Saint Paul's Liberty Lutheran Church
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February 6, 2019 **UPDATED LETTER TO ZLR COMMITTEE**

Dear Zoning and Land Regulation Committee Members:

On behalf of St. Paul's Liberty Lutheran Church and as the governing board of our congregation, we would like to give you substantial evidence for denying the application for the Conditional Use Permit (CUP) for the Oak Park Quarry. We continue to be concerned about the church structure and the impact that additional blasting would have on our historical building, as well as the surrounding cemetery. We are also concerned that the quarry operation is not within the parameters of the Town of Deerfield Comprehensive Plan recommended by the Planning Commission in 2006 and adopted by the Town Board in 2007. See Exhibit A for the detailed part of the plan that specifically addresses the cultural and historical preservation of the Town's resources, including St. Paul's Liberty Lutheran Church.

We request that you deny the CUP application submitted by the Oak Park Quarry. We have substantial evidence per Act 67 that the application submitted by Oak Park Quarry cannot comply with the following required CUP Standards:

Standard #1:
That the establishment, maintenance and operation of the proposed conditional use will not be detrimental to or endanger the public health, safety, comfort or general welfare.

Standard #2:
That the uses, values, and enjoyment of other property in the neighborhood for purposes already permitted will not be substantially impaired or diminished by the establishment, maintenance, and operation of the proposed conditional use.

Standard #3:
That the establishment of the conditional use will not impede the normal and orderly development and improvement of the surrounding property for uses permitted in the district.

There are ten pieces of substantial evidence which we believe preclude the quarry from meeting the above three CUP Standards:

1. ***The value of our property has already been diminished as a direct result of the blasting (Standard #2).***

   The church's foundation is built on the very same bedrock as the quarry bedrock. In essence, our historic church is subjected to the impact of every blast from the foundation up. Unfortunately, when a quarry blast occurs, the corresponding stress waves travel through a solid, dense bedrock layer with little energy dissipation. In other words, the Peak Particle Velocity (PPV) does not diminish or dampen out as it would in nonhomogeneous materials, such as soil or gravel. Consequently, the relatively high PPV magnitudes that the church experiences are extremely detrimental to our fragile building.

In addition, because of the height of the church, and the bell tower in particular, there is a stress and motion amplification in the response of the structure. According to the U.S. Bureau of Mines study, two-story homes commonly have an amplification factor in the range from 2 to 4, but it could be much larger for the higher bell tower. For example, the motion of the top of the bell tower could be well over 4 times the displacement seen at the base.

It should also be emphasized that the church was built in 1851, ten years before Abraham Lincoln became president. As far as we know, it is the oldest Norwegian Lutheran Church in the U.S. still holding regularly scheduled services in the original structure. It was constructed by local farmers using non-engineered materials (i.e., primarily quarried limestone and mortar) and thus is considered to be fragile. Note that the limestone that is being blasted in the quarry has the same structural integrity as that used in the church.

Consequently, it is extremely important to consider the cultural and historical significance of the church – it was constructed by some of the first Norwegian settlers in Koshkonong Prairie. In addition, the age of the structure, the materials of construction, the type of construction and the fact that it sits directly on bedrock, all contribute to the church's sensitivity to ground-borne vibration. The responsiveness of a structure and the existing condition of a structure must be factors in determining whether any blasting in the immediate area should even be considered.

Therefore, we feel that if future blasting is permitted, it will accelerate deterioration of the stone and mortar and continue to impair worship in the same location in the future, which is a violation of Standard #2.

2. ***Tombstones in our cemetery have been damaged as a result of blasting, substantially impairing integrity (Standard #2) and impeding improvements (Standard #3) .***

In January 2016, St. Paul's Liberty Lutheran Cemetery Association submitted a claim to our insurance company regarding 45 tombstones that had been damaged due to blasting. The headstones and monuments had shifted off-center on either their stone bases and / or concrete foundations. The shifting was recent, since in each case there existed a specific delineation that indicated where the headstone was originally positioned. The insurance company investigated the claim and concluded that the movement of the tombstones was due to an external force, especially when tombstones weighing up to a half a ton were observed to have shifted *"uphill."*

The Cemetery Association received the maximum compensation ($15,000) on its insurance claim for the tombstone damage; however, we were also required to sign a "Release Agreement" specifically stating that we would never submit another claim ***" …. arising out of loss, damages, or expenses that have been, or in the future may be, incurred arising out of past or future movement of or damage to any tombstones or other grave site structure caused by or resulting from blasting operations at the Oak Park Quarry."*** (See Exhibit B for a copy of the signed Release Agreement written by Church Mutual.)

Consequently, if future blasting is permitted, there is no recourse for the Cemetery Association to continue fixing damages that may occur, impeding improvements (Standard #3). It should also be noted that portions of the cemetery are considerably closer to the quarry than the church itself, i.e., by hundreds of feet. Thus, because the blast intensity does not scale linearly, the tombstones in these sections of the cemetery will experience a much higher value of PPV (Peak Particle Velocity) than the church.

In December of 2018, spot checks were made on a few of the tombstones to see if any movement of the stones could be detected since they were last photographed three years earlier, i.e., on December 12, 2015. The last blast at the quarry was on December 4, 2015, so the tombstones have not been subjected to any blasting events during these last three years. The photographs of four sample tombstones are shown in Exhibit C, comparing the measurements from 2015 and 2018. In essence, there were no changes in the positions of the stones, including some that had previously shifted "uphill."

It is possible for a tombstone to displace over time, under gravitational forces, especially if the foundation has settled such that the base is severely tilted. However, observing tombstones weighing up to 1000 lbs. recently shifting uphill (opposing gravity) provides substantial physical evidence to the fact that these stones have been subjected to external forces caused by blasting.

One additional piece of evidence was found concerning Tombstone #4 in Exhibit C. A photo of this tombstone (The Gilderhus Stone) was recently found on the *Find a Grave* website. Someone added the photo to the website on May 8th, 2011. It appears that the headstone dates back to about 1930, and the 2011 photo shows the upper portion of the stone was still in its original position after 80+ years (again see Exhibit C). Therefore, the "uphill" shift of the tombstone took place between 2011 and 2015, when blasting was a regular event.

In summary, we feel that Standards #2 and #3 cannot be satisfied. The uses, values and enjoyment of our property have already been substantially impaired and diminished by the conditional use of the quarry. Additional restoration and improvements no longer covered by insurance will be a significant cost to the Cemetery Association and the individual families.

3. Members of the congregation have observed physical evidence of damage during blasting which has impaired the use, value and enjoyment of the historic building (Standard #2).

From July to December of 2015, several members of our congregation were present at the church when blasting at the Oak Park Quarry occurred. The experiences described below were during a number of different blasting events. See Exhibit D for actual statements made by each individual listed below.

a. Art Mikkelson was leaning against the sill of the large stained glass window on the north side of the bell tower when he experienced mortar and small pieces of stone falling from the area above the aforementioned window.

b. While holding on to the top of the well casing (located in the front of the church on the northeast side), Lyndon Meyer felt the casing shake as he visually observed the relatively severe vibrations of the stained glass window in the new narthex addition that was constructed in 2001. He also felt the intensity of the airblast and reported that it was extremely alarming.

c. Roxann Engelstad stood outside of the basement door at the lower level of the new narthex and heard cracking of the stone and mortar, as well as the straining / creaking of the wood structure, near the top of the building. For safety reasons, she quickly ran away from the area because she was concerned that stone and mortar might be falling from above.

d. Roxann Engelstad was inside the sanctuary (on the north side) with her hands on one of large stained glass windows. During the blast, she not only felt the vibrations of the window, but heard the cracking of the plaster and/or windows on the south side of the sanctuary.

e. Pastor Holly Slater heard cracking in the stained glass while standing inside the sanctuary on the north side.

f. Pastor Holly Slater stood in the alcove for a blast and felt the surprisingly strong overpressure hit her. The stained glass windows in the alcove area would experience the same blast wave.

4. ***There is photographic evidence of the mortar falling from the south side of the bell tower which has impaired the use, value and enjoyment of the historic building (Standard #2).***

The bell tower took the greatest hit from blasting, which makes sense given that it is the tallest and most flexible part of the structure. In addition to a member of the congregation experiencing stone and mortar falling from the bell tower during a blast (see 3a above), we also have photographic evidence of the same type of damage on the opposite side of the structure.

In the spring of 2015, fresh mulch was put down on the south side of the bell tower. Throughout the rest of the year, we found that stone and mortar pieces had fallen out from higher up on the bell tower and were lying on top of the new mulch. (See Exhibit E for photographic evidence.) Now water has been seeping in through holes in the stone and mortar and has caused damage to the interior of the bell tower. In essence, paint and plaster are peeling away and the walls were even wet to the touch during the summer and fall of 2018.

If blasting is allowed to continue, accelerated deterioration will continue and Standard #2 cannot be met, i.e., the use, value and enjoyment of our property will certainly be impaired and diminished.

5. ***The stained glass windows are exceptionally fragile and may have already been compromised, impairing the use, value and enjoyment of the historic building (Standard #2).***

We fear it may be too late since the stained glass windows have already been compromised. Stained glass windows that were installed in the new narthex in 2001, which are in the alcove receiving the full force of the overblast pressure, have a few hairline cracks which cannot be explained, given their age. The older stained glass windows found in the bell tower appear to have numerous cracks that are relatively new. In addition, some of the steel framing that spans the stained glass (for support) has separated from the glass. Due to the water seeping into the interior of the bell tower, the wood frames supporting the perimeter of the stained glass windows now need to be repaired or replaced due to water damage.

The historical significance of the older stained glass windows has been described in a letter from Mr. Paul Phelps at Oakbrook Esser Studios after he visited the church on a site visit (see Exhibit F). The older windows, which were installed in the church in 1914, were designed by the highly-regarded artist Carl Reimann from Milwaukee. As stated in the letter from Oakbrook Esser:

> *"The history and importance of a stained glass window is first and foremost defined by the artist that initially designed it. It is a testament to the parishioners of St. Paul Liberty that sought out an artist of this caliber to create the stained glass windows that are seen today. The power of that action brought beautiful works of art into a small rural farming town."*

It should be noted that there are eight large windows in the nave, each measuring 4.5 ft. wide by 11.5 ft. high. In the bell tower, there is one entry arch window (5 ft. in width with a height of 4.5 ft.), two windows along the stairway to the balcony (each are 3 ft. in width with a height of 10 ft.) and three tower rose windows, each 4 ft. diameter. Mr. Phelps goes on to describe the condition of the windows and how fragile they are due to their age. Quoting from the letter:

> *"The stained glass windows are currently in their original condition meaning that no restoration has been done to date. Some minor repairs were done in place in 1986. As all stained glass windows age they become more fragile as the elements of the window; lead came, glazing putty, copper wires and reinforcing bars start to break down and lose their integrity. This is not through lack of attention or maintenance it is just the passing of time. The windows at St. Paul Liberty are 105 years old. Even though they have served the church very well, deterioration will continue under normal circumstances. Other environment conditions may accelerate deterioration."*

Thus, there are two key issues for the older stained glass windows: first and foremost, they are extremely fragile and could easily be broken down. Secondly, any other environmental conditions, such as the oscillations / flexure of the glass due to ground-borne vibration and overpressure from the airblast, will accelerate their deterioration.

The allowance of blasting would continue to damage the stained glass windows in a foreseeable manner which fails to meet Standard #2. We ask that you give careful consideration to the historic elements of our church such as the 105 year-old stained glass windows when you make your decision. The accelerated deterioration of fourteen original stained glass windows designed by a world famous artist shouldn't be the price we pay for being located across from the quarry.

6. ***There is photographic evidence that a significant crack extended in length during the blasting in 2015 impairing the use, value and enjoyment of the historic building (Standard #2).***

There was a small crack in the mortar next to the large stained glass window on the north side of the original building, which is now an interior wall in the new narthex addition of 2001. Consequently, it has been in a climate-controlled area since that time. That crack was photographed by Vibra-Tech in a pre-blast survey on September 2, 2015. After being subjected to 16 blasting events in the fall of 2015 (for which 4 of the blasts well exceeded the local ordinance), the crack was photographed again. It had increased in length by 10 inches. The crack was photographed again in December of 2018. After 3 years of no blasting, the length of the crack had not changed. See Exhibit G for photographic evidence.

Again, we feel that if blasting is allowed to continue, this crack will continue to grow and Standard #2 cannot be met.

7. ***There is physical evidence of a flyrock accident during the blasting which endangered the public safety of people, (Standard #1). The consequences of that accident impair the use, value and enjoyment of the church buildings and cemetery (Standard #2).***

On September 8, 2015, there was a flyrock accident on Oak Park Road caused by the quarry blasting. In this case, a truck was hit with flyrock, cracking the windshield and injuring the passengers. According to the State regulations, all flyrock must *"remain within the controlled blasting site area"* (Safety and Professional Services SPS 307.44). This accident also resulted in fines to both the quarry and the blaster from MSHA (Mine Safety and Health Administration).

Since the flyrock incident, the quarry operator has been required to position flaggers to block off a relatively large section of Oak Park Road during any blasting event. This means that there is limited access to the church during this time, and this is especially true for the sections of the cemetery that are located north of the church.

According to Standard #2, the use and enjoyment of our property should not be impaired or diminished by the proposed conditional use. Unfortunately, having to block off access to the church and cemetery is indeed a problem for not only members of the congregation, but also the community in general. For example, the church often hosts activities for the Boy Scouts, the community Senior Center, the local community theater group, etc. In addition, blocking off access to the cemetery requires coordinating with funeral homes, grave excavators, and monument installers. This does not even include the limited access that emergency vehicles would have on a major thoroughfare to area homes as well as to the church during blasting times.

The Oak Park Quarry has not followed the Standards in the past, and it has not provided new evidence that they will be able to abide by the Standards in 2019 going forward.

8. ***There is physical evidence of the quarry blasting exceeding both state and local regulations which is detrimental to and endangers the public health, safety, comfort and general welfare (Standard #1).***

In the summer of 2015, members of the congregation requested that a seismograph be placed at the church for all blasting events at the quarry. Consequently, seismograph recordings began on July 21st and the blaster submitted the blasting reports to both the Township and the church. The data from the church, along with the seismograph data at the closest residential structures surrounding the quarry, have been compiled into one spreadsheet. Considering the blasting log for the quarry for the just the latter half of 2015, that is, from July 21st until December 4th, 31 blasting events are recorded.

Out of the 31 blasts that were recorded at the church, there were five blasts that exceeded the local ordinance of 0.3 in/sec for the PPV level, and one blast that exceeded the local ordinance of 123 dB for the maximum allowable overpressure. Many, many more violations were recorded at other residences in the area.

It should also be pointed out that in the supplemental information submitted by the quarry for their CUP renewal, it states that the quarry was unaware of "*any blasting events that exceeded the State limits in 2015."* However, on August 12, 2015, the blasting report submitted to the Town indicates that there was a mis-fire at the quarry resulting in an overpressure of 135.3 dB at Dennis Mandt's residence (that is at 1191 Liberty Rd). The State limit is 133 dB. The flyrock accident on September 8, 2015, is also a State violation, as mentioned earlier.

In addition, it should be noted that out of the 31 blasting events in just the latter half of 2015, data is missing 7 times in various locations – indicating that either a seismograph was not placed at a particular location or the seismograph was not working. According to the Town ordinance, the quarry operator is responsible for supplying the seismographic measurement and recording equipment and preparing the Blasting Log that is submitted to the Town. In other words, the quarry operator is responsible for monitoring the blasting events, as well as their oversight, which is an apparent conflict of interest.

Again, we feel that in the past the Oak Park Quarry has been negligent in meeting the Standards as required by the CUP, especially Standard #1. The safety and general welfare of our church and the community has been endangered and the quarry has not provided new evidence that they will be able to ensure our safety in the future.

9. ***Future expansion of the cemetery will be impaired (Standard #3) with the proposed CUP.***

The church owns an additional acre of farmland for the future expansion of the cemetery. This land is adjacent to the existing cemetery, just north of the paved, U-shaped driveway. Consequently, future graves and tombstones in this area would be extremely vulnerable to quarry blasting, since they would be within ~200 ft. of the quarry's boundary.

Standard #2 states that the use and value our property shall not be substantially impaired or diminished by the operation of the CUP, and Standard #3 states that the CUP will not impede the development of our property. If the quarry continues in operation, our ability to sell lots and develop this cemetery expansion will indeed be impaired.

10. ***Restoration plans for the church have been impaired (Standard #3) due to the proposed blasting.***

We recently initiated a restoration project for our church to repair the damage to our building. Originally, we contacted Vogel Brothers Construction, however, they recommended that we work directly with consulting firms that specialize in historic restoration (where the firms then contract a team of architects, engineers, masons, and stained glass restoration specialists).

Since the fall of 2018, the church has contacted five restoration firms. In each case, we have been met with resistance because of an active quarry being in close proximity to the church. Repeatedly, we have heard that of the many buildings each has been asked to assess in the upper midwest, this is one of the oldest. Most agree that this is a unique building of its era, given that it was constructed with quarried limestone and mortar instead of wood. The Norwegian settlers who built the church intended that it would be a permanent structure for use by future generations.

All of the firms have said that a proposal may be moot until blasting ceases. All of the firms have stated openly that if blasting is not causing damage it is most certainly accelerating damage. One of the consulting firms would not come for a site visit upon learning about an active quarry in close proximity. A second firm conducted a site visit, but declined to submit a bid. Another firm, River Architects, was advised by four structural engineering companies not to bid on the project. (One of the emails that River Architects received from a structural engineer is provided in Exhibit H.) In addition, a masonry company told us to budget $15,000 extra per year for restoration if blasting continues, since they recognized that the damage on the church was more than normal deterioration. (A copy of this letter can also be found in Exhibit H.)

Obviously, the proposed CUP is already impeding the restoration project for the church, which is in direct violation of Standard #3. If the CUP is granted, we are unsure if we will be able to find suitable contractors to repair and restore our historic structure. Fundraising for the project is impaired because our congregation is reluctant to invest in a restoration project when blasting is ongoing.

In closing, it should be mentioned that new blasting ordinances were put in place by the Town of Deerfield Board in the Spring of 2016. We appreciated the efforts taken by the Town Board members to protect the church, since at that time, the CUP for the quarry did not expire until March of 2019. The church supported those ordinances because we felt that was the best possible outcome for the situation, given the quarry would be blasting for another three years.

In effect, the new ordinances lowered the probability of damage, however, no one can be absolutely positive that blasting at those levels will protect the church buildings long term. Actually, it's a challenge to find any significant studies or compiled data that deal with vibration generated by quarry blasting in the vicinity of historic structures that are 167 years old. We cannot find anyone brazen enough to blast near buildings of historical value or buildings with tall bell towers made of quarried limestone. Even with the most up-to-date blasting techniques, accidents do happen. We cannot afford any more accidents. We continue to believe that no blasting is the only assurance that more damage will not occur to our historic building and adjacent cemetery.

Given these realities of our church building, and the requirements that need to be met under the Conditional Use Permit, we do not believe that our historic 167-year old building can withstand the continued stress and structural degradation that comes from the blasting, nor do we think it is just to ask our congregation to continually incur the costs associated with these accelerated damages.

Sincerely,

Todd Birkrem (council president)
Michelle Jensen (council member)
Larry Lunda (council member)
Denel Ireland (council member)
Katherine Anklam (council member)
Roxann Engelstad (council consultant)
Ann Holmes (council member)
Bill Hommen (council member)
Lou Ann Lunda (council member)
Tami Graffin (council member)
Jim Mickelson (council member)
Pastor Holly Slater