# TAFE SA and Government of SA organisational Logo

Microcredential Content Drones in Agriculture

# TOPIC 3 – Where to now

In this topic, you will find a summary of all of the important things to consider before getting started in this space.

If you haven't already familiarised yourself with the [Civil Aviation Safety Authority](https://www.casa.gov.au/drones) (CASA). This is where you will find out up to date information about:

* rules for drones
* drone safety
* becoming accredited
* registration and flight authorisations
* industry initiatives

Make sure you subscribe to their [mailing list](https://updates.communication.casa.gov.au/link/id/zzzz5e8be6d10ee5b225/page.html?prompt=1).

At the end of this topic, there will be a quiz and forum to practice your understanding.

Now that you have made it this far, you have probably felt that a drone will help you with your property. Before rushing to your local electronics store or looking online for the one for you, its recommended that you develop a list of what is important. Shopping for new technology can be daunting and salespeople can be persuasive, so best come up with a list of non-negotiables for your drone.

### What will you need from your drone

How will your business make use of a drone? Is it for heard management? Crop identification or just to give you more information about what is happening on the land. No matter the solution, you need to be sure about what problem you are working to solve. This will help refine some of the criteria that you will use to select the most appropriate drone.

### Camera type

Based on the solution you are looking for, this will determine the type of camera that you need on your drone, as you would have seen in the material, there are many alternatives, RGB/Infrared/ multispectral/hyperspectral cameras and even thermal, LIDAR and radar sensors.

Most cameras on brand manufacturer drones have a camera capable of producing both high definition still and video images. They generally have large capacity SD cards (removable memory devices) and can store large numbers of high-resolution photos and video files such as. raw or 4k

To carry the larger professional camera systems for Film and TV or specialist thermal or lidar systems, larger heavy lift drones would be required. These not only have better lifting capacity but are more stable in windy conditions. The other thing to consider is the type of gimbal that holds the camera. On some drones the camera position is fixed while others have gimbals that are 2 axis and others 3. If you wish to face the camera down to take the overlapping images required for many of the examples in this course, you’ll need a 2-axis gimbal. With cameras that take advantage of VR (Virtual Reality) devices then a 3-axis camera is required. Some drone models don’t come with a camera at all and third-party devices such as Go-Pro’s are used.

On many drones the camera can be configured for a variety and settings including burst and interval capture for time-lapse photography.

<https://store.dji.com/guides/6-photo-modes-every-aerial-photographer-needs-to-know/>

Taking it to the next level.

Virtual Reality headsets are becoming increasing popular with drone developers and users. Several manufacturers have models available and are adding a new tool to the farmers toolbox. These devices allow a second person to experience the flight while viewing a live feed in 3D through the VR headset. They offer an excellent training tool or opportunity for an expert to do the field analysis while a pilot flies the aircraft.

 In Australia these devices are not to be worn by the pilot while they fly the aircraft However, the person wearing the headset can take control of the camera and take the photos/videos.

<https://www.youtube.com/watch?v=fRco1y9w9Hw>

How you will analyse the data captured by your drone   
Any drone is only as valuable as the data that it provides you. Consider any software required and if this is compatible with your current equipment. Depending on the type of camera and data that you will be using there are several software packages that can be used to analyse the information and provide you with more useful feedback. Don’t forget to add any software costs into your plan.

There are several cloud-based processing websites available if you don’t want to purchase your own specialised software. These often use a credit system where you purchase points as credits and use them when you request processing. These sites are convenient and don’t required complex computing equipment or skill to use. It should be noted however that these sites generally require good internet connections as they need to transfer a lot of data (your images) up to their sites. In regional areas this could be a disadvantage. In-house processing may be a better business choice but talk to your software supplier first. Make sure you have the computing power to do what you want. Many of the processes covered here such as photogrammetry require higher specification computing systems for them to work effectively.

### Understanding your environment

The environment that you want the drone to work in will very much impact the type and sized drone that you look to purchase. This will then impact any licence requirements for you to use it effectively.

Understanding the environment, particularly weather, is an important part of your pilot responsibilities. Drones must not be used in any type of rain event. Even light showers can damage your drone. The motors are exposed and can fail if they are wet.

Getting to know your weather indicators is an important skill to develop when flying your drone. Understand your clouds and how to read the sky. Use reliable weather sites such as the BOM (Bureau of Meteorology) to review the weather before your flight. Know the wind direction and strength. If you fly downwind to a position, you’ll have to fly back into the wind to get home. The extra battery power you save going out will be the difference between getting home or not.

Flight time and range needed   
Just how much work will you need the drone to do in one session? Range will depend on how far you will be from your drone, will you be following behind in a vehicle or sitting comfortably inside while you check your property lines. The range that the drone can travel from the controller will be an influence on which drone will be right for you.

The range of your drone is not only limited by its technical specifications but also by have far you as a pilot can see. Under Australian Air Law a pilot must always have a visual line of site of the aircraft.

Battery life   
The battery life equals flight time, there is little benefit of a drone that can only make it half way through the job, so being aware of what that job is and how long it will take will determine the battery requirements. Consider additional batteries that can be changed quickly, incorporate these into the budget.

The larger the device you buy the greater the number or larger the size of battery you’ll need. Just be mindful that the batteries have a finite life and to save cost don’t buy too large a device if you don’t need it. The costs on spare or replacement parts such as intelligent lithium batteries can be quite high. Also, if you are doing specialised work such as film production fully charged sets of batteries are import for long shoots. If you are travelling to regional areas, you should contact the airline prior to departure. You are only allowed to take 2 spare 100wh – 160wh as carry on. Batteries over 160wh must be consigned to cargo. For further information [click here](https://remoteaviation.com.au/travelling-drones-lithium-battery-rules/#:~:text=Most%20airlines%20require%20approval%20%E2%80%93%20it,%2C%20in%20carry%2Don%20baggage.&text=Over%20160%20Wh%20%E2%80%93%20All%20batteries,must%20be%20consigned%20as%20cargo.).

Operation and ease of use  
Consider how easy the drone will be to learn and master. Many drones on the market are user-friendly and easy to handle through a controller or even remotely through an app.

Despite all the advanced flights systems and automated mission software it’s important you can fly your drone under your control. While the controller is in your hand and the device is in the air you are the pilot. If any of the systems fail, it’s your responsibility to do your best to control your device and get it down and home safe. Just practice flying. It’s challenging at first but fun and *practice does make perfect*. There’s much more satisfaction in getting your aircraft to do what you want under your control. Knowing how to fly correctly helps you understand when some is not right. The automated processes are just the icing on the cake.

### Durability

Drones can crash take damage from the environment so ensuring that your equipment can take what is thrown at it will be important. It also means that the drones would continue to function well in multiple scenarios, across terrains and through adverse conditions.

### Reliability

A factor to look at is reliability which means that the drones would produce consistently accurate results over time, across locations and scenarios.

There are always a few things worth running through your flight checklist before you fly.

* Batteries and controllers are charged.
* Battery is locked into drone correctly.
* Props are correct and clean
* Take-off area is clear. - Avoid taking off and landing on loose dirt or dusty areas. The debris can suck up into the motors. This is the same for longer wet grass.
* Check the weather.
* Know your flight path – What obstacles such as trees or powerlines could you encounter.
* Watch out for birds – If you encounter angry birds, you should not fly. Swarms of bees or insects can also be a problem.
* Watch your drone – Visual line of sight is a legal requirement in Australia.
* Don’t fly in restricted or no fly zones. There are apps available to help with this as well as your on-board flight software.

<https://www.ozrunways.com/au/products/rwy-efb-for-android/>

* Observe and be aware of other flight traffic

For regional pilots it would be worth exploring an Air Radio license (AROC). This license allows pilots to use the restricted VHF air band radio. In locations where low flying aircraft such as crop dusters or helicopters are present, this licence allows the pilot to send out and receive notifications via the Air Radio network within your flight path.

### Availability

Would your drone be operational and functional for almost the entirety of their usage with little or no downtime? Consider what you would need to do to service or repair the drone and how long this may take it out of service.

### Portability

Do you intend on carrying you drone around in, perhaps, a single bag and deployed from the spot by an operator from even a small area?

### Return on investment

As with any other equipment that you buy for the business, you will need to consider how this new technology will benefit you and potentially pay for itself, either in savings of time or supporting an increase in production. By knowing the benefit, it brings, and potentially how long the technology will last, you will be able to calculate a return on this investment. Perhaps though, just making your life easier is all that you need.

### Ongoing costs and maintenance

Even the best drone pilot will have accidents, and to keep your drone in working order you will need to keep up with maintenance. When purchasing a drone, make sure that spare parts are available and factor these into the ongoing costs.

### Budget

Your budget will have an obvious impact as to your drone selection, when thinking through your budget, make sure you consider the other aspects of operation such as software, repairs, licencing, and any other ongoing costs.

Check the regulations for your area  
Licencing is often based on the size of the drone, check regulations with <https://www.casa.gov.au/drones/rules/drone-types> to ensure you are aware of anything that may limit your application.