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BENTLEY BROOK

This tributary of Bentley Brook in Millstone shows how soil can abruptly determine stream shape, substrate composition, pH and aquatic habitat. There is only about 800' between the vertically eroding marl based stream reach and the horizontally eroding sand based reach. The sand reach has functioning wetlands to temporarily hold stormwater. In the marl reach, stormwater must remain in the incised channel and further downcuts the bed. (After the topsoil on the streambank has all collapsed from the underlying marl, the sand/gravel streambed will then erode faster than the marl streambank.) Note that the 'armoured' gravel in the streambed here has been cleaned of much its sand; this absence of sand or silt temporarily produces 'hungry water' which further exacerbates erosion downstream - because the water leaves this reach seeking more sediment to restore equilibrium of its suspended load. Furthermore, because exposed, raw marl has no "roughness" to slow stream velocity, it mimics man-made cement structures which protect a reach at the expense of accelerating erosion in unprotected downstream reaches.Some additional effects: the pH of Bentley Brook 1000' downstream of these reaches was 3.55 (7 is neutral). Once marl is exposed and further acidified by exposure to oxygen, it rarely supports revegetation of the streambank - further increasing erosion and mass wasting. Note that historic channelization of the upstream reach (the grown-over mounds of dirt) exacerbates the natural fragility of the soils and increases slope and velocity of the channel, which further exposes the acidic glauconitic marl.

Upstream:

Marl Armour

Marl and tree root overhang

Mass-wasting around marl

Marl w/ Channel Dredging

Tree roots exposed with Marl

Armoured substrate

Downstream:

Sandy substrate

Vegetated bankcover with wetlands

Vegetated, gently sloping banks with wetlands