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FIELD REVIEW REPORT NO.: 11680-016

THURBER FILE NO.: 11680

FIELD REVIEW REPORT	DATE: December 8, 2017
TO: District of Sechelt	ATTENTION: Sanath Bandara EMAIL: SBandara@sechelt.ca

PROJECT NAME: Sinkholes at Lots 9 and 21, The Shores Subdivision Sechelt, BC

CONTRACTOR(S): Concordia Homes Ltd.

PURPOSE OF SITE VISIT: Visually assess site status.

REFERENCE DRAWING / DOCUMENTS: See Thurber Engineering Ltd. reports dated April 5, 2013 and July 16, 2015

THURBER PERSONNEL ON SITE:	CLIENT/CONTRATOR PERSONNEL ON SITE:	TIME ON SITE:
David J. Tara (DJT)	Sanath Bandara (District of Sechelt) Serge Fjetland (District of Sechelt) Adam Bullock (District of Sechelt)	From 14h30 to 16h15 WEATHER: Cloudy.

BACKGROUND

1. In 2015, two sinkholes developed on Lots 9 and 21 and were first described in our report dated February 27, 2015. A limited scope drilling investigation was completed under Thurber's supervision in the areas surrounding those sinkholes as described in our July 2015 report.
2. In May of 2017, signs of potential sinkhole activity were reported on Gale Avenue North adjacent to Lots 7, 8, 22 and 23, and the District requested that Thurber conduct a limited scope investigation as described in our report dated June 30, 2017.
3. In a memorandum dated July 11, 2017, Thurber provided an assessment of current groundwater management issues and provided recommendations for proactive groundwater management measures to mitigate the ongoing formation of sinkholes at the site.
4. The District of Sechelt is carrying out routine inspections and groundwater level monitoring at the site using a customized checklist developed by Thurber.
5. Unless specifically requested, Thurber does not conduct site visits or review the District's Site Monitoring Reports.

ACTIVITIES/OBSERVATIONS:

6. Thurber's December 8 site visit was completed in conjunction with District of Sechelt personnel.
7. Gale Avenue North remains closed in front of Lot 9 (6660 Gale Avenue North) and Lot 21 (6657 Gale Avenue North).
8. Some additional cracking of Gale Avenue North identified between Lots 9 and 21 and curb in front of the Lot 9 driveway appears to have sagged since June 2017 visit. See Photos 1 and 2.
9. No significant changes in asphalt patch adjacent to catch basin located near Sta. 2+60 between Lot 7 (6652 Gale Avenue North) and Lot 23 (6648 Gale Avenue North) were observed.
10. The sinkhole located in front of the residence on Lot 21 (6657 Gale Avenue North) was backfilled with granular material and partially covered with polyethylene sheeting in 2015. The elevation of the top surface of the granular infill material is similar to the surrounding ground surface and generally appears similar to our last site visit in June 2017. Some of the granular material has been eroded below the polyethylene sheeting. See Photo 3.
11. Concrete panels in Lot 21 driveway appear to be deforming relative to one another and we understand that the District is monitoring this movement.
12. Flow from the storm outfall below the lower statutory right of way (SRW) bench between Lots 9 and 10 (6664 Gale Avenue North) appeared relatively clear. The outlet is partly infilled by deposited fine sand and silt. See Photo 4.
13. No obvious changes in the depression in the asphalt of the 2012 Seawatch Lane sinkhole adjacent to Lot 28

(6629 Gale Avenue North) since our last visit.

14. Seepage continues from multiple springs on the slope on Lot 3 just below the dwelling bench and above the lower SRW bench. The springs coalesce on the lower SRW bench where they appear to be collected into a French drain which discharges below the bench.
15. Downslope of the SRW bench at Lot 4, wet areas and slow seeps were noted along with hydrophilic vegetation such as horsetail.
16. The Lot 3 spring seepage mitigation works appear to be relatively wet with build-up of sediment and vegetation near the top of the PVC sumps inside the concrete collar. Upward seepage boils appear to occur around the exterior of the two PVC sumps suggesting that maintenance of the spring remedial works may be required. See Photo 5.

PHOTOS



Photo 1. Sagging curb and deforming asphalt in front of Lot 9.



Photo 2. Sagging curb and deforming asphalt in front of Lot 9.



Photo 3. Backfilled sinkhole at Lot 21 and granular material deposited at base of driveway.



Photo 4. Deposition of fine sand and silt at storm outfall in SRW between Lots 9 and 10.



Photo 5. Seepage around PVC sump in Lot 3 seepage mitigation works.

INSTRUCTIONS / RECOMMENDATIONS / REMARKS

17. As a short-term emergency repair, the District should advise the owner of Lot 21 that additional granular material and polyethylene sheeting should be placed to direct runoff away from the backfilled sinkhole.
18. Gale Avenue North traffic restrictions should remain in place until remedial works have been undertaken.
19. District of Sechelt personnel should continue to regularly inspect the site for signs of movement particularly between the two sinkholes.
20. We recommend that the piezometers be monitored weekly. Further, we recommend that the site be visually inspected for changes or signs of distress at the same time. We understand District of Sechelt personnel now routinely monitor the piezometers and conduct weekly site inspections.
21. Based on our observations, the comments and recommendations in our July 11, 2017 memorandum continue to be relevant and we strongly recommend that the District review and implement them.
22. The Lot 3 seepage mitigation works described in Item 16 and shown in Photo 5 do not appear to be functioning as intended. Further, it appears that the recommendations in Golder Associate's report to the District titled "Geotechnical Inspection and Recommendations, Sinkhole Treatment and Seepage Control Measures, Seawatch Residential Subdivision, Sechelt, BC" dated June 23, 2015 have not yet been implemented by the owner(s) of the Lot 3. We recommend that this be brought immediately to the attention of the Lot 3 owner(s) and their engineer, Golder, to be rectified.

FURTHER EXAMINATION REQUIRED: ☒ YES ☐ NO ☐ NOT APPLICABLE	REPORT BY: David Tara, P.Eng.	REVIEWED BY: David Regehr, P.Eng.