Highlights

* New facility location problems that combine the use of neighbourhoods and barriers together.
* Exact second-order cone formulations for the k-median with neighbourhoods and barriers.
* Preprocessing and strengthening techniques that enhance the formulations.
* Design of a matheuristic algorithm that provides good quality solutions for the formulations.
* Exhaustive computational experiments on planar graph instances considering different parameters and approaches.
* Case study in drone delivery applied to the city of Córdoba.