Noise Assessment for Multifamily and Healthcare Federal Housing Administration Applications Transcript, 8/20/20

Sara Jensen: Welcome, everybody, and thanks for attending today's training on Noise Assessment for Multifamily and Healthcare Federal Housing Administration Applications. My name is Sara Jensen, and I am the program environmental clearance officer for HUD's Office of Housing. I'm joined by Zach Carter, an environmental protection specialist in HUD's Office of Environment and Energy. Zach is HUD's new subject matter expert for noise. Michelle Grainger and Michelle Juma are our technical assistance providers at Enterprise Community Partners.

This webinar is intended for people that work with HUD's Multifamily and Office of Residential Care Facility FHA program. That means FHA lenders, third-party consultants that work with FHA, attorneys, and HUD staff. Before I go over our training objectives and topics, Michelle from Enterprise will go over some webinar housekeeping.

Michelle Grainger: Thank you, Sara. All questions in today's presentation will be answered at the end of the webinar and will be posted on the HUD Exchange site. We will be answering some common questions during the presentation. We will also have a polling feature on today's webinar. To answer questions in today's presentation, go to menti.com and enter code 823282, or scan the QR code. Once you're there, enter your nickname. Questions will also pop up when the presenter indicates that the poll is open. This is why you wouldn't see any questions appearing right now.

When a question appears, participants should answer before the countdown ends. You will have 30 seconds to answer. A long or no answer gets zero points. The faster you answer, the more points you receive. There will be questions that have more than one correct answer. Please select one. Also, you do not have to close out of the poll and go back to the website. The poll will advance to the next question when the presenter opens it. After the final poll, the final winner will be revealed. Now, we'll pass it on to Sara to take us off.

Sara Jensen: Thanks, Michelle. Here's the Menti. So it's menti.com, and the code that you enter is 823282. And we'll put this up again when we get to the first poll question. Okay. As we mentioned previously, this training is intended for people that work with HUD's Multifamily and Office of Residential Care Facility FHA program.

So this is designed for FHA lenders, third-party consultants, attorneys, and HUD staff that work with FHA programs. Our objectives are to explain how to document and prepare noise submissions for FHA applications, how to comply with specific MAP Guide and 232 Handbook requirements, and how applications can more fully address regulatory requirements and avoid processing delays.

Our training today is on HUD's current noise regulations. We've received lots of feedback from our FHA partners on how to improve the noise regulations. Zach will talk a bit about HUD's efforts towards modernizing HUD noise policies and tools. However, any changes will be out in the future. And today's training is to get us all up to speed and on the same page about current requirements.

Having said that, we will present lots of information that clarifies confusion and answers frequently asked questions. If you work with a HUD program other than FHA, particularly a program that is under Part 58, I would like to direct you instead to the HUD Exchange Noise Abatement and Control Page for links to training guidance documents for the programs you work with. If you would like to follow along with the slides, Michelle has posted a link in your chat box. And you also should have received an e-mail with a link to the slides.

Here's our agenda for today. We'll start with an overview of HUD noise requirements. We'll talk specifically about how to document noise for multifamily and ORCF -- that's the acronym for Office of Residential Care Facility -- applications. We'll discuss noise mitigation and what to do if your project site is in HUD's unacceptable noise zone. And we'll end with some policy updates and frequently asked questions, including what's new in the upcoming MAP update. Please note that we have sprinkled frequently asked questions and clarifications throughout the presentation. These will not all be coming at the end.

As Michelle noted, we will have interactive polling questions, and we hope you'll all participate. Thanks to those of you that submitted questions ahead of time with your registration form. That's really helpful. We have reviewed them and have made sure to cover the ones related to FHA programs during the session today. We have a lot of information to cover today, so we are unlikely to have much time at the end for questions. However, please still submit questions during the webinar via the Q&A panel. We will take as many as we can, and we will follow up in writing on any we missed.

There are two caveats. We will only accept questions related to FHA programs. And we cannot accept questions about specific projects. Please direct those to the Multifamily Office processing your application or Lean Thinking for ORCF projects, and they will bring in regional and field environmental officers for consultation. Now, I'd like to turn the presentation over to Zach.

Zach Carter: Thanks a lot, Sara. I really appreciate that. So again, Zach Carter, and I am in the Office of Environment and Energy. In this first section, I'm just going to cover some basic background about the HUD noise requirements. What are some of the basic concerns about the impact of noise on residents that led to the Noise Control Act, which is sort of the source of some of these requirements originally being passed.

And then, HUD's implementing regulations in 24 CRF 51B. A lot of it has to do with the growth of residential developments that are in proximity to some of these main sources that we're going to talk a lot in detail about, like highways, airports, rail lines. There also was data and studies starting 50 years ago that increased awareness of some of the health impacts, other impacts, like hearing loss, activity interruption, those kinds of things. So this is part of the concern around noise and our residential or healthcare developments.

Based on the federal policy to address those impacts, HUD's regulation established a framework pretty straightforwardly using, again, some of these basic inputs we're going to talk about to measure projected noise at site [inaudible] that's proposed for use in residential or healthcare development, basically where people will sleep. So these are developments where people will sleep overnight. And then, to look at how that development's compatible with that noise environment and if anything needs to be done to address it at that location.

One of the things we're going to be using is the scale of decibels. These are some comparisons, just give you a sense of what a decibel is and relative to things you may have experienced. And

these are examples specifically of acute sounds and the decibel level, but a lot of what we're going to be talking about in the presentation is going to be in a time average noise level.

Meaning if you have a 24-hour day, 365-days-a-year average noise level of, say, 72 decibels, that's going to be an equivalent kind of all the time to what you would think of as maybe in the range of speech in terms of an acute event. So this is to give you some context. You can see maybe a very busy crowded street would verge on 90 decibels at a particular time. Strong horn, 100 decibels. So when you're very close to the sources, that would be the level. But again, we're talking about a time average level. It should kind of give you a context of that.

This is some of the same information, just on a scale. So looking at the threshold there, is also shown where you start to effect hearing damage or feeling or pain relative to some of these benchmarks. The first step in evaluating noise under HUD's noise regulation is projecting the noise level at the site.

That's, again, measured in decibels, and we're using a time average scale, which has a nighttime penalty called day-night level, or DNL. And again, for HUD purposes, we're only going to include specific sources. So that's going to be airports, roadways, railroads, and military sites, or very specific type of industrial sites where you might have loud sounds, which we'll discuss later.

And the noise from the source is going to be projected 10 years into the future, particularly where it's likely to change, such as if you have an increase in traffic on a highway or growing area like that. And if we were talking about just a time average scale without the nighttime penalty, that would be a lot of times referred to you like decibel LEQ or continuous average sound level. But HUD, again, focused on residential and healthcare where people sleep overnight. We're looking at the day-night, and that means there's a 10-decibel penalty for the noise you have between 10:00 P.M. and 7:00 A.M., normal sleeping hours.

After the projection is done and you've quantified the noise level at the site and in the scale, the site's classified. We're talking here about new development classified into acceptable, normally unacceptable, and unacceptable ranges. These are from Section 51.103 and 51.104 of HUD's regulation. Acceptable is 65 and below. Normally unacceptable is 66 to 75 decibel DNL. And then, 76 and above is going to be termed unacceptable.

Because it focuses on residential and health impacts, what we're really looking at and HUD's goal is the 45-decibel indoor level. That's what we're trying to get to for those living and sleeping spaces where people are spending time inside units. So the regulation assumes you get a 20-decibel reduction from standard construction from outside to inside the unit.

And that means if you have what's classified as acceptable level of 65 decibels immediately outside the building, then that 20 reduction is going to get you to that 45, and so your goal. That's also going toward the location where you measure the noise because you're measuring at a location outside of that residential unit in the direction of your noise source or sources on the site. And that's going to be what's called the noise assessment location, which would be [inaudible].

This is background as far as the health basis for impacts on quality of life basis for some of these levels. It originally came from an EPA report in 1974. And in 2019, Department of Transportation Volpe Center and HUD worked on updating that and posted those results of that update to evaluate the effective noise, particularly in various aspects of health, and identify new scientific developments around noise or areas for further research.

So this is kind of a first step in looking at some of the research behind the noise regulation. And we actually continue to work with Volpe to look even further into trying to modernize some of the policies and make sure that our assessment process is accurate and the policies are accurate to what is out there. Just relating that.

Under the current regulation, which is what Sara said we're talking about today, what does the policy require? So processing depends on the type of project that we're looking at. So for example, new construction or conversion of a non-residential to residential use, so maybe you had a historic warehouse that's being converted into condos, that would be a conversion, for those projects, a full noise assessment is required.

And if you are 66 decibels or above, you have to mitigate that noise impact in the development. But between 66 and 75, you don't have to have a special approval as long as it's mitigated. If you go 76 or above for those types of projects, in unacceptable, it's not allowable without either an environmental impact statement or a waiver of that requirement.

If you get into the -- an environmental impact statement would be a one- to two-year-long intensive study, the EIS. A waiver process can also be extensive, but we worked on making that more efficient as well. So, we'll talk a little bit more about that. If you get into sub-rehab projects, those require also a full noise assessment. What we mean by full noise assessment is you're calculating the actual noise level at the site. And mitigation would be strongly encouraged. I mean, basically, the expectation would be to mitigate the noise impacts if it's 66 or above for those, unless there's some specific reason it wasn't feasible.

For modernizations, so 223(f), maybe, where you have minor rehab or maintenance, you don't have to calculate the specific noise level, but you would have to do a screening for those sources that we talked about, railroads, airports, other specialized sources. And if they're present, consider attenuating within the project. So just one more point of background. You know, if we're talking about a project requires noise mitigation, what does that mean? So we're going to get into more detail on that toward the end of the presentation. But just to introduce that concept, there's three basic approaches that can be taken to mitigate. And it gets more detailed than that, but that's the overall.

Two of them are preferred. So reconfiguring or redesigning the layout is preferred, as well as barriers. Because those can protect the outdoor areas of the site as well. But the third one is probably what we see most commonly, especially where you find mid-rise or high-rise development, because, obviously, it's more difficult to protect that with a barrier.

So a lot of times, for those projects, we see noise attenuation in the structure itself, which usually means upgrading your wall components, window components, door components. And we're going to talk in more detail about how to quantify that in the environmental review and show that you're meeting that 45, again, into your goal.

That's the initial background about the process. Now, we'll start to move into more of the process of actually evaluating noise. And just to give an outline of the section, first, we're going to quickly look again at the sources that are required for evaluation. These would also be the sources you look at for the screening process.

Then, we'll look at the noise assessment data collection and designation of your noise assessment locations. How to actually calculate the noise level using the tools that we have on our website.

And then, after that's done, for [inaudible], with the site visit, which is a very important step, and then, finally, classifying the site and getting to that mitigation.

We talked about these three sources. What are the search distances? We're considering mainly these three sources, and then we're looking at them within a certain distance. So it's 50 miles for airport or airfield, 3,000 feet of a railroad, and then 1,000 feet of a noise-contributing roadway, which we'll talk about what that means. Either if you have a screening process or if you're actually doing the noise assessment, the full assessment, if you do those search distances and you don't have one of those noise sources present, then that document's compliant, with the caveat that we're also here looking at what are called loud impulsive sounds.

We'll get more into detail about what that means as well, but loud impulsive sounds can come from the sources here, but they can also come from other industrial or military operations that have a specific type of noise that they're emitting. And so, that's one additional component of the search process, the screening process. If none of those sources are present, that completes the analysis. And if they are, you have to get into calculating. So as move into that section of the presentation, we're going to be doing our first poll, and for that, I'm going to pass to Michelle to provide her view of how you can participate in the poll.

Michelle Grainger: Thank you, Zach. As a reminder to our attendees today, in order to answer questions in today's presentation, you may go to menti.com and enter code 823282, or you may scan the QR code that is currently showing on the screen. Once you're there, you may enter your nickname. The questions will pop up when the presenter indicates that the poll is open. This is why you wouldn't see any questions up here now.

When a question appears, participants should answer before the countdown ends. You will have 30 seconds to answer. A long or no answer gets zero points. The faster you enter, the more points you receive. There will be questions that have more than one correct answer. Please feel free to select one. Also, as a quick note, that you do not have to close out of the poll and go back to the website. The poll will advance to the next question when the presenter opens it. After the final poll, the final winner will be revealed. I will pass it on to Sara to kick us off for our first poll.

Sara Jensen: Our first poll question is a frequently asked question. Which of the following activities does not require a full noise calculation in HEROS? A, new construction and conversion to residential requiring an environmental assessment. B, substantial rehabilitation requiring an environmental assessment. C, refinance and rehabilitation that is categorically excluded subject to related laws and authorities, including noise abatement. The poll is now open, and you'll have a little more than 30 seconds to respond.

Michelle Juma: The poll is now closed. We received 127 respondents selected C.

Sara Jensen: Everyone selected C? Well done, everybody. That is the correct answer. Rehab that is categorically excluded subject to related laws and authorities does not require a full noise calculation in HEROS. This is all 223(f) with rehab and some 221(d) for sub-rehab. As an aside, if any of you would like a refresher on how to determine the correct environmental levels of review for FHA programs, for example what is categorically excluded, what requires an environmental assessment, please come to our upcoming HEROS training on September 15th. More details at the end of the presentation.

The HEROS questions and prompts actually change based on the activity and level of review. So HEROS will walk you through what is needed. And before Zach gives more detail on noise

requirements, I just wanted to show how this looks in HEROS. So let's think of two examples, projects with rehab. The first is the 223(f) with rehab, and as I noted before, 223(f)s with rehab are always categorically excluded subject to, sometimes abbreviated to CEST, as you see on this slide.

At the CEST level of review, HEROS requires you to screen for noise sources and evaluate attenuation measures feasible within the scope of rehab. The second project is a 221(d) for a substantial rehabilitation.

Our example project is above the categorical excluded threshold and requires an environmental assessment level of review. For this level of review, HEROS requires a screen for noise sources and a noise calculation. As Zach mentioned, the HUD noise regulation encourages noise attenuation for rehab projects and strongly encourages them for substantial rehab projects. And let me quickly show you what this looks like in the HEROS screen.

The first is our example 223(f) with rehab at the categorically excluded level of review. And the first question asks about the project activities. We would choose rehab of an existing residential property. The next question asks about the standard noise mitigation measure. We don't have standard noise mitigation requirements in the MAP Guide or the 232 Handbook. So you would mark no.

The next question asks about preliminary threshold screening for roads within 1,000 feet or railroads within 3,000 feet and airports within 15 miles. Zach will talk about which roads you must consider after I go through these HEROS examples. The point I want to make here is that we are looking for distances in this box and an uploaded map with distances marked. The last question is about mitigation. The choices are to either implement mitigation or say no mitigation is necessary. If you pick no mitigation necessary, you must explain why no mitigation is needed.

Several people wrote in questions before this webinar about mitigation for minor rehab. Let me give you an example of when HUD would encourage noise mitigation for a 223(f). In this existing project, all of the south units are directly facing Highway 240. We also know that this project is just over five miles from an airport. If you look at the proposed scope of work, you can see that there are some items where it might be feasible to incorporate noise attenuation. You could upgrade the window replacements for units that face the highway to windows with a higher noise attenuation value. You could add extra insulation for the roof replacements to mitigate for airplane noise.

At this point, you would want to look into the preliminary threshold screen more carefully. For this case, we learn that the airport noise contours do not extend to this project. And in fact, the flight path is in an entirely different direction. So there's no need for noise mitigation in the roof replacement. However, HUD would encourage noise mitigation in the windows for the units facing the highway.

Here's our example 221(d)(4) for a substantial rehabilitation where the rehab work is over the categorical exclusion threshold and requires an environmental assessment. In this example, you would also pick rehab of an existing residential property in the first question. The next question asks about preliminary threshold screening, and in this case, noise generators were found within the distances. And then, the next question requires a full noise assessment calculation, which Zach will explain how to do in more detail.

This project is in the normally unacceptable range and therefore has strongly encouraged this mitigation. Because this is a sub-rehab project, HUD expects that there would be opportunities to incorporate noise attenuation into the project. Although the noise regulation does not require mitigation for substantial rehab, HUD may choose to reject a project with unacceptable noise impacts if attenuation is not feasible.

The final example I want to show is a 221(d)(4) new construction project. This time, you would mark new construction for residential use. Then, again, you go through the preliminary screening, followed by a full noise assessment calculation. This project is in the normally unacceptable range as well.

And for new construction, mitigation is required in order for HUD to approve this project. Here's an example of what you might put for noise mitigation. For this project, we have a barrier, attenuation measures incorporated into the building plans, and an ongoing operation and maintenance plan. Zach will talk about establishing and documenting noise mitigation in more detail later.

Then we have a compliance determination and uploaded documentation. Only HUD staff can make the final compliance determination, but we need our partners to make a recommendation here in order to be able to upload documentation. This example shows the language that will auto populate in HEROS, but I strongly recommend that you customize the language in this compliance box and tailor it to your project. HUD staff will review and update this determination as appropriate.

The final question at the bottom is one that only HUD staff can answer. Are formal compliance steps or mitigation needed? In this case, the answer is yes, and HUD will track this and follow up on needed mitigation. We'll provide more details about mitigation and HEROS later. And now, I'm going to turn it back to Zach to explain how to collect noise assessment data and how to do the noise calculation.

Zach Carter: Thanks a lot, Sara. Appreciate that. We're going to talk more about gathering data, as she said, which is a really critical part of the process. But first, we are going to kick this section off with another poll question, question number two. Just a quick reminder that you can stay logged into Menti if you closed out the poll. If you're now just joining us, please go to menti.com. And again, the code to use is 823282.

This question is which type of road within 1,000 feet of the project site does not have to be analyzed in the HUD noise assessment? Is it interstate and other highways or large roads for which data is available? B, small roads for which traffic data is available? C, roads for which data is not available based on a web search? Or, D, small roads for which data is not available, as confirmed by state and local road planners? The poll is now open on menti.com with the code displayed, and you have 30 seconds to answer the question. The poll will close automatically, and you should be able to see the question in the options.

Michelle Juma: The poll is now closed. Five respondents selected A, 22 respondents selected B, 5 respondents selected C, and 99 respondents selected D.

Zach Carter: Looks like the majority got the correct answer, which is D. It's going to be small roads for which data is not available, and we want that to be confirmed by the state or local road planners, the organization that makes data available for us in that area. One question on this topic, and I think we had this in some of the registration questions as well, is what is a major

road? The regulation actually, itself, just talked about roads that contribute noise. And the Noise Guidebook instructions discusses, quote, significant roads. And HEROS questions, I believe, also, maybe talked about major or busy roads. So there's a few different terms out there.

But basically, the question is what are the roads that have the potential to contribute noise to the project? And those are the ones that we want to analyze and review. And so, depending on how close the road is, it's really hard to have a specific cutoff in traffic volume. It'd be nice to, but we have a small road that's very close and, for example, has heavy trucks, even a low-traffic volume can impact the site noise level in a way that matters. So just to try to provide some clarity on this, we can say normally that if there's data available for a road, even a small road, it should really be factored into the assessment, at least to check whether it's going to have a noise impact.

But if you have a very small road, there's no data available, then you can omit that from the assessment, but for that road and, really, for any road data that you're getting for the review, you should contact the local or state traffic planner, just to verify that that's not actually available. So just not being able to find it online, the systems have different levels of ease of access, is not really optimal. So whatever record you have of verifying that is what would be included in the environmental review.

Obviously, if you have -- when we say small roads -- because if you have a bigger road, maybe a larger arterial roadway, within 1,000 feet and you can't find data for that, that is potentially going to be noise contributor to the site. And so, we'd have to find some other way to look at it, whether that means maybe, depending on how big it is, actually doing a sample to extrapolate the numbers, or measuring on-site the noise, other solutions we'll talk about later. But not having data for a larger road would be very unusual.

So in terms of data that you're actually collecting for the road, what do you need to find? Well, it's going to the annual average daily traffic, AADT. The breakdown of automobiles, medium trucks, and heavy trucks are what you're looking for AADT score for the HUD calculator. And again, requesting it from the traffic planning agency, for example, state DOT, is best, and it's best to ask them for their official 10-year projection because that's required for HUD's review. And having the official projection from them is going to be more accurate than just kind of a general estimate based on growth in the area. And then, also, we need the percentage of nighttime use, if possible by the class.

What do we mean by class? The average annual daily traffic count the planning agencies put out are going to be a breakdown using federal highway criteria. So that has more categories than HUD's three main categories of vehicles. So to talk about how to translate that, generally, HUD, automobiles, it translates to cars, pickups, and vans, in that classification. Medium trucks for HUD is going to be two-axle single-unit trucks, 10,000 to 26,000 pounds in federal highway terms.

And then, the heavy trucks will be all other classes of trucks, including long buses. Also, the 10-year projection night percentage by class is very helpful and accurate to have. And it's a really good idea if you can't find this level of detail in the detail to check with your HUD contacts, as they may know where to look for that as well.

Again, when we say the vehicle classes, here's the federal highway classes. You can see only the category number five, single-unit two-axle trucks, is going to go into the medium truck category for HUD. You can see that all the other truck classes besides pickups are going to be heavy

trucks. That's a question we get a lot. If the state just reports AADT and there's a truck percentage or a just the truck AADT, can we split that truck one between medium and heavy?

You can see, based on this, that's not going to be accurate because there's a lot more heavy trucks. We'll see that in some actual examples, too, the medium in that figure. And the Noise Guidebook actually says that. It says that if the information doesn't break it down into medium and heavy, that you should count the heavy truck numbers. Again, this is another way of looking at the same information in the classes corresponding to the federal highway class corresponding to the HUD Noise Guidebook classes.

We're also looking in the review for current data. So what is current data? Generally, it's going to be something within the last three years. That's usually acceptable. But if there is, we want the newest data that's available. And similar to what we talked about with small roads where how do you know if data is available, it's the same thing. For currency, we're looking to verify. If we say, well, there's not data within the last three years that's available from the state or from the local planning agency, we'd want to actually have the contact with them to verify that that's the case.

And just as a caveat, if the state is about to release a new data set, that's another reason to try to request it directly because if the HUD review is completed and submitted, which would measure [inaudible] timeframe, like three years from the time that HEROS was actually assigned to HUD staff. And then, while it's under HUD review, the new data comes out, we're going to want to recalculate using that new data set, just like we would if there was a new FEMA flood map or what have you. It's always best to verify the data is as current as possible.

Again, just for data currency and making sure it's recent, we also want to look at the data from the point here the review is submitted to HUD. So looking from the time the HEROS review is first assigned to HUD, we're looking for a 10-year projection from that time period into the future. And so, again, best to have the official projection from the agency. If not, then we want to see the methodology for that, which we'll talk about.

Again, I know we're repeating this a lot, but it's hard to emphasize too much how preferable it is to have the projections in the DOT or the local source sort of guesstimating. And if you have to come up with an alternate method for that 10-year projection, then a specific method that is based on the historical trend. So usually, you'll have past years of traffic data available. That's going to be better than just a 1 or 2 percent sort of general growth factor. And it's pretty easy to do that extrapolation based on historical trends. I'll show an example of that coming up as well.

Here's a map that you might see. This is from Florida. It's Department of Transportation. This shows the traffic AADT. I think right now, it's in the truck AADT mode for South Dixie Highway in Dade County. And you can see there's quite a bit going on in the area. So there's going to be varying levels of growth.

And it's tough to project without actual historical data or an official projection. In this example that came from a national HUD project, this is what is really optimal, which is the reviewer contacted Florida DOT and got their official projection or trim line 10 years out, which you can see there is going to be around 86,000. They have their growth rate that they're using for that based on historical data. So that's going to be most accurate.

Now, if you didn't have that available, you could actually, if you only had the historical AADT and you didn't have the state's projection, instead of doing 1 or 2 percent, you could actually take those historical data, put them into Excel, and then do a regression, do a forecast, but you see that

you actually end up with something -- if you're doing a linear projection, it's going to be higher than what the state's estimate actually is.

So that's much better, again, to use the official projection. But failing that, to have a methodology like this where you show actually how you're projecting it out and just showing the charts as well. And some [inaudible] this to include in your HEROS review is going to be if you don't have the official projection, at least showing something like this is going to be defensible, again, than just a chart with the 1 percent because this is based on some external reference point.

Here's another example from Texas. They have, actually, a couple of maps that they make traffic data available on. This is one of the simpler ones. So you can see it's got the AADT for vehicles and then truck percentage. And it's got a 2035 projection, which would work because HUD, you have to go at least 10 years out. But you can also take that and do the same forecast and factor that into just 10 years out, if you prefer, which, often, you would because that's more realistic sometimes, depending on how far out the growth is projected.

But as we said earlier, if you can actually get the traffic data by class, that's going to be much better. So on that previous slide, we were actually looking at a truck percentage of 15.4. So again, for this, we'd have to count those all as heavy trucks because we don't have the breakdown by class. But if you're able to actually get the breakdown by class, which is this is from another website the state has, which is harder to access and, really, the best way would be to contact Texas Department of Transportation, you can see that, really, the medium truck percentage is going to be 2 percent out of that.

And then, the heavy truck is going to be about 12 percent. So by getting the breakdown by class for that road, you could actually get a more favorable analysis that would not overestimate heavy trucks. But again, you can see here, it wouldn't be accurate to just slip that number between heavy and medium trucks.

And another advantage of getting the data by class is that you can get a more accurate nighttime percentage. So you could actually figure out for medium trucks, heavy trucks, and also automobiles where the nighttime percentage is for each of those. And because the nighttime penalty and because of the way heavy trucks are treated in the calculator, having that specific nighttime heavy truck percentage is going to make it much more accurate in your analysis.

That's traffic data. To get into another variable the calculator is going to require for roadways, gradient. So the default assumption is 2 percent if there appears to be a grade and it's not known. If there's not a grade, you would have 0 for the grade. But default is 2 percent. But actually, if you think that's over or underestimating, you could use a topographic map or use the feature of Google Earth where you draw a path line and get an elevation profile to get a more specific gradient.

So here, it looks like there's a grade on this road. This is in Massachusetts, the Massachusetts Turnpike. If you look at 2,000 feet along this road, you can see there's about an 11-foot change in elevation. So that gives you, like, 0.6 percent, or 1 percent gradient, which is less than the default. For another road, it might be higher. If the gradient's really significant, like 4 or 5 percent, it's going to have a large impact on the truck noise, so it's important to make sure that's accurate.

That is basically the process of gathering the road data. It's a big part of the review. Now, moving into addressing railroads. Similar to what we said about roadways, the best way source for rail data is going to be contacting the rail operator. But because you're dealing with private source rather than a public agency with roadways, there's no requirement for them to provide that data.

So that's going to be most accurate, but we're going to look at how you can get the rail data if you don't have that provided by the rail operator. And the main source is going to be the Federal Railroad Administration Safety Map and Crossing Inventory.

If you go to that source, which we're going to talk about, and for some reason, the data is not available through it either, a railroad is a significant noise source that we're going to have to find some other way of dealing with that. It's not going to be that we eliminate that rail if it's an active rail line from the noise assessment. Here's the links to Federal Railroad Administration's Safety Map, Crossing Inventory. They also have an app, which is really user-friendly and very helpful. So highly recommend the smartphone app.

Just looking at the calculator example for railroad, the information that's needed to fill in the form here, it's going to be similar. The distance, the average train speed, engines per train, operations, which we'll get into in just a second. This is an example of what the Inventory Safety Map looks like. It's possible to search by location, and you can also click on specific crossings nearest to the project site to actually get the inventory for that. It's color-coded, and that's important because we'll see for the horn, which is one factor that's entered into this calculator, the yellow dots are going to be grade crossings, and that's where you're going to have horns sounded as well.

The DNL calculator asks whether there's a whistle or horn associated with the site. FRA rules require horns to be sounded at least 15 and no more than 20 seconds before public at-grade crossings. Or if they're going fast than 60 miles an hour, a quarter mile before. And so, the inventory form is going to indicate if they're in a quiet zone and if it's an at-grade crossing that's also shown on the map, like you saw. So if it's a public at-grade crossing, it's not a quiet zone, then there is going to be a horn there as long as you're within -- based on the speed you find for this train, 15 seconds to 20 seconds before that crossing.

This view is showing the pop-up box that comes up on the inventory when we click on one of those dots on the safety map. And so, it links directly to the inventory form from the safety map. This is a view of what the crossing inventory form looks like. It's going to tell you information like the type of train.

Again, if you're in a quiet zone. And then, most importantly, the information on train operations. So it's got the total day trains, through-trains, night-through trains, switching trains, and then transit trains. It's also got the speed there, and we'd be looking usually at the typical speed and the average between the high and the low of the typical speed.

One question that comes up a lot is what do we do with switching trains? And so, looking at FRA's guidance for how this inventory form is put together, we don't count the transit trains because those are included already in the day and night through trains, but the switching trains are not, so we have to add those in.

And we also deal with the fact that FRA's night operation hours, there's three extra hours compared to HUD's. Here, you see an equation, we're going to provide this in the materials as

well, for how to convert the information from FRA's crossing inventory to HUD's nighttime train operations. And basically, what you're doing is you're taking the three-quarters of night trains from the inventory and then you're taking a third of the switching trains and taking that out as a percentage of the total of those three.

Some other things that are noteworthy when we look at the inventory, you're going to be looking at, again, the timetable speed, the whistle or horn based on the quiet zone, and then we have some defaults if you don't have that information. If you have information from the operator, maybe it'll tell you the cars per train and engine type and number. But if they don't have that, at least the freight, we have defaults of 50 cars per train, two per diesel engine. So defaults is bolted tracks, but really, that's going to increase your noise level. So it's best to just do a site observation, and you should be able to observe whether it's welded or bolted. Or, again, get that from someone who's knowledgeable about the operation.

Airport noise source information, that's what we're going to talk about next. We've covered rail. Usually, airfield data is the simplest to deal with. There is a method in the Noise Guidebook for calculating airport operations, noise contours where you don't have that available from the airport. But that's pretty rare, that you have an airport that's significant enough traffic to be affecting your site but doesn't have a contour or it can't at least provide some estimate or information when contacted about the impact. But there is a methodology for that. So if you need to do that, that's something you would contact HUD to consult on.

We're covering here how to use the contour map. You can see this is for Chicago O'Hare. Here, you have a significant area around the city that's affected by the noise contours from O'Hare. And what you're basically looking for is are you within the contour area that's marked? And it's marked by the sound level.

And if you are, then you add that to your calculator, and if you're not within, that would be enough documentation to move on. In marginal cases where a site's just beyond 65-decibel contour and you have other noise sources, so you need that to be factored in, you may have to extrapolate to kind of drawing a 60-decibel zone, just to add that extra noise level into the analysis, but that would be when you're very close to that 55 contour and you have already a high noise level.

Here's another example of the contour map. This is from Air Installation Compatible Use Zone. So this is a study that military airfields put out for communities that they're in proximity to. This is in Fort Worth, Texas, at the joint base there, and you can see they actually have a 60-decibel contour displayed on this map, and we have the 66-decibel contour mark. And as you can see, it does overlap some neighborhoods in the city, so it would have to be factored into the review. And oftentimes, the military airfields will have an environmental staff. So that's usually very helpful to contact if you have questions about their AICUZ, what they call their contour map.

We just included this one as well from an installation in Alaska. It's interesting because it actually has explosive contours as well. So it's got the noise contours in the runway, but it also has where you have bombing ranges or munitions ranges, and it's got a weapons and explosives noise contour that you can use there as well. You can see, though, that it really stays mostly on the base. It's not impacting much of the community, except a very small area to the south.

Again, it's always better to have the actual data, but there are a few assumptions you can use if that's not available. One that we do get questions on a lot is speed. So you're using the posted

speed limit. If there's some reason that you can't find a posted speed limit, there might have to be an assumption in that case, but I think that would be pretty rare.

The assumption for nighttime traffic, if that's not available, it's 15 percent of the ADT. And then, because highways have a lot of times class breakdowns that maybe arterial roads don't, for those non-highway roads, those arterials, there is a default of 92 percent car, 4 percent medium truck, 4 percent heavy truck. But again, that's not highways. We talked about the basic train assumption as well.

Now, we're going to get into the noise assessment. We collected our data, so the next step is for designating the noise assessment location, or the concurrent step. And the noise assessment location is going to be the point on the site where you're looking at the closest proximity to the noise exposure. And the guidebook actually says it's going to be 6.5 feet out from the façade of the structure where you have residential units in the direction of your noise source.

If there are no outdoor noise-sensitive uses and you're looking at attenuating the structure and you plan to base all that structural attenuation on a single worst case scenario, then sometimes you can have just one single noise assessment location. So you can see, in this example, we had highway I-35 and then 9th Street were the two main noise sources. And so, there's one NAL designated 6.5 feet from the structure in the direction of both those sources. And that's where we're going to do our noise calculation, our measurements from, et cetera. And then, the attenuation for the rest of the structure is going to be based on that location.

If you want to have a more refined approach, where you have additional attenuation in one part of the building and less in others, you would have to designate an additional noise assessment location to get the noise level in those other parts that are less noise exposed. And similarly, there may be a more complex site, which we'll look at on those next slides.

So this is a very complex site. It's got exposure to two highways, two large arterial roads. It's got a rail line and even a rail yard nearby. And then, the project itself has a courtyard. Those are determined to be an area that requires quiet. So there's several factors that we're looking at on this project to determine where the noise assessment location would be.

So you can see that because you got maybe one where you have most exposure to one of the highways and the rail line, another that's got both the highways and arterial road, another mainly with the railroad and the highways. And this is just to try to determine the impact of all these sources and this complex design layout where the largest impact would be for the worst case, but also how to effectively shield that noise-sensitive area that we had outdoors.

That covers the basics of setting up the noise assessment and gathering the data designated in a location. Now, we're going to be transitioning to a third audience poll on our next slide. And I'm going to bring that up now. Just a quick reminder again we're doing this through menti.com. The code is 8263282. This is an audience question. It's a little more subjective on this one. That'll be okay for our results. We'll explain in a second. The question is, what do you consider to be a use that requires quiet in terms of outdoor at a property? A is a swimming pool. B is a dog run. C is a gazebo. D, all of the above. Or E, it depends. The poll is now open, and you have 30 seconds to answer the question. It'll close automatically, and then we'll look at the answer.

Michelle Juma: The poll is not closed. Six respondents selected A. One respondent selected B. Sixteen respondents selected C. Forty-four respondents selected D. Forty-three respondents selected E.

Zach Carter: That's an interesting mix, and that's what we were going for with this question. All those are going to count toward the correct answer for our contest because, as we talked about, it does sort of depend on the purpose of the project and the designation of that outdoor area. So it's really interesting, especially the split between all of the above and it depends. Thanks for your participation in that.

When we talk about outdoor quiet spaces that are determined to require quiet and evaluate it as noise assessment location, it's going to depend on the purpose of the project, other factors that are evaluated case by case. I know I saw in some of the registration questions it'd be nice if we had a list of outdoor uses that are noise sensitive. That's something that I think we'd like to have we don't have currently. So currently, they're evaluated case by case. For most projects, HUD is trying to balance the need for project amenities with the need to meet the noise abatement requirements.

It's something that it's important to explain, when you have an outdoor area, in the environmental review, sort of how that area is going to be used. It's why having plans for the site is very helpful so that the reviewers can understand why or why not a specific area might be designated as needing to be shielded or protected from the noise sources that are in proximity to the project. That's with regard to common areas that are noise sensitive.

However, for ancillary spaces to individual dwelling units, we have a specific policy that has been in effect for a few years that exempts, basically, from coverage balconies, provided they meet certain criteria. And so, the criteria is that you achieve an interior goal of 45 decibels. You have mechanical ventilation. And there's an operation and maintenance plan for the doors and windows to that balcony area. And we're going to talk about in the environmental review HEROS screen documenting the mitigation in the review for the operation and maintenance plan.

Another thing that comes up sometimes is we need to add decibel levels from different sources together. So the calculator does this to some extent, but in certain cases, for example if you have different lanes of a road on a grade, you might analyze the uphill grade differently and need to add that to the review. Additionally, if you have those low impulsive sounds, there may be a need to address that factor separately and add them together. So this is just showing you the difference in sound levels and the addition to the lower level when you're adding together manually. This is from the Noise Guidebook.

Just to sum up getting the information ready for the calculator, the steps are gathering the data, selecting the noise assessment location, measuring the distance from the noise assessment location to your noise source, inputting the noise source data into the calculator, calculating combined DNL, and then recalculating it based on barriers or mitigation, as appropriate.

This is basically a note to explain the results in the noise calculator, that currently they are explained in integers. So that's whole numbers, not decimal values. That's a simplification from these last few months that's gone into effect, and we just want to make sure everyone's aware of that.

Now, to look in more detail at a sample project. This is from an actual HUD review prepared initially by a third party, reviewed by HUD. And it's going to be near a rail line and a sort of a transit [range ?] development project. And so, we're going to look at setting up the noise calculation. Just one additional note on here. It's always really helpful to overlay the site plan on an aerial photo, both for measurement and also for orienting the noise assessment location. It's so easy to do that. We would normally expect to see that in our view. And it's important to make sure that's lined up accurately as well.

Here we have just the basic points for how you measure the effective distance from the noise assessment location to the noise source. And we'll go through these specifically in the example. For this slide, it's zoomed in; you can't see the nearest significant road. Looking at the data, there's mostly small roads around, but there was a sort of arterial to the north of the site that did have an impact on the calculation and was close enough to the level from the rail that it mattered. So that's the one that was factored in. So it's just showing you that there.

You can see the noise assessment location is 6.5 feet from the corner in the direction of that significant road and closest to the rail line. This is showing the measurement from the noise assessment location with the map overlay to the center line of the road. So the center line is actually more visible in the next image, but this is kind of the minimum documentation we want to see for that measure. And the reason it's measured on the map is because the road that we're looking at is far enough away that it's not in the plan. So it can't be measured from the plans itself. So the next best thing is to do the overlay and then measure on the map.

And just another note, in this view, one thing here people ask about, what about the barrier effect of sort of the intervening buildings? Where you have a location where there's maybe a larger parking garage that's entirely blocking the residential building, we have that solid barrier across, that's something you would calculate using the barrier module that we'll get to. But in this case, you have several gaps between these buildings that at least two out of three of them are lower than the proposed project. And so, we don't get that barrier effect, really, in a way that we would factor into the review from those. So we would just count the road as a normal source there.

Here, you have that segment of the road. You can see the center line better now. And it's adjusted for HUD's 10-year requirement. So we've taken their 2038 number and factored that out to 10 years. And because it's a small arterial, it doesn't have the vehicle class breakdown. So we are using the truck percentage. It has all heavy trucks. So if you are able to measure the effective distance on the plan, that's always best. So we did have the railroad right of way shown on the plan, and as noted on your slide, if you have a right of way like that and the rail line is centered or the two rail lines are more or less centered within that right of way, then you can calculate the effective distance by measuring the distance of the nearest edge of the right of way and the farthest edge and then averaging those two.

And so, actually measuring that on the plans from the noise assessment location, it gives you 16 feet to the near edge, 80 feet to the far edge, and that averages out to 48 feet effective distance. And so, that's always going to be more accurate, measuring from the plans than measuring from the aerial map, and that's preferred if it's possible. Now, we've got the noise assessment location set up. We've got the road data.

And so, the next step is looking at the rail and determining what runs on it. Before moving directly to the FRA crossing inventory that we talked about, you can actually see there's a local metro rail station there. So you know that's going to be at least some of the traffic is going to be

the metro rail on the tracks. A lot of times, the best way to find out operations for that is to look initially at the metro schedule, the commuter schedule, and that has departure times, the [cross set ?] stations. So that would be one way to get a sense of the nighttime operations and total operations for the commuter rail.

Then, to confirm whether that's the only thing on those tracks, looking at the FRA database, you can also see that there's an at-grade crossing at the station. And so, there's going to be an inventory form available, and that's going to have the information, whether it's the freight or commuter, and here, it shows it's actually both. And it shows you which lines run on that track and also the total movements. So this can get a little tricky because the crossing inventory is actually going to include the metro rail. And so, how do you break does out? Because it includes a lot of times the freight operations, and then the secondary operations are on that track, wherein in this case, the metro rail and the secondary freight. So how do you split that out?

Again, the best way is to contact the operator. Here, the primary one is the metro rail. And so, the reviewer actually contacted them and they provided the information that shows specifically the breakdown between freight, commuter rail, the time of day, the speeds, the number of locomotives, and that detailed information. And so, that was pretty crucial for getting the accurate level from the rail in this case.

After gathering the data for the project, the remaining step is inputting it into the noise calculator. Here on the road DNL screen, we can see we've taken our effective distance as measured, our average speed, and then counted the trucks as all heavy trucks, and get 52 decibels DNL. From the rail, the commuter rail is electric, and then we have diesel for the freight.

We've got our effective distance measured from plans, the average speeds, engines, and rail cars. That ends up with a 72-decibel noise level. And so, one thing to note from the Noise Guidebook is that when there's more than 16 decibels difference between two of the sources, it's going to effectively add zero to your higher source. So in this case, because of the difference, the road is not really going to matter in the final outcome. The rail is going to have the main effect.

We have our airport noise contour. Even though we know for the site we're not in proximity to the airport, we still need to confirm the distance there. And so, what we'd expect to see in the environmental review is just a contour map, this is from Austin-Bergstrom, and then, the aerial map showing the distance from it to the site, and an overlay is good as well. But it's pretty obvious here that it's not affecting the site.

And then, finally, the consideration as you're filling out the calculator is the loud impulsive sounds. And so, this is where we're introducing this concept of the technical definition of loud impulsive sounds and the penalty they add. So it's very specific. These are one second or less in duration and they're fluctuating well above the background noise level.

So some of the ones you might have are railyards. I think that was a question we had in the registration, is could railyards be a source of loud impulsive sounds? Yes. You know, often, they would be. And that's where, if you have a rail line that's going into a railyard near the project, then that penalty would possibly be added to that source.

You have quarries, military operations. There may be jet traffic, so you have sonic booms. Or you have bomb ranges, as we talked about. So what the Noise Guide [inaudible] is when we have these types of operations, you are to add 8 decibels to the noise level from that noise source. And so, if it's associated with one of the main ones, like we had, especially rail or airport, it would be

added to that noise level from the contour or from the calculation. If not, then you would have to do a little more work to figure out, okay, can we get some kind of range of what the decibel level from this industrial operation might be. Or is this a situation where it's so unique that we're going to have to look at some onset measurement of the noise?

And then, finally, for this particular site, we had no quiet zone, so there's no horn. And so, for the rail, no loud impulsive sound. So the final noise level, 72, the same as what it was from the rail. So we're in the normally unacceptable range needing mitigation but not requiring special approval. And so, we would just document the mitigation, which we're going to talk about how to do shortly and move on with the review.

To go into the next section, we're going to be doing one more final poll to check your knowledge. Just again a reminder, menti.com, 823282. And this final question to true or false. If loud impulse sounds are present, HUD regulations require adding 8 decibels to the total noise level for the site after road, rail, and aircraft sources are combined. Is that true or false? The poll is now open. You have 30 seconds to answer the question. It'll close automatically, just like before, and Michelle will announce the results.

Michelle Juma: The poll is now closed. Seventy-nine respondents selected true. Twenty-eight respondents selected false.

Zach Carter: Yeah. This is sort of a tricky one, but we just covered it a little bit there. But it's a little tricky because of the way the calculator is set up. But actually, the regulation says that you add 8 decibels to the specific source of the loud impulse sounds, rather than the total noise level for all the sources combined.

That's why it's important to understand that concept from the Noise Guidebook of adding the different decibel levels together and the factor that that adds to the higher level, that chart we showed. Because we may have to do separate calculations and then add them together. And really, if you have a loud impulsive sound potential, it's the situation where professional expertise, specifically acoustical engineering expertise or at least the HUD stuff who can have input on how to analyze that, would be very helpful because it's a unique situation.

Sara Jensen: Zach, before you go on, there are a couple of clarifications that maybe we could do right now. Going back to gathering rail and truck data, there's just one helpful comment that someone sent in that sometimes cities have information on rail lines crossing the city limit. So that's another potential source of data.

And there was one clarification question on medium and heavy truck data. So if it is not separated out, you said that we need to count it all as heavy truck data. The question is, when you're looking at the noise calculator, there's a line for autos, a line for medium trucks, and a line for heavy trucks. Can you explain how you deal with that medium truck line if you don't have the data separated out?

Zach Carter: When we look at those columns, you actually check at the top. You can inactivate that medium truck column. And so, it's possible to only have the column for automobiles and the column for heavy truck active. So if you only have the heavy truck percentage and the automobile ADT, you would only do those two columns for the calculation, and you would inactivate that medium truck part of it.

Sara Jensen: Perfect. Thank you for that clarification. Just one more. There are some other questions, but we're going to be covering them, so we don't need to talk about them now. But

there were several questions that came in on outdoor noise. One comment is that we are aware that this is an issue, and we are working on written guidance. It just wasn't ready for this webinar, but that will be coming. Several questions came in with this specific question. Is it acceptable to exclude night fraction for DNL calculation for an outdoor common area that is only available during daytime hours? For example, a rooftop patio only open 8:00 A.M. to 8:00 P.M.

Zach Carter: Yeah. I mean, that's an excellent suggestion, and that's definitely something that we understand would be a good approach. The issue is that right now, in the regulation, we only have this one metric, which is DNL, that we talked about, inherently has, within that time average level, 10 decibels added to nighttime hours.

And so, that's the only metric that we have in our regulation to use for the noise assessment currently. And so, the question of how to break out that nighttime impact, it's not clear how we do that under the regulation right now. But what we do have is the regulation clearly says where we have these areas that require quiet, that they are determined to require quiet.

And so it's something that we do want to look at more careful in the interim, is how are we determining what requires quiet? And then, yes. Long-term, I think, certainly, as we work with Volpe Center at Department of Transportation, as we mentioned, those kinds of things, we're open to them and we want to consider whether DNL for those areas makes sense, and maybe it doesn't. Maybe there's another metric we'd use for those that would make more sense.

Sara Jensen: To everyone that sent in that question or has that question, the answer is no. However, more guidance will be coming on outdoor noise.

Zach Carter: As we talked about, after you had completed the calculation, it's important to ground truth it with the site visit. This is the [limit here ?] of an actual HUD insured project, and it's really hard to get an impression from looking at an aerial map or even site photos of exactly how units relate geometrically to this elevated roadway, sort of a complex situation. And so, just seeing the site is something that's very helpful in a situation like this. And you really want to ground truth it.

On the other hand, you may look at a site and say I'm coming up with this high noise level. It doesn't really correspond with what we see on the site. It seems very quiet, even at hours where we have traffic or we have other things. And so, that's where, as we get into alternative methods of analysis, in some of those situations there might be a case where you want to look at how can we second opinion that result?

That leads into the question of onsite noise measurement, or noise sampling, use of noise meter, which is something that is mentioned in the regulations. So there's a chapter in the Noise Guidebook as well that has some specific examples of where noise measurement might be useful.

And so, for example, where you have a unique topography or where you have a noise source that's close by, we mentioned with rail, that you can't find the rail operation data, it's not forthcoming for some reason but you know that source is there. Another reason the regulation mentions is where the results of the calculation are controversial. So what we just talked about with ground truthing the result on the site.

And some logical and valid reasons that there is to question the result or that the result is hard to derive from the calculation, then measurement is something you would look at. Here's an example of what a site might look like. This is here in Washington D.C. near Union Station. You

have the Union Station is elevated, sort of a commuter rail yard. Below ground, you have Metro lines operating.

And you also have mechanical operations like water pumps for this area for ground water near these operations. And all this mechanical activity is a opening to part of the underground structure here, or under the elevated platform. And so, there's a lot of different kind of [style ?] coming out of here. Not something that is really amenable for any of the types of sources to calculation using our standard tools. And so, there's a lot of multifamily residential development in this area. So that might be an example of a location where measurement would be an appropriate strategy to use

Another example, and this is actually a question we had in the registration questions, is there's a racetrack. I think this is maybe an example from a specific activity. So you don't have necessarily a road, traffic within 1,000 feet of the project, but you still have, within a certain distance, more than 1,000 feet but enough where it is impacting the site, you have a racetrack that maybe has drag races, very loud car races.

And it may not meet the criteria of loud impulse sound because it would be continuous for more than a second, but it's extremely loud, unique, and intermittent. Maybe on the weekends or a couple weekends a month. And so, looking at how to consider that under the noise regulation and just the overall quality of the development is challenging. In that situation, we might look at whether noise attenuation in the structure is going to work for those acute events that are loud. And also, how it would impact people outside, even in terms of safety, depending on how close it is to the project site.

And the Noise Guidebook actually does mention possibly using the C-weighted scaled, rather than the A-weighted noise level. So A-weighted is what goes into DNL scale, and that actually focuses on the frequencies of sounds that are most audible for humans and weights those more heavily. But the C weighting gets into sound that's sort of marginal to human hearing, so lower or higher frequency. But when those are having this amplitude and they're loud enough, they can be really disturbing and [inaudible].

So that C-weighted scale takes that into account. It'd be something that has to be done with measurement by an acoustic professional, but it would give you more accurate and actually doesn't require that 8-decibel penalty to the source when that C-weighted scale is used. So sampling with that might be appropriate in that type of situation. And then, getting a more specific input on attenuation measures that could be appropriate.

As you maybe got a sense in the last slides, and I think this is another question of the registration, when we get one of these non-standard assessments, maybe using sampling, how do we, as HUD handle it? Just as a preliminary thing, we really would ask, rather than submitting a completed assessment with onsite measurements, that you contact the HUD point of contact and explain the basis for using that approach and get a response it before proceeding so that we agree that that makes sense.

And then, generally, because this is something that we need a methodology for, it's not part of our standard process, we would want to see a quasi-professional, such as an acoustical engineer. IMC is one of the bodies that certifies acoustical engineers. So it would be appropriate for them to have that qualification, and those individuals are out there, and they would have, frankly, more capacity for that type of assessment than we have. And so, we would definitely factor that

expertise into the review. And I think it adds value in those situations where measurement's appropriate.

Reinforcing what I just said, when should you bring in an acoustical engineer? Definitely for sampling if you're going to use that onsite measurement, for those reasons we talked about. If we have one where environmental impact statement is required or a waiver of the EIS, because we're 76 or above for new construction, or changing use, then it would be a really good idea to have someone who can make those recommendations and improve the attenuation since a high level of attenuation is going to be needed for those. And then, as we mentioned, the qualifications that they would be looking for there.

Just to sum up what's required when you have these levels. We talked about this earlier, so I won't reread the whole thing. But again, just mentioning at this point in the process, you've done the calculation. You've ground truthed it. You know what the level is. So based on the type of project, you know whether you must mitigate in the development or whether it's sub-rehab and strongly recommended, we kind of expect it unless it's not feasible. So let's talk about, actually, how we mitigate in projects.

We covered this earlier in some detail. But again, reconfiguring, using barriers are the preferred solutions. But attenuation in the structure is one that we see a lot, particularly for those mid-rise and high-rise developments. We want to talk about timing of mitigation. I think most people are used to this, but something we do see sometimes when we're doing a multi-family new construction with environmental assessment.

And so, we're making a finding [inaudible] impact. And to be able to make that finding, we're supposed to have specific mitigation developed for the structure. And so, actually, the time that the approving official at HUD signs off on the review, before a firm commitment, we would want to have the mitigation plan for the project and the specs of what is going to be build. Usually, the architect's sort of concurrent in that so that that can be part of the approval conditions for the project.

And so, this is just a note on timing, and then that can be handed off in conditions at closing to actually be carried during the project, but the plan for it would be developed at the time that review is completed. Now, moving into actually how you document the attenuation and structure attenuation in the environmental review. So this is the Sound Transmission and Classification Assessment Tool, or STraCAT, which is on our website. And this is basically an electronic version of the figure 19 and figure 17 from the Noise Guidebook.

One of the things to note about this is that the figure 19 actually talked about what part of the structure are you using for this attenuation? Usually, it's either a wall or it can be an individual unit. So to the extent we have pretty much uniform windows and door configuration on the exterior, you might look at each façade that has the noise impact and do the attenuation level through that. But if you have some specific units that have more unique windows and doors or more noise exposed, then you may need to look into unit-level of attenuation and do that value that in STraCAT. And for projects that require that require a EIS or waiver, you definitely need to be looking more specifically at some of the units.

This also ties back to this noise assessment location because where you just have a single worst-case noise assessment location, then you're basically saying that all the façades or units would meet the required STC based on that worst-case level. But again, as we talked about, if you want

to be more specific, with more attenuation in certain places, you need to designate additional locations, calculate additional levels around the structure.

How much attenuation is required? This is actually in the regulation. And so, for normally unacceptable, 66 to 75, you're going to have to have 5 STC over standard construction. We said standard construction, you do 20-decibel reduction. So that's 25. If you're 66 to 70, it's going to be 25 STC. If you're 71 to 75, then it's going to be 30 STC.

Above 75, again, that's the area where you're going to do an environmental impact statement for waiver. And for those levels, the regulation says the attenuation is going to have to be approved by HUD. The STraCAT is going to be an estimate on that, but it's just going to be an estimate. So it will have to be verified. And it may be more than just the 5-decibel increment.

So for example, if the DNL is 80, a 5 STC increment would get you 35 STC. But if you allow for a margin of error, which is something that's discussed in the guidebook, then we may look at 38 STC for a 80-decibel site. And again, that's assuming, for a site like that, that it goes through the process of the environmental impact statement or waiver.

This is what STraCAT actually looks like. You can enter the basic project information there. And then, the noise level for your noise assessment location. And it'll give you a target attenuation amount here. So here, just using the example we looked at earlier, 72 decibels DNL, it's going to give you 30 STC as the required attenuation target. And since we're just using that one worst-case scenario, it's going to be 30 STC in the walls all around the project. But we're going to look at it at the level of the individual units.

This is what it looks like after you enter the basic information. It's going to let you enter the STC for the individual components. So here, you have the wall construction. If you have documentation of the STC for your wall components, window components, door components, you can manually enter those in the tool. Or we have a dropdown menu that has a lot of the different options and has the STC already entered for them. And that can be really helpful for something like sub-rehab where you don't have a new product specification and what that STC is.

So here's what the dropdown menu looks like. You would click on wall, and then it would give you the different components you can choose. And based on the ones you select, you would enter the STC for that component. And we've actually updated this even within the last year to add more options that were requested for common materials.

And so, here you see, for the façade outside of the unit, we've selected the quantity of windows, the square footage of those, the STC. Same for doors. So this is reflecting on the balcony, we had French doors opening to the balcony, so that's the two, and the manufacturer's STC attenuation rating for those. And then, your wall. And so, the tool's showing you that the projected attenuation from these is going to be 33.55. And that is going to meet your 30 STC.

So this is showing in your environmental review that the required attenuation is achieved. The only other thing would be including the backup of the STC ratings that you see here in the environmental review. To document that that's the case, the architect's concurrence that this is going to be incorporated in the project, and then that would become a condition.

One thing on this topic of attenuation, a question that we actually had in the registration, was what about when you have a climate that doesn't require air conditioning? Are we assuming that air conditioning is included? Yes. The Noise Guidebook has a section that discusses that, and it

says, really, the first step in attenuating noise in the structure is going to be having mechanical ventilation.

So if you don't have mechanical ventilation and windows have to be open, if you can configure them away from the noise source, that might work in some cases. That would have to be calculated based on the noise assessment location outside the part of the building where those windows are. But if they have to face a noise source, it's going to be difficult to attenuate without having air conditioning in the building and the closed acoustical system that that provides.

We talked about another mitigation option, is site configuration. This is actually an image from the Noise Guidebook itself that has a garage building that's shielding some units. It's blocking them from a highway, providing attenuation. And this is a real-world example where you have the intersection of a couple of highways, a lot of noise generation, and then you've used -- the buildings are not shielded from the highway, but the buildings are actually shielding the common area. And it's also placed as far away from the highway as possible. So the site configuration is giving you as much attenuation as you can get just from the layout of the site.

Finally, the barrier performance module is going to be a way you document the barrier effect when your barrier is attenuation. The diagram, it's in the guidebook and it's on the barrier performance module on the website. It's sort of laid out like a single-family subdivision, which we see a lot near highways, where you have a noise barrier to single-family homes in the neighborhood.

And it shows you the different inputs that you have, which is basically the observer would see the barrier distance to the source, to the effective distance, the barrier height, and then the calculator is actually going to draw that line of sight distance line. And then that gives you the attenuation. So your barrier has to be high enough to block the line of sight from the observer to noise source.

In a multi-family project, again, we might see the common areas have a barrier. You're not going to usually have the barrier blocking the whole building. But one question we had in the registration and one thing that comes up is what about the building itself providing attenuation? So this is an actual project where you had a long-term care facility that had a rooftop deck. And you had a barrier effect, a rail line very close below the building, and then you had the actual roofline of the property providing a barrier effect to protect the upper deck from rail noise. And so, how do you calculate that?

Basically, this is a type of sound that's diffracting around the edge of the building. And there's the setback of that deck from the edge, so that's why you have some shielding there. Basically, you would use the same layout here, but in this case your observer is going to be a little higher than your barrier height, but because of that setback, that line of sight is still going to be broken to the rail source. And so, the edge of the roof was 64 feet off the ground. Adding [five foot ?] to that is the observer height of 69 feet. And then, you had about a 13-foot setback, so that's the D, from the barrier roof edge to the people on the roof deck. 47 feet from the edge of the structure at the ground to the rail line.

And then, alpha, the angle subtended by the building, it was pretty much blocking the entire view of the railroad because you had a setback on all sides of the roof. So except the very far distance, you couldn't see the rail line. So the angle that is blocked or subtended by the barrier is 180

degrees, which is the max you can have. And then you see that that comes out to significant attenuation, reducing it by about 12 decibels, which is the amount that is necessary for that site.

Just a note on that, too, as far as how does that play into the requirements for an EIS? If the barrier is going to be in place by the time construction is completed, before occupancy, then it can be counted into the noise level. And so, that is one of the advantages of using a barrier or the building providing a barrier effect, is that it can be counted for how you classify the site as unacceptable, normally unacceptable, or acceptable.

Getting into the HEROS mitigation screen, so this is just following up on what if you have a balcony, you have the operation and maintenance plan, you have STraCAT, you have noise attenuation. Any of these measures, you have the barrier, they're going to have to be built into the development, those have to be documented in the review. And so, the mitigation screen is where you enter that.

The plans go into the mitigation screen at the time the HEROS review is completed. And then, there's a follow-up screen. So as you go through the process of handoff and closing -- and it goes into asset, longer-term measurement of that, property management, there is this mechanism for following up on saying, yes. It was completed as specified in the conditions, and the attenuation was incorporated. And that way, the public record is complete.

Sara Jensen: Thanks, Zach. We are coming towards the end of our time. I wanted to let everyone know that if you need to leave at the scheduled end, the whole thing will be recorded. We may go a little longer. And what I'll be talking about to get us to the end is what to do when your project is over 75 DNL.

And then, I'm going to go over some policy updates and FAQs. So it will all be recorded. Stay if you can. We'd love to have you stay. And I just want to underline Zach's point about mitigation. You can have the best plan in the world and it doesn't mean anything if it doesn't get into the plans and specs for the project and if we don't follow-up and make sure that the mitigation took place.

One other thing before I go on. Michelle, I think we're running low on time, but if you could push whatever needs to happen on the poll so that people can see on their individual screens how they did on the poll, that would be great. And while I'm talking, maybe you can check your phone and see where you came in on the poll. So we're going to talk about what happens if you are in the unacceptable noise zone.

The regulation generally prohibits new construction or projects that convert to residential use in the unacceptable noise zone. In order the proceed, a project must do one of three things. Either complete an environmental impact statement or receive a waiver of an environmental impact statement requirement, get approval of the site from the assistant secretary for CPD, and get the approval of a noise attenuation by the assistant secretary for CPD. Again, remember that our training today is targeted for FHA partners, so we're talking about Part 50.

Housing staff have three options when applications come in with a project over 75 DNL. The first is to reject the project. The second is to work with the lender to complete an environmental impact statement, which is quite involved. And the third is to pursue a waiver of the EIS requirement. That's an option if noise is the only unresolved issue at the site and the HEROS review is complete for all related laws and authorities and environmental assessment factor and

HUD approves the mitigation plan to achieve 45 DNL indoors and 65 DNL outdoors where there are noise-sensitive uses.

So lenders with projects over 75 DNL, here's what HUD needs to consider an EIS waiver. When we say complete HEROS review, this means that all consultation processes are complete. So we can't process an EIS waiver if we're waiting for a memorandum of agreement on historic preservation or waiting for consultation with U.S. Fish and Wildlife and Endangered Species.

The HEROS review must be reviewed by the field or regional environmental officer in HEROS. And these are the field staff in HUD's Office of Environment and Energy that provide technical assistance on environmental issues, including noise, and they must review and comment in HEROS for projects that need an EIS waiver.

We also need a final site plan and detailed noise exposure and attenuation plan included in that site plan. This can mean that HUD can't process a noise waiver at the pre-op stage for multi-family or before the application is in for ORCF. So the lender role, this is what we need to keep things going smoothly. So at a minimum, we need you to identify the noise issue in the pre-application or applications. And, in fact, what we really want is you to raise the noise issue at the concept meeting for multi-family or via Lean Thinking for ORCF well before you submit your application.

Explain why HUD should consider an EIS waiver for this project. Why is this noise-impacted location good for housing? And finally, we need you to commit to providing the information that HUD needs. We may need updating site plans or special studies to support the EIS waiver request. HUD has a new system of early EIS waiver team coordination. We ask that housing staff alert the field and regional environmental staff and me, the PICO [ph], as soon as they know they will need to request an EIS waiver.

We will then assemble the waiver team with the aim to review the noise calculations and mitigation plan and identify any other environmental issues as early as possible so that when a project is ready to officially start the waiver process, it will go as quickly and as smoothly as possible. Once an official request goes in, the waiver is reviewed by headquarters' Office of Environment, then the Office of General Counsel. And if it's approved, it gets signed by the Assistant Secretary for CPD.

As I mentioned before, we have discussed many FAQs and policy updates throughout the presentation, but let's go through a few more to end our day. How can I avoid a delay in the noise review process? The best way is to provide complete noise data as early as possible. This training today is designed to provide you the tools you need to submit noise analysis that meets HUD's standard. Who at HUD reviews noise assessments? The primary reviewer is the multi-family or 232 staff completing the HEROs review. This is generally an underwriter or appraiser.

The housing staff are supported by Office of Environment and Energy field staff. These are the field and regional environmental officers I mentioned a minute ago. For new construction or conversion of use activities over 200 units, field or regional environmental officers must review and comment in HEROS by regulation. For new construction with noise exposure that are under 200 units, housing staff are encouraged to consult with REOs and FEOs for questions and technical assistance.

What is a special environmental clearance? This is fairly technical. So in the interest of time, I will just say that there is an outdated phrase in the Noise Guidebook that led to a requirement in

the MAP Guide for FEO and REO review and comment for noise impact to new construction under 200 units. OEE has updated that definition, and multi-family issued a MAP Guide update.

And so that is no longer the case. Projects with noise between 65 and 75 that are under 200 units are not required to go through review and comment by the REO and FEO. However, as I just mentioned, they are HUD's noise expert and will often be invited in for technical assistance or questions on noise or any other environmental issue at any level of review. Noise levels that require an EIS waiver, even if the project is under 200 units, will still require review and comments.

What noise changes are coming with the MAP updates? Not many. So there were extensive edits to the noise section, but most of the edits were clarification. For example, we clarify the noise requirement at each level of review. We state the existing requirement for the 10-year noise projection. And we incorporate the balcony memo into the MAP Guide.

There is one new section on railroad vibration, noise, and location. We brought this section over from the 232 Handbook so the two programs would align. We received a lot of feedback on this section from the drafting table and made edits so the language was less prescriptive and more flexible.

For projects closer than 100 feet from a railroad track, we will need at a minimum approval from HUD, a structural examination for vibration damage, and documentation that the site meets safety standards. For example, is there a fence to protect residents from the railroad track? If needed, HUD may ask for a railroad vibration study performed by a registered professional engineer with experience in structural vibration analysis. The new section also states that HUD may add up to 8 decibels additional noise attenuation for projects within 3,000 feet of an actively operating railyard. The amount of attenuation will depend on existing or proposed barriers, topography, and the nature of the railyard operations.

What is a largely undeveloped area? The noise regulations require and EIS level of review for projects in the normally unacceptable zone, this is between 65 and 75, that are in a largely undeveloped area. Largely undeveloped means that the following things are not true. The area within 2-mile radius of the project boundary is over 50 percent developed for urban uses. And infrastructure is available and has capacity to serve the project. This means that there is water main in place that a project could tap into. It doesn't mean that the connection is already to the site. We recommend reaching out to your housing contacts if you have any questions about a potentially largely undeveloped site.

What average speed for a given road should I use in the noise calculator? Use the posted speed limit for the average speed. The speed limit may be different for cars and heavy trucks. We sometimes get questions about actual versus posted speed limit due to traffic or speeding. But the posted speed limit is defensible and gives a reasonable average speed. If there is no posted speed limit, you'll need to get this information from the relevant transportation agency. And a question came in in the comment box about does that need to be part of the noise documentation? Yes. We would want to see either a picture of the posted speed limit or documentation from the transportation agency.

Here's a really important one. I've heard there's a 1-decibel tolerance that may be used for noise calculator results Is this true? No. This is not HUD policy. You may have seen this in old noise presentations or materials, but this is no longer in effect. The noise calculator currently displays

results in whole numbers, or integer values. HUD's position is that this appropriate reflects the level of accuracy of the tool. So 1-decibel adjustment is not necessary.

We'll end with some resources. Here are some really good resources for additional information about HUD's noise regulation. The first link is to the noise website on the HUD Exchange, and you will find all the other things listed, plus all the noise tools, guidebooks, and other information there. HUD also has online training modules, including one for noise abatement and control. This goes over a lot of the material we covered today, but it's for a general audience, not FHA-specific, and you can take it at your own pace.

Housing also has an environmental webpage that includes links to program guidance. You can find lots of information related to FHA and environmental reviews here. For noise, I'd like to point out links to the balcony memo and the MAP update related to the review and comment and normally acceptable noise zones that I mentioned a minute ago.

So earlier, I mentioned an upcoming webinar. This is for HEROS training for FHA partners, both multi-family and ORCF. We'll cover how to determine the correct level of review for FHA projects, how to complete the HEROS screen as an FHA partner, troubleshooting HEROS, and questions and answers. And it's designed for people brand new to HEROS and for people with HEROS experience.

The next slide has links to past webinars. All of the materials are posted, and the recorded webinars are posted at these links. And this webinar today will be posted with all the material in a couple weeks. So now, we have three minutes, but also can stay on for ten minutes after our scheduled time, and we can take any questions that have come in. Remember that we are only accepting questions related to FHA programs and we can't accept questions about specific projects.

Zach Carter: There was one question that came in that I wanted to mention, which I don't think I covered, which is about stop signs and the distance to a stop sign factor. And so, usually, we're looking at are we within 600 feet of a stop sign? And we often get the question of does a traffic signal count as a stop sign? The answer to that is no. A traffic signal does not count as a stop sign.

There was also a question about the example and the percentage of medium trucks because that is an arterial roadway. And so, we said one option for the default there would be to split 92 percent autos, 4 percent medium trucks, and 4 percent heavy trucks. You know, we could do that. The other option would be to count them as heavy trucks.

So the calculation counted them as heavy trucks, but you could optionally, for that example, since it is non-highway, split the heavy trucks into 4 percent medium and 4 percent heavy, which would actually be more than -- with the heavy truck percentage being 3 percent from the agency would be have a minimal impact on the outcome. But I just wanted to mention that.

Sara Jensen: I see a question about railroad cars, and I mentioned this really quickly just now. But the question is, is the noise made by railroad cars being connected and disconnected considered a loud impulsive noise? I'll just say quickly yes, and that's the reason why the MAP Guide is adding that as being near a railyard as a potential noise course. But do you want to elaborate a little bit?

Zach Carter: Yeah. I mean, I think the issue there is how is it factored into the review? So usually, it's going to be associated with rail lines. So we'd be calculating the noise level from,

and so, again, we talked about it's kind of tricky when you have a loud impulsive sound and 8-decibel penalty, you know, how that's added into your review. So you have the level from the rail operations that are going in there, it can be added to that. If not, then probably, you want to contact HUD to try to figure out how to quantify that loud impulse contribution that, again, like you said, would be coming from the railyard.

Sara Jensen: There was a question that came in when you were talking and I was holding to the end about if the local DOT is doing roadway expansion and has conducted an environmental assessment, including a noise analysis. Is there a way we can incorporate that study into the HUD noise analysis? Not project-specific but generally.

Zach Carter: Yeah. Hopefully, as part of that analysis, they would have had some estimate of how the improvements are going to change the volume. And then, you just simply be able to take the traffic volume changes and factor into the HUD calculation.

As far as their actual noise projection, the metric that they're using may be different from HUD's metric. And so, you'd have to see whether it was the same, to use the actual noise level that they're projecting, but I think our preference, generally, would be to take their estimate of increase the traffic data and then factor that into your projection for the HUD review.

Sara Jensen: Here's an interesting question that I've heard before. Might be good to clarify. I'm hearing about noise testing from noise coming from the outside. But what about noise between units? Specifically the stomping sounds from upstairs neighbor?

Zach Carter: That's not something that's covered under HUD's regulation, but I will say that on those projects we've seen where there's an acoustical engineer who is providing an attenuation plan and actually reviewing construction plans for the attenuation, I've seen a lot of times that they will make additional recommendations about the way floors and ceilings are joined or sealed and wall attachments and things that also reduce noise between units.

And so it's definitely something that there's expertise out there to assist in projects, but it's not something we're focused on as part of HUD's review process or really having detailed guidance on how to mitigate that, like in our guidebook.

Sara Jensen: That's helpful. The noise regulations are really focused on noise coming into the property. Someone said they were excited to see new wall construction details in the tool you showed. And the comment is there are not exterior walls. How to handle exterior walls that are 2 by 6?

Zach Carter: There was. I'm not sure as far as the wall dimensions and thickness, but also the material. So we did add an option for, I believe, triple width, which is something you see in thicker walls in some older buildings. And so, you may want to check that, but you'd need a little more detail than just the wall thickness as far as the materials to select the appropriate product from the chart.

Sara Jensen: Someone asked about the upcoming HEROS webinar. It's true there is no registration link yet, but I believe that since you registered for this one, you will get a notification when that link goes live. And we'll also be sharing that information widely. Zach, there's a question, any guidance for when highway usage is decreasing? So when you're doing your 10-year projection, how would you do that?

Zach Carter: It's also really beneficial to have the -- you know, in that example you looked at from Florida DOT, there was fluctuation over years, and the most recent year, there was some leveling out. And so, that affected their overall trim line. But based on historical data, it's going to be either the state's or planning agency's projection that's going to take into account the lower recent level and also historically. It's going to come up somewhere between those. And then, linear, the same thing.

So the answer is basically you can't just look in the most recent year. You know, you look at the historical trend, and it would be a balance between that recent fluctuation down and then any growth historically in the area too.

Sara Jensen: Zach, I wonder if you've heard this question before. If you have a lack of data from the train company, can you use YouTube videos from train chasers?

Zach Carter: I'm not sure I understand.

Sara Jensen: Yeah. I'm not sure what data you would get from that. Maybe the train counts.

Zach Carter: Yeah. I mean, the YouTube video, I guess, would have to identify the time period and be long enough to be representative. And then, you'd have to watch that, and they might not count it, and then you'd have to rely on them as having the accurate information.

And so it'd almost be easier just to go out and do the observation. It'd be about the same as watching the video. Unless it's hard to -- I know travel is challenging right now, but it's hard to imagine enough detail around the video to use that in your documentation.

Sara Jensen: We have another three minutes before we cut off. There's a question about is it appropriate to use the barrier performance module for common outdoor space to determine the building attenuation?

Zach Carter: Yes. That would be common. If you have an outdoor space that requires attenuation, then a barrier is often the preferred solution for that. In the diagram we looked at, the representation of the single-family home, it would be the common area, and it would be the same. What is the height of the wall? How far is the common area from the wall? How far is the wall of the barrier from the noise source? It's the same geometry for that.

Sara Jensen: A few people have asked about how they get the slides. So there's a link to them in the chat box. There was also a link to them in the reminder e-mail for this webinar. And they will be posted up afterwards with the recorded webinar. We did make a couple of small edits just last night, and so I recommend, if you pulled it off before, go ahead and pull a fresh one down from the chat box or the one that will be posted.

Zach, are you seeing anything else? There's a follow-up on the YouTube video that the video shows a number of locomotives, cars' crossing speed, lots of good information. It seems like the answer would depend.

Zach Carter: Okay. So you're just using it instead of an aerial map to get the layout of the rail and stuff like that. Yeah. That would make sense. It might be hard to measure it from the video, but I see. If you're not talking about trying to count operations from it, then that makes more sense to me.

Sara Jensen: I think they are saying, because they're saying you can get the number of locomotives and cars and the speed from the YouTube video.

Zach Carter: Oh, okay. It's hard to say without seeing it. I haven't watched that particular series, but, again, the question is it representative of the time period that you would cover if you looked at the inventory of what does it average per day? Is it reflective of that? And I guess if you could document it was, that would be something to look at. But I'm just not familiar with that.

Sara Jensen: It would be an unusual data source; let's put it that way. So you'd want to really double check that it would be okay. Let's take one last question before we sign off. There have been questions about stop signs. How do you calculate the distance to a stop sign? Let's see.

Zach Carter: The question is, the stop sign that we're talking about, then a road that is a noise source for your property. And when you looked at the effective distance where you got your noise assessment location, you're drawing that line to measure to the center of the line of the roadway. So wherever that shortest distance when you're hitting the roadway at that point, the question is, from that point on the roadway, within 600 feet, is there a stop sign? And if so, then that's the distance that's going to go into the calculator. And a traffic signal is not a stop sign.

Sara Jensen: I think that will be our last question, but we will follow up with others that came in. We'll post answers when the materials go up. Thank you so much. Michelle, is there anything you need to say to close this out?

Michelle Grainger: I will let Michelle Juma announce who the winners were for today's polling before we wrap up.

Michelle Juma: Happy to do so. Thank you again to all of our participants. The top five respondents who are in first place was Sara. Second, LPK. Three, TMA. Four, Anne H. And fifth place, Bruce Shakey.

Sara Jensen: Thank you. And that was not me Sara. I only came in 14th. So congratulations to the other Sara. And thank you so much, Zach Carter, for all this great technical information. And thank you, everyone, that participated and attended.

Zach Carter: I want to say thank you as well and hope to hear from you in the future. And we'll get additional responses to these questions as well.

Michelle Grainger: Thank you, everyone, for joining us today. We will hang for about three minutes to see if there are any remaining questions before we close today's webinar.

(END)