

## RPA LiDAR Surveys for TfNSW Specification G73

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### ABSTRACT

*Remotely Piloted Aircraft (RPA), or drones as they are commonly known, have been used for several years within Transport for NSW (TfNSW). RPAs have traditionally used a high-definition digital camera and photogrammetric techniques to model ground surfaces. However, advances in technology (i.e. the increased payload of RPAs and the miniaturisation of high-end measuring devices) allow highly specified Light Detection and Ranging (LiDAR) and inertial navigation units to be mounted on drones to survey ground features. High-spec LiDAR systems, measuring many hundreds of thousands of points per second, enable a selection of points to reflect from the true ground surface in heavily vegetated environments. This offers significant advantages over image-only systems which rely on an unobstructed view of the ground surface. TfNSW has recently partnered with Linke & Linke Surveys, a national surveying company with in-house aeronautical expertise, to undertake multiple RPA LiDAR surveys throughout NSW. The first of these surveys was in south-western Sydney. Initially commencing as a trial on a small, previously surveyed area, the aim was to determine whether a mature RPA LiDAR system could meet the ground survey tolerances provided in TfNSW Specification G73 Detail Surveys across various surface types. The results demonstrated that it is possible to achieve Specification G73 tolerances for natural surface, batters, trees, overhead non-utility cables and natural surface drainage in a heavily vegetated environment. Accordingly, the project was extended to include survey of all such features over the 4.5 km length of the project. However, the project highlighted the surveying expertise necessary to obtain accurate ground models in vegetated areas. This includes, but is not limited to, a thorough and comprehensive processing regime, a rigorous checking process and additional ground survey by traditional means in areas of uncertainty. This project led to several similar surveys for TfNSW with each project refining the processes to achieve an optimal solution. This presentation highlights these processes and discusses the advantages in time, cost, safety and environmental impacts experienced on RPA LiDAR surveys.*

**KEYWORDS:** RPA, LiDAR, drone, survey, G73 specification.