



Dufferin Aggregates
2300 Steeles Ave W, 4th Floor
Concord, ON L4K 5X6
Canada

Phone 905-761-7500
Fax 905-761-7505
www.holcim.ca

Dufferin Aggregates Milton Quarry Community Advisory Panel (CAP) Meeting Minutes

Event: Community Advisory Panel (CAP)
Milton Quarry

Date & Time: Wednesday, June 3, 2015 7:00 – 8:30 p.m.

Place: Milton Quarry

Chair: Sarah Blazak, Smithcom Limited

Participants: CAP Members:

Walter Heyden, Dufferin Aggregates, Site Manager, Milton Quarry

Colin Best, Town of Milton Councillor

Sandy Martin, Milton Chamber of Commerce

Ted Brown, Halton Hills Councillor

Bryan Lewis, Halton Hills Councillor

Janice Vancso, Neighbour

Pam Sheldon, Neighbour

Nancy Mott, Niagara Escarpment

Nancy Tilt, Neighbour (Bruce Trail)

Presenters:

Daniel Corkery, Golder Associates

Guests:

Marion McMeeken

Shelly Varley

Jim Sheldon

Minutes: Allana Brandt, Smithcom Limited

Regrets: Letty Stevenson, Dufferin Aggregates
Cindy Lunau, Town of Milton Councillor

Minutes

Sarah Blazak brought the meeting to order.

The quorum reviewed applications for the open membership spot on the CAP. Two applications were reviewed, one from Kim Wilson and one from Steven Ng Qui Sans. Factors such as commitment to time, location of



residence and past experience were taken into account. Steven Ng Qui Sans was voted for to be the newest CAP member. Walter will send him the corresponding information.

The quorum present reviewed and approved the minutes from April 1, 2015.

Daniel Corkery, Senior Blast Consultant at Golder Associates – Presentation on Blasting

- Walter introduced Daniel and explained Golder’s relationship with Dufferin. Golder is the company that Dufferin uses for blast monitoring.
- The monitoring units that Dufferin uses belong to and are maintained by Golder. Golder is responsible for consolidating the data and providing a monthly report to Dufferin.
- Daniel began his presentation by showing a graphic of blasting that explained how ground and air vibrations are formed.
- The blasting process is as follows: explosives are loaded in a hole, the blast fragments/shatters the rock, moving the rock into a pile out in the quarry. This energy creates ground and air vibrations.
- Most often, you will feel ground vibrations from behind the shot, which will feel like a rumble. In front of the blast, you will feel air vibrations.
- Quarries in Ontario have limitations on air and ground vibrations set by the MOECC (Ministry of the Environment and Climate Change).
- These MOECC guidelines are the most stringent in North America, compared to those in other Canadian jurisdictions and U.S. states.
- Studies done by the U.S. Bureau of Mines have shown that factors such as weather, humidity, and the slamming of doors inside homes have more of an impact on residences compared to ground and air vibrations in the range permitted by the MOECC.
 - Daniel displayed a table showing where Ontario falls in terms of ground and air vibration limits compared to other jurisdictions, which showed our limits are much lower than what other provinces/states allow.
- Question: Does construction-blasting mean putting a road in Northern Ontario?
 - Yes, it includes road jobs, water and sewers jobs, etc. Each project may have a different set of guidelines.
- Question: Do some states have no limits?
 - Yes, a lot of states have no limits for air vibrations. Even the Ontario guidelines for construction have no limit for air vibrations, but mines and quarries have to live up to both air and ground vibration limits.
- Daniel showed a picture of a measuring unit and outlined its different components and their functions.
 - There is a microphone to collect air vibrations, three sensors to measure ground vibrations in three directions, the box, and a wireless modem, which sends data to a website for Golder associates to view.
 - The unit is called a Mini Mate Plus Seismograph, made by InstanTEL in Ottawa.
- The configuration of the unit in the backyard of a house was shown, noting how the unit should be placed in between the residence and the blast site for the most accurate readings.



- Daniel showed an example of the graphs that are created from the blast monitors, showing the waves of the vibrations.
- Question: You had made reference to the fact the vibration and effect is behind the rock. Is it fair to assume here that in these cases, wherever you have these units, they are behind the blast? In other words, they would never be across the opening, but always behind?
 - Correct, yes.
- Walter showed the 2014 locations of the monitoring units, pointing out the active mining area and the monitoring stations located at the three closest residences. The graphs showed very similar data sets for the each of the monitoring locations.
- Question: Is the one at Highway 25 less effective?
 - Yes, but back when Dufferin was working there it was very effective.
- Question: Would it be fair to move it over closer to the area?
 - If there was a residence to put it at.
- Question: You just mentioned you're moving further east, and there's not one there.
 - As Dufferin works in that area, that could come into play to provide more meaningful data.
- Walter showed the current 2015 monitoring stations.
- Question: Why would someone ask to have the monitors removed from their residence? Wouldn't it be to their advantage to have it on their property?
 - Prior to the current units that digitally send data to the office, there was manual data collection. A data technician from Golder would have to go out to the property and download the information, so some people were either not comfortable with people coming onto their property or were not available to be home during the day.
- Question: Could the monitor be placed on public land?
 - They need some servicing; they require power so they do have to be put at some form of a residence. There also could be vandalism/theft if they're not located on private property.
- Walter showed graphs of the results of each residence monitoring throughout 2014 and 2015.
- Question: Were there any instances that did not match the normal pattern?
 - There were two instances of abnormal air vibrations. Walter pointed out the two instances on the graph, which were both due to rifling/rock burst.
- Question: What is rifling?
 - Daniel explained the process of rifling. When you load explosives in a hole, you put crushed stone at the top of the hole to keep the explosives down. This does not hold the energy and gases down, but instead allows the explosive to go off.
 - Walter added that a rock burst is the same idea, but instead of venting out the top, the blast happens out the front.
- Daniel continued his presentation, explaining the different ways a blast is designed to influence ground and air vibrations.
 - Key items that may affect how blasts are felt include:
 - The distance between a residence and the blast
 - The maximum explosive weight per delay period
 - The blast design



- Collar (length of hole at the top not loaded)
 - Burden (distance from face to first row of holes)
 - The orientation of the blast with respect to the receptor
- Question: How do you know how much explosive to put in?
 - It's a combination of how much it takes to actually fragment the rock properly, and how the blast will affect the surrounding residents.
- Question: Are the explosives adjusted based on weather factors?
 - We don't typically delay blasts other than for safety reasons. If there is a thunderstorm and/or lightning strikes, that would affect the blast schedule. Regulations require that once there is a loaded shot, it has to be guarded continuously, so delays can cause problems for security and safety reasons.
- Daniel explained how ground vibrations are measured using the unit Peak Particle Velocity (PPV). PPV measures how fast the ground is vibrating at a certain time. It is measured in millimeters per second.
 - PPV is used because it is the best parameter to measure damage in homes due to ground vibrations, based on many studies done.
- Lower frequencies have a higher probability of damaging a home. Houses have a natural frequency, and frequencies get really low, houses will start to resonate. Houses resonate anywhere between 2 and 20 hertz.
- Daniel showed a graph of the connection between ground vibrations and distance.
 - As distance increases, ground vibration decreases.
- Human perception of ground vibration depends on many factors, such as magnitude (millimeters per second), dominant frequencies, and duration of the blast.
- Human perception level of when we feel ground vibrations is below half a millimeter per second.
- The Milton average ground vibration measurement is 7 mm/second. The Ontario limit is 12.5 mm/second.
- Daniel explained air concussions. Characteristics of air concussions are:
 - Energy is transmitted in the form of pressure waves
 - Air pressure rises rapidly, falls more slowly, and returns to a normal value after a number of oscillations
 - Spread over a large area
 - Waves consist of audible sound
 - Low frequency concussions (which can cause rattling) are measured in dBI or PSI
- A graph was shown of the effects of overpressure on windows and the potential for damage. Daniel explained that an air concussion could exceed the MOE guidelines and still not come close to damaging windows.
- Daniel explained the relation of wind pressure to air vibration from a blast. A graph was shown to demonstrate the relationship between wind speeds to decibels recorded.
 - 20 mph wind is equivalent to 128 on the monitoring microphone.
 - 40 mph wind is equivalent to 140 on the monitoring microphone.
 - Wind is not as noticeable to humans because of the slow rate of pressure change compared to that from a blast.



- Depending on the direction and the frequency, wind can actually increase the level of what Golder monitoring records.
- We can hear a sound further away if the wind is blowing towards us from the source, like hearing a train.
- Daniel explained the decibel logarithmic scale, in that every time it rises 10 units, that it is three-fold in terms of PSI. This means a decibel measurement is a bit more complex. We refer to decibels in terms of damage, not in terms of hearing.
- It was clarified that air blasts are measured in decibels, and ground vibrations are measured in millimeters per second.
- Question: I don't live near a quarry and don't feel the blasts. Which one is more telling and would bother you more?
 - Air blasts in quarries are the main source of complaints.
- The human body is very sensitive to the onset of vibration, but we are poor at distinguishing relative magnitudes. We perceive vibrations well below the onset of even cosmetic damage.
 - Response is complex and depends on several factors
 - Vibration magnitude is only one factor
- The human response to air concussions is similar to ground vibrations, as the perception is stronger indoors, and air pressure pulses from the blast can create rattling and rumbling noises in a home.

Walter Heyden, Dufferin Aggregates, Site Manager, Milton Quarry – Explanation of Blast Improvement Project

- Walter continued the presentation to speak to the quarry planning and blast improvement project.
- The project was put in place to reduce air and ground vibrations, and to minimize impact on residents.
- Walter pointed out the town line on a map, pointed out residents' homes, and the two areas that are going to be mined in this year, the West cell and East cell.
- There will be a transition of fully moving extraction to the East side.
- The extraction on the left side of the map (West cell) will be finalized in 2017.
- Question: How deep is the ramp on the east side?
 - 37-38 meters to the end of the reserve and bottom of the limestone, below the water line. Below that level is shale.
- The "air over pressure control project" is the blasting impact control project.
 - This process began in July/August 2014.
- The project was initiated because of concern that air concussion readings were trending upwards as opposed to being flat or decreasing. Dufferin wanted to determine the cause of the increase, and worked with its blasting contractor and with Golder to analyze blast data to determine how to reverse the trend.
- Walter showed graphs of air and ground vibration monitoring at nearby residences, showing an initial trend upwards due to rifling and rock bursts.
 - On average, Dufferin was running at 1.5mm/second and barely getting up to 2mm/second. They were very low ratings, and relatively flat trend for ground vibrations.



- Question: Are these graphs kept for internal purposes or are they distrusted to anyone?
 - They are available upon request, but Dufferin is required to keep them for its records. Dufferin has to report overages to the Ministry.
- Walter explained that based on the initial data, Dufferin decided to make changes to the blast design at the Milton Quarry.
 - Orica is Dufferin's blasting coordinator, and used Six Sigma methodology for this research.
- A graph was displayed that identified potential reasons for high ground and air vibrations due to blasts. Quick improvements included:
 - Improve stemming ejection (rifling)
 - Face ejection
 - Wind direction
 - Face orientation
- The actions that came out of the blast improvement project were:
 - Mine planning (orient faces away from receptors)
 - Blast design
 - Face mapping and bore tracking
 - Increase burden (distance from face to first row of holes)
 - Increase collar (length of hole at the top not loaded)
 - Decking (include gaps in between explosive column)
- Question: Why would you blast from the bottom, then middle, then top?
 - If you were to fire from the top, the top of the rock will land on the bottom of the quarry and would not properly break apart. This would make it hard to dig.
- Walter showed the results of these changes by referencing graphs from November to December 2014, showing dramatic reductions in ground and air vibrations caused by blasts.
- Walter explained that so far in 2015, Dufferin is seeing a continuation of a strong downward trend of air and ground vibration readings based on the changes made.
- Dufferin is continuing to refine blast design and face orientation to continue this downward trend.
- Walter specifically pointed out the Wilson residence results, which read very close to Dufferin internal targets, even though that home is the closest resident to the quarry that would experience ground vibrations.

Corporate Social Responsibility

- Tree planting occurred on Earth Day, April 25
- 6th Line clean up occurred on April 22
- Open house to happen in August or September
 - Will provide bus tours, showing the quarry in operation
- Working with Darling House again
 - Last fall for a cleanup and involvement with the golf tournament
- Ready mix drum program ongoing with Halton Health Care Foundation
 - Long-term commitment. Has been very successful to-date.
 - Fundraising by selling spots on ready mix drums for suppliers to put their logos on



Future CAP Topics and Dates

- Topics:
 - Update on operations
 - Nancy to speak about Niagara Escarpment
- Next meeting scheduled for October 7, 2015

Open Discussion

- Janice pointed out the monitor showed in Daniel's presentation looked very far away from the house, but her monitoring system is much closer to her house.
 - Daniel explained that guidelines state that the monitoring unit should be a meter and a half away from the home; otherwise vibrations bouncing off of the house could raise the reading. Daniel said he will check the distance of her monitoring unit, but reassured that if anything, it would be giving an artificially higher reading, it wouldn't mask anything.
- Bryan requested an additional sign for children playing in the North and South directions on 5 Side Road. He clarified it is not strictly truck drivers, but a general trend he has noticed. Bryan noted that three areas that will be targeted with truck safety blitzes in June:
 - 5 Side Road between Dublin Road, and Regent Road 25
 - Acton south of Georgetown
 - 5 Side Road and 10 Side Road
- Shelly expressed her thanks for putting "children playing" signs up near her home on 5 Side Road. Unsafe driving now seems to be because of golfers.
 - Walter explained the more information you are able to get about a truck/vehicle driving recklessly, the better. With the right information, Dufferin is able to discipline unsafe drivers coming to the quarry. Try to make note of the license plate number and inform Dufferin.
- Sandy said that it seems like Dufferin is well within the limits of ground and air vibration. Could the two higher spikes in the charts have been an anomaly?
 - Rifling caused the two big blasts that spiked air and ground vibrations. Once you take those points out of the data set, it is clear that improvements such as the reorientation of the face have helped.
- Colin asked if there were any problems with fly rock, as there were some concerns from people on Highway 7.
 - Walter explained that there are no fly rock issues specific to the Milton Quarry. The MOE considers fly rock as a reportable incident, but it is similar to ground vibration and air control in that quarries are required to have proactive design measures that protect against fly rocks (i.e. using mats with dampening material to cover the top of blast sites).
- Pam asked if Dufferin foresees replacing monitoring equipment at former locations as the blast site moves further east?
 - Walter explained that it would depend on vibration transmissions. If there's a receptor that becomes closer or equally as close, then yes, Dufferin will look to put monitors back in locations.



- Pam said that the ground vibrations have seemed worse lately – that it almost feels like an earthquake. But after seeing this presentation, she is very grateful for receiving this information. She suggested that Dufferin give this presentation to other residents as the blast site moves.
- Jim Sheldon commented that at his home, he is feeling much heavier ground vibrations than before. He is not sure if blasting techniques have changed but he notes that he is getting anywhere from 2-3 second low frequency rumbles followed by a 2-3 second air blast. He would appreciate a monitor in that area to see if he is getting heavier vibrations.
 - It was explained that the site of blasting has moved, but Walter will get back to him and let him know about the monitor.
- Another guest of the CAP said she has noticed cracks in her basement cement that she did not see before, and she is concerned to see new cracks next to her front door as well.
 - Walter explained that Dufferin is not able to place monitors at both locations considering the homes are 25 meters apart from each other. He will consider placing a monitor at one, but the unit would have to stay there for some period of time to collect proper data.

Adjourn