# USER MANUAL

## WILDLIFE DRONES AND FLIGHT PLANS


### Stakeholders

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# 1. System Overview

The primary use of the system is to aid wildlife rangers in protecting wildlife. The system uses tracking data of animals to predict their next location within the next 2 hours. This will allow optimal flight plans to be created for the drone pilot. Rangers will also be able to receive optimal patrol routes for conservation.
Pilots will be able to poach incidents on the map, to be taken into account when creating flight routes.
The administrator of the system will be able to add new users, delete existing users, specify/update reserve properties, add animal tracking data.

**Jargon**

- Node JS is an open-source, cross-platform JavaScript run-time environment that executes JavaScript code server-side.

- Point of interest is a point or points that the user deems as important this could be because of a poaching incident, fence that needs repairs, dead animal or other suspicious activities.

- User: refers to either an administrator, pilot or ranger registered on the system.

## 1 Deployment model

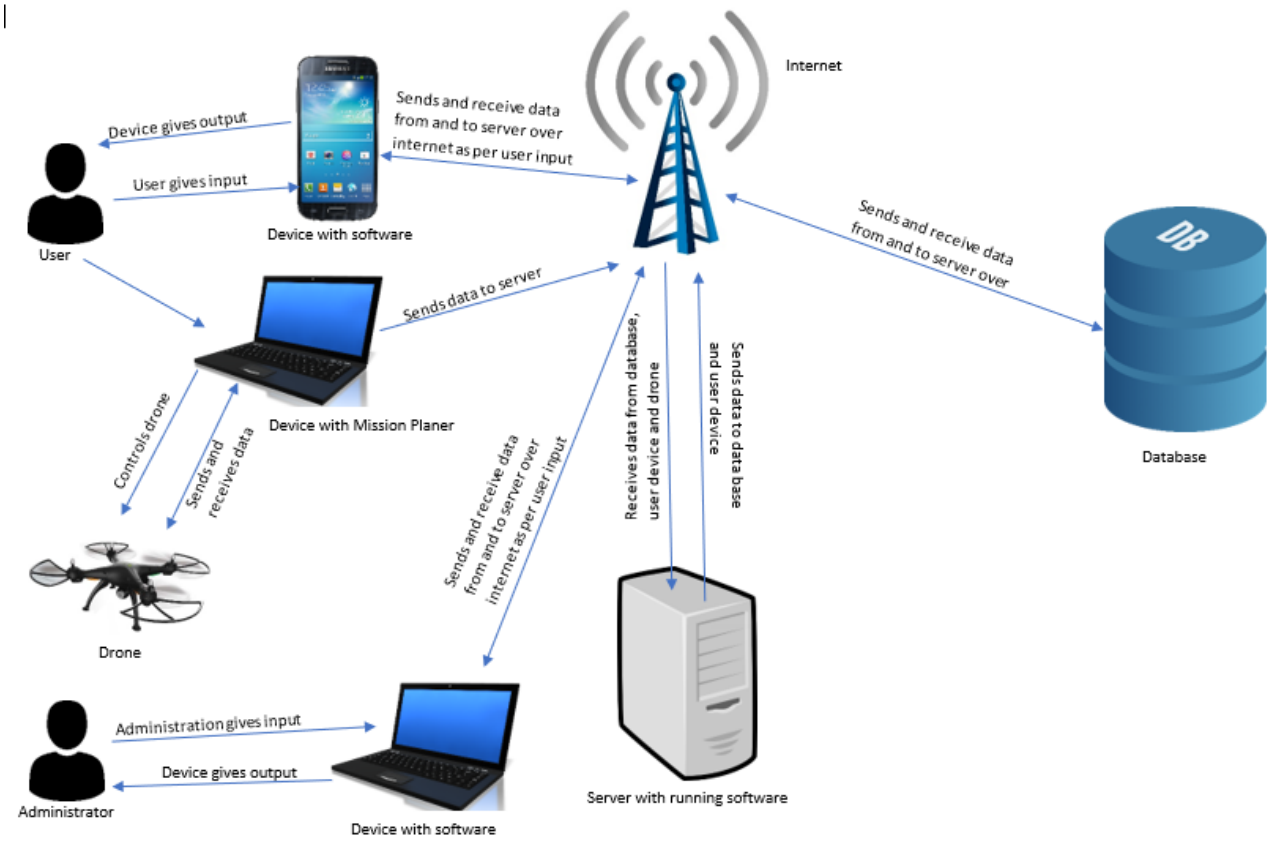


*Figure 1 Deployment diagram*

# 2. System Configuration

Devices:

- For client side of software:
  - Android smartphone such as Samsung Galaxy S5 or similar.
  - Any personal computer that can run a web browser.
- For server:
  - The server hardware should be sufficiently capable of supporting multiple clients and performing necessary functions.
  - Minimum recommended system specifications are: 4GB RAM, 4-core CPU

General:

- All devices must have an internet connection to be able to function correctly, some functionalities are available offline.

## 1. Installation

**Required software:** Node JS for server.

### 1.1 Install NodeJS

1.1.1 Download https://nodejs.org/en/
1.1.2 Run the installer.
1.1.3 Follow the prompts in the installer.
1.1.4 Restart your computer.

The **Wildlife Drones and Flight Plan** software will be available on the following GitHub link: https://github.com/cos301-2019-se/Wildlife-Drones-and-Flight-Plans.git.

### 1.2 Downloading Wildlife Drones and Flight Plan

1.2.1 Go to the link https://github.com/cos301-2019-se/Wildlife-Drones-and-Flight-Plans.git
1.2.2 On the GitHub page click on Clone or download.
1.2.3 Select Download ZIP.
1.2.4 Once the zip file has been downloaded unzip the folder.

### 1.3 Installing/running server

1.3.1 In the extracted folder go into the server folder.
1.3.2 Open a command prompt in the server folder.
1.3.3 In the command prompt type: *npm install*.
1.3.4 After the download and installation is complete, in the command prompt type: *npm run start*.

### 1.4 Installing/running client

1.4.1 In the extracted folder go into the client folder.

1.4.2 Open a command prompt in the client folder.
1.4.3 In the command prompt type: *npm install*.
1.4.4 After the download and installation is complete, in the command prompt type: *npm run start*.

### 1.5 Envirnoment Configuration

Development configuration can be made in the .env file.

Example:

```
APP_NAME=Wildlife Drones
SECRET=secretKey
RESERVE_NAME=Kruger National Park
CELL_SIZE=500
MAIL_HOST=smtp.gmail.com
MAIL_PORT=465
MAIL_USERNAME=drbam301@gmail.com
MAIL_PASSWORD=your top secret password
OTP_PATTERN=[A-Z\d]{3}\-[A-Z\d]{3}
OTP_EXPIRES=120
OTP_ATTEMPTS=3
```

- APP_NAME - the name of the application that will be shown to the user in emails
- SECRET - a random string used as a private key for jwt tokens. This should be sufficiently long (e.g 256 or 512 characters) and random.
- RESERVE_NAME - the name of the reserve as per OpenStreetMaps
- CELL_SIZE - the size (width and height) of a cell in metres
- MAIL_HOST - the SMTP mail host (e.g. smtp.gmail.com)
- MAIL_PORT - the mail server port (465 is recommended as TLS is always enabled)
- MAIL_USERNAME - the email address used to log into the mail server
- MAIL_PASSWORD - the password used to log into the mail server
- OTP_PATTERN - A regular expression pattern to generate a random one-time-pin from
- OTP_EXPIRES - How long (in seconds) an OTP lasts. This is also the time the user has to wait before login attempts reset.
- OTP_ATTEMPTS - The number of login attempts the user gets before being locked out until the one time pin expires.

## 3. Getting started

Users can only be added to the system via the administrator, the administrator can only be added by the system administrator when setting up the database.

The user roles can be classified as administrator or pilot.

Administrator:

-Add, delete and update users
-See heatmaps
- See hotspots

-See previous flight routes.
-See drone locations.
-Upload csv file containing animal locations

Pilot:

-Generate flight routes.
-Add incidents to the map

A user can access the system by entering their email, password and OTP on the login page further described on page 6.

After a user has logged-in to the system, the following can be done depending on the role of the user:

- The Pilot will be able to generate a flight plan for his/her shift via the client application on the provided computer that has the software installed.
- The Ranger will be able to generate patrol routes via the client application that will be on the provided smartphone.
- The user will be able to toggle features on the map such as routes used, points of interest and hotspots.
- The user will be able to add poaching incident points to the system.

# 4. Using the system

**Pre-condition:**

-The user has basic skills to work with a computer and/or smartphone.

## 1. Logging in

1.1. The user/admin starts the mobile/desktop application with the name *Wildlife Drones and Flight Plans.*

1.2. The user/admin will be presented with a login screen with the following fields: email.

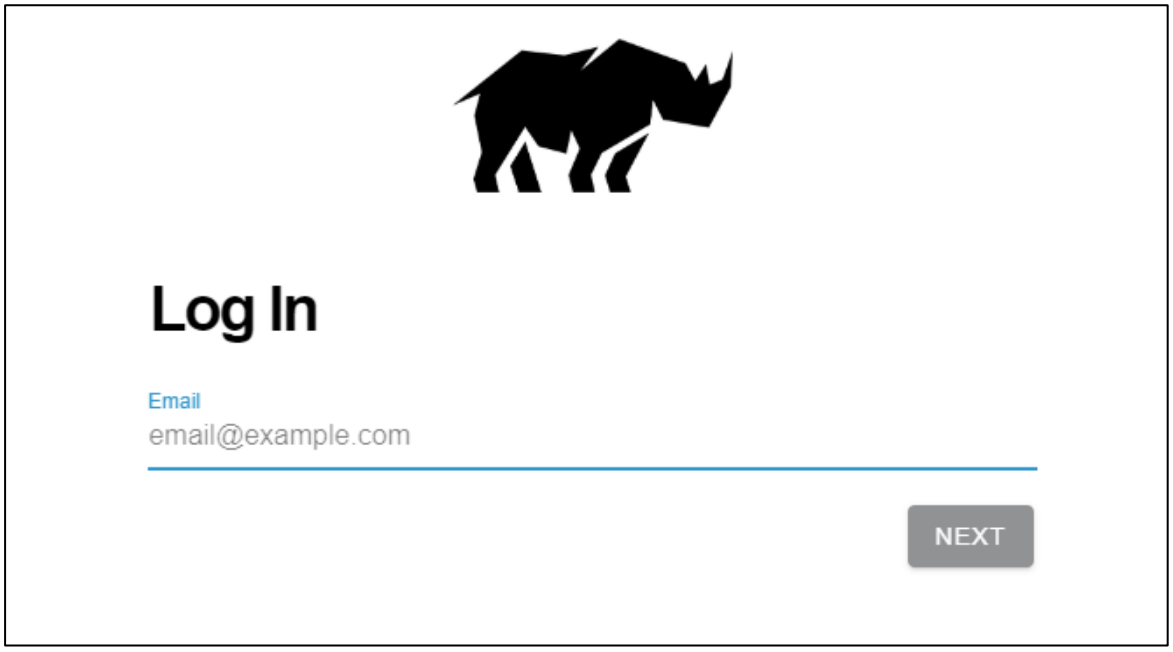


*Figure 2 Login page*

1.3. The user/admin has to fill in the email in the corresponding

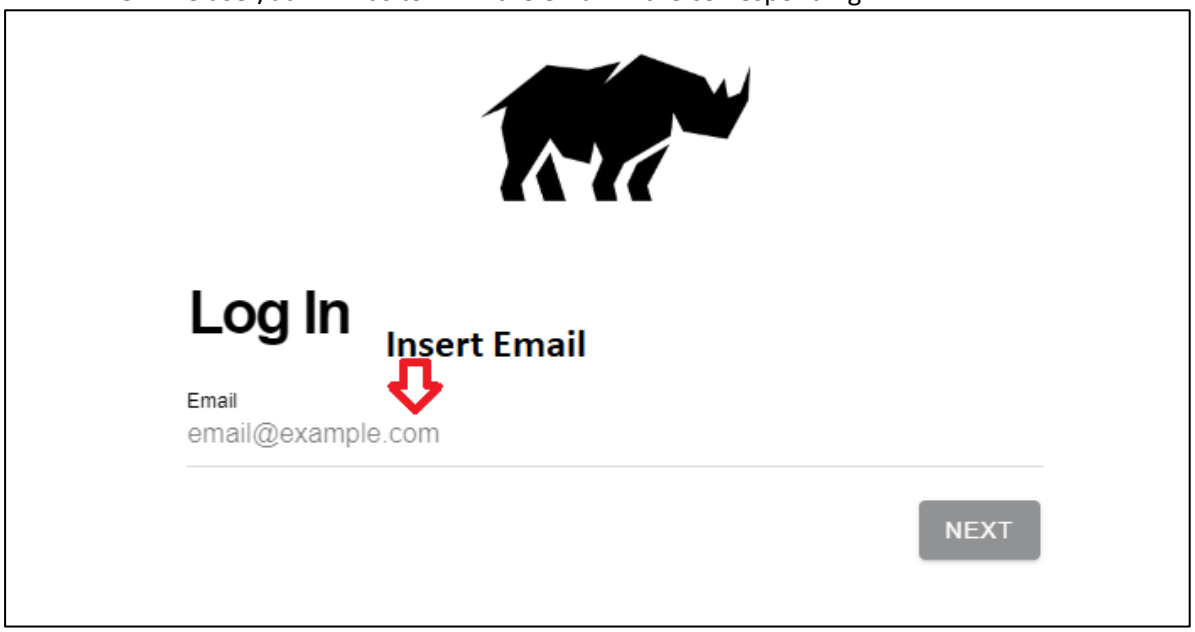


*Figure 3 Login email field*

1.4. The user/admin will have to click the *NEXT* button underneath email input field


*Figure 4 Login next button*

1.5. After the user/admin has entered a valid email and clicked the login button a One Time Pin will be sent to the users email address.

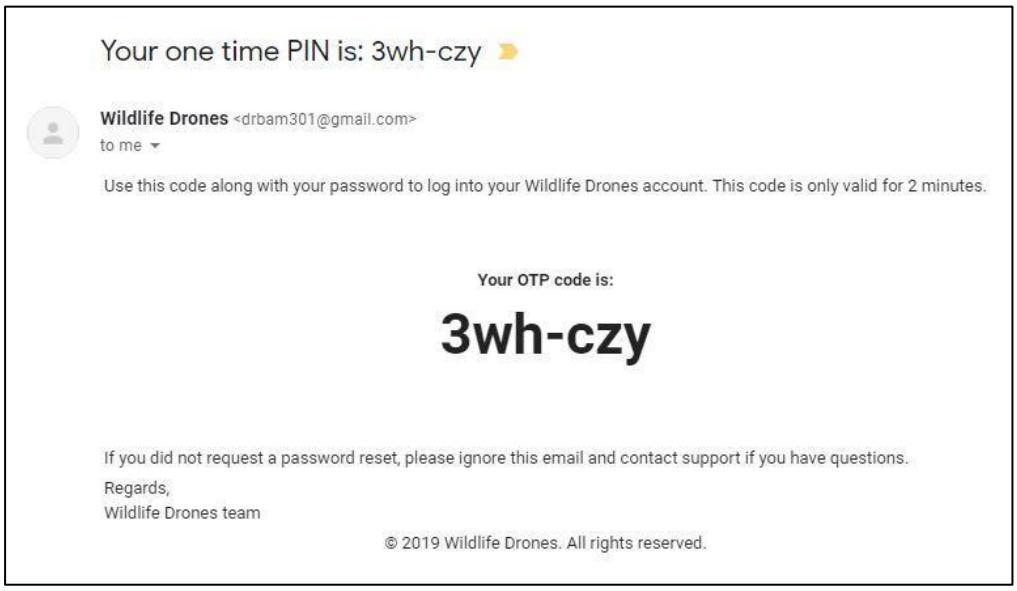


*Figure 5 OTP email*

1.6. The user/admin will then be presented with another page where the user/admin will have to enter the password and OTP that they receive.

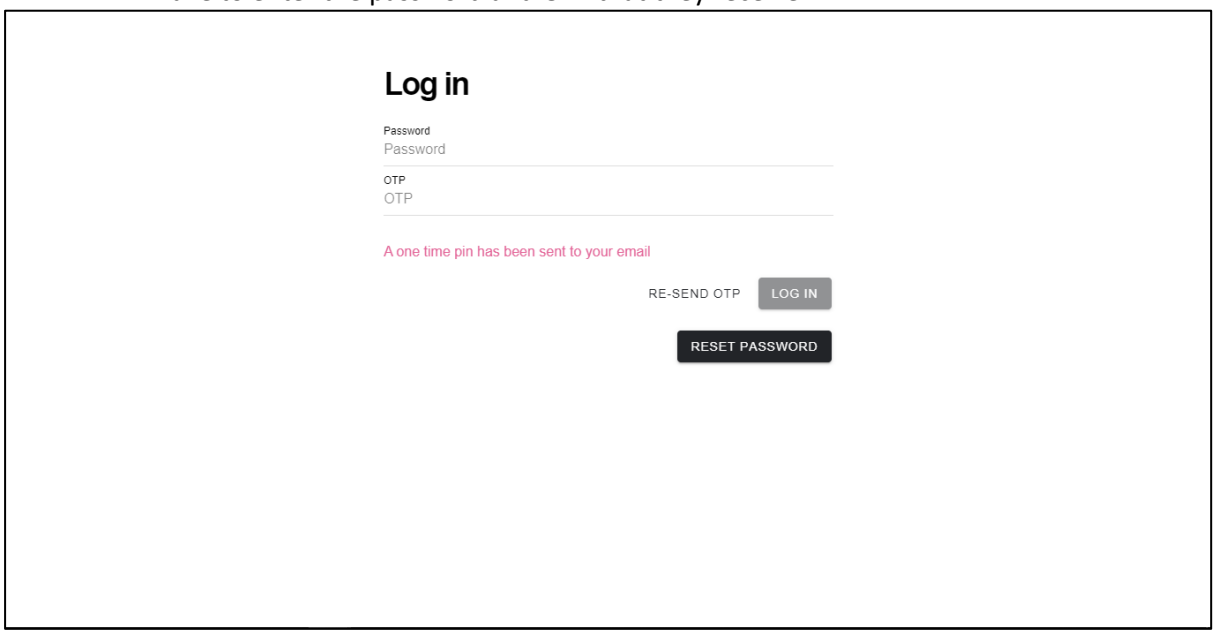


*Figure 6 Login password and OTP page*

1.7. Once the valid password and OTP has been entered the user will press the login button.
1.8. The user will be notified of successful or unsuccessful login
1.8.1. If the login was successful, the user/admin will be navigated to the map and related features.
1.8.2. If the login was unsuccessful the user/admin will be notified of an unsuccessful login, and will be able to repeat step 1.1.1.3.

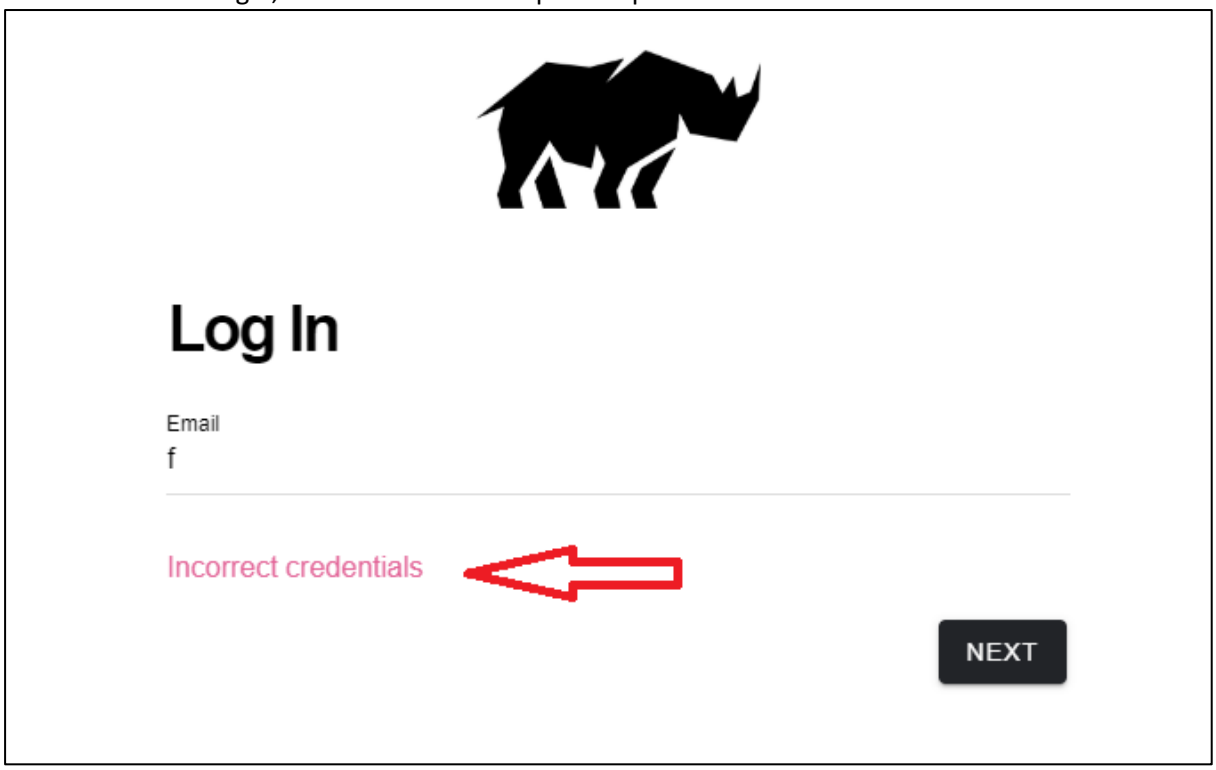


*Figure 7 Incorrect email*

1.9. If the user forgot their password the user must press the Reset password button.

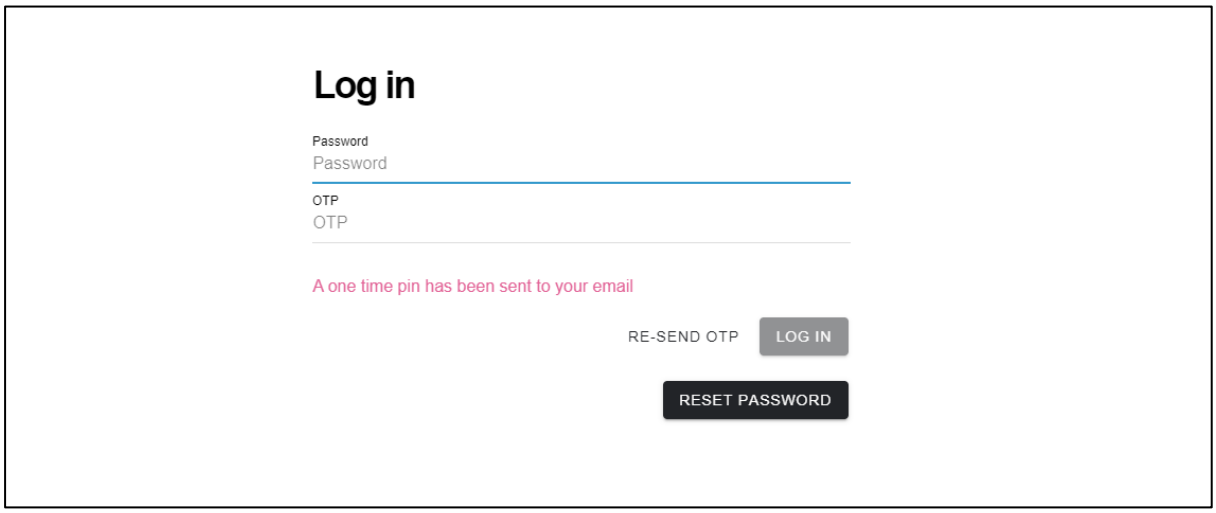


*Figure 8 Forgot password, reset password button*

1.9.1. The user will then receive the following popup where they must enter the OTP that they received.

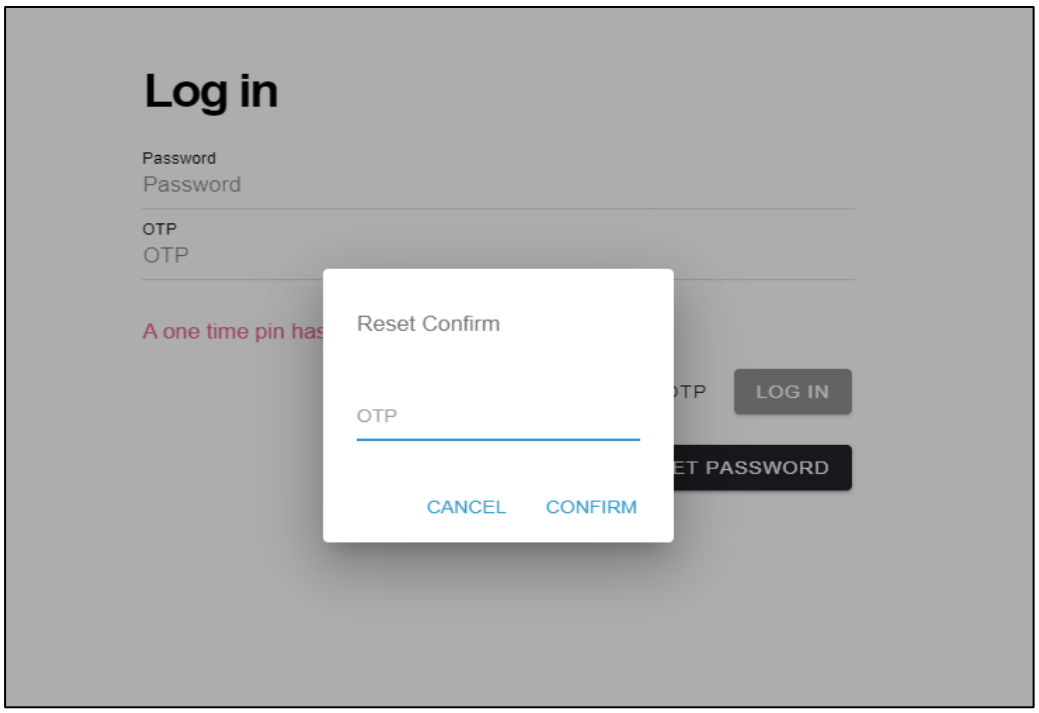


*Figure 9 Reset Confirm*

1.9.2. The user will need to insert the OTP received via email into the appropriate field and confirm.The user will then receive a new email containing a random generated password they can use for the system.

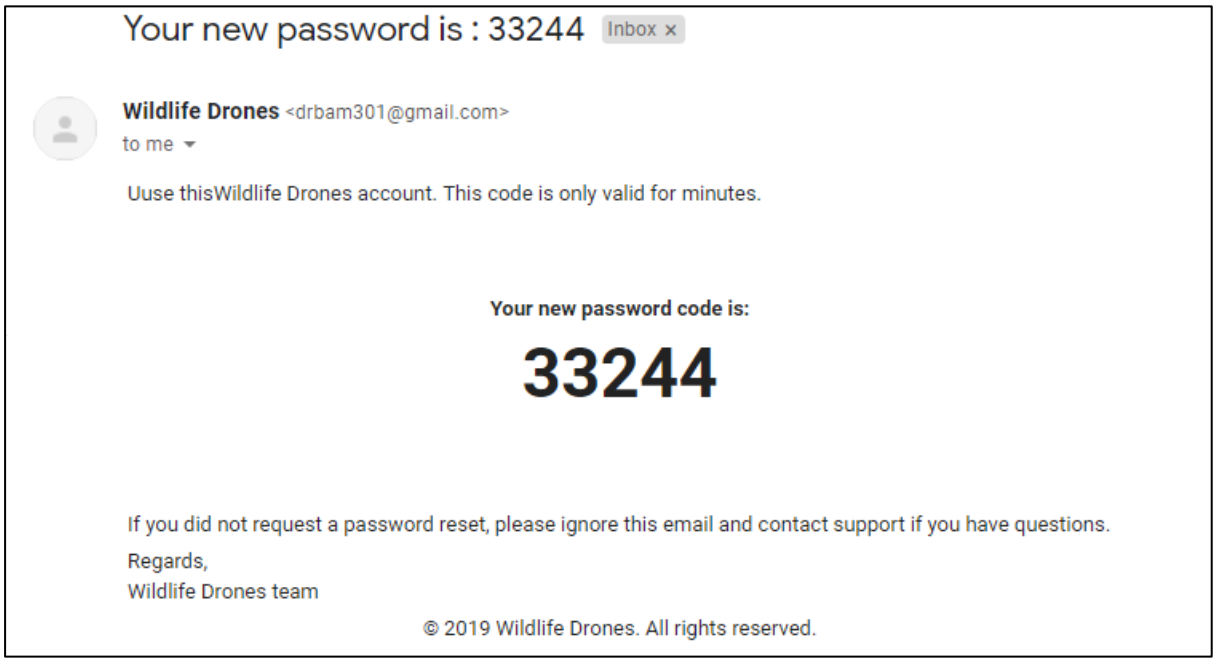


*Figure 10 OTP Email*

1.10. If the users' OTP timed out or the user did not receive an email the user may request a new otp by pressing the *Re-Send OTP button.*

1.10.1. The user will then see the following message


*Figure 11 OTP notification*

1.10.2. The user will then receive a new OTP in their Inbox which they can use.

**Pre-condition: (For 2 - 6)**

- The user is logged into the system.

## 2. Map features

2.1. Reserve border shown with white lines the reserve will be the non-greyed out area, user location is the blue dot with white outline, poaching incidents are red dots, drones are blue dots without a white outline.

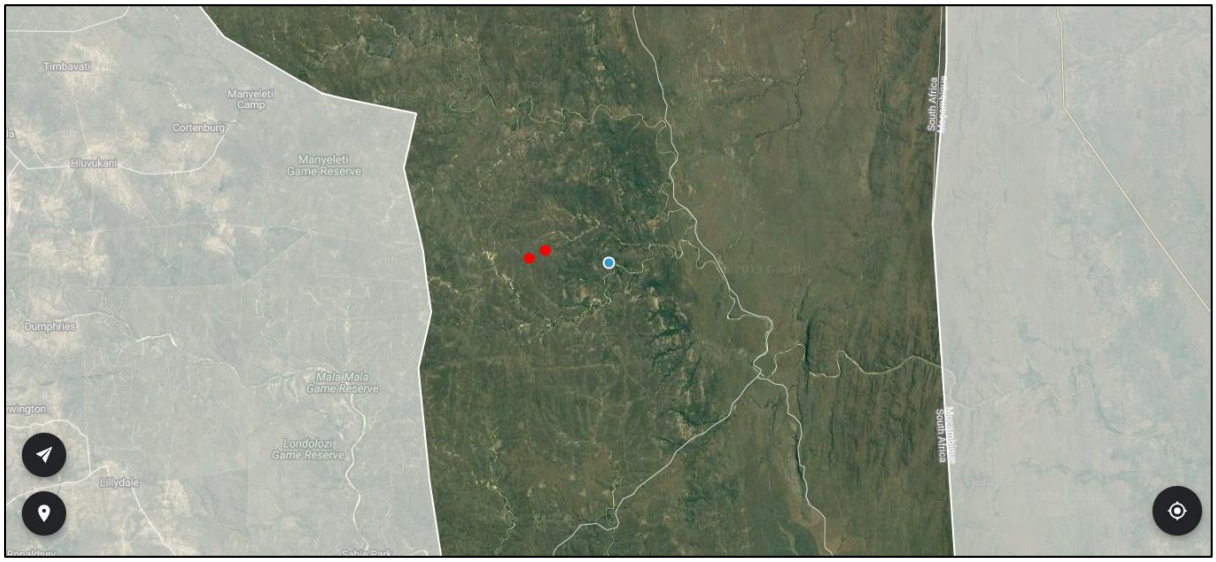


*Figure 12 Map Features*

## 3. Adding Drone

3.1. The user *clicks on* the paper plane on the bottom left of the screen.

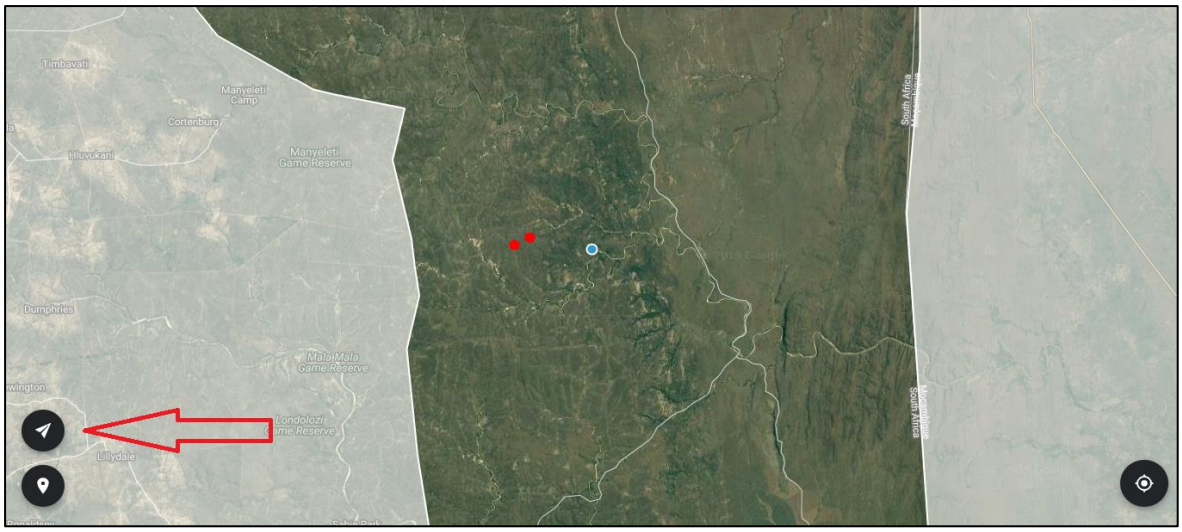


*Figure 13 Adding Drone Button*

3.2. The user will then be presented with a popup and three new buttons (a cross, an add and a check mark) at the bottom centre of the screen, the pop up will have 5 fields namely:*Flight type*, *Drone name*, *Drone name*, *Average flight time (minutes)* and *Average speed (km/h)* .

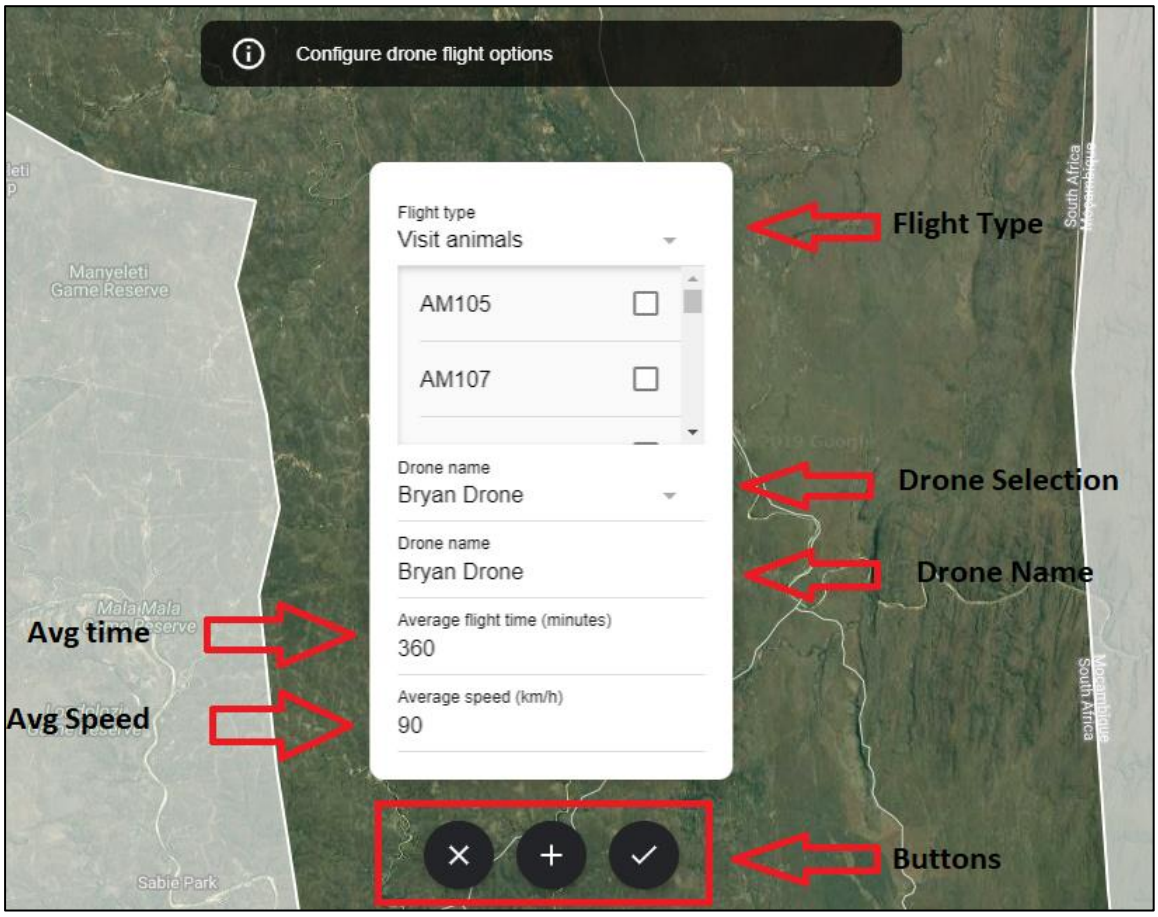


*Figure 14 Add Drone Fields*

3.3. The second Drone name is an editable text field where the new drone name should be entered.

3.4. The *Average flight time (minutes)* and *Average speed (km/h)* fields are also editable text fields where the average flight time (in minutes) and average speed (in kilometre per hour) can be added for the new drone.

3.5. Once the *Drone name*, *Average flight time (minutes)* and *Average speed (km/h)* fields have been filled in the drone can be added by pressing the *plus* button.

3.6. If one wants to cancel adding the drone the *cross* button.

3.7. Once the new drone has been added it can be selected from the drop-down list.

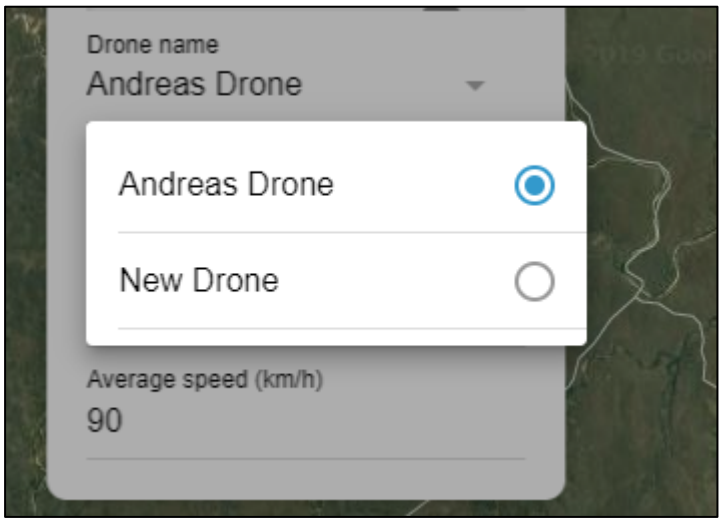


*Figure 15 Select Drone*

## 4. Creating Drone Route

4.1. The user *clicks on* the *paper plane* button on the bottom left of the screen.

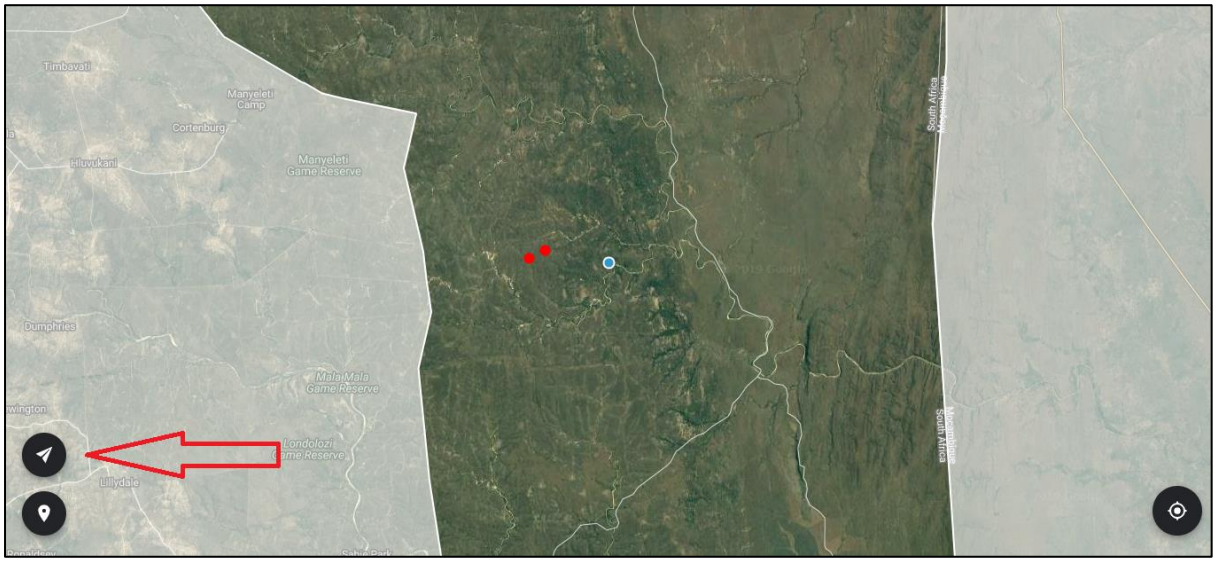


*Figure 16 Create Drone Route*

4.2. The user will be presented with a popup and three new buttons (a cross, an add and a check mark) at the bottom centre of the screen, the pop up will have 5 fields namely: *Flight type*, *Drone name*, *Drone name*, *Average flight time (minutes)* and *Average speed (km/h).*

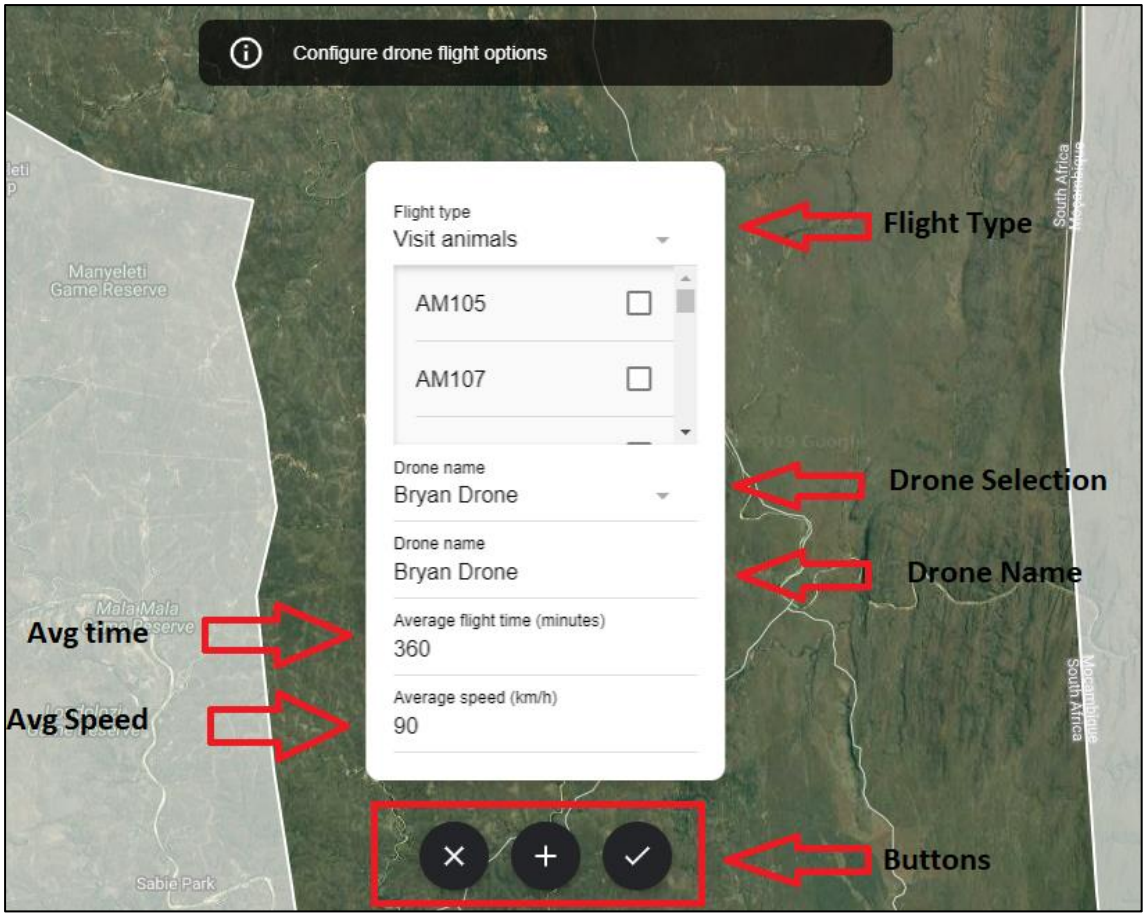


*Figure 17 Add Drone Route Fields*

4.3. The drone for which the route should be created is selected from the drop-down list.

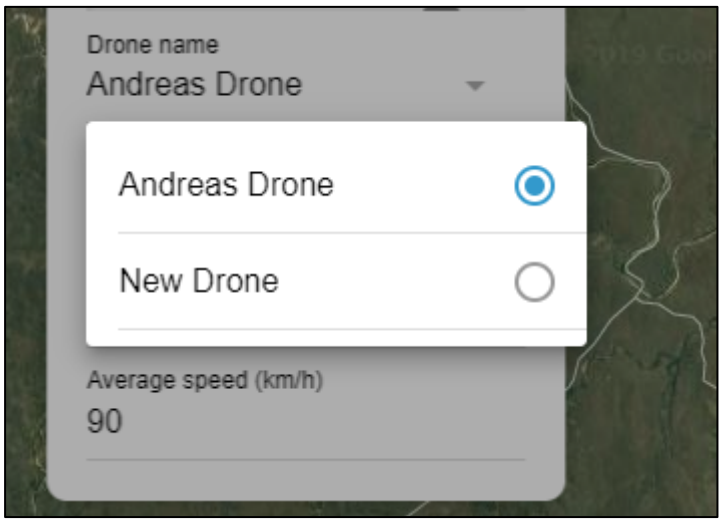


*Figure 18 Select Drone For Route*

4.4. The average flight time and average speed can be edited for the selected drone in the *Average flight time (minutes)* and *Average speed (km/h)* fields.

4.5. The user can also select the flight type which will open a list of flight types to choose from.

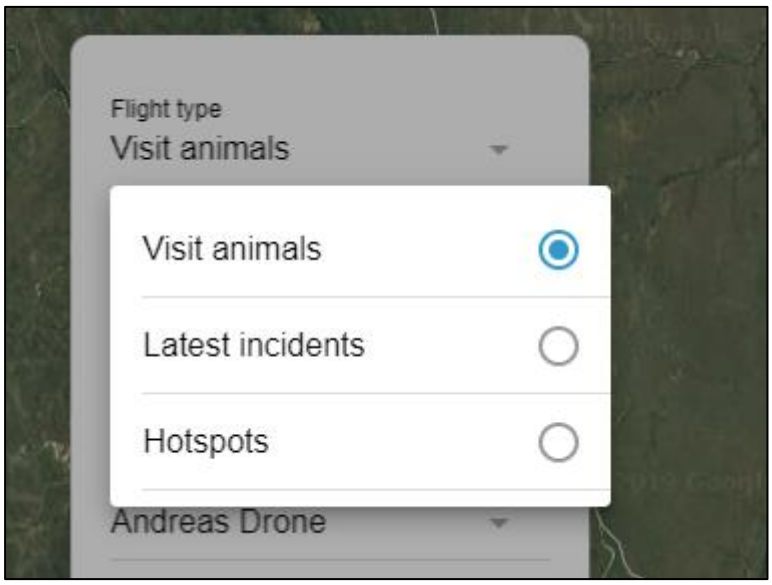


*Figure 19 Type Of Route Select*

4.6. If flight type is *Visit animals* the user will then be able to select the animals, he/she wishes to see by selecting the animals id.

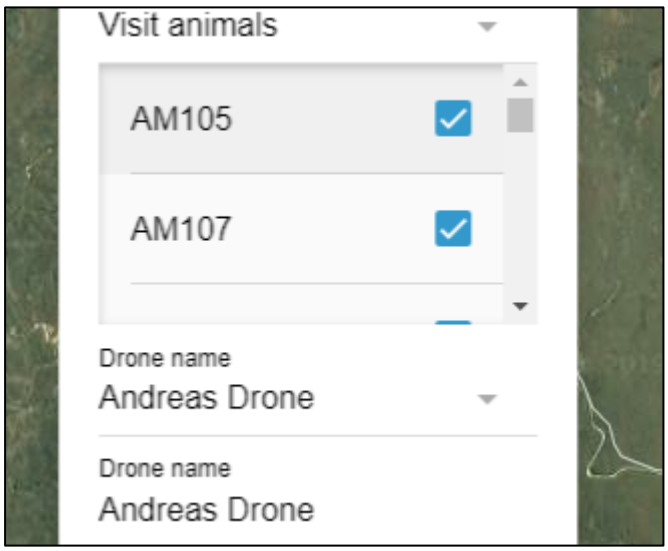


*Figure 20 Select Animals To Visit*

4.7. The user then presses the *check mark* button to create the route.

4.8. The drone route is then displayed on the map.

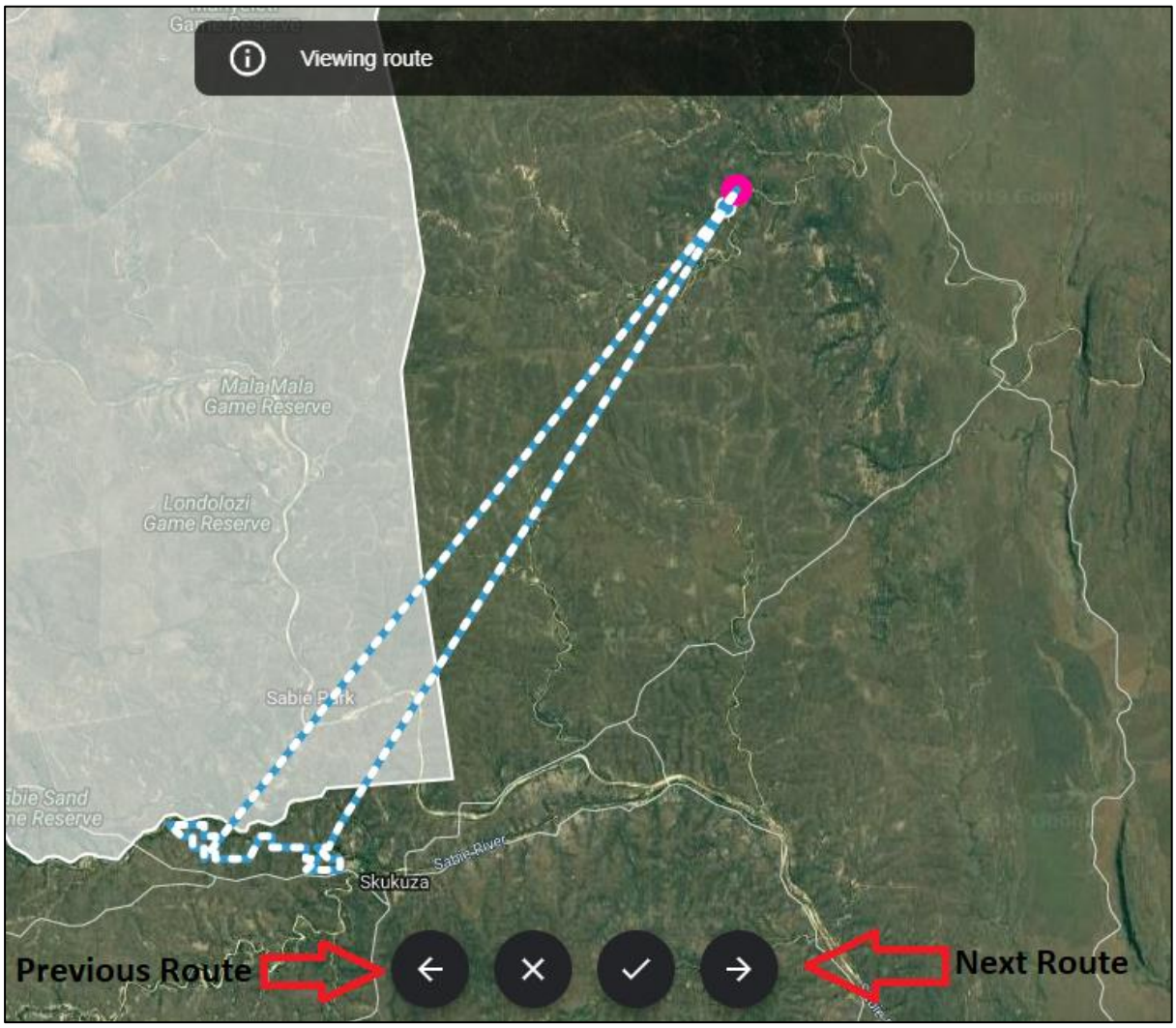


*Figure 21 Select Route To Create*

4.9. To confirm the created route the user presses the *check mark* button on the bottom centre of the screen. This will save the route.

4.10. The decline the route the user presses the *cancel mark* buttons on the bottom centre of the screen.

## 5. Plotting poaching incident

5.1. The user clicks on the *point of interest* button on the bottom left corner of the screen.

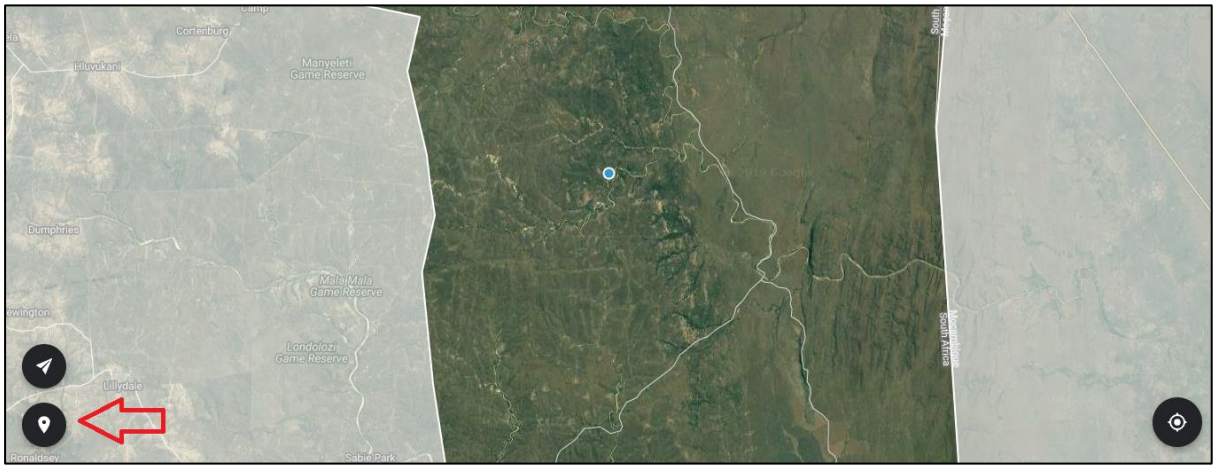


*Figure 22 Add Incident*

5.2. The user will be shown a red location point on the map, which can be moved around the map by moving the map.

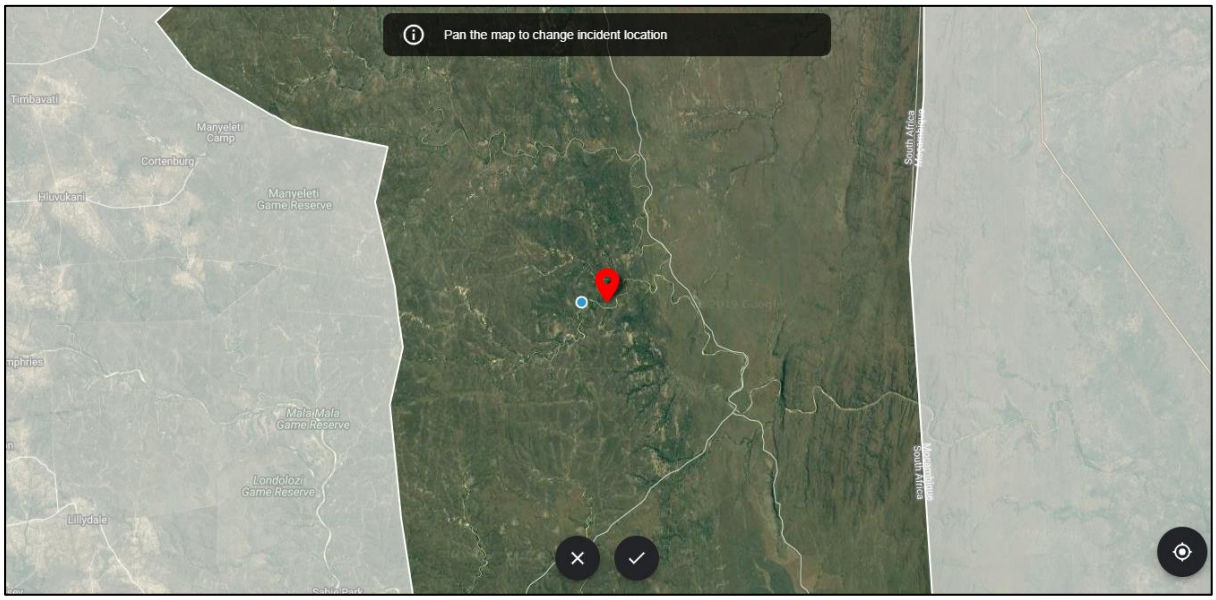


*Figure 23 Incident Location*

5.3. In addition to the place marker a *cancel* and *check mark* will appear on the bottom centre of the screen shown.

5.4. Once the marker is on the desired spot the user clicks the check mark.

5.5. An incident pop up will appear with an *Incident type* drop down list and a *Description* text field.

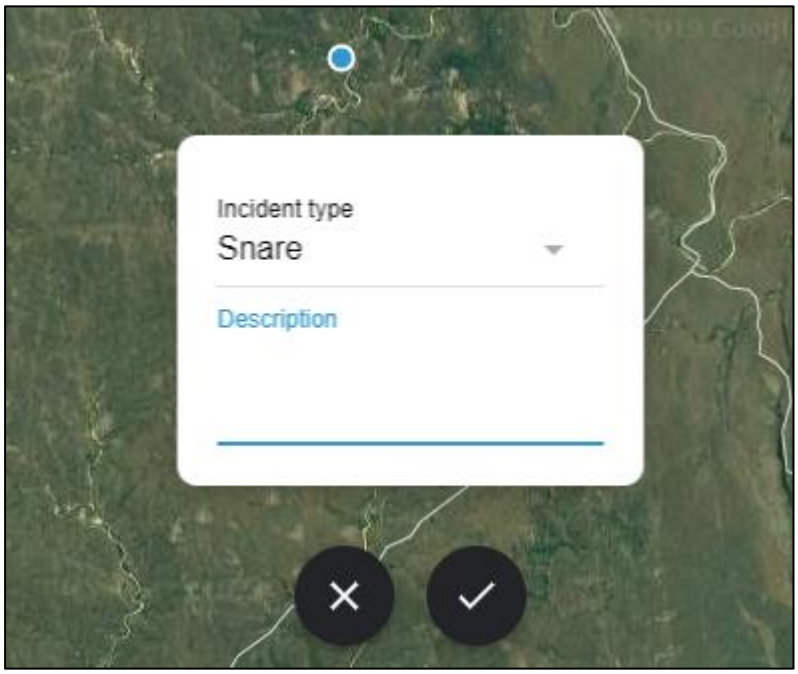


*Figure 24 Incident Fields Type*

5.6. The user chooses the appropriate incident from the drop-down list shown.

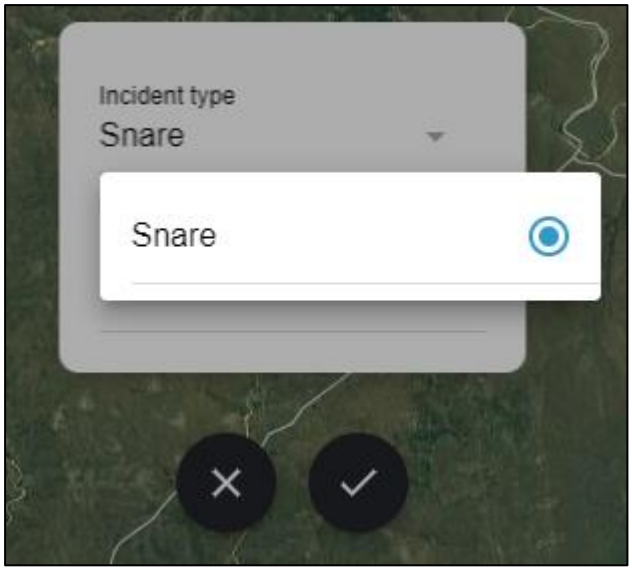


*Figure 25 Incident Type*

5.7. The user can add a description in the *Description* text field.
5.8. The user clicks the *check mark* button, to add the incident.

5.9. The new incident is shown on the map.

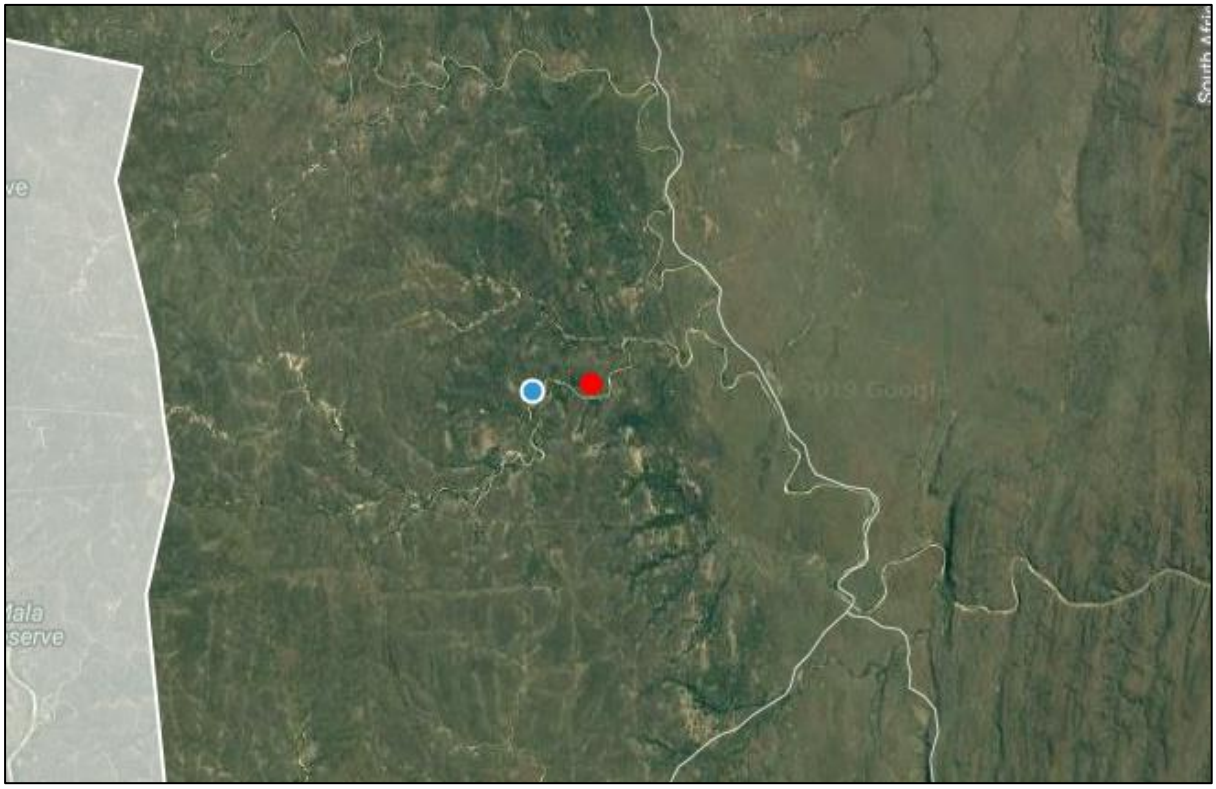

*Figure 26 Added Incident*

5.10. Alternatively, the user can press the *cross* button to cancel placing the poaching incident at any time.

## 6. Centre map on current location

6.1. The user clicks the location button on the bottom right of the screen.

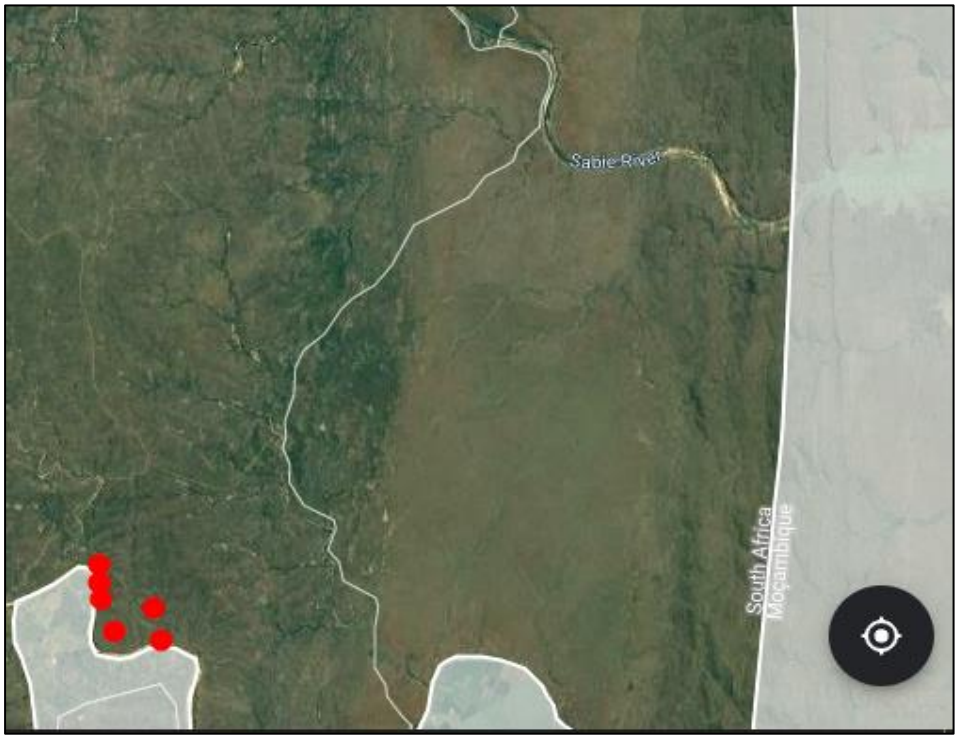


*Figure 27 Centre Button*

6.2. The map will centre on the users' current location.

**Pre-condition: (For 7-9)**

- The admin is logged into the system.

## 7. Map Features

7.1. Reserve border shown with white lines the reserve will be the non-greyed out area, user location is the blue dot with white outline, poaching incidents are red dots, drones are orange dots without a white outline. Navigation tabs will be shown at the top of the page which a user may press. The admin will be automatically sent to the Map tab when logged in. Past flight plans will be shown on the map and can be navigated through using the arrows.

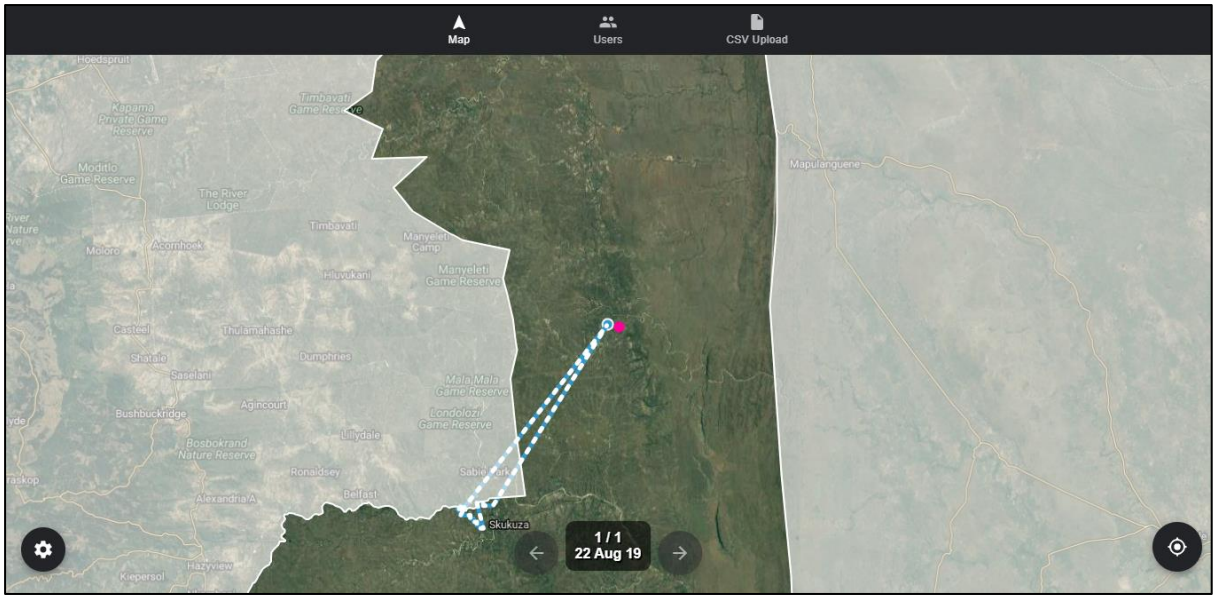


*Figure 28 Map Features For Admin*

## 8. Users Tab

To get to the users page click the users tab icon.

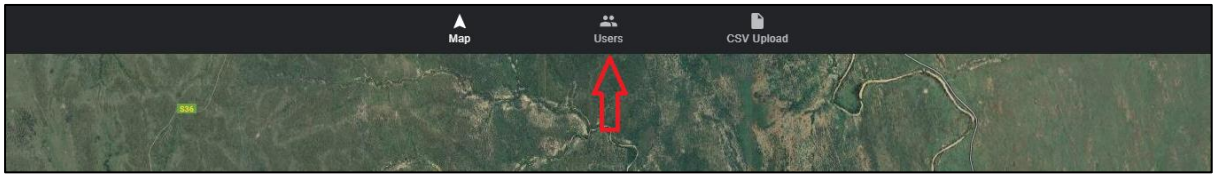


*Figure 29 User Tab*

8.1. On the users page you will be able to add, delete and edit users.

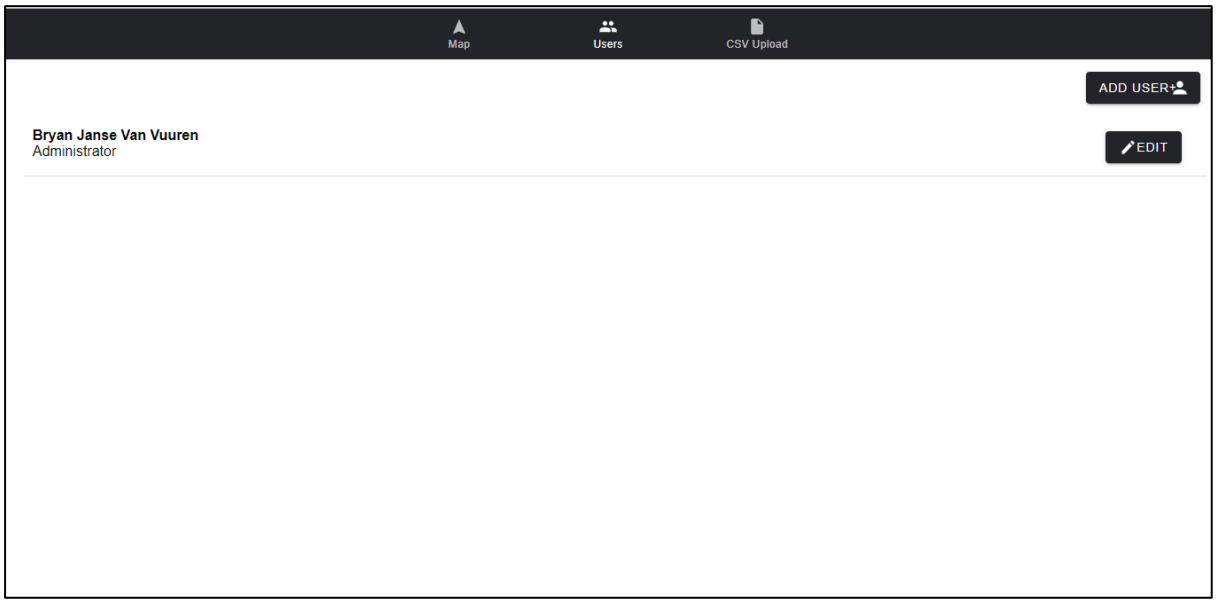


*Figure 30 User Page*

8.2. To add a user press the *Add User* button on the top right of the screen. You will be taken to a new page which will show the following.

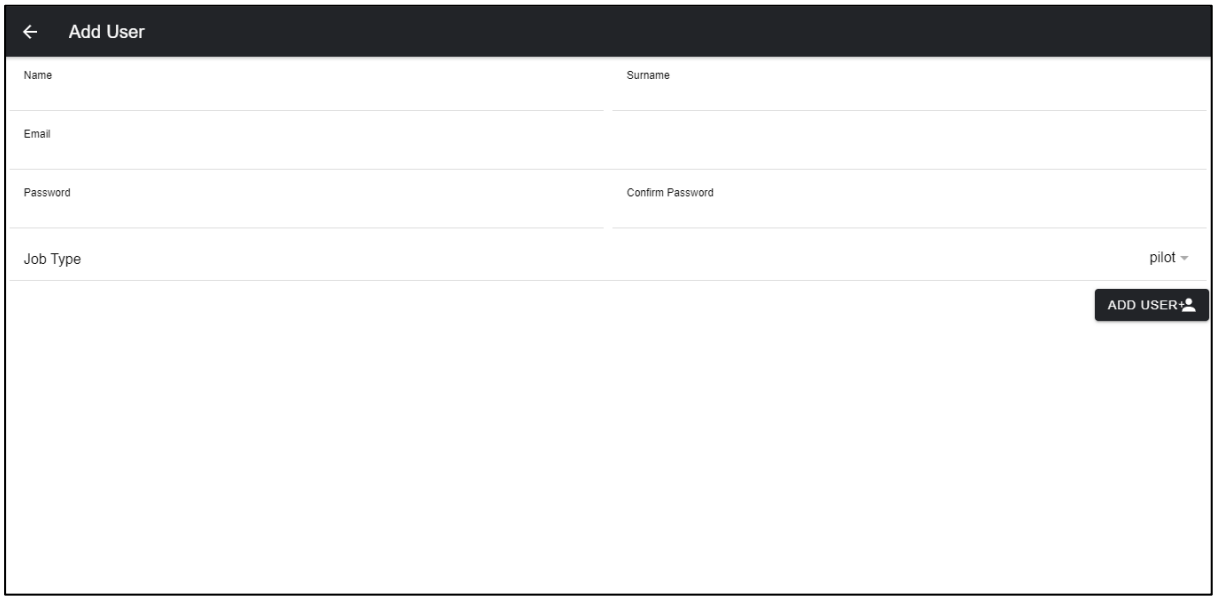


*Figure 31 Add User*

8.3. Fill in all the users details such as *Name, Surname, Email, Password and Job Type.*

8.3.1. There are two types of Job Types. (Admin/Pilot)

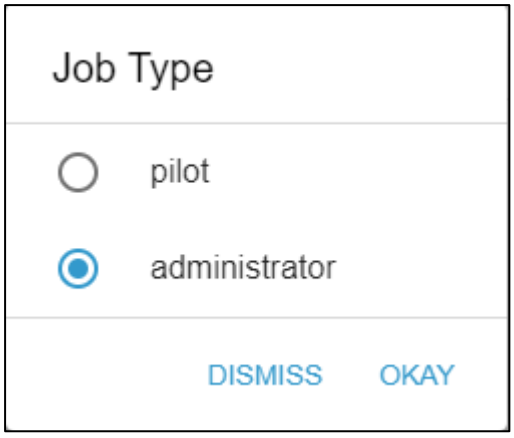


*Figure 32 User Job Type*

8.3.2. Once finished will all users data press the *Add User* button.

8.4. To edit a user press the *Edit User* button on the Users page next to the user you wish to edit. You will be taken to a page containing that users details. You may leave the page by pressing the back arrow on top left of screen or by pressing *Done* button.

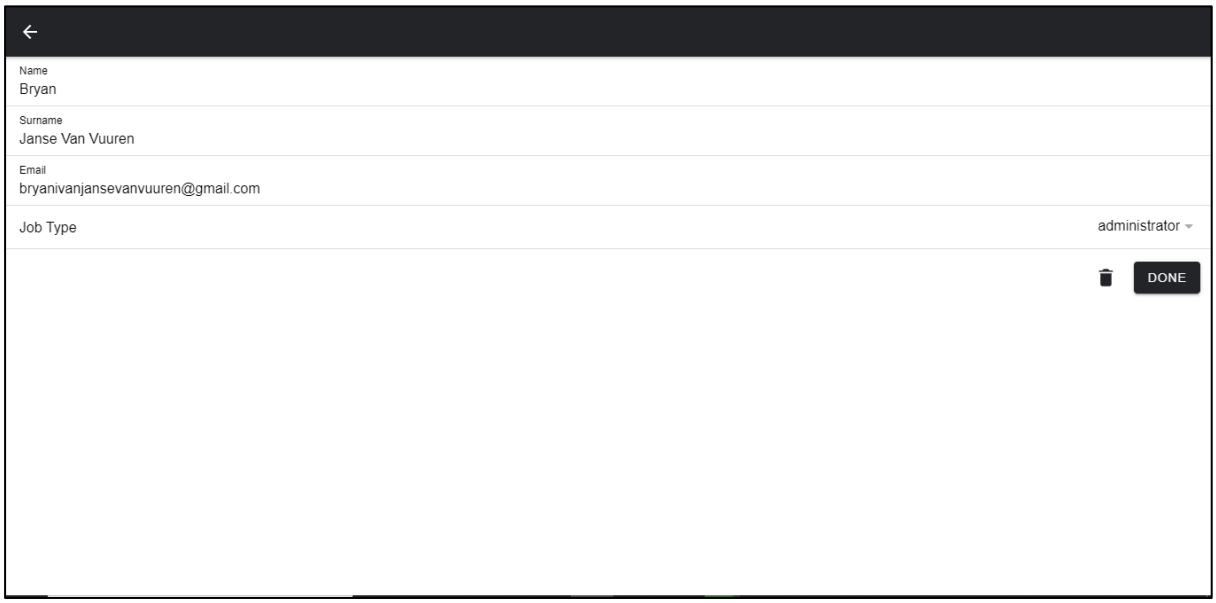


*Figure 33 Edit User*

8.4.1. Change the fields you wish to edit. Once done the User may press the *Done* button. A confirmation message will then appear asking the User to confirm the changes.

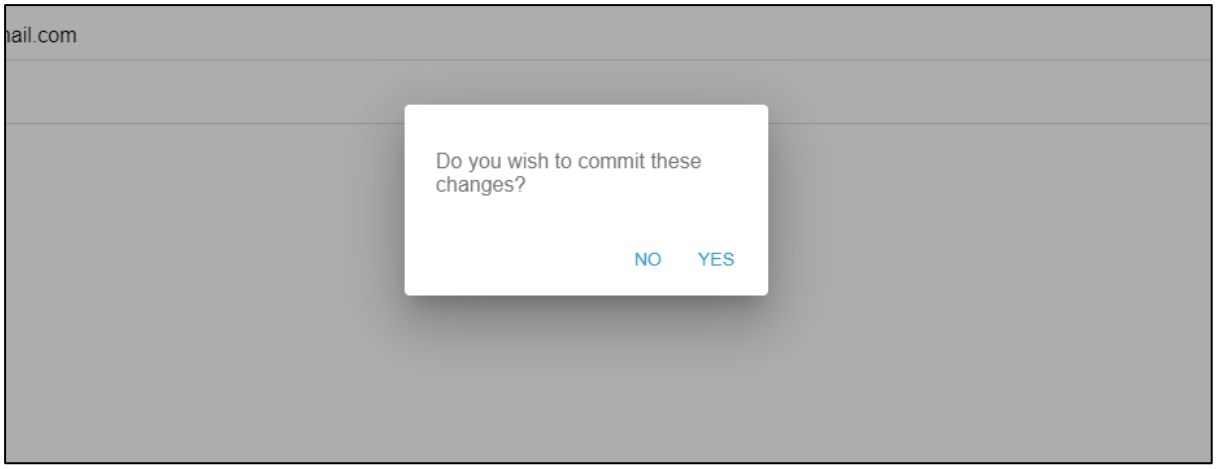


*Figure 34 Accept Changes*

8.4.2. The User must press either yes/no to decide if they wish to commit the changes.

8.5. To delete a user press the trash bin icon beneath the users details on the Edit User page.

8.5.1. On press a confirmation message will appear.

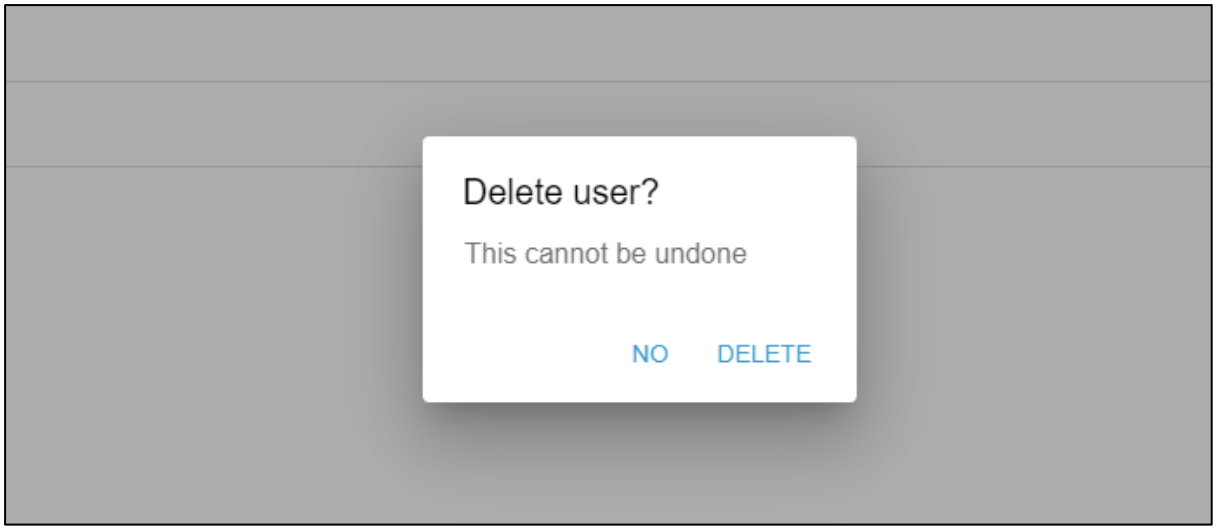


*Figure 35 Confirm Delete*

8.5.2. The user must either decide to delete or not delete as the operation cannot be undone.

## 9. CSV Upload Tab

To get to the CSV upload page the user must press the CSV Upload Tab

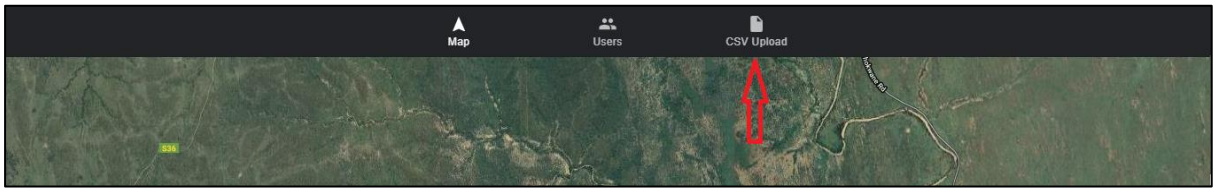


*Figure 36 CSV Tab*

9.1. On the CSV upload page the user will have to press the Choose File button to upload a CSV file containing animal data. The file headers must contain the following event-id, visible, timestamp, location-longitude, location-latitude, external-temperature, habitat, sensor-type, individual-taxon-canonical-name, tag-local-identifier, individual-local-identifier, study-name, species.

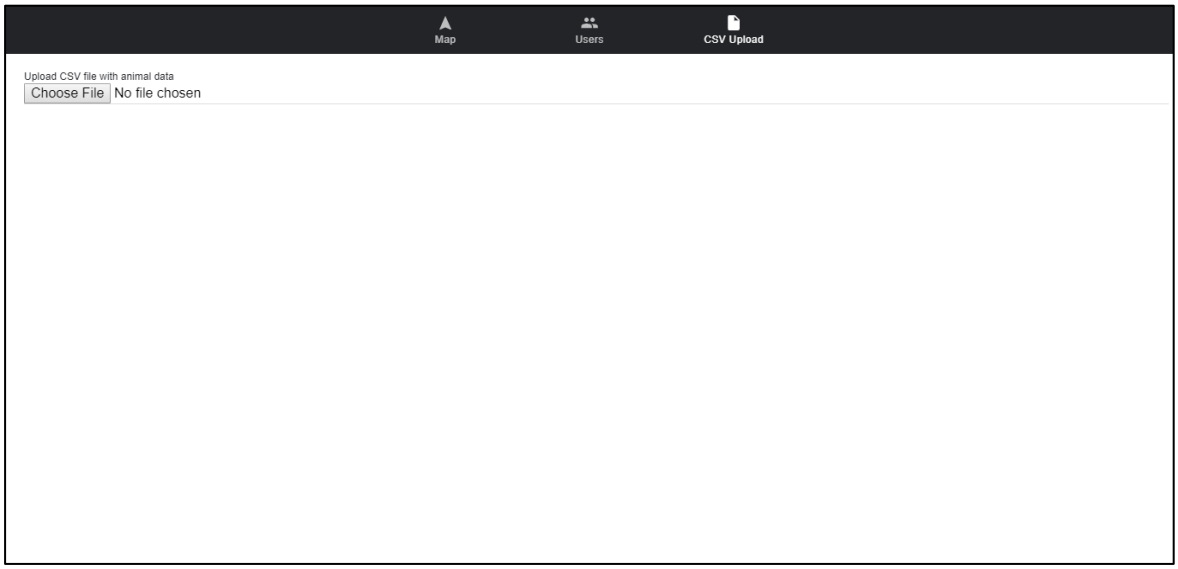


*Figure 37 CSV Page*

9.2. When choose file button is pressed the user will need to select a CSV file off of their system.

9.2.1. Once CSV file has been selected the CSV file will be processed on the server.

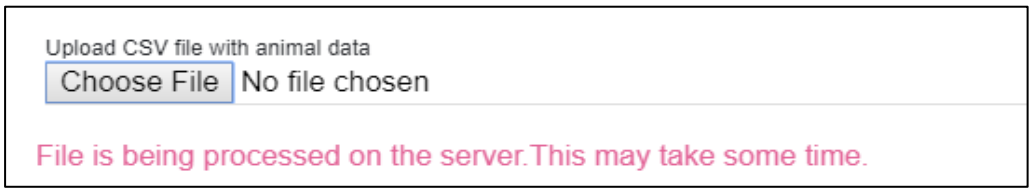


*Figure 38 Select CSV File*

9.2.2. If the CSV file does not contain the correct headers the following error will appear

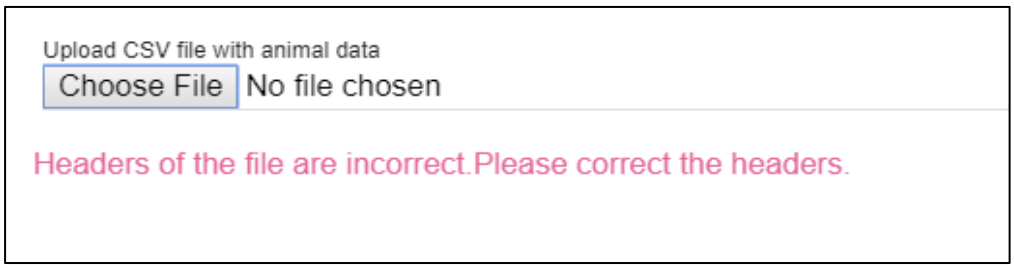


*Figure 39 CSV File Incorrect Headers*

9.2.3. All admins will receive an email when the CSV file starts being processed.

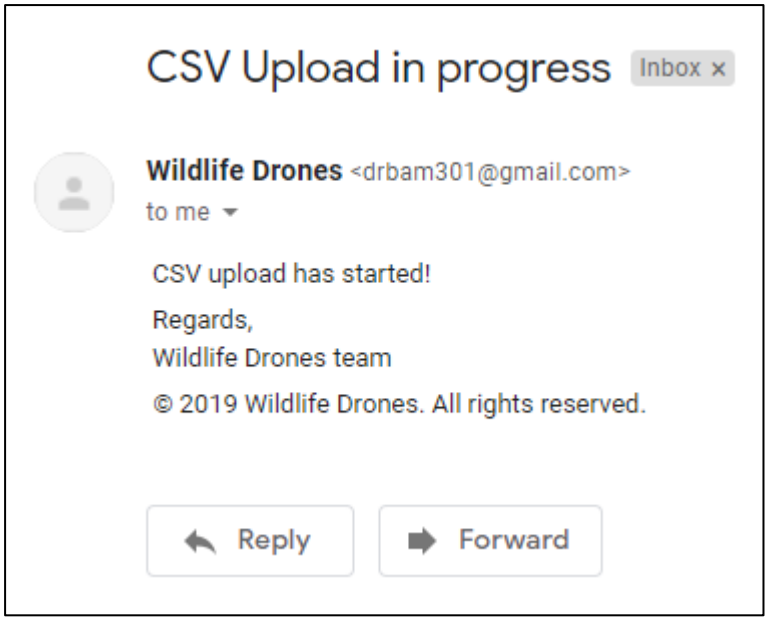


*Figure 40 CSV File Upload Email*

9.2.4. Once the CSV file is done syncing on the server all admins will receive the following email

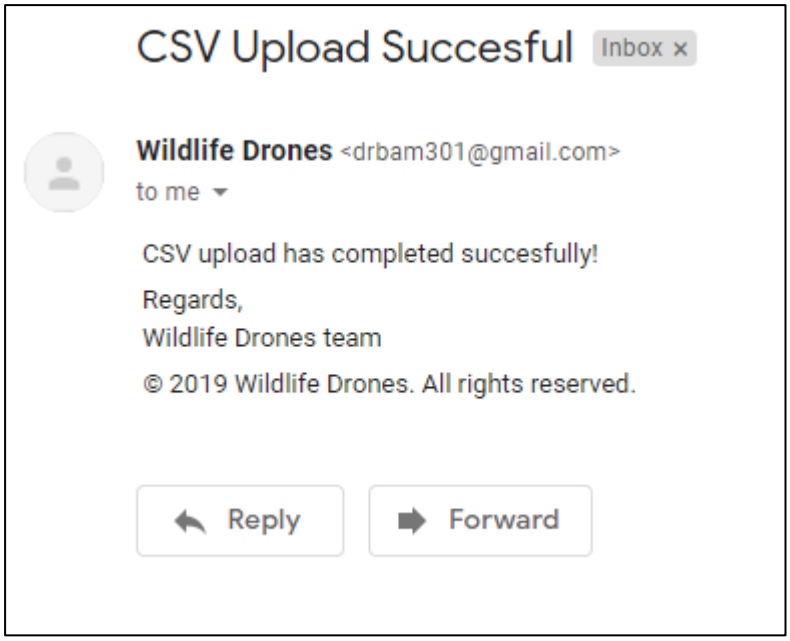


*Figure 41 CSV Upload Success Email*

# 5. Troubleshooting

## 1. No data received

1. **If no map data is being downloaded/ received.**
   1.1. Make sure device is connected to the internet.

## 2. Login failed

2. **If login fails with correct authentication details (email and password)**
   2.1.1. Make sure device is connected to the internet.
3. **If login fails and device is connected to internet**
   3.1.1. An incorrect credential message will appear on the screen if login credentials are incorrect.

4. If the user enters credentials wrong 3 times in a row the user will be unable to attempt to login again for 2 min

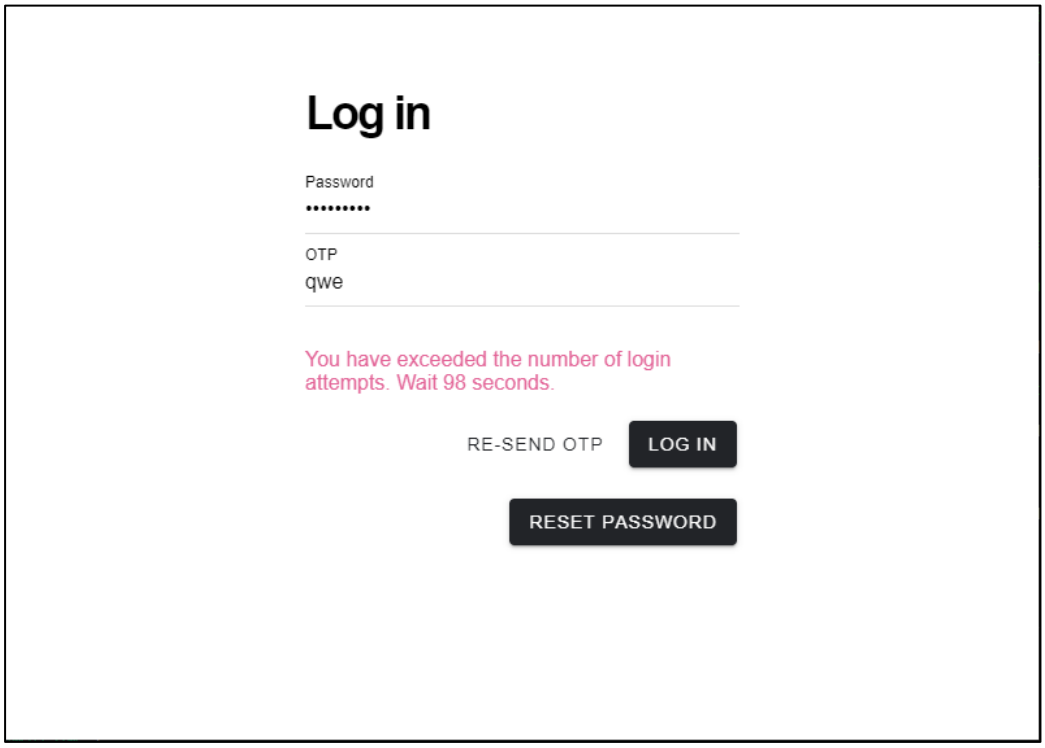


*Figure 42 User Locked Out Of System*

5. If no route has been generated, change location or increase the drones flight time or flight speed.

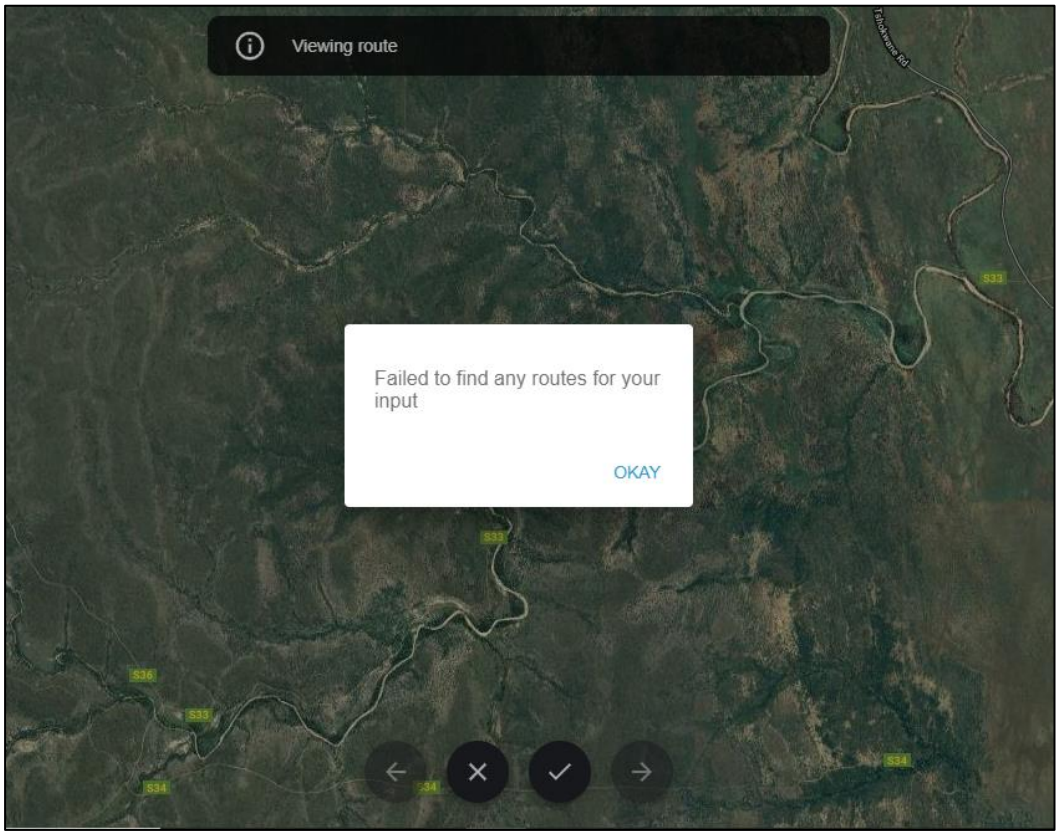


*Figure 43 No Routes Can Be Created*