

Te Puru Stream Flow Duration Curve Method

In order to develop a synthetic flow record for the Te Puru Stream at the Bridge, the Auckland Council Flow monitoring site on the Mangemangeroa Stream was used as a surrogate. The Mangemangeroa Stream catchment is of broadly similar size, with a similar landuse and is the closest monitored catchment to the Te Puru catchment (approximately 8 km separation).

To correlate the two sites, relative catchment area was used as a scaling factor. The Te Puru Stream has a catchment of 2.109km² at the bridge and the Mangemangeroa Stream Catchment is 4.756km² based on the MFE River Environment Classification Network. Thus, the synthetic Te Puru Stream flow record was created by scaling the Mangemangeroa flow record by 0.424. Flow in the surrogate timeseries was compared to flow gaugings obtained by PDP staff and found to be relatively similar for the dates measured.

Once the flow had been synthetically developed for the Te Puru Stream at the Bridge, flow gauging comparisons were done to determine the scaling factor to create synthetic flow records further down the catchment at locations C and Quarry (as shown in Appendix A of A02803201L001). Using the comparison flow gaugings scaling factors of 1.84 and 2.24 were used to develop flow records at C and Quarry respectively.

Auckland Council provided PDP with the flow timeseries from 14/07/2000 through to 01/03/2023. This is the most up to date processed data that Auckland Council holds.

Manual gaugings undertaken at the bridge site compared relatively well with synthetic flow record. For example, for a gauged flow of 24 l/s the synthetic flow indicated 18l/s at the site. This indicates at these flows the synthetic flow record will be conservative (i.e. estimated dilution of wastewater will be less than reality).

For the sites further down the Te Puru catchment, these were again scaled based on flow gaugings as no further information was available to be able to translate the flow series to. Further long term data capture is recommended to enable refinement of the flow duration curves.

PDP has provided the following datasets:

- Te Puru Catchment Flow Duration Curve (FDC) without Naturalisation at the Bridge (i.e. with the wastewater flow still included)
- Te Puru Catchment FDC with Naturalisation at the Bridge
- Te Puru Catchment C FDC without Naturalisation
- Te Puru Catchment C FDC with Naturalisation
- Te Puru Quarry Catchment FDC without Naturalisation
- Te Puru Quarry Catchment FDC with Naturalisation

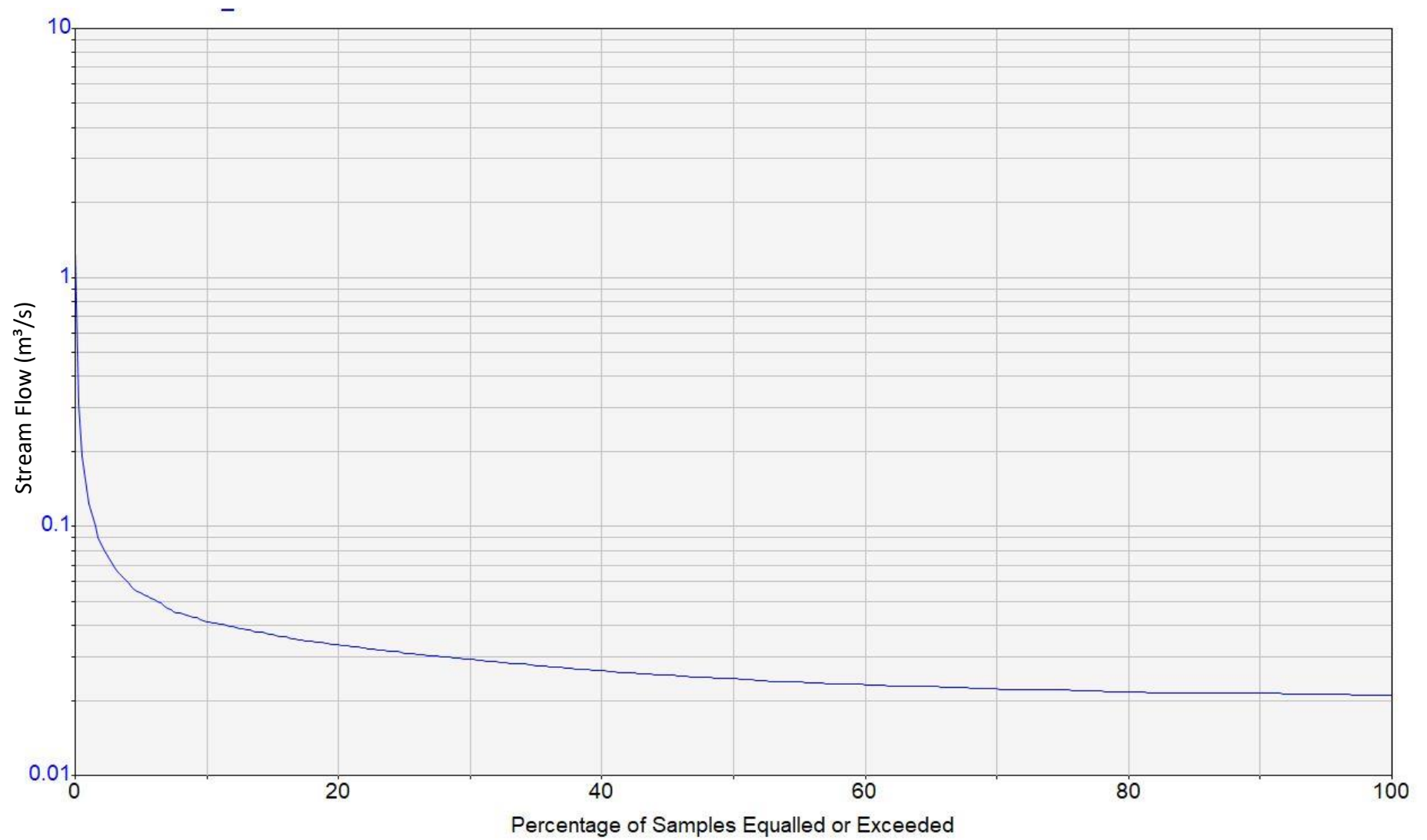


FIGURE 1: BRIDGE SITE FLOW DISTRIBUTION CURVE – WITHOUT NATURALISATION

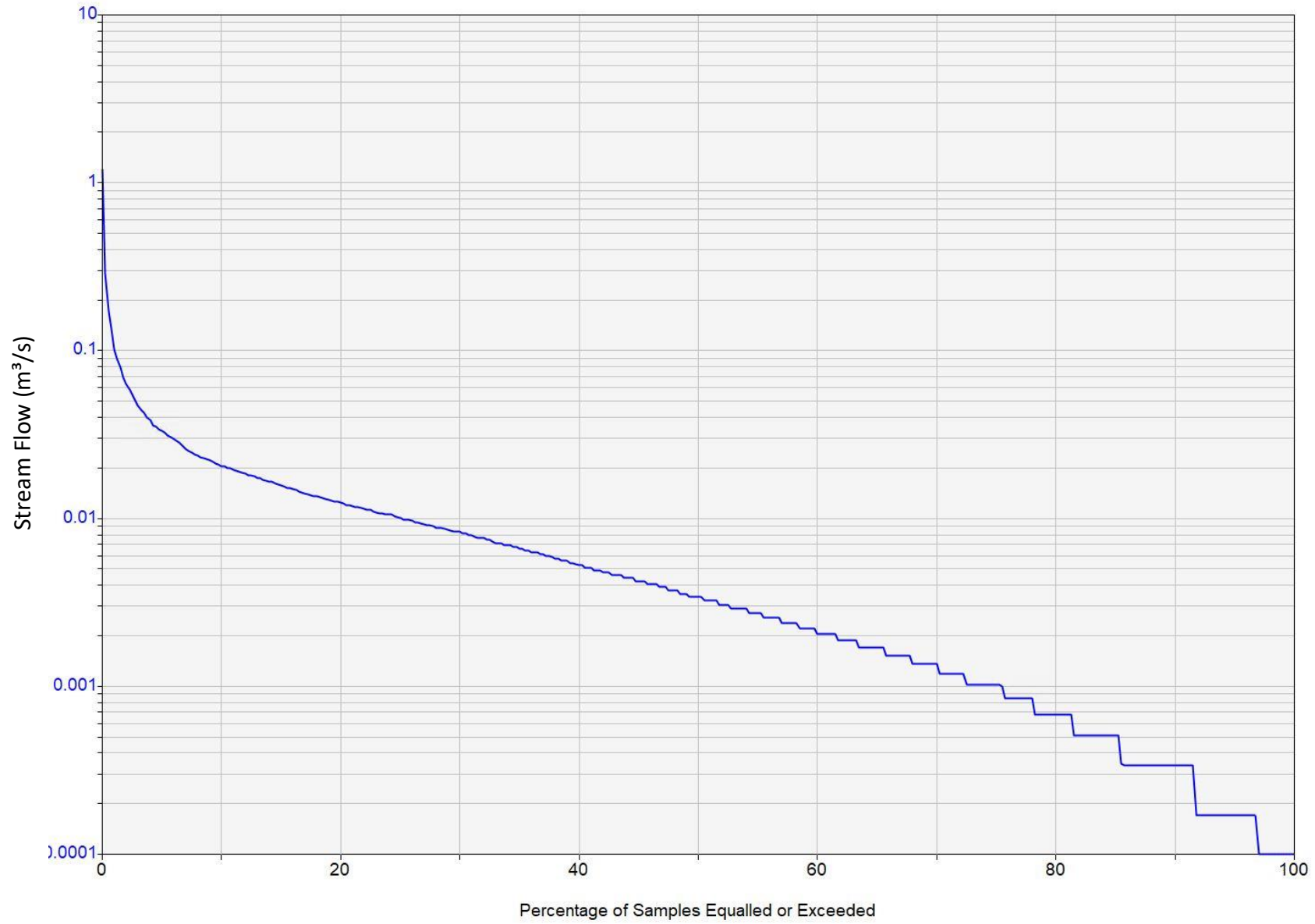


FIGURE 2: BRIDGE SITE FLOW DISTRIBUTION CURVE – WITH NATURALISATION

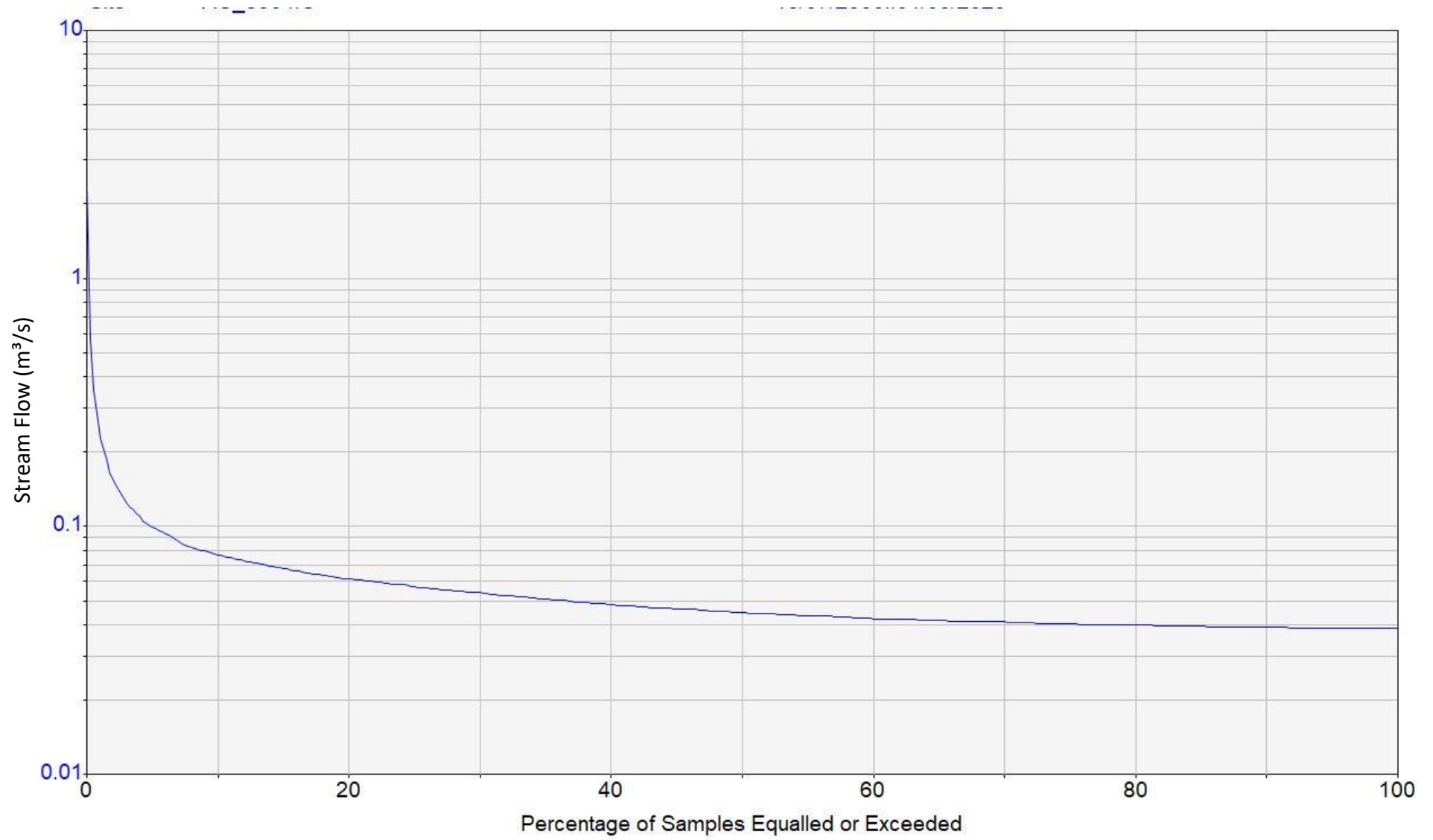


FIGURE 3: SITE C FLOW DISTRIBUTION CURVE – WITHOUT NATURALISATION

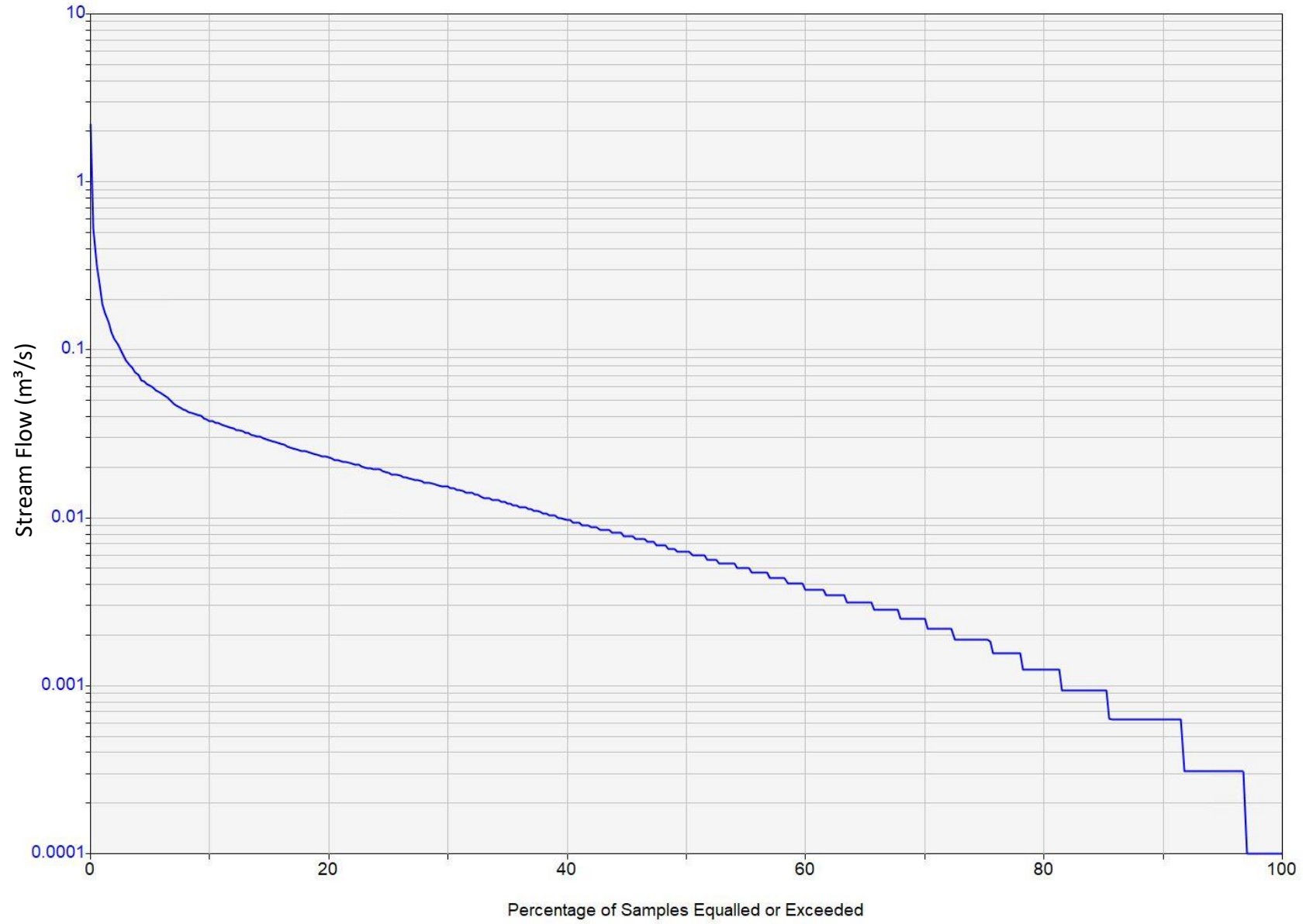


FIGURE 4: SITE C FLOW DISTRIBUTION CURVE – WITH NATURALISATION

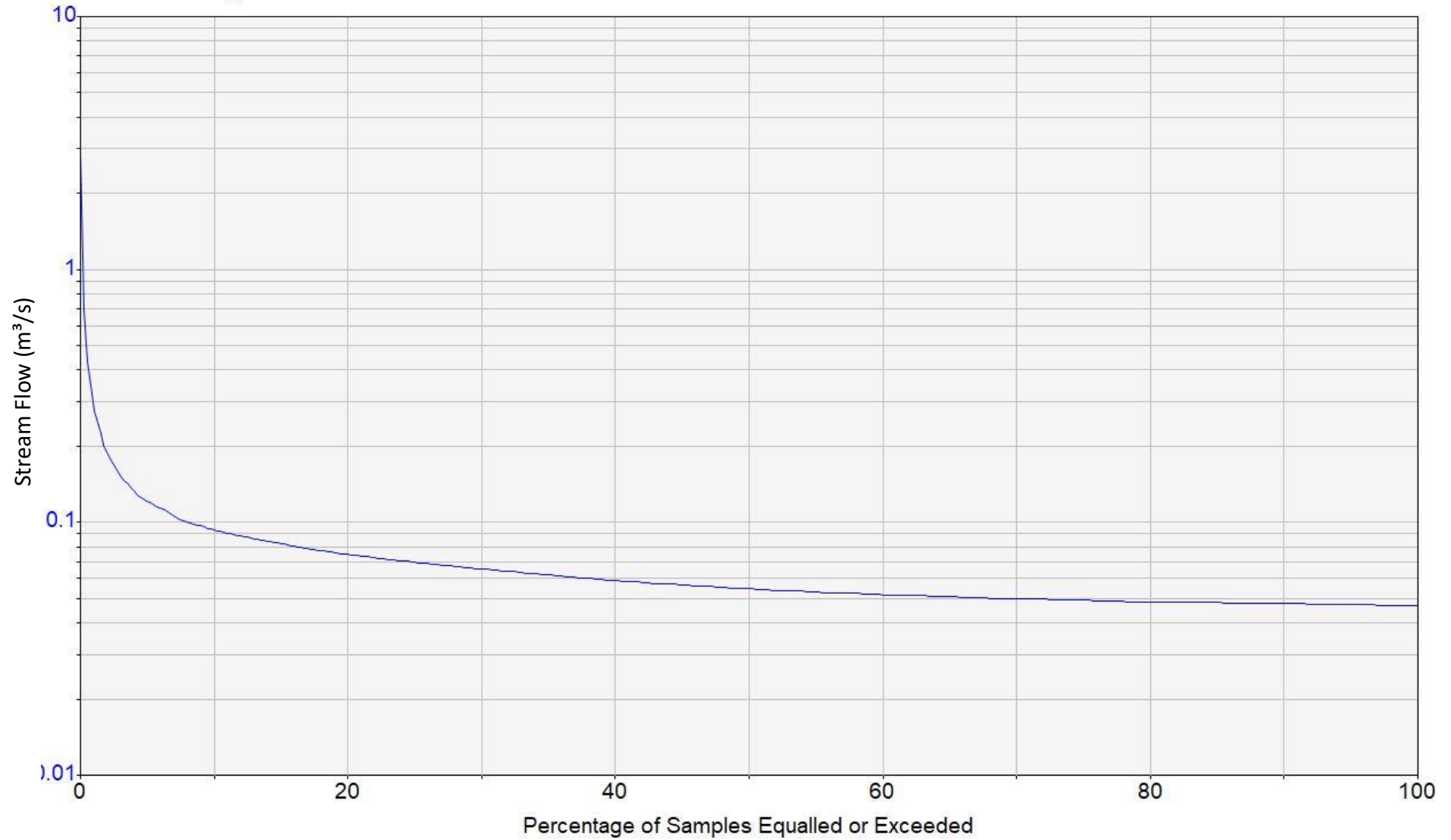


FIGURE 5: QUARRY SITE FLOW DISTRIBUTION CURVE – WITHOUT NATURALISATION

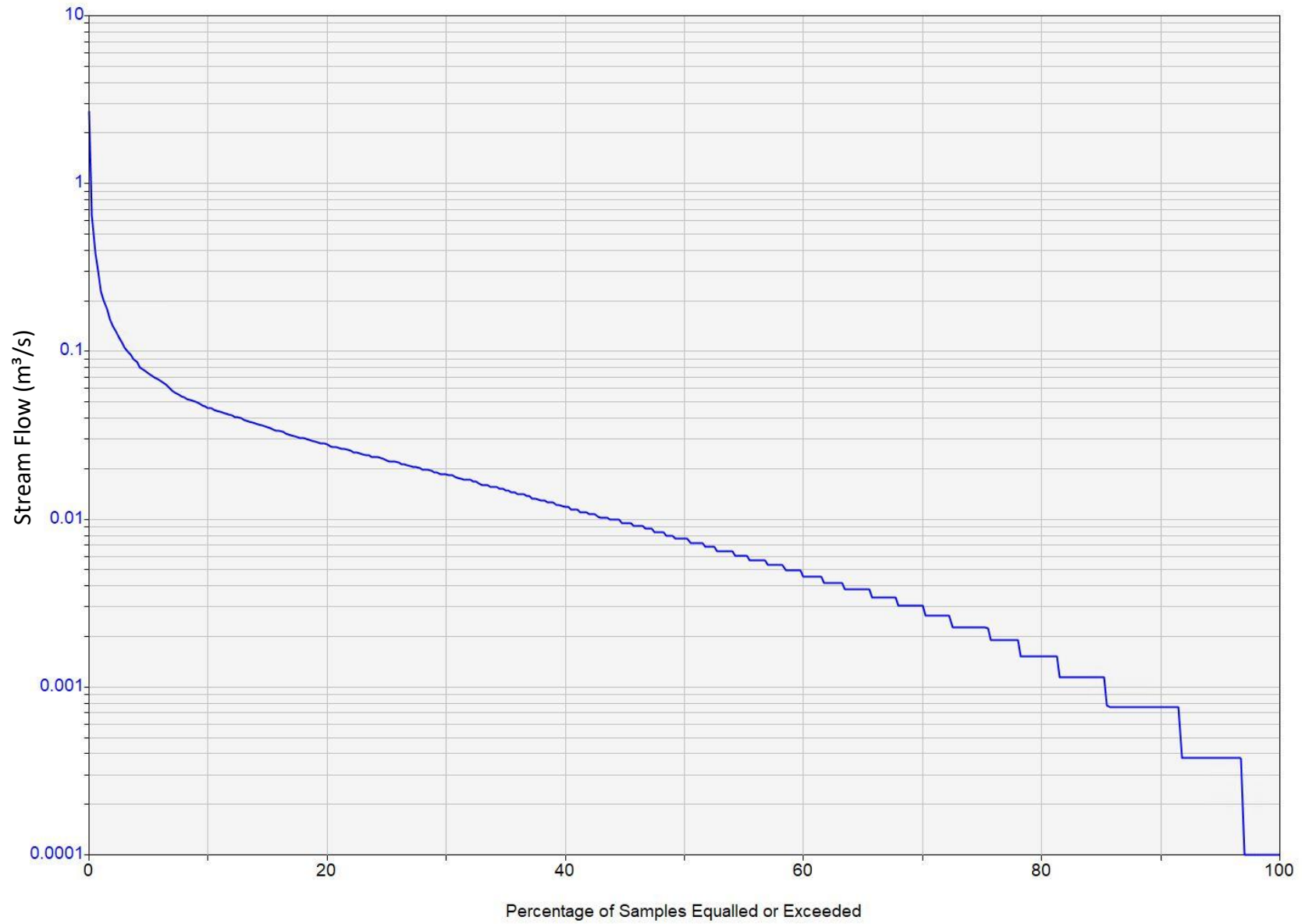


FIGURE 6: QUARRY SITE FLOW DISTRIBUTION CURVE – WITH NATURALISATION