

Technical Memo



Date : 12 July 2021
To : Stephen MacArthur – Blyth & Blyth
From : Yusuf Kaya
Subject : 2014 – Redevelopment of Lethamill Golf Course: Assessment of Surface Water Discharge

Redevelopment of the Lethamill Golf Course in the Hogganfield area of Glasgow is proposed. The development proposals provide a new model for how golf can continue to be developed successfully with a focus on short-form golf, increased family orientation and accessibility. Key facilities will include a 9- or 12-hole golf course; 9 hole par 3 course; expansive short-game area; maintenance shed with associated hardstandings; driving range; instruction and fitness studios; adventure golf; golf hub/clubhouse including retail outlet, changing facilities, café/restaurant and indoor simulator/kids movie theatre; associated parking facilities. The existing Lethamill Golf Course clubhouse will be demolished as part of the development.

A flood risk assessment was carried out for the redevelopment site, and this was reported separately (Redevelopment of Lethamill Golf Course, Hogganfield, Glasgow: Flood Risk Assessment, June 2021).

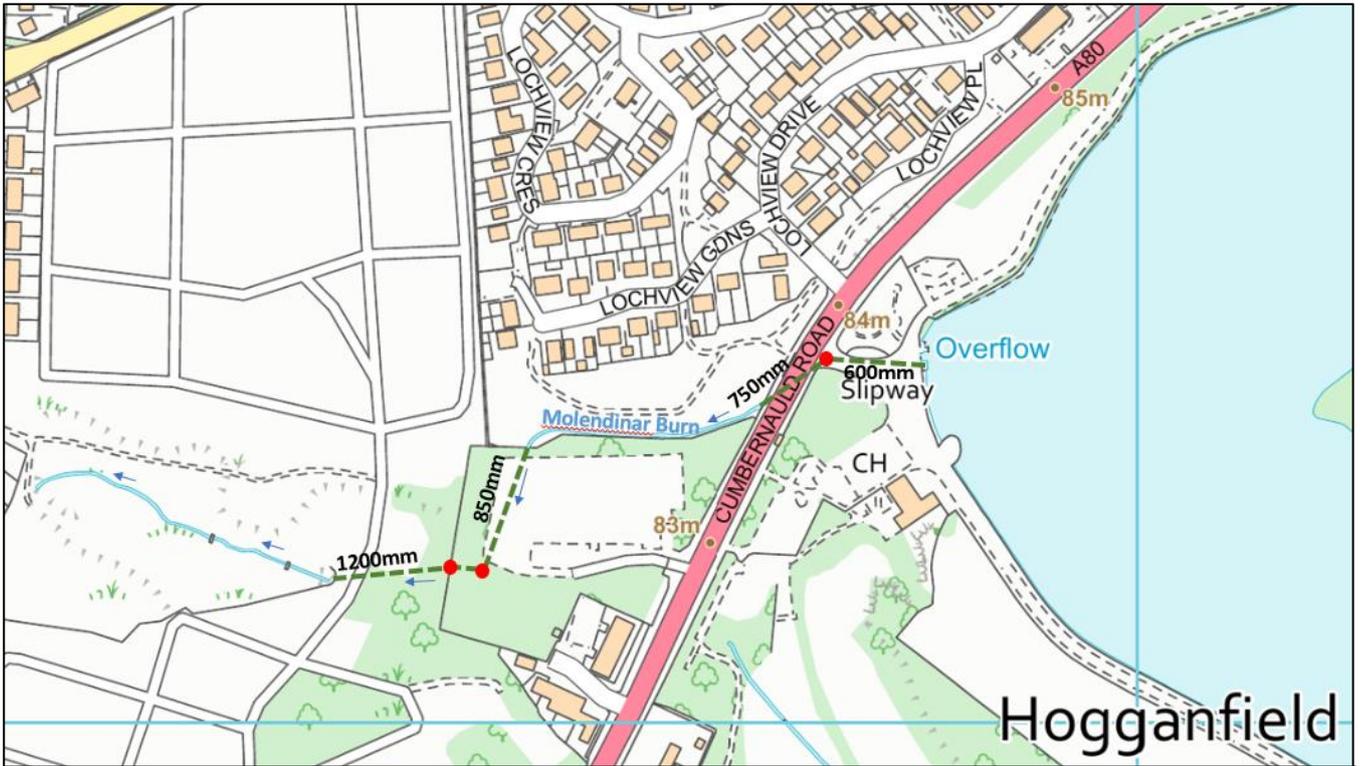
This Technical Memo concentrates on assessing the impact of the proposed attenuated surface water runoff from the development on flooding risk along the receiving watercourse.

It is proposed that attenuated surface water runoff from the development will be discharged into the Molendinar Burn downstream of Hogganfield Loch. Outflow from Hogganfield Loch is to the west where there are two overflow structures; an inlet 1.5m wide and 0.6m high, and a second inlet 0.6m in diameter, both having crest/invert levels of 82.48m AOD. Both structures connect to a 600mm diameter pipe via a chamber, which then becomes a 750mm diameter pipe under Cumbernauld Road. There is steel plate within the chamber, which is estimated to be approximately 0.07m higher than the crest/invert level, i.e. 82.55m AOD. The pipe discharges into an open channel on the west side of Cumbernauld Road. This is illustrated in Figure 1.

The drainage system for the development has been designed by Blyth & Blyth. Information provided by the designers indicate that surface water discharge from the development will be limited to 6.58l/s and that discharge will be made to a manhole on the burn on the east side of Cumbernauld Road (red dot shown in Figure 1). This is where the 600mm upstream pipe changes to 750mm downstream.

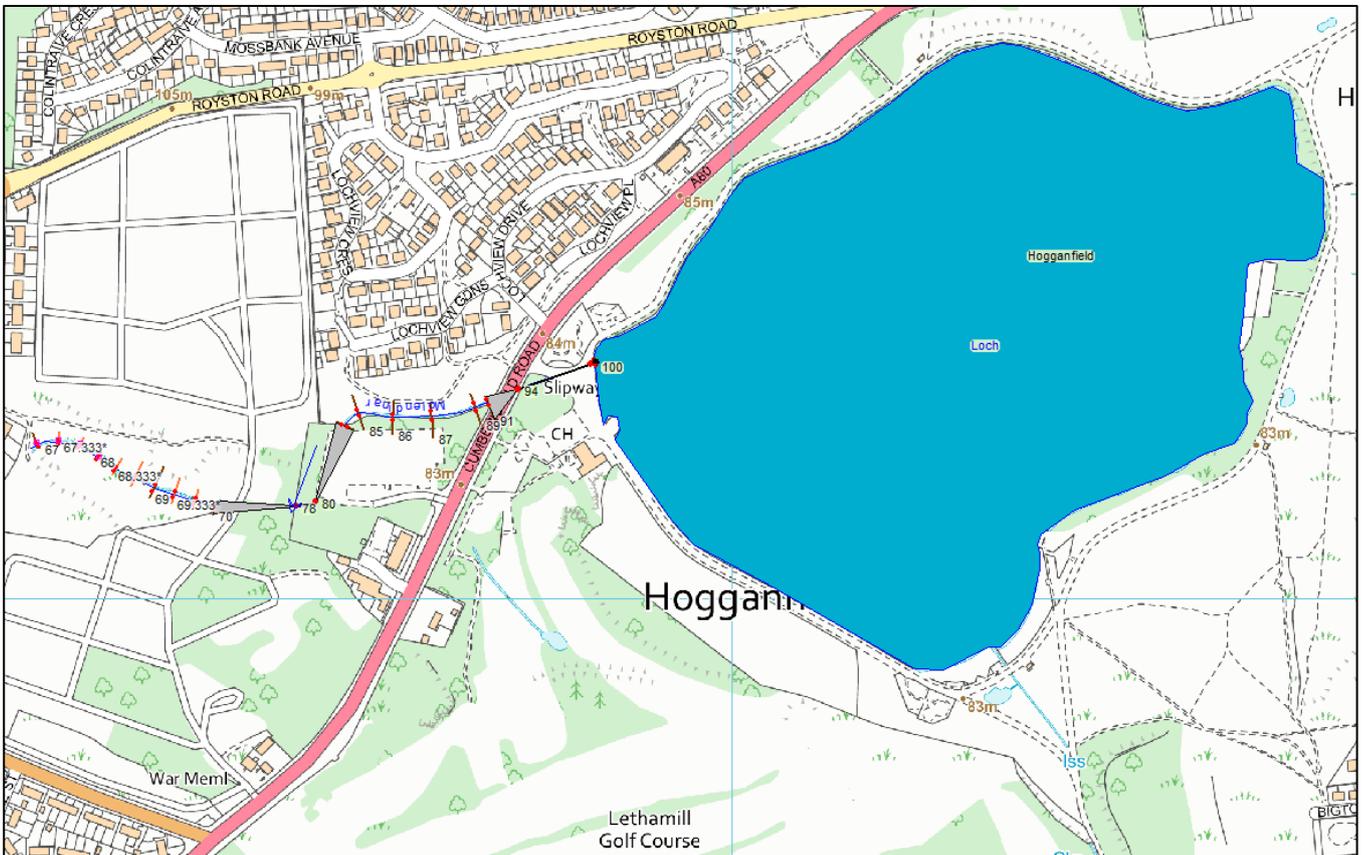
A mathematical model was set up of the Molendinar Burn from the loch to a point just east (upstream) of Greenside Street in Blackhill, over a length of some 600m. The extent of the model is shown in Figure 2. The model is based on HECRAS and includes the loch.

Figure 1: Line of Molendinar Burn downstream of Hogganfield Loch



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Figure 2: Extent of Molendinar Burn model

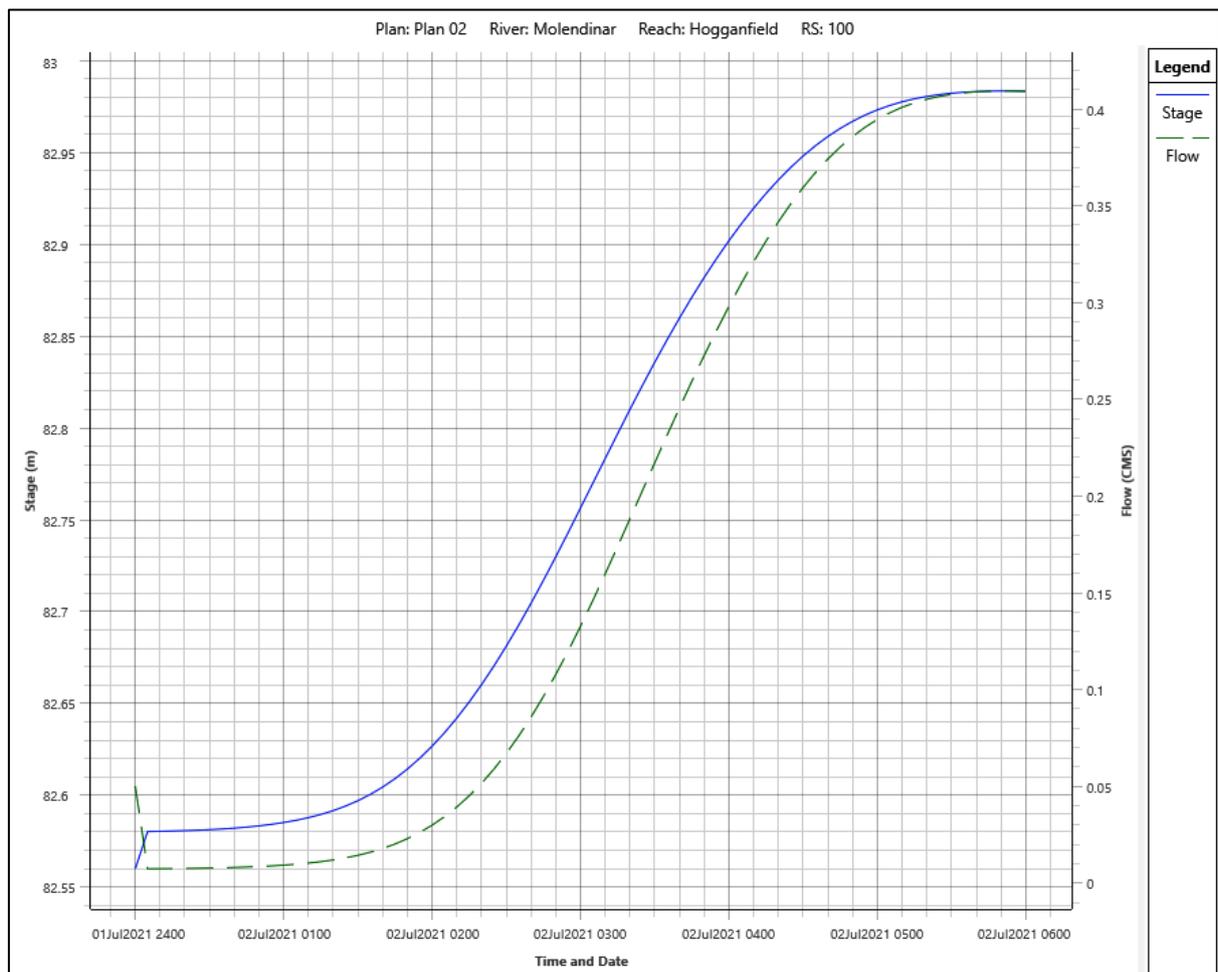


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The model was originally run for the 1 in 200 year flood event, with water entering Hogganfield Loch from upstream. The loch which has a surface area of some 21.75ha (hectares). Flows entering the loch are attenuated significantly, and only a small amount of flow leaves the loch. The model indicated that for a 200 year plus climate change event, water level in the loch rises by about 0.43m to 82.98m AOD. In the flood risk assessment report this was calculated as 82.96m AOD using a different type of model. The results are within 20mm of each other, indicating that there is a good correlation between the two.

The predicted peak outflow from the loch is 0.41m³/s. The outflow is limited by the capacity of the 600mm culvert.

Figure 3: Predicted 1 in 200 year plus climate change water level in the loch and outflow



No flooding is predicted from any section of the burn included in the model.

The above run was repeated with an additional discharge of 6.58l/s made into the manhole on the east side of Cumbernauld Road. This was included as a constant flow. This increases flows passing downstream by the same amount. There was no change predicted to water level in the loch, or outflow rate from the loch.

The additional discharge of 6.58l/s increases the predicted water levels downstream (west) of Cumbernauld Road by up to 5mm along the open channel section. The predicted 1 in 200 year plus climate change water levels along this section of the burn are shown in Appendix. Along the open channel

section to the east of Blackhill, the predicted increase in peak water level is up to 3mm. Further downstream the increase in peak water level will be less. This indicates that the proposed discharge from the development site would not have a significant impact on flooding risk downstream.

Summary

It is proposed that attenuated discharge of surface water from the proposed redevelopment of Lethamill Golf Course is made into the culverted section of the Molendinar Burn downstream of Hogganfield Loch. The discharge will be limited to 6.58l/s.

A mathematical model was set up to assess the impact of such flows on flooding risk along the burn. It was found that such a discharge has no impact on peak water level in the loch, nor on outflow rate from the loch.

The model indicated that although peak flows downstream will be increased by 6.58l/s, the impact of this on peak water level along the open channel section of the burn on the west side Cumbernauld Road would be up to 5mm increase. This is well within the water surface fluctuation which would be experienced during such an extreme event.

Further downstream, the impact would be reduced further.

Based on the above, it is concluded that the proposed discharge of attenuated surface water run off from the redeveloped golf course should not have a significant impact on flooding risk downstream.

APPENDIX – Sections along open channel west of Cumbernauld Road

