

GQS Explanation updated 11/27/2020

This Document has been revised from the original document. The only change/addition is on page 4 and it has been written in a bold **PURPLE** font.

Can you explain the “Glidepath Qualification Surface” which is mentioned in the AMPU and which calls for the removal of certain trees in the approach path to the airport?

Perhaps the best way to explain this is through an analogy with something familiar to most non aviators, namely a road:

Two Lane Road Analogy

There is a two-lane road that you have used for many years. It is a normal country road with a center line and a line marking the edge of the pavement, but no shoulder, no margin for error.

The town decides to improve the safety of your road by creating a three-foot-wide shoulder by clearing vegetation and moving utility poles encroaching on this space.

A few questions about this situation:

1. Is the road now wider than before?
Answer: No, the shoulder does not add to the road’s active width
2. Is the road now safer than it was?
Answer: Yes, because there is a three-foot shoulder that did not exist
3. Will traffic increase on the road because of the shoulder?
Answer: The road’s capacity has not increased, and its destination remains unchanged, so the amount of traffic will not be changed by the safety improvements. Logically, if there are multiple roads to the same destination, the modified road will be favored by careful drivers wanting the safest route

The above situation is analogous to what is being proposed in the Airport Master Plan Update.

A confusing element in the plan is something called the GQS or Glidepath Qualification Surface (GQS). The GQS represents the floor of a safety buffer that

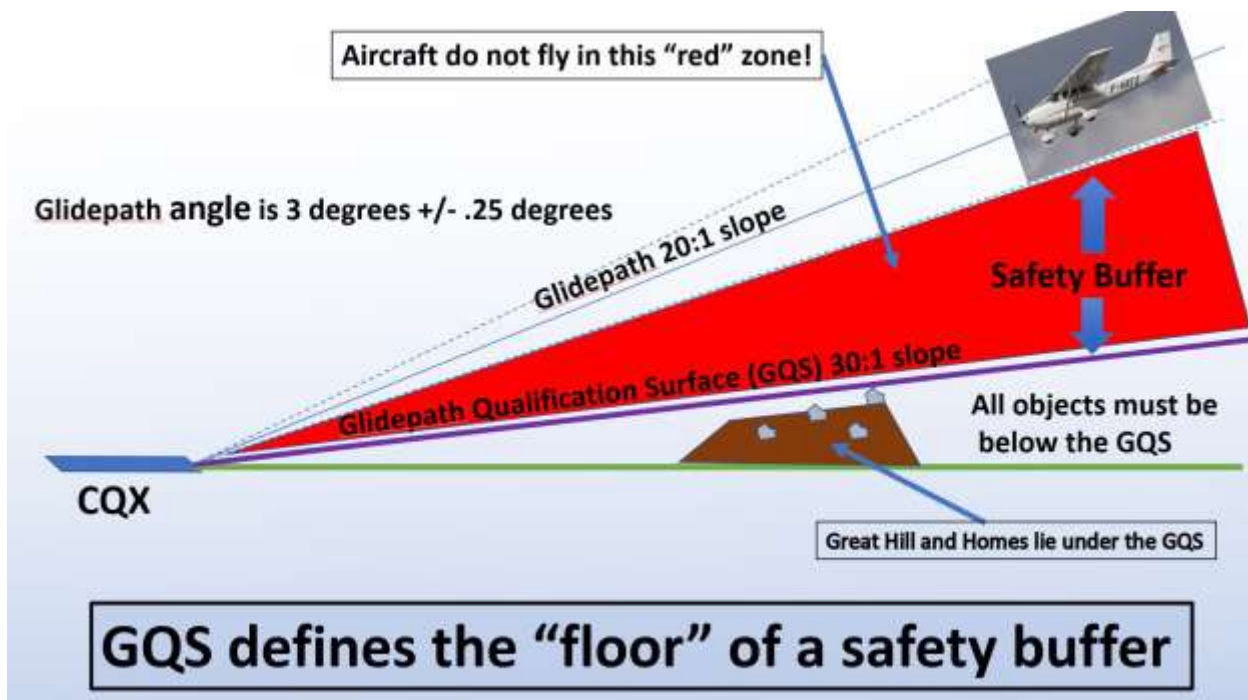
slopes up from the runway and is well beneath the actual glide path of aircraft using an instrument approach with vertical guidance (e.g. the LPV approach).

The vertical space beneath the glide path and above the GQS is like the three-foot shoulder created for the road above. Just as drivers do not drive on the shoulder, pilots will never come close to the GQS on an instrument approach. In fact, if the instruments detect it is coming close to the GQS, the approach must be aborted.

The proposed actual “vertical road” for an aircraft is the 20:1 glideslope which is the same as what is being used today. So, the “road” is not being changed or widened, but the safety buffer (GQS) is formalized as a requirement.

Just as the road with a cleared shoulder is unlikely to see an increase in traffic, an airport with an improved instrument approach will not significantly increase traffic to the airport. Remember, Chatham has had instrument approaches for bad weather for more than 40 years. The GQS proposal is only a significant safety improvement to something that is already there.

The Airport Commission is not building an “Interstate Highway” to Chatham, but just creating a buffer to make the airport safer for all. The turboprops that currently land at Chatham will continue to do so regardless of whether we implement safer approaches, since it is only the FAA that governs what types of aircraft are authorized to land at the airport.



The above analogy addresses the safety issue but still leaves several concerns open. The below questions and answers address issues of increased traffic and noise.

As with all analogies, the above "road" analogy does not carry over perfectly. One of the objections heard at the 9/30/19 meeting at the Community Center was that the new system would allow landings that pilots might have otherwise avoided because of adverse weather conditions. Hence, more noise for the people living under the approach path.

The point being made above is a valid one. With the new approaches it might be possible to land with a cloud cover that is 350 or 400 feet rather than the 600-foot minimum for the currently published approaches. We do not have any data to show what portion of time the ceiling at Chatham Airport is less than 600 but greater than 350. In the author's experience, this occurs for a very small percentage of time at Chatham. But let's be overly generous in estimating that the figure is 10% of the time that it's cloudy (it is most likely closer to 1%). And let's assume that instrument operations (when there are low clouds) are 10 percent of the total, which is, again, a very generous number. Then 10 percent of 10 percent means a potential for only a 1 percent increase in the traffic directly over the flight path. If we weigh that against widely proven benefits of an approach with vertical guidance, including a lower noise profile for each aircraft, a 90 percent smaller area "footprint" in instrument conditions and studies that show an 8 times safety improvement over circling approaches, then one can see that the proposal makes sense.

In the road analogy, the lane-keeping technology would enable people to drive in weather conditions that might have otherwise kept them at home. Having an automated system take command of the driving is really scary for some.

In aviation, having the autopilot guide the aircraft down to a safe landing is not only common, but encouraged as the safest way to fly the approach. By having the autopilot stay exactly on course (both laterally and vertically) it frees the pilot to concentrate more on many critical chores, including maintaining proper airspeed and looking out the window to see the runway environment. The autopilot is disengaged when the pilot reaches the "Decision Altitude" where he must have the runway in sight. If these approaches were actually "scary", then why would instrument pilots would be so strongly in favor of them? Pilots don't want to crash into people's houses, and there are numerous articles and studies that document the dramatic safety improvements of LPV approaches over the circling approaches in use at Chatham today.

I'm wondering why there is a 30:1 slope for the GQS.

The 30:1 slope on the Master Plan Update is used with the standard 3-degree glide slope which is the safest because it is the most common slope by far for approaches with vertical guidance. For this slope, pilots know exactly what the aircraft configuration must be to maintain a steady descent.

Would/could 25:1 work?

Before any implementation work is actually proposed all the alternatives and variations to the approaches would be carefully considered. The Master Plan is a conceptual framework and is unlikely to come to fruition exactly as drawn. Another example of this is the new administration building which will be drawn on the Master Plan without any expectation that the final design would match the drawing. What this means is that there will be plenty of opportunity for public comment once an actual implementation plan is drafted. **Based on public input received in November 2019 the Commission will work with the FAA to explore these higher Glide Path Alternatives that greatly reduce the number of obstructions that would need to be cleared. The result would still be far safer than the current circling approaches, but the number of properties affected would be greatly reduced.**

If so, would the trees need to be removed?

It's highly likely that there would still be trees that would need to be removed, but it stands to reason that it would be fewer.

I think that when the Commission proposes the removal of trees, people will naturally conclude that the reason is that aircraft will in fact fly in at levels where they would have impacted those trees if left standing. Otherwise, why remove them?

We do understand the very emotional reaction that folks have to the removal of any trees. However, the road analogy does work well here, in that the removal of certain trees creates a "safety buffer" and not a widening of the "roadway". Folks don't drive

on the shoulder of the road. For example, at a 3-degree glide slope, an aircraft approaching Runway 24 will be over 5,900 feet from the airport at the time that it reaches an altitude of 350 feet. At that time, the aircraft is still over a half mile from the top of Great Hill. At that exact instant the pilot must abort the approach if he/she does not see the airport. If she does see the runway, **she continues the descent visually, exactly the same as if it were a bright sunny day. In other words, she will pass over Great Hill the same way she has always done, and at the exact same altitude she has always used on perfectly clear days.** It is very important to note that every instrument approach always becomes a visual approach prior to landing. For the new LPV approaches, the noise levels will always be either the same or (for most) much lower than they are today. Because the approaches are straight-in to the runway, far fewer homes will be overflown when these approaches are put into place.