Dufferin Aggregates
Teedon Pit Community
Liaison Committee Meeting
Minutes

Date:	Thursday, Sept. 13	6:30pm – 8:30pm
Location:	Wyebridge Community Centre, 8340 County Rd 93, Tiny, ON	
Chair:	John Matheson	StrategyCorp
Participants:	Cindy Hastings	Tiny Township City Councillor
	Peter Anderson	Local Neighbour
	Jessica Campitelli	Local Neighbour
	Christopher Williams	Local Neighbour
	Judith Grant	Federation of Tiny Township Shoreline Associations
	Kevin Mitchell	CRH Canada Group, Inc.
	Jessica Ferri	CRH Canada Group, Inc.
	Mohamed Mousa	Dufferin Aggregates
Minutes:	Alicia Sinclair	StrategyCorp
Regrets:	David Barkey	Local Neighbour
Guests:	Bonnie Pauze	Local Neighbour
	Jenny Anderson	Local Neighbour
	Walter Wojcik	Local Neighbour
	Guy Monague	Local Neighbour
	Kate Dewey	Local Neighbour
	David Cobb	Local Neighbour
	Anne Naihi-Ritchie	Local Neighbour
	Gary Lagos	GHD

Approval of the Minutes

- The facilitator noted that no changes to the minutes from the June 19 CLC meeting were received, and the CLC proposed no further changes to the minutes during the meeting. The facilitator welcomed any suggestions to the style of the minutes.

Recognition of Councillor Hinton's Contribution

The facilitator expressed condolences at the passing of Councillor Richard Hinton and acknowledged his positive contribution to the process. CRH representatives also expressed

condolences and welcomed the continued participation of the city through Councillor Cindy Hastings.

Introductions

- The facilitator welcomed Mr. Gary Lagos, M.Sc, P. Geo, who is an associate at GHD, to present on GHD's hydrogeology work with Teedon Pit. Mr. Lagos has been a hydrogeologist for 28 years across a number of jurisdictions in both Canada and the United States.
- The facilitator indicated during the first 3 CLC meetings, several questions have been raised regarding water. Dufferin has responded at the previous meetings and tonight GHD will make a presentation on water. The facilitator indicated the list of questions being tracked from the earlier CLC meetings will be addressed by Dufferin at a future CLC meeting.

Permit to Take Water Renewal

Referring to slide 4 of the "Teedon Pit – CLC Meeting #4 September 13, 2018" presentation, GHD explained the following:

- **Re: Water Taking**
  - Dufferin has not taken the maximum amount of water specified on the Permit to Take Water (PTTW) as washing operations are not running at the maximum production yet.
  - There is some water lost when washing the aggregate, depending on which type of aggregate it is. The general rule of thumb in the industry suggests that about 10% of water is lost when washing aggregate. This is due to a variety of factors, particularly:
    - Evaporation
    - Water adhering to the sand or stone after washing when it is shipped

- **Re: Closed Loop System**
  - GHD and Dufferin explained that it is industry standard to name such a system a "closed loop" system, notwithstanding the expectation of the 10% water loss. They noted that such a system could considered a "leaky loop" system in recognition small amount of water lost.
  - GHD and Dufferin note that this "closed loop" terminology would also be used by the Ministry of Environment, Conservation and Parks (MECP).
  - The closed loop system has an outflow mechanism for emergency purposes only.

- **Re: Production Well**
  - Dufferin does not pump the production well every day—they only pump from the production well when the sump pond requires top up water. The amount of water pumped is monitored with a flow meter. The water level in the sump pond is measured with a transducer. The transducer is removed in the winter during freezing conditions and when the pumping of water is not taking place.

- **Re: General Tone of the CLC with regards to the MECP and Operations**
  - Participants observed that, in their opinion, they had little faith in MECP. They expressed concern that the Ministry ignored them in the past.
  - They expressed appreciation that CRH had done more in the last few months to

listen and answer concerns than they had previously seen by other groups.
    - However, they noted that they still are not satisfied, and they repeatedly referenced their observation that well problems on neighbouring lands seemed to be coincident with abnormal or heightened activity at the pit.
    - Participants made it clear that they want a full evaluation of the interrelationship between the pit and water quality and quantity on neighbouring properties. Some participants seemed to generally agree that of the two issues, quality was a greater concern than quantity.
    - Over the course of a free-flowing discussion, many other specific quips, comments, and concerns were expressed to this general effect.

Hydrogeology Program Since Dufferin Acquired Teedon Pit

Referring to slide 5 of the "Teedon Pit – CLC Meeting #4 September 13, 2018" presentation, GHD explained the following:

- **Re: Monitoring Wells**
    - Dufferin has installed 7 additional groundwater monitoring wells for hydraulic monitoring purposes. On the site, there are 10 monitoring wells, 1 production well, and offsite 3 domestic wells are monitored.
    - Dufferin reported that it will have to replace one of the monitoring wells because the seal on the well seal collapsed due to the depth/pressure in the well. They will replace the collapsed well, but they noted that it is difficult to drill deep wells. The well they need to replace is 72M deep and is anticipated to be replaced in the fall of 2018.
    - Dufferin installed pressure transducers/data loggers in all new monitoring wells. Existing wells had pressure transducers and data loggers already.
    - MECP monitored the installation of the new wells. The Ontario Geologic Survey (OGS) has been sent the shared geology and was invited to observe the installation of the monitoring wells as well.

- **Re: Addition of Flow Meter to Production Well**
    - Dufferin explained that they had installed an automated flow meter to the production well to eliminate risks of human error.

- **Re: Boreholes and Core Testing**
    - Dufferin drilled 4 boreholes to evaluate and test the geology in the area of the settling ponds and sump pond by examining the grain size distribution. The depth of the borehole varies, and they are typically 20-25M below ground surface but do not fully penetrate the aquitard. In this procedure, soil cores 1.5M in length are collected and examined.
    - For Dufferin's testing, 21 samples were collected. The material is extracted for testing purpose only. After testing, the hole is then sealed
    - The cores are photographed and stored in boxes at Teedon Pit.

- **Re: Well Survey**
    - Dufferin and GHD completed a well survey with residents within 1km of the site.
        - The Ministry only requires the survey to be conducted within 500km of the source of the water taking.
    - Dufferin sent Ontario Water Well (Jim Wilson), a licensed well contractor, to neighbours who expressed concerns of sediment in their wells. One CLC

participant noted that they did not recall the contractor coming to their home, but they and Dufferin would follow up about this.
    - No new wells were drilled as a result of the survey.

GHD Hydrogeological Investigations at Teedon Pit

Referring to slides 7-11 of the "Teedon Pit – CLC Meeting #4 September 13, 2018" presentation, GHD explained the following:

- **Re: Monitoring Coverages for the Well Study** (Slide 7, Figure 2 "Cross Section Locations")
    - GHD explained that:
        - The purpose of the study is to pinpoint the make-up of the environment, aquifer, and aquitard.
        - These types of studies form the foundation for engineers to do their work.
        - Mr. Lagos personally visited the site. He noted as an engineer licensed in Ontario, this is an obligation in order to sign the study.
        - The OGS is conducting a survey on their own.
    - GHD believes that with the 10 monitoring wells, 4 boreholes, 1 production well, and 3 domestic wells, there is sufficient coverage of the site to describe its geological features.
    - The pressure transducers tell how much water is in the well and the hydrogeologic conditions.

- **Re: Different Assumptions between GHD and the Ruland Report**
    - Wilf Ruland's report is based on the assumption there was no aquitard in the area of the settling ponds and sump pond.
    - GHD's comprehensive drilling program provided sufficient data to determine that there is, in fact, an aquitard.
    - The main difference between the reports is that Wilf Ruland assumed there was no aquitard, whereas GHD did testing to determine that there is an aquitard.
    - Dufferin and GHD will be happy to discuss findings with Ruland. It was understood that a neighbour would arrange this meeting/conversation.

- **Re: Geological Make-Up of the Area of the Pit** (Slide 8, Figure 3 "Cross-Section A-A'")
    - Based on its investigation of the site, GHD determined that the aquitard consists of 85% silt and clay, 14-15% sand, and 1% gravel.
    - The silt and clay form a barrier with very low permeability. Water travels through the aquitard at only 3m/year (per Slide 11, Figure 6).
    - The silt ensures that the clay does not fracture when exposed to weather.
    - There are 30M of clay and silt in the local aquitard.

- **Re: Questions Relating to the Permeability of the Sump Pond**
    - Members of the CLC showed concern that that previous operators did not notice when the previous owners left the production well on for over 70 days. They hypothesized that the water must be seeping into the ground, as the local neighbours did not observe a significant flooding during this time. They suggested they should have seen flooding as a result of increased water pumping during those 70 days.
    - Referencing the geological make-up of the aquitard, GHD said the high amount of water could not have seeped into the ground during those 70 days.

- In follow-up questions regarding the permeability of the aquitard, CLC participants asked whether or not the water levels in the sump pond decrease during the winter when the production well is not operating. Decrease in water levels during the winter may suggest that water is seeping into the ground. Dufferin and GHD explained that they cannot measure during January, February, and March because the frozen water would break the pressure transducer. CLC members noted that one way to measure whether or not water levels are dropping is to see if the ice on top of the water breaks due to the lowering water levels in the pond underneath the ice.
- It was noted by CRH that the water levels recorded in the sump pond were higher in the spring than the level after pumping stopped in the fall indicating the sump pond holds water.

- **Re: Questions Relating to a Previous Well in the Sump Pond**
  - Participants hypothesized that perhaps water was seeping into the ground through an old well in the area of the sump pond.
  - One participant noted that they believed there was a well in the area of the sump pond from a previous owner. They hypothesized that perhaps this well collapsed, thereby remaining hidden from Dufferin but continuing to allow water to be contained and seep through the ground.
  - GHD and Dufferin noted that they would investigate whether or not there was a well in the area of the sump pond previously.

- **Re: Horizontal Movement of Water** (Slide 13, Figure 8 "Schematic of Sump and Silt Ponds")
  - Participants hypothesized that if the water was not seeping into the ground and if there was not, in fact, a collapsed well in the sump pond, then water must move horizontally in the ground? CLC participants noted that this hypothesis may explain why they are also experiencing silt in their domestic wells.
  - GHD noted that they have never seen water run above ground over the berm, but they acknowledged that the berm is new. The berm is made of native materials.
  - With regards to underground water movement, GHD said there was not lateral movement from the silt pond, but they did note that water in the area flows west in the Upper Aquifer. CLC members noted that they had been previously told by other consultants that it flows east.

- **Re: Horizontal Movement of Water Cont'd** (Slide 8, Figure 3 "Cross-Section A-A'")
  - In continuing with the discussion on horizontal permeation, GHD noted that if the water table is flat and that if the water leaked and moved horizontally, the ground area would mound.
  - Members noted that they have observed mounding, but GHD pointed out that the phenomenon they witnessed is actually flow under artisan conditions. This is different from mounding.
  - There are high areas that are recharge areas, and discharge areas are different. GHD said these have no connection to the operations of the pit.
  - GHD pointed out that on the north boundary of the site, there is elevated water due to the collapsed well.
  - GHD noted that there are no boreholes in the west or north because it is all sand and gravel in those areas.

- **Re: Geological Features and Impact on Movement of Water** (Slide 11, Figure 6 "Teedon Pit Hydrogeologic Model/Pit Operation")
    - In continuing the discussion on horizontal permeation, GHD discussed the geological features and their impact on the movement of water.
    - When looking at Figure 6, GHD noted that the upper aquifer is almost flat and that the local neighbours are all above the upper aquifer.
    - In response to the question of whether or not the local aquitard is vertical, GHD and Dufferin noted that aquitards can, in fact, look like cliffs in moraines.
    - CLC members noted sand and gravel are never uniform deposits. As such, they questioned whether it was possible that eskers and other glacial formations in the region could function as a highway for water flow. GHD noted that this area is a moraine, not an esker. They also noted that if there is connectivity, water still requires a gradient to flow. While there is a gradient in the area of the pit, the gradient is very low.
    - CLC members noted, however, that if the well was left on for over 70 days and if the aquifer can recover as quickly as it did, then the aquifer must have significant capacity.
    - The observed that if there is a steady state of flow to the west, GHD and Dufferin should not rule out that there is hydro-connectivity that moves water west and north.
    - GHD noted that the maximum hydraulic connectivity is fractured rock, and water moves through it at 1cm per second. It would require a significant amount of water to flood the area. Members noted, though, that there was a large flood in 2008.
    - CLC members explained that they are trying to convey the idea that the area around the pit is not uniform and there may be variation in flow. However, GHD noted that having artisan flow and having sand and gravel do not equate—a discharge zone is needed, but there is no discharge zone on the property. If water was moving through the aquitard, it would take 4-5 years to go the distance of the closest well.
        - A participant noted that there is a spring on the property. GHD noted that they did not believe the pit was impacting it. They noted that they would walk through that part of the site to further investigate it.
    - CLC members conveyed the idea that their hypothesis for why they are experiencing issues with their water is that the 10% of water that is lost in operations contains silt and is moving sideways through the upper aquifer, which is unconfined, to their domestic wells.

- **Re: Questions Relating to the Function of the Overflow** (Slide 8, Figure 3 "Cross-Section A-A'")
    - CLC members continued the discussion on the water flow. They observed that if the water was left on for 70 days and neither (1) seeped into the aquitard, (2) seeped into the ground through a collapsed well in the sump pond, nor (3) moved horizontally, then what can explain where the water went?
    - GHD explained that it flowed into the emergency overflow and into the creek, but CLC members noted that they found this explanation difficult to believe.

<u>Hydrogeological Questions from the CLC</u>

StrategyCorp compiled the list of questions related to water for Dufferin aggregates. Dufferin and GHD provided responses to these questions. Though time only permitted for a handful of questions, Dufferin and GHD agreed to have a follow up meeting in November to come back to

the remaining water questions. In the time that allowed, GHD and Dufferin generally discussed Question 1, Question 7, Question 8 and Question 9. General discussion notes are below:

- The Teedon Pit does not have impact on water table levels as shown by the hydrographs. If the water table was impacted, the hydrograph would show it.
- One member noted that while it had been stated earlier that the group is not concerned about water quantity, one neighbour, who owned a dairy farm and is not a participant on the CLC, did note that they had a dry well in 2015.
- One participant noted that when they moved to their property in 1991, they had two wells with good water. In 2008, there was a severe flood and the previous pit owner was operating aggressively, and there was silt in their water. The only thing that changed was the operations. They noted that while it has not been as bad under Dufferin's operations, they do occasionally have silt in their well. However, the silt goes away in the winter when the operations stop. They noted that they do maintain their well and that in their experience studying their well, licensed well drillers have refused to drill a new well on their property due to artisan conditions.
- GHD noted that they have never seen a silt plume in ground water and that silt cannot travel through ground water, only surface water.
- GHD proposed that perhaps the issue of silt in the water comes from the well itself. They noted that well drilling is not a science and that it is possible that they have faulty wells. They noted that in an artisan well with high flow rates, if well drillers do not use the correct well screen slot size and the correct sand pack, the silt can enter the well. can build-up. Furthermore, while their wells are aquifers and not hardwater, water can change over time.
- GHD noted that the most likely cause of the silt in water is changes in nature.
- GHD noted that there are no chemicals used and that everything is mechanical. They noted that they are a small operation in a large environment.
- Dufferin promised that they would not bring in recyclable material until the CLC has been consulted.
- Towards the end of the meeting, the GHD began to respond to Question 10 "It has been said that this water is 'the world's cleanest water.' Should the precautionary principle be used?" GHD disagreed with this statement, but due to timing, GHD was unable to provide an in-depth explanation, and the CLC urged that this question be discussed at the next meeting.

Next Meeting

- Dufferin and GHD noted that GHD will come to the next meeting to continue addressing the remaining questions on water.
- The next meeting will take place on Thursday, November 1, 2018 from 6:30 – 8:30pm.