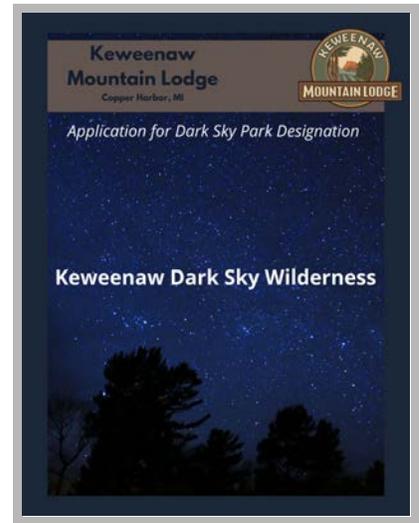


Keweenaw Mountain Lodge Application for Dark Sky Park Designation Version: 2.1 Change Log

Date: October 9, 2021

The following is a summary of the changes that were made between version 1.0 and version 2.1 of this application.



In this version of the application, we addressed the feedback provided by John Barentine on May 29, 2021. We have also provided various updates we felt were important based upon our review since submitting version 1.0. We are grateful for the feedback that John Barentine provided, as it has been helpful in improving our dark sky activities and our Dark Sky Park application.

Addressing John Barentine's Feedback

From Barentine:

Next, here's what I don't find in your draft:

Lightscape Management Plan

"Visitor activities with respect to the introduction of unnecessary artificial light at night into the park environment must be regulated" ("Lighting Management Plan", item 6, p. 10)

This is not discussed in the lighting plan.

Response:

We monitor the light usage of visitors at the Keweenaw Mountain Lodge, and educate visitors on light usage while on property. This is primarily done through our workshops and by our Outdoor Activity Center staff members when discussing best times and locations to view the stars / dark skies.

We have also put a sign at the Outdoor Activity Center and on our website (on the Stargazing page) that provides information about the light usage on the property.

We have added a subsection in the Lightscape Management Plan called “Visitor Lighting”, with information that addresses this.

From Barentine:

Illuminated signs are regulated: curfew between one hour after sunset to one hour before sunrise; single-color displays on black backgrounds; luminance < 100 cd/m²; surface area < 18.6 square meters (“Lighting Management Plan”, item 7, p. 10)

This is not discussed in the lighting plan.

Response:

We only have one large sign that is illuminated, and that is the sign at the entrance of the resort property on US Hwy 41. It is illuminated using dark sky compliant lights (i.e. fully shielded, facing downward, etc.). This is included in the Lighting Inventory Table under the Road Sign / Entrance section.

We have dimly lit cabin number signs that are solar powered and are dark sky compliant. These are included in the Lighting Inventory Table under the Cabin Porches section.

The Lighting Inventory Table can be found on pages 32-34.

We have also added a subsection in the Lightscape Management Plan called “Illuminated Signs”, with information that addresses illuminated signs.

From Barentine:

“A policy governing the installation of temporary lighting requiring that any such installation will adhere to the LMP to the greatest possible extent and whose duration will be limited to the shortest possible time” (“Lighting Management Plan”, item 8, p. 10)

This is not discussed in the lighting plan.

Response:

We have added a subsection in the Lightscape Management Plan called “Temporary Lighting”, with the following information:

“Any temporary installation of outside lighting will adhere to the dark-sky compliant guidelines to the greatest possible extent, and whose duration will be limited to the shortest possible time.”

From Barentine:

Park commitment to public education

Dark skies/natural darkness and benefits of good lighting are to be part of Park interpretation/outreach programs (“Minimum Requirements for All Parks”, item 7, p. 7)
Dedicated programming occurs at least four times per year (“Minimum Requirements for All Parks”, item 8, p. 7)

You describe work with the Work with Marquette Amateur Astronomers, Michigan Technical University’s AMJOCH Observatory on outreach programming (pp. 37). However, except for a couple of events in April and May 2021, all are planned for the future (see table, pp. 38-39). You’ll need to get some of these under your belt before you can apply. Document the events as you hold them with information like attendance numbers, photos, etc.

Response:

We updated the organization and information of the “Night Sky Educational Program and Outreach Initiatives” section. We changed the structure and made the section more robust and informative.

We hold workshops related to our Stargazing activities (e.g. Night Sky Photo Workshops, Light Management Workshops, Northern Lights Photo Workshops). During the workshops we discuss the benefits of the dark skies. As well, whenever we are discussing dark skies and stargazing with guests on property, we inform them of the benefits.

On our website, for Stargazing we indicate the benefits of the dark skies, why it is important to continue to better understand these benefits as it relates to each of our daily lives.

We continue to build relationships with astronomy clubs and their leaders and members. We have added more information about these relationships and workshops.

These updates can be found starting on page 43, with the “Night Sky Educational Program and Outreach Initiatives” section.

From Barentine:

And third, here’s what I find is unclear or ambiguous:

Basics

“The Park must provide the opportunity for public nighttime access, with or without supervision” (“Eligibility”, item 1, p. 4)

It's unclear from the presentation whether public nighttime access to the site is preconditioned on visitors availing themselves of paid amenities such as lodge stays. ("Public access to public or private lands may be subject to a nominal entry fee, but must not be contingent on the required paid use of any other product, service, program or facility available at the site," guidelines, p. 4) I suggest adding a clear statement about this on page 7 that clears up the apparent ambiguity.

Response:

This information has been added to the Executive Summary, on page 7, with the deed restriction that is with the property. Thus, you will find the following in the Executive Summary, with the last sentence being the addition for this version of the application:

"In this application we have provided a history of the Lodge and the property, information about the surrounding areas and park resources, data on the level of light pollution and our data to show the quality level of our skies at the top of the Keweenaw in the northwoods of Michigan, and our educational and outreach initiatives. As well, you will see the support we have from the community, as exhibited in the support letters from individuals and organizations at the township, county, and state levels. As part of the deed restriction on the property, along with the Lodge being on the national register of historical places, the resort is accessible to the public for lodging, dining, and outdoor activities, including stargazing. **Thus, public nighttime access to the site is not preconditioned on visitors availing themselves of paid amenities, such as lodging stays.**"

Also, on page 13, the following has been included:

"The general public is able to access the property at night, and do not have to be lodging guests. Public nighttime access on the property is not preconditioned on visitors availing themselves of paid amenities of the Lodge."

From Baretine:

Lightscape Management Plan

"The use of outdoor light at night is only prescribed when it is strictly needed, where it is needed, and in the appropriate amount for a specific task. The purpose of outdoor light allowed under the policy must be specifically to ensure public safety" ("Lighting Management Plan", item 2, p. 9)

"Our overall philosophy of light management on the Lodge property is to only use lighting where and when it is needed, and when it is needed do so in an appropriate amount for the specified task required." (p. 27) We need a clearer description of what constitutes a

“need” for lighting and how the decision to use light will be made, as well as what guides decisions about how much light is “required” for particular tasks.

Response:

To determine if lighting is needed, we balance between the safety risks and degrading the natural darkness.

From Baretine:

Park commitment to dark skies and lightscape management

Dark skies in park management documents (“To Be Included In IDSP Application Package”, item 4, p. 14)

This is not really clearly articulated. Do you have anything like a written management plan for the site that would suffice? Otherwise we need to figure out how to address this in a way that the Dark Sky Places Committee will accept.

Response:

On page 31, there is a section called “Lightscape Management Plan” which indicates our commitment to dark skies and lightscape management. This is structured similar to other recent applications. For example, the recently accepted application by the Curecanti National Recreational Area in Gunnison, Colorado.

As for our commitment to fostering dark skies, we hold workshops, are building our outreach initiatives, and constantly are talking to people about the Stargazing opportunities in the Keweenaw. We have also now posted our Lighting Management Plan on our website under the “About” section -- which mirrors what is said in this application.

From Baretine:

If current compliance rate is <2/3, a plan to achieve 90% compliance within five years and 100% within ten years (“To Be Included In IDSP Application Package”, item 8, pp. 14-15)

Plans for retrofits are described in the notes on page 31, but there is no schedule given for completing the retrofits. Can you add something to the effect of “we will retrofit these lights in Year One, those lights in Year Two, ...” etc.?

Response:

We continued to make changes to our lighting over the summer, and now have over 90% of our outside lighting adhering to dark-sky guidelines. Being that we are over 90% compliant already, our plan is to achieve 100% compliance within 5 years.

We have added “within the next 5 years” to the following sentence on page 31:

“That said, we continue to work towards having 100% of our outside light fixtures dark-sky compliant within the next 5 years, while decreasing our energy usage with inside lighting (e.g. continuing to replace with LED lights).”

From Baretine:

Ongoing sky brightness measurement program (“Minimum Requirements for All Parks”, item 3D, p. 6)

This is not discussed in the application. A brief statement to the effect of “lodge staff will make ongoing night sky brightness measurements and report them to IDA” will suffice.

Response:

We continually take the SQM readings, log them into a spreadsheet, and make that spreadsheet available on our website.

So we added the following on page 36:

“We will continue to take readings of the sky quality on a regular basis going forward, and report them on our website and to IDA annually.”

...and the following on page 39:

“The raw data can be found also on our website (in a spreadsheet format).”

From Barentine:

Evidence of a “restoration project” (“Minimum Requirements for All Parks”, item 5, pp. 6-7)

(A) *Producing at least one “night sky friendly” lighting project that is publicly visible and interpreted, OR*

(B) *Involving at least two external partners in dark sky restoration efforts (e.g. chamber of commerce, power utility, university research, tribal nations, environmental groups, conservation groups, natural history association), OR*

(C) *Cooperation with at least two nearby municipalities that results in adoption of lighting codes that improve sky conditions in the Park, OR*

A combination of the above or an alternative restoration project may be suggested.

The streetlight replacements near the lodge (pp. 22-27) qualify as a “night sky friendly’ lighting project that is publicly visible”, but it is unclear whether it is “interpreted” to guests. Can you discuss that further and/or come up with a plan for how to draw attention to the retrofits?

Response:

Yes, we replaced the street lights in February 2021 with dark-sky compliant lighting. To help people be aware of the project and understand the benefit of these new lights, we posted on our social media channels and we wrote a blog post about the project. A picture of one of the social media posts is included in the application on page 30, and the link to the blog post on our website is provided on the same page.

From Baretine:

There are a few additional items from my notes:

1. Some of the maps (e.g., p. 10) are pretty small and difficult to read. Make these larger if possible to improve legibility.

Response:

We have been able to increase the size of most of the maps throughout the document to make them more readable. Also, the hi-res version of the PDF document has clearer images of the maps in general.

From Baretine:

2. We need a clear statement about the nature of public access to the property, in particular whether access is preconditioned on paying for services at the lodge.

Response:

This was mentioned in an earlier response to a similar comment. Updates were made on page 7 and 13 regarding public access.

From Baretine:

3. I’m puzzled by your sky brightness readings (pp. 33-34). When plotted as a frequency distribution (see below), they are much more scattered than I expected them to be. While there could be user error – and measurements taken on some night (e.g., 2/18/21; 2/20/21) – I actually suspect that snow on the ground might be amplifying the lights on site and making the apparent night sky brightness higher than it expected.

What were the other weather conditions like, besides temperature? Any clouds in the sky? Looks like it's probably not moonlight interference. I think you measured correctly, but it just seems like the sky there should be darker than what you measured. So I encourage you to keep measuring, especially around the upcoming dark of the moon (~5 to 15 June), so we can understand better whether in fact snow was the culprit.

Response:

We provided John Barentine access to our raw data and the individual data points for each date/location reading. He did an analysis on the data to help better understand the differences in the readings. He concluded that differences in readings in the winter time and the summer time was most likely related to snow. We have included his analysis as an appendix in the application.

John Barentine's analysis was done on SQM readings between February and April 2021. We have continued to collect data since submitting our first version of the application (which we submitted April 22nd, 2021). The updated data is included in this version. Thus, there are now SQM readings from February - October 2021, consisting of more than 290 SQM readings.

From Barentine:

4. Did you use the SQM (big red button on the front) or the SQM-L (no big red button on the front) to make the night sky brightness measurements?

Response:

We used the SQM reader with the red button on the front: Unihedron SQM HTS: 9005.80.60.00. The information about this model of SQM reader has been added in the application on page 39.

From Barentine:

5. You mention on page 33 that the numbers reported in the night sky brightness measurement table are "median[s] of the readings, which included 3 to 6 each." If you have the complete, raw data, please include them in the report for the record (i.e., not just the medians). The result will be better in a statistical sense. And if you can send those to me now, it would help with the analysis discussed above.

Response:

As mentioned in a previous response above, we provided John Barentine access to the data, and he provided analysis on the data. His analysis is included in the appendix.

The raw data (e.g. the 3 to 6 readings per date/time) is also included in the appendix, and is available on our website in spreadsheet format.

Additional Updates

In addition to the feedback we received from John Barentine, we have made the following updates. We think these updates also help improve our dark sky activities and our Dark Sky Park application.

1. Added the Application Log at the beginning of the application (after the Table of Contents) -- this is done to keep track of the general activities of the application.
2. Changed the section heading name “Night Sky Viewing Map” to “Stargazing at the Lodge”.
3. In the “Viewing Areas in the Surrounding Areas” section, added numbers for each suggested viewing area and put those numbers on the map accordingly. Pages 14-15.
4. Added screenshots of the webcam and weather station information that we provide users on our website so they can see the current weather conditions.
5. Changed out more outside lighting with dark-sky compliant lighting:
 - Main Lodge - Conference Center: Installed dark-sky compliant lighting (new fixtures and bulbs), *May 18, 2021*
 - Maintenance Building - Garage Door: Installed dark-sky compliant lighting (new fixtures and bulbs), *July 12, 2021*
 - Maintenance Building - Wall Pack: Installed dark-sky compliant lighting (new fixtures and bulbs), *August 16, 2021*
 - Road Sign / Entrance - Road Sign: Installed dark-sky compliant lighting (new fixtures and bulbs), and changed the focus of the light fixtures to be downward facing, *August 17, 2021*
6. Restructured and added more information to the “Lightscape Management Plan” section
7. Restructured and added more information to the “Night Sky Educational Programs and Outreach Initiatives” section
8. Added a support letter from Mt. Bohemia, Lonie Glieberman
9. Added an appendix with the Sky Quality Measurement Raw Data

In this change log, we outline the major changes to the application in this change log. Along with the changes above, there were multiple smaller changes made throughout the document which improved the document but are not captured in the log notes above.