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Local flow and turbulence at a tidal energy conversion installation near a pier of an estuarine bridge[1] MARTIN WOSNIK, KAELIN CHANCEY, University of New Hampshire — Estuarine bridges could serve as ideal locations to deploy marine hydrokinetic (MHK) energy conversion systems. The hydrokinetic resource is typically strong at these narrow locations, the bridge piers can serve as supporting structure for both the bridge and turbines, and synergies exist in the permitting processes. The Living Bridge Project installed a hydrokinetic turbine on a floating platform at Memorial Bridge in Portsmouth, NH. The location is well-suited as a tidal energy test site, reaching tidal current speeds greater than 2.5 m/s during spring ebb tides. In tidal estuaries the currents can vary significantly in space and time. Measurements were conducted with two acoustic Doppler current profilers (ADCP), mounted on the bow and stern of the platform, and with two acoustic Doppler velocimeters, mounted in various locations. The ADCPs indicated higher maximum current velocities and mean kinetic power density than prior nearby resource assessments. The ADV measurements yielded turbulence time and length scales consistent with estuary scales, e.g., width of the river and distances between the bridge piers. The tidal flow turbulence characteristics, such as the size and occurrence of coherent structures, affects the loading on the tidal turbine.

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