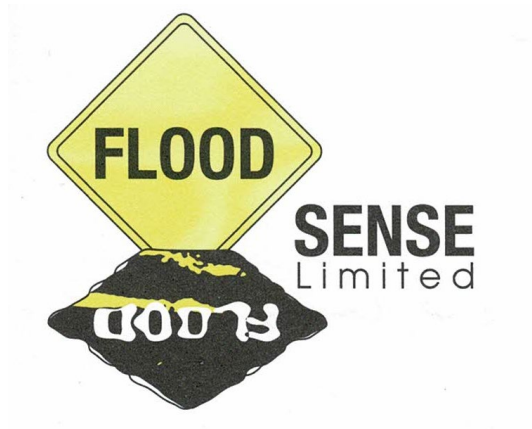


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REPORT ON FLOODABILITY ISSUES 16 HARE ROAD BRIGHTON

Introduction

Mr Stewart Campbell (the owner) has engaged Flood Sense Limited to report on floodability issues in respect of his property at 16 Hare Street, Brighton.

The property forms part of a basin between hills and is traversed at its western end by Taylors Creek. More generally the creek forms a boundary between the property and the wooded hills to the north.

Site Visits

Three site visits were undertaken; on 28 June, 5 July and 13 July 2022.

The first visit, accompanied by the owner, was predominantly to enable an overview to be formed. The inspection was mostly via observations from the elevated levels on the east side of the property and from the private road that runs adjacent.

The main observations were:

- The property in question exists on several levels, the highest “terrace” being at least 3 metres above the level of the lowest areas. Flood risk, if any, would therefore vary across the property.
- There was no sign of any flooding originating from spill over from Taylor’s Creek. This was probably to be expected, given that no major rainfalls had been recorded in the months prior.

- A culvert allows Taylor's Creek to flow under the concrete ford on the private road immediately to the west of the property. The culvert is of corrugated steel, and was estimated to be of 900mm diameter.
- Inspection of the lengths of Taylor's Creek visible from the road ford revealed that the creek was deeply incised, but somewhat overgrown with a combination of native scrub, gorse, broom and blackberry.
- Despite the likely resulting impedance to flow brought about by the infestation referred to above, the stream channel was assessed to have a substantially greater flow capacity than the culvert.
- The culvert did not however, pose a significant limitation to flow as any flood flows that might exceed the culvert's capacity would be able to flow over the concrete ford without leaving the overall confines of the wider stream bed.

The second visit enabled a more detailed inspection of the characteristics of Taylor's Creek in the areas where it flows between the property in question and the foot of the wooded hills, and to better appreciate the elevation of the property, relative to the local environment. The main observations were:

- Access to the creek was difficult in many locations as a result of the growth of vegetation within the stream channel and on the margins.
- Where access was possible, it was apparent that the degree of in-channel growth was significant, and generally comparable to that observed previously immediately downstream of the road culvert.
- The stream bed was deeply incised; the channel invert estimated at a level 3-4m below general ground level.
- The relative elevation of the land adjacent to the stream appeared greater in the property in question than in those developed properties immediately downstream in Hare Road. (This observation was not confirmed by measurement).

The third visit was undertaken mid-morning on 13 July. Substantial quantities of rain had fallen in the previous 48 hours, and the opportunity to observe the area immediately after a significant rainfall event was taken. Musselburgh readings reveal that approximately 90 mm of rain had fallen over the previous 2 days with a peak intensity of close to 8 mm/hr. Based on HIRDS data, it is apparent that the 48-hour rainfall was of the order of a 5-year event, while the peak 1-hour intensity was likely of the order of an annual event. It was therefore a relatively minor weather event, but significant enough to enable relevant observation. The main observations (all made from the private road) were:

- There was only minor ponding in the lowest parts of the property (refer photo below)



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- This was assessed as being internal rainwater that had fallen directly into the basin that forms the property.
- There was no evidence of overtopping from Taylor's Creek into the property.
- The flow in the stream would have been past its peak at the time of inspection but was still well in excess of the ford culvert's capacity. The ford was submerged by approximately 75mm of floodwater (refer photo below).



- From the vantage points available in the conditions, Taylor's Creek was flowing well within its banks (refer photo below).



Comment on the Submission of Mr Ind

In his submission Mr Ind states that the area is “low lying and subject to flooding from Taylor's Creek”, and that “there have been multiple occasions in recent times where the area proposed for housing has been inundated with stormwater”.

Observations of 13 July (see above) made towards the tail end of a prolonged period of heavy and persistent rain (incidentally, sufficient to cause a fatality in the nearby Silverstream catchment) raise some doubt re the claim of inundation from the stream on *multiple occasions*. There was certainly no threat of overflow from the creek on this occasion.

There appears to be a mismatch between Mr Ind's recall that access to some sections of Kayforce Road had been cut on *at least 2 occasions*, but the creek had overflowed into the property in question *on multiple occasions*. Observations (and photos) leave little doubt that overtopping of the ford that serves the newer Kayforce Road properties would be by far the more frequent occurrence.

Mr Ind's reference to access to properties adjacent to the property in question (16 Hare Road) being cut might cause the reader to assume that the disruption to access is in some way associated with concurrent flooding on Mr Campbell's land. The reality is quite different. The culvert under the road ford is of such limited capacity that overflowing of the ford will occur relatively frequently. (It was probably designed that way as a balance between cost and inconvenience). Consequently, road access will be cut from time to time, but not as a result of the creek's lack of capacity. The culvert's lack of capacity impacts on road access to some Kayforce Road properties from time to time, but is irrelevant to any

consideration of floodability of, or accessibility to, the property in question, now or in the future.

Comment on Stantec's Assessment

Stantec's original assessment was that the site had a **low** hazard rating. Following receipt of Mr Ind's submission, Stantec amended their assessment to **medium**, seemingly solely on the basis that the submission raised *valid concerns*. It is considered that Stantec's reassessment was conservative, possibly necessarily so, in the absence of physical supporting evidence.

It is accepted that the task of this writer was made somewhat easier by being able to inspect the site in person during a significant rainfall event. A rating of **low** in term of flood risk is considered the more appropriate.

Climate Change Considerations

NIWA's high intensity rainfall projections for the area suggest that key peak rainfall intensities could increase by approximately one-third by 2100 in their most pessimistic scenario 8.5 which assumes warming of 4.3 degrees Celsius. Such a scenario would need to be factored into the overall planning for the site, but it is considered that the combined effects of stream clearing and site landscaping could fully mitigate any potential adverse effects of the increased resultant stream flows.

Conclusions and Recommendations

- Site visits and analyses have led this writer to conclude that there are no issues of flood risk that should preclude the property's status being amended to "Town and Settlement". My understanding that this is broadly similar to its standing of several decades ago, before it was altered for rating considerations.
- The site would require landscaping depending on any ultimate layout decisions, as is usual for any such development; detailed design would define their extent. The landscaping could easily include minor bunding adjacent to the stream should any low point be subsequently identified adjacent to the stream.
- The stream certainly requires an extensive clean-out of excess vegetation. This would likely apply to the entire length of the channel adjacent to the property in question, based on observations made at random points of inspection. Mr Ind's recommendation of an "upgrade" of the stream is supported in this regard.
- It is beyond the scope of this report to assess the effects of any residential development on downstream properties from any resultant increased runoff into Taylor's Creek, but a design-specific analysis would identify whether a stormwater detention system, or similar, might be appropriate to ensure that there should be no downstream detriment.

N.P. Johnstone BE (Civil)

Director

Flood Sense Limited

25 July 2022