remote island life where lower lamp lumen limits (1,000 lumens) were used to determine the compliance percentage.

Table 6.1 Comparison of Percentage Compliant with other applications

Dark Sky Application	Quantity Surveyed	Quantity Compliant	Percentage Compliant
This Dark Sky Town Application	910	778	85%
Other "Community" applications			
Isle of Sark Dark Sky Island	582	436	75%
Isle of Coll Dark Sky Island	272	222	81%

Where new or replacement external lighting is required the most onerous light control conditions should be applied to maintain this condition. To assist in this objective, Section 2.4 contains recommendations on luminous intensity recommendations for new luminaires, with a lamp output greater than 3,000 lumens. For domestic style luminaires with no intensity data Section 3.3 contains a lumen cap evaluation method.

6.2 Recommended Changes

All existing lighting units within the application boundary, which utilise lamps greater than 3,000 lumens, should be brought into line with the light limitation recommendations in this ELMP within the timescale indicated in the guide to Table 6.2 and 6.3 following.

All existing street lighting within Moffat and Beattock was retrofitted with "flat glass" LED lighting units within three months of the project starting. In addition Dumfries and Galloway Council have retrofitted at least 10% of the street lighting stock in other parts of the County during the same time period. The remainder of the County is continuing be replaced through the Carbon Reduction programme as local authority improvement budgets permit. Each street will be equipped with new luminaires and bracket arms, where necessary, to meet zero light intensity limitation at 90^0 and above as recommended in this ELMP.

Change of property size

If a major addition occurs on a property, or street, lighting for the entire property, or street, shall comply with the recommendations in this LMP. The following are considered major additions:

- An addition of 50% or more in terms of residential houses, gross floor area, seating capacity, parking space or street length.

- Single or cumulative additions, modifications or replacement of 50% or more of installed exterior lighting luminaires.

Change of Property Ownership

If a property, with non-conforming lighting eg Old Moffat Academy, changes ownership or usage a new external lighting application must be made. The application must include a complete lighting inventory and site plan detailing all existing and proposed new exterior lighting. If the existing exterior lighting is no longer required all non-conforming lighting should be disconnected and removed.

Guide to Table 6.2 and 6.3 "Compliant" column

In both tables the last column contains 3 grades of luminaires namely:-

(1) Those which are "fully or part shielded" regardless of their lumen output (shown as 1 or more in clear cells) and are not at issue
(2) Those with lamps less than 5,000 lumens although they are not "fully shielded" (shown as 1 or more in clear cells) and are also not at issue.
and
(3) Those with lamps greater than 5,000 lumens and not "fully shielded" (shown as red cells) in the table.

As previously indicated priority should be given to modifying the over 5,000 lumen units, in the red cells, followed by those over 3,000 lumens during the next 5 years.

A Red bar across the complete record should be treated as top priority since some are technically incorrectly installed, regardless of the dark sky application, and some may have incorrect luminaires to suit the lighting application.

Cells with 1 or greater mean that these luminaires are fully compliant and are not at issue.

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
1.01	wellglass	3	house	0	no	3		8	switch	access	no	3	0
1.01	spotlight	2	house	5	yes	2		35	pir	corner	yes	2	0
1.02	bulkhead	3	house	90	no	1		18	switch	steps	part	3	0
1.02	bulkhead	1	house	0	no	1		18	switch	door	yes	1	0
1.02	wellglass	1		0	no	1		60	pir	corner	no	1	0
1.03	bulkhead	2	house	0	no	2		18	switch	door	yes	2	0
1.03	heritage	2		90	no	2		40	switch	path	no	2	0
1.03	Heritage	1		90	no	1		8	switch	door	part	1	0
1.04	floodlight	1	house	70	yes	1		150	pir	yard	no	1	0
1.04	spotlight	1		60	yes	1		4	pir	steps	no	1	0
1.04	heritage	1		40	no	1		40	switch	door	no	1	0
1.05	wellglass	2	house	0	no	2		8	switch	path	no	2	0
1.06	bulkhead	2	house	90	no	2		40	pir	path	no	2	0
1.06	floodlight	1	house	90	yes	1		150	pir	garden	no	1	0
1.06	bulkhead	1	outhouse	0	no	1		8	pir	door	no	1	0
1.07	bulkhead	2	house	0	no	2		60	switch	path	no	2	0
1.08	wellglass	1	house	0	no	1		60	switch	access	no	1	0
1.08	spotlight	2	house	60	yes	2		par 38	pir	drive	no	2	0
1.09	wellglass	2	house	0	no	2		60	switch	path	no	2	0
1.09	globe	2	house	180	no	2		8	switch	door	no	2	0
1.10	bulkhead	16	flats	90	no	6		18	switch	balcony	no	16	0
1.10	bulkhead	2	flats	90	no	2		18	pecu	door	no	2	0
1.10	black bollard	10	gardens	45	no	10		8	pecu	path	yes	10	0
1.10	globe	2	pole	90	no				pecu	car park	no		2
1.11	heritage	2	house	0	no	2		11	switch	door	no	2	0
1.11	heritage	3	pole	180	no	3		40	switch	drive	no	3	0
1.11	floodlight	1	garage	90	yes		1	300	pir	drive	no		1
1.12	bulkhead	1	house	0	no	1		8	switch	door	part	1	0
1.12	bulkhead	2	house	90	no	2		60	switch	path	no	2	0
1.13	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
1.14	wellglass	4	flats	0	no	4		60	switch	corner	no	4	0
1.14	floodlight	3	flats	80	yes		3	300	pir	stairs	no		3
1.14	bulkhead	1	outhouse	90	no	1		60	pir	access	part	1	0
1.15	258 lm	3	house	45	yes	3		3.6w	pir	access	part	3	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
	floodlight							led					
1.15	wellglass	1	house	0	no	1		60	switch	garden	no	1	0
1.15	heritage	1		180	no	1		40	switch	path	no	1	0
1.15	bulkhead	1	garage	90	no	1		8	pir	drive	no	1	0
1.15	floodlight	1	porch	80	yes		1	300	pir	path	part		1
1.16	contemporary	2	garage	90	no	2		13	pecu	access	part	2	0
1.16	heritage	8	house	90	no	8		8	pecu	path	no	8	0
1.17	globe	2	house	180	no	2		40	switch	access	part	2	0
1.18	bulkhead	3	house	90	no	3		60	pir	door	no	2	1
1.18	floodlight	1	garage	0	yes		1	300	pir	access	yes	1	0
1.18	floodlight	1	garage	20	yes	1		120	pir	drive	no	1	0
1.19	floodlight	2	house	90	yes		2	300	pir	yard	part		2
1.19	heritage	2	house	180	no	2		20	switck	door	no	2	0
1.19	bulkhead	4	barn	90	no	4		28	switch	access	no	4	0
1.19	floodlight	1	barn	80	yes		1	300	switch	yard	no		1
1.20	heritage	4	house	180	no	4		60	switch	access	part	4	0
1.20	bulkhead	1	garage	90	no	1		60	switch	yard	part	1	0
1.20	led	8	ground	90	no	8		3	solar	drive	part	8	0
1.20	heritage	2	gate	180	no	2		40	switch	access	no	2	0
1.21	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
1.21	wellglass	2	house	0	no	2		60	pir	corner	no	2	0
1.21	bulkhead	3	house	90	no	3		60	pir	path	no	3	0
Sub1	**92%**		**135**								**124**		
2.01	plaza	2	sports hall	90	no			50	switch	car park	no		2
2.01	street light	1		5	no		1	35	switch	corner	no	1	0
2.01	bulkhead	2		90	no	2		8	emerg.	exit	no	2	0
2.02	bulkhead	1	clubhouse	90	no	1		11	switch	door	part		1
2.03	floodlight	1	garage	70	yes		1	300	pir	drive	no		1
2.04	heritage	2	house					8	switch	door	part	2	0
2.05	bulkhead	1	house	90	no	1		60	pir	access	no	1	0
2.06	garage	2	garage	45	yes		2	150	pir	drive	no	2	0
2.06	heritage	4	house	180	no	4		11	switch	porch	part	4	0
2.07	bulkhead	1	house	90	no	1		16	switch	path	no	1	0
2.08	bulkhead	1	house	0	no	1		40	switch	door	part	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
2.08	ds floodlight	3	house	0	yes		3	150	pir	path	yes	3	0
2.09	wellglass	1	house	0	no	1		60	switch	path	no	1	0
2.10	no lights												0
2.11	bulkhead	2	house	90	no	2		16	switch	door	no	2	0
2.12	bulkhead	2	house	90	no	2		16	switch	door	no	2	0
2.13	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
2.13	bulkhead	2	house	90	no	2		11	pir	path	no	2	0
2.14	wellglass	2	house	90	no	2		60	switch	door	no	2	0
2.15	heritage	1	house	180	no	1		40	switch	door	no	1	0
2.15	bulkhead	1	house	90	no	1		16	pecu	drive	no	1	0
2.15	floodlight	1	hut	45	yes		1	200	pir	drive	part	1	0
2.16	wellglass	1	house	0	no	1		60	switch	path	no	1	0
2.17	floodlight	1	house	90	yes		1	150	pir	drive	no		1
2.17	floodlight	2	house	45	yes			300	pir	parking	no		2
2.19	heritage	2	house	180	no	1		60	switch	path	no	2	0
2.20	heritage	1	house	180	no		1	par 38	switch	path	no	1	0
2.21	bulkhead	1	house	90	no	1		60	pir	door	no	1	0
2.21	floodlight	1	house	0	yes		1	150	pir	door	yes	1	0
2.22	bulkhead	1	house	90	no	1		60	switch	access	no	1	0
2.23	wellglass	2	house	0	no	2		60	switch	access	no	2	0
2.24	wellglass	1	house	45	no	1		60	switch	corner	no	1	0
2.25	wellglass	1	house	0	no	1		60	switch	door	no	1	0
2.26	floodlight	1	house	45	yes		1	120	pir	access	no	1	0
2.27	wellglass	1	house	0	no	1		60	switch	door	no	1	0
2.27	bulkhead	1	porch	90	no	1		60	pir	door	no	1	0
2.28	heritage	1	house	180	no	1		40	switch	door	no	1	0
2.29	bulkhead	1	garage	90	no	1		60	pir	access	no	1	0
2.30	bulkhead	1	house	90	no	1		60	switch	door	no	1	0
2.31	bulkhead	13	sheltered	90	no	13		16	switch	door	no	13	0
2.31	floodlight	1	sheltered	20	yes		1	42	pir	path	no	1	0
2.32	globe	1	house	90	no	1		60	switch	door	no	1	0
2.33	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
2.34	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
2.35	bulkhead	1	house	90	no	1		40	switch	access	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
2.36	heritage	1	house	180	no	1		60	switch	door	no	1	0
2.37	bulkhead	1	house	90	no	1		13	switch	path	no	1	0
2.38	heritage	1	garage	180	no	1		40	switch	door	no	1	0
2.39	heritage	1	house	180	no	1		60	switch	rear	no	1	0
2.39	bulkhead	1	house	90	no	1		60	pir	rear	no	1	0
2.40	heritage	2	house	90	no	2		40	pir	door	no	2	0
2.40	bulkhead	3	house	90	no	3		16	switch	access	no	3	0
2.41	floodlight	1	hotel	0	no		1	150	pir	rear	yes	1	0
2.41	heritage	2	hotel	180	no	2		8	switch	door	no	2	0
2.42	heritage	1	house	180	no	1		60	switch	door	no	1	0
2.42	heritage	1	house	180	no	1		8	switch	access	no	1	0
2.42	bulkhead	1	house	0	no	1		60	switch	rear	no	1	0
Sub2	**92%**		**88**								**81**		
3.01	heritage	2	house	180	no	2		40	switch	door	no	2	0
3.02	bulkhead	1	house	90	no	1		8	switch	door	no	1	0
3.03	no light												0
3.04	heritage	1	house	0	no	1		8	switch	door	no	1	0
3.04	wellglass	1	house	0	no	1		60	switch	rear door	part	1	0
3.05	heritage	3	house	180	no	3		8	switch	door	no	3	0
3.06	no light												0
3.07	heritage	1	house	0	no	1		60	switch	door	no	1	0
3.08	heritage	1	house	180	no	1		40	switch	door	no	1	0
3.09	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
3.09	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
3.10	no light												0
3.11	heritage	1	house	0	no	1		8	switch	rear access	part	1	0
3.11	heritage	2	house	180	no	2		8	switch	door	no	2	0
3.12	heritage	2	house	0	no	2		8	switch				2
3.12	floodlight	2	house	0	yes		2	300	switch	patio	yes	2	0
3.12	bulkhead	1	house	90	no	1		60	switch	access	no	1	0
3.12	bulkhead	2	house	0	no	2		8	switch	lane	yes	2	0
3.13	floodlight	1	pole	45	yes			70	switch	car park	no		1
3.13	bulkhead	1	house	90	no	1		60	switch	car park	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
3.13	heritage	1	house	0	no	1		11	switch	door	no	1	0
3.13	asymetric	1	garden	180	yes			70	switch	wall wash	no		1
3.15	wellglass	1	house	0	no	1		60	switch	door	no	1	0
3.16	no light												0
3.17	heritage	1	house	180	no	1		20	switch	door	no	1	0
3.18	welglass	2	house	0	no	2		60	switch	corner	no	2	0
3.18	bulkhead	1	garage	90	no	1		60	switch	drive	no	1	0
3.19	floodlight	1	house	0	no		1	300	switch	door	yes	1	0
3.20	wellglass	1	house	0	no	1		8	switch	door	no	1	0
3.21	heritage	1	house	180	no	1		60	switch	door	no	1	0
3.21	street light	1	house	0	no			55 sox	switch	corner	no		1
3.21	wellglass	1	outhouse	0	no	1		60	switch	access	no	1	0
3.22	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
3.23	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
3.23	wellglass	2	house	0	no	2		8	pir	access	no	2	0
3.23	floodlight	1	outhouse	0	yes		2	150	pir	access	yes	1	0
3.24	wellglass	2	house	0	no	2		60	switch	access	no	2	0
Sub3	**88%**		**43**								**38**		**5**
4.01	heritage	1	house	0	no	1		11	switch	door	no	1	0
4.01	wellglass	1	house	0	no	1		8	switch	corner	no	1	0
4.01	bulkhead	2	house	90	no	2		60	pir	access	no	1	1
4.02	wellglass	1	house	0	no	1		60	switch	access	no	1	0
4.02	coach lamp	1	house	90	no	1		60	pir	door	no	1	0
4.03	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
4.04	heritage	1	house	0	no	1		20	switch	door	no	1	0
4.05	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
4.05	heritage	1	house	0	no	1		60	switch	door	no	1	0
4.06	heritage	1	house	180	no	1		60	switch	door	no	1	0
4.06	wellglass	1	house	0	no	1		60	switch	corrner	no	1	0
4.07	bulkhead	1	house	0	no	1		60	switch	door	part	1	0
4.08	bulkhead	1	house	0	no	1		60	switch	door	part	1	0
4.09	wellglass	1	house	0	no	1		8	switch	access	no	1	0
4.10	floodlight	1	house	0	yes			300	switch	drive	yes	1	0
4.10	wellglass	1	house	0	no	1		8	switch	door	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
4.11	floodlight	1	house	45	yes			300	pir	steps	no		1
4.11	wellglass	2	house	0	no	2		60	switch	access	no	2	0
4.12	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
4.13	heritage	1	house	180	no	1		60	pir	door	no	1	0
4.13	floodlight	1	house	45	yes			300	pir	drive	no		1
4.14	bulkhead	2	house	90	no	2		60	switch	access	no	2	0
4.14	floodlight	1	house	90	yes			300	pir	drive	no		1
4.15	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
4.16	par38	2	house	60	yes		2	150	pir	drive	no	2	0
4.16	globe	1	house	90	no	1		60	switch	path	no	1	0
4.17	bulkhead	2	Carehome	90	no		2	28	pecu	path	no	2	0
4.17	bulkhead	2		90	no	2		8	emerg.	door	no	2	0
4.18	par38	2	house	60	yes		2	150	pir	drive	no	2	0
4.18	wellglass	1	house	0	no	1		60	switch	door	no	1	0
4.19	bulkhead	1	house	0	no	1		8	switch	door	no	1	0
4.20	heritage	1	house	0	no	1		60	switch	door	no	1	0
4.21	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
4.22	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
4.22	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
4.23	bulkhead	1	house	90	no	1		60	switch	path	no	1	0
4.23	heritage	1	house	180	no	1		60	switch	door	no	1	0
4.24	wellglass	4	house	0	no	4		60	switch	path	no	4	0
4.25	pathlight	3	drive	0	no	3		60	switch	drive	yes	3	0
4.26	heritage	1	house	0	no	1		60	switch	access	no	1	0
4.27	wellglass	1	house	0	no	1		40	switch	path	no	1	0
4.27	floodlight	1	house	45	yes	1		300	pir	drive	no	0	1
4.27	contemporary	2	house	180	no	2		35	switch	door	no	2	0
4.28	heritage	1	post	180	no	1		60	switch	garden	no	1	0
4.28	wellglass	1	house	0	no	1		60	switch	garden	no	1	0
4.28	bulkhead	3	house	90	no	3		13	switch	path	no	3	0
4.29	wellglass	2	house	0	no	2		60	switch	path	no	2	0
4.29	bulkhead	1	garage	90	no	1		60	switch	drive	no	1	0
4.30	floodlight	1	house	0	no			300	switch	door	yes	1	0
4.30	bulkhead	1	house	90	no	1		60	pir	access	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
4.31	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
4.31	floodlight	1	house	45	yes			300	pir	access	no	0	1
4.32	no lights	0										0	0
4.33	no lights	0										0	0
4.35	heritage	4	house	180	no	4		60	switch	access	no	4	0
4.35	floodlight	1	house	45	yes			300	pir	access	no	0	1
4.36	wellglass	3	house	0	no	3		60	switch	access	no	3	0
4.36	bulkhead	2	house	90	no	2		13	switch	door	no	2	0
4.37	wellglass	2	house	0	no	2		60	switch	access	no	2	0
4.38	heritage	1	post	180	no	1		8	switch	drive	no	1	0
4.38	heritage	2	house	180	no	2		8	switch	access	no	2	0
4.39	heritage	7	house	180	no	7		40	switch	access	no	7	0
4.39	heritage	2	post	180	no	2		8	switch	drive	no	2	0
4.40	heritage	1	house	180	no	1		11	switch	stair	no	1	0
4.40	heritage	4	house	90	no	4		40	switch	access	no	4	0
4.41	spotlight	2	workshop	60	yes		2	150	pir	access	part	2	0
4.41	floodlight	1	workshop	45	yes		1	150	pir	steps	part	1	0
4.42	wellglass	1	house	0	no	1		60	switch	access	no	1	0
4.43	floodlight	1	house	45	yes			300	pir	access	no	0	1
4.43	heritage	1	post	180	no	1		60	switch	drive	no	1	0
Sub4	**92%**		**103**								**95**		
5.01	spotlight	4	house	20	yes	4		35	pir	garden	part	4	0
5.01	wellglass	2	house	0	no	2		60	switch	garden	no	2	0
5.02	heritage	2	flats	0	no			80	24hour	door	no		2
5.03	heritage	2	house	180	no	2		40	switch	door	no	2	0
5.04	floodlight	1	house	10	yes			300	pir	drive	part	1	0
5.04	heritage	1	house	180	no	1		60	pir	steps	no	1	0
5.05	heritage	1	house	180	no	1		60	pir	steps	no	1	0
5.06	bulkhead	1	house	0	no	1		60	switch	access	no	1	0
5.07	bulkhead	2	house	90	no	2		18	switch	access	no	2	0
5.07	contemporary	1	house	180	no	1		35	switch	door	no	1	0
5.08	spotlight	1	house	10	yes	1		60	pir	path	no	1	0
5.08	wellglass	1	house	0	no	1		8	switch	path	no	1	0
8.08	bulkhead	1	house	0	no	1		60	switch	path	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
5.09	wellglass	1	house	0	no	1		60	switch	corner	no	1	0
5.09	bulkhead	3	house	90	no	3		60	pir	rear	no	3	0
5.10	bollard	3	wall top	90	no	3		60	pir	drive	no	3	0
5.10	heritage	3	house	90	no	3		40	switch	path	no	3	0
5.11	heritage	5	house	90	no	5		8	switch	access	no	5	0
5.11	bulkhead	2	house	90	no	2		18	switch	path	no	2	0
5.12	bollard	2	gate post	90	no	2		60	switch	access	no	2	0
5.13	globe	2	gate post	90	no	2		60	switch	access	no	2	0
5.13	bulkhead	1	garage	90	no	1		60	pecu	door	no	1	0
5.13	bulkhead	1	house	0	no	1		60	pecu	door	part	1	0
5.14	heritage	1	house	180	no	1		60	switch	path	no	1	0
5.14	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
5.14	floodlight	1	outhouse	0	yes			300	pir	garden	yes	1	0
5.14	floodlight	1	house	45	yes			300	pir	path	part		1
5.14	bulkhead	1	house	90	no	1		60	switch	door	no	1	0
5.14	wellglass	1	house	0	no	1		20	switch	corner	no	1	0
5.15	floodlight	1	post	45	yes		1	150	pir	gate	part	1	0
5.15	heritage	2	post	180	no	2		11	switch	gate	no	2	0
5.15	wellglass	1	house	0	no	1		60	switch	door	no	1	0
5.15	floodlight	1	house	45	yes			300	pir	drive	no		1
5.16	heritage	1	house	180	no	1		60	switch	path	no	1	0
5.17	7 bulkhead		old school	90	no			mix 8/13	switch	emerg.	no		0
5.17	1 floodlight		old school	0	no			300	pir	path	yes		0
5.17	5 wallpack		old school	90	no			70	switch	play area	no		0
5.17	5 sonpack		old school	45	yes			250	switch	play area	no		0
5.17	1 bysymmetric		old school	0	yes			70	switch	play area	yes		0
5.17	4 caribe		old school	90	no			70	switch	play area	no		0
5.18	bulkhead	4	flats	90	no	4		16	switch	door	no	4	0
5.19	wellglass	2	house	0	no	2		60	switch	door	no	2	0
5.19	heritage	1	house	180	no	1		60	switch	door	no	1	0
5.20	bulkhead	1	house	0	no	1		60	switch	path	no	1	0
5.21	bulkhead	2	house	90	no	2		60	switch	door	no	2	0
5.21	wellglass	1	house	0	no	1		60	switch	corner	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
5.22	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
5.23	bulkhead	1	house	0	no	1		16	switch	path	no	1	0
5.24	heritage	2	house	180	no	2		11	switch	front	no	2	0
5.25	heritage	1	house	0	no	1		40	switch	door	no	1	0
5.26	bulkhead	1	house	90	no	1		13	switch	door	no	1	0
5.26	floodlight	1	house	0	yes			300	pir	steps	yes	1	0
5.27	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
5.28	heritage	2	house	180	no	2		40	switch	door	no	2	0
5.29	heritage	1	house	180	no	1		60	switch	door	no	1	0
5.30	heritage	2	house	180	no	2		8	switch	door	no	2	0
Sub5	**95%**		**79**		**empty building not included**						**75**		
6.01	no lights												0
6.05	no lights												0
6.06	bulkhead	14	house	90	no	14		16	switch	sheltered	no	14	0
6.06	floodlight	1	house	45			1	42	pir	sheltered	no	1	0
6.19	globe	1	house	0	no	1		60	switch	door	no	1	0
6.20	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
6.21	no lights												0
6.22	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
6.23	bulkhead	1	house	90	no	1		13	switch	path	no	1	0
6.24	heritage	1	house	180	no	1		8	switch	path	no	1	0
6.25	bulkhead	1	house	90	no	1		13	switch	door	no	1	0
6.26	heritage	1	garage	180	no	1		20	switch	door	no	1	0
6.27	no lights												0
6.28	heritage	1	house	180	no	1		60	switch	yard	no	1	0
6.28	bulkhead	1	house	90	no	1		60	pir	yard	no	1	0
6.29	bulkhead	1	house	90	no	1		13	switch	yard	no	1	0
6.29	bulkhead	1	house	90	no	1		18	switch	access	no	1	0
6.30	heritage	2	house	180	no	2		40	pir	path	no	2	0
6.31	floodlight	1	hotel	0	yes			300	pir	yard	yes	1	0
6.31	heritage	3	hotel	180	no	3		8	switch	door	no	3	0
6.32	heritage	1	house	180	no	1		8	switch	path	no	1	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
6.32	bulkhead	2	house	90	no	2		60	switch	path	no	2	0
6.33	contemporary	1	house	180	no	1		35	switch	table	no	1	0
6.34	bulkhead	2	house	90	no	2		60	switch	door	part	2	0
6.35	bulkhead	1	house	0	no	1		60	switch	door	part	1	0
6.36	heritage	1	house	0	no	1		20	switch	door	no	1	0
6.37	no lights												0
6.38	bulkhead	1	house	90	no	1		60	switch	garden	no	1	0
6.39	floodlight	1	house	0	yes			300	pir	garden	yes	1	0
6.40	bulkhead	1	house	0	no	1		13	switch	door	no	1	0
6.41	heritage	1	house	0	no	1		40	switch	door	no	1	0
6.42	bi-symmetric	4	office	45	yes			70	pecu	yard	part		4
6.43	floodlight	1	house	90	yes			300	pir	garden	no		1
6.44	bulkhead	1	house	90	no	1		60	switch	garden	no	1	0
6.45	heritage	3	house	180	no	3		60	switch	front	no	3	0
6.46	heritage	1	post	180	no	1		40	switch	garden	no	1	0
6.47	heritage	1	house	180	no	1		60	switch	door	no	1	0
6.48	bulkhead	1	house	90	no	1		60	switch	door	no	1	0
6.49	bulkhead	1	house	90	no	1		60	switch	door	no	1	0
6.50	wellglass	1	surgery	0	no	1		60	switch	corner	no	1	0
6.51	heritage	1	house	180	no	1		11	switch	door	no	1	0
6.51	floodlight	1	house	10	yes			300	pir	drive	no		1
6.51	bulkhead	1	house	90	no	1		13	switch	path	part	1	0
6.52	heritage	3	house	0	no	3		60	switch	path	no	3	0
6.52	bulkhead	1	house	0	no	1		60	switch	path	no	1	0
6.52	wellglass	1	garage	0	no	1		60	switch	drive	no	1	0
6.53	wellglass	3	house	0	no	3		60	switch	corner	no	3	0
6.53	heritage	2	pole	180	no	2		20	switch	garden	no	2	0
6.53	floodlight	1	house	0	yes			300	pir	drive	yes	1	0
6.54	heritage	3	house	180	no	3		60	switch	path	no	3	0
6.55	bulkhead	1	house	0	no	1		60	switch	door	no	1	0
6.55	heritage	3	house	180	no	3		20	switch	path	no	3	0

Table 6.3 Domestic Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
6.55	bulkhead	1	garage	90	no	1		60	switch	path	no	1	0
6.56	heritage	4	house	180	no	4		8	switch	path	no	4	0
6.56	bulkhead	2	house	0	no	2		60	switch	door	no	2	0
6.56	floodlight	1	house	0	yes			300	pir	drive	yes	1	0
Sub 6	**93%**		**87**								**81**		
Part Domestic Totals		**535**			**84%**	**448**	**39**				**92%**	**494**	**46**

Table 6.3 Domestic Property Audit Summary

Total Domestic Units Surveyed =	**535**		**2,500 lumens Compliance =**	**84%**				**5,000 lumens Compliance =**	**92%**	

Table 6.4 Non-Domestic & Commercial Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
7.01	Bollard	8	post	90	no	8		11	pecu	drive	no	8	0
7.01	road light	6	column	5	no		6	55SOX	pecu	car park	no		6
7.01	wallpack	8	hospital	90	no		8	50son	pecu	path	no		8
7.01	asymmetric	1	hospital	45	yes			400	switch	steps	no		1
7.02	bi-symmetric	10	pole	70	yes			150mbi	time limit	training	no		10
7.02	bulkhead	4	clubhouse	90&0	no	4		16	switch	access	part	4	0
7.03	bulkhead	2	office	90	no	2		8	switch	access	no	2	0
7.03	floodlight	1	office	45	yes		1	300	switch	yard	no		1
7.04	bulkhead	7	office	90	no	7		28	pecu	access	no	7	0
7.04	bulkhead	1	office	90	no	1		8	switch	door	no	1	0
7.04	asymmetric	1	pole	0	yes			250	8pm limit	training	yes	1	0
7.04	asymmetric	2	pole	45	yes			250	8pm limit	training	no		2
7.05	floodlight	1	cafe	0	no		1	120	switch	yard	yes	1	0
7.05	led floodlight	2	cafe	45	yes	2			pir	yard	no	2	0
7.05	bulkhead	2	cafe	90	no	2		8	switch	access	no	2	0
7.05	floodlight	1	cabin	0	yes			300	switch	pre 6pm	yes	1	0
7.06	bulkhead	6	toilet	90&0	no	6		11	pecu	access	part	6	0
7.06	power point	21	post	90	no	21		8	pecu	marker	no	21	0
7.06	bi-symmetric	2	post	0	yes			150	switch	storage	yes	2	0
7.06	new proposal	2	post	0	yes			150	switch	entry	yes	2	0
7.07	bulkhead	16	mill	90	no	16		16	pecu	access	no	16	0
7.07	floodlight	2	mill	0	yes			150	pir	door	yes	2	0
7.07	bysymmetric	1	mill	90	yes			400	switch	coach park	no		1
7.07	bi-symmetric	1	mill	90	yes			70	switch	coach park	no		1
7.07	asymmetric	1	mill	90	yes			150	switch	coach park	no		1
7.08	bi-symmetric	4	post	80	yes			250	switch	yard	no		4
7.08	bulkhead	14	shop	0	no	14		8	pecu	path	no	14	0
7.08	asymmetric	1	shop	0	yes			150	pecu	atm	yes	1	0
7.08	downlight	4	shop	0	no				pecu	atm	yes	4	0
7.08	street light	10	post	0	no			80	10pm off	drive	no		10
7.08	bi-symmetric	1	shop	80	yes			250	switch	yard	part		1

Table 6.4 Non-Domestic & Commercial Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
7.09	3 asymmetric		old hotel	45	yes			250	dead	parking	no		
7.10	bulkhead	2	office	90	no	2		16	pecu	access	no	2	0
7.10	bi-symmetric	1	office	90	yes			70	switch	car wash	no		1
7.10	downlight	11	canopy	0	no			Multiled	dimmable	petrol pump	yes	11	0
7.11	bi-symmetric	4	pub	90	yes			70	switch	tables	part		4
7.11	heritage	10	pub	180	no	10		11/24	switch	footpath	part	10	0
7.11	sign light	12	pub	0	no	12		13	switch	wall wash	yes	12	0
7.12	street light	1	garage	15	no		1	35	switch	yard	part	1	0
7.12	floodlight	2	garage	45	yes		2	300	pir	yard	part	2	0
7.13	bulkhead	5	restaurant	90	no	5		8	pecu	path	part	5	0
7.13	sign light	2	restaurant	0	no	2		24	pecu	front wash	yes	2	0
7.14	floodlight	1	garage	20	yes			300	pir	yard	part	1	0
7.15	floodlight	1	centre	10	yes		1	100	pir	yard	part	1	0
7.15	bulkhead	2	centre	90	no	2		8	switch	yard	no	2	0
7.15	globe	1	centre	0	no	1		60	switch	door	no	1	0
7.15	heritage	2	centre	180	no	2		24	switch	door	no	2	0
7.16	heritage	4	hotel	180	no	4		8	switch	door	no	4	0
7.17	bulkhead	1	bandb	90	no	1		13	switch	door	part	1	0
7.18	floodlight	2	shop	0	no		2	120	switch	pavement	yes	2	0
7.19	heritage	2	bandb	180	no	2		11	switch	door	no	2	0
7.20	bulkhead	1	shop	90	no	1		12	switch	door	no	1	0
7.20	sign light	2	shop	0	no	2		8	switch	sign	yes	2	0
7.21	heritage	2	hotel	180	no	2		24	switch	door	no	2	0
7.21	bi-symmetric	2	hotel	90	yes			70	switch	wall wash	part	2	0
7.21	asymmetric	1	ground	180	yes			250	switch	wall wash	no		1
7.21	heritage	1	chalet	180	no	1		8	switch	door	part	1	0
7.21	floodlight	1	hotel	45	yes		1	300	switch	courtyard	part	1	0
7.21	bulkhead	2	hotel	90	no	2		60	switch	courtyard	part	2	0
7.22	downlight	11	canopy	0	no			250	switch	pumps	yes	11	0
7.22	bi-symmetric	2	pole	0/30	yes			250	switch	car wash	no		2
7.22	bulkhead	1	office	90	no	1		8	switch	door	no	1	0

Table 6.4 Non-Domestic & Commercial Property Lighting Audit

Ref No	Type of Fitting	Qty.	Building Type	Elevation	Adaptable	<2500	2500-5000	wattage	Switching	Application	Fully Shielded	Compliant	Non-Cply.
7.23	heritage	1	restaurant	0	no	1		11	switch	door	no	1	0
7.24	bi-symmetric	2	hotel	45	yes			250	12 pm off	car park	no		2
7.24	bi-symmetric	1	hotel	90	yes			250	2pm off	wall wash	part		1
7.25	wallglass	2	shop	0	no	2		60	switch	path	no	2	0
7.25	bi-symmetric	2	shop	45	yes		2	80	6pm off	plant stall	no	2	0
7.26	heritage	5	hotel	0	no	5		11	switch	pavement	no	5	0
7.26	heritage	3	hotel	180	no	3		40	switch	front	no	3	0
7.26	signlight	2	hotel	0	no	2		60	switch	sign	yes	2	0
7.26	bulkhead	3	hotel	90	no	3		8	switch	doors	part	3	0
7.26	bi-symmetric	3	hotel	145	yes			70	switch	wall wash	part		3
7.26	floodlight	2	hotel	10	yes			300	pir	courtyard	part	2	0
7.27	signlight	3	cafe	0	no	3		60	switch	sign	yes	3	0
7.28	heritge	4	hotel	180	no	4		11	switch	doors	no	4	0
7.28	heritage	4	post	180	no	4		20	switch	courtyard	no	4	0
7.29	bulkhead	4	health	90	no	4		8	switch	courtyard	no	4	0
7.30	floodlight	2	surgery	45	yes			300	pir	courtyard	part		2
7.30	bulkhead	5	shops	90	no	5		60	switch	rear access	part	5	0
7.31	streetlight	24	pole	0	no			150	t/switch	c.park/f.path	part		24
7.31	bulkhead	18	school	90	no	18		8	emerg.	fire exit	no	18	0
7.31	asymmetric	14	school	0	yes			150	t/switch	area	yes	14	0
7.31	asymmetric	7	school	45	yes			150	t/switch	quadrangle	part	0	7
7.31	asymmetric	8	pole	0	yes			400	switch	sport	yes	8	0
7.31	asymmetric	1	pole	0	yes			150	switch	exit	yes	1	0
7.31	denver/wall	12	school	90	no		12	42	t/switch	access	no	12	0
7.31	denver/below	10	school	90	no		10	42	t/switch	access	part	10	0
		430				**204**	**50**		All 7.31 11.00pm off			**305**	
				Compliant								**71%**	
	Domestic Units		**535**	**494**	**92%**								
	Commercial Units		**430**	**305**	**71%**								
	Total		**910**	**799**	**87%**								

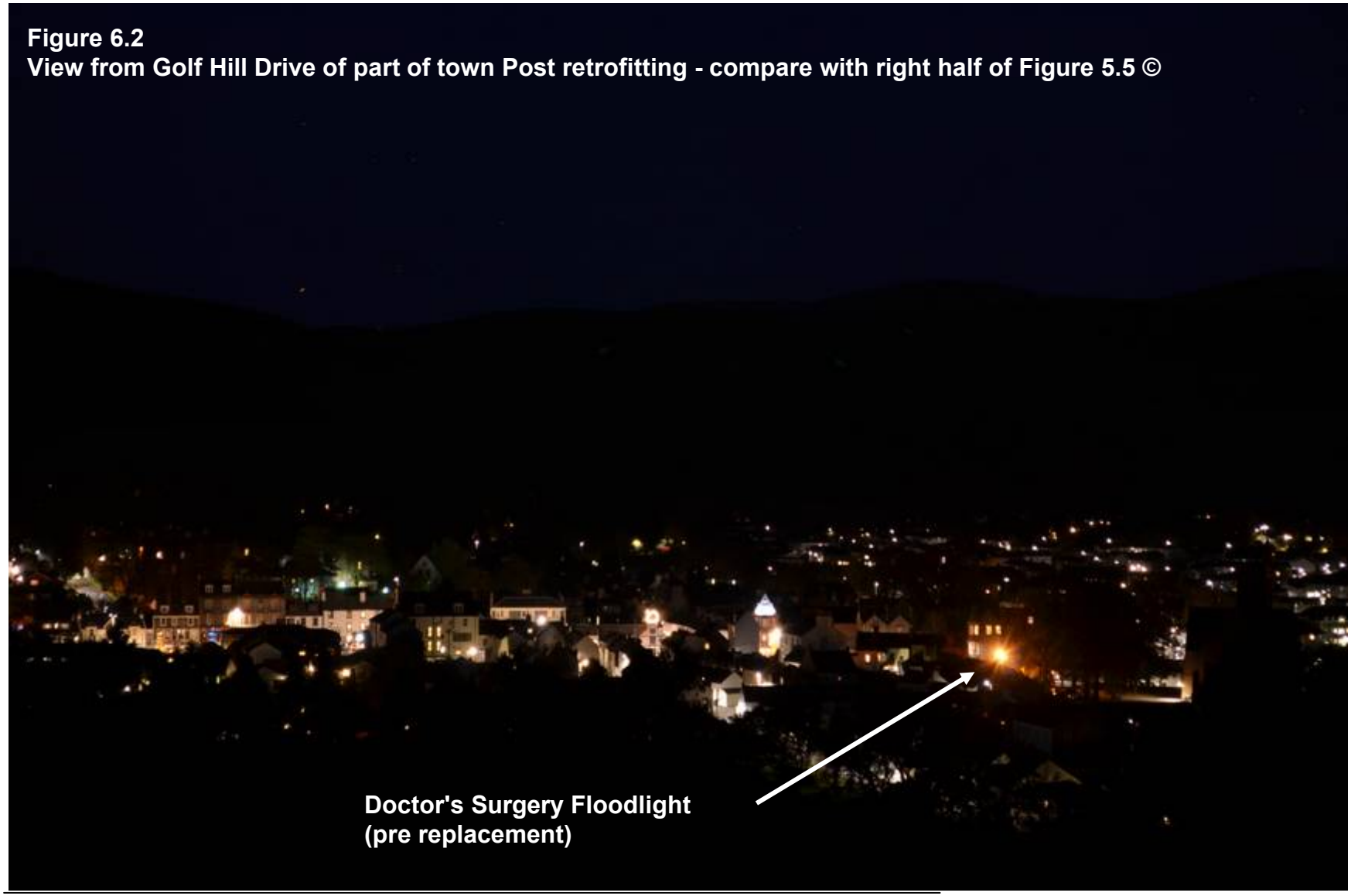
6.5 New Sky Quality Results - Post Retrofitting

Table 6.5

	Post Re-Lighting Sky Quality						Average	Average		
Ref. #	**Location**	**Read 1**	**Read 2**	**Read 3**	**read 4**	**Read 5**	**After**	**Before**	**Change**	
VP01	Hillend Turning Circle	21.52	21.34	21.36	21.45	21.32	21.40	21.31	0.09	
VP02	Green Frog Car Park	21.21	21.2	21.22	21.2	21.2	21.21	20.91	0.30	
VP03	EWM Car Park	21	21.02	20.92	21.05	20.96	20.99	20.77	0.22	
VP04	St Andrews Church	20.95	20.94	21.01	21	20.95	20.97	19.68	1.29	
	04/11/2013	20.86	20.81	20.85	20.97	20.83	20.86			
VP05	Moffat CAN	20.99	20.94	20.93	20.92	20.93	20.94	20.67	0.27	
VP06	Golf Club	21.16	21.11	21.08	21.14	21.11	21.12	21.06	0.06	
VP07	Beattock	21.32	21.38	21.36	21.36	21.32	21.35	21.01	0.34	
	04/11/2013	21.14	21.1	21.23	21.14	21.12	21.15			
	23/11/2014	21.23	21.22	21.23	21.24	21.24	21.23			
VP08	Annan Water Hall	21.42	21.38	21.36	21.35	21.36	21.37	21.14	0.23	
	23/11.2014	21.32	21.37	21.38	21.37	21.38	21.36			
VP09	Well Road End	21.3	21.38	21.35	21.42	21.23	21.34	21.48	-0.14	drop??
	04/11/2013	21.09	21.08	21.14	21.22	21.12	21.13			
	23/11.2014	21.25	21.25	21.25	21.23	21.24	21.24			
VP10	Rosemount control site	21.16	21.14	21.24	21.12	21.17	21.17	21.23	-0.06	drop??
	04/11/2013	Mist conditions with low readings - not recorded								
	4am 10/11/2013	21.18	21.21	21.16	21.12	21.23	21.18	21.23		
	3am 29/11/2013	21.33	21.34	21.34	21.35	21.35	21.34	21.23	0.11	better

Figure 6.1
Photograph taken from Rosemount House, Moffat during Persied Meteor Shower 2013 by James H Paterson ©

Figure 6.2
View from Golf Hill Drive of part of town Post retrofitting - compare with right half of Figure 5.5 ©



6.5 Inventory of Retrofitted Public Street Lighting Pre September 2013

	Street Lighting Inventory			New Dark Sky Conversion - 0% ULR					
Road name	Old Lamp	No.	Old Profile	41w LED	41w LED	41w LED	41w LED	105w LED	140w Cosmo.
Beechgrove	45 CPO	8	CTG		8				
Old Edinburgh Rd.	45 CPO	8	CTG		8				
Old Edinburgh Rd.	55 SOX	10	Refractor			10			
Hillside Terrace	55 SOX	4	Refractor			4			
Hydro Avenue	55 SOX	5	Refractor			5			
Edinburgh Road	150 SON	12	Bowl					12	
Northfield Park	70 SON	2	Refractor				2		
Mearsdale Drive	55 SOX	2	Refractor			2			
Mearsdale	55 SOX	5	Refractor			5			
Meadow Place	55 SOX	5	Refractor			5			
Reid Street	55 SOX	5	Refractor			5			
Gallows Well	55 SOX	1	Refractor			1			
The Whins	55 SOX	4	Refractor			4			
Harthope Place	55 SOX	5	Refractor			5			
Grange Place	55 SOX	2	Refractor			2			
Grange Road	55 SOX	7	Refractor			7			
Academy Road	150 SON	5	Bowl					5	
Moffat House Lane	55 SOX	1	Refractor			1			
High Street	250 SON	8	Bowl						8
	70 SON	9	Conical				9		
	150 SON	11	Bowl					11	
Westpark	No Public Lighting								
Eastgate	55 SOX	11	Refractor			11			
Dundanion Road	55 SOX	5	Refractor			5			
Old Well Road	55 SOX	6	Refractor			6			
	35 SOX	2	Refractor	2					
Hartfell Crescent	35 SOX	6	Refractor	6					
Buccleuch Place	35 SOX	2	Refractor	2					
Dixon Street	55 SOX	2	Refractor			2			
Causway Street	55 SOX	3	Refractor			3			
	70 SON	1	Refractor				1		
Well Street	55 SOX	4	Refractor			4			
Star Street	55 SOX	2	Refractor			2			
Mansfield Square	55 SOX	6	Refractor			6			
Mansfield Place	55 SOX	4	Refractor			4			
Annangate	55 SOX	2	Refractor			2			
Church Street	55 SOX	2	Refractor			2			
Annanside	55 SOX	6	Refractor			6			
Rae Street	55 SOX	3	Refractor			3			
Buccleuch Street	55 SOX	3	Refractor			3			

Church Place	55 SOX	1	Refractor		1*		
Church Gate	150 SON	3	Bowl				3
The Glebe	55 SOX	2	Refractor		2		
Beatock Road	150 SON	31	Bowl				31
Station Park	70 SON	8	CTG			8	
	70 SON	3	Conical			3	
Golf Hill Drive	70 SON	5	F/Glass			5	
Holm Street	150 SON	4	Bowl				4
	70 SON	4	Refractor			4	
Ladyknowe	55 SOX	1	Refractor		1		
Osborne Row		0					
Burnside	70 SON	6	Bowl			6	
School Lane	55 SOX	2	Refractor		2		
Well Road	55 SOX	35	Refractor		35		
Hamilton Place	55 SOX	1	Refractor		1		
Greenwood Close	55 SOX	7	Refractor		7		
Millmeadows	55 SOX	2	Refractor		2		
Sidmount Avenue	55 SOX	5	Refractor		5		
Haywood Road	70 SON	7	F/Glass			7	
	70 SON	7	Heritage			7*	
Cinder Path	35 SOX	1	Refractor	1			
Millgreen	55 SOX	6	Refractor		6		
Millburn	55 SOX	2	Refractor		2		
Park Circle	55 SOX	16	Refractor		16		
	150 SON	1	CTG				1
St. Ninians Road	55 SOX	23	Refractor		23		
Annandale Road	55 SOX	8	Refractor		8		
Annandale Place	55 SOX	5	Refractor		5		
Annandale Way	55 SOX	8	Refractor		8		
Warriston Road	55 SOX	7	Refractor		7		
Warriston Place	35/55 S	12	Refractor	1	12		
Fingland Court	55 SOX	10	Refractor		10		
Pringle Court	55 SOX	9	Refractor		9		
The Holm	150 SON	19	CTG				19
Duncan Drive	55 SOX	7	Refractor		7		
Jeff Brown Way	150 SON	10	CTG				10
Old Carlisle Road	55 SOX	23	Refractor		23		
Hartfell Homes	45 CPO	8	CTG	8			
Selkirk Road	55 SOX	12	Refractor		12		
Ettrick Drive	55 SOX	8	Refractor		8		
Frenchland Drive	55 SOX	6	Refractor		6		
Crosslaw Burn	55 SOX	8	Refractor		8		
	70 SON	4	Refractor			4	
Meadow Bank	55 SOX	1	Refractor		1		

	70 SON	7	Refractor			7
Meadow Bank Rise	70 SON	3	Refractor			3
Ballplay Road	55 SOX	24	Refractor		24	
Holm Park	35/55 S	2	Refractor	2	2	
Eastfield Rise	55 SOX	6	Refractor		6	

Table 6.6 Summary		**POTENTIAL WATTAGE SAVING**					
Pre Retrofit light sources		**35 SOX**	**45 CPO**	**55 SOX**	**70 SON**	**150 SON**	**250 SON**
Pre Application individual Totals		**14**	**24**	**374**	**66**	**96**	**8**
LED Retrofit Circuit watts		41	41	41	41	105	153*
New Application Load (watts)		574	984	15334	2706	10080	1224
New Connected Total Load	**30.9**	**kWatts**					* not LED

7.0 Community Sky Quality Management

7.01 Background

In addition to publishing new lumen caps in the 2013 IDA revisions to dark sky applications there are now fuller responsibility requirements to maintain records of the ongoing sky quality.

The IDA now require the maintenance of records showing sky darkness measurements at various times throughout the typical astronomy viewing months together with at least one permanently installed sky quality meter and also participation in the IDA Global Sky Monitor website.

At the Community Council meeting on 28th November 2014 the nomination of two committee members to carry out this recording was unanimously approved. It will be the requirement of the Community Sky Quality Managers to measure, record and report their findings to the IDA on an annual basis.

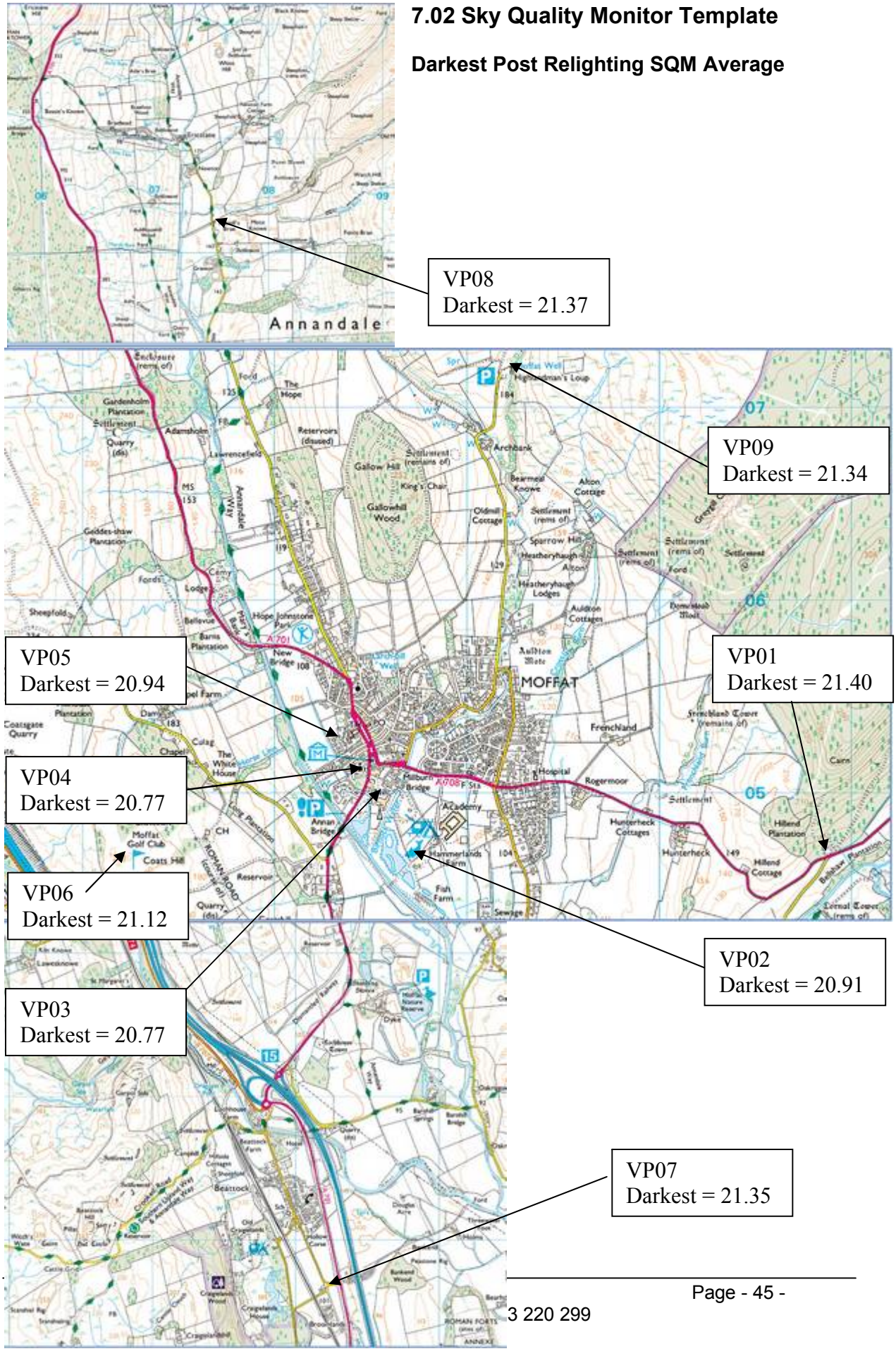
In order to engage an educational side to monitoring the night time environment a permanent measuring device is proposed to be installed on or close to Moffat Academy. Two 6th Form pupils already attend the Community Council meeting each month and will add the permanent monitor results to the Community Agenda each astronomical month.

Sky Quality Management measurements will be undertaken as follows:

- Measurement locations to be the same as that previously used for this application and shown in Figure 5.9.
- Measurements to be taken on or close to a new moon.
- Measurements to be taken using Unihedron SQM-L meter.
- At each location 6 readings are required with the first reading discarded and the average value calculated using the 2nd through to 6th. Record all except 1st reading.
- Record percentage of cloud cover.
- Where access to any of the various measurement points becomes problematic new locations will be selected and added to the report. A linking ‘same evening hour’ measurement will be taken at both old and new locations as a linking quality control monitor.
- A GPS map reference shall be recorded for all new measurement locations.

7.02 Sky Quality Monitor Template

Darkest Post Relighting SQM Average



7.03 New Sky Quality Results - Post Retrofitting

		Consecutive SQM Readings					Average	Cloud	Time
Ref.	**Date**	**2**	**3**	**4**	**5**	**6**			
VP01	10/3/15	21.31	21.3	21.4	21.3	21.33	**21.33**	10%	8pm
Hillend									
VP02									
G/Frog									
VP03	10/3/15	20.46	20.47	20.47	20.48	20.48	**20.47**	10%	8.15
EWM									
VP04	04/11/13	20.86	20.81	20.85	20.97	20.83	**20.86**		
church	10/3/15	20.36	20.35	20.37	20.39	20.45	**20.38**	20%	9pm
VP05	10/3/15	20.97	20.72	20.69	20.69	20.71	**20.72**	20%	8.45
M'can									
VP06	10/3/15	21.19	21.22	21.22	21.21	21.21	**21.21**	20%	8.45
golf									
VP07	04/11/13	21.14	21.10	21.23	21.14	21.12	**21.15**		
Beat'ck	23/11/14	21.23	21.22	21.23	21.24	21.24	**21.23**		
	10/3/15	21.2	21.19	21.1	21.1	21.26	**21.17**	15%	8.30
VP08	23/11/14	21.32	21.37	21.38	21.37	21.38	**21.36**		
A/water									
VP09	04/11/13	21.09	21.08	21.14	21.22	21.12	**21.13**	50%	
Well/rd	23/11/14	21.25	21.25	21.25	21.23	21.24	**21.23**		
	10/3/15	21.35	21.37	21.35	21.3	21.32	**21.34**	20%	9pm
VP10	04/11/13	Total mist – readings abandoned							
control	29/11/13	21.33	21.34	21.34	21.35	21.35	**21.34**		3am
	10/3/15	20.99	20.98	21.03	21.0	20.98	**21.00**	20%	9pm

Table 7.01 Template for readings taken after original September 2013 application submission.

Refer to Section 5.6 for the sky quality measurements taken prior to the removal of the low and high pressure sodium street lighting and Table 6.5 for measurements taken following the street lighting improvement works..

8.0 Community Lighting Improvements following original LMP submission in September 2013

This section will be expanded as more improvements are brought into LMP compliance.

8.01 The Famous Star Hotel

70w High Pressure Sodium uplighting (see left)

Replaced by

20 watt LED Horizontal down-light and 10 watt LED close offset wall wash below ground level (see right and below)

Amitex 20 watt LED Down-light > 3,000 lumens

Amitex 10 wat LED Basement Wall Wash <3,000 lumens

8.02 Memorial to the Fallen Residents of Moffat in Both World Wars

Four ground mounted spotlights located at each plinth corner and elevated 45 degrees
to illuminate the four plinth faces only.

4 x Design Plan - Centaur 4xLED Spotlight cat. no. CESB 100
Total output = 550 lumens

Renovation work to clean the Memorial during 2014 to commemorate the 100th anniversary of WW1 included the installation of permanent lighting to comply with the objectives in Moffat's application for dark sky status. The light sources were placed on each corner of the plinth to accentuate the names on the plinth.

This angular incidence of upward light provides a shadow effect on each letter and although the names cannot be read in the photograph they can be read easily by night, on site, due to the light / dark modelling on the plinth.

This has been achieved with a light source less than the 600 lumen cap demand in a Dark Sky Park or Reserve.

NOTE: Prior to the introduction of LED light sources this plinth would have been illuminated by a metal halide or sodium discharge light source greater than 5,000 lumens.

8.03 Moffat Cottage Hospital

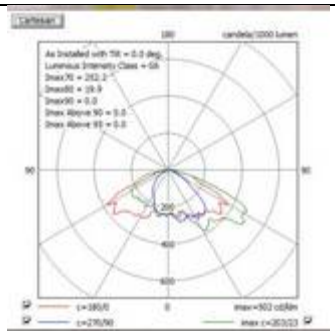
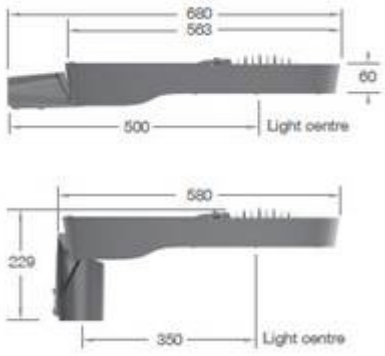
View of Hospital property after public street lighting was changed to LED lighting

View from Rosemount, Well Road

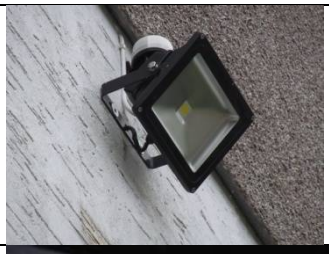
View from Frenchlands

Moffat Lighting Master Plan recommends that all new external lighting using a light source greater than 3,000 lumens must be horizontal flat glass and that all light sources (including LED's) should be Warm White (about 3,100^{0}K).

Equipment Profiles

Existing Profile	Comments	Proposal
	**Car Park Lighting** 6 no. 35 or 55 watt low pressure sodium lanterns On 5 metre hockey stick column with 5^0 or 10^0 tilt	CU - Phosco P851 as -5^0 or -10^0 side entry option - cost about £200  Cat No P851-12-M-WID-G6-NW-D0200-31W (LED)
		

	**Footpath Circulation round Hospital building** 11 no. Large Bulkhead - Plaza Type 50 or 70w High pressure sodium Some are under cover but most are open to external view	 Siteco CW 27-5 Downlight Cat. 5NA 275 2-1MT2D 08 70w CDM-TT (but may now have 35w or LED version)
Alternative options  SILL 420	 ERCO - Parscoop (may now have LED version)	 iGuzzini Platea - BC46 (warm white LED version)
	2 no.	 Deltalight - Nox
	9 no Bollards (only 3 required if entry road is lit by wall mounted P851's)	 Thorlux - Probe 57w TC-T Compact fluorescent 4,300 lumens

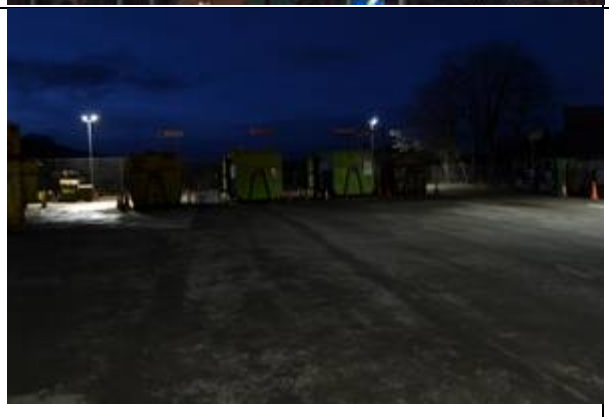
	1 no. LED bi-symmetric floodlight with PECU Recent replacement for old 250/400w HPS floodlight	Phosco P851 on wall bracket Or iGuzzini Platea
		Bulkhead (8 watt) 11 no. All units have lamps less than 3,000 lumens and are not at issue with dark sky objectives in a Dark Sky Community
	1 no. Par 38 spotlight on PIR presence detection	All units have lamps less than 3,000 lumens and are not at issue with dark sky objectives in a Dark Sky Community

This project is awaiting funding

8.04 Residential Domestic Improvements

	An example of upward light limitation from domestic Heritage lanterns where the owner resident has installed Crown Silvered lamps, normally associated with spotlight type projectors, to redirect upward waste light which would normally be expected from a similar wattage tungsten filament or compact fluorescent lamp. Location in Old Well Road.
DB improvement	

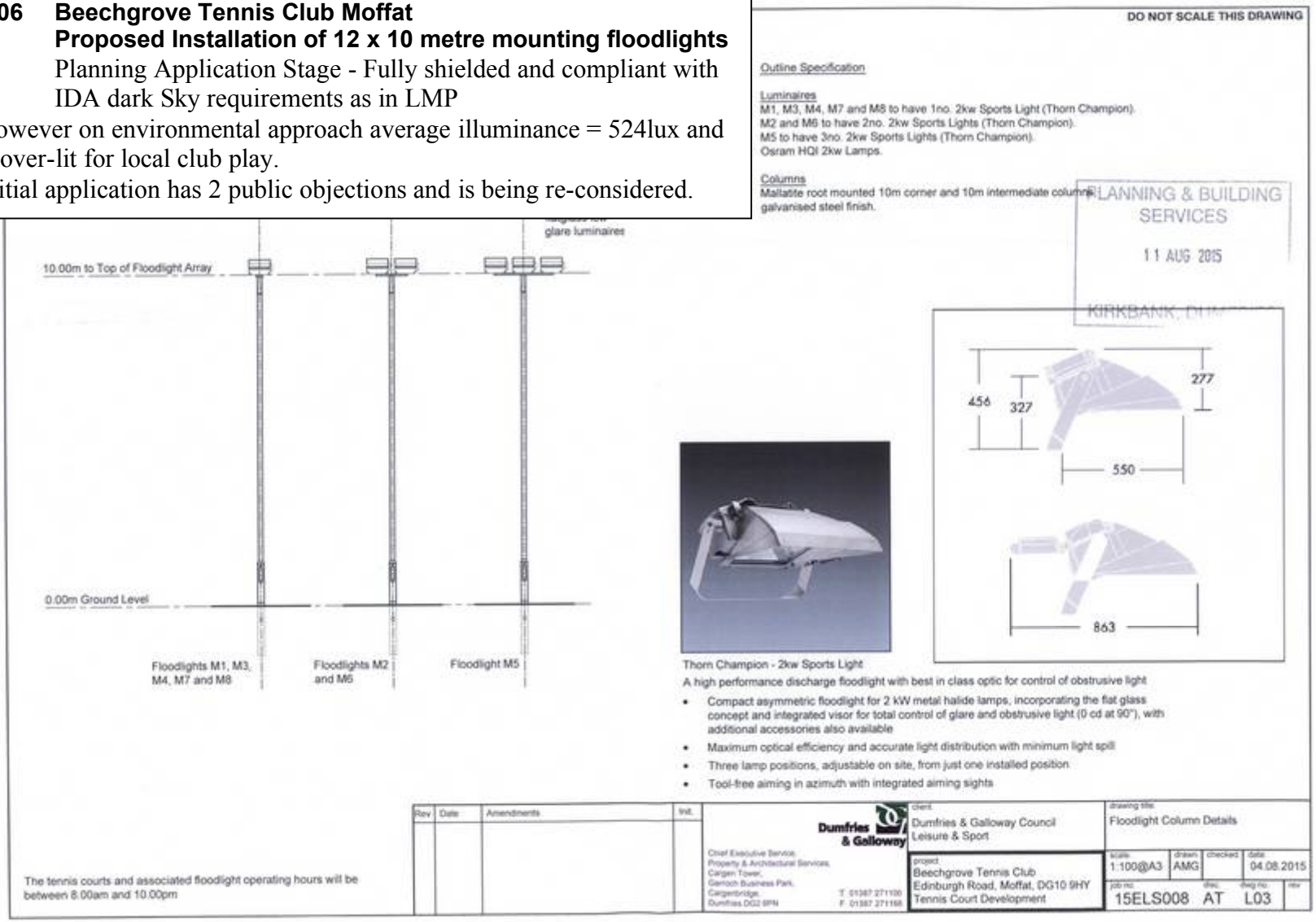
8.05 Moffat and Beattock Domestic Waste Amenity Site

  	This site originally closed at 4.00 pm but recently the closing time was increased to 6.00 pm. During the winter months, with a sunset of 4.00 pm, there was therefore a need to illuminate the site for public safety. The flood lighting was designed and installed by Dumfries & Galloway Council to comply with the fully shielded requirements of LMP. All lights are extinguished at 6.30pm.

8.06 Beechgrove Tennis Club Moffat
Proposed Installation of 12 x 10 metre mounting floodlights
Planning Application Stage - Fully shielded and compliant with IDA dark Sky requirements as in LMP

However on environmental approach average illuminance = 524lux and is over-lit for local club play.

Initial application has 2 public objections and is being re-considered.



8.07 Gallow Hill
Proposed sale of land from Private Ownership into Communal Woodland Trust

Gallow Hill lies immediately North of Moffat and following the removal of a 40 year old Conifer Forest had opened the hill as a visual vantage point.

A Trust has recently been formed and a feasibility study has been commissioned. There is a preliminary thought that, together with other uses, it would provide an ideal spot to install hard standing for astro viewing or better still a small observatory if Moffat becomes a Dark Sky Town.

Appendix 1-5 Calculation Software Output - See Separate File

APPENDIX 6

The following 3 figures show the vertical distribution of light through the minor axis of a Philips BGS 451 1xECO35-2S_830 WSO road lighting luminaire at different angles of upward tilt.

It is not normal to compute values between 0.1 and 0.01 but have been included here to show that there is no upward light from this particular luminaire regardless of the bracket arrangement on which retrofitted. This is due to the excellent control of light from LED sources.

In each figure
the value of Isolux lines are:- 0.01, 0.05, 0.1, 1.0, 5.0, 10 and 25 lux
Light source:- 41watt LED
source lumens:- 3,800
colour temperature:- 3,000^{0}K
grid points are at 0.5 metre intervals

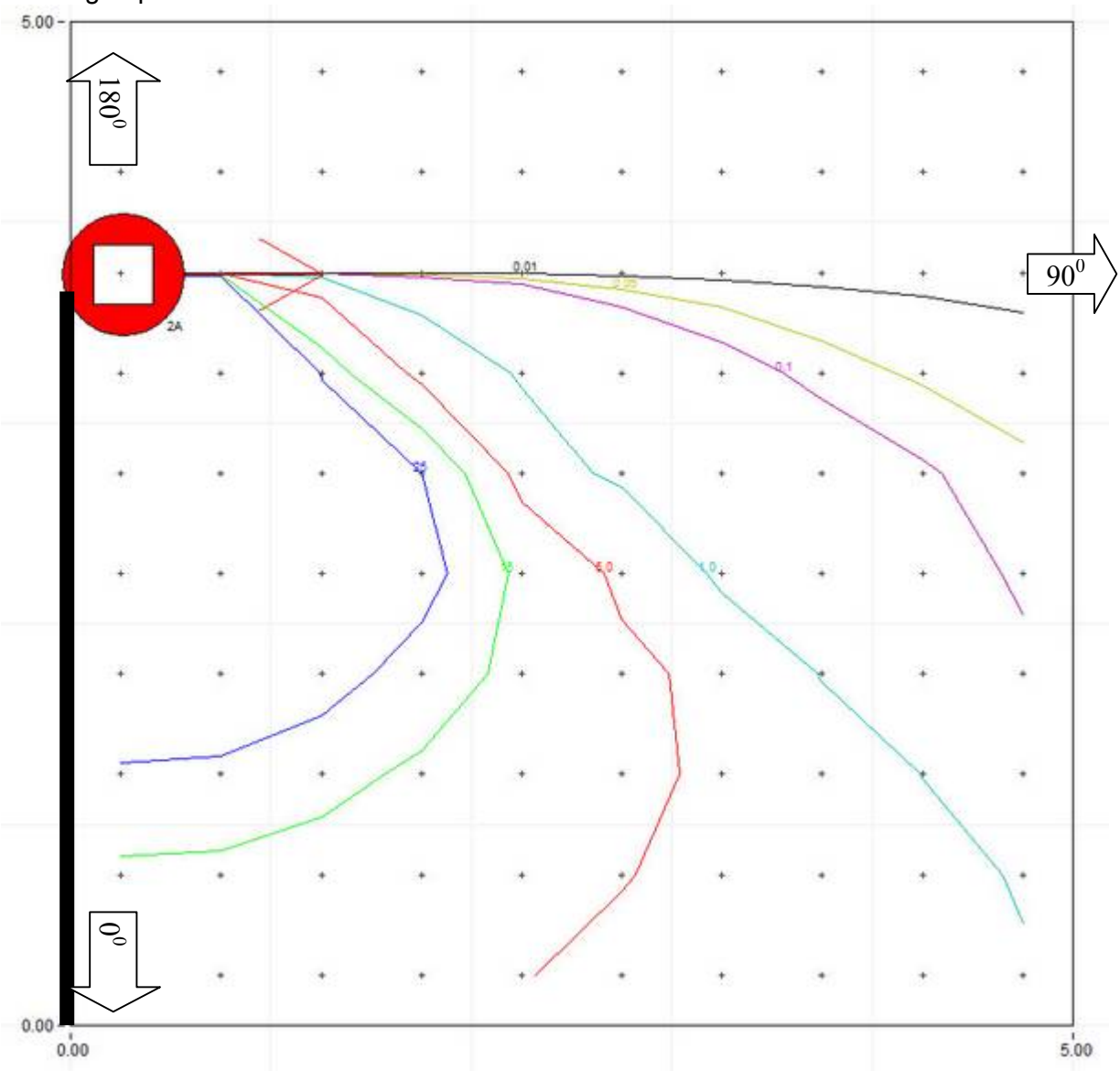


Figure A6.1 Philips BGS 451 tilted up 0 degrees

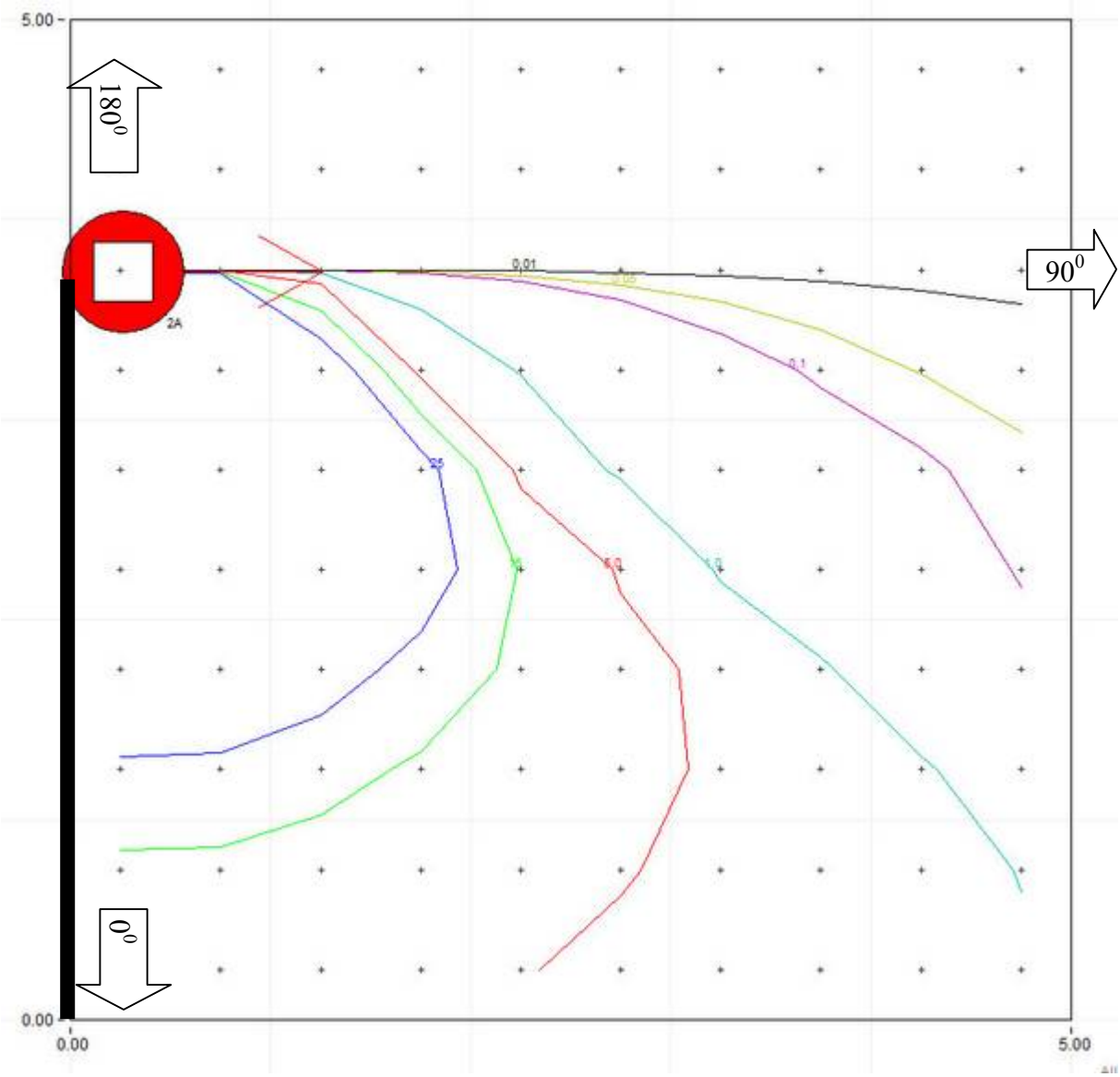


Figure A6.2 Philips BGS 451 tilted up 5 degrees

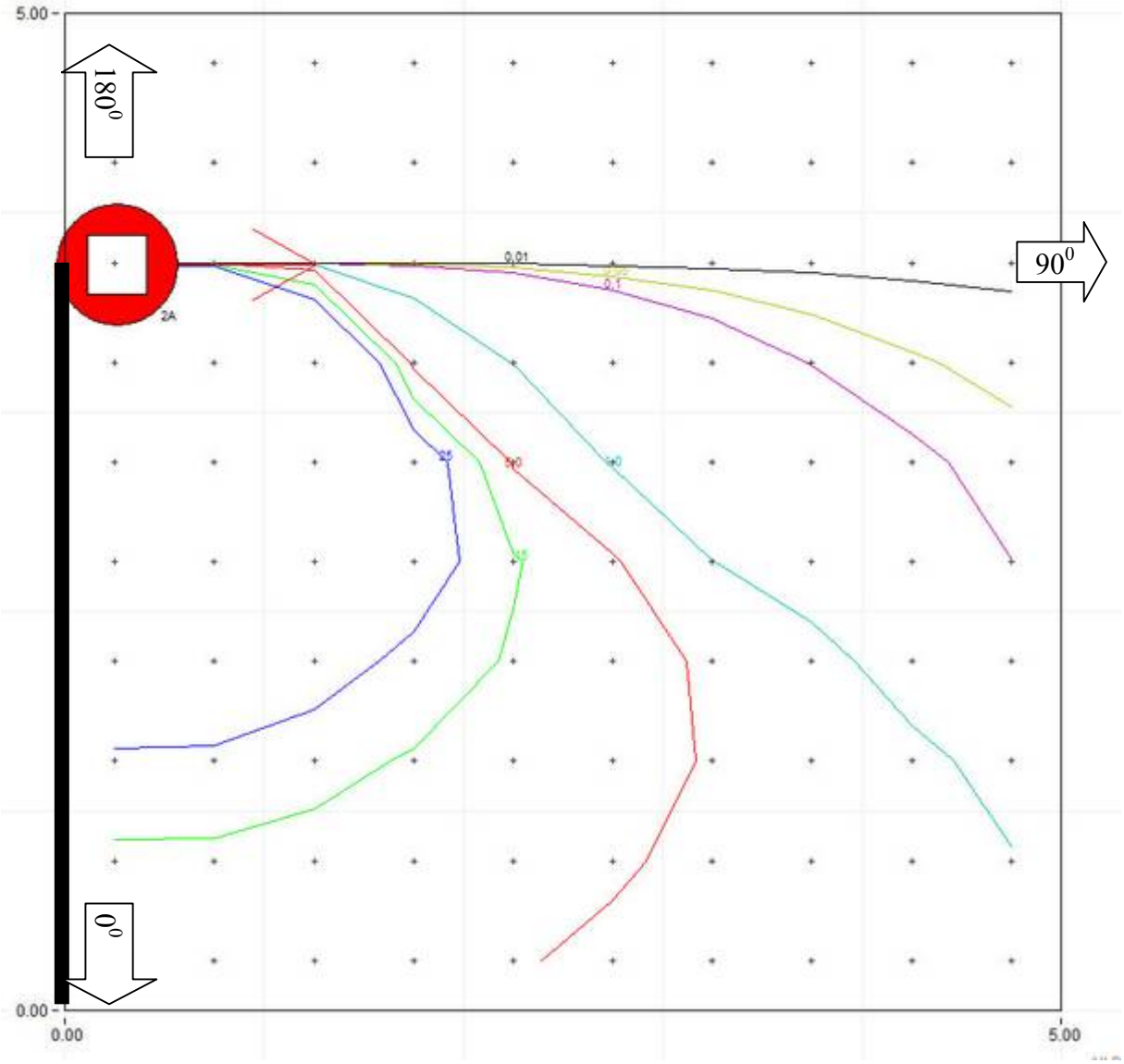


Figure A6.3 Philips BGS 451 tilted up 10 degrees

APPENDIX 7
Supporting Letters for Moffat - Dark Sky Community

Scottish / National Government

Joan McAlpine MSP - Scottish Parliament
Aileen McLeod MSP - Scottish Parliament

Municipal Authority

Sir Neil McIntosh CBE DL - Former Chief Executive Dumfries & Galloway
Mrs Jean Tulloch – Her Majesty's Lord Lieutenant of Dumfries & Galloway
Alistair Speedie 1st letter - Director of Planning & Environmental Services
Adam Anderson – Chairman Moffat & District Community Council

Tourist Authority

Paula McDonald - Regional Director - Visit Scotland Tourist Board

Moffat Commerce

Martin Brown – Chairman Moffat & District Initiative
Tim Leighfield – Manager -The Famous Star Hotel
Moffat CAN 1st letter
Benmar Service Station
Ron McLean - B&B
Peter Grey- Beattock Station Action Group
David Major - Architect - White Hill Studio

Moffat Wildlife Trust

Iain Anderson - Club Chairman

Moffat Residents - Better Quality of Life

Evelyn Atkins
Peter Dreghorn

Moffat Residents - Dark Sky

Dr Peter Bower
Judith Holden
Colin Brydon
David Elliot
Jon and Christine Haydon

Moffat Academy Students

G Thompson	C F	F Rankin	R Crosby
D Lenox	C Dowds	C Wise	C Smith
A Paten	M	C Morgan	B Kirkpatrick
G Fritsch	E Carlyle	F Margerison	L Crawford
J Craig			

Recent Moffat Initiatives

Moffat CAN 2nd later letter
Green Frog Café
Neil Adams
David Booth

Rcd 3/10/2013

The Scottish Parliament
Pàrlamaid na h-Alba

Joan McAlpine MSP
South of Scotland Region

Mrs. Jean Purves,
Chairperson Moffat and District Community Council
Merecleuch House,
Ballplay Road,
MOFFAT
DG10 9JU

2nd October, 2013.

Dear Mrs. Purves,

Moffat Dark Skies Project.

I follow with interest the moves to have Moffat recognised as a dark sky park and wish the project every success.

The new lighting scheme should help with your project but if there is any way I can be of assistance please do not hesitate to contact me.

Yours sincerely,

Joan McAlpine
MSP for South of Scotland

Room M3.10, The Scottish Parliament, Edinburgh, EH99 1SP
Unit 7, Loreburne Centre, High Street, Dumfries DG1 2BD
Tel: 0131 348 6885 01387 255334 Email: Joan.McAlpine.msp@scottish.parliament.uk

Subj: **RE: Dark Sky Moffat**
Date: 10/04/2014 16:29:39 GMT Daylight Time
From: Aileen.McLeod.msp@scottish.parliament.uk
To: Lcadslimited@aol.com
CC: steve@owens-online.co.uk, calum.edgar@dumgal.gov.uk

Hi Jim

Many thanks for your email below and really good to have the chance to meet you the other Monday in Glasgow.

I really appreciate you drawing the wording of NPF3 with regard to dark sky Places to my attention and I take your point completely. I'm not sure if we will be able to secure the required re-wording of NPF3 at this late stage of its development. However, there is no harm in trying and we can but ask.

I've therefore written to Derek Mackay MSP, the Local Government and Planning Minister and drawn his attention to this issue and asked him what needs to be done to secure the necessary amendments to the text. I know Derek visited the Observatory at Dalmellington not that long ago so I have also mentioned to him what we are trying to do in a wider context in terms of maximising and promoting the potential of Scotland's international dark sky Places, how we can be encouraging the development of more such Places and how we can showcase Scotland as the place for dark sky tourism and also mentioned to him about the International Year of Light next year.

Lets see what he comes back with in his response to my letter to him and I will let you know as soon as I know more.

Thanks again for drawing this to my attention – very much appreciated on my part.

Kind regards
Aileen

Birnock Lodge
Well Road
Moffat
DG10 9JT

17th March, 2012

Dear Sir,

Moffat Dark Sky Community Status Application

I write in my capacity as a Deputy Lieutenant of Dumfriesshire and former Chief Executive of Dumfries & Galloway Council to support the bid by Moffat Community Council to establish Moffat as a Dark Sky Town. I have been a resident of Moffat for the past 29 years and fully recognise the significance which this status would have for the town and the wider community in this region coupled with the wider national interest for Scotland given that Moffat could be the first in Europe to achieve such special recognition.

The reduction of light pollution in the town has been lead, in part, by the Community Council, their Lighting Engineer and Dumfries and Galloway Council Engineering staff. All have been working in close harmony over the past 12 months and have already changed most of the old street lighting luminaires in the town. The new units use less energy than the previous units but also, more importantly, have been carefully selected to provide the right amount of light on the public roads and footpaths without providing wasted upward light. This has markedly reduced town sky glow over both Moffat and the adjacent village of Beattock.

I understand that "before and after" sky quality meter readings in the town of Moffat are showing that the night sky is now darker as a direct result of the Council changing the street lighting and I hope that, apart from the energy savings for the Council, Dark Sky Status will bring an added value to the winter tourism in Moffat in the same way that Galloway Forest Dark Sky Park provided the Newton Stewart area when it was awarded Gold Status by the International Dark Sky Association in 2009.

I believe that the Exterior Lighting Master Plan which has been developed for Moffat and the generality of Dumfries and Galloway Council is a template which other towns in the Region can follow and I am sure some will follow on if the Community Council's initiative is successful.

On a wider view I hope local astronomy groups and a renewed interest in astronomy, across the South of Scotland and the North of England, flourishes out of this initiative to become a Dark Sky Town and wish the Community Council every success.

Sincerely

Neil McIntosh

Sir Neil McIntosh CBE DL

DUMFRIES

GILLESBIE
LOCKERBIE
DG11 2LF

Tel: 01576 610230
Fax: 01576 610240

Mr Adam Anderson
Chairman Moffat and District Community Council
C/o Mrs Jean Purves - Secretary
Merecleugh
Ballplay Road
Moffat
DG10 9JU

Dear Mr Anderson,

Moffat Dark Sky Community Status Application

Thank you for giving me the opportunity to provide a letter of support for the bid to establish Moffat as a Dark Sky Town, possibly the first in Europe to achieve this status.

Over the past 12 months Dumfries and Galloway Council Engineering staff have been working in close harmony with your Lighting Consultant and have already changed more than 600 street lighting luminaires in the town. The new units use less energy than the previous units but also, just as importantly, have been carefully selected to provide the right amount of light on the public roads and footpaths without providing wasted upward light. This has markedly reduced town sky glow over both Moffat and Beattock.

I understand that "before and after" sky quality meter readings in the town of Moffat are showing that the night sky is now darker as a direct result of the Council changing the street lighting and I hope that, apart from the energy savings for the Council, Dark Sky Status brings an added value to the winter tourism in Moffat in the same way that Galloway Forest Dark Sky Park provided the Newton Stewart area when it was awarded Gold Status by the International Dark Sky Association in 2009.

I believe that the Exterior Lighting Master Plan which has been developed for Moffat and the generality of Dumfries and Galloway Council is a template which other towns in the Region can follow and I am sure some will follow on if your initiative is successful.

On a wider view I understand that Northumberland National Park, together with Kielder Water & Forest Park have also prepared a parallel Exterior Lighting Master Plan and will be submitting it about the same time as Moffat. I hope astronomy groups, and a renewed interest in astronomy, across the South of Scotland and the North of England flourishes out of your initiative to become a Dark Sky Town and wish you every success.

Kind regards.

Jean Pullar

Your Ref:

Our Ref: A/8 AMS/MS

4 October 2013

Planning and Environment Services
Director
Kirkbank House
English Street
Dumfries DG1 2HS

Any enquiries please contact
Alistair M Speedie
Direct Dial 01387 260376
Fax 01387 260188
E-mail alistair.speedie@dumgal.gov.uk

Mr Adam Anderson
Chairman
Moffat and District Community Council
c/o Mrs Jean Purves
Merecleugh
Ballplay Road
MOFFAT DG10 9JU

Dear Mr Anderson

MOFFAT DARK SKY COMMUNITY STATUS APPLICATION

Thank you for giving me the opportunity to provide a letter of support for the bid to establish Moffat as a Dark Sky Town, possibly the first in Europe to achieve this status.

Over the past 12 months Dumfries and Galloway Council have been working in close harmony with your Community Council and have already changed more than 600 street lighting luminaires in the town. The new units use less energy than the previous units but also, just as importantly, have been carefully selected to provide the right amount of light on the public roads and footpaths without providing wasted upward light. This has markedly reduced town sky glow over both Moffat and Beattock. This came from our Council's commitment to reduce energy consumption and carbon emissions.

I understand that "before and after" sky quality meter readings in the town of Moffat are showing that the night sky is now darker as a direct result of our Council changing the street lighting and I hope that, apart from the energy and carbon savings for our Council, Dark Sky Status brings an added value to the winter tourism in Moffat in the same way that Galloway Forest Dark Sky Park provided the Newton Stewart area when it was awarded Gold Status by the International Dark Sky Association in 2009.

I believe that the Exterior Lighting Master Plan which has been developed for Moffat is a template which other towns in the Region can follow and I am in no doubt others will follow on from your initiative as our Council continues to change all of its street lights throughout the region.

Moffat/-

Dumfries & Galloway COUNCIL

Moffat is recognised as being an important tourist destination for our region and it has good access links and tourism infrastructure to support this. Should this initiative be successful it will enhance Moffat tourism especially during the winter period.

The ultimate vision would be for Dumfries and Galloway as a region to qualify as a dark sky community/reserve in the future once all street lighting has undergone the lamp conversion with the Gold Status Galloway Forest Dark Sky Park and Moffat Dark Sky Town being exemplars within that community/reserve.

On behalf of Dumfries and Galloway Council I support your application and wish the town of Moffat every success.

Yours sincerely

Alistair M Speedie
Director Planning and Environment Services

Moffat & District Community Council

Maple Lodge
Ballplay Road
Moffat
DG10 9JU
Ref: MDCC/JP/805

International Dark Sky Association

14th March 2014

Dear Sir

Moffat – A Dark Sky Town

As a direct result of Scottish Government funding, to create an energy reduction programme in street lighting, the Moffat & District Community Council is very keen to apply for **International Dark Sky Community** status and has already endorsed Dumfries and Galloway Council's commitment to replace the existing street lights in Moffat and Beattock with new units which, at the same time as reducing their carbon footprint, will provide less upward light.

By improving the quality of our sky at night, we not only retain a quality of life appreciated by residents, but could see the development of new and sustainable events and activities around star gazing and astronomy that could attract more visitors and be beneficial for local businesses.

Businesses, especially accommodation providers, will be able to promote opportunities for star gazing alongside the many other activities and attractions on offer. The Community Council will also support the development of astro-tourism, and the hosting of star gazing events, around Moffat and Beattock in the future.

The Community Council will continue to encourage residents and local businesses to replace their lighting with LED lights and fully supports the efforts of Mr Jim Paterson to assist us with achieving our goal to be recognised as a dark sky community.

Yours faithfully

Adam Anderson

Adam Anderson
Chairman

Adam Anderson
Chairman
01683 – 221164
e-mail: adamanderson2@btinternet.com

Jean Purves
Secretary/Treasurer
01683 – 221202
merecleuch93@btinternet.com

PM/Moffat Dark Skies
23 July 2013

Adam Anderson
Chairman
Moffat & District Community Council
c/o Mrs Jean Purves
Merecleugh
Ballplay Road
Moffat
DG10 9JU

Moffat Dark Sky Community Status Application

Thank you for giving VisitScotland the opportunity to provide a letter of support for the bid to establish Moffat as part of the UK's Dark Sky Community.

Recent years have seen Scotland's tourism industry maintain its position as a key contributor to the nation's economy, generating an annual visitor spend in excess of £4.5bn annually and day visitors contributing a further £6.2bn, giving a total spend close to £11bn (2011 figures). Not only that but tourism accounts for over 200,000 jobs – many in rural areas, helping less populous communities to prosper – across 20,000 different tourism-related businesses, while also feeding into other sectors such as food and drink, retail, transport and construction.

Visitor expectations have grown ever more sophisticated with a shift away from individual tourism attractions towards more rounded experiences, delivered to a consistently high quality at each point of the customer journey.

Any official "Dark Sky" status could add to the overall ambition to grow tourism numbers in Dumfries & Galloway and may be of benefit to the local area.

The Framework for Change also focuses on the need for quality products and services, working in collaboration and innovation - this proposal would seem to address these points and could provide a unique experience for tourists to the area.

Dumfries & Galloway is predominantly a leisure tourism destination and this development could add to the breadth of offering and contribute to the area becoming a sustainable year round destination.

It is a fact that most visitors to Scotland are attracted, more than anything else, by our scenery and natural environment. It is also a fact that Scotland has more forest cover than the rest of the UK (17% of Scotland is forested), so we know that Scotland's trees play a big part in adding to our visitors' enjoyment. Dark Sky Park status would add value to the existing experience provided by the Moffat to visitors.

Sustainability is a key theme in the Tourism Framework for Change and the local Area Tourism Partnership Plan. To become Europe's most sustainable destination we need to ensure that tourism growth doesn't result in the degradation of the very environment that is one of our unique selling points. A development of this nature is a good opportunity for the area to develop its sustainability product.

PM/Moffat Dark Skies
23 July 2013

VisitScotland's marketing campaigns are designed to attract visitors to Dumfries & Galloway throughout the year however seasonality can still be an issue. Dark Sky status could provide opportunities to promote the area during the quieter times of the year and give another reason to visit and stay longer.

Dumfries & Galloway is positioning itself as an area which is "Naturally Inspiring" and Dark Sky status for Moffat would fit well with this branding.

The Forestry Commission is a key partner in the Dumfries & Galloway Area Tourism Partnership (ATP), of which its personnel are active and supportive members. It contributes to the Area Tourism Strategy in conjunction with other public agencies and the trade members of the ATP. It also works closely with community groups at more local level in encouraging access and use of the forests. VisitScotland welcomes the opportunity to further develop this partnership approach relating to the aforementioned bid.

Hopefully the above observations will be useful in future discussions relating to this application.

Yours sincerely

Paula McDonald
Regional Director

MOFFAT
BETTER FOR BEING THERE

Moffat and District
Community Initiative
1 Ladyknowe, Moffat DG10 9DY
www.visitmoffat.co.uk
Tel: 01683 220227
email: info@visitmoffat.co.uk
VAT No. 842 6143 38

20 August 2013

The Secretary
Moffat and District Community Council
Merecleuch House
Ballplay Road
Moffat
DG10 9JU

Dear Jean,

Re: **Dark Skies Application**

Moffat and District Community Initiative fully support and encourage this application, recognising that the actions taken to create dark skies over the town of Moffat in Dumfries and Galloway will become a very important aspect of the town. As Moffat was the first Walkers Welcome Town in Scotland and we continue to promote the opportunities for our visitors to experience the outdoor life, and all it has to offer, this proposal fits very well into our Business Plan to market Moffat to the wider world.

Many residents of the town are directly involved in the Tourism industry and are very much aware of how our night sky will enhance our attraction for tourists. The Initiative welcomes and encourages any actions that enhance the quality of holiday experience for visitors and that provide reasons or incentives for more people to visit the town.

Universal agreement amongst business owners and investors in Moffat recognises that the individuality of the town needs to be preserved and enhanced and this includes the avoidance of light pollution. Most of the tourism businesses in the town are open all year and the Initiative believes the dark skies could lead to more visitors discovering the peace and tranquillity of Moffat outside of the main holiday season.

Many actions have been taken recently to encourage more families to visit Moffat and it would be wonderful for youngsters from urban areas to have their first clear views of a sky full of stars here.

We believe the achievement of recognition as a Dark Skies Town would be good for Moffat businesses, good for employment, would benefit the town's community as well as promote fresh experiences to fulfil the aspirations for future generations of stargazers.

Yours sincerely,

Martin J. Brown
Chairman

LEADER
The Scottish Government
Dumfries & Galloway
"Scotland's 1st 'Walkers are Welcome' Town"

St Michael's Services Limited
9 St Michael Street, Dumfries, DG1 2QD.
Tel: 01387 254304

www.stmichaels-services.co.uk

Mrs Jean Purves, Secretary,
Moffat & District Community Council,
Merecleuch House,
Ballplay Road,
Moffat

31st July 2013

Dear Jean,

As a local business owner based in Moffat, we are delighted to support the Community Council in the work they have done with regard to the Dark Skies Status initiative for the town of Moffat.

As we depend mainly on tourists and passing traffic during the summer for our trade, we are sure that the Dark Skies Status would bring more tourists to the area not only in the summer months but throughout the year, thus increasing the trade in the town to all the businesses over the whole year.

We recently completed our own project at our premises at Benmar Services, Station Road Moffat, where we have been upgrading the site over the last year, providing new facilities for our customers to obtain fuel 24 hours a day by exchanging all the original 400watt bulbs in our canopy lighting, to 80 watt LED bulbs, producing the same amount of light on the forecourt, but considerably reducing our costs and carbon footprint. Also the introduction of dusk till dawn sensors and timer switches so that the lights automatically switch off after the customer has left the premises. This has enhanced the forecourt services, but has not affected the Council's plans form the Dark Skies Status.

Congratulations on a job well done!

If we can be of any further support please do not hesitate in contacting us via our email address: benmargarge@gmail.com or direct dial 01683 220010

Yours sincerely

Jamie R Wood
Director.

09.19.2013

To
Mrs. Jean Purves
Secretary
Moffat & District
Community Council

Dear Mrs. Purves

We are writing to you in support of Moffat's application for designation and recognition as a Dark Skies town.

There will be new opportunities for tourism in Moffat, and in particular hoteliers, if Dark Skies status is achieved.

Currently, most visitors take their holiday in Moffat between Easter and October however if the application for Moffat is successful in becoming the first town in Scotland to have Dark Sky status, it would also be able to promote itself as a night-time or winter destination especially for those activities around star gazing and astronomy.

As a local hotelier we would welcome opportunities which would help to extend the tourism season to all year round business adding to our business in the quieter months of the year.

We hope the application will be successful and if so we could then highlight Moffat's status as a Dark Skies town in our future advertising.

Yours sincerely

Tim Leighfield

info@thefamousstarhotel.co.uk

THE FAMOUS STAR HOTEL MOFFAT

Tel 01683 220156
Fax 01683 221524

44 HIGH STREET
MOFFAT DG10 9EF

www.famousstarhotel.co.uk
info@famousstarhotel.co.uk

THE FAMOUS STAR
HOTEL & RESTAURANT

moffat CAN
CARBON NEUTRAL

Old Church Depot, Annanside,
Moffat DG10 9HB
Tel 01683 221847
E-mail: info@moffatcan.org
www.moffatcan.org

Dear Jean Purves

We are a Moffat community charity and social enterprise dedicated to carbon reduction.

We have been very impressed by the new low-energy lighting installed around Moffat and by the resulting decrease in light pollution and carbon emissions.

We feel that for Moffat to be recognised for this achievement via formal Dark Sky status would be highly beneficial in terms not only of enabling and developing maximum access to astronomy for local residents and for visitors but also of boosting the local economy via increased green tourism.

Yours sincerely,

Alis R. Ballance

Alis Ballance

Chief-Executive

Moffat CAN Ltd Co. No. 354379 Scottish Charity No. SC040255

Mr R Mc Lean & Mr B Camm.
No29 Well Street Bed & Breakfast
Moffat
DG10 9DP

24th July 2015

Dear Sir/Madam

We are writing to you in support of Moffat's application for designation and recognition as a Dark Skies town. We have a Bed & Breakfast right in the middle of Moffat and the installation of the LED lights has added to the beauty of the night skies and the reduction of light pollution.
We feel that the new lighting will be for the benefit of residents and visitors alike. Any boost to tourism, such as happened at Galloway forest Park, especially out of season, would be welcome and improve Moffat's status as an all year round visitor destination.

We hope the application will be successful and we will then include Moffat' status as a Dark Skies town in our future advertising.

Yours Sincerely

Ron Mc Lean & Bradley Camm

BEATTOCK

BEATTOCK STATION ACTION GROUP
Buckrig, Beattock, Moffat, DG10 9RL

Mrs. J. Purves,
Merecleuch House,
Ballplay Rd,
Moffat,
DG10 9JU

26th July 2013

Dear Mrs Purves,

We are writing to you in support of Moffat's application for designation and recognition as a Dark Skies Town.

As a group fighting to have Beattock railway station reopened we realise the importance of local support. Part of our argument is that the opening of Beattock station should increase tourism to the Moffat area and certainly the designation of Moffat and area as a Dark Skies Town should also do this.

In increasing the use of the railway by the reopening of Beattock station we see a reduction in pollution by less use of the car. By Moffat being a Dark Skies Town the light pollution will be greatly reduced. You could say that we are promoting a similar cause.

We wish you luck and success in your endeavours.

Regards,

Peter Gray,
Secretary.

STATEMENT

White Hill
DESIGN ⌘ STUDIO

To: James Paterson
Rosemount
Well Road
Moffat
DG10 9BT

Our Ref: Moffat Dark Sky
WHDS Moffat Dark Sky 141202

Your Ref:

Date: 02 December 2014

Dear Jim

Moffat Dark Skies Project

EXPRESSION

I am writing to offer my support to the Moffat Dark Skies Project which I feel is of significant benefit to the community.

Since discussing the project with you, I have been promoting the use of Dark-Sky light fittings to clients on a range of local projects and will incorporate a Dark-Sky lighting specification into future projects.

I will also meet with the local electrical contractors to see if we can promote appropriate external fittings for use within the town to make information on these more widely available.

I look forward to working with you on the project.

Yours sincerely,

David Major
White Hill Design Studio LLP
\enc.

ENQUIRY

T: 01683 221 898 F: 01683 501 064
E: info@whitehilldesignstudio.com
W: www.whitehilldesignstudio.com
A: Annan Water, Moffat, DG10 9LS

Members
David Major B Arch ARIAS
Jane Gray BA Hons MSc

Moffat Wildlife Club

November 25th 2014

Dear Mrs Purves,

I am writing on behalf of Moffat & District Wildlife Club in support of the plans for Moffat to acquire dark sky status.

We are completely behind the initiative to replace the old sodium lighting with LED lighting, which is much more energy efficient. I understand that the new lights will save around half of the energy used in the old system, making a significant contribution to reduction in CO2 emissions, which of course is critical in long term reduction of climate change.

Clearly, the Wildlife Club's main concern in relation to artificial light is its effect on the natural world. The intensity of natural light varies around the lunar cycle, the seasons and of course day / night cycle. Organisms have evolved to respond to these changes in ways which impact on their feeding, breeding, migration and hibernation (fauna) and flowering, vegetative growth and direction of growth (flora). It is pretty certain that the introduction of artificial light will disturb the normal routines of many plants and animals. There are many examples of this disruption, including negative effects on migrating birds, early breeding in some bird species, the feeding behaviour of bats caused by insects clustering around outdoor light sources, and temporary visual impairment in frogs and toads. All these issues are addressed in the Royal Commission on Environmental Pollution report on artificial light, published in 2009.

We would be broadly supportive of any efforts to reduce artificial light in the environment. Having achieved this with regard to the street lighting in Moffat, we can see the wider benefits of continuing with a bid for Dark Sky status. These include the possibility of further raising awareness of the impact of artificial light upon the environment, as well as economic benefits to Moffat from tourism.

We know the Community Council have been supportive of the initiative, and trust that they will continue to provide all necessary support in the future.

Yours sincerely,

Iain Anderson

Iain Anderson

Club Chairman

Mrs Jean Purves,

Secretary,

Moffat & District Community Council

9 Nethermiln Meadow
Moffat
DG10 9QG

12 November 2014

Dear Mr Paterson,

I would like to congratulate Moffat on their forward thinking regarding the dark sky initiative. I moved to Moffat on 31 October, coming from a busy town with harsh street lighting. For many years I have had sleep problems, and often commented on the harshness of the lights, which seeped into my bedroom. Since coming to Moffat I have noticed that I sleep sounder and wake refreshed, I can only attribute this to the new LED lighting that is used in the town.

Perhaps health is an aspect of the new LED lighting that has not been considered.

Yours sincerely

Evelyn Atkins

Evelyn Atkins.

Subj: **Re: Moffat Stars**
Date: 25/11/2014 16:51:11 GMT Standard Time
From: pbdreghorn@btinternet.com
To: Lcadsinscotland@aol.com

To Jim Paterson

I write in support of current and future developments towards a Dark Sky status in Moffat. The replacement of the sodium street lights have not only provided a darker sky for viewing stars and planets but a directional light on the streets and pavements which is both brighter and focused. This is of great benefit to me as I suffer from Glaucoma and have very reduced peripheral vision. So, ironically reduction of lighting has improved the lighting from diffuse to directional and with stronger outlines for people to see.
Further restrictions on lighting of doorways, security lights and decorative lights would be appropriate, working collaboratively with residents and business outlets. Photovoltaic on/off lighting would good in places where constant lighting is unnecessary.
The other compliment I would like to pay is the awareness raising session you held in Moffat which was joyful, scientific and empathetic to residents. Also no funding nor committee was needed for the work to go ahead which was unique in developments in the area.
Lastly as a member of Borders Forest Trust Corehead Project we would like to measure hte darkness of sky with your equipment to establish the feasibility of a dark sky viewing point.

Best wishes
Peter Dreghorn M.Sc. Biodiversity, Wildlife and Ecosystem Health
Corehead Steering Group, River Annan Trust, Beattock Station Action Group.
Adamsholm
Annan Water
Moffat
DG109LS

For station news
www.beattock.com

An Cluain,
Ballplay Road,
MOFFAT,
Dumfriesshire,
Scotland DG10 9JU
Tel: 01683-221219

Attention of the Hon. Secretary,
Moffat Community Council.

18th April 2013

Dear Hon. Secretary,

New LED Street Lighting in Moffat

Now that the majority of the town's street lamps have been converted to LED format, I have taken time to observe and note the resultant lighting effects, both good and bad. Overall the new warm white lights are very good. I like them. I am most impressed by the uniformity and high level of the road illumination. I have also observed that the colour of vehicles and personal clothing is better rendered and much more natural than was the case with the earlier Sodium lamps.

More negatively, the illumination of nearby objects on the roadside, such as pedestrians and pavement obstacles, is less pronounced than before, although I find it quite adequate for most purposes.

Although I have little personal interest in astronomically observing Moffat Dark Skies as such, I do very much approve of the future visitor and tourist potential. Together with the vastly reduced costs of energy supply and maintenance, this has convinced me that the whole project was well worth the cost and effort.

I would like to express my personal thanks to our Community Council for their initiative, forward planning and satisfactory adoption of this modern lighting scheme. Well Done !

Yours truly,

Dr. Peter G. Bower

Hunters' Croft,
Haywood Road,
Moffat
DG10 9BU

22nd April 2013

Dear Mrs Purves,

I would like to pass on to the Community Council my pleasure at seeing the new street lights gradually coming into being. The actual lamp posts look very modern and quite discreet and I think the white downward lighting looks far more natural and attractive than the original sodium lights.

No doubt there are differing views in Moffat about this undertaking but I thought I should express a positive reaction.

Yours sincerely,

Judith Holden

29-05-13

Dear Lighting Section,

Thank you for the new street lighting in Moffat
It's great; no more yellow glow, no more intrusive
light in the house, now we can (on the rare cloud-
free occasions) see the stars, now we can see
the colors of the cars at night.

My congratulations and thanks to all
responsible - you have enhanced our lives

Colin Brydon

NJ

DGFIRST
LOCAL SERVICES
ANNANDALE & ESKDALE

1 9 SEP 2013

HARTHILL DEPOT
LOCKERBIE

David & Niamh Elliott
Archbald Moffatt House
Academy Road
Moffat DG10 9HW
01683 221 899

26 SEP 2013

DG First

Harthill Depot

Glasgow Road

Lockerbie DG11 2SE

Dear sirs

Street Lighting

May take this opportunity to congratulate your department on the choice and installation of the new street lights in Moffat. They are a significant benefit to the environment and probably use less energy.

Unfortunately the private lighting installed over the entrances to St Marys [converted] doesn't have the same ethos.

Yours sincerely

David & Niamh Elliott

Flat 2
Birnock Water
Moffat
DG10 9DY
November 14th 2014

Dear Mrs Purves,

We are writing in support of the plans for Moffat to acquire dark sky status.

I know that some people had understandable concerns about the strength of the new street lighting when it was installed, but we find it to be entirely satisfactory as both pedestrians and motorists. In fact, on a day to day basis I doubt that anybody wishes for the return of the old lighting.

The new lighting has many benefits, however, including it being much less obtrusive to those of us who have a lamp post close to their property. The two greatest benefits, however, are on the one hand hidden and on the other extremely noticeable. The hidden benefit is the reduced carbon footprint (and cost) of using the LED technology which is a contribution to the greatest problem facing humanity – that of man-made climate change. The noticeable benefit is the significant improvement that many of us have observed in the visibility of the stars on a clear night.

This improved night sky visibility is something that we could now capitalise upon, by completing Moffat's designation as a dark sky community. Once this is achieved, there are significant potential gains for the town from tourism – both direct winter 'dark sky' tourism, repeat visits at other times of the year, and more generally from the increased media exposure that would follow a dark sky designation.

We know the Community Council have been supportive of the initiative, and trust that they will continue to provide all necessary support in the future.

Yours sincerely,

Jon & Christine Haydon

Mrs Jean Purves,

Secretary,

Moffat & District Community Council

10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
DG10 9QF

Dark Sky Initiative

Dear Sir/Madame

I am 13 years of age and a pupil at Moffat Academy Scotland and I'm studying Physics. A big area of our cericulm is space every year and it would be nice to have International Dark Sky Statous. So that we could do even night trips but not needing to pay much if any for a trip. I find space is a really great part of physics because it is something that is always changing and that we can always find out more.

As a community it would help Moffat because it would cut ~~ambitions~~ and Moffat already has Light Emmiting Diods (LED) Dwlights in our street lights. Then if we dogot International Sky Statous we could get an observatry for the whole community and or the school, if we could fundraise enough buy a school telescope. Then the whole community could start a Astronemy Club if we got all that. What I'm trying to say is that it would be great to have Dark Sky Statous for all of us.

Yours Sincerly

Graheam Thompson

10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
DG10 9QF

International Dark sky Reserve

Dear Sir/Madam

I am a 13. year old student at Moffat Academy. I'm in S2 and I am hoping we can get Dark Sky Status in Moffat.

We are going to go around Moffat and raise money for the funding. We ~~still~~ could do this by Bake sales etc. We are hoping that it would raise enough around about half so the school could pay the other half. If we achieved this we would be the second place in Dumfries and Galloway region to have Dark Sky Status. All the physics students in Moffat Academy are extremely keen on getting this.

Tourism would increase in moffat making it easier to expand and upgrade the observatory.

Yours Sincerely

Campbell Smyth

10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
DG10 9QF

Ref international Dark Sky reserve.

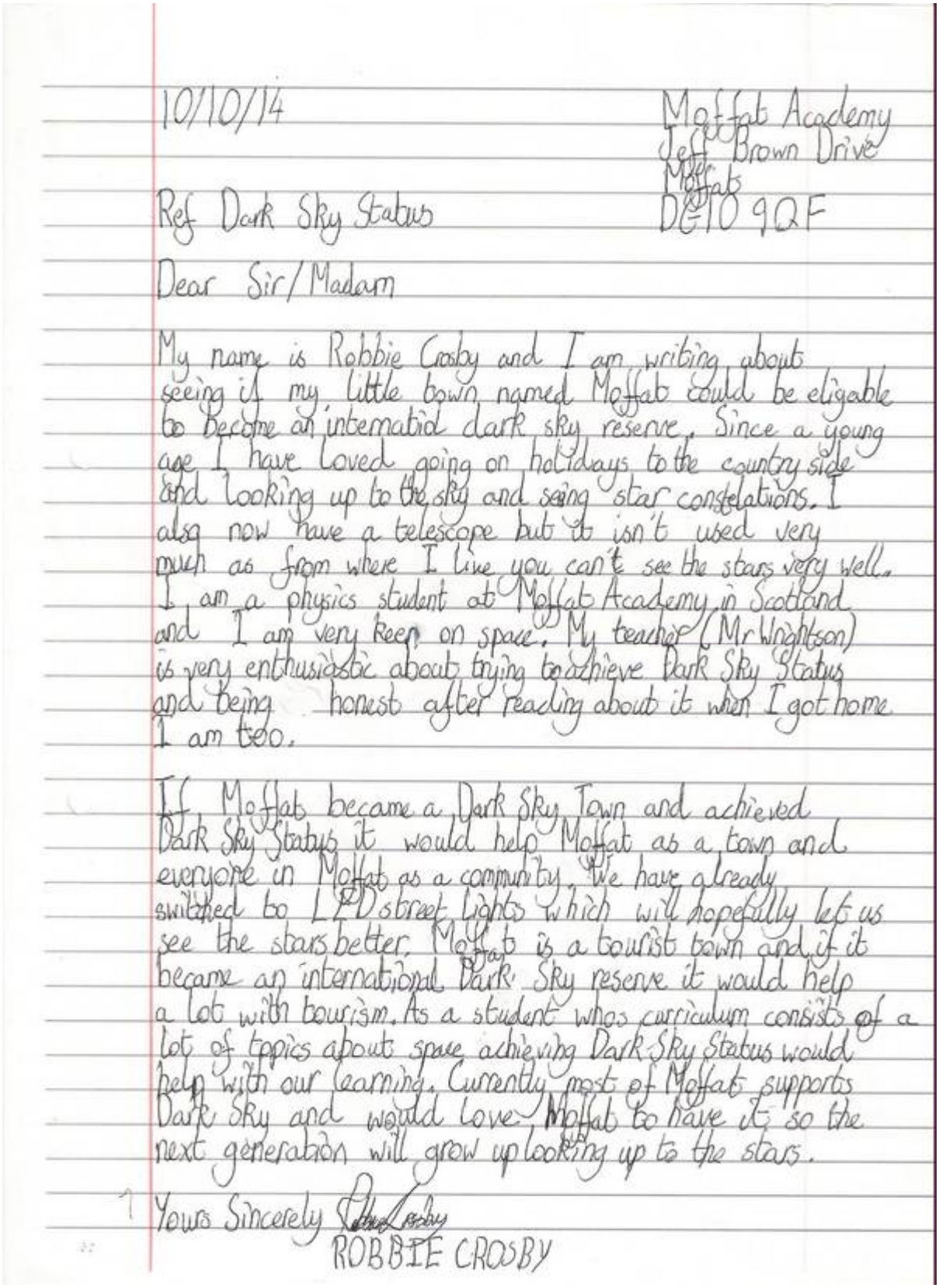
Dear sir/Madam

I am 14 years old boy who took Phisics at Moffat Academy, I really like the space but there is only one problem I can't get a good view because we don't have a telescoop. But We have all readey got LED Street lights.

At Moffat academy in phicics we all want a International dark Sky resrorty to get this we are going to go round moffat area and see how many people want dark sky resrorty and then rasie money for the resrorty. Hopefully you see where I am coming from

yours sincerly

Fraser Rankine



10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
DG10 9QF

Ref Dark Sky Status

Dear Sir/Madam

My name is Robbie Crosby and I am writing about seeing if my little town named Moffat could be eligable to become an internatiol dark sky reserve. Since a young age I have loved going on holidays to the country side and looking up to the sky and seeing star constelations. I also now have a telescope but it isn't used very much as from where I live you can't see the stars very well. I am a physics student at Moffat Academy in Scotland and I am very keen on space. My teacher (Mr Wightson) is very enthusiastic about trying to achieve Dark Sky Status and being honest after reading about it when I got home I am too.

If Moffat became a Dark Sky Town and achieved Dark Sky Status it would help Moffat as a town and everyone in Moffat as a community. We have already switched to LED street lights which will hopefully let us see the stars better. Moffat is a tourist town and if it became an international Dark Sky reserve it would help a lot with tourism. As a student whos curriculum consists of a lot of topics about space achieving Dark Sky Status would help with our learning. Currently most of Moffat supports Dark Sky and would love Moffat to have it so the next generation will grow up looking up to the stars.

Yours Sincerely

ROBBIE CROSBY

10/10/14

Moffat Academy
Jess Brown Drive
moffat
DG10 9QF

Dear Sir/Madam

I am Writing to you today to inform you of our bid to gain Dark Sky Status in our area.
At Moffat Academy, I have been Studying physics and we recently have been discussing Space and the Stars. We eventually came up with a idea that we could gain Dark Sky Status in Moffat. We already have been reducing emissions in many ways so at Night you can see the Stars.
I enjoy the thought of sitting at night with a telescope, identify the Stars, Moffat is a town with a population of 2,000. Nearby are a couple of small villages such as Beattock. We recently installed in the town new Led Street Lamps which use less energy and cause very little light pollution.
Not far from here (Around 70 miles) is another area which has gained Dark Sky status called Galloway forest park. We hope that we become the Second Area in Dumfries and Galloway. I hope you go ahead with the plans for our town to gain Dark Sky Status.

Yours Sincerely,
David Lennox, S2 - Moffat Academy.

10/10/14

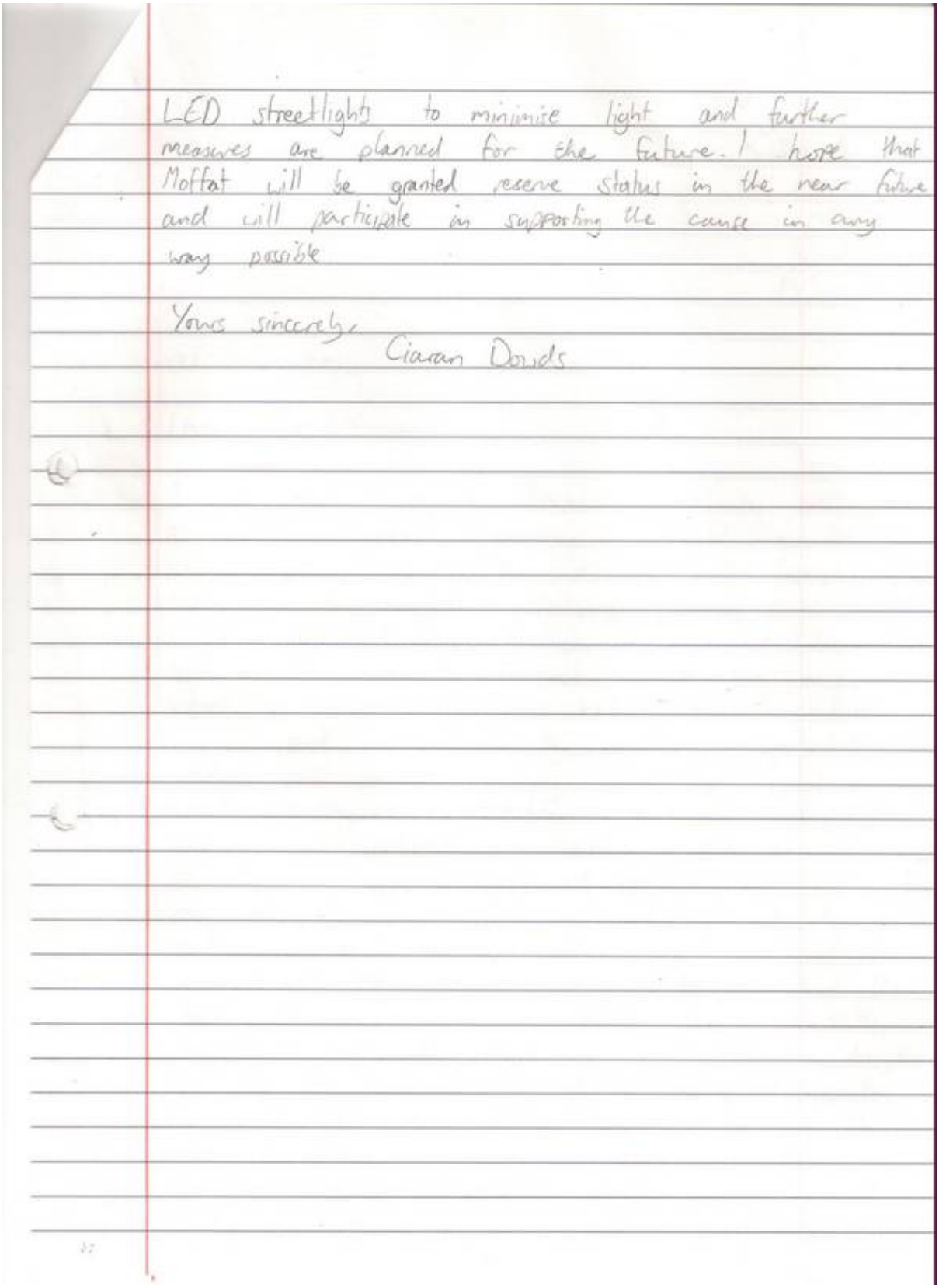
Moffat Academy
Jeff Brown Drive
Moffat
Scotland
DG10 9QF

ref: International Dark Sky Reserve

Dear Sir/Madam,

As a member of the local community and physics student at Moffat Academy I would like to express my support for a Dark Sky Reserve around Moffat. I am currently studying physics at National 5 level and I am intending to carry it forward to higher and advanced higher levels in my following years at school. My interest in Physics extends out with school and is one of my personal hobbies which I enjoy studying and pursuing in my spare time. My favourite area of physics is electronics however I do enjoy learning about astronomy and cosmology and feel it is an extremely important area of physics that has yielded some of the most amazing and important discoveries about our world. In the last century light pollution has damaged the relationship between humanity and the stars and in many areas people cannot see the stars at all. For this reason, I would like to strengthen the link by controlling the light pollution and granting the people of Moffat, Scotland and the rest of the world a place to visit and enjoy the stars.

Already the community have made progress by installing



LED streetlights to minimise light and further measures are planned for the future. I hope that Moffat will be granted reserve status in the near future and will participate in supporting the cause in any way possible

Yours sincerely,
Ciaran Dowds

10/10/14

Moffat Academy
Jess Brown Drive
Moffat
Dumfries & Galloway
Scotland
DG10 9QF

Ref: International Dark Sky Reserve

Dear Sir/madam

I am a 4th year student at Moffat Academy and currently studying Physics at Nationals level. I would love for a Second Dark Sky Reserve in my region as quite often looking up at the stars I am bussled on how large Space actually is and wonder if it ever ends. Our old system used Sodium lighting but was recently changed to LED lighting. I am writing this letter because I think a Dark Sky Reserve would really benefit our community and other communities around the so people was an enhance view on how beautiful Space is and how lucky we actually are.

Yours sincerely

Cameron Wylie

10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
Dumfries and Galloway
Scotland
DG10 9QF

Ref: International Dark Sky Reserve

Dear Sir/Madam,

I am an S4 student studying National 5 physics at Moffat Academy. A large part of the course is focused around the study of space and the physics behind it. I would like to express my support for Moffat to become an International Dark Sky Reserve. I believe this would help the community and would also increase my knowledge of physics. As it would allow us to further our studies in physics. The street lighting has recently been changed from sodium lighting to LED lighting. The physics department are hoping to acquire a telescope to further observe the sky. I am expressing my support for Moffat to become an International Dark Sky Reserve and I hope it will be granted in due course.

Yours sincerely

G. Smith

Gary Smith

10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
Dumfries + Galloway
Scotland
DG10 9QF

ref: International Dark Sky Reserve

Dear, Sir / Madam

I am a S4 student at Moffat academy in Dmfries and Galloway studying nationa 5 physics.

A substancial part of our course deals with Astronomy and space. To be listed as an International Dark Sky Reserve would benifit me, and my community by being able to exploit the natural resources we have to learn from, the stars.

The local community have replaced the old sodium lighting in the streets, there are now Led lighting which substantially reduces light pollution helping us see the sky more at night.

I would love to see my town granted Dark Sky status, I hope this is granted in due course. yours sincerely Alison Paton.

10 October 2014

Moffat Academy
Jeff, Brown Drive
Moffat
Dumfries and Galloway
Scotland
DG 10 9QF

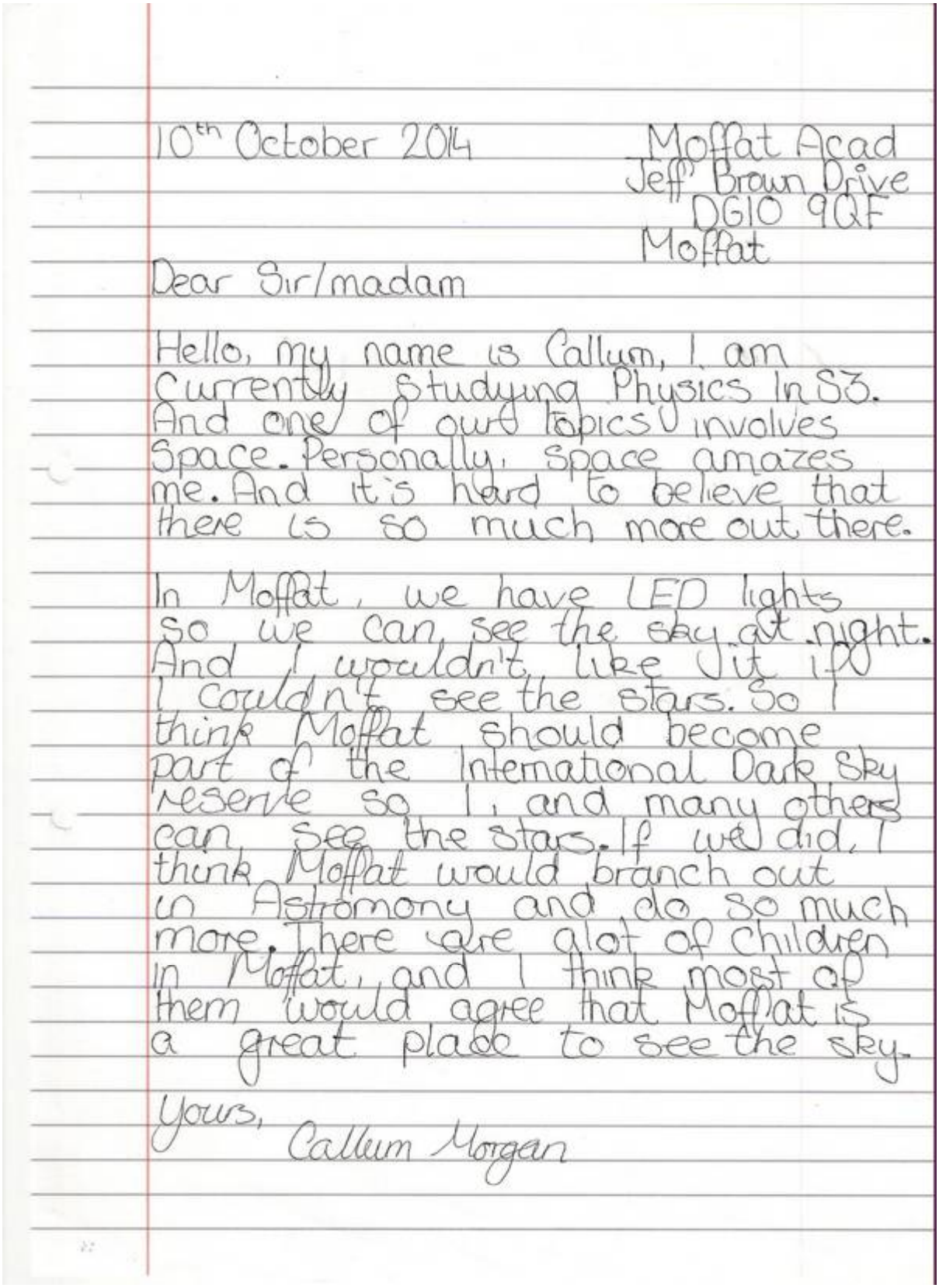
Ref: International Dark Sky Reserve

Dear sir/madam

I am a student studying Higher Physics at Moffat Academy. I am currently in S6. Part of our course is has topics relating to astrophysics.

I live in a beautiful place and ~~want~~ ~~x~~ ~~dont~~ want to be able to look at the sky and see the stars. So if we got rid of the street lights and replaced them with LED lights we would be able to see the sky at night.

~~Yours~~ Your sincerly Michelle



10th October 2014

Moffat Acad
Jeff Braun Drive
DG10 9QF
Moffat

Dear Sir/madam

Hello, my name is Callum, I am currently studying Physics In S3. And one of our topics involves Space. Personally, space amazes me. And it is hard to believe that there is so much more out there.

In Moffat, we have LED lights so we can see the sky at night. And I wouldn't like it if I couldn't see the stars. So I think Moffat should become part of the International Dark Sky Reserve so I, and many others can see the stars. If we did, I think Moffat would branch out in Astronomy and do so much more. There are alot of children in Moffat, and I think most of them would agree that Moffat is a great place to see the sky.

Yours,
Callum Morgan

10/10/14

Moffat Academy
Jeff Brown Drive
Moffat
Dumfries and Gallaway
Scotland
DG10 9QF

Ref: International Dark Sky Reserve

Dear Sir/Madam

I am writing to you with regards to the Dark Sky Reserve. Currently I am a student at Moffat Academy and I am on my fifth year of Secondary. I am studying Higher Physics at the moment and part of the course is related to Space. In an effort to achieve Dark Sky Status the community of Moffat have come together and replaced all of the old street lights with new LEDs.

Living in the countryside, we take these things for granted and don't actually realise how privalleged we are to actually get to see the stars in the sky each night. Watching the stars, many questions come to mind and I hope that by being given Dark Sky Status, many more people with look to the stars.

Yours Sincerely

Bruce Kirkpatrick

Eloise Fritsch
Moffat Academy
Moffat
Jeff Brown Drive
DG10 9QF

10th October 2014
International Dark Sky Reserve

Dear Sir / Madam,

I am Eloise Fritsch, a physics student at Moffat Academy. As I take physics, I have to study Space - and that is actually one of the reasons why I chose the subject.

In Moffat, we have LED lighting and lots of people in the community hope to add to this by building an observatory. The physics department in Moffat Academy also wants to get a telescope and set up an astronomy club.

Personally, I think that the stars are beautiful and I am glad that the community are trying to get a Dark Sky Status. And although I am not particularly interested in the astronomy behind stars, I know that having things like an observatory and Dark Sky Reserve would benefit my studies and please people in my area.

Yours sincerely,
Eloise Fritsch

Emma Carlyle
Moffat Academy
Jeff Brown Drive
Moffat
DG10 9QF

International Dark Sky Reserve
Dear Sir / Madam,

I am Emma Carlyle, a physics student in 3rd Year at Moffat Academy. As part of our physics cours we have to study space.

In Moffat we currently have LED street lights to stop light polution & secure the Dark Sky status we have.

I personally dont have any interests on the stars but I can see how it would benefit others & my education, when we come on to learning about stars.

Yours sincerely
Emma Carlyle

International Dark Sky Reserve

Fraser Mackerson

Moffat Academy
Jeff Brown Drive
Moffat
Dumfries and Galloway
Scotland
DG10 9QF

10/10/14

Reference :- International Dark Sky Reserve

Dear Sir/Madam,

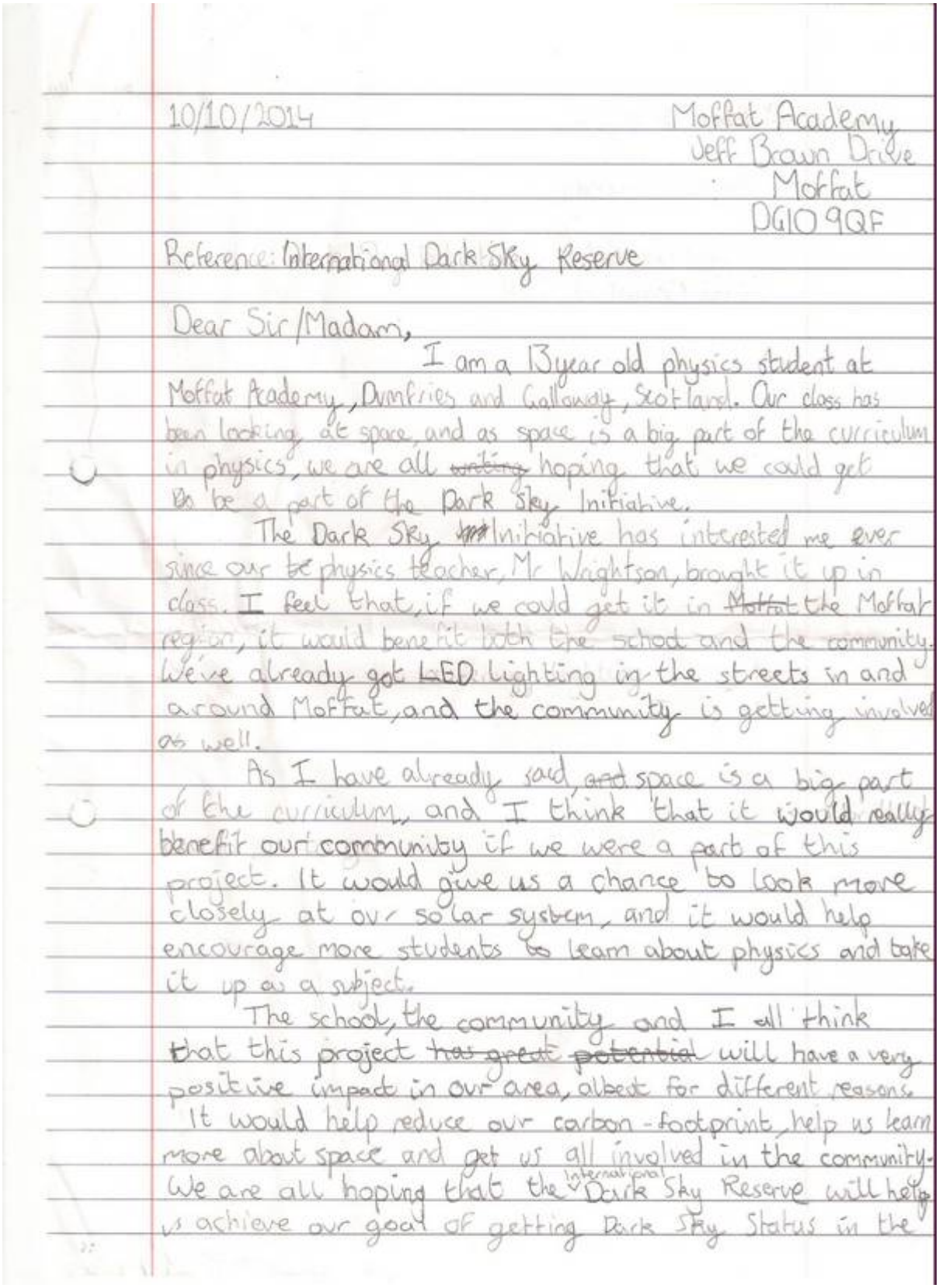
As a pupil at Moffat Academy I'm studies Physics at National 5, and having a substantial part of our curriculum based around space and astrophysics I am a keen supporter of the dark sky initiative.

As a step towards this the local community have started using LED lighting to replace the previous sodium lights, this has been able to decrease light pollution in our community. Our physics department are hoping to obtain a telescope and the local community an observatory.

I'm writing this letter to support my school and community in hope that this is going in due course.

Yours Sincerely

Fraser Mackerson



10/10/2014

Moffat Academy
Jeff Brown Drive
Moffat
DG10 9QF

Reference: International Dark Sky Reserve

Dear Sir/Madam,

I am a 13 year old physics student at Moffat Academy, Dumfries and Galloway, Scotland. Our class has been looking at space, and as space is a big part of the curriculum in physics, we are all ~~writing~~ hoping that we could get to be a part of the Dark Sky Initiative.

The Dark Sky ~~Park~~ Initiative has interested me ever since our physics teacher, Mr Wightson, brought it up in class. I feel that, if we could get it in ~~Moffat~~ the Moffat region, it would benefit both the school and the community. We've already got LED lighting in the streets in and around Moffat, and the community is getting involved as well.

As I have already said, and space is a big part of the curriculum, and I think that it would really benefit our community if we were a part of this project. It would give us a chance to look more closely at our solar system, and it would help encourage more students to learn about physics and take it up as a subject.

The school, the community and I all think that this project ~~has great potential~~ will have a very positive impact in our area, albeit for different reasons. It would help reduce our carbon-footprint, help us learn more about space and get us all involved in the community. We are all hoping that the International Dark Sky Reserve will help us achieve our goal of getting Dark Sky Status in the

James Craig

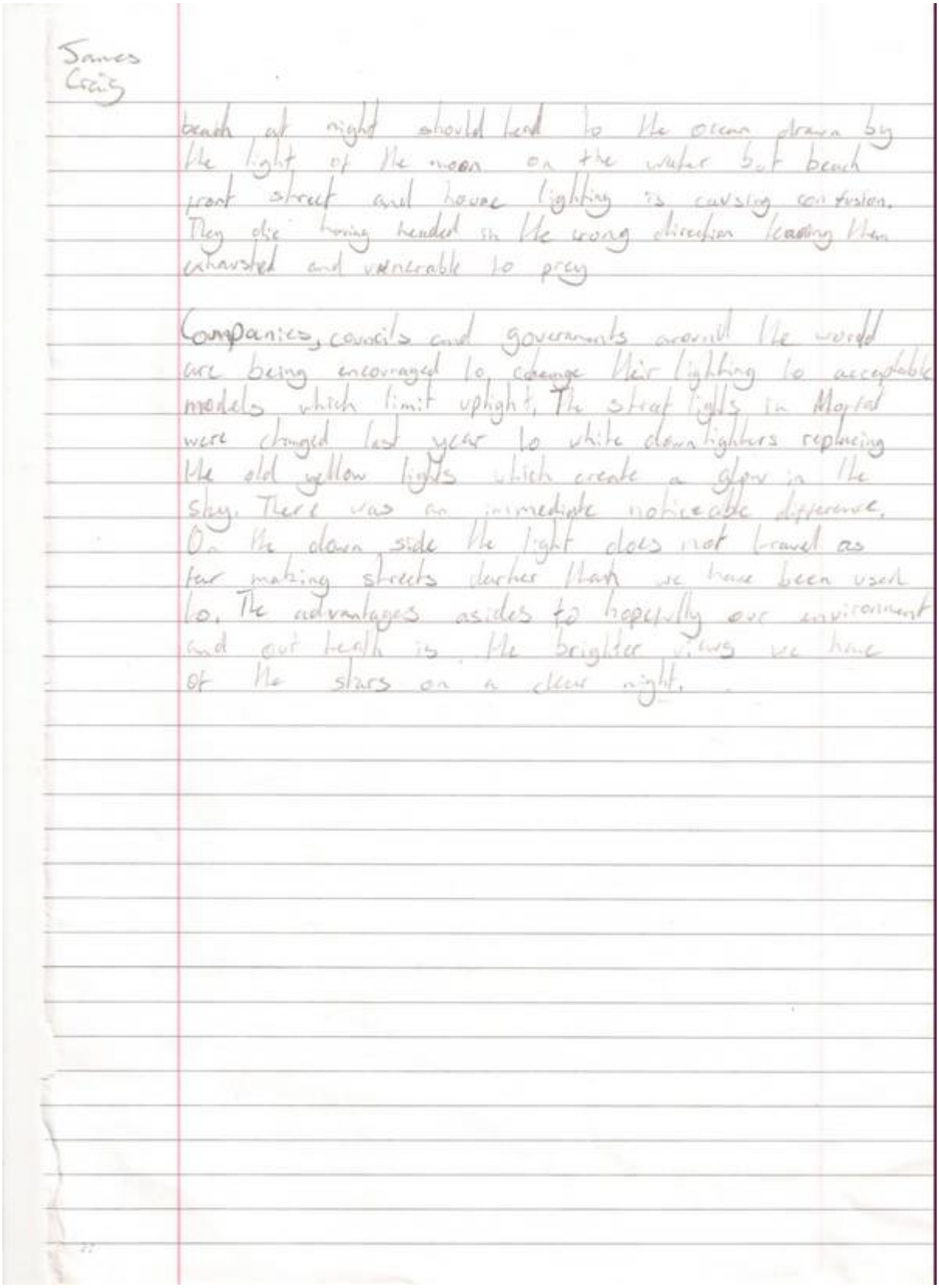
International Dark-sky Report

The International Dark-sky Association was founded to educate and inform people around the world about light pollution. It was started nearly 35 years ago in 1988. Light pollution is defined as- "any negative effect of artificial light, including light that creates sky glow, glare, light trespass, light clutter, bad visibility at night and energy waste." Definitions:-

- Sky glow is brightening of night sky over cities.
- Light trespass is light falling where its not needed or wanted.
- Glare is too much brightness.
- Light clutter is bright and confusing groupings of lights.

The IDA's main concerns are the energy wasted and the effect too much light has on our natural state. Energy costs speak for themselves and we are all aware of the arguments surrounding production and costs of producing power. However the IDA states our health is at risk due too much light. The artificial light at night confuses our bodies and their circadian rhythm. Circadian means 24 hour period. Light dictates to the brain when we should wake and when we should sleep. It has been the part of human evolution. The IDA claim that when these cycles become too unbalanced it takes its toll on our bodies and makes us less efficient at fighting off cancer and other diseases.

Animals are also being affected. Whether they are diurnal or nocturnal they all need darkness to keep their cycles correct. Examples are given on their website of birds flying into search lights or tall bright buildings and becoming disorientated. Turtles born on a



James
Craig

beach at night should lead to the ocean drawn by the light of the moon on the water but beach front street and house lighting is causing confusion. They are being headed in the wrong direction leaving them exhausted and vulnerable to prey

Companies, councils and governments around the world are being encouraged to change their lighting to acceptable models which limit uplight. The street lights in Moffat were changed last year to white down lighters replacing the old yellow lights which create a glow in the sky. There was an immediate noticeable difference. On the down side the light does not travel as far making streets darker than we have been used to. The advantages asides to hopefully our environment and our health is the brighter views we have of the stars on a clear night.

moffat CAN
CARBON NEUTRAL

Old Church Depot, Annanside,
Moffat DG10 9HB
Tel 01683 221847
E-mail: info@moffatcan.org
www.moffatcan.org

27th August 2014

Dear Dark Sky Association,

I am writing on behalf of Moffat CAN (Carbon Neutral) www.moffatcan.org. We are a registered charity with aims which focus on carbon reduction and education. We operate as a social enterprise, offering local jobs and training, especially for those with barriers to employment. In line with our aims we have projects and enterprises in the key areas of concern for climate change: energy, food, waste, transport and purchasing. We run Scotland's first aquaponicum, harvesting fish and fruit and veg in water and Scotland's first mushrooms from waste coffee enterprise.

Our site in Moffat is set up as a microcosm of a low-carbon society, and we run thousands of tours every year for visitors from around the country and abroad. At the moment we are planning to develop this side of our educational activity by developing our community-owned building and land.

We are, in particular, keen to develop the tower of our building, which is an old church. We wish to build up the old tower to its original height, based on old photos given to us by a local historian. We very much wish to transform this tower into an Observatory, having been inspired by the likelihood of Dark Sky Status for Moffat, following the recent very successful project in our town, converting all street lighting to low energy lighting. This is something we feel very strongly about, as tackling light pollution is of importance to us as a carbon reduction organisation.

We wish to move forward with funding applications to turn our tower into an Observatory, but would really need to back up any application with Dark Sky Status, to have any chance of success. We had thought that Dark Sky Status would be awarded to our town, given the success of our street-lighting project. However, we understand there has been a delay with this. We would be really grateful if you could update us on progress, as we are enthusiastic to be a part of acquiring the status for our town and to build it into our development plans. Our organisation has a very strong record of achieving funding and delivering successful projects on time.

I look forward to hearing from you.

With best wishes,

Alis R Ballance

Alis Ballance, CEO

Moffat CAN Ltd Co. No. 354379 Scottish Charity No. SC040255

SUPPORTING
THE SOPHIE NORTH TRUST FUND

Mr Jim Patterson
Rosemount
Well Road
Moffat
5/8/14

Dear Mr Patterson,

I am writing to you with regards to the Moffat Dark Sky Initiative and to show our support for such a worthy gathering.

Just to give you some background on The Green Frog. We are a combination of Garden Centre, fishery and fishing centre, shop and café with a covered outside seating area. There is also a large car park area on site even though we are only 10 minutes' walk from the town centre.

Importantly though, for the Dark Sky's Initiative there is a wonderful view of the nights sky on clear nights with no buildings or interruptions. I was very impressed to see the space station passing over head a couple of weeks ago, and I often see many shooting stars when leaving after some of our late night functions.

The yellow sky glow from the old street lighting is now in the "dim" passed and I think this location would make an ideal spot for stargazing parties. The Green Frog features in the external lighting master plan as one of the measurement points for the sky quality monitoring.

In Order to increase our winter usage we ran a few events and parties in the evenings and would be more than happy to run facilities for star gazing parties if this should arise.

We at The Green Frog, fully support any initiative to promote the quality of the night sky without pollution.

Thanks for taking time to read our letter of support.

Yours sincerely

Kris Allan AKA the green frog

THE GREEN FROG | HAMMERLANDS | MOFFAT | DG10 9HU TEL | 01683 221220

Subj: **Neil Adams added a comment to your profile on Moffat Online**
Date: 15/09/2014 11:31:46 GMT Daylight Time
From: mail@moffatonline.co.uk
Reply-to: do-not-reply@moffatonline.co.uk
To: JandDPaterson@aol.com

Neil Adams added a comment to your profile on Moffat Online

The work done with the street lighting in Moffat for the "Dark Skies Project" is truly excellent. What a difference the lights have made.

This has encouraged me to look at my own lighting at home, I have planned LED lighting for my car parking area and have just ordered LED replacement bulbs for PIR lights on my out house. I have also fitted LED lighting wherever I can inside the house.

Outside I am hoping it will help with the Dark Skies Project and I know that overall it will certainly help with my energy consumption.

To view the full comment, visit:
http://www.moffatonline.co.uk/profiles/comment/list?attachedToType=User&attachedTo=0vubk0vaskwg2&commentId=2782450%3AComment%3A74136&xgsi=1&xg_source=msg_com_profile

To reply to the comment, visit:
http://www.moffatonline.co.uk/profile/NeilAdams?xgsi=1#com

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To disable email notifications for comments on your profile, go to:
http://www.moffatonline.co.uk/profile/JamesPaterson?xgsi=1&unfollowMyPage=1&xg_source=msg_com_profile

To control which emails you receive on Moffat Online, go to:
http://www.moffatonline.co.uk/?xgo=Kw7juTQHsz4Ke3essY2j0VAYxVkHDaiF/XjAHDzs4golpteQCH0dPg&xg_source=msg_com_profile

16 September 2014 AOL: JandDPaterson

Adam Anderson

Chair Moffat and District Community Council.

David Booth

17 meadow Bank,

Moffat. DG10 9LR

Re dark Sky project Moffat ..

Many Months ago now Jim Paterson, carried out a survey at my property with respect to our outside lighting and compliance with dark sky status .

I can confirm that following the survey and Jim's advice we have converted all of our outside lighting (some 8 in all) to a system compatible with the dark sky project , and took the opportunity to fit LED's. Reducing both the light spread and the power bill into the bargain.

Hopefully this letter and others will pursued the "powers that be "that the town of Moffat should be award the coveted Dark Sky Status.

I am more than happy to provide more information or be involved in whatever form to further this particular project.

Yours sincerely

D M Booth

David Booth

23/9/14.

James H Paterson