

Uses for drone photography on reserves

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Trundle Mere hide photographed from a drone (photo: Josh Hellon 2016)

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1. Summary

This report presents some of the imaging and processing techniques from drone test flights at the Great Fen. Suggestions are made for application of these techniques and for future improvements.

2. Introduction

A DJI Phantom 2 Vision+ drone was purchased in 2015 for monitoring at the Great Fen and potentially at other Wildlife Trust reserves. Natural England provided funding for most of the equipment purchase and training.

Josh Hellon (Monitoring & Research Manager) was trained in its use and completed a pilot training course. This course enabled the Civil Aviation Authority (CAA) to grant us permission to undertake aerial operations up to a height of 400ft above ground level.

Part of this training involved the compilation of a comprehensive drone operation manual for the Wildlife Trust. This manual covers health and safety, training and insurance information.

The drone is fitted with a wide-angled camera, allowing video and photos to be taken. This report explains how these video/images were processed to remove lens distortion, aggregate images and edit video.



Figure 1 The DJI Phantom in flight at Rymes Reedbed (photo: Henry Stanier 2016)

3. Methodology

3.1 *Survey locations*

Surveyors conducted three separate flight operations at the Great Fen at the following locations:

- Corney's farm - Fields to the west of barn 18/01/2016
- Engine Farm - Froglife ponds and new pool creation 04/03/2016
- Rymes Reedbed - Hide, meres and Holme Fen NNR 07/03/2016

3.2 *Survey technique*

At each site, surveyors took video clips of the habitat. The aim was to provide slow, steady tracking shots so it was easy to see the habitat in detail. The pilot operated the drone with the camera in a fixed position; tracking from left to right, or steadily climbing and moving forward. Surveyors also took some birds-eye shots by fixing the camera pointing directly down and moving slowly forward.

Photos were taken from the same angles as the videos, to provide wide-angled views of the landscape.

A series of photographs were taken from a birds-eye view; flying in a grid pattern to cover a large area.

3.3 Image/video processing



Figure 2 Images of Corney's Farm before (l) and after (r) processing

The aerial photographs were processed using Photoshop Elements. The [filter] > [lens correction] command allows the user to choose the correct model of drone and automatically removes the distortion (figure 2).

Multiple images were joined together using the [file] > [automate] > [photomerge] > [collage] function in Photoshop.

Video was edited using Microsoft Movie Maker; allowing editing, credits and captions. These videos can be easily uploaded to YouTube and other social media sites.

4. Results

4.1 *Landscape photography*



Figure 3 Landscape photograph of Rymes Reedbed and Holme Fen from approximately 200ft

Good quality landscape photographs were taken from a height of approximately 200ft above ground level (figure 3). By tilting the camera slightly down it was possible to capture a large area of habitat in good detail. From the maximum height of 400ft, a very large area could be seen, but with less ground detail.

4.2 *Habitat mapping*

The following figures show the tiled images taken at Engine Farm and Rymes Reedbed:



Figure 4 Tiled image of Engine Farm showing earth mound, new ditch, new ponds and MLC drainage channel

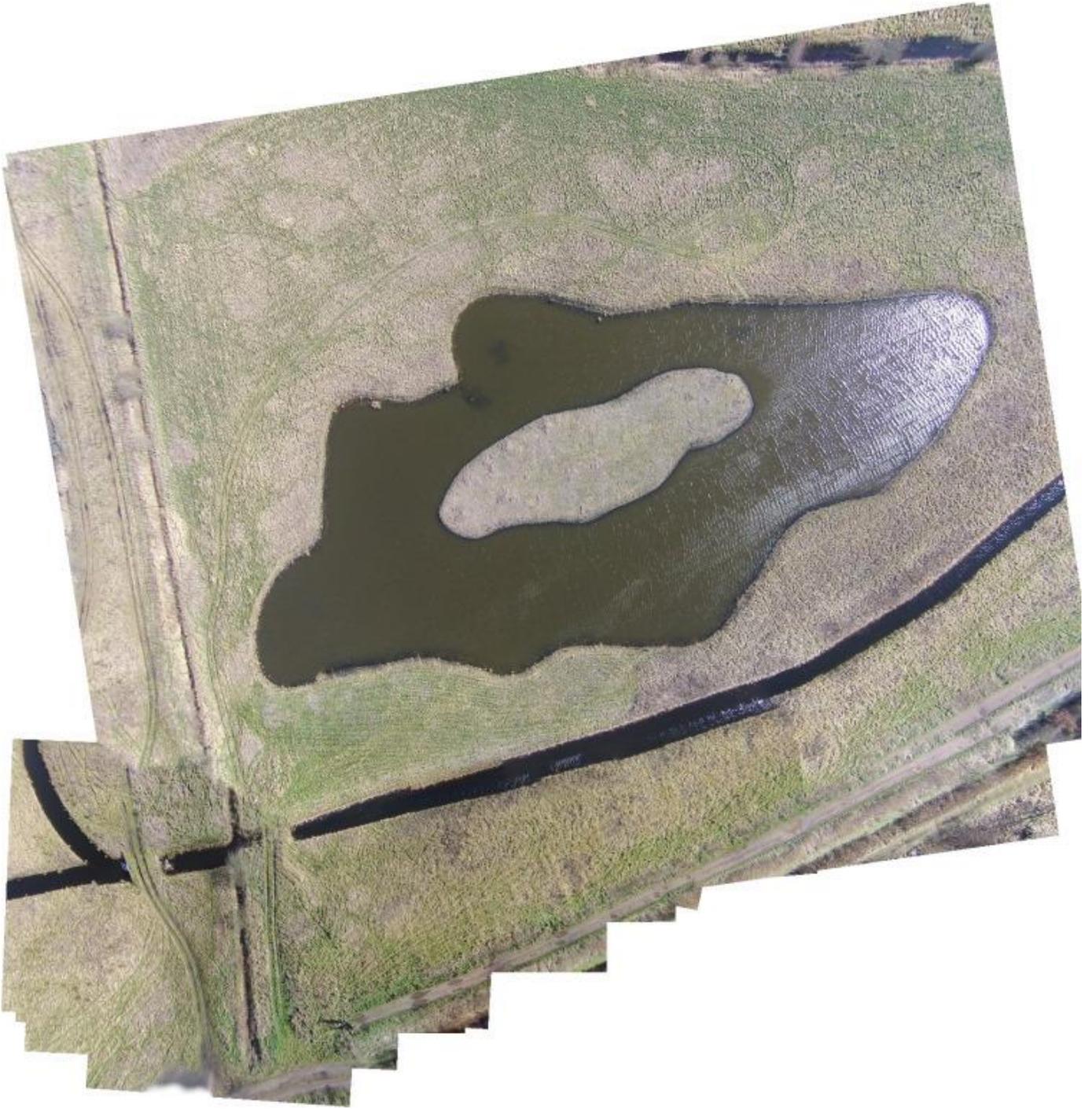


Figure 5 Tiled image or mere at Rymes Reedbed (250ft)



Figure 6 Tiled image of reservoir and hide at Rymes Reedbed



Figure 7 Detail from previous image (figure 6)

The tiled images (figures 4-6) show that Photoshop can create a single image from any number of aerial photographs. Some irregularities are clear on the images, with tiles not meeting correctly. This can be manually adjusted by a more experienced Photoshop user. It also highlights the importance of maintaining camera direction and altitude during each flight.

The mapping area is limited by the fact that the drone can only fly 500m from the operator. Each flight can therefore cover an area with a radius of 500m from the operator.

Figure 7 demonstrates the level of detail that can be provided from these images, taken at an altitude of 250ft. The vegetation type is clear along the margin of the ditches and in the grassland.

4.3 Video

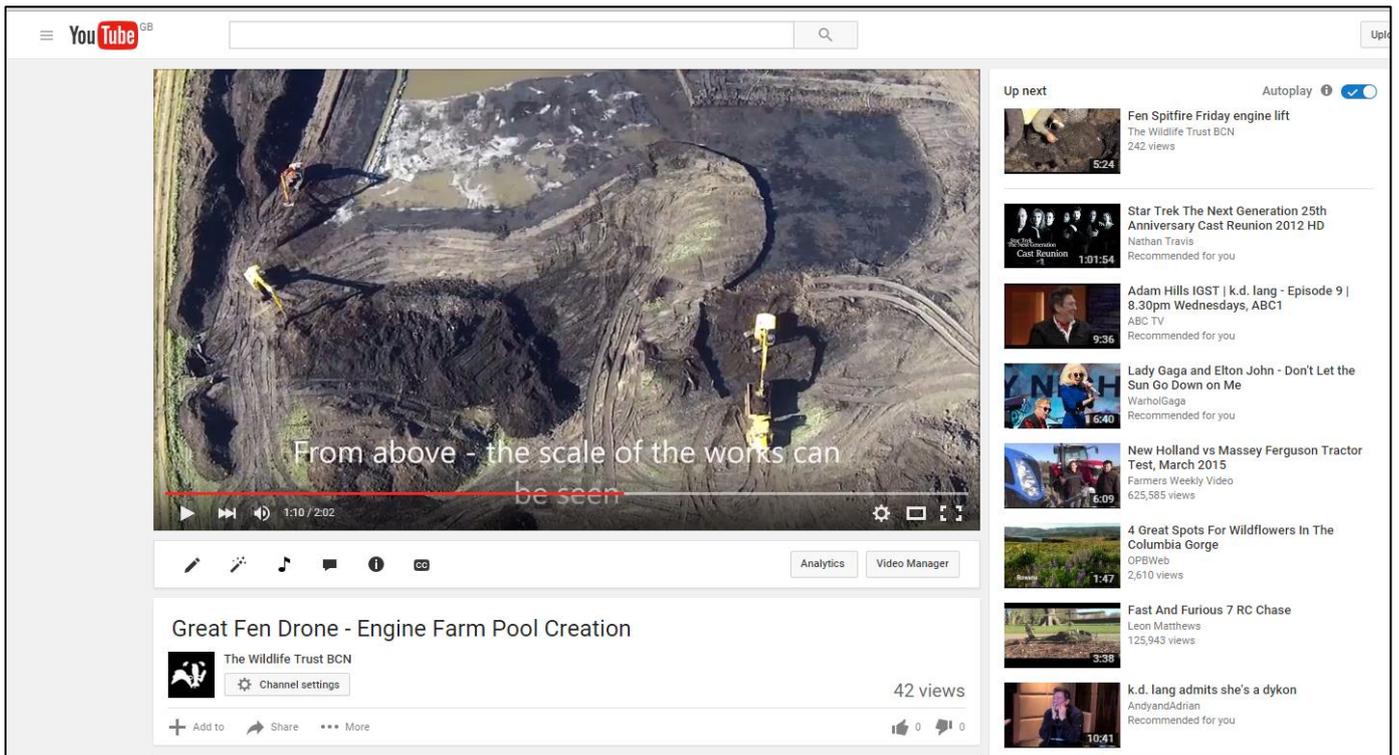


Figure 8 Engine Farm video on YouTube with captions

Video was easily edited from the drone footage (figure 8). The image is HD quality; so ideal for social media accounts and websites.

5 Management Suggestions

The following suggestions are made for future use of drone photography:

- Videos of reserves and habitat creation for website and social media;
- Tiled maps of specific areas <1km square;
- Fixed-point landscape images;
- Monitoring of vegetation change/scrub encroachment.