



TABLE OF CONTENTS

1.0 Enactment	3
2.0 Preamble	3
3.0 Definitions	3
4.0 General Requirements	4
4.1 Shielding	
4.2 Lamp types	
4.3 Voluntary light curfews	
5.0 Street Lighting	5
6.0 Signage	5-6
7.0 Enhanced Preservation Areas	6-8
7.1 Observatories	
7.2 Curfews	
7.3 Signage	
7.4 Miscellaneous	
8.0 Prohibitions	9-10
8.1 Shielding	
8.2 Lamps	
8.3 Laser Light Sources	
8.4 Outdoor Advertising Signs	
8.5 Streetlights	
8.6 Searchlights	
8.7 Light Trespass	
8.8 Glare	
9.0 Exemptions	10-11
9.1 Temporary Exemptions	
9.2 Permanent Exemptions	
9.3 Grandfathering of Existing Luminaires	

10.0 Remedial Orders, Enforcement, Appeals	12
10.1 Remedial Orders and Enforcement	
10.2 Appeals	
11.0 Severability	12
Appendix	13-20

1. Technical Standards
2. Examples of Permitted and Prohibited Luminaires
3. Consolidated List of Definitions
4. Temporary Exemption Application

1.0 ENACTMENT

A bylaw to regulate light pollution.

The Council of the Municipal District¹ of Foothills No. 31 (herein referred to as: The MD) has passed, for three readings, Bylaw 27/2009, on April 16th, 2009, entitled the DARK SKY BYLAW. On June 15th, 2011, The MD passed for three readings an amendment to Bylaw 27/2009. The purpose and intent of Bylaw 27/2009 and subsequent amendments is to regulate the type of light source and fixture that is to be installed by any person² in the MD, thereby mitigating further light pollution, and reducing existing light pollution, that is shown (in certain instances) to adversely affect astronomical observation, plant and animal cycles, and the safety and health of those persons within the MD.

2.0 PREAMBLE

The DARK SKY BYLAW will be exclusive of the Municipal Development Plan (bylaw 139/98 and 30/04) and the Land Use Bylaw (1/99) of the MD and any amendments and rewritings of the abovementioned documents.

The DARK SKY BYLAW will bring into immediate effect the prohibition of inefficient³ incandescent light bulbs for outdoor use, in accordance with the Government of Canada's decision to phase out the sale and use of ALL inefficient light bulbs by the year 2012 (Government of Canada 2008).

¹ **Municipal District:** the Municipal District of Foothills No. 31, a Municipal District duly established pursuant to the laws of the Province of Alberta, or the area within the legal boundaries of the Municipal District of Foothills No. 31.

² **Person(s):** includes a corporation, other legal entities and an individual having charge or control of a premises.

³ **Efficiency:** relative to lighting, efficiency is calculated by how many lumens (a unit of light measurement) a light source can produce per watt of power input. The higher the lumens per watt, the more efficient the light source is.

3.0 DEFINITIONS

The definitions pertinent to this bylaw are embedded within the document to ensure ease of understanding for the reader. The embedded definitions are in footnotes at the end of each page, with a consolidation of definitions available in the appendix.

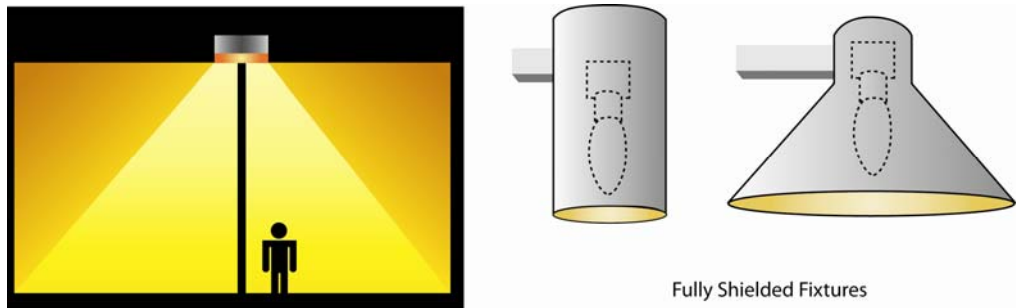
4.0 GENERAL REQUIREMENTS

All development approved after the passing of this bylaw is subject to the rules and regulations set out herein.

4.1 Shielding

FULL CUT-OFF⁴ fixtures⁵ shall be installed for all exterior lighting and all fixtures shall be oriented as to direct ALL light below the horizon⁶. See Figure 1.

Figure 1



4.2 Lamp⁷ Types

Permitted lamps within the MD are restricted to specific types of High Intensity Discharge (HID) light sources. Please see the *Technical Standards* section of the appendix (page 14).

⁴ **Full cut-off fixture:** A light fixture that does not allow any light dispersion above the horizontal plane, and whose lamp (bulb) is recessed fully within the housing of the fixture itself.

⁵ **Fixture:** the assembly that houses the lamp(s) and can include all or some of the following parts; housings, mounting brackets, and pole sockets.

⁶ **Horizon:** the apparent intersection where the earth meets the sky, also referred to as the *apparent* horizon.

⁷ **Lamp:** the component of a luminaire (complete lighting system including lamp and fixture) that produces light, commonly referred to as a light bulb.

4.3 Voluntary Light Curfews

ALL residential, commercial, industrial, recreational, and institutional users of exterior night time illumination are encouraged to extinguish luminaires when not required.

5.0 STREET LIGHTING

In addition to the MD street lighting policy, adopted April 19, 2001 (ADC-STN-1), ALL streetlights installed after the adoption of this bylaw shall be of the cut-off⁸ flat lens fixture variety (see Figure 2). Furthermore, ALL streetlights shall be subject to the standards set out in the *Technical Standards* section of the appendix (page 14).

Figure 2



Flat lens cobra head fixture (permitted)



Drop lens cobra head fixture (prohibited)

6.0 SIGNAGE

ALL signage in the MD is regulated by Section 10.11 of the Land Use Bylaw. Further to the regulations set out in Section 10.11 of the Land Use Bylaw, ALL new signage in the MD requiring night-time illumination shall be illuminated only from the top of the sign, and only with full cut-off fixtures, oriented such that ALL light will be directed downward and below the horizon (see Figure 3).

ALL signage in the MD installed prior to the passing of this bylaw that is used for advertising/entertainment purposes that does NOT comply with the above regulation shall be required to extinguish artificial illumination by⁹:

- 11 pm between April 1st and September 30th

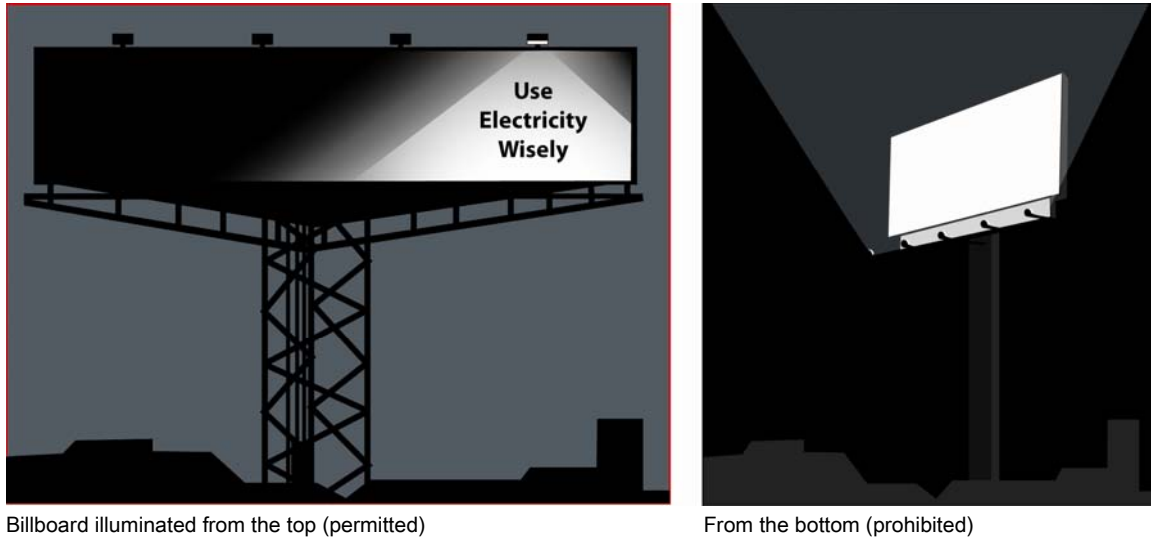
⁸ **Cut-off fixture:** a fixture allowing no more than 2.5% of direct light emitted above the horizontal plane.

⁹ Curfews are generally aligned with the Vernal (March 20-21) and Autumnal (September 22-23) Equinoxes.

- 9 pm between October 1st and March 31st

UNLESS approved business hours¹⁰ surpass the prescribed curfew times.

Figure 3



7.0 ENHANCED PRESERVATION AREAS

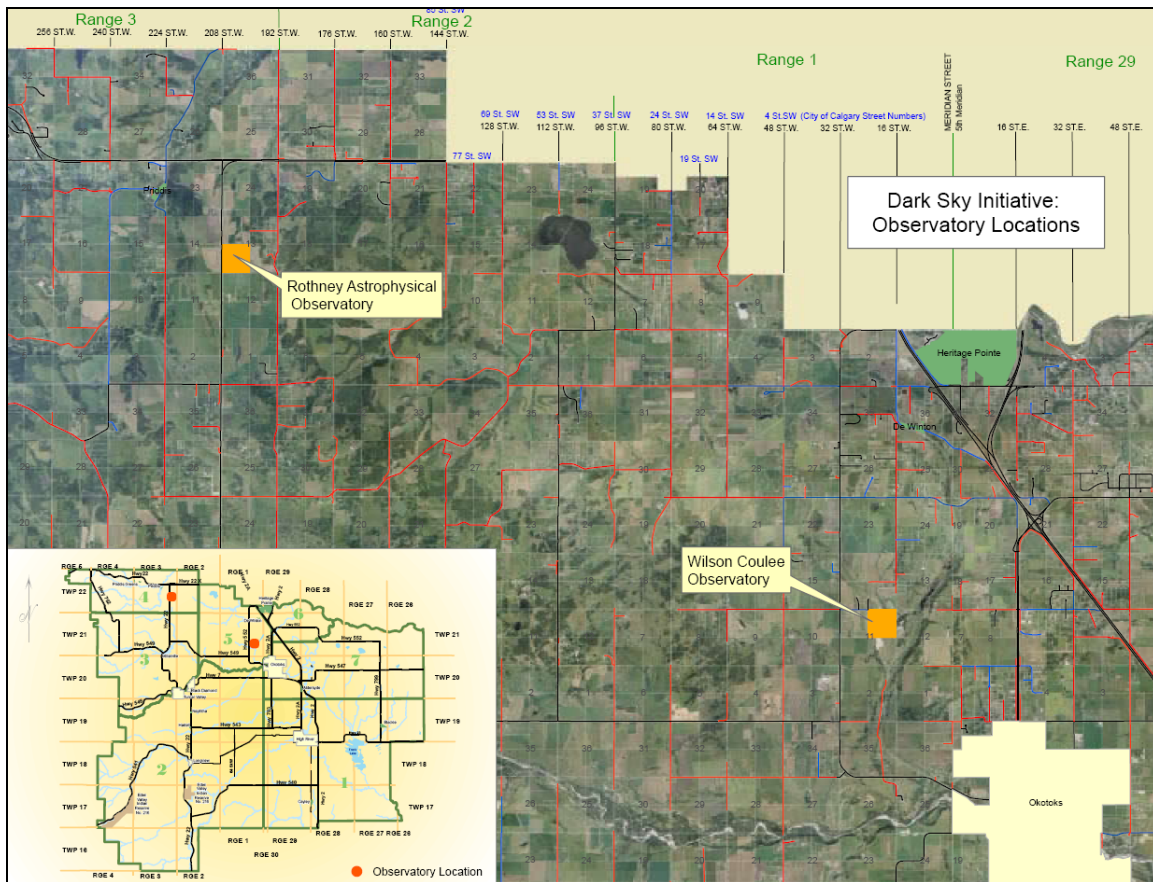
The following regulations will apply within the identified *Enhanced Preservation Areas* shown around the observatories in Figure 5.

7.1 Observatories

The University of Calgary's Rothney Astrophysical Observatory (RAO) and the Royal Astronomical Society of Canada's Wilson Coulee Observatory (WCO) are situated within the boundaries of the MD. See Figure 4.

¹⁰ **Business hours:** those operating hours as outlined in the business's Development Permit.

Figure 4



Geographic location of the RAO and WCO

7.2 Curfews

ALL existing sources of exterior illumination, including but not limited to residential, commercial, industrial, recreational, institutional, and signage for the purposes of advertising/entertainment that do NOT comply with pertinent sections of this bylaw shall be turned off by¹¹:

- i. 11 pm from April 1st to September 30th
- ii. 9 pm from October 1st to March 30th

When enforcing Section 7.2 of this bylaw, the municipality may take into account any practical considerations, including business hours of operation seasonal nighttime differences, and so on.

¹¹ Curfews are generally aligned with the Vernal (March 20-21) and Autumnal (September 22-23) Equinoxes.

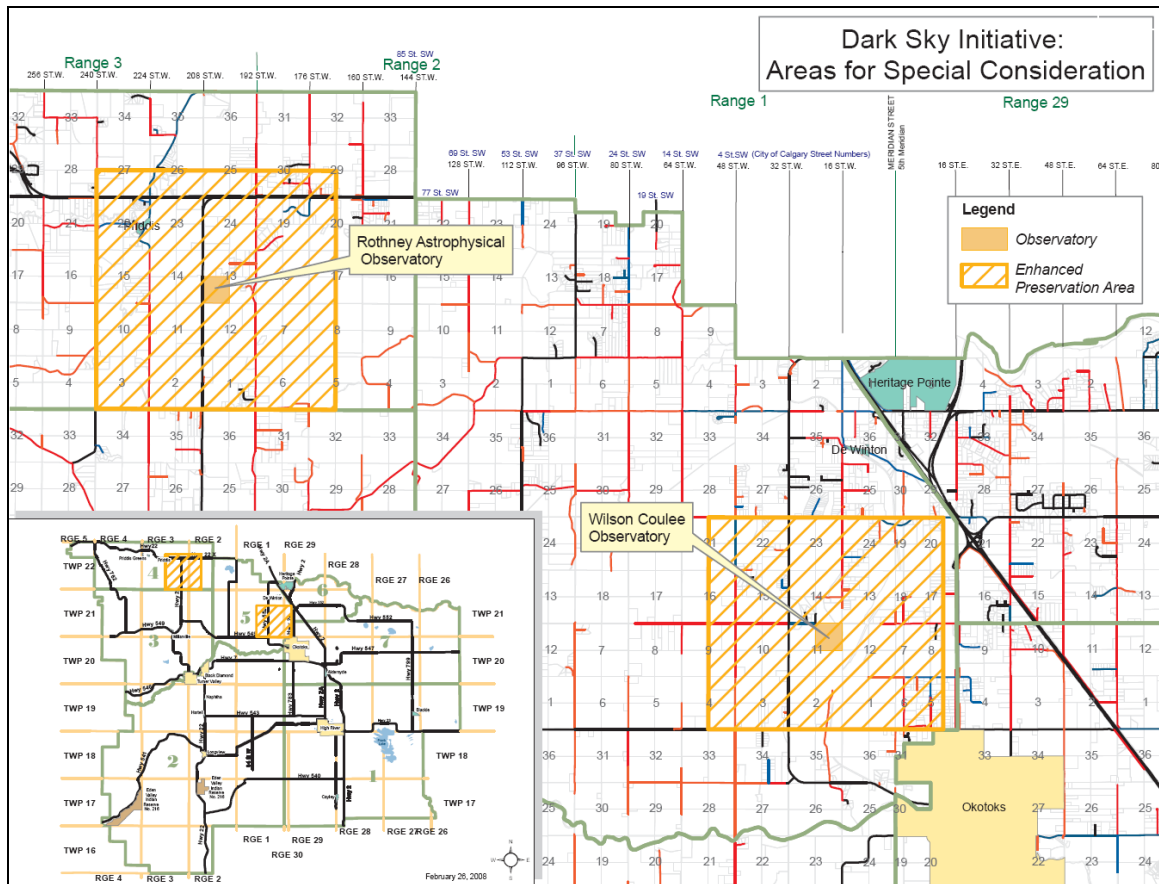
7.3 Signage

No new illumination for the purpose of advertising/entertainment shall be permitted within the specified radius of the observatories. See Figure 5.

7.4 Miscellaneous

ALL persons residing within the specified radius are encouraged to use the least powerful lamps possible for their outdoor lighting needs and take the steps necessary to make existing lighting compliant with this bylaw.

Figure 5



Enhanced Preservation Area surrounding both the RAO and WCO

8.0 PROHIBITIONS

8.1 Shielding

ALL luminaires that are not fully shielded and are not exempt as per Section 9 of this bylaw, are prohibited for use in the MD.

8.2 Lamps

To align with the Government of Canada's phasing out of all inefficient lamps by 2012, inefficient incandescent lamps are strictly prohibited for exterior use in the MD, effective immediately. Furthermore, the use of mercury vapor lamps is also prohibited for exterior applications in the MD.

8.3 Laser light sources

The use of laser light sources for outdoor advertising and/or entertainment purposes is prohibited.

8.4 Searchlights¹²

The operation of searchlights for advertising and/or entertainment purposes is prohibited.

8.5 Outdoor advertising/entertainment signs

Illumination of existing non-compliant outdoor signage after approved business hours is prohibited unless the luminaire is retrofitted to be fully shielded and oriented as to direct ALL light below the horizon. ALL new signage illumination MUST be compliant with this bylaw.

8.6 Streetlights

The use of drop lens cobra head light fixtures for street lighting purposes is prohibited. Only flat lens streetlight fixtures are permitted.

¹² **Searchlight:** A luminaire containing a light source and a reflector for throwing a high-intensity beam of generally parallel beams of light.

8.7 Light Trespass¹³

Effective immediately, no luminaire shall be oriented such that the light it emits trespasses beyond the property line on which the luminaire is situated, see Figure 6.

Figure 6



8.8 Glare¹⁴

No luminaire that produces glare due to its bulb type, power, and/or orientation, shall be permitted.

9.0 EXEMPTIONS

9.1 Temporary Exemptions

Temporary activities may be exempt from the regulations set out in this bylaw on a provisional basis. Those persons granted exemptions are required to extinguish lighting immediately after the use has ended, and furthermore, are encouraged to ensure that, if possible, the lighting fixtures used for temporary purposes are fully shielded, whether it is achieved through retro-fitting, or the acquisition of fully shielded light fixtures at the time the lighting is purchased. Any persons granted temporary exemptions that in the future become permanent shall be required to adhere to this bylaw. Please see Section 3 of the appendix for further information on temporary exemptions, including a copy of the Temporary Exemption Application.

¹³ **Light Trespass:** the shining of light produced by a luminaire beyond the boundaries of the property on which it is located.

¹⁴ **Glare:** light emitting from a luminaire with intensity great enough to reduce visibility and in extreme cases momentarily blind observers.

9.2 Permanent Exemptions

- i. Intermittent¹⁵ activities including but not limited to the following areas are exempt from the regulations of this bylaw on a permanent basis and do not require the benefit of an approved Temporary Exemption Application.
 1. Agriculture
 2. Resource extraction
 3. Construction
 4. Filming
 5. Holiday lighting
- ii. Street lighting is partially exempt from Section 4.1 of this bylaw, requiring only cut-off fixtures and not full cut-off fixtures.
- iii. Street lighting is exempt from Section 7.2 of this bylaw on a permanent basis due to implications of safety on roadways.
- iv. Street lighting is partially exempt from Section 8.7 of this bylaw on a permanent basis due to the need for wide dispersion of street lighting for safety and efficiency purposes. Some trespass is permitted.
- v. Outdoor advertizing/entertainment signs within 500 metres of the right-of-way of Highway 2 (see Figure 7) may be internally illuminated by the use of neon lamps. Such signage must have opaque backgrounds only and any such lamps shall be fully enclosed in cabinets. Illumination of signage within this area must be extinguished outside of approved business hours. All aspects of this form of exempted signage are to the discretion of the Approving Authority.
- vi. Any activity or use that is regulated by a body superseding the authority and jurisdiction of the MD is exempt from this bylaw.

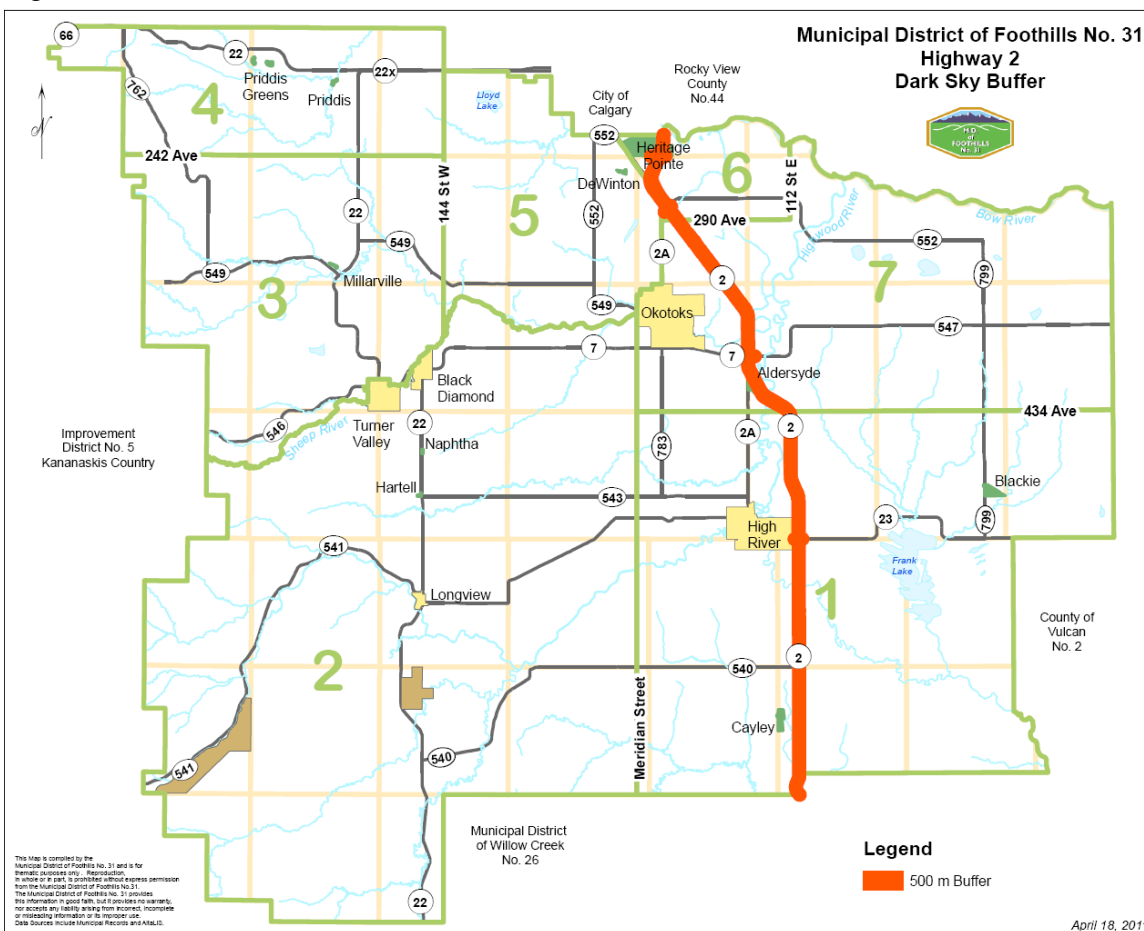
¹⁵ **Intermittent:** activities lasting 20 consecutive working days (approximately one month) or less, upon which exterior lighting is required at approximately the same time each night.

9.3 Grandfathering of Non-conforming Luminaires

- i. ALL luminaires and luminous signs lawfully in place prior to the date of the adoption of this bylaw shall be grandfathered. In the case that grandfathered luminaires are to be moved, repaired, or replaced for any reason, the luminaire shall then be required to meet the provisions set out in this bylaw.
- ii. Should grandfathered luminaires¹⁶ currently in place cause glare and/or light trespass, the owner is to rectify the situation at their earliest convenience. Should the owner choose not to do so, a remedial order may be issued.
- iii. The MD is committed to developing a program that will assist homeowners with retrofitting their existing non-compliant luminaires.

¹⁶**Grandfathered Luminaires:** luminaires not conforming to this bylaw in operation prior to the date of the passing of this bylaw.

Figure 7



Lands within 500 metres of the Highway 2 right-of-way.

10.0 REMEDIAL ORDERS, ENFORCEMENT, APPEALS

10.1 Remedial Orders and Bylaw Enforcement

- i. Should any part of the Dark Sky Bylaw not be adhered to, the responsible person(s) will be provided with a notification of the infraction, accompanied by a time limit in which it must be corrected.
- ii. Should the responsible person(s) choose not to correct the infraction in the time provided and in a manner deemed appropriate by the MD, a remedial order may be issued.

10.2 Appeals

The Community Standards Appeal Board shall be the board responsible for hearing appeals of remedial orders issued to person(s) that have not adhered to the regulations of the Dark Sky Bylaw.

11.0 SEVERABILITY

Should any part, section, subsection, or portion of this bylaw be repealed or declared by a court of competent jurisdiction to be illegal, the same shall not affect the validity of the bylaw as a whole or in part thereof, except for that which was declared to be invalid.

APPENDIX

1. Technical Standards
2. Examples of Permitted and Prohibited Luminaires
3. Consolidated List of Definitions
4. Temporary Exemption Application

Preamble

Technical Standards are subject to change as lighting technology advances and therefore the following technical standards outlined below may be amended from time to time.

Section 4, sub-section 4.2: Lamp Types

Permitted lamps within the MD are restricted to specific types of High Intensity Discharge (HID), and other light sources, including but not limited to:

1. High Pressure Sodium (HPS) *HID*
2. Low Pressure Sodium (LPS) *HID*
3. Light Emitting Diode (LED)
4. Quartz Halogen
5. Fluorescent (including but not limited to compact fluorescent)
6. Metal Halide *HID*
7. Neon (ONLY in the area identified in Figure 7 of the Bylaw)

Section 5: Street Lighting

ALL streetlights shall use LPS, HPS, LED, or metal halide lamps in streetlight design. The following lamp wattages are permitted for the corresponding application, in accordance with the Illuminating Engineering Society of North America (IESNA)¹⁷ recommendations.

1. 70 w for residential
2. 100 w for intersections
3. 100 – 200 w for major thoroughfares
4. 200 w for pole spacing ratio of greater than 5:1
5. Pole spacing ratio not to exceed IESNA luminance and uniformity standards
6. Pole spacing ratio assumes values 3:1 to 10:1 based on usage

¹⁷ **IESNA:** is the international body that acts as the standards committee for responsible outdoor lighting, the Illuminating Engineering Society of North America.

2 Examples of Permitted and Prohibited Luminaires



Permitted wallpack Luminaire



Prohibited wallpack luminaire



Permitted pole-mounted luminaire



Prohibited pole-mounted luminaire



Prohibited decorative luminaire
(Unshielded, exposed lamp)



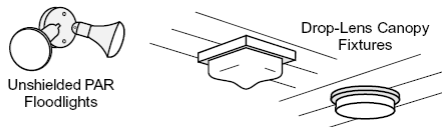
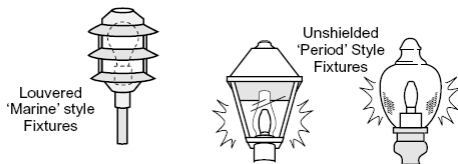
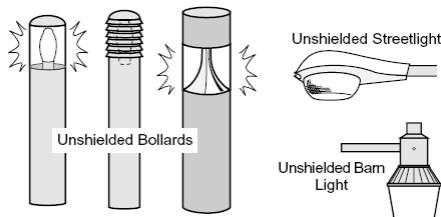
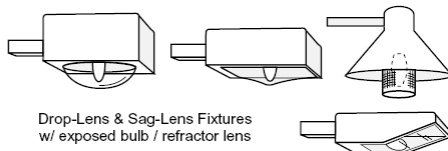
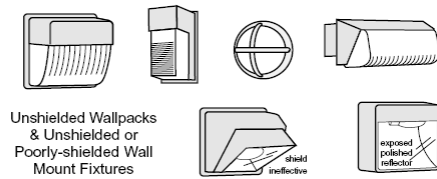
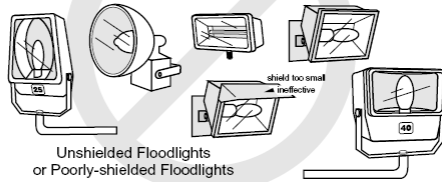
Prohibited decorative luminaire
(Unshielded, exposed lamp)

Better Lights for Better Nights

Help eliminate light pollution. Select the best fixture for your application using this guide. Use the lowest wattage bulb appropriate for the task and turn off the light when it's not being used.

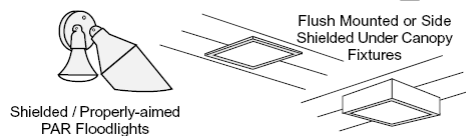
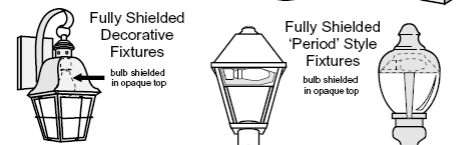
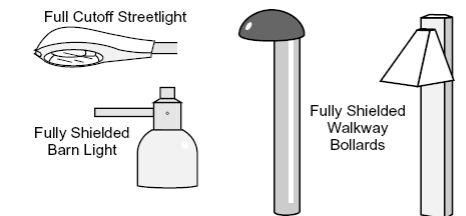
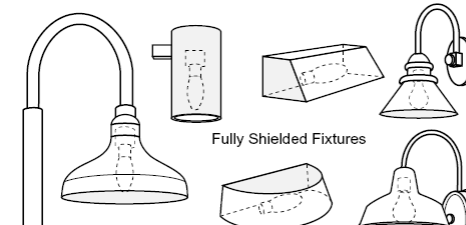
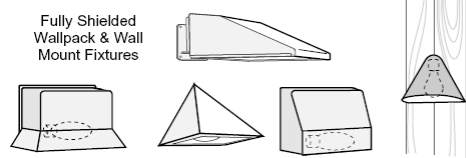
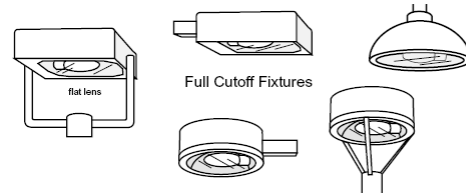
Unacceptable / Discouraged

Fixtures that produce glare and light trespass



Acceptable

Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night



Rendered for the Town of East Hampton, NY by Bob Crelin ©2005

presented by the

Dark Sky Society

www.darksksociety.org

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Business hours: those operating hours as outlined in the business's Development Permit.

Color Rendition: the visible wavelengths at which the lamp operates, sometimes making light appear as though it has a color to it, such as yellow or blue.

Cut-off fixture: a fixture allowing no more than 2.5% of all light emitted above the horizontal plane.

Efficacy: measured in lumens per watt, the ability of a lamp to produce illumination.

Efficiency: relative to lighting, efficiency is calculated by how many lumens (a unit of light measurement) a light source can produce per watt of power input. The higher the lumens per watt, the more efficient the light source is.

Fixture: the assembly that houses the lamp(s) and can include all or some of the following parts; housings, mounting brackets, and pole sockets.

Full cut-off fixture: A light fixture that does not allow any light dispersion above the horizontal plane, and whose lamp (bulb) is recessed fully within the housing of the fixture itself.

Glare: light emitting from a luminaire with intensity great enough to reduce visibility and in extreme cases momentarily blind onlookers.

Grandfathered Luminaires: luminaires not conforming to this bylaw that were in operation prior to the passing of this bylaw.

Horizon: the apparent intersection where the earth meets the sky, also referred to as the *apparent* horizon.

IESNA: is the international body that acts as the standards committee for responsible outdoor lighting.

Intermittent: activities lasting 20 consecutive working days (approximately one month) or less, upon which exterior lighting is required at approximately the same time each night.

Lamp: the component of a luminaire (complete lighting system including lamp and fixture) that produces light, commonly referred to as a light bulb.

Light Trespass: the shining of light produced by a luminaire beyond the boundaries of the property on which it is located.

Lumen: a unit of luminous flux equal to the light emitted in a unit solid angle by a uniform point source. In most instances the greater the number of lumens per watt of energy, the more efficient the lamp will be.

Lumen Maintenance: also referred to as lumen depreciation, is the loss in the ability of a luminaire to produce light over its lifespan.

Municipal District: the Municipal District of Foothills No. 31, a Municipal District duly established pursuant to the laws of the Province of Alberta, or the area within the legal boundaries of the Municipal District of Foothills No. 31.

Opaque: impenetrable to any light source, including but not limited to artificial light sources.

Person: includes a corporation, other legal entities and an individual having charge or control of a premises.

Searchlight: A luminaire containing a light source and a reflector for throwing a high-intensity beam of generally parallel beams of light.



Dark Sky Bylaw: Temporary Exemption Application



CONTACT INFORMATION (LANDOWNER)

NAME(S):

ADDRESS:

TELEPHONE:

FAX:

EMAIL:

CONTACT INFORMATION (OTHER)

NAME(S):

ADDRESS:

TELEPHONE:

FAX:

EMAIL:

PROPERTY LOCATION AND LEGAL DESCRIPTION

PLAN:

BLOCK:

LOT:

QUARTER:

TOWNSHIP:

RANGE:

MERIDIAN:

DESCRIPTION OF ACTIVITY REQUIRING EXEMPTION

START DATE:

END DATE:

DURATION (NIGHTLY):

NATURE OF ACTIVITY:

LIGHTING PLAN REQUIREMENTS

BULB TYPE:

WATTAGE:

SHIELDING: NONE PARTIAL FULL

LOCATION OF LUMINAIRES (SHOW ON PROPERTY SKETCH AND ATTACH)

WILL LIGHT TRESPASS ONTO ADJACENT PROPERTIES: YES NO

LANDOWNER SIGNATURE (AUTHORIZING ACTIVITY TO TAKE PLACE) DATE

SIGNATURE OF PERSON(S) ACTING ON BEHALF OF LANDOWNER DATE

THIS SIDE FOR OFFICE USE ONLY

DECISION:

APPROVED *APPROVED WITH CONDITIONS* *REFUSED*

CONDITIONS (IF APPROVED WITH SUCH)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

REASONS FOR REFUSAL (IF REFUSED):

SIGNATURE:

DATE:

Please Note: Temporary Exemption Applications are required only for activities requiring structure based lighting. See below for examples.

Examples of activities requiring Temporary Exemption Applications

- Celebrations (weddings, birthdays, festivals, etc)
- Non-permanent sporting events
- Concerts

Examples of activities not requiring Temporary Exemption Applications

- Resource extraction equipment operation
- Agricultural equipment operations
- Protective services