Hazard Assessment for Drone Flight, Vasona Creek at West Valley College

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I Location and Environmental Profile

The area surveyed is the upper 80% of the approximately 3000' segment of Vasona Creek and the riparian zone surrounding it where they traverse the West Valley College campus; excluding the final (northern) 20%. [4]
The creek's headwaters are at the southern edge of the roughly rectangular campus, approximately in the middle of the east-west southern border, and proceeds North-NorthWest until exiting near the NorthWest corner. The riparian zone on both sides of the creek is approximately 800 feet wide at the southern border, narrows to 200 feet over the first 1000 feet, then varies between 200 and 300 feet for the next 1000 of its length, then narrows to 50 at the northern end of the 2000+ feet surveyed.[4],[5] Note that where 800 feet wide, large areas of the zone have been cleared to accommodate tennis courts and playing fields.[4]
The campus is at an elevation of 328 feet and is under the overhang of the airspace of San Jose Airport (SJC), and so is class E airspace up to 700' above MSL. This will reduce the usual maximum altitude of 400' AGL at which drones are permitted by 30 feet[1]. There are no TFRs[2] and no NOTAMS[3] that concern us.

II Identified Hazards and Their Impact

Most significant hazards are Poison Oak, tree branches, and RF/EMF interference, in that order, with foot traffic and fire danger distant at 4th and 5th. The latter two can easily be planned for by bringing a whistle, a sign or caution tape, and a fire extinguisher or gallon of water, respectively, but the first three are not so easy.

Poison Oak is rampant and grows to waist-height starting from the edge of the streambed and extending out to the edge of the walkways or of an adjacent area which is dominated by a different species. A great deal of the riparian zone is devoted to Poison Oak and it will not be long before a drone will fly or fall into it.

Trees are most everywhere in the area and there are few open places in which to fly. The open areas tend to be less than 50 feet wide and in most places - where they exist at all - less than half that.[5] These are places where there is more than one streambed, and are the top of the ridge between them. Furthermore these open spaces are largely populated by tall grasses and weeds, discouraging simply walking, let alone taking off and landing on the ground. Trees tend to rise from the Poison Oak dominated areas, and naturally the branches intrude into the open spaces.

Interference from Electromagnetic sources should also be expected.
- Our CoDrones controlling radios operate at 2.4 Ghz[6], as does WiFi
- Our CoDrones use a Nordic nRF24L01+ communications chip, which can be set to put out either -18, -12, -6, or 0 dB [6],[7]
- Negative dB values are not really negative; they indicate a power level less than .1mW. 0dB = 1mW [8]
- Interference should be expected when there is another source of the same signal which is 30dB or more stronger than the one of interest[8]
- The campus WiFi map [9] shows >-30 dB in most of the areas - and between -67 and -30 in the rest - that people typically go: over walkways and roads and bridges across the creek, surrounding buildings and playing fields, covering open areas between buildings, and of particular interest to us: over footpaths which stray into the riparian zone and are not uncommon
- Our CoDrones have an expected range of 100-200 feet.[6] At max range the dB has dropped to nothing. So it should be expected that during flight the dB level of the drone is 30 below that of the WiFi. It seems likely that the drone will interfere with the(a) WiFi connection(s) even before that.

III Risk Mitigation

For electromagnetic interference, keep as far as possible from buildings and walkways. The distances between buildings on opposing sides of the zone ranges from 250 feet to 450 feet[4], so for approximately half of the exact locations in the zone, distances of >100' from the nearest building are found. But as discussed the vast majority of exact locations in the zone are not flyable due to trees, brush, Poison Oak, or interesting due to the presence of tall grasses and weeds or water. So interference from WiFi could be avoided in theory, but only by luck in practice. Of course this problem by nature can have significant effect without being detected.
Hazards of tree branches are difficult to mitigate since they dominate the vast majority of the zone. As stated previously open spaces are rare and small within the zone, in fact, all but nonexistent, as can be seen from the aerial view.[5] There is simply almost nowhere to fly.
Hazards of people/foot traffic and fire danger from overheated motors are simply (if not trivially) mitigated as discussed above.
The hazard(s) presented by Poison Oak cannot be mitigated. Only the damages can be mitigated, and only after they occur, and only with great effort.

IV Conclusion

The creek and riparian zone is a beautiful place, and handy. Unfortunately flying there is not practical. Look elsewhere. If you insist on flying there:
1. Bring water just in case an overheated motor starts a fire. Although unlikely, this is unthinkable. Should it happen in summer, the fire will grow rapidly and 1 gallon of water or 1 fire extinguisher might not suffice, so this becomes a deal-breaker.
2. Bring long sleeves, long pants, gloves, cleanser/degreaser for your skin, cleanser/degreaser for the drone, and a change of clothes and plastic bags.
But unless you need to inspect the underside of the footbridges... forget it. Go somewhere where there is adequate room to actually enjoy your outing.

References:

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