Lidar velocity measurements need to be interpreted differently than conventional in-situ readings. A commonly ignored factor is “volume-averaging”, which refers to lidars not sampling in a single, distinct point but along its entire beam length. However, especially in regions with large velocity gradients, like the rotor wake, it can be detrimental. Hence, an efficient algorithm mimicking lidar flow sampling is presented, which considers both pulsed and continuous-wave lidar weighting functions. The flow-field around a 2.3 MW turbine is simulated using Detached Eddy Simulation in combination with an actuator line to test the algorithm and investigate the potential impact of volume-averaging. Even with very few points discretising the lidar beam is volume-averaging captured accurately. The difference in a lidar compared to a point measurement is greatest at the wake edges and increases from 30% one rotor diameter (D) downstream of the rotor to 60% at 3D.