COIT13234

Mobile Application Development

Alternate App Proposal

Name:	George Price
Student Number:	12129164

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Problem Description and Solution

Social Dilemma

For decades Australians have been wrestling with the challenging dilemma that presents itself every year in the form of magpie swooping attacks, primarily between August and October. During magpies' peak breeding season many outdoor activities such as a daily walk or run, cycling, children attending school, postman deliveries, outdoor council work, or simply passing anywhere near a tree that hosts a magpie nest; can become a fearful and regretful event for humans.

According to Magpie Alert, between 2013 and 2021 there has been 35,760 reported magpie swooping attacks leading to 5,292 reported injuries (Magpie Alert! n.d.). These statistics suggest that up to 15% of magpie attacks may result in injuries. The Australian government has issued guidelines on how to stay safe from swooping magpies, correctly pointing out that some "attacks are more serious leading to bloodied ears and cheeks or even eye injury. The risk of eye injury means all magpie attacks need to be taken seriously." (Science 2011)

While a small percentage of injuries do lead to hospitalisation or visits to the GP, deaths caused by magpie attacks are rare with only a few ever recorded. Recently a baby girl tragically died from falling during a magpie attack (Layt 2021).

Local councils use a fair number of resources erecting signs, warning humans of particularly aggressive areas. However, since magpies can attack passing people in an area of 110m to 150m, it is not possible to always avoid them.

There have been suggestions to cull magpies in populated areas, but this is neither humane nor a viable option as magpies serve an important role in the pest management of our local environment. The Brisbane City Council points out that the "long-term conservation of this species is necessary for maintaining biodiversity, which is the variety of all plants and animals that inhabit our world." (www.brisbane.qld.gov.au n.d.).

Mobile SwoopApp Solution

By leveraging cost-effective and readily available mobile technology with Australia's savvy and highly engaged netizens, we can mitigate and overcome several challenges arising from the coexistence of Aussies and magpies.

According to the Moreton Bay Regional Council, the best mitigation strategy is to avoid traversing areas where magpies are nesting during breeding season, and to seek alternative routes (www.moretonbay.qld.gov.au, n.d.). While offering these guidelines is helpful, the SwoopApp will provide people with the actual tool they need to follow them more effectively. Those who live or work in high incident areas can use this app to plan their outdoor activities by avoiding the swoop zones where possible.

The public could be encouraged during magpie breeding seasons (perhaps through a PR campaign by local councils and media) to participate and download the SwoopApp and post swooping incident

reports, as they go about their daily outdoor activities. The council could also encourage their outdoor workers to download the app and report any swooping incidents encountered.

A mobile application was chosen as an optimal solution due to the following factors:

1. More than 20 million Australians own a smartphone (Red Search 2022), providing high accessibility to mobile applications.
2. This also provides excellent on-demand incident reporting availability, with near-instant capability.
3. These factors potentially offer a high engagement ratio of voluntary data input from users.
4. Outdoor and council workers often carry mobile devices for work, through which they would easily run the SwoopApp.

An incident report can be quickly placed by tapping the "Report Swoop" button, whilst in the general vicinity of the event, which will submit a report containing the location's GPS coordinates, time, and map location.

Benefits

The benefits stemming from this project are numerous. Projects like SwoopApp can also help pave the way for future technologies that help human-wildlife coexistence.

Societal Benefits

Magpie swooping attacks not only affect those taking a stroll, but anyone from a child going to school to an adult mowing the backyard can be aggressively targeted.

However, data suggest that Australians who have exercise routines such as walking, jogging, and cycling, are most likely to be victims (Magpie Alert! n.d.). Thus, it is not uncommon for Australians to reduce or even cease such types of outdoor exercise during magpie breeding season. This could have a reduced positive effect on people's health and wellbeing. By using the SwoopApp "My Route" feature, users can easily add their own routes and navigate around the danger zones, thus keeping up their healthy exercise routines.

The SwoopApp can also help educate users with a better understanding of magpie behaviour, how to stay safe, and the magpie's role in our local ecosystems and farmlands. This could help reduce the fear and animosity a growing number of Australians have towards magpies and promote smarter behaviour towards them.

In the last 9 years, there has been 5,292 reported injuries due to magpie swooping attacks (Magpie Alert! n.d.), with several hundred people hospitalised due to severe scratches, and eye damage that is occurring more frequently (Sydney Ophthalmic Specialists, 2015). Considering that the average cost for public hospitals to treat admitted patients is $5,205 (Australian Institute of Health and Welfare, n.d.), any reduction in physical harm and financial cost to society would be greatly beneficial.

Council Benefits

Using the SwoopApp and insights gathered from breeding cycles, the council could benefit from this knowledge when planning jobs such as roadworks, infrastructure repairs, park work, water works; by more efficiently planning the job sites around the high swooping zones.

Local councils and ornithologists will benefit from the deep data taken from SwoopApp, offering insights into magpie bird behaviour and breeding habits. From such analysis the government could develop improved signage placement, safety tips and guidelines.

Often as a last resort, some councils pay for the removal of dangerous magpies using bird relocator services (A guide to relocating problem magpies, n.d.). Such professionals could use the SwoopApp application and data, and in a contract with local councils, identify swooping attacks that have led to serious injuries, and relocate them more efficiently before more harm is done.

Comparison to similar Applications

There is only one other comparable magpie-swooping alert application in the Google Play store, called Magpie Swoops app by HC Studios (play.google.com 2022), and it offers basic swoop incident reporting, with no other notable features.

Here are the unique features that SwoopApp would have over the sole competitor:

1. Feature to search by postcode, or address, or current location.
2. Feature that allows anonymous users to report swooping incidents, with or without the use of Location Services.
3. Safety Tips that provide expert and government advice.
4. Educational information and articles on Australian magpies, highlighting the role they play in our ecosystem and other interesting statistics.
5. Functionality for users to create accounts and login with, personalising their experience with settings and unlocking additional features such as:
   a. My Routes, a practical way to plan safer routes and bypass swoop zones.
   b. Incident Alerts, that update users to new swoop attacks.

This feature-rich SwoopApp would be in a dominant market position, especially with support from Australia's local councils, who stand to also benefit. Potentially a "council only version" of the app could split off from the main, providing even more features and integration with council worker needs.

Application Features

SwoopApp Features and System Logic

There are three levels of user access available on SwoopApp. All users who download and install the application will have access to core functionality of reporting swoop attacks, viewing the swoop map, and accessing general information.

As a growing number of netizens are increasingly hesitant in providing personal data, SwoopApp users have the option to "anonymously report" magpie attacks without logging in. However, logging in with an account offers additional features and personalisation settings.

Council workers and other professional users will have special registered accounts, that allow full application functionality, with full incident report authority that automatically adds attack locations on the swoop map or downgrades their status.

Basic Application Functionality

SwoopApp requires access via the internet (WIFI or Mobile Networks), in order to download, update, create accounts, login, report magpie attacks, and view the incidents map. A GPS location service may also be required.

- All users can sign up for a regular account, using their full name, email address, and a secured password.
    - Council workers and other designated professionals can sign up for a special login account, with an additionally provided Council ID.
- Registered users can sign into the SwoopApp using their login name and password.
- Unregistered users can use basic functionality of the application by continuing as an "Anonymous User" instead of logging in.
- All users can use the "Report Swoop" core function of the application.
    - Users can report automatically by using their current GPS location,
    - or manually by locating an address using the search feature on the Swoop Map.
    - To prevent abuse, a form of social validation is employed. Incident locations will only be added to the live map after a certain number of reports in the general vicinity are made, with each user type contributing by different weighted scores. For example, an anonymous user would only contribute 0.5 to the location veracity.
        - Non-logged in users will be limited to 3 incident report submissions a day.
- All users can view the "Swoop Map".
    - users can use the map's additional function of "Search" by current location, postcode or address.
    - users can choose "Show" to display all reports per swoop marker location.
- All users can view the "Safety Advice" information screen.
- All users can view the "Aussie Magpies" educational information screen.
- All users can "Share" swoop incidents via social media integration.

Additional Functionality for Registered Users

Users who sign up for an account and log into SwoopApp will gain access to additional features that are not available to non-logged in users.

- When logged in, users can use the "Report Clear" function located on the incident map.
  - A certain number of reports in the vicinity will grey out the incident on the map.
  - All swoop markers on the map from the previous year are downgraded and greyed out.
- Access to the "My Routes" map is unlocked, allowing the user to view their personalised routes.
- Users can also plan and save "New Routes".
- Users can turn on "Alerts" for new swoop incidents, filtering by their routes, postcodes or states.
- Users can access their "Account" page, displaying their details and system options.
- Users can "Edit" their account and system options, such as preferred map location and swoop alert filters.

Additional features of Special Users

Authorised council workers, official magpie removalist, and other designated professionals, who sign up for a council account will be given "Verified" trust status.

- Users with Verified trust status will grant their reported swoop incidents immediate marking on the incident map.
- This verified status will also immediately grey out any swoop markers on the map that are reported as "clear".

UI Design

Low Fidelity Mock-up

The SwoopApp UI was initially mocked up in low fidelity, to test the general feel and flow of the application. Simple testing was then conducted with my partner, offering this feedback (Figure 1):

- The report button needs to work instantly. If I was walking along getting attacked, I wouldn't have the time to fill out any forms.
- I can't be bothered signing up, do I have to?
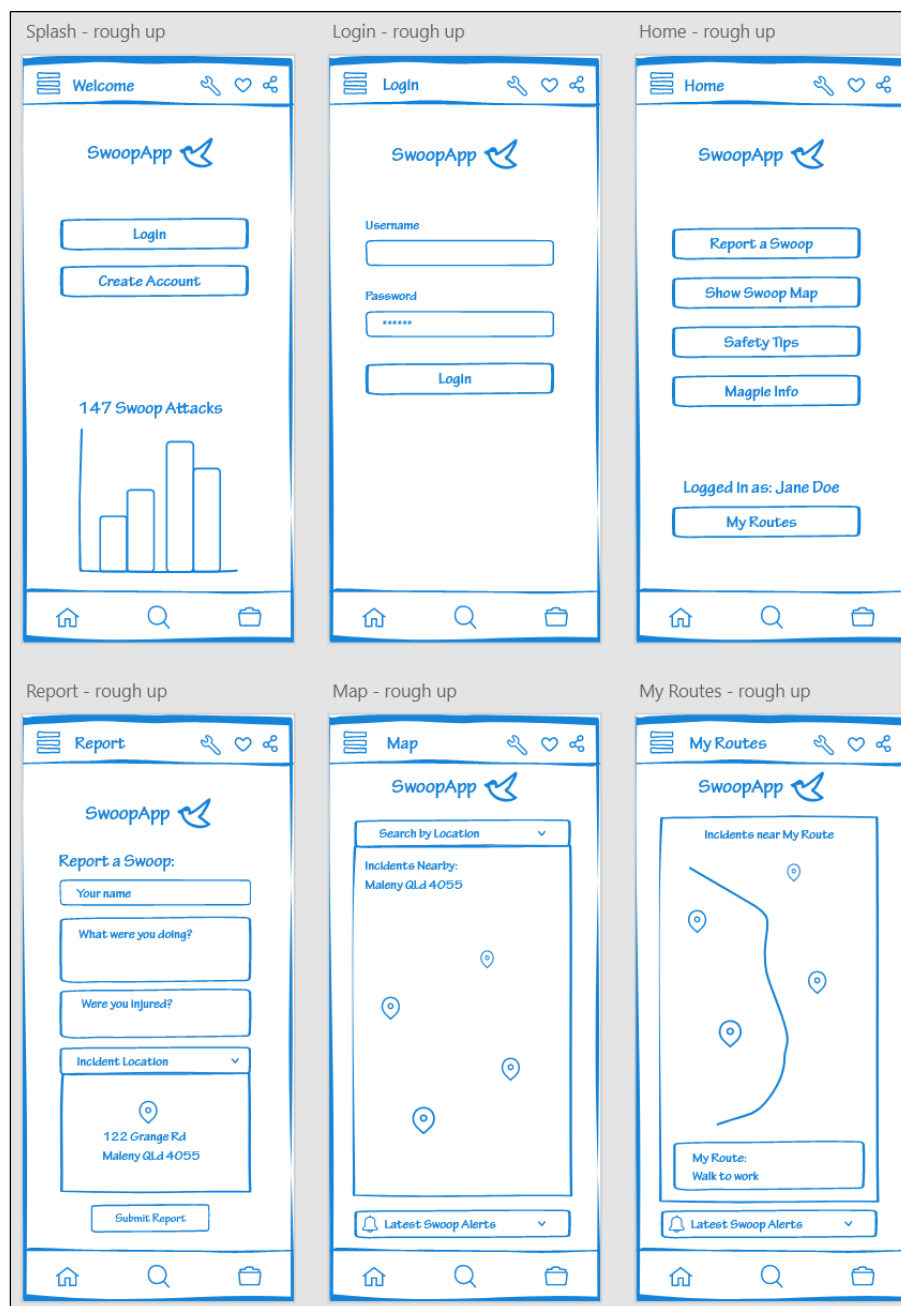- Could I receive alerts for my suburb only, all alerts might be too many?

Figure 1. Low fidelity mock-up.

Medium Fidelity Mock-up

After taking on board the suggestions received, changes were implemented into a higher fidelity mock-up, and the entire SwoopApp system was illustrated in detail (Figure 2):
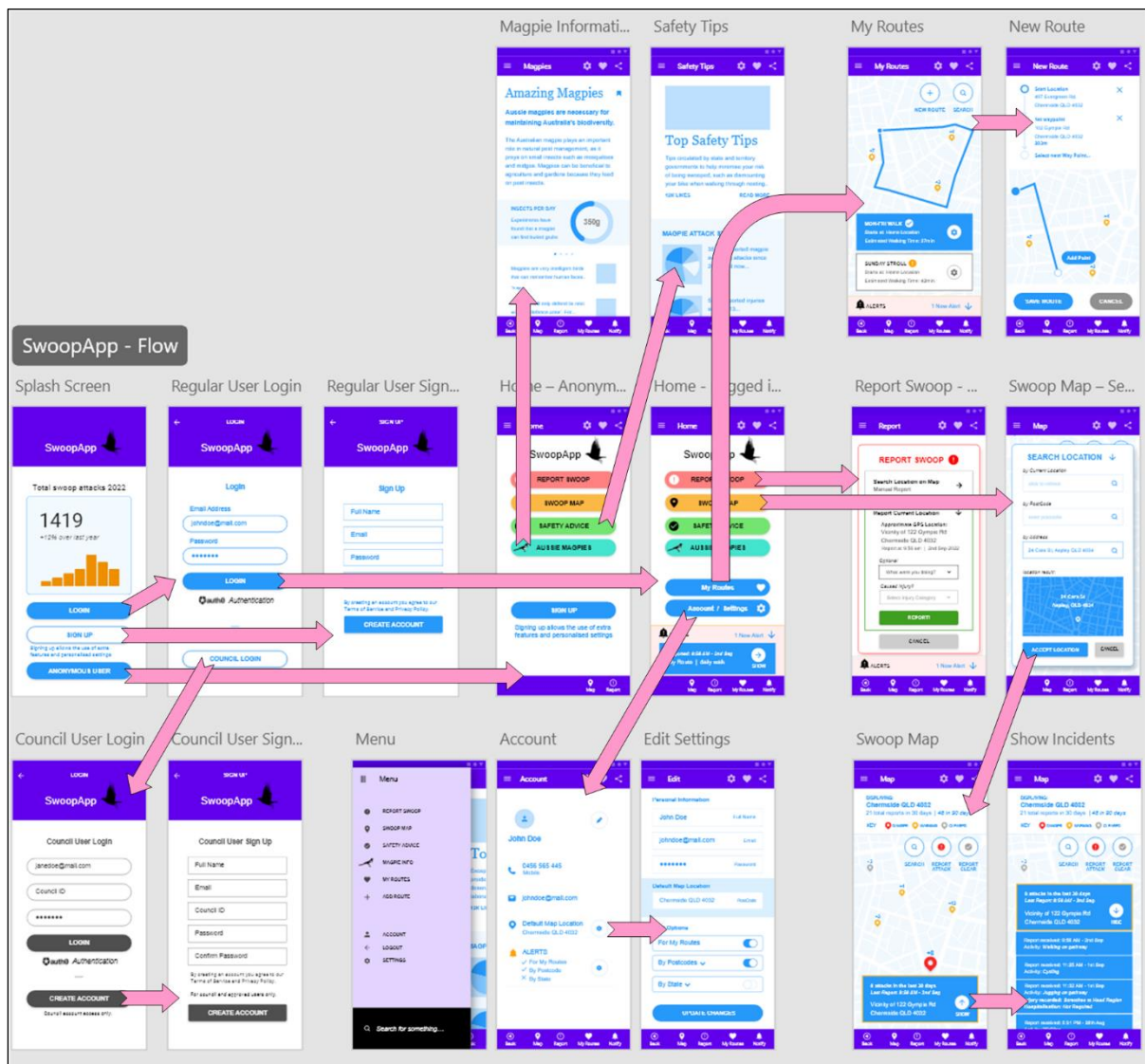
Figure 2. SwoopApp UI flow.

Splash Screen, Login and Create Account

The splash screen prompts users to log in or create an account, regular or council (Figure 3).
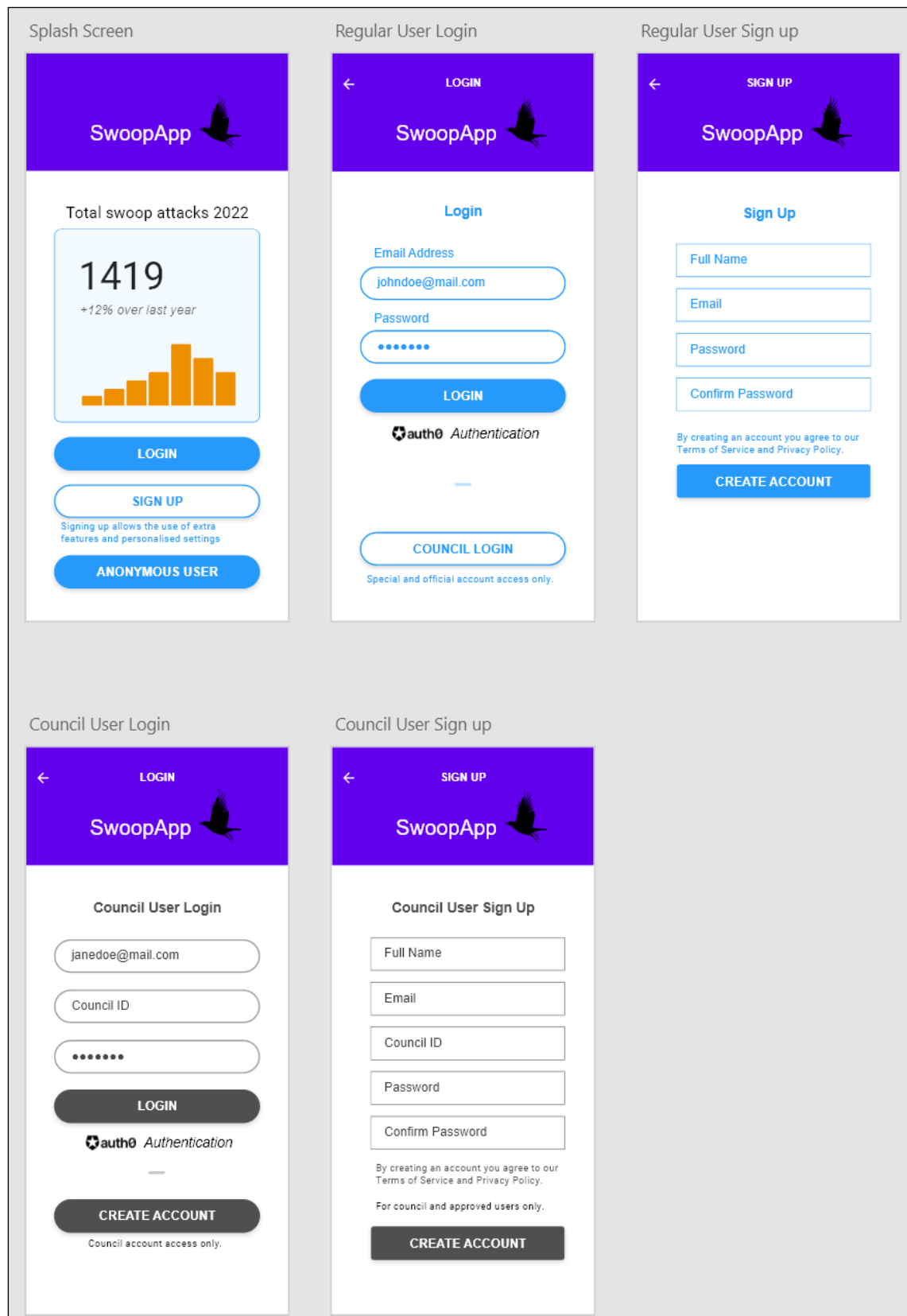

Figure 3. User elements UI.

Home Screen for Logged-in and Anonymous Users

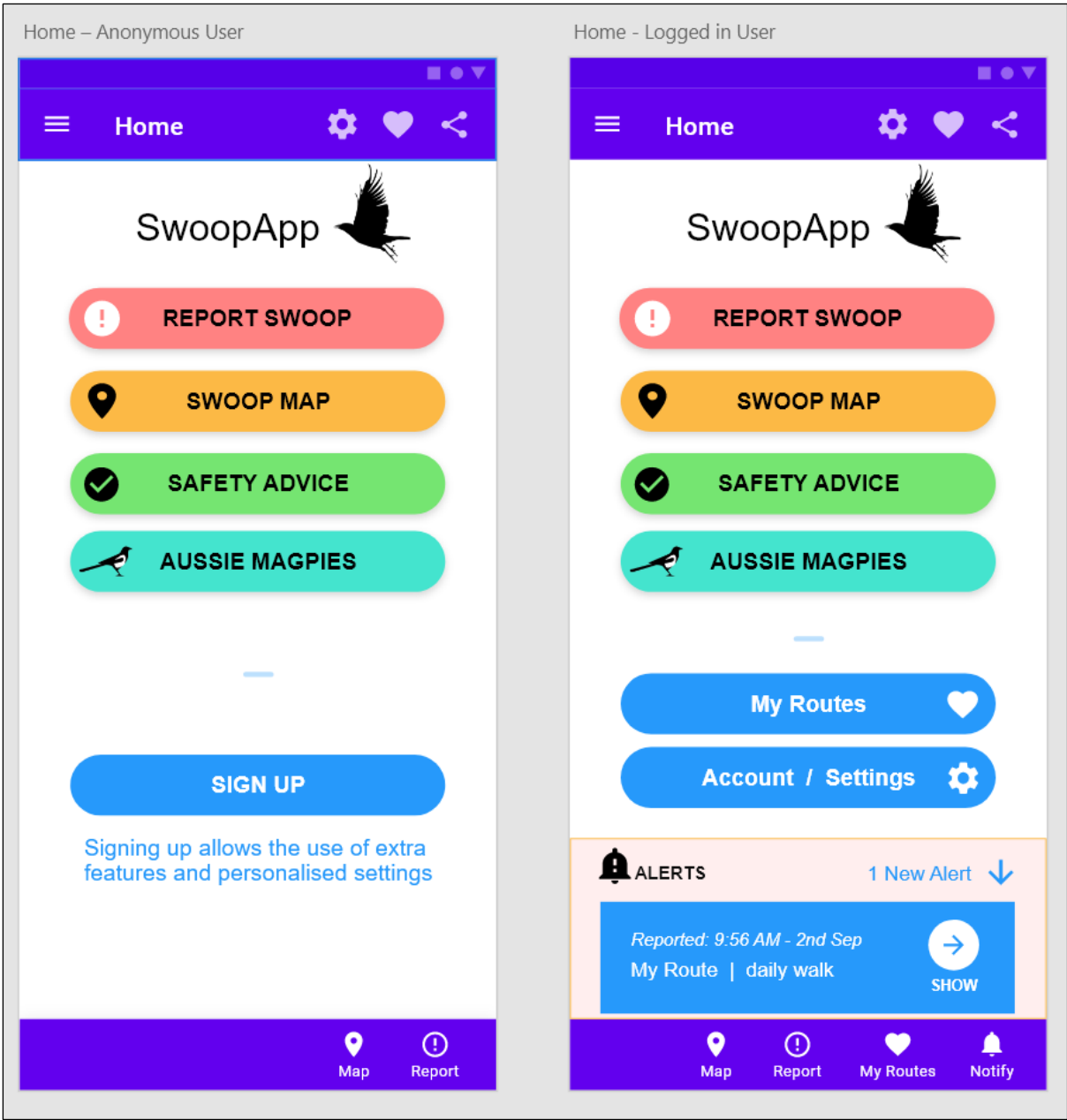Logged-in users have access to extra features and personalised settings (Figure 4).

Figure 4. Home screen UI.

Account, Settings, and Menu Screens

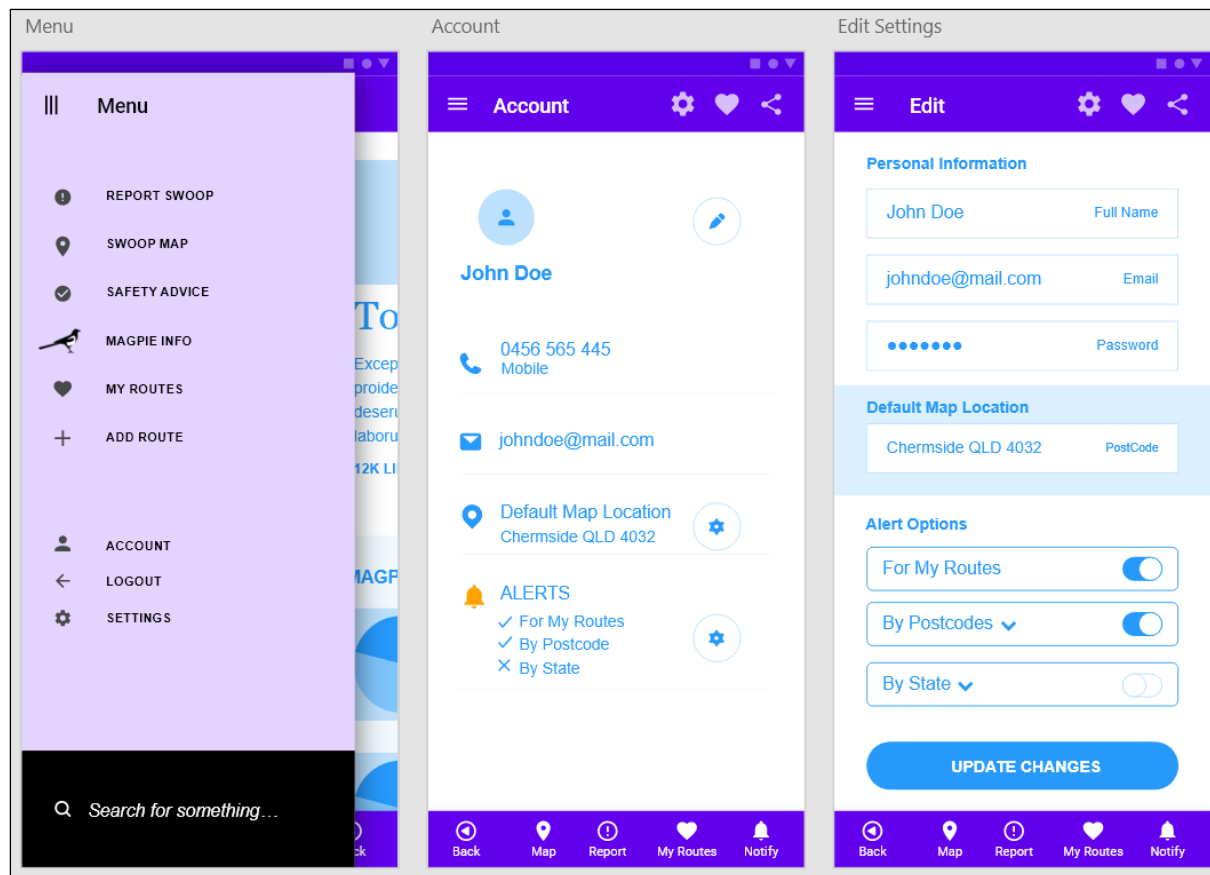Logged-in users can edit their account settings and personalise map and alert options (Figure 5).

Figure 5. Details UI.

Report Swoop, Search Map

Users can report instantly from their location or manually by searching for a location on the map (Figure 6).
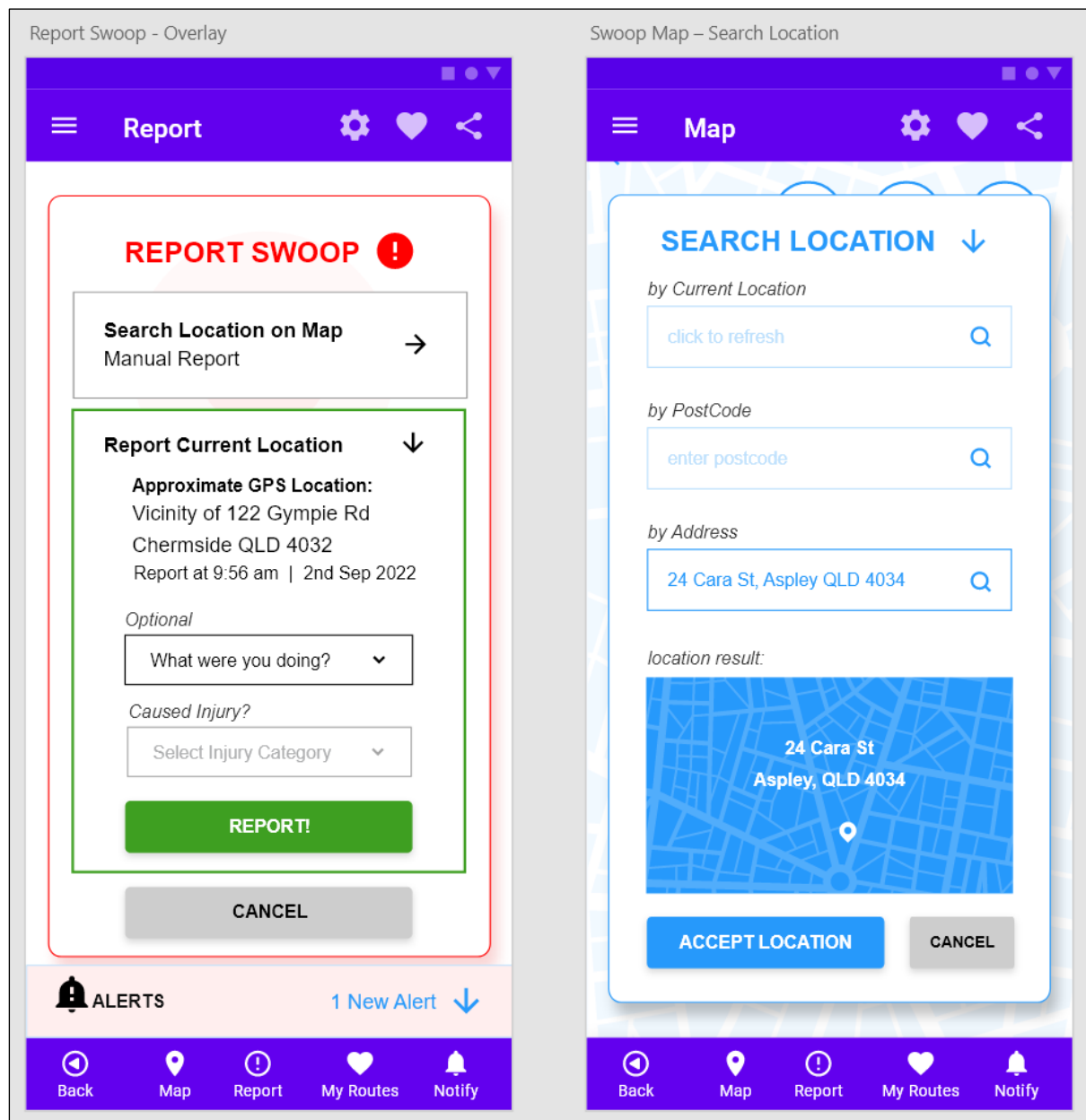

Figure 6. Report UI.

The Swoop Map and Incident Reports

Users can view swoop incidents by searchable locations, and then read all incidents. Markers display report tally, and severity of incidents (Figure 7).
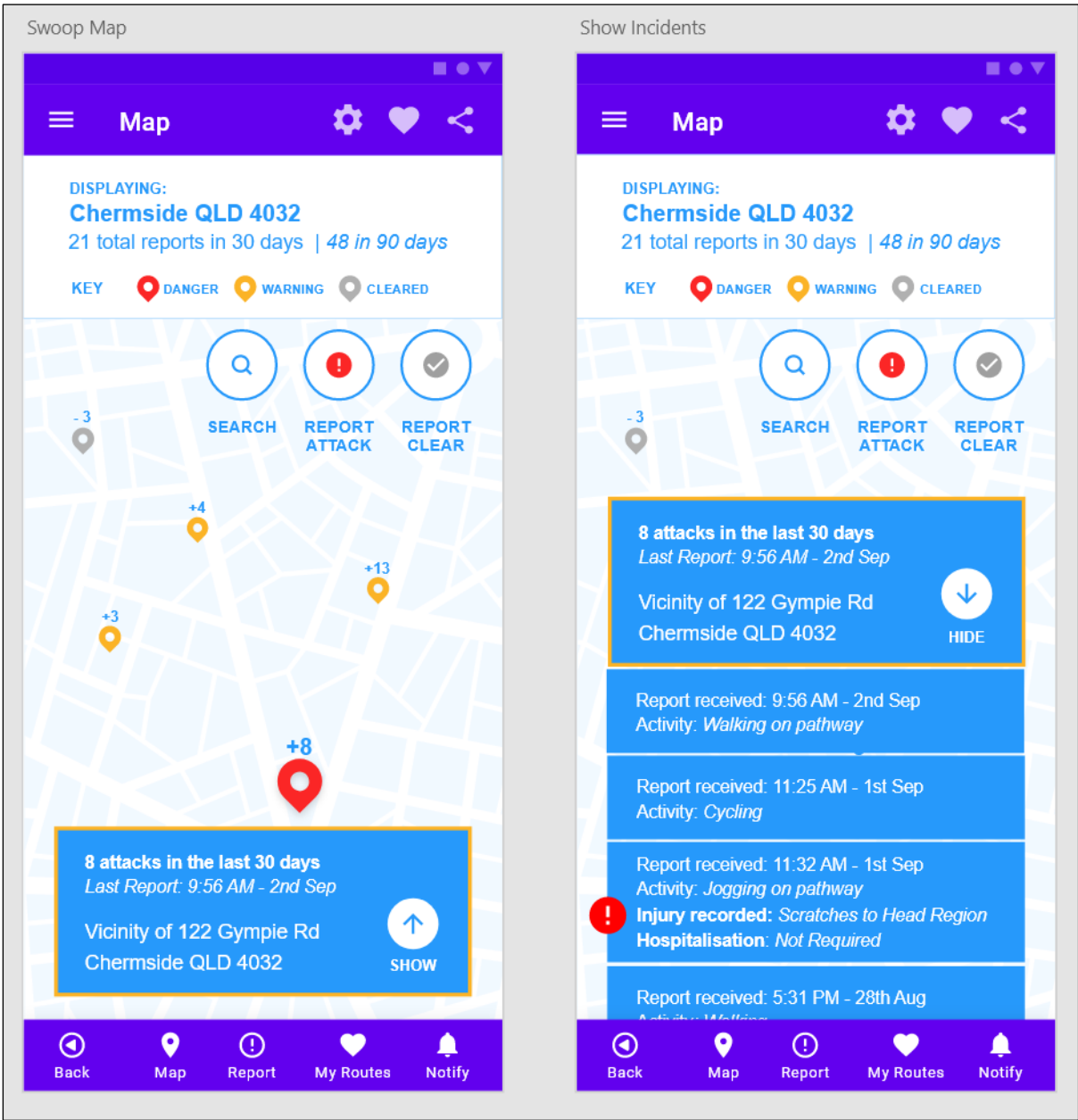

Figure 7. Swoop Map UI.

My Routes, Add Route

Logged-in users can view and create personalised map routes, planning their outdoor activities around swoop zones (Figure 8).
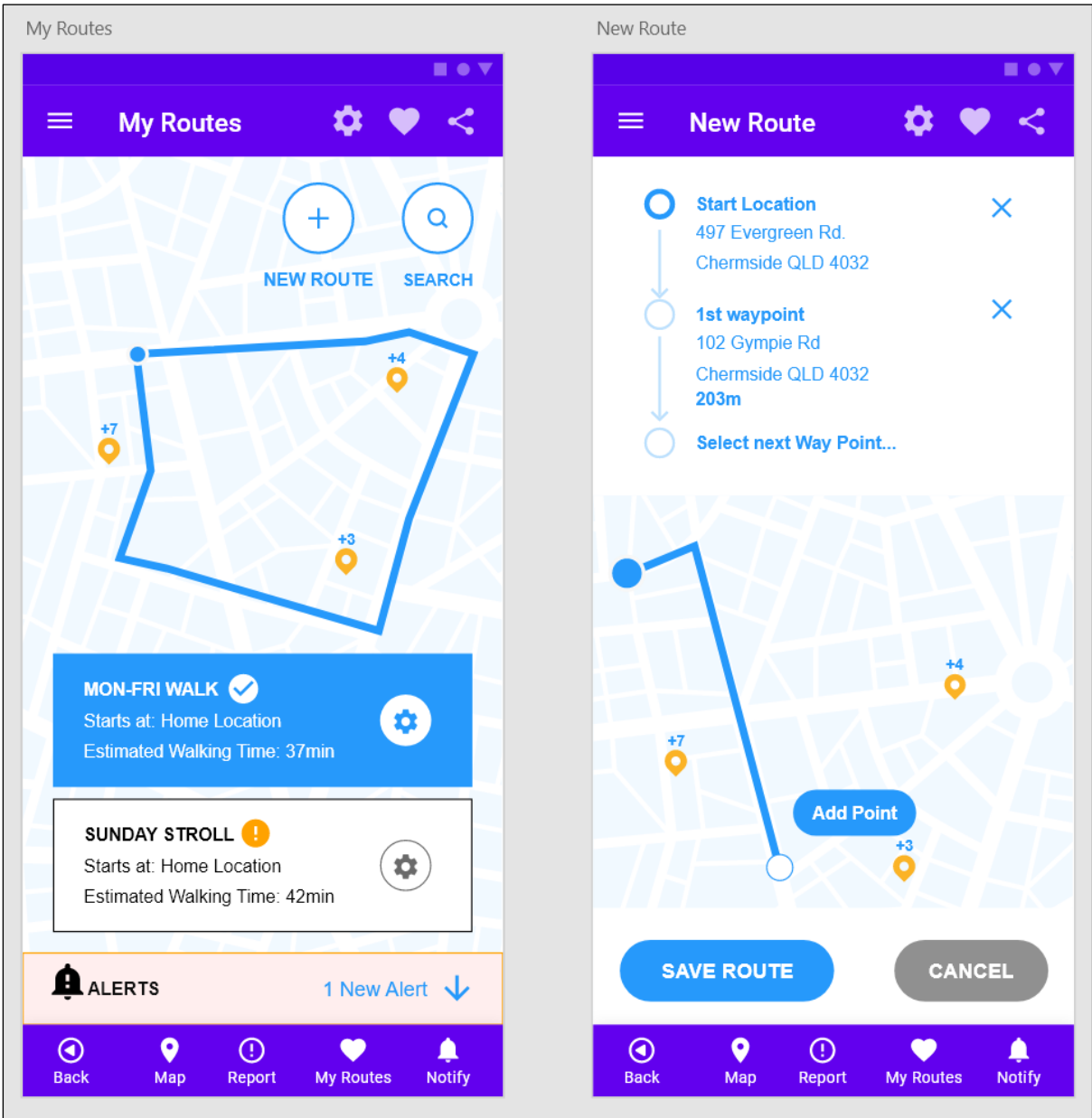

Figure 8. My Routes UI.

Safety Tips and Educational Information

All users can access educational information from expert and government sources (Figure 9).
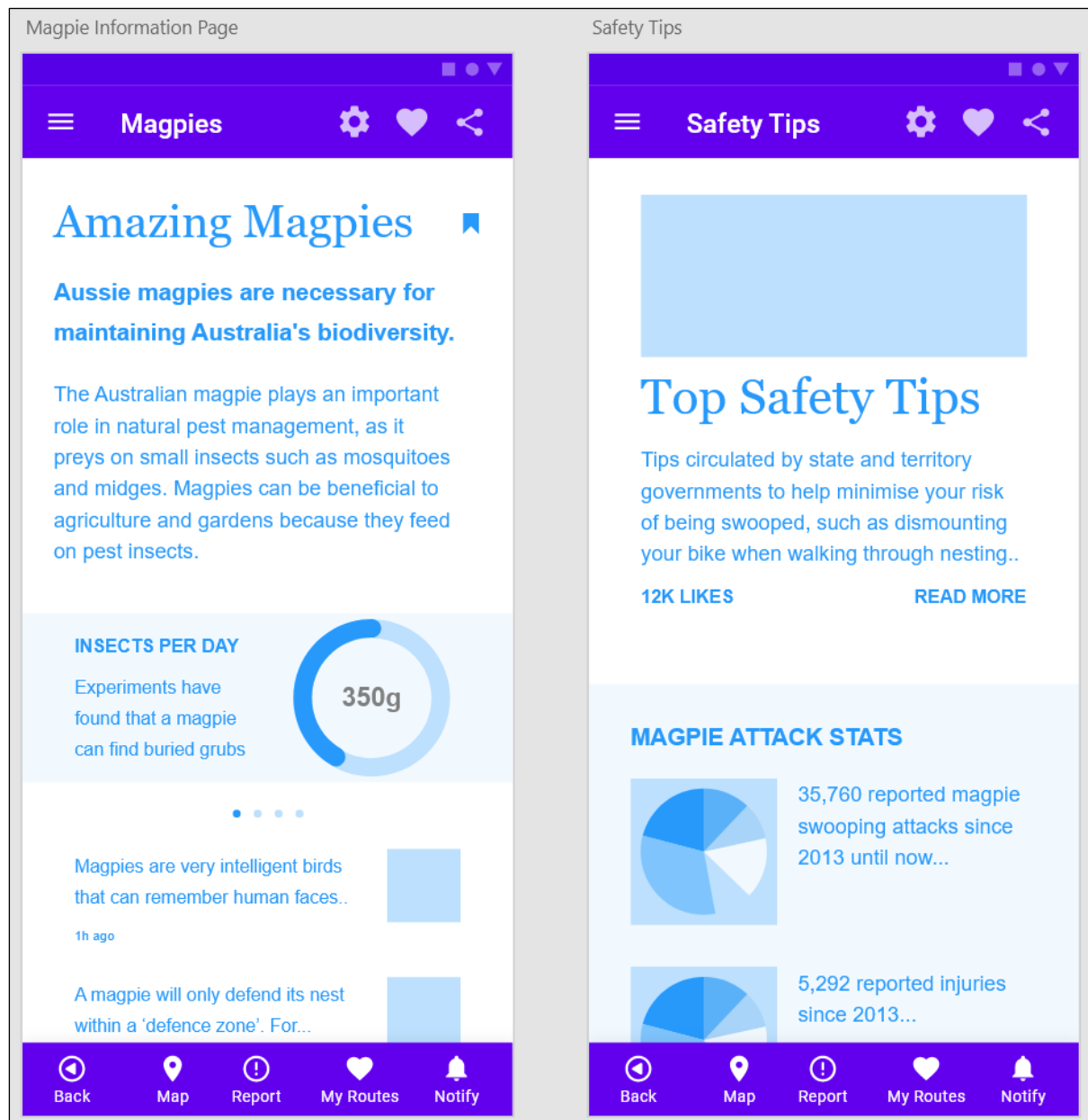

Figure 9. Educational UI.

Security

Considering that cyber-attacks are exponentially increasing on the internet, mobile networks, and public WIFI, SwoopApp will be built using the following industry best practices and proven security mechanisms:

General SwoopApp data connectivity and security practices:

All sensitive data in transit requirements of the SwoopApp application will be processed using HTTPS and encryption that implements 2048-bit SSL keys. This includes API communications, swoop incident reporting, map data requests, alerts and so on. Local user data will also be encrypted, such as My Routes. Cached data use will be limited and wiped on device restarts. Applying updates and security patches will also be required of users.

AuthO user authentication security:

All users who sign up and log into SwoopApp will be handled by AuthO, using their Universal Login and User Management platform (Auth0 n.d.). This will redirect all SwoopApp Login and Sign-Up handling to the AuthO hosted Authorisation Service, that will authenticate or save new user profiles, and redirect the user back to the SwoopApp. This process is encrypted and highly secure, retaining no sensitive login data on the application side. Single Sign On (SSO) options for users who have multiple devices will also be implemented. Additional Multi-factor Authorisation (MFA) options can also be directly implemented through Auth0.

Additional security for Council users:

The login and account creation for council users require a verifiable and council provided ID, that will be stored in SwoopApp user management Auth0 servers. Role-Based Access Controls will also be implemented, granting the extra privileges that come with these accounts.

Swoop incident reporting and meta data:

There will be three levels of meta data sent and stored.

- Anonymous users will only transmit their device's MAC address, location of swoop incident, activity type, and injury status. The MAC address is required to limit submissions and prevent spamming.
- Logged-in users will submit the same as above, and additionally their username and email address.
- Council and special users will additionally submit their verified ID and name.

Incident report weighting (prevent false reports):

To mitigate false incident reports, real-time monitoring of users' reporting behaviours, AI-driven analysis, and a weighted value for each user type will be implemented. A value of 2.0 total reports is required before an incident report marker is placed on the Swoop Map.

- Anonymous users will have a weighted value of 0.5 for their incident reports and will be limited to 3 per day.
- Regular logged-in users will have a weighted value of 1.0 and will be limited to 6 per day.
- As council and special users are verified and trusted, their reports (adding and clearing) will automatically add to the Swoop Map or downgrade the incident status.

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