

Survey Results
Sullivan County Solar Installations

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Introduction

Lighting Research Center (LRC) visited the three solar sites both during the daytime and at night in the summer of 2008. Questions were asked about visual comfort, lighting quality, and perception of safety.

At the Woodridge site, a lighting system existed before the solar system was installed. As a result, LRC was able to survey townspeople both before and after installation of the solar system. For Swan Ridge and Bethel Woods, survey results were only collected after installation. At Woodridge and Swan Lake, many participants were available to complete surveys both during the daytime and after sunset.

Colleen Emery (Sullivan Renaissance) worked through local community leaders to recruit participation at Woodridge and Swan Lake. Additional people visiting the sites of their own accord were invited to participate at Swan Lake and Bethel Woods. Participants were rewarded for their participation with a \$1 scratcher-type lottery ticket. Ms. Emery also rewarded participants at the Woodridge site by providing raffle tickets for a restaurant giveaway.

Ms. Emery further involved the community by inviting local students from Monticello High School and Fallsburgh High School to join LRC at the Woodridge site to observe the collection of surveys, photometric data, and installation of monitoring devices.

At the Bethel Woods site, there is no local community to speak of, mostly visitors interested in the Woodstock concert history, and patrons of the Bethel Woods Center for the Arts. As a result, visitors were not available to complete surveys both before and after sunset. Some of the survey respondents at this site were concert venue employees, on their way home after a summer event.

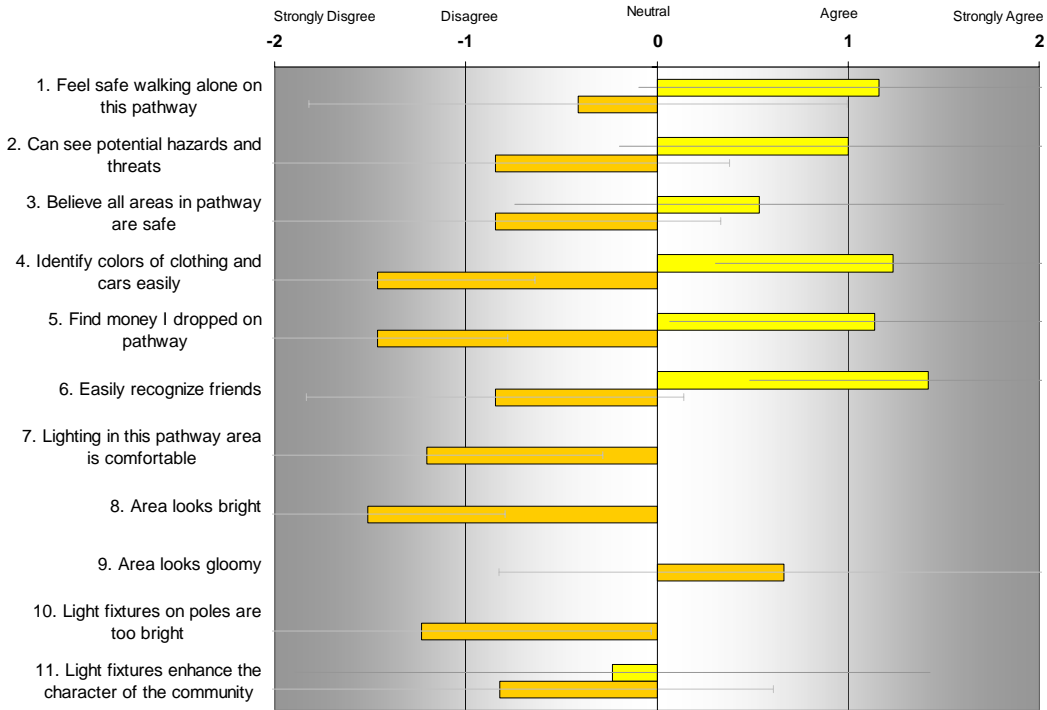
The following report shows the results from the surveys at the three sites with the solar lighting system.

Woodridge Survey Results

Opinions about the solar LED installation were more positive than with the previous high pressure sodium (HPS) lighting installation. Survey responses indicate that the solar LED lighting was more comfortable, made people feel more safe, and overall promoted visibility, compared to the previous HPS system. People's opinions about the solar LED system did not vary as much between day time and night time. Statistical analysis showed a significant difference between day and night for only two questions with the LED lighting ("colors" $p=0.002$ and "recognize friends" $p=0.007$). Compared to the previous HPS system, responses to the LED system were more favorable in all questions except "enhance the character of the community" ($p<.001$).

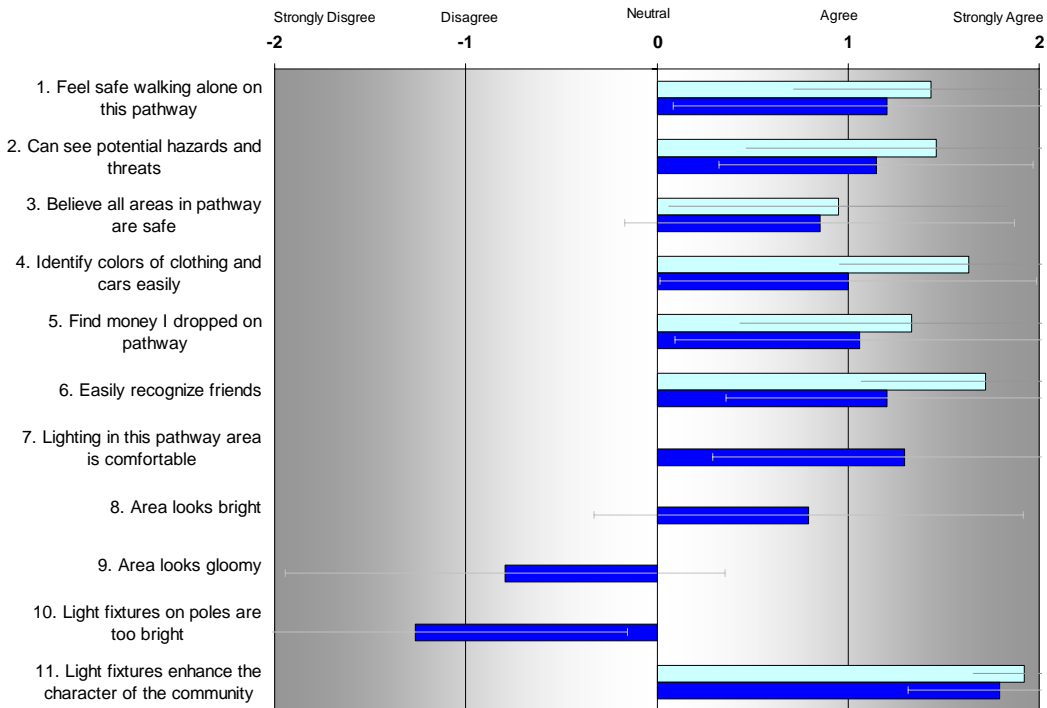
Average Woodridge Townspeople Survey Responses, Day and Night With Previous High Pressure Sodium Lighting (October 2007)

■ HPS-Daytime (n=43) ■ HPS-Night (n=39)

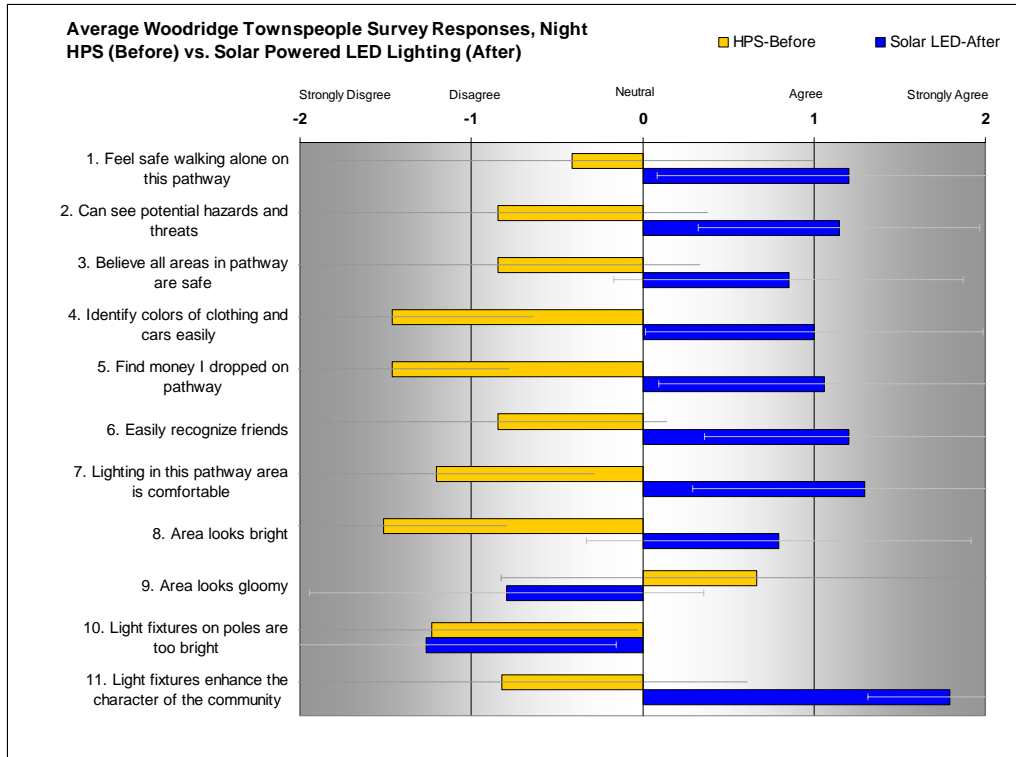


Average Woodridge Townspeople Survey Responses, Day and Night With Solar Powered LED Lighting (June 2008)

■ LED-Daytime (n=39) ■ LED-Night (n=34)



Overall at the Woodridge site, the LED system was rated positively, while the HPS system was rated negatively. Responses that were statistically significantly more favorable ($p < 0.001$) for all questions, except for question 10, which asked whether the fixtures were too bright. (Neither the HPS nor the LED were rated as too bright).



Many Woodridge participants also shared their comments. Before the retrofit, comments about the previous HPS lighting system were negative. After the retrofit, many participants commented that they liked the appearance of the solar luminaires. After dark, many comments remained positive, but multiple participants commented that trees blocked light. One person commented that the environment looked “shadowy and surreal” and another commented about the bluish-white color of the light.

Woodridge Comments - HPS(Before Retrofit)-Daytime

The lights stink.

Light fixtures in general enhance the character of the community, not necessarily the ones we have here.

This area in Woodridge looks great!

Current street lights are very unattractive and I will be happy to see them gone.

The condition of the sidewalk itself is poor.

Present light fixtures on sidewalk area are low quality, too tall/skinny not straight-seem way to few to adequately light up area. Cobra head lighting on street are ugly.

These lights are ugly.

Its getting better!

We want more and better light.

Woodridge Comments - HPS(Before Retrofit)-Nighttime

The lighting is terrible.

Anything would be better than the lights that are here now! Even a person with a flash light or candle.

The village has a lot of potential. Hopefully the lights will add a lot!

Again, not these fixtures.

It looks great - Brightness would be enhanced if they were close together.

The lighting is horrible now.

Present lighting system is really inadequate. Sidewalk very dark and shadowed.

Woodridge Comments - LED Solar (AfterRetrofit)-Daytime

Go Green

Nice lights.

Planters around lights make them much more attractive.

Beautiful lamps and fixtures- enhance community's appearance.

I think that the lights look awesome! And thank you for providing these for our neighborhood.

Pebbles should be concrete in front of Kessler Bros.

I hope this will a positive change. It certainly will save money.

The light posts look very good. I like the old Victorian style about them.

The lamps make the town look better.

Great

Looks nice; good addition

The solar lights are very attractive and functional.

The lights are a plus to the village and look beautiful- Maybe a little more bright.

The lights are a wonderful addition to the community. They provide character, light and show the community that solar lighting is a viable alternative to electric lights. I am glad that Woodridge volunteered to install the solar lights.

The lamp posts are aestheically pleasing.

The lights are a great addition to the town and they're eco-friendly! It's also very educational and shows people that solar power is efficient and great substitute to electric lighting.

Woodridge Comments - LED Solar (AfterRetrofit)-Nighttime

Beautiful lit street. Kind of Old fashioned. Romantic and non-stressful feelings. Go Green.

Love it.

Beautiful fixtures, not crazy about color temp (would like whiter light)

Very Shadowy. A bit surreal.

The lighting is a great addition to the village fareway. There could be more lights for better visibility but its great for walking traffic.

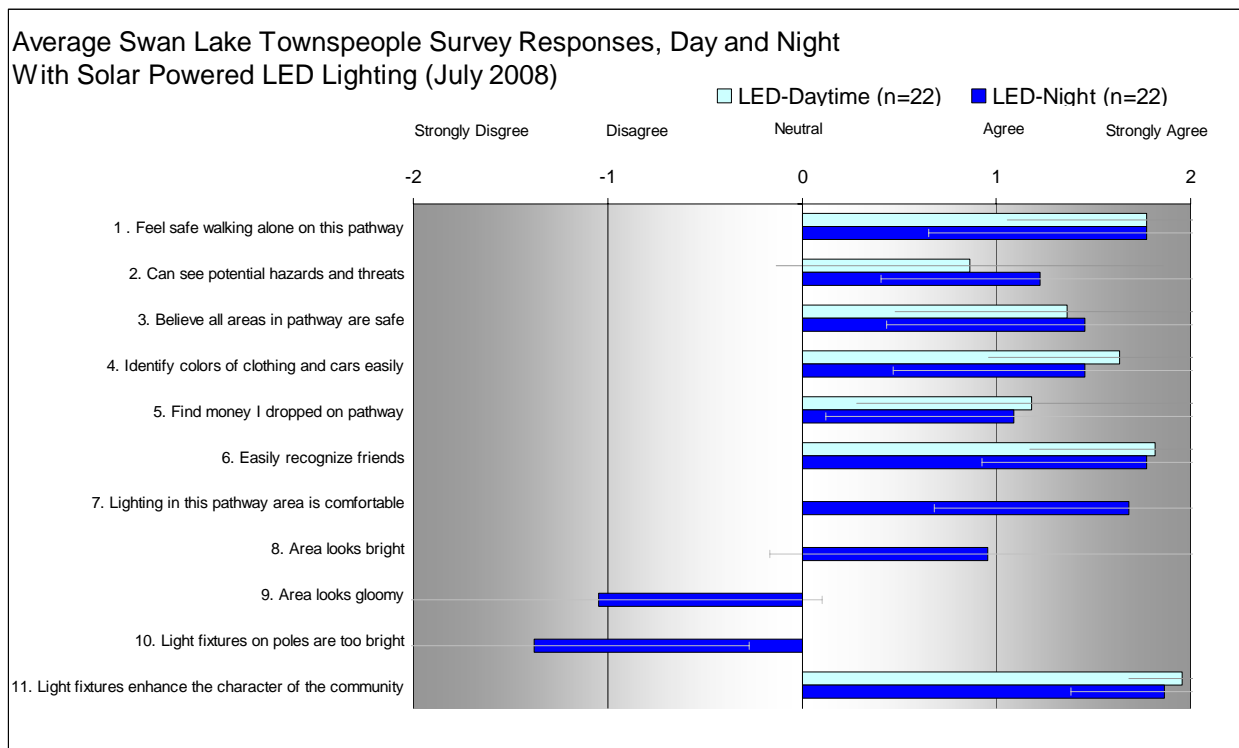
You can see in the areas where the light isn't blocked by trees. I have night blindness so am unable to see well in the dark.

Thank you again for adding these lights to our community. They are a great help to us all.

Interesting session.
Light seems adequate except in shadows. Perhaps trees are too close to lights.
I love them! Let's do more!
If there were stores it would be fine. I wouldn't walk here even if the lights were brighter.
Street lighting is unobscured. Greenery obstructs sidewalk lighting, but is necessary.
Nighttime lighting from businesses in the area is missing.
In most towns, lights from businesses along the main street would also enhance the lighting along the sidewalk, making the entire sidewalk light.
Looks great.
Very nice.
Some dark areas between lights where trees shaded walk.
Much nicer than the previous ones.
Also great when power is out.
Looks fantastic.

Swan Lake Survey Results

At Swan Lake, results with the LED lighting were similar to Woodridge. Overall, opinions about visibility and safety were positive. Opinions didn't change dramatically between day and night. (Responses to none of the questions showed a statistically significant difference between day and night, $p < 0.05$.)



Several participants commented that the main issue that made them feel unsafe was not lighting, but rather, the fact that the elevated boardwalk adjacent to the lake does not have a rope or barrier to prevent falling into the water.



Swan Lake Comments-Daytime

(Regarding Question 2) Someone falling off the pathway if not careful and watch where you walk.

These lights are a welcome addition to Swan Lake and will, perhaps, encourage additional such projects.

Love Them! Great enhancement to our community.

I think it's a great place to come, because it is safe and clean.

This is a great thing that is being done here in Swan Lake.

Any kind of rope or fence by the lake for small children.

We enjoy the lights. They are pleasant to look at.

I think very good. Thanks God.

A wonderfully friendly park. It is laid out just perfectly.

Swan Lake Comments-Nighttime

Need Rail?

These lights rule.

I love it.

Beautiful

Missing railing makes me uncomfortable

Looks very nice...we should have more thru town.

Wonderfully laid out park- lighting is adequate & has a soft hue.

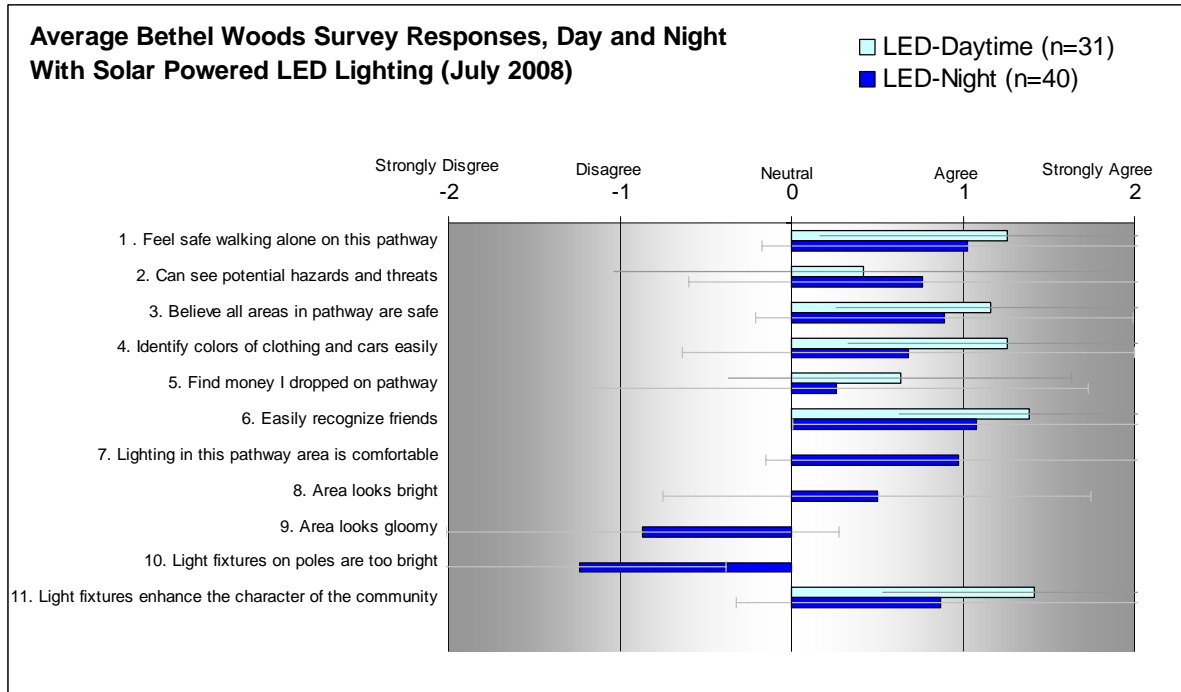
Soft light in the gazebo.

Pretty happy with that.

Bethel Woods Survey Results

At Bethel Woods, passing visitors and a few concert staff employees answered surveys about the lighting during the day or at night (not both). Again, feedback about the LED system was mostly positive, similar to the other two sites. There was not much difference between opinions during the day and at night. Statistical analysis showed a difference between day and night ($p < 0.05$) only in the responses to the question about enhancing the character of the community. Some visitors found the low light levels appropriate to this type of site, while others indicated that they preferred higher light levels.

The ground at the Bethel Woods site is an irregular bark-type material rather than pavement; people commented that they would not be able to locate dropped money for this reason, not due to illumination. This affected their answers to question 5, and comments below.



Comments from these visitors were again mostly positive. Several people commented that the luminaire was aesthetically pleasing. A few commented that the amount of light was appropriate for this setting, but may not be enough in other environments. Some would have preferred more light. LRC interviewed a security guard, who commented that he finds the adjacent areas to be too dark for him to monitor activities of visitors. His job involves patrolling for unusual activity, which is made more challenging with light only in a small area of the grounds.

Bethel Woods Comments - Daytime

It's nice to see people using alternative energy.

They're beautiful!

Have not been here after dark.

The solar lights are a great idea and show that Woodstock is making an effort to conserve energy.

I think the wood chips are not a good idea.

Beautiful.

They look beautiful and are functional too! I bet they save a ton of energy!

Everything here at Bethel is beautiful. I feel very safe.

Bethel Woods Comments - Night

Although the light level is much lower than one normally sees in such a setting, I find it more than adequate. The lack of glare is particularly pleasing compared to most fixtures. The subtlety is much more fitting for such a rural area.

Nice lights!

They look good and they don't use electricity.

Lighting is not the problem. Wood chips are the problem to find change.

Need to be brighter.

Let's get more of them.

A softer more natural light would be nice. Solar is a plus always.

Light is very soothing to the eye. Would strain the eyes in other street light settings.

Too dim. You'd be better off with one 300W Halogen.

The place looks beautiful!!

My eyes are relaxed with the amount of light output.

I do think there are better options out there. Decor pretty lighting hides it.

I am strongly in favor of the greening of the nation or the world. But we still have a way to go. I do everything I can to help the environment. Compost kitchen garbage, recycle all recyclables. Put my kitchen water in empty gallons to water my plants.

They're great! Sullivan County needs more of these.

The solar lights are not only functional but beautiful. Congratulations on using solar power- This is "the way" , not in the future but NOW. I filled out this survey and wrote my comments by the light of the solar lamp! Perfect!

Good Idea!

The lighting is warm and just the right brightness.

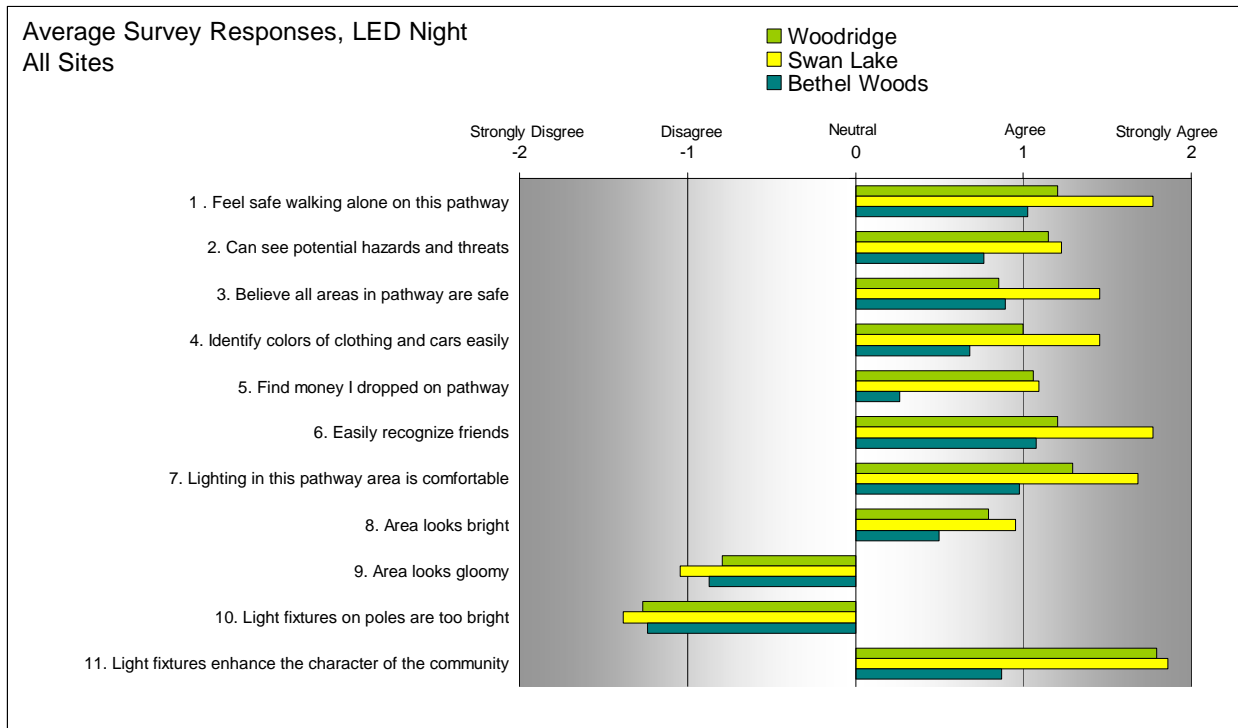
Great!

I feel it's good that the site of Woodstock has environmentally friendly lighting!

Could be a little more bright.

Overall

When comparing the three sites to each other, all the sites show similar, positive feedback about lighting quality and quantity with the LED system¹. At the Bethel Woods site, responses to some questions were slightly less emphatic, perhaps because the participants were not frequent visitors, were unfamiliar with the site, and had no particular allegiance to the community². As discussed above on question 5, at Bethel Woods, the ground is an irregular bark-type material rather than pavement, affecting their answers about being able to “find dropped money.”³ Overall, these results show that the solar-powered LED lighting installations were well-received by most occupants.



¹ Statistical analysis (one-tailed, one-sample t-test) showed that responses to questions 1-8 and 11 were all reliably positive, and questions 9-10 were reliably negative ($p < 0.05$), under the LED lighting system at night, with the exception of the money question (#5) at the Bethel Woods site.

² Statistical analysis showed that Bethel Woods visitors were not as emphatic in their opinion that the luminaires were a community enhancement, compared to Swan Lake ($p = 0.026$) or Woodridge ($p = 0.014$).

³ Statistical analysis of nighttime responses showed that significantly fewer people felt they would be able to find dropped money at Bethel Woods than at Swan Lake or Woodridge ($p < 0.001$).