Functional Requirements

1. **The app must provide user login before accessing the app**
    - 1.1. The app must allow an existing user to log in.
        - 1.1.1. The login must prompt the user for their username.
        - 1.1.2. The login must prompt the user for their password.
        - 1.1.3. The login must be able to verify login credentials with a database.
            - 1.1.3.1. If the login credentials are valid, the app must log in the user.
            - 1.1.3.2. The app must reject the login request if the login credentials are invalid.
                - 1.1.3.2.1. The login request must be rejected if the username is incorrect
                - 1.1.3.2.2. The login request must be rejected if the password is incorrect
            - 1.1.3.3. If the app rejects the login request, the app must inform the user of the rejection.
    - 1.2. The app must allow new users to register an account.
        - 1.2.1. The registration shall take in a user's display name.
        - 1.2.2. The registration shall take in a user's username.
            - 1.2.2.1. If the username is already used, the registration must re-prompt the user for a new username.
            - 1.2.2.2. If the username is already used, the registration must be rejected.
        - 1.2.3. The registration shall take in a user's password.
            - 1.2.3.1. The user must key in a password that is at least 8 characters long for it to be valid.
                - 1.2.3.1.1. If the password is invalid, the registration must re-prompt the user for a new password.
                - 1.2.3.1.2. If the password is invalid, the registration must be rejected.
        - 1.2.4. If the registration is not rejected, the app shall add another account into the database after registration
    - 1.3. The app must allow users to sign out of their account.

      1.3.1 The users shall be able to tap on a 'sign out' button to sign out of their account.

      1.3.2 The users shall be shown the login page for their account after sign out.

2. **The app must be able to display a map**
    - 2.1. The map must be able to show the user's current location with an accuracy of 10 metres

2.1.1. The map must show the user's current location while moving, indicated by a moving cursor on the map
2.1.2. The map must show the user's current location while static, indicated by a static cursor on the map
2.2. The user must be able to pan across the map to view different locations
2.3. The user shall be able to zoom in and out of the map

3. The app must be able to ask for user permission to track location
3.1. The app must prompt the user for permission to access and track their location when location-based services are required.
3.2. The app must clearly explain why location tracking is needed, including details about how the location data will be used.
3.3. The app must include an option for the user to provide or deny permission for location tracking.
3.3.1. If the user denies permission, the app must inform the user that location access is necessary and redirect the user to their device's settings

4. The app must allow users to plan for their runs
4.1. The app must prompt the user for the starting point of the run
4.1.1. Users should be able to select their current location for the run
4.1.2. Users should be able to specify a starting location by inputting an address
4.1.2.1. The app must display auto-suggested locations to the user while the user inputs an address
4.2. The app must prompt the user for the desired distance of the run
4.2.1. The user must input a number between 1 and 30 to be considered valid
4.2.1.1. The app must reject the user's input if the user's input is invalid
4.2.1.2. The app must inform the user to input a number between 1 and 30 if the user's input is invalid
4.3. The app must prompt the user for any nearby landmarks that they might want to pass by in the running route
4.3.1. The app shall prompt the user for the landmark via a drop-down menu.
4.3.1.1. The drop-down menu shall display all valid landmarks that the user can select.

4.3.1.1.1. A landmark must be invalid if the total round-trip distance to and from the starting point passing through the landmark exceeds the desired distance.

4.3.2. The user shall have the option to not choose any landmark

4.4. The user must have the option to toggle between generating a shelter-optimised route or a standard route

5. The app must be able to generate 3 distinct running routes for the user

5.1. The generated routes must start from the given starting point

5.2. The generated routes must end at the given starting point

5.3. The generated routes must be within 0.5km of the desired distance

5.4. The generated routes must be shown in the map

5.4.1. The sheltered sections of the route must be displayed in another colour to the user.

5.5. If the user specifies a landmark, the generated route must pass through the landmark specified by the user

5.6. If the user opts to generate a shelter-optimised route, the app must optimise the amount of sheltered pathway in the route

5.7. The user should be able to select which of the 3 routes they wish to follow

6. The app must be able to track the user's run

6.1. Users shall be able to see their distance covered on the app while running.

6.2. Users shall be able to see their running summary after their run.

6.2.1. Users shall be able to see the total time taken for the run in MM:SS format.

6.2.2. Users shall be able to see the total distance covered in km.

7. The app must allow for user navigation during the run

7.1. The app must continue to show the user's location and updated path during the run

7.2. The app must display text navigation instructions to guide the user during the run

7.2.1. The navigation instructions provided must be within 6 words

7.2.2. The navigation instructions must specify which direction to turn when a turn is about to be made

7.2.2.1. The navigation instructions must specify how sharp the turn will be for the user

7.3. The app must automatically end the run once the user reaches the ending point

7.4. Users must be able to end the run prematurely
7.5. If the user strays 50 metres away from the generated route, the app must prompt the user to return to the path

8. The app must be be able to access weather information

8.1. The app must be able to access weather information on the user's current location
8.2. The app must be able to access weather information on the user's stated starting point
8.3. Weather information must consist of the 2-hour rain forecast in the region
8.3.1. The app shall recommend the user to generate a shelter-optimised route if the 2-hour rain forecast predicts rain in the region

9. The app must be able to display the user's past run history

9.1. The app must display all the user's completed runs in a scrollable list.
9.2. If the user clicks on a specific run, the app must expand the details of this run in a separate page
9.2.1. The details must consist of an image of the running route.
9.2.2. The details must consist of the total distance of the running route.
9.2.3. The details must consist of the total time taken for the run.
9.2.4. The details must consist of the pace of the run.

Non-Functional Requirements

1. Performance

1.1. The application must load each page within 3 seconds.
1.2. The application must respond to user actions within 2 seconds.
1.2.1. The map must respond to zoom in and out actions within 1 second.
1.3. The application must generate possible routes within 20 seconds.

2. Usability

2.1. More than 95% of users should be able to complete the route selection process within 2 minutes.

3. Compatibility

3.1. Map view must be clearly viewed and compatible with both iOS and Android smartphones

4. Privacy

4.1. The application must clearly inform users of the reasons for collecting location data.
4.2. The application must obtain user consent to collect location data.
4.3. Users must be allowed to sign out of their account at any time.

5. Accessibility

5.1. The map interface must have appropriate labels.

5.2. All font sizes used in the application must be at least of size 10.

6. Accuracy

6.1. The generated route must run through only accessible paths.

6.2. If users allow for the collection of location data, the user's displayed live location must be within 10m of their actual location.

6.3. For user navigation, upcoming changes in direction must be reported to the user when the user is 50m away from the change.

7. Support

7.1. Proper documentation must be provided for future developers.