In this memo, we present to you our model of a drone based disaster response system capable of dealing with the Puerto Rico hurricane scenario. After careful consideration of the demands of the situation, we have selected a suitable fleet of drones and set of medical package configurations that may be employed in response to such an emergency. Below, we outline the main components of our model and summarise the results of its performance.

Our first challenge was determining the ideal packing configurations for ISO containers. We treated this as an optimisation problem. Through doing so, we were able to devise three different algorithms (In-Fitter, Cuboid Reduction Method and RatioCheck) that we used in together to figure out how to pack supplies in the most efficient way possible. Our model demanded the use of three ISO containers to supply our medical centres.

To select the drones suitable for delivery we prioritised their maximum range over the delivery time. We concluded that given a 24 hour delivery deadline, speed was a less important factor. Using algorithms, we concluded that we would be able to supply our medical centres adequately. The time frames generated ranged from 8 months for a container supplying several medical centres to 8 years for one medical centre. Furthermore, this strategy allowed us to map roughly 60% of the major road networks linking the medical centres.

While this model is not perfect, when compared to data from the 2017 Puerto Rico hurricane scenario, it is evident that the time frame of support provided is certainly sufficient for most medical centres. Therefore, we conclude that while one must initially invest more costs in allocating three ISO containers to the disaster area, the corresponding payoff largely merits the price. We use this as justification to present our design recommendations to you in the report that follows.