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GABAY: Intelligent Flood Alert System for Commuter Safety in Flood-Prone Areas

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EXECUTIVE SUMMARY

To enhance the accuracy and the reliability of the data being gathered, our system will implement a method that will cross reference reports submitted by the users with the information gathered from trusted external sources such as local government units (LGU), and weather stations. This approach would greatly help the credibility of the reported flood data by the users. Additionally, by having a user-friendly design, registered users of the Gabay application can access various functionalities such as having personalized notification, interactive maps for easier sharing of flood reports through images and texts. By combining both real-time crowdsourcing and verified information from reliable sources, Gabay would help commuters to navigate safely and with confidence during the monsoon

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CHAPTER I. INTRODUCTION

Project Context

Flooding is a major issue in the Philippines, particularly in Metro Manila, where heavy rains can quickly render roads impassable, disrupt transportation, and put commuters at risk. Every year, countless Filipinos struggle with travel delays, financial losses, and safety concerns caused by unpredictable flood conditions. Despite the availability of multiple information sources such as social media, weather applications, and government flood warnings, our research shows that these platforms often fail to provide accurate, real-time, and location-specific updates that commuters need to make informed decisions.

Grolinger et al. (2014) noted that social media plays an essential role in crisis management due to its ability to rapidly share information. However, as our study confirms, while social media is the most widely used source of flood updates, it is also highly unreliable, with 63% of respondents rating it as only somewhat reliable and 55% finding it somewhat effective. The inconsistency and lack of verification in user-generated posts lead to misinformation, confusion, and, in many cases, dangerous decisions when navigating flood-prone roads. Meanwhile, official government agencies provide verified updates but often fail to update them frequently enough to reflect real-time conditions. As a result, commuters must rely on personal observations or word-of-mouth updates, which are not always

accessible or accurate. The lack of a centralized, real-time flood monitoring system significantly affects commuter decision-making. Our research found that over half of commuters (55%) act within 30 minutes of receiving a flood or weather alert, highlighting the urgency of having real-time, accurate information. However, without a system that consolidates verified reports, commuters are often forced to make last-minute travel decisions based on outdated or incomplete information. Dariagan et al. further emphasize that poor information processing negatively impacts disaster response, reinforcing the need for a structured, reliable platform that prioritizes accuracy, timeliness, and accessibility.

To address these gaps, we propose GABAY, a commuter-focused flood alert mobile application that provides real-time, location-based flood updates to help users navigate safely and efficiently during heavy rains. Unlike existing platforms that rely on a single source, GABAY will integrate multiple data sources, including crowdsourced reports from commuters, government agencies, and GPS-based flood tracking technology. This multi-source approach ensures that flood information is accurate, timely, and relevant to the specific routes commuters take daily. The app will send customized alerts based on the scope where the user is travelling, notify them of flooded or impassable roads, and help them make informed travel decisions before leaving their homes or workplaces.

Beyond personal convenience, GABAY also addresses economic and productivity losses caused by flood-related travel disruptions. Many workers,

students, and business owners rely on public transportation or private vehicles to reach their destinations. When floods disrupt road conditions, they face significant delays, lost income opportunities, and reduced productivity. Employees who arrive late may receive salary deductions, students may miss critical lessons, and businesses may lose customers due to unpredictable flooding. GABAY can help minimize these economic impacts by allowing commuters to avoid flooded areas, and reduce unnecessary travel delays. Our study supports the need for this app, as findings indicate that a majority of commuters actively seek weather or flood updates before traveling. However, the reliability of these updates remains a significant concern, with many users reporting that they struggle with inconsistent and incomplete information. Without a centralized and real-time tracking system, these decisions are often made with limited or outdated information.

The increasing frequency and unpredictability of extreme weather events due to climate change make it even more important to have an efficient, real-time flood information system that helps people plan their commutes safely. By leveraging crowdsourced data, official reports, and GPS-based tracking, GABAY will bridge the gap between scattered, unreliable information sources and verified, real-time flood updates. The app is not just a response to the challenges highlighted in our study but is a proactive solution to an ongoing problem that affects millions of commuters annually. By ensuring that people have access to reliable, real-time

flood and weather information, GABAY has the potential to improve urban mobility, and enhance commuter preparedness in the Philippines.

GABAY will primarily focus on Manila and Makati due to their high population density, heavy commuter traffic, and frequent flooding. These areas are major economic, educational, and transportation hubs, making real-time flood updates essential for residents. Manila is home to some of the country's largest universities, such as the University of Santo Tomas (UST), Far Eastern University (FEU), and De La Salle University (DLSU), attracting thousands of students daily. Many key roads, including España Boulevard, Taft Avenue, and Recto Avenue, are flood-prone, often disrupting student and worker mobility. Meanwhile, Makati serves as the financial center of the Philippines, with thousands of employees commuting daily.

Purpose and Description

The GABAY mobile application provides real-time, accurate, and location-specific flood information to commuters, ensuring travelers' safety during adverse weather conditions. By incorporating crowdsourced data, GPS tracking, and weather updates, GABAY offers a user-friendly platform that allows travelers to receive personalized flood notifications and make informed decisions regarding their routes. The app collects and analyzes flood data from various sources to

deliver timely and reliable updates, addressing the gap in current flood reporting systems.

The GABAY system uses a dynamic and interactive heat map to visualize collected flood data, allowing users to report and verify flood conditions. With bilingual support (English and Filipino), the app ensures accessibility for a wider audience. It aims to enhance commuter safety and improve urban mobility by reducing travel delays caused by unpredictable flood conditions.

Significance of the Study

This study will assist travelers, who frequently face unwelcome flooding. By delivering real-time, trustworthy flood information, GABAY will enable users to make better decisions, choose safer routes, and reduce delays caused by flooded paths. The program will improve traveler safety by providing localized, up-to-date flood alerts that traditional media sources may have overlooked.

GABAY will also have the potential to assist government organizations and local emergency response teams. The collected flood data will help local governments (LGUs), transportation agencies, and emergency services improve flood control techniques and urban development. By evaluating user-submitted information, decision-makers will be able to identify flood-prone areas, better allocate resources, and improve disaster preparedness programs.

The study will propose that mobile technology and crowdsourcing can be used to enhance catastrophe risk reduction. It will suggest that the initiative could be extended to other industries, such as public safety authorities, logistical corporations, and environmental organizations, to deliver real-time flood data to a broader range of customers. Furthermore, the study will imply that GABAY can be used as a model for integrating crowdsourced data with disaster preparedness technology, offering a practical solution to urban flooding issues and promoting community engagement in disaster resilience efforts. This could lead to a more inclusive and effective approach to catastrophe mitigation.

Conceptual Framework

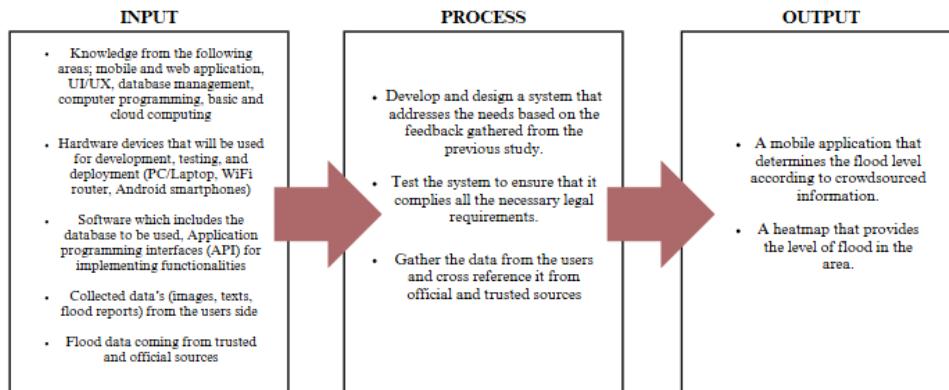


Figure 1. IPO Conceptual Framework

Input-Process-Output (IPO) framework, is a tool that is used to describe the flow of information and activities within the system. It is a diagram that is composed of three columns starting from the input towards the output (Adobe, n.d).

By implementing the IPO framework in our research, we are able to gather all necessary data and information to help us develop our proposed mobile application Gabay.

Figure 1 is divided into three frames the first frame also known as the input in the concept of IPO framework, is the phase where knowledge such as mobile and web development, UI/UX designs, database management and both hardware and software requirements which includes Integrated Development Environment (IDE), Application Programming Interface (API), databases, information uploaded from the users which are the following flood level information, texts, and images, and information coming from official and trusted sources are gathered to be able to perform the process which is needed to achieve the necessary Output (Gabay).

Meanwhile, the second frame is the area which deals with how the researchers will utilize the resources mentioned in the first frame in order to construct the necessary output. Lastly, the third and final frame shows the expected output which is the proposed mobile application called Gabay that provides a heatmap that is based on the result from cross referencing the users information from official sources.

Objectives**General Objectives**

The purpose of this study is to develop a disaster preparedness mobile application that focuses on real-time flood-level determination through crowdsourcing and GPS functionality, enabling commuters to make informed travel decisions and promoting safety travels. Additionally, this proposed mobile application system aims to bridge the gaps between technological advancements and everyday users, as it ensures that individuals and communities can respond to flood events, thus minimizing the risks and most importantly enhancing the overall concept of disaster preparedness.

Specific Objectives

1. Develop a mobile application that allows users to upload images, and text-based updates about flood conditions.
2. Integrate GPS functionality (geotagging) to ensure location-specific data accuracy and authenticity.
3. Implement a bilingual interface to enhance accessibility for both local and foreign users.
4. Design a personalized notification system to alert users about flooded routes in real-time.

5. Enhance user engagement by including interactive elements which foster accurate and frequent crowdsourcing updates.
6. Create a feedback system based on user experience and reports to enhance app functionality and data validity.
7. Gather data to support long term disaster preparedness
8. Implement a method that will cross-reference the data gathered by the users with trusted external sources to verify the accuracy of users data.

Scope and Limitations

The main focus of the researchers is to propose and develop Gabay a disaster preparedness mobile application that aims to help commuters who frequently travel within the cities of Makati and Manila. The goal is to promote disaster preparedness by providing real-time flood information through crowdsourcing, latest news and updates which are used for cross referencing crowdsourced reports, and latest weather updates to help them plan their routes accordingly. Additionally, our project will offer personalized notification to enhance user experience, interactive maps, and the ability to report inappropriate contents uploaded by different users. However, the research also has several limitations regarding the project, one notable limitation is the scope of demographics users which focuses more on those who travel within Manila and Makati, rather than the whole Metro Manila, and the proposed mobile application will be developed on Android Operating Systems only due to time constraints. As a result to successfully meet the said requirements, iOS users and

those who are not traveling within Manila and Makati will not be included in the initial phase of deployment.

Definition of Terms*Table 1. Definition of Terms*

Terms	Definition
Bilingual Support	The application's capacity to deliver information in many languages—English and Filipino in particular—in order to increase accessibility for a larger audience. Regardless of the language they prefer, users can engage and comprehend the system more easily when it is multilingually supported.
Crowdsourcing	It is the process of obtaining data from a sizable population, frequently using mobile applications or the internet, in order to improve awareness of situations and making choices in disaster response.

Disaster Preparedness	Developing and putting into practice plans to lower risks and guarantee a successful reaction to natural catastrophes. This includes public awareness campaigns, and early warning systems.
Flooding	Can be brought on by severe rains, storm surges, inadequate drainage systems, or rising sea levels, creating a threat to safety for the public, infrastructure, and commerce.
Flood Level Updates	Data about the water levels in flood-prone places, frequently broken down by severity (e.g., low, moderate, high). These updates assist travelers and commuters in making well-informed choices on safety precautions and routes.
Geotagging	The process of attaching geographical coordinates (latitude and longitude) to media such as images, and text. This feature allows applications to provide

	location-based data, improving the accuracy of flood reports.
GPS (Global Positioning System)	A satellite-based navigation system that provides real-time location tracking and mapping services.
Heatmap	Data visualization technique that represents the intensity of a variable using color gradients.
Travelers	The users of the proposed mobile application

CHAPTER II. REVIEW OF RELATED LITERATURE/SYSTEMS

Role of Mobile Applications in Disaster Risk Reduction

The rapid development of mobile phone technologies and their widespread adoption have significantly contributed to Disaster Risk Reduction (DRR). With mobile networks covering 95% of the global population, mobile devices serve as critical tools for gathering environmental data, disseminating hazard warnings, and supporting emergency response efforts (GSMA, 2020). Mobile devices enable citizen science, allowing non-experts to participate in data collection, which aligns with the Sendai Framework for Disaster Risk Reduction by promoting people-centered decision-making (United Nations, 2015). By integrating mobile data with scientific analysis, communities can generate real-time hazard assessments, enhancing disaster preparedness and resilience-building (Fritz et al., 2019). Natural disasters continue to impact lives, causing fatalities and significant economic losses due to infrastructure damage (Schryen et al.). These disasters, categorized as geophysical, hydrological, climatological, meteorological, or biological events, are further intensified by factors such as rapid urbanization, which increases flood frequency and affects more people (Dulawan et al.). In the Philippines, Metro Manila has been identified as one of the most flood-vulnerable cities, with historical data supporting its susceptibility to severe flooding.

Mobile applications play a role before, during, and after a disaster. Before a disaster, mobile alerts (via SMS, social media, or apps) inform communities about impending threats, as seen in Nepal and India's SMS flood alerts (Pandeya et al., 2020). During a disaster, social media platforms like Twitter, Facebook, and WhatsApp help disseminate real-time hazard information, aiding emergency response efforts (Kaigo, 2012; Agahari et al., 2018). After a disaster, Geographic Information Systems (GIS) tools, such as Google Maps and OpenStreetMap, assist in mapping disaster impacts and coordinating recovery efforts (Sonwane, 2014; Rahman et al., 2012; Parajuli et al., 2020).

The role of Information and Communication Technology (ICT) in disaster management continues to evolve, with advancements in cloud computing enabling better data gathering, storage, and analysis across various sectors such as healthcare, finance, and social media (Grolinger et al.). However, studies on cloud computing's application in disaster and risk management remain limited, despite growing research interest in its potential for disaster response and mitigation. The rise of DRR-focused mobile applications has strengthened disaster resilience by providing context-specific, real-time data. These technologies allow communities to respond quickly, improve risk communication, and ensure faster coordination between emergency services and affected populations.

Crowdsourced Data Collection & Verification

Recent studies highlight the role of mobile applications in disaster management, particularly in crowdsourced data collection for situational awareness. According to Esparza et al., apps such as 3-1-1 citizen hotlines and Waze enable users to report flood conditions in real time, helping authorities and communities respond more effectively. However, their research found that crowdsourced reports often contain biases, including sample bias, spatial bias, and demographic bias, which can impact the accuracy of disaster response efforts. During Tropical Storm Imelda (2019) in Texas and Hurricane Ida (2021) in New York, Esparza et al. identified that minority-populated areas were underrepresented in crowdsourced reports, and transient users (such as drivers) contributed to inconsistent data.

To address these challenges, Victorino, Estuar, and Lagmay proposed an interactive and automated validation system that cross-references crowdsourced flood reports with weather station data. Their approach involves using geospatial proximity and time records to determine the validity of a report by comparing it with nearby reports and weather station data. A report is classified as correct if it falls within a confidence interval established by its neighborhood. This validation system enhances situational awareness and trust in crowdsourcing applications, making it easier for responders and decision-makers to rely on public reports for disaster management. Their study leverages the "wisdom of the

crowd" and improves the overall reliability of flood reports, with plans for nationwide adoption.

Crowdsourcing remains valuable tools for disaster preparedness and response. Esparza et al. suggest that addressing data biases through population normalization and multi-source data integration can improve the reliability of real-time disaster information. Meanwhile, Victorino et al.'s validation system strengthens the credibility of crowdsourced data by ensuring automated cross-checking and user verification. As ICT continues to advance, further research on mobile applications and disaster risk management is essential to enhance crisis situational awareness and mitigation strategies (Lagmay et al.; Williams).

GPS and Location-Based Services

Recent studies highlight Global Positioning System (GPS) data as a rapid, reliable, and cost-effective alternative for disaster management, particularly in flood detection and response efforts. Traditional approaches, such as satellite and drone-based flood monitoring, offer valuable insights but face challenges related to data acquisition speed, cost, and accessibility. These studies highlight the critical role of GPS technology in disaster response and risk management. GPS serves as a foundational tool that enables faster response times, improved situational awareness, and better resource allocation, providing real-time location data to help first responders navigate chaotic situations and make informed decisions. It enhances situational awareness by offering up-to-date

information on the status and location of resources and personnel, enabling better decision-making during emergencies.

According to Yang, Ohira, and Gokon (2024), abnormal fluctuations in GPS data can accurately determine both the time and location of flood events. By analyzing anomalies in GPS signals, their study successfully mapped flood-affected areas, particularly near rivers and flood-prone regions. Their findings also emphasize how population movement patterns during a disaster—tracked through GPS—provide crucial insights for evacuation planning and rescue operations. The integration of spatial analysis and visualization techniques further enhances flood detection by allowing authorities to quickly assess affected zones and make informed decisions.

Beyond flood detection, GPS technology plays a broader role in public safety and disaster relief efforts. According to GPS.gov (2019), GPS has been instrumental in managing major global disasters, such as the 2004 Indian Ocean tsunami, Hurricanes Katrina and Rita in 2005, and the Pakistan-India earthquake in 2005. Search and rescue teams utilized GPS, geographic information systems (GIS), and remote sensing to map disaster-stricken areas, guide emergency response teams, and assess damage. In wildfire management, aircraft equipped with GPS and infrared scanners have been used to identify fire boundaries and hot spots, allowing for real-time transmission of fire maps to firefighters.

Freemium Business Model

According to a study conducted by Liu et al., Freemium is a business model that aims to provide a product or service that is free of charge, but consumers can opt to purchase a premium version with advanced features and functionality. Furthermore, they also mentioned that this business model strategy is observed in all mobile app markets like the Apple store, Google play, etc., Their study revealed that positive experience from freemium applications usually yields higher sales of a paid version of the same application. Moreover, they also found out that freemium applications with higher quality are likely to generate higher sales compared to those applications in higher visibility but without quality products.

Meanwhile, Josmivoski et al., analyzed the product life cycle of freemium applications that consists of five major steps namely, product development, introduction, growth, maturity, and lastly decline. Their study also covers the concepts of two different types of freemium models which are called feature limited freemiums (FLF) which focuses on having basic features, and subscriptions are used in order to unlock other functionalities, on the other hand, time limited features (TLF), they defined it as applications that provide full functionality of the said application on a limited amount of time. Based on their findings TLF are usually less successful compared to FLF.

Status of Smartphone Market in the South East Asia region and the Philippines

According to the data reported by the International Data Corporation (IDC), the market of mobile smartphones in the Philippines grew by at least 6.1% or almost 18 million units in the year 2024. The data also indicates that Transsion dominated the market with at least 37.3% market share during 2024, followed by realme with 13.3%, vivo and oppo with 11.0% market share respectively. Meanwhile, another statistical data this time from Canalys reported that in the whole South East Asia (SEA) region, Oppo led the mobile market with at least 16.9 million shipments made or at least 18% of market share, followed closely by South Korean brand Samsung with 16.6 million shipments or 17% market share.

Leveraging Firebase for Mobile and Web

Chougale, Yadav, and Gaikwad (2024) describe Firebase as a robust cloud-based solution that addresses the challenges of managing large volumes of unstructured data, such as images, videos, and text, which traditional relational databases (RDBMS) often struggle to handle efficiently. They highlight Firebase's Realtime Database and Firestore, which leverage NoSQL technology to ensure seamless data synchronization across devices, with Firestore providing additional offline support. Firebase Cloud Storage further simplifies the handling of user-generated content, making it a powerful tool for mobile and web applications. In addition, Firebase offers various other services that enhance application development. Tools like Cloud Tasks enable scalable application management, while Firebase Notifications allow for targeted user alerts. Firebase ML Kit APIs also provide

developers with the ability to integrate machine learning features into their applications with minimal expertise, making Firebase an ideal choice for Android app development.

Chandra et al. (2024) support Firebase's advantages by comparing its database performance to MySQL. Their study, which used the Wilcoxon Signed-Rank test on CRUD operations, demonstrated that Firebase Realtime Database outperforms MySQL in terms of database response time. They emphasize that Firebase simplifies backend development, reducing the need for extensive server-side management and enabling developers to focus on building applications. This makes Firebase particularly suitable for mobile applications that require fast response times and efficient data synchronization across devices.

Bachchaw et al. (2020) further reinforce Firebase's capabilities by outlining its versatility as a cloud-based platform that enhances mobile and web development. Firebase Authentication allows for easy user sign-in through various methods such as phone numbers, passwords, and popular identity providers like Google, Facebook, and Twitter. Firebase's real-time data synchronization features, including the Realtime Database and Firestore, provide developers with a powerful foundation for building responsive apps. Firebase Storage, leveraging Google Cloud Storage, offers secure and cost-effective file storage for user-generated content. Firebase Test Lab also provides a cloud infrastructure for testing Android apps on a range of devices, while Firebase Crashlytics ensures real-time crash reporting, allowing developers to quickly address issues. Firebase Notifications provide an effective means for developers to engage users through targeted alerts.

MongoDB in Modern Application

Rathore and Bagui (2024) highlight MongoDB as a flexible and scalable NoSQL database that plays a critical role across various industries, including artificial intelligence (AI), cloud applications, the Internet of Things (IoT), and smart environments. Its document-oriented model allows efficient handling of diverse data structures, making it particularly valuable in finance, IT, e-commerce, and mobile applications. MongoDB's single-view functionality enhances real-time data access, supporting use cases such as personalization, catalog management, and content delivery. Additionally, it modernizes payment systems, facilitates serverless applications, and optimizes data retrieval in gaming and mainframe modernization.

MongoDB's ecosystem, including MongoDB Atlas, Compass, and Charts, provides developers with robust tools for database management and visualization. Key features such as ad hoc queries, real-time aggregations, auto-scaling, in-memory storage, and advanced security controls support data-driven decision-making and customer analytics. Cloud integration further extends MongoDB's capabilities, with MongoDB Atlas offering a fully managed cloud database service that eliminates the need for local installations while supporting various cloud models, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

MongoDB's applications in IoT are particularly noteworthy, as it efficiently manages real-time data streams from connected devices, accommodating both structured and

unstructured sensor data for rapid retrieval and analysis. Its flexible schema makes it valuable for predictive maintenance, asset tracking, smart metering, and connected vehicle systems. Leading companies such as Bosch, Toyota, and Vaillant leverage MongoDB for IoT infrastructure in smart factories and vehicle monitoring systems. Beyond IoT, MongoDB plays a crucial role in smart environments, including smart cities, smart homes, and industrial automation. By processing vast amounts of real-time sensor data, MongoDB supports applications such as traffic management, energy optimization, and environmental monitoring.

Fotache and Cogean (2013) provide a broader perspective on the NoSQL movement, emphasizing MongoDB's rise amid increasing limitations of traditional relational databases. While relational databases remain dominant, NoSQL solutions have gained traction due to their schema flexibility and ability to handle unstructured data at scale. Some researchers fully endorse NoSQL, while others critique its trade-offs, with a growing body of literature advocating a hybrid approach that integrates relational and NoSQL technologies. Asay (2013) identifies two major weaknesses of relational databases in mobile applications: rigid schema constraints and an inability to accommodate diverse data structures. Selvadurai (2013) further recommends NoSQL databases for mobile applications requiring scalability and high-speed data management. Within the NoSQL landscape, MongoDB stands out due to its wide adoption, scalability, and cloud compatibility.

Fotache and Cogean (2013) also explore MongoDB's technical capabilities, particularly its integration with Java-based applications. They discuss how the MongoDB Java driver facilitates seamless connectivity by providing a thread-safe connection pool, authentication support, and efficient query execution. MongoDB's aggregation framework, accessible via Java drivers, enables advanced data analytics, allowing developers to perform complex operations on large datasets. They also highlighted MongoDB's role in cloud-based database services, where platforms such as MongoLab (now part of MongoDB Atlas) provide scalable storage and multi-cloud deployment options, including Amazon Web Services (AWS), Microsoft Azure, and Joyent. These services support data replication, automated backups, and real-time monitoring while offering various pricing tiers based on storage and processing needs. Despite some limitations, cloud-hosted MongoDB solutions simplify database management, ensuring scalability, high availability, and reduced administrative overhead.

Google SSO Integration for Applications

Purwinarko, Hardyanto, and Adhi (2024) discuss the importance of Single Sign-On (SSO) systems in simplifying user authentication for web-based services. By reducing the need for multiple credentials, SSO enhances security and makes access to services like library systems, academic portals, and financial platforms more convenient. With a single login, users can access multiple services, improving both efficiency and ease of use. Different SSO methods include form-fill authentication, Federated Identity (OIF), and SSO

Protected (OAM). SSO services often rely on Identity Provider (IDP) platforms like Facebook, Google, and LinkedIn, enabling social logins that allow users to sign in once and access multiple applications securely. There are two main ways to implement SSO in different software environments: (1) using authentication software that automatically provides credentials, and (2) integrating with existing authentication processes. SSO reduces the number of login details users need to remember and speeds up access to services. OAuth 2.0 is a commonly used authorization framework that allows secure access to web services without storing user passwords. It improves security by letting users grant access to only specific resources instead of sharing full account access. Many social media platforms use OAuth 2.0 for authentication, allowing third-party applications to integrate login services. For example, Google's OAuth 2.0 API enables developers to verify user identities and control access to content. Using Google OAuth 2.0 removes the need to manage multiple usernames and passwords, making authentication simpler and more secure.

MapaKalamidad.ph

MapaKalamidad.ph is a crowd-based, social media-powered platform designed to collect, organize, and disseminate real-time hazard information during emergency events. It leverages social media to gather, verify, and display critical data into actionable insights for residents, communities, and government agencies. The platform was developed by Yayasan Peta Bencana with support from MIT's Urban Risk Lab and operates as a free,

transparent platform for emergency response and disaster management in megacities across South and Southeast Asia. The platform uses CogniCity Open Source Software to geospatially classify and visualize confirmed reports, enabling informed decision-making during emergencies. Central to its design is the “people are the best sensors” principle, where verified reports are collected directly from users at street level, bypassing the need for costly and time-intensive data processing. This real-time data is presented on a mobile-friendly, data-light web map, accessible to the public for viewing and sharing. The platform incorporates AI-assisted humanitarian chatbots to engage with disaster-related social media posts. These chatbots prompt users to confirm observations through structured disaster reports, which are then instantly verified and displayed on a live map.

HazardHunterPH

HazardHunterPH is the Philippines' one-stop shop for hazard assessment services. It allows the user to quickly and easily generate hazards assessment reports of the user's selected location. With its full features now on mobile devices, it makes hazard assessment portable 24/7. The core features of HazardHunterPH Mobile are:

It finds out if a location is safe or prone to seismic, volcanic, or hydro-meteorological hazards. It generates hazard assessment reports with explanations and recommendations. Sees which areas in the Philippines are prone to different hazards. Display exposure of schools, hospitals, and roads to various hazards and view up-to-date hazard and risk information from mandated government agencies.

AI Tool That Will Aid in Flood Patterns

According to Baltazar et al. (2024), the Philippines, a disaster-prone country, is utilizing AI technologies to improve disaster prediction, risk management, and mitigation. A study conducted between June 2023 and March 2024 found that machine learning and neural networks have significantly improved disaster forecasts by processing extensive datasets from meteorological, seismic, and geographical sources. AI-driven models are enhancing the accuracy of predictions for typhoons, earthquakes, and flood risks, contributing to more effective early warning systems and timely evacuation protocols. However, challenges such as infrastructure limitations, budget constraints, and data quality hinder the full adoption of AI in disaster risk management. The study suggests that AI holds immense potential to revolutionize disaster response strategies in the Philippines, but further research is needed to address technical barriers and enhance AI's role in building resilient communities.

Recent studies highlight the role of machine learning modeling and forecasting in evaluating flood risk and communities' readiness for disasters during Tropical Storm Trami (Bagyong Kristine) in the Bicol area (Onsay et al., 2025). More precise forecasts of locations susceptible to flooding were made possible by the using machine learning techniques, which aided in the creation of focused prevention strategies.

According to Al-Rawas et al. (2024), AI, machine learning (ML), Internet of Things (IoT), cloud computing, and robotics an essential role in flash flood early warnings and

susceptibility predictions. It found that AI/ML was applied in 64% of published papers, followed by IoT (19%), cloud computing (6%), and robotics (2%). Common AI/ML methods include random forests and support vector machines. However, further optimization and emerging technologies like computer vision are needed. AI/ML algorithms have shown accurate prediction performance, but there is a need for larger test datasets. Early warnings can be disseminated via electronic media, but internet connectivity and data loss issues persist. AI/ML uses various variables, but their selection lacks a clear theoretical basis. Future studies should consider sociodemographic, health, and housing data for more reliable flood risk assessment maps.

Effectiveness of the System

According to Kuller et al. (2021), it examines research on warning communication and risk awareness in Flood Early Warning Systems (FEWS), highlighting the importance of comprehending how various audiences perceive the danger of flooding and the necessity of using efficient communication techniques to guarantee prompt and suitable answers.

Recent studies highlight how commuting behavior in Metro Manila is affected by flooding, demonstrating the role of warning systems in influencing travel decisions (Abad et al., 2020). Data collected suggests that adaptations occur more often during the trip to work than during the return to home, mainly involving changes to departure times. The outcomes of binary logit models suggest that adaptations primarily depend on the respondent's commute and employment situation. Perceived flood characteristics,

sociodemographic profile, and commuters' beliefs about changes in flood frequency were all factors that played a role but were less weakly associated with the inclination to adapt commuting behavior. The analysis provides recommendations for transit agencies and employers to help affected travelers adapt to travel conditions during flood events without compromising household or workplace commitments.

According to Kurata et al. (2023), it assesses Filipinos' readiness for disasters in flood-prone areas using the Protection Motivation Theory and the Theory of Planned Behavior. It supports the development of flood alert systems by highlighting how preparation actions are shaped by risk perception, media impact, personal encounters, and social standards.

Recent studies also highlight the economic value of flood forecasts and early warning systems (FFEWS) in mitigating flood-related damages (Van Houtven, 2024). As population growth, economic development, and climate change are increasing the risks of inland flooding globally. As a result, flood mitigation approaches like flood forecast and early warning systems (FFEWS) must be considered and evaluated. Cost-benefit analysis (CBA) has been used to assess flood mitigation investments, but a growing body of research has focused on assessing the benefits of information-based approaches like FFEWS. This review summarizes research on the economic benefits of FFEWS using

value-of-information (VOI) analysis, emphasizing the role of FFEWS in improving protective action decisions and flood-related outcomes. A systematic search of 66 articles and reports from 1970 to 2023 in over 15 countries found that few studies applied a VOI-based approach, and most estimated VOI in relative terms. Nearly half of the studies used expert assessments or surveys to quantify the effectiveness of warnings for prompting protective actions and reducing damages. However, evidence regarding the economic value of avoided flood damages is limited, particularly for the US.

According to Kim et al. (2021), the Philippines ought to inquire about creating an individual Department of Disaster Resilience with the mission, power, organizational structure, resources, and technological know-how to efficiently prepare for and respond to catastrophes. These institutional structures may have an impact on how well flood warning systems.

Comparative Analysis

Table 2. Comparative analysis of different key findings

Study	Key Findings	Relevance
Creating effective flood warnings: A framework from a critical review (Kuller et al., 2021)	Highlights the significance of knowing how various audiences see the risk of flooding and the necessity of using efficient communication techniques.	Proposes that in order to improve responsiveness, It should concentrate on customizing alerts to the requirements and risk perceptions of individual travelers.
Commuting behavior adaptation to flooding: An analysis of transit	Indicates how commuters modify their travel habits in reaction to floods, with	Suggests that in order to support decision-making, flood alarm systems ought

users' choices in Metro Manila (Abad et al., 2020)	morning travels seeing the most adjustments.	to include real-time data, especially during the most active periods for travel.
Factors Affecting Flood Disaster Preparedness and Mitigation in Flood-Prone Areas in the Philippines: An Integration of Protection Motivation Theory and Theory of Planned Behavior (Kurata et al., 2023)	Examines disaster preparedness using the Theory of Planned Behavior and Protection Motivation Theory, demonstrating how standards in society, media coverage, and people's experiences affect flood preparedness.	Emphasizes how behavioral data must be included into FEWS to enhance user involvement and preparedness evaluations.
Economic Value of Flood Forecasts and Early Warning Systems (Van Houtven, 2024)	Evaluates the financial advantages of FEWS through information analysis, demonstrating how they enhance preventative measures and lessen damages caused by flooding.	Demonstrates the value of investing in real-time flood notifications and supports their affordability.
A Comparative Study of the Disaster Management Organizations in the Philippines, South Korea, and the United States (Kim et al., 2021)	Suggests creating a Department of Disaster Resilience in the Philippines to improve management of responses to disasters.	Emphasizes how crucial financial backing is to the long-term viability of flood alert systems.

The Table above (Table 2) highlight the importance of flood early warning systems (FEWS) in limiting the effects of flooding, especially on commuters and emergency preparedness efforts. Flood warnings should take into account how various audiences view danger, since this effects their susceptibility to alerts (Kuller et al., 2021). Furthermore, commuters change how they commute in reaction to floods, making it critical for flood

early warning systems to provide updated information, particularly during travel (Abad et al., 2020).

Societal standards, social media, and personal situations all influence flood preparedness, which highlights the necessity of behavior-based methods in FEWS to improve public participation (Kurata et al., 2023). Another important factor to take into account is the cost of flood warning systems. As early warning system spending have been shown to lower financial losses and increase cost-effectiveness (Van Houtven, 2024). Additionally, it has been proposed that the Philippines create a Department of Disaster Resilience to improve disaster preparedness and provide sustained funding for flood prevention efforts (Kim et al., 2021).

The overall findings highlight the need for FEWS to include user-specific data, real-time updates, and support from institutions in order to move above basic warnings. More efficient and long-lasting flood prevention plan can result from a well approach that incorporates behavioral insights, economic arguments, and organized disaster preparedness strategies, especially for commuters in flood areas.

Table 3. Comparison between different systems

System	Source of Information	Update Frequency	Reliability	Accessibility	Effectiveness for Commuters

Social Media	Crowdsourced posts from individuals	Real-time but unverified	Prone to misinformation	Widely used	Widely used but unreliable
Government Alerts	Official reports from PAGASA, MMDA, NDRRMC	Not real-time	Verified but often delayed	Requires app or website access	Useful but not frequent enough
Traditional FEWS (Project NOAH, etc.)	Sensor-based data & flood models	Periodic	Scientific accuracy	Not commuter-focused)	Mainly for disaster planning, not real-time travel decisions
GABAY App	Multi-source: government agencies, GPS-based tracking, user reports	Real-time updates	Cross-verification of data sources	Mobile app, instant alerts	Location-based, travel-specific information

Table 3. highlights the strengths and weaknesses of existing flood warning systems and how GABAY addresses these gaps. Social media, while offering real-time updates, is unreliable due to misinformation. Government warnings are accurate but often delayed, making them less useful for immediate commuter decisions. Traditional Flood Early Warning Systems focus on large-scale forecasting rather than real-time, location-specific updates. GABAY improves on these by integrating multiple verified data sources, including government reports, real-time GPS tracking, and user-submitted reports, ensuring both accuracy and speed. Unlike other systems, GABAY provides continuous, real-time alerts tailored for commuters, helping them navigate flood-prone areas safely. By

consolidating and verifying information, GABAY minimizes misinformation, enhances preparedness, and directly addresses travel disruptions. Its mobile-first approach ensures accessibility, allowing users to receive instant, location-based alerts, making it a more effective solution for urban flood management.

CHAPTER III. METHODOLOGY

Systems Architecture

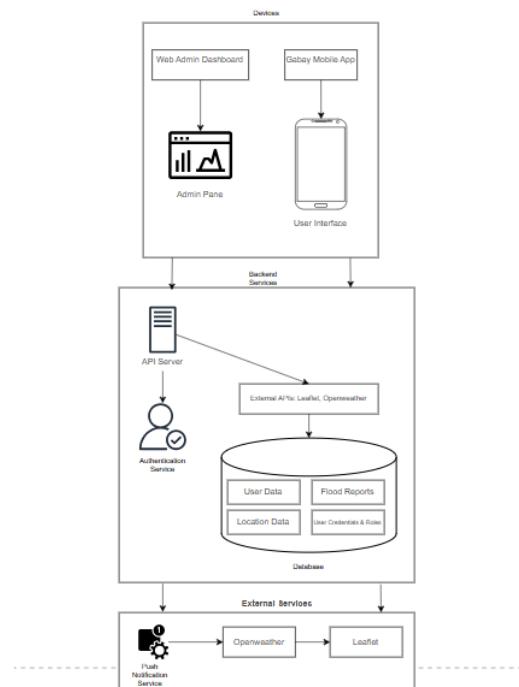


Figure 2. Gabay System Architecture

Figure 2. showcases the system architecture of Gabay, the architecture is broken down into three parts namely the devices, backend services, and external services. The components included under the devices are the following namely Gabay Mobile Application that is mainly used by the travelers, and the Gabay Web Application which is handled by the system administrators. Travelers who use the mobile application can report floods, check weather and flood updates, and receive notifications. Meanwhile the role of the web application is for the administrator to monitor reports and validate uploaded

content sent by the travelers through the aid of a dashboard. Furthermore, for the backend services, aside from handling information and system operations, they are also responsible for the database which serves as the source of information gathered from the users uploaded content. Lastly, API's such as Leaflet and OpenweatherAPI are used as a source for external services, these API would help in providing real-time map rendering (Leaflet), and weather forecasts (OpenweatherAPI).

Software Development Lifecycle Methodology

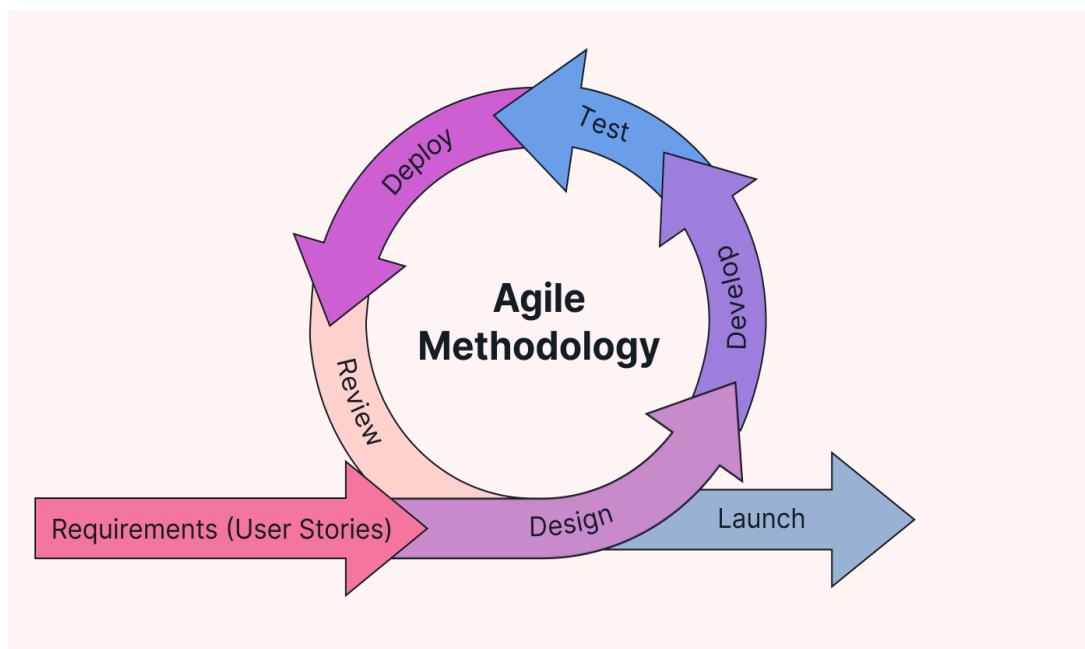


Figure 3. Depicting the flow of Agile Methodology

Figure 3. illustrates how an agile methodology lifecycle works in the field of project management, an agile framework methodology works by breaking down the whole project into several phases known as sprints. This framework uses an iterative approach whereas every member involved in the project discusses potential improvements after every iteration called as “sprints”, to further improve the project.

Furthermore, Kumar et al., identified four fundamentals of an agile project which are the following; adaptive planning, iterative and evolutionary development, rapid, and

being flexible. Their study also emphasizes that implementing an agile approach can provide a positive impact both the customers (users) and the developers. The researchers also enumerated reasons on why using an agile approach improves the overall software development process, these includes; earlier fault detection, less lead time for testing, and improved overall communication.

Developers of the GABAY mobile application will implement a type of agile methodology which is called Scrum, as the developers believe that the advantages of implementing a scrum approach in mobile development outweigh the disadvantages, as this method ensures the ability to be flexible, and adaptable to changes throughout the development process.

Requirements Analysis

Table 4. Showing the features and functionalities of the Gabay Application

Features	Functionalities
Authentication	<ul style="list-style-type: none"> • Ensures a secure access that registered and unregistered users are verified through logging in with correct credentials

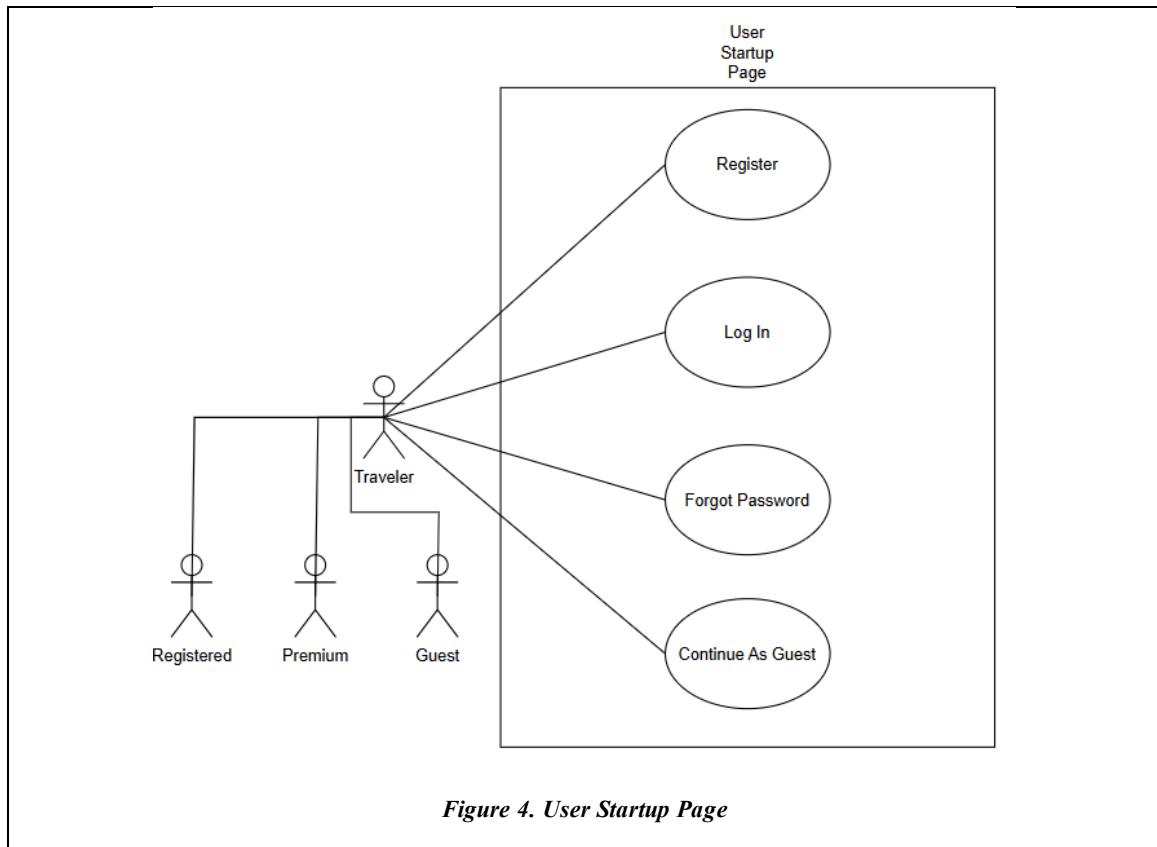
Authorization	<ul style="list-style-type: none"> Ensures that guest travelers, registered & subscribed travelers have proper permissions on what functions their account can do.
Geotagging / Geolocation	<ul style="list-style-type: none"> Ensures that data sent by registered and/or subscribed travelers are based on their current location to provide accurate detail of current flood level updates.
Crowdsourced data for flood level updates	<ul style="list-style-type: none"> Unique feature of our application whereas travelers can provide real time information to other application users.
News Update	<ul style="list-style-type: none"> Provide latest news that will be also be used in cross referencing the crowdsourced data.
Image Verification using API	<ul style="list-style-type: none"> Helps administrator in ensuring the authenticity of media files uploaded by the users Ensures that users abide the terms and conditions in uploading media

Weather API Implementation	<ul style="list-style-type: none"> Provide real-time weather data which also plays an important role in flood level updates.
Personalized notifications	<ul style="list-style-type: none"> Registered and subscribed travelers are notified through notifications based on their desired preferences and location.
Premium subscription	<ul style="list-style-type: none"> Provides registered travelers to experience enhanced functionality like an ad-free experience.
Payment Gateway	<ul style="list-style-type: none"> Allows potential subscribers to have a secure payment method in purchasing premium subscriptions. By implementing an API that validates and authenticates payment
Bilingual support	<ul style="list-style-type: none"> Ensures that the proposed mobile application captures a broader scope of audience by providing both English and Filipino language
Create analytical reports	<ul style="list-style-type: none"> Administrators can create analytical reports to determine the user activity and engagement on the platform.
User Management	<ul style="list-style-type: none"> Administrator has the capacity to suspend and/or delete registered and subscribed travelers in case of violating the terms and conditions with regards to the use of Gabay mobile application.

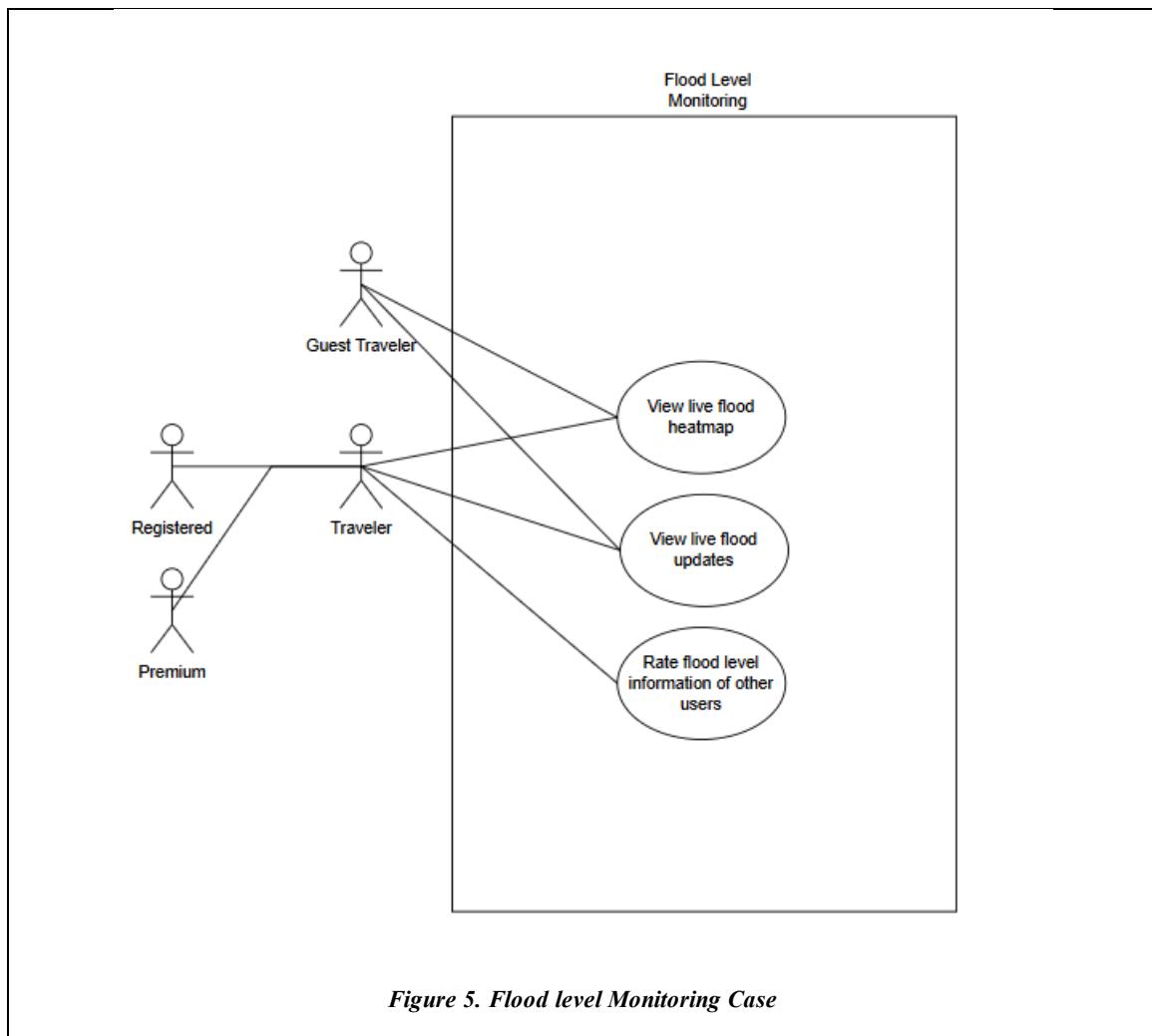
Requirements Documentation

Use Case Diagram

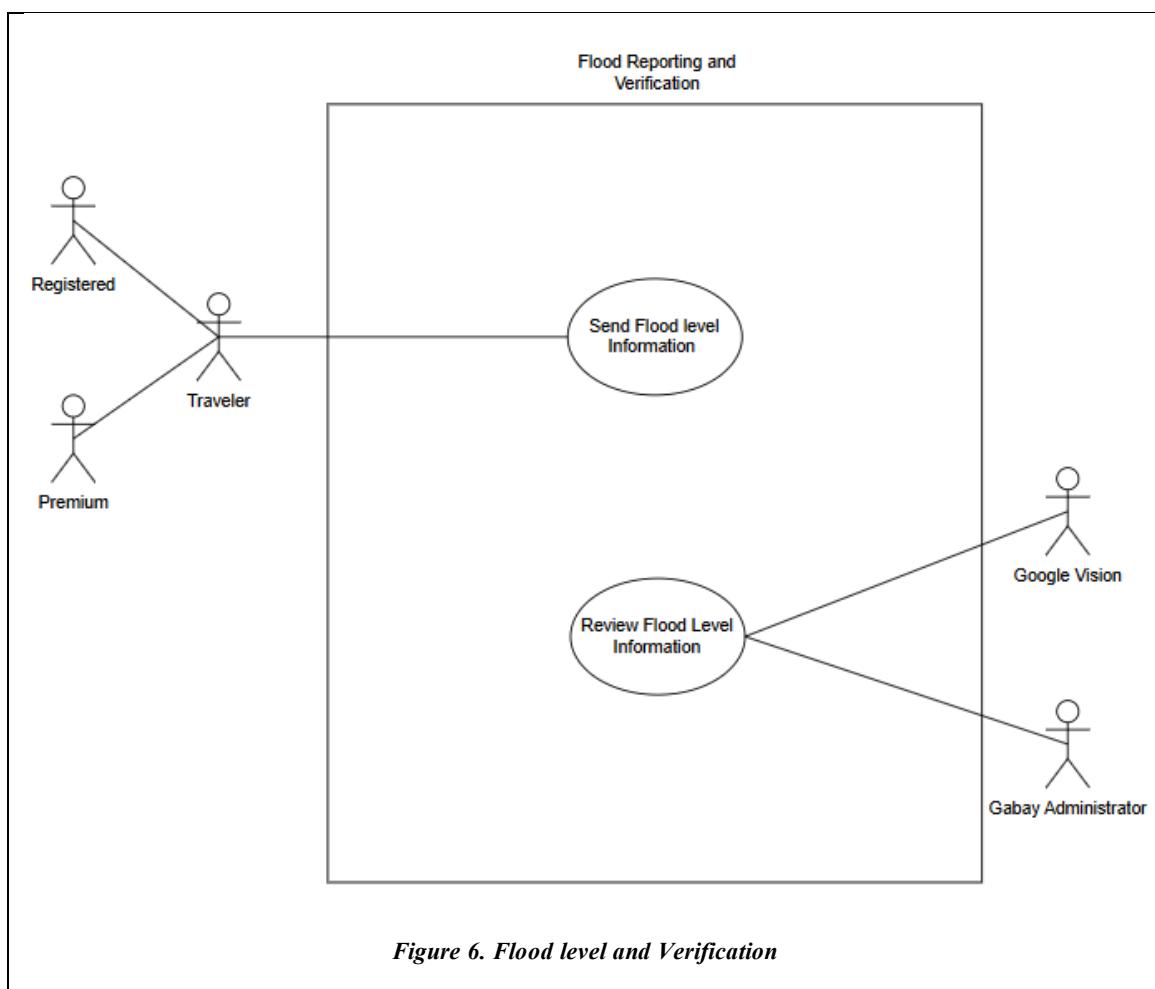
Use Case Diagram	Reference Number: <i>UCD-01</i>
	Version Number: 3.0
System Name: Gabay Startup Page	



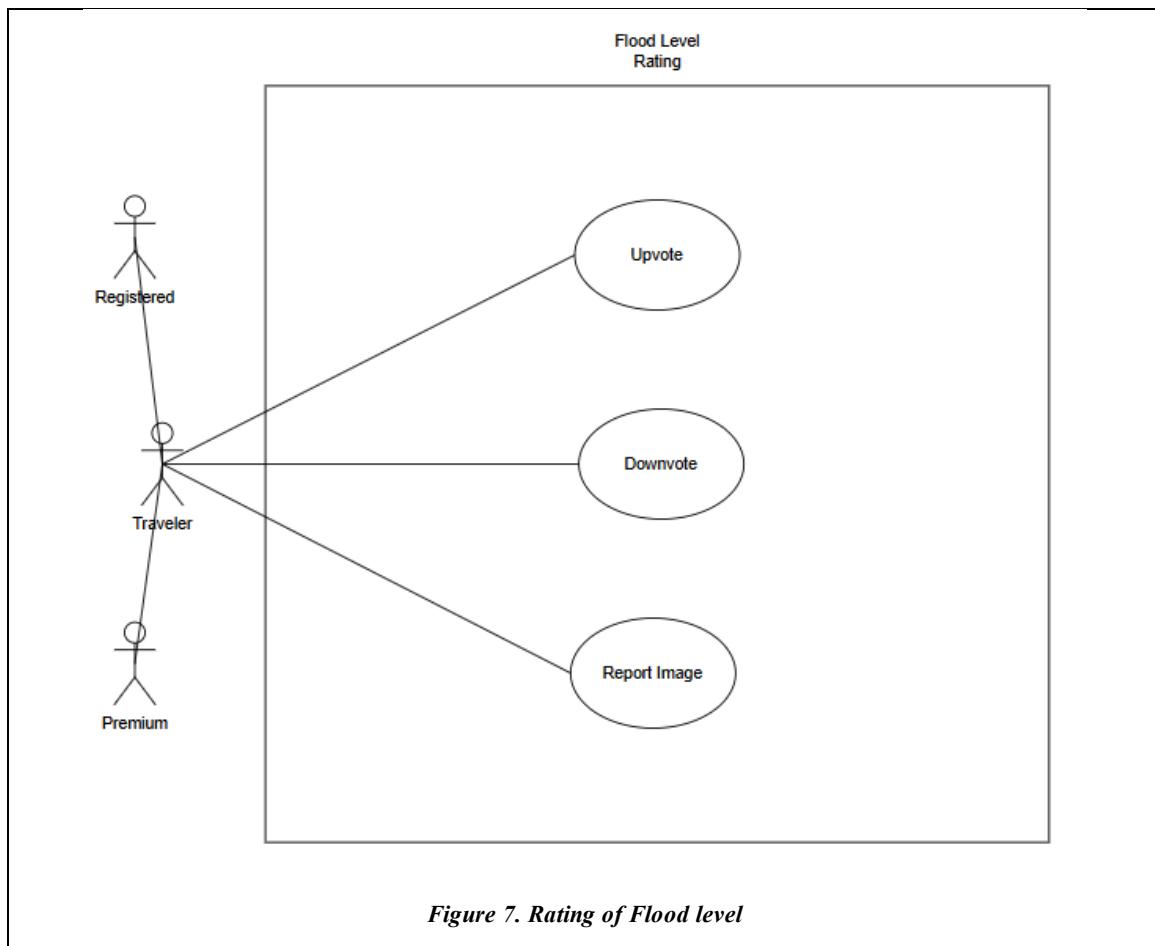
Use Case Diagram	Reference Number: <i>UCD-02</i>
	Version Number: 3.0
System Name: Flood level Monitoring	



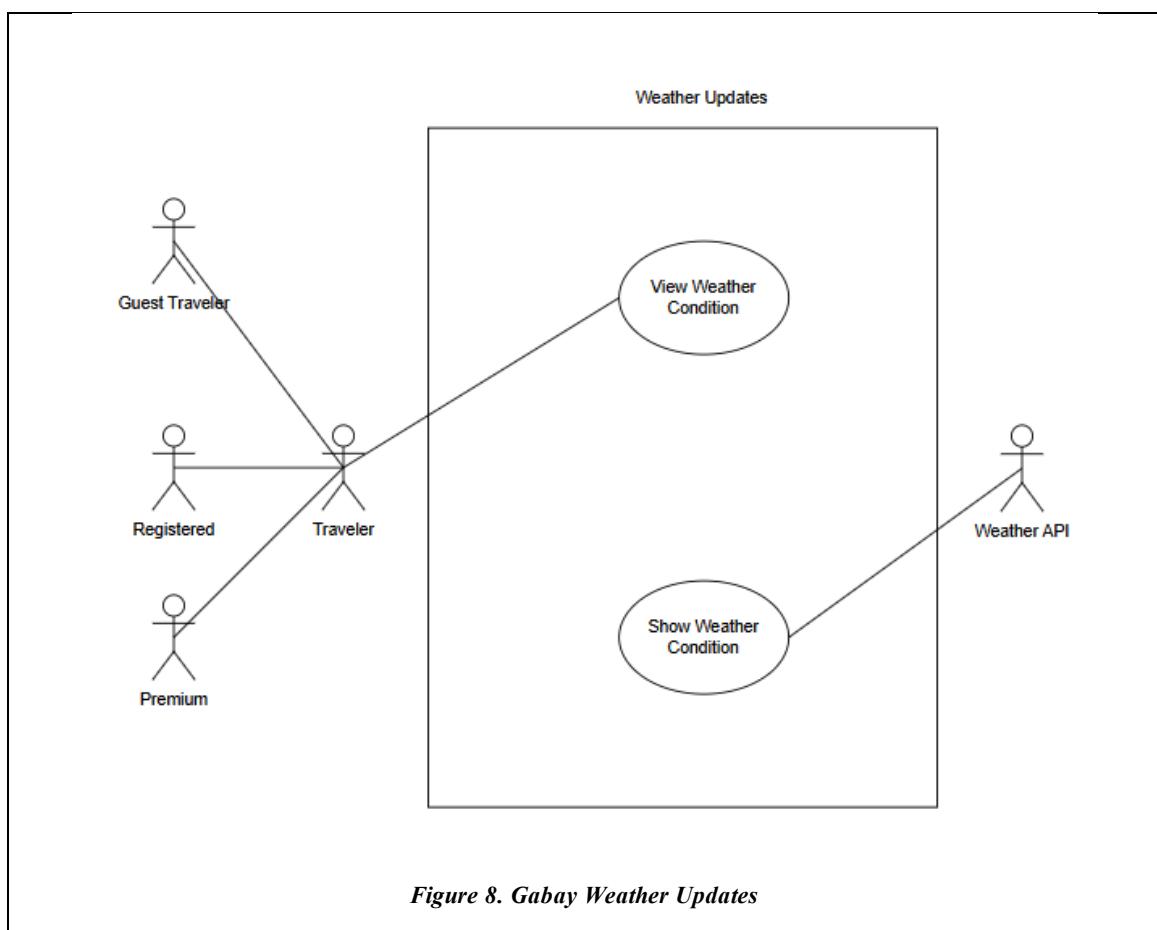
Use Case Diagram	Reference Number: <i>UCD-03</i>
	Version Number: 3.0
System Name: Flood Reporting and Verification	



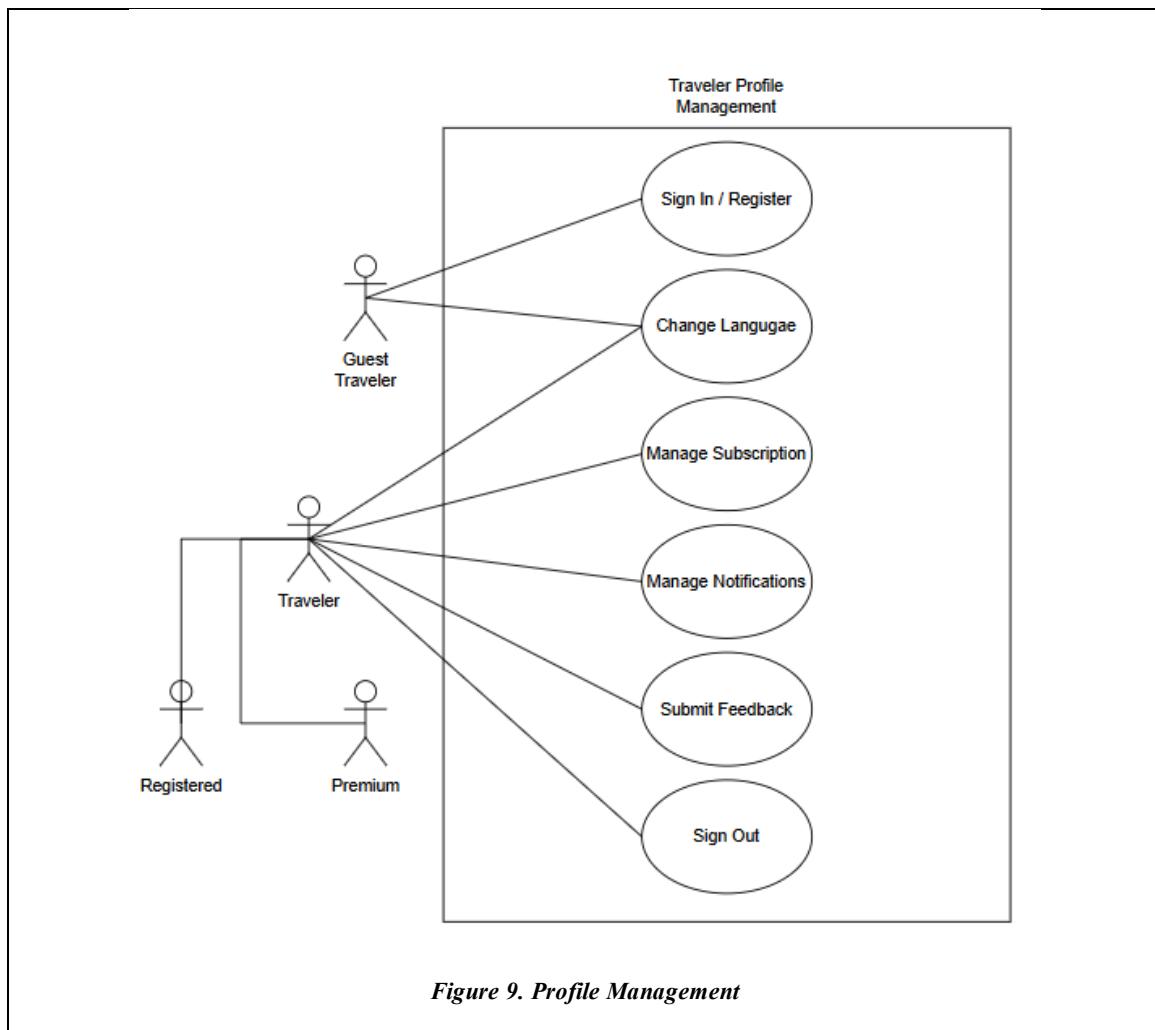
Use Case Diagram	Reference Number: <i>UCD-04</i>
	Version Number: 3.0
System Name: Rating of Flood Level	



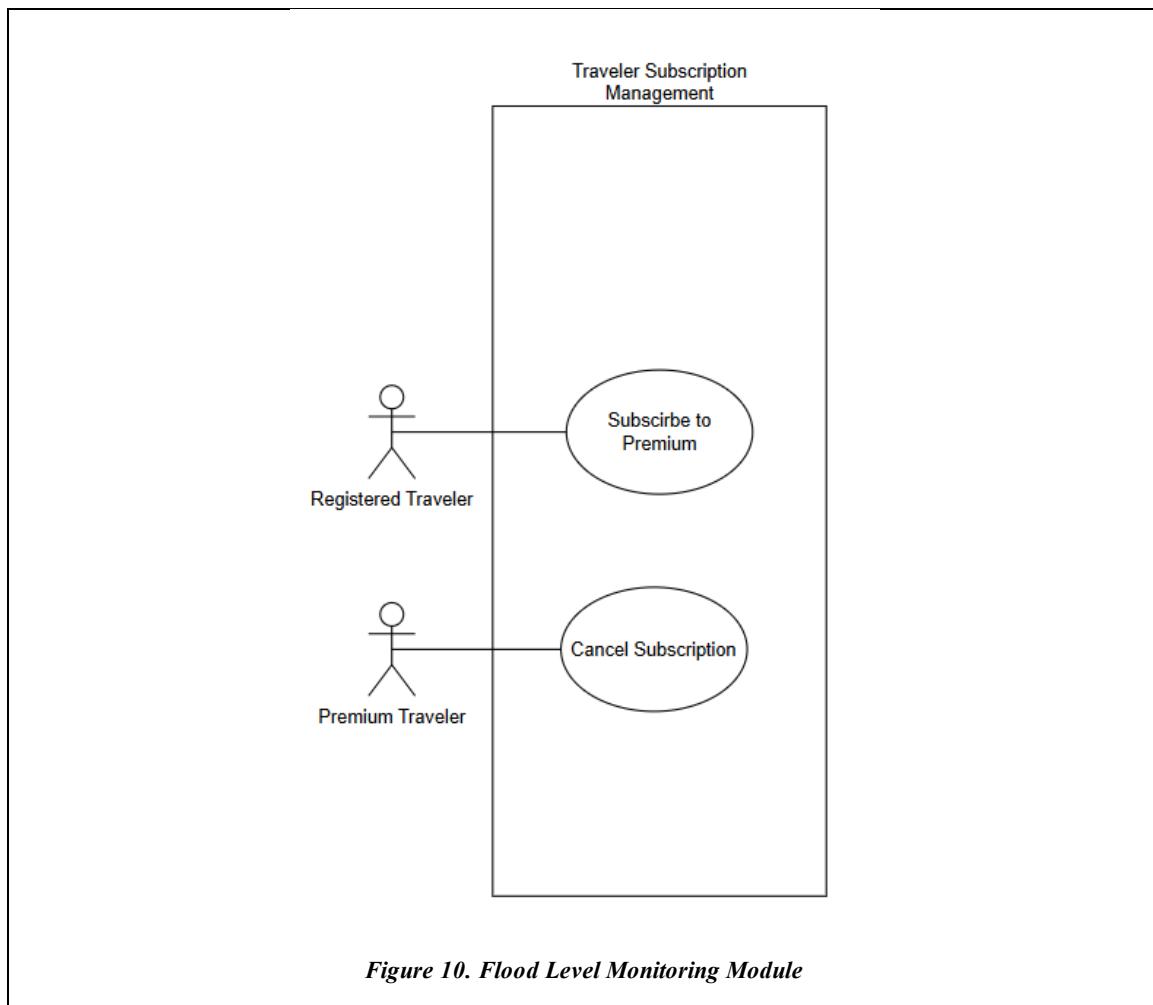
Use Case Diagram	Reference Number: <i>UCD-05</i>
	Version Number: 3.0
System Name: Gabay Weather Updates	



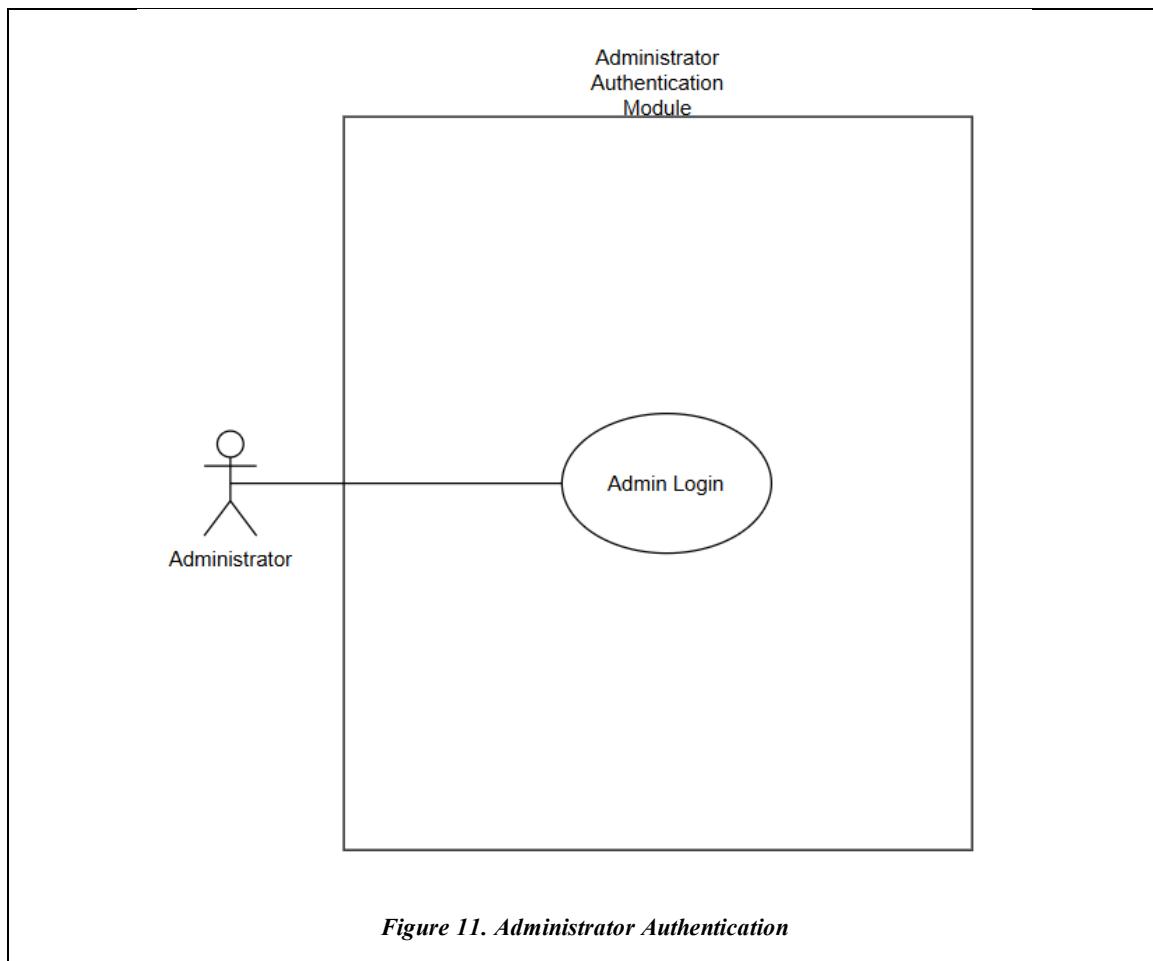
Use Case Diagram	Reference Number: <i>UCD-06</i>
	Version Number: 3.0
System Name: Traveler Profile Management	



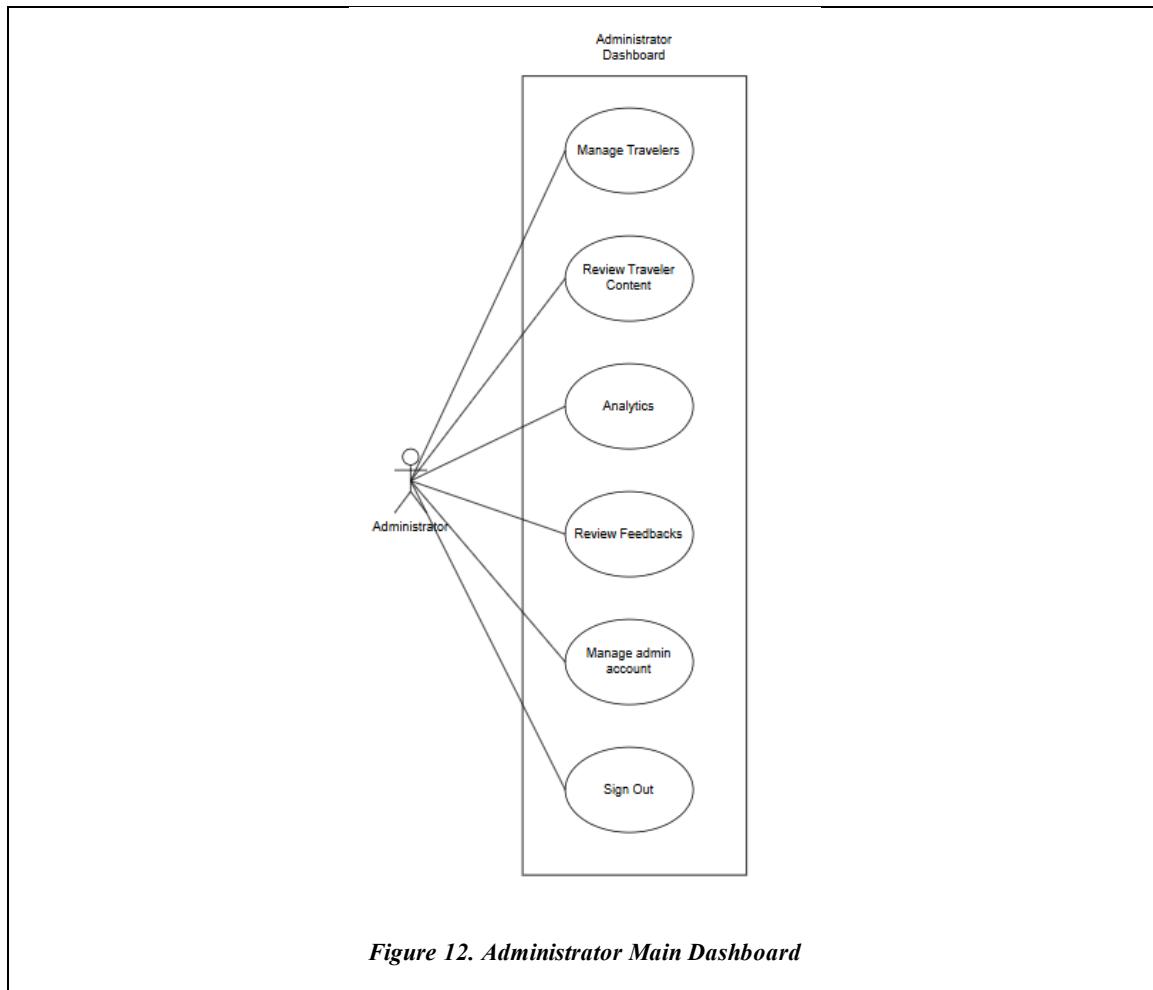
Use Case Diagram	Reference Number: <i>UCD-07</i>
	Version Number: 3.0
System Name: Manage Subscription	



Use Case Diagram	Reference Number: <i>UCD-08</i>
	Version Number: 3.0
System Name: Administrator Authentication	



Use Case Diagram	Reference Number: <i>UCD-09</i>
	Version Number: 3.0
System Name: Administrator Main Dashboard	



Use Case Narrative**Identification Summary:****Title:** Register**Summary:** This use case narrative describes the process of signing up (user registration) to create a new account in the Gabay mobile application**Actors:**

1. Guest Traveler – A user who wishes to continue using the app without registering or choose to register to become a registered traveler.
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the startup page of the Gabay mobile application and clicks on the Sign up button.

Flow of Events:

1. After the traveler opens the Gabay mobile application, the traveler has four options which are the following: Login, Sign Up, Continue as Guest, and Forgot Password

2. The traveler selects Sign Up
3. The system will then redirect the traveler to the sign up (registration) page
4. If the traveler enters the following credentials; First name, Last name, Email Address, Password and Confirm Password
5. The traveler then submits the registration form
6. The system would then validate the details that were entered by the traveler
7. If the details are valid the system would then send a verification code for the traveler via email
8. The traveler then receive the verification code
9. The system would then validate the verification code entered by the traveler
 - o If the code is correct the traveler is successfully registered to the mobile application
 - o If the code is incorrect the traveler is prompted to re-enter the code or request a new code from the system
10. Upon successful signing up (registration) the traveler is then redirected to the login page.

Alternative Flow:

- A1: If the email is already registered, the system will notify the traveler that the email address provided is already in use
- A2: If a field during the registration process is missing or invalid, the system will provide a message prompt to correct the details before submitting

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler has successfully registered a new account and can now proceed to login
- The traveler is redirected to the startup page (login page)

UI Requirements:

- Clear input fields
- Submit buttons
- Error message for invalid inputs

Identification Summary:

Title: Login

Summary: This use case narrative describes the process of logging in (user authentication) to verify the user.

Actors:

1. Registered Traveler – A user who wishes to continue using the app by registering and undergoing a verification process
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler is currently on the startup page of the Gabay mobile application and wants to access the Gabay homepage

Flow of Events:

1. After the traveler opens the Gabay mobile application, the traveler has four options which are the following: Login, Sign Up, Continue as Guest, and Forgot Password
2. The traveler enters their email address and password

3. The traveler then clicked on the login button
4. The system would then verify the credentials entered by the traveler
5. If the credentials are correct the traveler is then redirected to the main homepage of the Gabay mobile application
6. If the credentials are invalid the system will prompt the traveler to enter the email address and password or the traveler can also choose the option of forgot password

Alternative Flow:

- A1: If the traveler inputs the incorrect credentials, the system will provide an error message indicating that the email address or password is incorrect
- A2: If the traveler forgets their password, the traveler can then proceed to the forgot password to reset their password.
- A3 If the traveler opted to sign in using Google account or Facebook account, upon clicking the respective button they will be redirected to the appropriate login page

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler is redirected to the Gabay Homepage

UI Requirements:

- Clear input fields for both email and password
 - Sign in button
 - Error message for invalid inputs
-

Identification Summary:

Title: Continue As Guest

Summary: This use case narrative describes the process of changing a password if the traveler forgots their login credentials

Actors:

1. Registered Traveler – A user who wishes to continue using the app without registering or choose to register to become a registered traveler.
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler is currently on the startup page of the Gabay mobile application and wants to access the Gabay homepage

Flow of Events:

1. After the traveler opens the Gabay mobile application, the traveler has four options which are the following: Login, Sign Up, Continue as Guest, and Forgot Password
2. The traveler clicked the Continue as Guest button.
3. The traveler is redirected immediately to the Gabay mobile application homepage.
4. The system will also notify the traveler regarding the limited features available, and they may register or login to unlock some features

Alternative Flow:

- A1: If the traveler tries to access some features not available for guest users, the system will prompt them to either sign in or sign up.

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler is redirected to the main homepage of the Gabay mobile application while having limited access to the features
- The traveler has the option to either sign in or sign up

UI Requirements:

- Clear indication on what features and functionality guest users can access
- Notifications that encourages travelers to either sign up or sign in
- Ease of navigation through sign up or sign in.

Identification Summary:

Title: Forgot Password

Summary: This use case narrative describes the process of a registered or premium traveler who has forgotten their password and needs to reset it to regain access to their Gabay App account.

Actors:

1. Registered Traveler – A registered or premium traveler who has forgotten their password and wishes to reset it.
2. Authentication Service – The service responsible for handling and confirming the password change.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the startup page of the Gabay mobile application and wants to access the Gabay homepage

Flow of Events:

1. The traveler requests a password change from the login page by selecting the "Forgot Password" link.
2. The system prompts the traveler to enter the email associated with their account.
3. The traveler enters their email and submits the request.
4. The system validates the entered email to ensure it is associated with an account.
5. If the email is valid, the system sends a verification code to the email address
6. The traveler enters the verification code provided by the authentication system
7. If the traveler enters the correct verification code proceed to the next page which is entering a new password.
 - a. If the traveler enters the incorrect verification code prompt the traveler to enter the correct verification code or resend new verification code.

8. The system prompts the traveler to enter a new password.
9. The traveler enters a new password and confirms it.
10. The system confirms the password change and completes the reset process.
11. The traveler can now log in using the new password.

Error Sequences:

- E1: If the entered email is not found, the system displays: "Email not found. Please check your email address."
- E2: If the new passwords do not match, the system displays: "Passwords do not match. Please try again."
- E3: If there's a technical issue in sending the reset link, the system displays: "There was an issue sending the reset link. Please try again later."

Post-Conditions:

- The traveler has successfully reset their password and can log in with the new password.

UI Requirements:

- A clear input field for the traveler's email.
- A "Submit" button to request the password reset.

- A confirmation message after a successful password reset: "Your password has been reset. You may now log in with your new password."
 - A link to return to the Log In page after resetting the password.
-

Identification Summary:**Title:** View Live Heatmap

Summary: This use case describes the process for Guest Travelers, Registered Travelers, and Premium Travelers in providing a visual representation of flood in real-time using a heatmap

Actors:

1. Guest Traveler – A user without an account who has limited access to the app.
2. Registered Traveler – A traveler with an active account, who has access to basic features.
3. Premium Traveler – A traveler with a premium subscription, who has access to all features.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler has logged in or continued as a Guest
- The traveler is currently in the homepage of the Gabay Mobile Application
- The traveler must already have their current location and destination set

Flow of Events:

1. The traveler (Guest/Registered/Premium) must enter their current location and their destination
2. The system will look for data from crowdsourced information and official and trusted sources
3. The flood heatmap will show with each color indicating what is the current level of the flood (Blue = Passable, Yellow = Moderately Passable, Red = Not Passable)
4. The user can interact with the map by zooming in and out the map

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."

Post-Conditions:

- The traveler has successfully view the latest heatmap

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application
 - Pleasing colors with regards to the heatmap
 - Easy-to-access buttons for other feature and functionality
-

Identification Summary:

Title: View Live Flood Updates

Summary: This use case describes the process for Guest Travelers, Registered Travelers, and Premium Travelers in checking the real-time flood updates on the Gabay Mobile Application

Actors:

1. Guest Traveler – A user without an account who has limited access to the app.
2. Registered Traveler – A traveler with an active account, who has access to basic features.
3. Premium Traveler – A traveler with a premium subscription, who has access to all features.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler must have access to the internet
- The traveler must be currently in the maps section of the mobile application

Flow of Events:

1. The traveler successfully logs in (or continues as a guest) and is directed to the main homepage.
2. The traveler enters their current location and location of interest
3. The user can scroll up and see the latest updates uploaded by other travelers
 - a. Guests can only see texts
 - b. Premium and registered users can see both texts and images, while also has the ability to upvote or downvote the content

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."

Post-Conditions:

- The user has successfully see the latest flood updates

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application
 - Easy-to-access buttons for Submit Flood Report, Manage Profile, and Manage Subscription.
-

Identification Summary:

Title: Rate Flood Information of other users

Summary: This use case describes the process for Registered Travelers, and Premium Travelers to validate or rate the accuracy of flood reports submitted by other Travelers

Actors:

1. Registered Traveler – A traveler with an active account, who has access to basic features.
2. Premium Traveler – A traveler with a premium subscription, who has access to all features.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler must have access to the internet

- The traveler must log in into their respective accounts

Flow of Events:

1. The traveler successfully logs in and is directed to the main homepage.
2. The traveler enters their current location and location of interest
3. The user can scroll up and see the latest updates uploaded by other travelers
 - a. Premium and registered users can see both texts and images, while also has the ability to upvote or downvote the content
4. The user can select the report which they want to rate (upvote, downvote, report image)

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."

Post-Conditions:

- The user has successfully rated the flood report

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application

- Easy-to-access recognize buttons for upvoting, downvoting, or reporting an image
-

Identification Summary:

Title: Send Flood Level Information

Summary: This use case describes the process for Travelers (Registered, Premium) on how they send flood information with the Gabay Mobile Application

Actors:

1. Registered Traveler – A traveler with an active account, who has access to basic features.
2. Premium Traveler – A traveler with a premium subscription, who has access to all features.
3. Google Vision – An API that analyzes the images uploaded by the traveler (registered, premium)
4. Gabay Administrator – A user who handles and has the authority in the Gabay Mobile Application

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler must have access to the internet
- The traveler must log in into their respective accounts
- Current location must be active

Flow of Events:

1. The traveler successfully logs in and is directed to the main homepage.
2. The traveler enters their current location
3. The traveler can send flood information by scrolling the appropriate flood level
4. The traveler can also opt to upload an image and text to further enhance the authenticity of content.

Alternative Flow:

- A1: The traveler can also opt not to upload either texts, or images.

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."
- E3 If no internet connection, the system displays: "No connection".

Post-Conditions:

- The user has successfully uploaded a flood report

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application
 - Easy-to-access and recognizable buttons for uploading flood contents
-

Identification Summary:

Title: Review Flood level information

Summary: This use case describes the process on how the system reviews the flood content uploaded by the travelers

Actors:

1. Google Vision – An API that analyzes the images uploaded by the traveler (registered, premium)
2. Gabay Administrator – A user who handles and has the authority in the Gabay Mobile Application

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v1.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The administrator must be logged in via the web application

Flow of Events:

1. The administrator clicked the archived section on the web application
2. The administrator can see the list of all contents uploaded by the travelers
3. The administrator can review contents flagged by Google Vision
4. The administrator can override the contents flagged by Google Vision

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If no internet connection, the system displays: "No connection".

Post-Conditions:

- The administrator can see the list and status of all uploaded contents by the traveler

UI Requirements:

- Clear dashboard displaying various functionality of the Gabay Web application
-

Identification Summary:**Title:** Upvote**Summary:** This use case describes the process for Travelers (Registered, Premium) on how they upvote a flood content uploaded by other travelers**Actors:**

1. Registered Traveler – A traveler with an active account, who has access to basic features.
2. Premium Traveler – A traveler with a premium subscription, who has access to all features.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler must have access to the internet
- The traveler must logged in into their respective accounts

Flow of Events:

1. The traveler successfully logs in and is directed to the main homepage.
2. The traveler enters their current location

3. The traveler can swipe the screen up to see the latest updates uploaded by other travelers.
4. The traveler can then click on the upvote button if the traveler deemed the information as accurate.

Alternative Flow:

- A1: The traveler can also opt to click either the report image button or downvote button if the content is inaccurate or violates privacy policy.

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."
- E3 If no internet connection, the system displays: "No connection".

Post-Conditions:

- The user has successfully upvoted a flood report

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application
- Easy-to-access and recognizable buttons for upvoting flood contents

Identification Summary:**Title:** Downvote**Summary:** This use case describes the process for Travelers (Registered, Premium) on how they downvote a flood content uploaded by other travelers**Actors:**

1. Registered Traveler – A traveler with an active account, who has access to basic features.
2. Premium Traveler – A traveler with a premium subscription, who has access to all features.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler must have access to the internet
- The traveler must logged in into their respective accounts

Flow of Events:

1. The traveler successfully logs in and is directed to the main homepage.
2. The traveler enters their current location

3. The traveler can then swipe the screen up to see the latest updates uploaded by other travelers.
4. The traveler can then click on the downvote button if the traveler deemed the information as incorrect.

Alternative Flow:

- A1: The traveler can also opt to click either the report image button if the content violates privacy policy or upvote if the information provided is accurate

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."
- E3 If no internet connection, the system displays: "No connection".

Post-Conditions:

- The user has successfully downvoted a flood report

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application
- Easy-to-access and recognizable buttons for upvoting flood contents

Identification Summary:

Title: Report an Image

Summary: This use case describes the process for Travelers (Registered, Premium) on how they report an image uploaded by other travelers.

Actors:

1. Registered Traveler – A traveler with an active account, who has access to basic features.
2. Premium Traveler – A traveler with a premium subscription, who has access to all features.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler must have access to the internet
- The traveler must logged in into their respective accounts

Flow of Events:

1. The traveler successfully logs in and is directed to the main homepage.
2. The traveler enters their current location

3. The traveler can then swipe the screen up to see the latest updates uploaded by other travelers.
4. The traveler can then click on the report image button if the traveler deemed that the image violates data privacy

Alternative Flow:

- A1: The traveler can also opt to click either upvote button if the information is accurate or downvote button if the content is inaccurate.

Error Sequences:

- E1: If there's a system issue loading the homepage, the system displays: "Unable to load homepage. Please try again later."
- E2: If flood or weather data is unavailable, the system displays: "Unable to retrieve data. Please try again later."
- E3 If no internet connection, the system displays: "No connection".

Post-Conditions:

- The user has successfully reported an offensive or inappropriate image.

UI Requirements:

- Clear layout displaying various functionality of the Gabay Mobile application
- Easy-to-access and recognizable buttons for upvoting flood contents

Identification Summary:

Title: View Weather Condition

Summary: This use case describes the process for Travelers (Registered, Premium, Guest) on how they view the current weather conditions

Actors:

1. Registered Traveler – A traveler with an active account, who has access to basic features.
2. Premium Traveler – A traveler with a premium subscription, who has access to all features.
3. Guest Traveler – A user without an account who has limited access to the app.
4. Weather API: The external service that provides weather data to the Gabay system.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler must have access to the internet

- The traveler must log in into their respective accounts or continue as guest.

Flow of Events:

1. The traveler selects Weather from the menu.
2. The Weather API will provide the current weather information.
3. Gabay Mobile Application will display the current weather information

Error Sequences:

- E1: If the weather data is unavailable, the system (Gabay) displays: "Unable to retrieve weather updates. Please try again later."

Post-Conditions:

- The traveler has viewed the latest weather information for their route.

UI Requirements:

- Current weather displayed clearly with icons.
 - Simple, clean layout with essential details.
-

Identification Summary:

Title: Show Weather Condition

Summary: This use case describes the process Gabay shows the weather conditions to the travelers

Actors:

1. Weather API: The external service that provides weather data to the Gabay system.
2. Gabay (System)
3. Registered Traveler – A traveler with an active account, who has access to basic features.
4. Premium Traveler – A traveler with a premium subscription, who has access to all features.
5. Guest Traveler – A user without an account who has limited access to the app.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- Weather API must be included in the source code of the Gabay Mobile Application

Flow of Events:

1. The traveler selects Weather from the menu.
2. The Gabay System will locate the current location of the Traveler who is using the Mobile application
3. The Gabay System will connect with the Weather API (Openweather) to obtain the latest weather information and its forecast for seven days.
4. Gabay will display the result generated from the Weather API

Error Sequences:

- E1: If the weather data is unavailable, the system (Gabay) displays: "Unable to retrieve weather updates. Please try again later."

Post-Conditions:

- The traveler can view the latest weather updates and its seven day forecast.

UI Requirements:

- Current weather displayed clearly with icons.
 - Simple, clean layout with essential details.
-

Identification Summary:

Title: Sign in/Register

Summary: This use case narrative describes the process of signing in or signing up when guests are currently inside the main homepage of Gabay Mobile Application

Actors:

1. Guest Traveler – A user who wishes to continue using the app without registering or choose to register to become a registered traveler.
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler is currently on the main homepage of the Gabay Mobile Application

Flow of Events:

1. After the traveler opens the Gabay mobile application, and proceeds to continue as Guest
2. The traveler is notified of limited features and functionalities

3. When the traveler clicks on the menu icon the traveler can either register or sign in

Alternative Flow:

- A1: If the traveler attempts to log in the traveler is redirected to the log in page to enter their credentials
- A2: If the traveler opts to register the traveler is redirected to the registration page

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler has successfully registered a new account and can now proceed to login
- The traveler is redirected to the login page
- The traveler is redirected to the Gabay Homepage updating the profiles (If the traveler opts to log in)

UI Requirements:

- Clear input fields for both email and password
- Sign in button
- Error message for invalid inputs

- Gabay Homepage with features and functionalities not found in guest users
-

Identification Summary:**Title:** Change Language**Summary:** This use case describes the process for Guest Travelers, and Travelers (Registered and Premium) to change their preferred language.**Actors:**

1. Guest Traveler – A user without an account who can sign in, register, or change the language.
2. Travelers (Registered and Premium) – Travelers with active accounts who can manage their profile, subscription, notifications, submit feedback, and sign out.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the main homepage of the Gabay Mobile Application

Flow of Events:

1. After the traveler successfully entered the Gabay Mobile Homepage the traveler can click the menu button below

2. The traveler can toggle the language to Filipino or English

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the homepage. Please try again later."

Post-Conditions:

- The traveler has successfully changed the language
- The traveler must notice the change in language used in the application
- The traveler is redirected to the Gabay Homepage updating the profiles (If the traveler opts to log in)

Identification Summary:

Title: Manage Subscriptions

Summary: This use case narrative describes how subscription management takes place

Actors:

1. Registered Traveler – A user who uses the Gabay mobile application and is registered to the system

2. Premium Traveler – A user who uses the Gabay mobile application and is registered and pays a premium fee to access other features and functionalities
3. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the homepage of the Gabay mobile application after the system authenticates their credentials

Flow of Events:

1. The traveler clicks on the menu button
2. The traveler selects Subscription
3. The traveler can either select subscribe or cancel their subscription

Alternative Flow:

- A1: If the traveler selects subscribe they will be redirected to the payment page
- A2: If the traveler selects cancel subscription they will greet with a popup indicating confirm cancelation of membership

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler can either subscribe or cancel their current subscription
- The traveler is redirected to the startup page (login page)

UI Requirements:

- Clear input fields
- Submit buttons
- Error message for invalid inputs
- Popup message for cancelation of subscription

Identification Summary:

Title: Manage Notifications

Summary: This use case narrative describes how to manage notifications

Actors:

1. Registered Traveler – A user who uses the Gabay mobile application and is registered to the system

2. Premium Traveler – A user who uses the Gabay mobile application and is registered and pays a premium fee to access other features and functionalities
3. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the homepage of the Gabay mobile application after the system authenticates their credentials

Flow of Events:

1. The traveler clicks on the menu button
2. The traveler toggles the notification

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler can expect notifications to appear when they toggled the button on

UI Requirements:

- Easy to notice buttons
-

Identification Summary:**Title:** Submit Feedback**Summary:** This use case narrative describes how travelers are able to send feedback regarding the Gabay Mobile Application.**Actors:**

1. Registered Traveler – A user who uses the Gabay mobile application and is registered to the system
2. Premium Traveler – A user who uses the Gabay mobile application and is registered and pays a premium fee to access other features and functionalities
3. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the homepage of the Gabay mobile application after the system authenticates their credentials

Flow of Events:

1. The traveler clicks on the menu button
2. The traveler clicks on the contact us
3. The traveler is redirected to the contact us page
4. The traveler can now enter their desired message or feedback

Alternative Flow:

- A1: If the traveler opts not to send feedback they can click the back button to return to the menu page

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler can send a feedback to be read by the administrators

UI Requirements:

- Clear input fields for both message and subject
- Submit button
- Appropriate message boxes for both subject and message
- Back button for change of mind purposes

Identification Summary:**Title:** Sign Out

Summary: This use case narrative describes how travelers are able to sign out after using the Gabay Mobile application

Actors:

1. Registered Traveler – A user who uses the Gabay mobile application and is registered to the system
2. Premium Traveler – A user who uses the Gabay mobile application and is registered and pays a premium fee to access other features and functionalities
3. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The traveler is currently on the homepage of the Gabay mobile application after the system authenticates their credentials

Flow of Events:

1. The traveler clicks on the menu button
2. The traveler clicks on the sign out button
3. The traveler confirms the sign out process by clicking on the ok button

Alternative Flow:

- A1: If the traveler did not click on the ok button during confirmation return the view page to the menu page of Gabay Mobile application

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler is redirected to the Gabay mobile application startup page

UI Requirements:

- Clear confirmation message for signing out
-

Identification Summary:

Title: Subscribe to Premium

Summary: This use case narrative describes how travelers are able to subscribe in the Gabay Mobile Application.

Actors:

1. Registered Traveler – A user who uses the Gabay mobile application and is registered to the system
2. Maya API – The system that verifies the payment

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler is currently on the homepage of the Gabay mobile application after the system authenticates their credentials

Flow of Events:

1. The traveler clicks on the menu button
2. The traveler clicks on the subscription
3. The traveler clicks on subscribe now
4. The traveler is then redirected to the card payment details page

5. The traveler entered their appropriate details
6. The traveler clicked on start membership
7. Maya API would then verify the details entered by the traveler
8. The traveler is successfully subscribed

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."
- E2: If there is an error or invalid input in the fields provided an error message displayed:"Incorrect Card Details".

Post-Conditions:

- The traveler is redirected to the Gabay mobile application startup page
- The traveler is expected to have an ad free experience and other features limited to premium members

UI Requirements:

- Clear fields for card payment details
 - Start membership buttons
-

Identification Summary:

Title: Cancel Subscription

Summary: This use case narrative describes how travelers are able to cancel their premium membership

Actors:

1. Premium Traveler – A user who uses the Gabay mobile application and is registered to the system
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The traveler is currently on the homepage of the Gabay mobile application after the system authenticates their credentials

Flow of Events:

1. The traveler clicks on the menu button
2. The traveler clicks on the subscription
3. The traveler clicks on cancel membership

4. A message will pop up indicating whether the traveler is sure to cancel their current subscription
5. The traveler clicks on “OK”
6. A message will appear that the traveler has successfully unsubscribe from the Gabay mobile application

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The traveler is redirected to the Gabay mobile application startup page
- The traveler is expected to lose the authority to other functions
- The traveler is expected to see some advertisements

UI Requirements:

- Clear confirmation message
-

Identification Summary:

Title: Admin Login

Summary: This use case narrative describes the process of logging in (user authentication) to verify the administrator

Actors:

1. Administrator – A user who oversees the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The admin is currently on the login page of the Gabay Web application and wants to access the Administrator Dashboard (Gabay Dashboard).

Flow of Events:

1. After the Admin opens the Gabay web application, the admin will encounter a field for signing in
2. The Admin enters their credentials

3. The Admin then clicked on the login button
4. The system would then verify the credentials entered by the Admin
5. If the credentials are correct the admin is then redirected to the main homepage of the Gabay web application
6. If the credentials are invalid the system will prompt the admin to enter the correct email address and/or password

Alternative Flow:

- A1: If the admin inputs the incorrect credentials, the system will provide an error message indicating that the email address or password is incorrect

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The admin is redirected to the Gabay Dashboard page

UI Requirements:

- Clear input fields for both email and password
- Sign in button
- Error message for invalid inputs

Identification Summary:

Title: Manage Traveler

Summary: This use case narrative describes the process of how administrator manage travelers

Actors:

1. Administrator – A user who oversee the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The admin is currently logged in the Gabay Web application

Flow of Events:

1. After the admin successfully entered the Dashboard, the admin clicked on the Travelers button
2. The Admin will have the ability to delete, suspend, reactivate travelers

3. The Admin can also see the current status of each travelers

Alternative Flow:

- A1: If the admin decides to suspend a user for violating the terms and conditions, they can suspend it by clicking the suspend button
- A2: If the admin will reactivate a suspended traveler, the admin can click the reactivate button to reactivate the traveler account

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The admin is redirected to the Traveler page of the Gabay Dashboard

UI Requirements:

- Clear button for each functions (Delete, Suspend, Reactivate)
-

Identification Summary:

Title: Review Traveler Content

Summary: This use case narrative describes the process of how administrator manage and see the status of the contents uploaded by the travelers

Actors:

1. Administrator – A user who oversee the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The admin is currently logged in the Gabay Web application

Flow of Events:

1. After the admin successfully entered the Dashboard, the admin will click on Archive
2. The Admin will be redirected to the archive page

3. The Admin view the contents uploaded by the traveler and their status (Flagged, Approved, Rejected)

Alternative Flow:

- A1: If the admin wants to delete or remove images the admin will click on the reports page, then the admin can click on the delete icon to delete images reported by travelers

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The admin will see the list of all contents uploaded by the travelers

UI Requirements:

- Clear button for each delete icon
 - Color coded status name for easy identification
-

Identification Summary:**Title:** Analytics

Summary: This use case narrative describes the process of how administrator can look the current status of the application

Actors:

1. Administrator – A user who oversee the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The admin is currently logged in the Gabay Web application

Flow of Events:

1. After the admin successfully entered the Dashboard, the admin clicked on the Statistics
2. The Admin can set whether they want to see monthly, quarterly or annual statistics

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The admin is redirected to the Statistics page of the Dashboard

UI Requirements:

- Clear button for each functions (Monthly, Quarterly, Annually)
- Clear charts and graphs

Identification Summary:**Title:** Review Feedbacks**Summary:** This use case narrative describes the process of how administrator can read feedbacks sent by the travelers**Actors:**

1. Administrator – A user who oversee the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025

Version: v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The admin is currently logged in the Gabay Web application

Flow of Events:

1. After the admin successfully entered the Dashboard, the admin clicked on the feedback icon
2. The Admin will be redirected to the feedback page
3. The Admin can see the list of all feedback sent by the travelers.

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The admin is redirected to the Feedback page of the Gabay Dashboard

UI Requirements:

- An email like feedback dashboard
- Bolded fonts when feedbacks are unread

Identification Summary:

Title: Manage Admin Account

Summary: This use case narrative describes the process of how administrator can add co-admins

Actors:

1. Administrator – A user who oversee the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025

Date of Update: March 25, 2025

Version: v2.0

Person in Charge: Glee Rome Gaddi

Preconditions:

- The admin is currently logged in the Gabay Web application

Flow of Events:

1. After the admin successfully entered the Dashboard, the admin clicked on the co-admin icon
2. The Admin will be redirected to the co-admin page
3. The Admin can see the list of all admins

Alternative Flow:

- A1: If the admin wants to add new co-admin, they can just click on the add icon
- A2: If the admin wants to delete a co-admin, they can just click on the delete icon

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

- The admin is redirected to the Co-Admin page of the Gabay Dashboard

UI Requirements:

- Clear input fields
- Submit buttons
- Error message for invalid inputs

Identification Summary:

Title: Sign Out

Summary: This use case narrative describes the process of how administrator will signout with the Gabay Web Dashboard

Actors:

1. Administrator – A user who oversee the Gabay mobile application system through the use of Web Application
2. Gabay (System) – The system that displays the startup page and handles the navigation flow.

Created Date: February 18, 2025**Date of Update:** March 25, 2025**Version:** v2.0**Person in Charge:** Glee Rome Gaddi**Preconditions:**

- The admin is currently logged in the Gabay Web application

Flow of Events:

1. After the admin successfully entered the Dashboard, the admin clicked on the co-admin icon
2. The Admin will click on the sign out icon
3. A message will appear to ensure the admin will sign out
4. Admin will confirm the action

Error Sequences:

- E1: If the system encounters an issue while loading, the system displays: "Unable to load the startup page. Please try again later."

Post-Conditions:

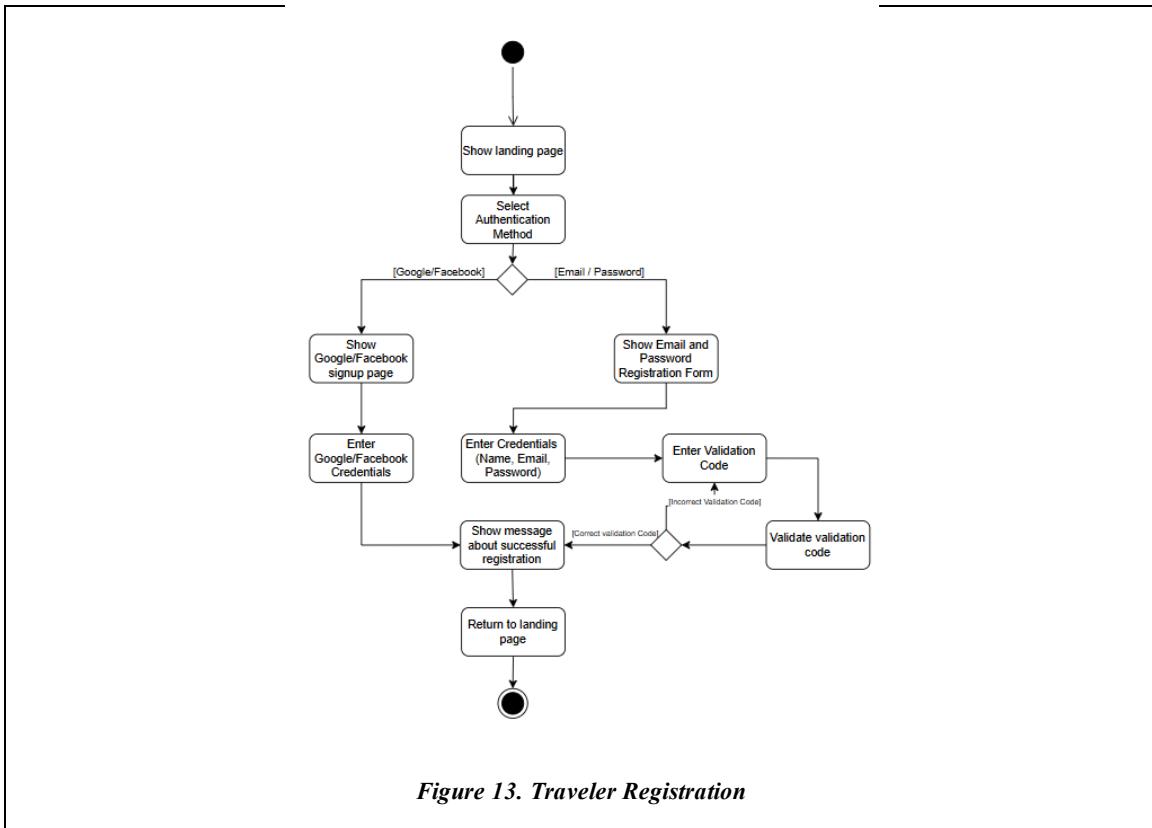
- The admin is redirected to the Gabay Web Application login page

UI Requirements:

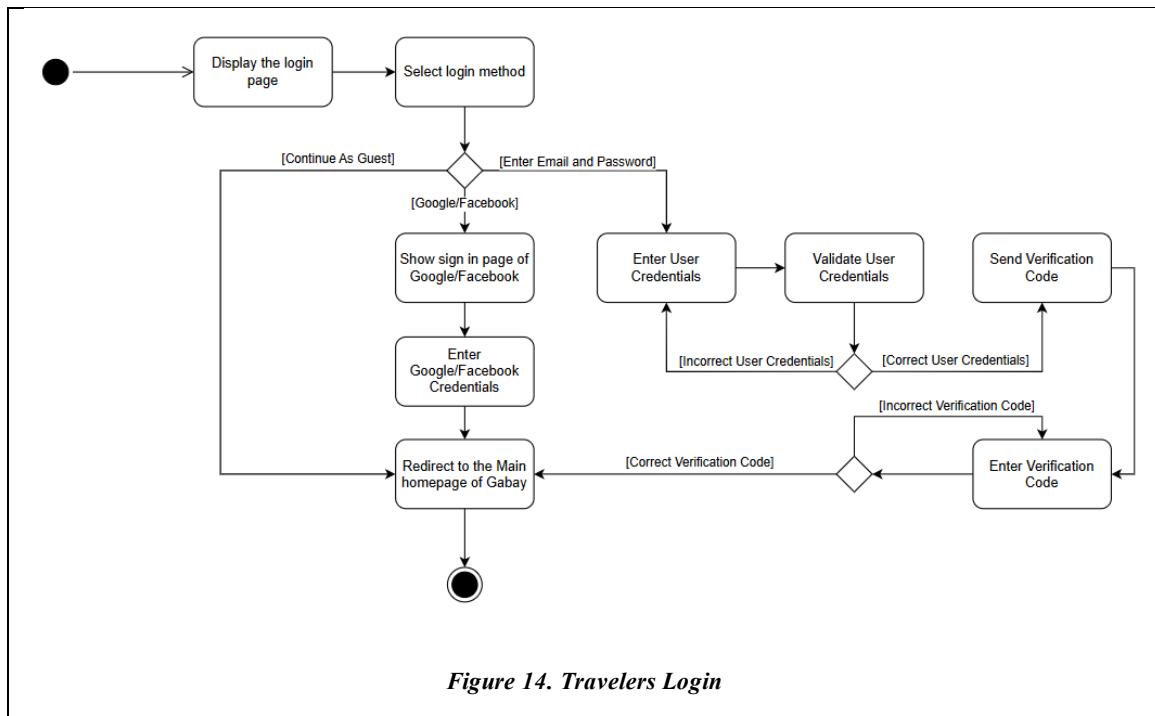
- Clear messages
- Signout button

Activity Diagram

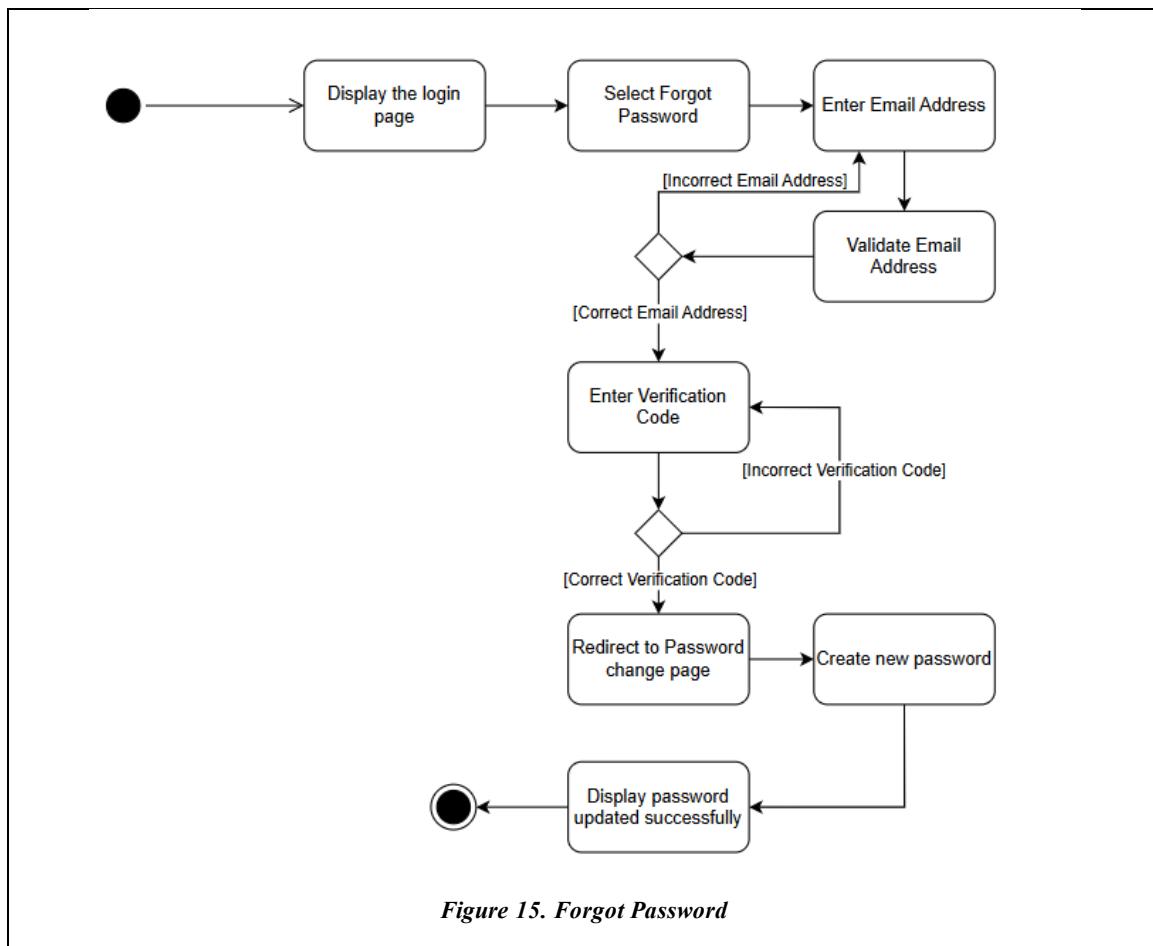
Activity Diagram of Travelers	Reference Number:
Registration	<i>AD-01</i>
	Version Number:
<i>1.0</i>	
System Name: Gabay	
Subject: Traveler Registration	



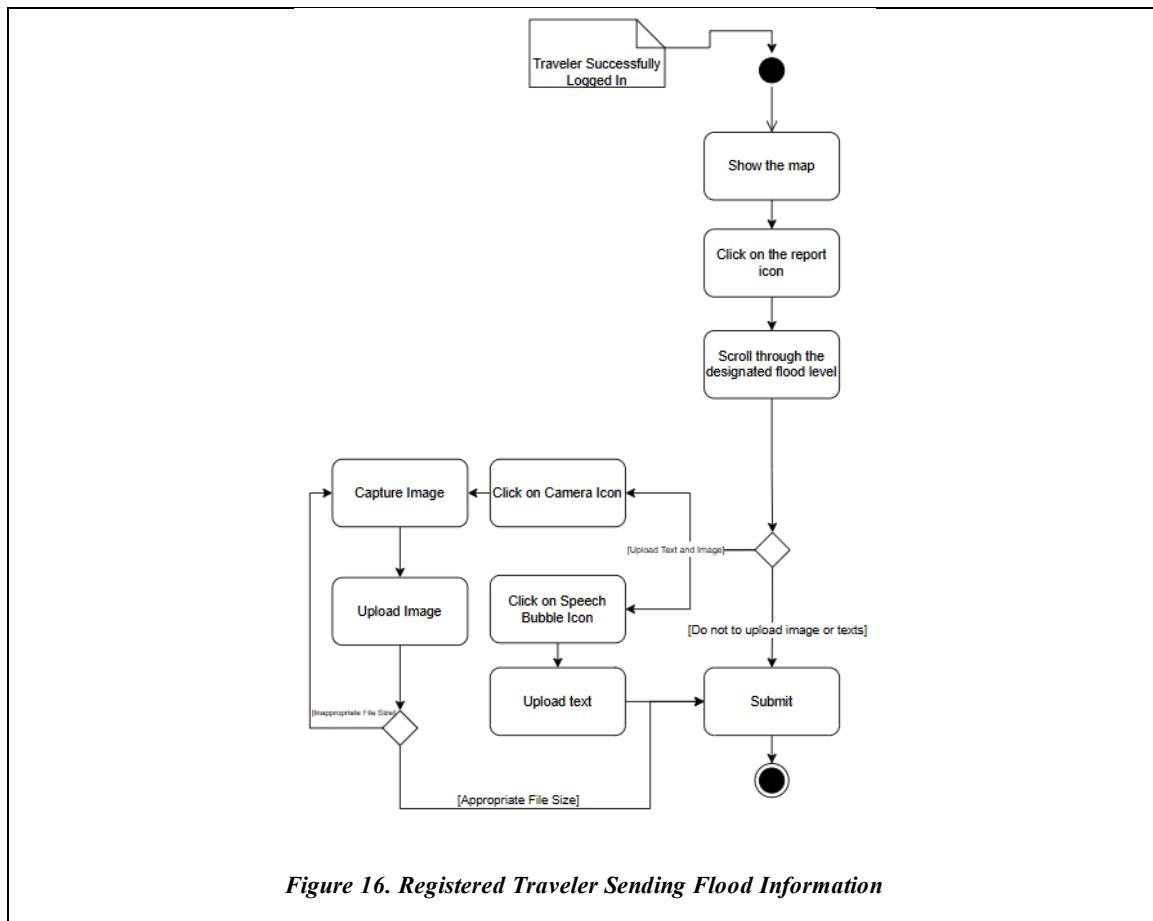
Activity Diagram of Travelers Login	Reference Number: <i>AD-02</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Traveler Login	



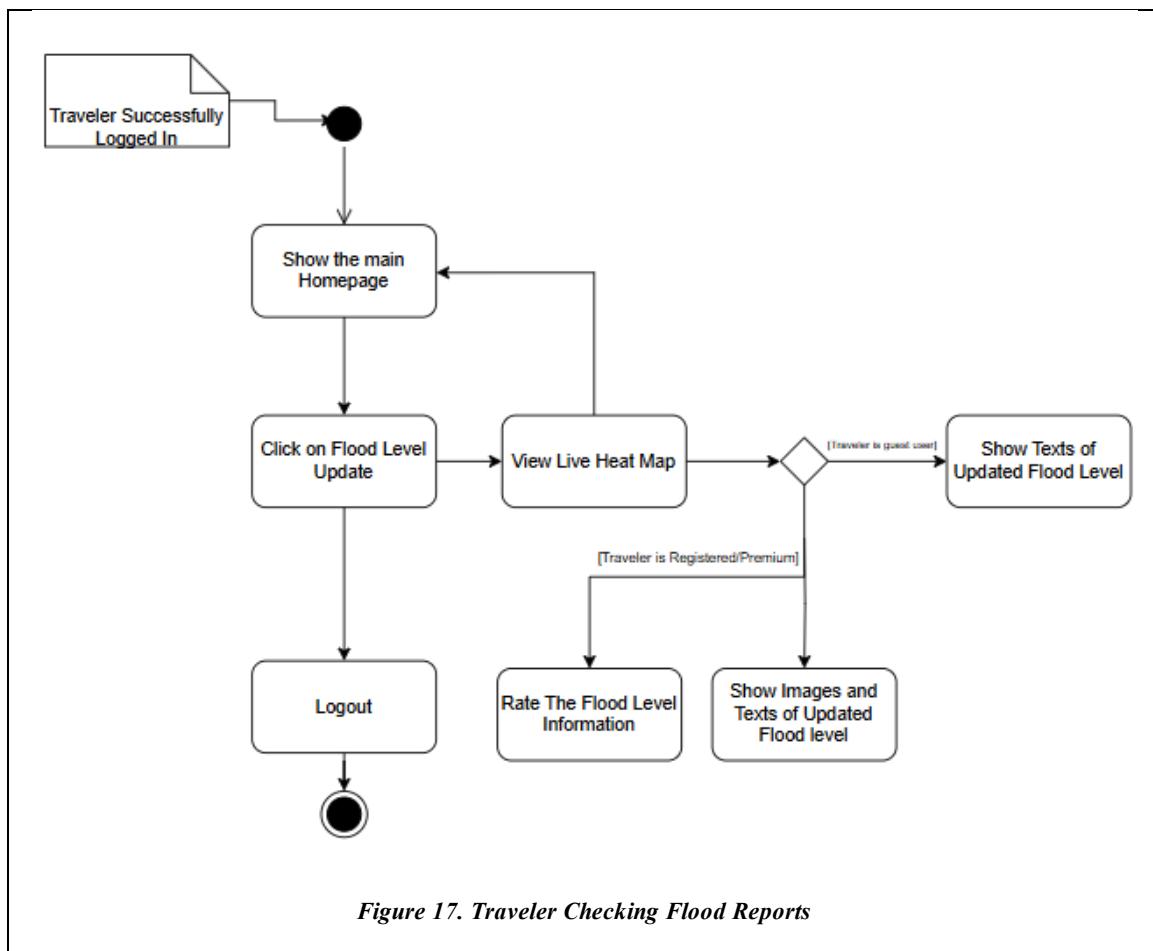
Activity Diagram of Travelers Login	Reference Number: <i>AD-03</i> Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Traveler Forgot Password	



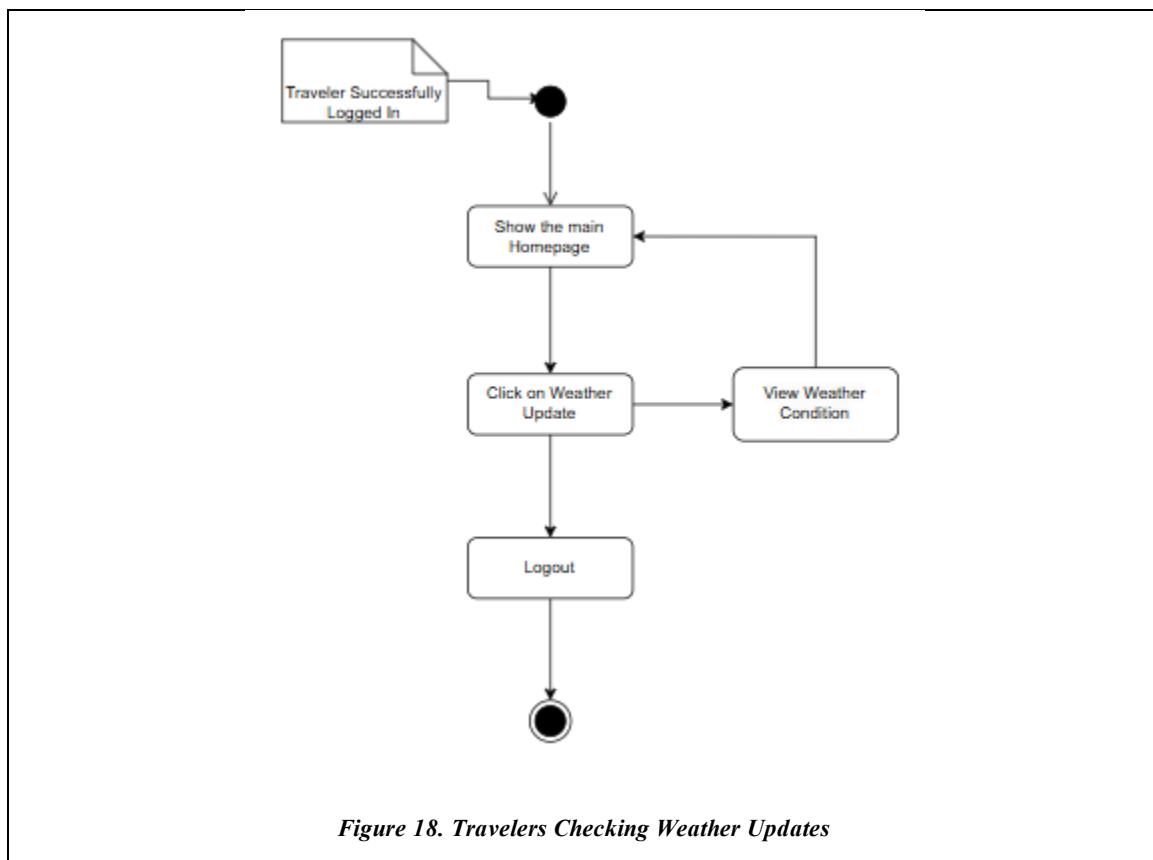
Activity Diagram of Registered Travelers sending of flood information	Reference Number: <i>AD-04</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Registered Travelers sending of flood information	



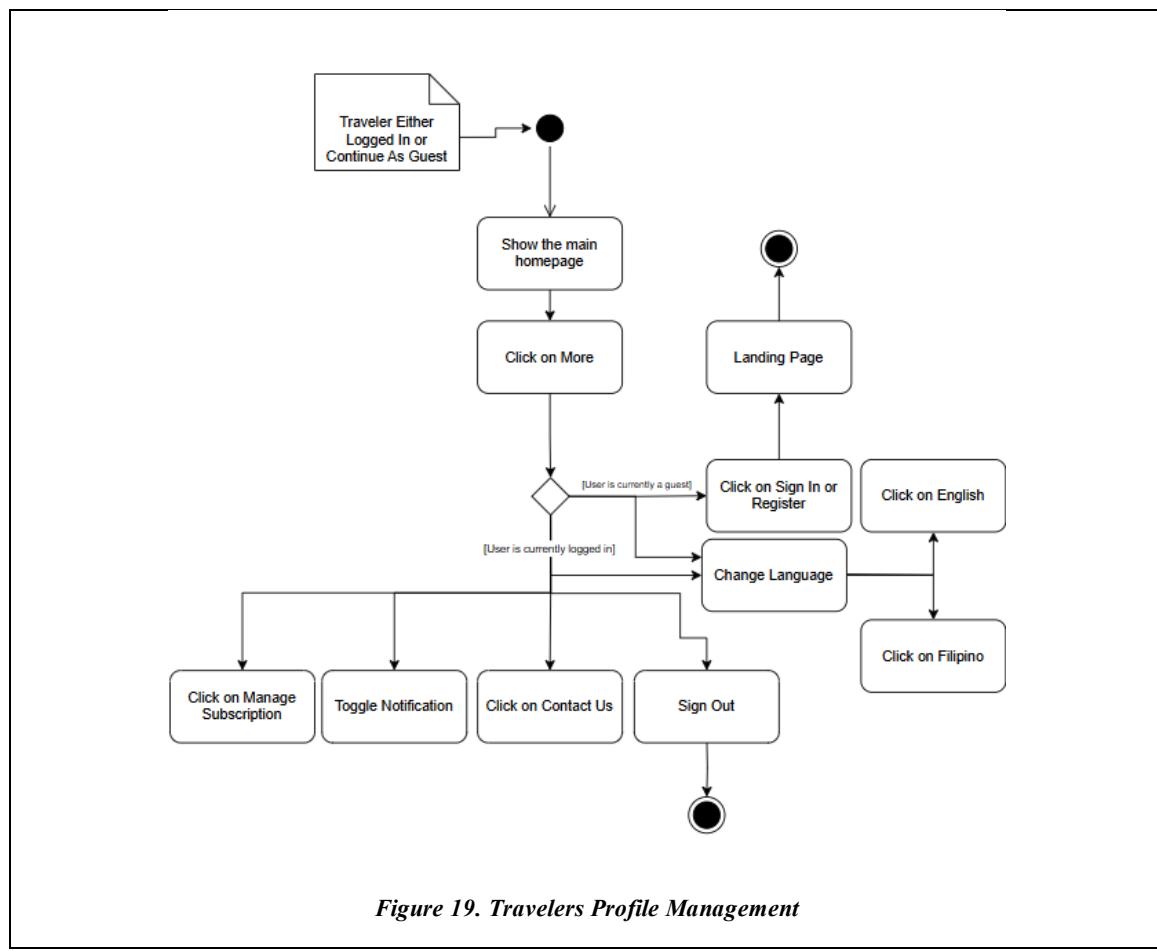
Activity Diagram of Travelers checking flood reports	Reference Number: <i>AD-05</i> Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Travelers checking flood reports	



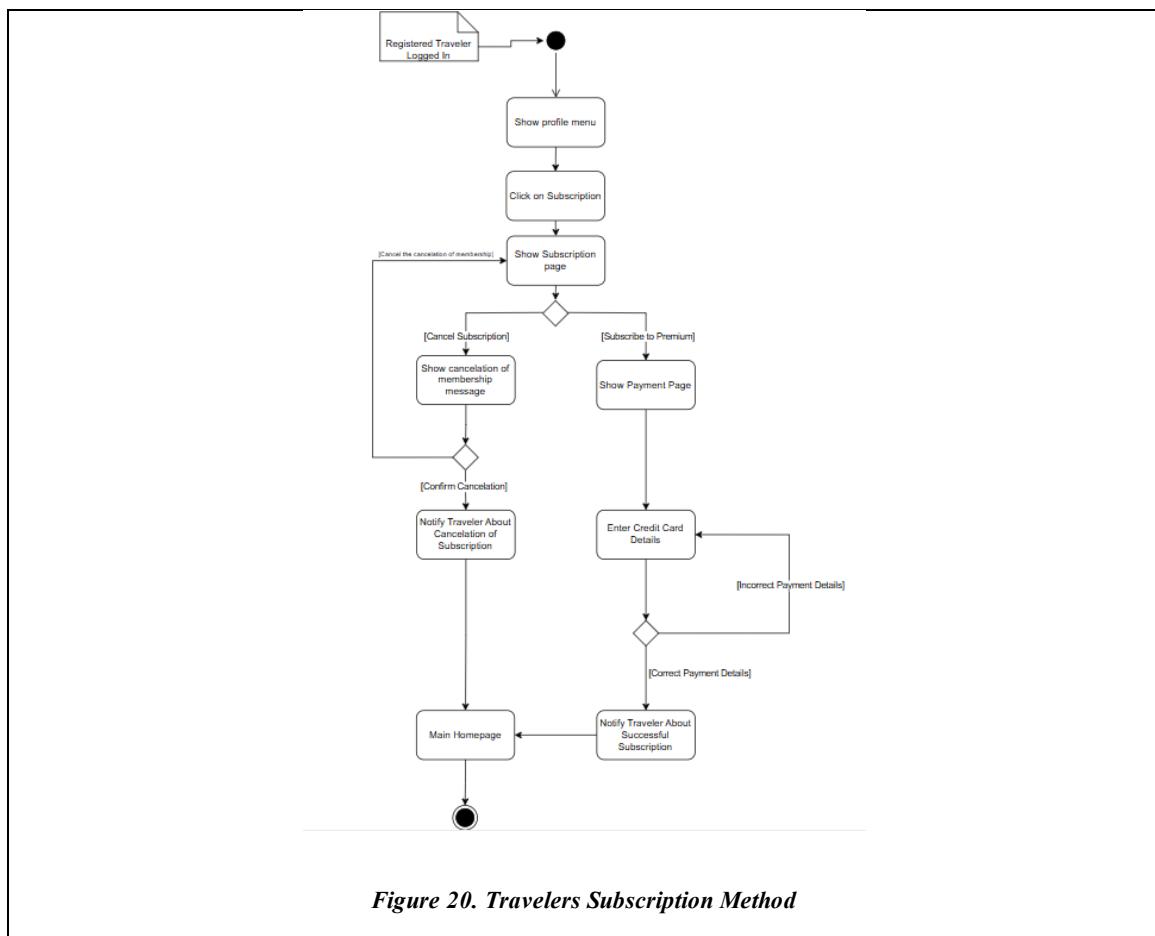
Activity Diagram of Travelers checking weather updates	Reference Number: <i>AD-06</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Travelers checking weather updates	



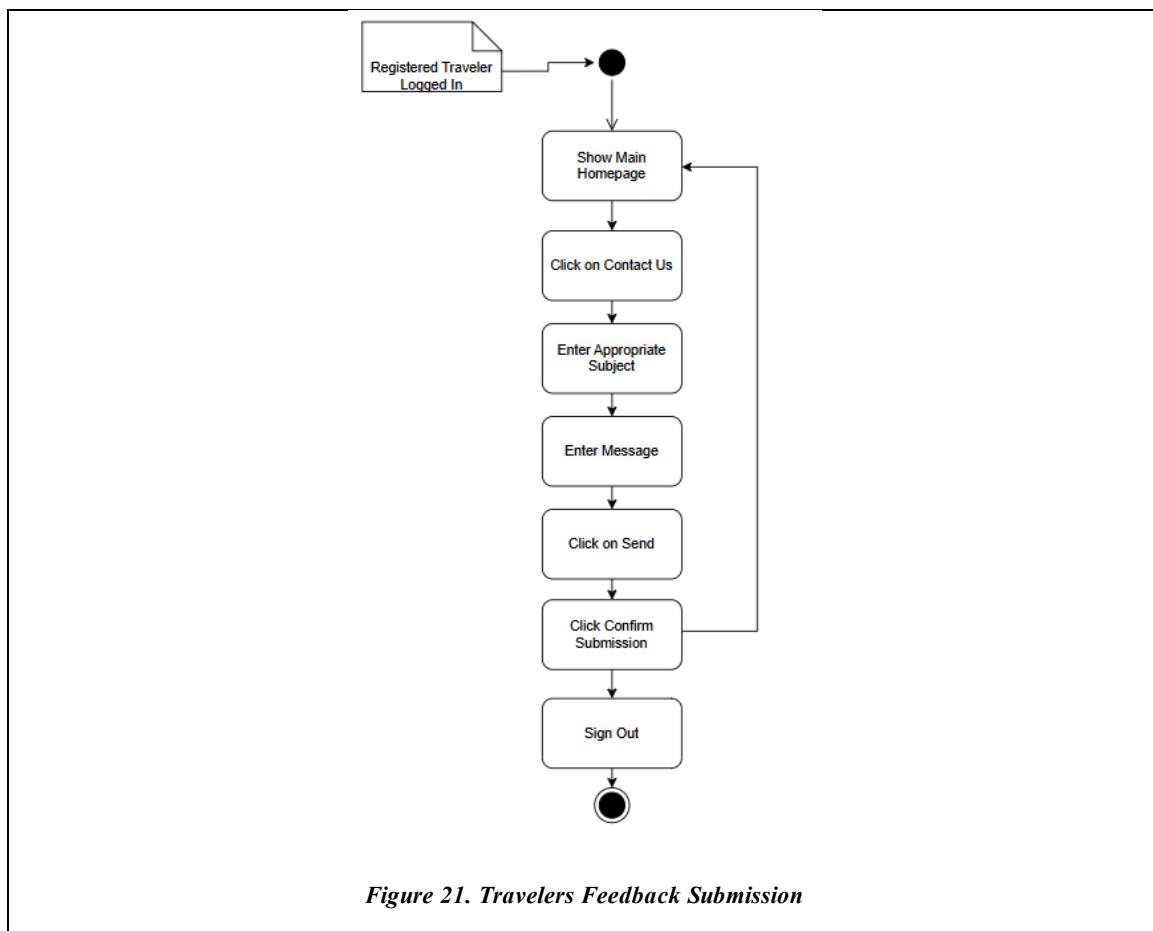
Activity Diagram of Travelers Profile Management Management	Reference Number: <i>AD-07</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Travelers Profile Management	



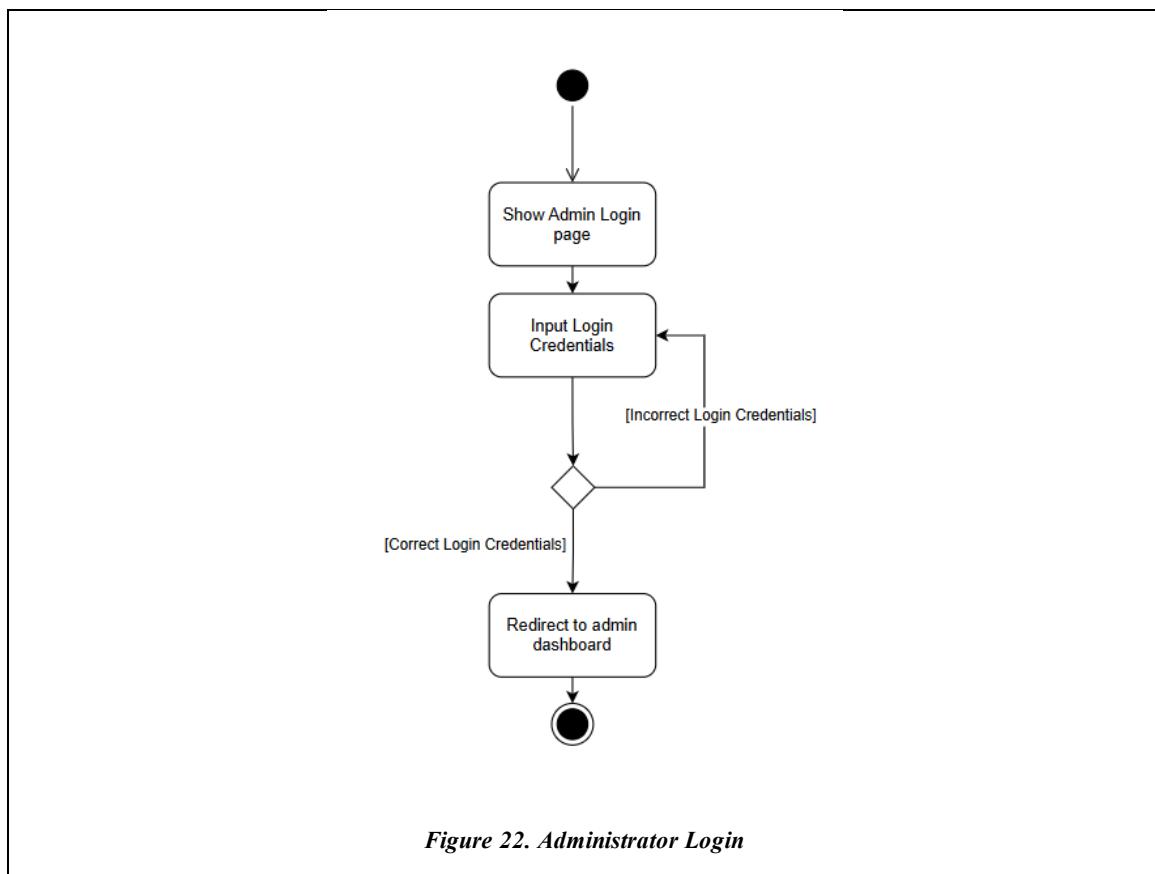
Activity Diagram of Travelers Subscription Method	Reference Number: <i>AD-08</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Travelers Subscription Method	



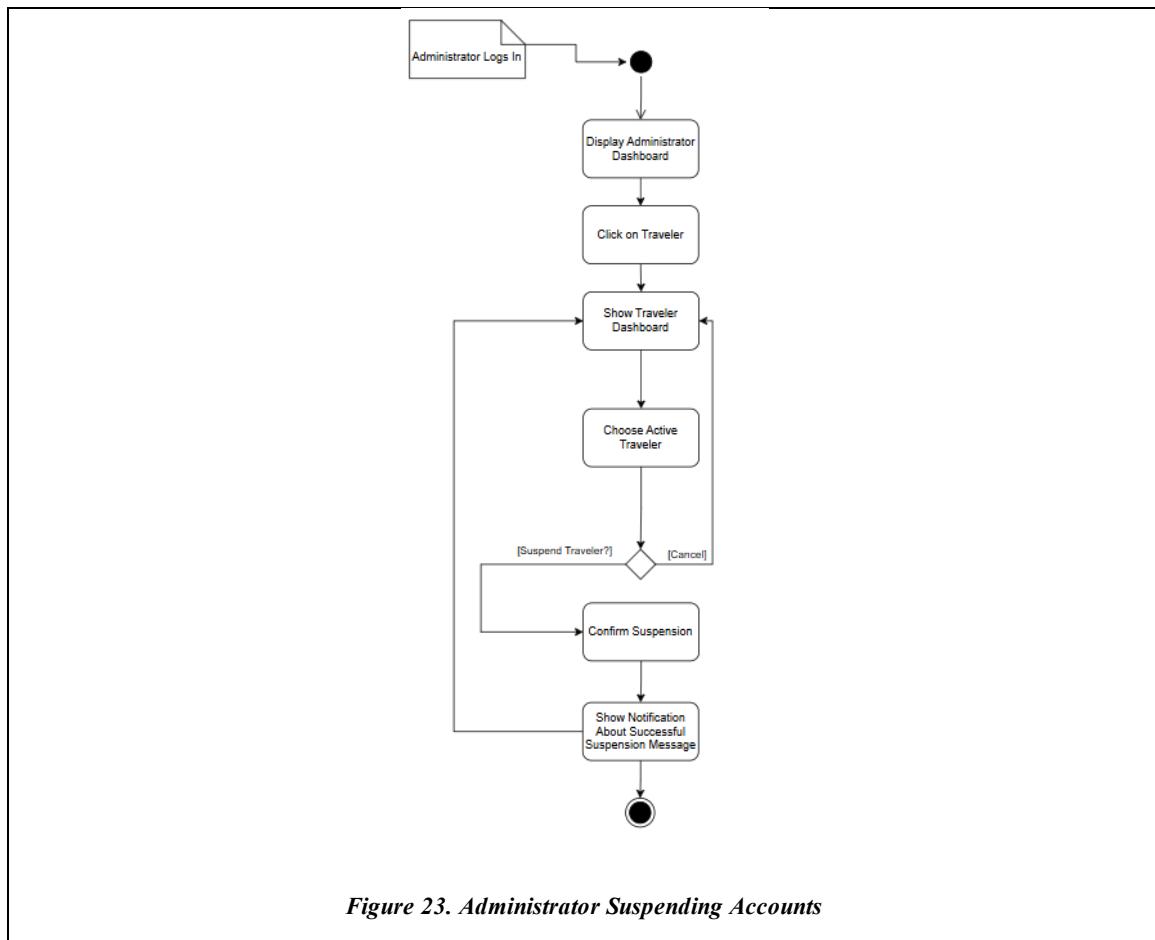
Activity Diagram of Travelers Feedback Submission	Reference Number:
	<i>AD-09</i>
Version Number:	
	<i>1.0</i>
System Name: Gabay	
Subject: Travelers Feedback Submission	



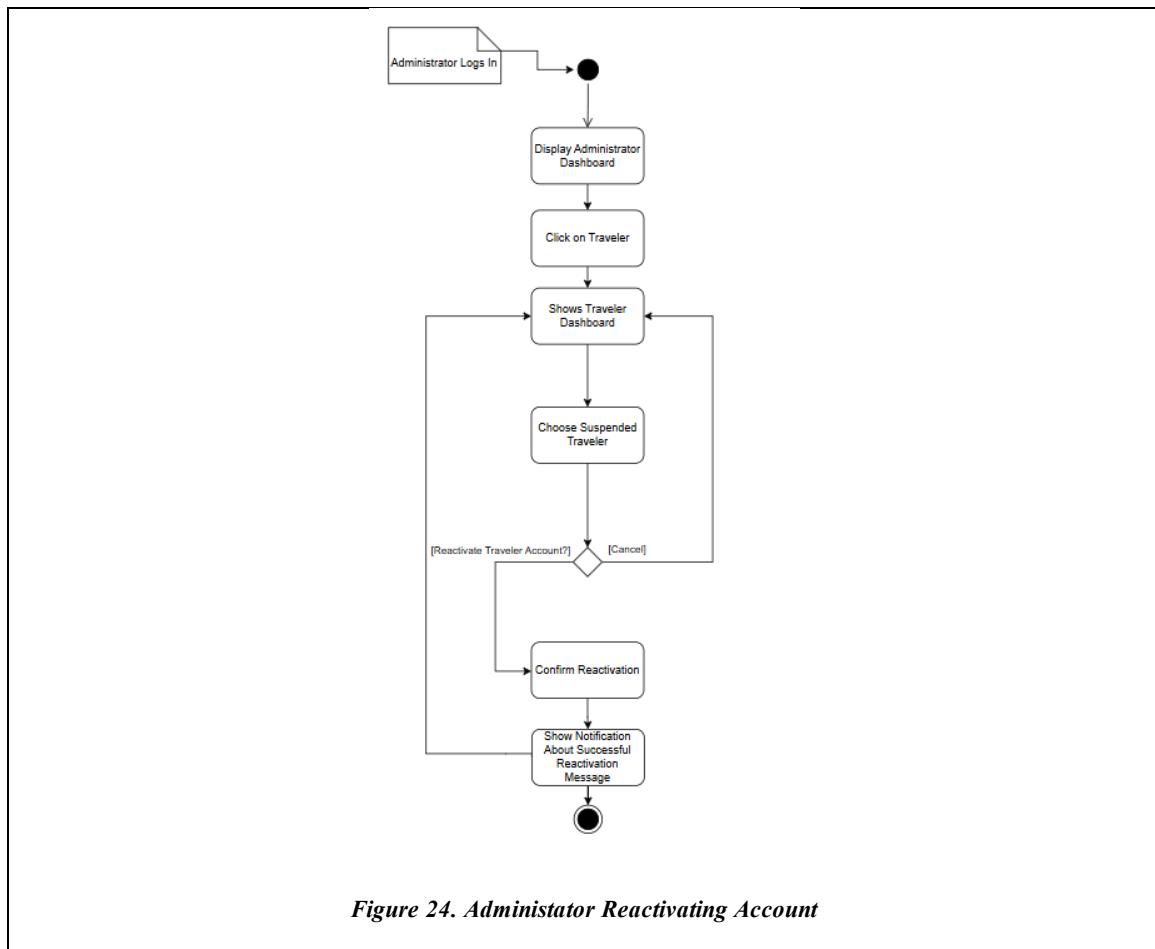
Activity Diagram of Administrator	Reference Number:
Login	AD-10
	Version Number: 1.0
System Name: Gabay	
Subject: Administrator Login	



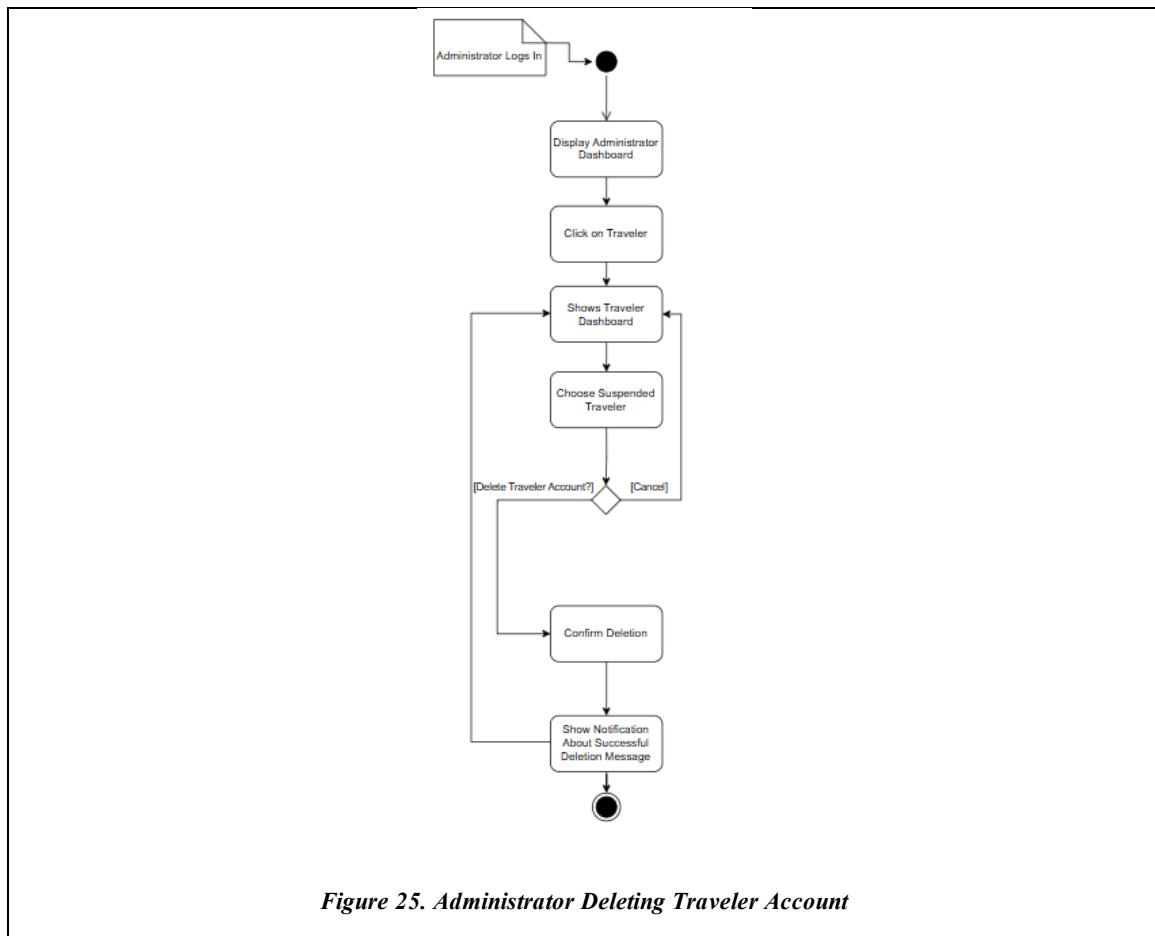
Activity Diagram of Administrator Suspending Traveler Account	Reference Number: <i>AD-11</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Administrator Suspending Traveler Account	



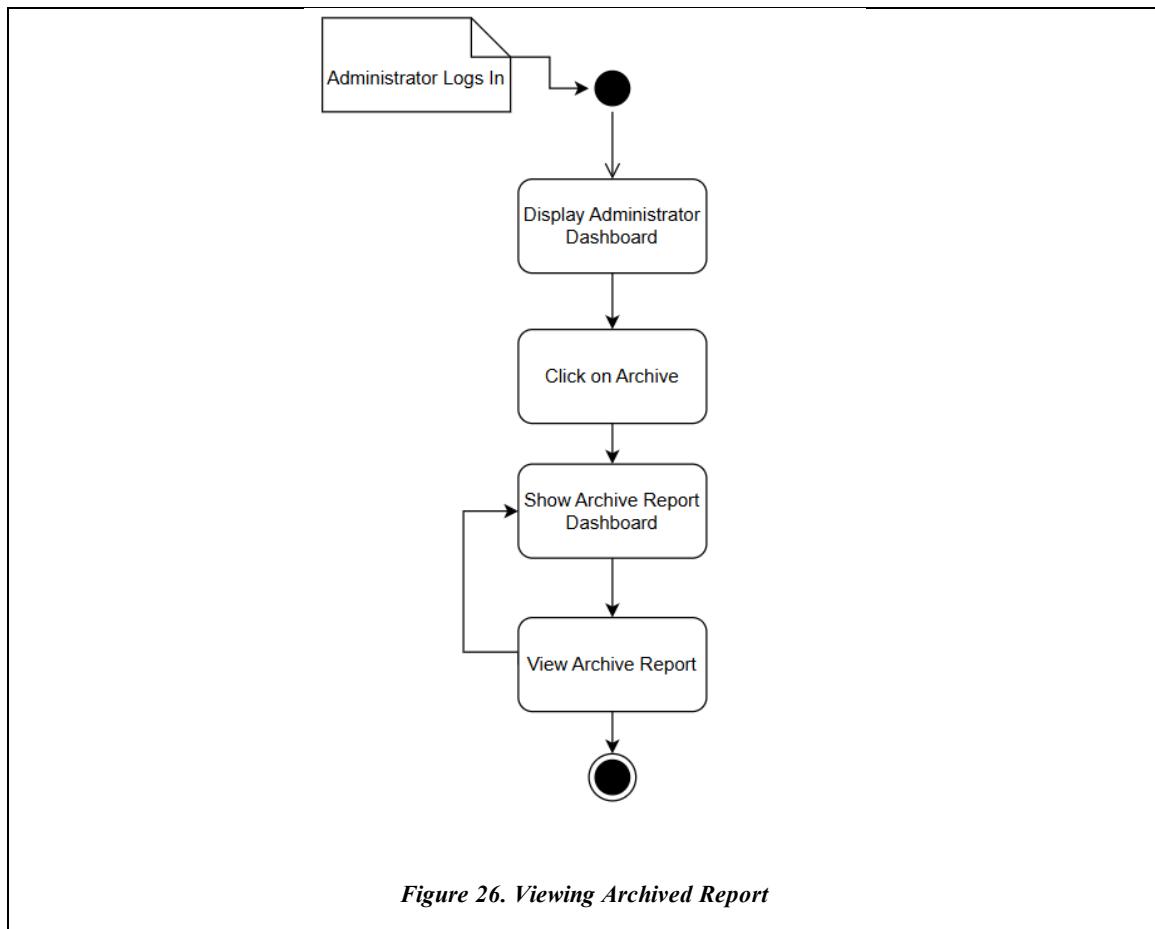
Activity Diagram of Administrator Reactivating Traveler Account	Reference Number: <i>AD-12</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Administrator Reactivating Traveler Account	



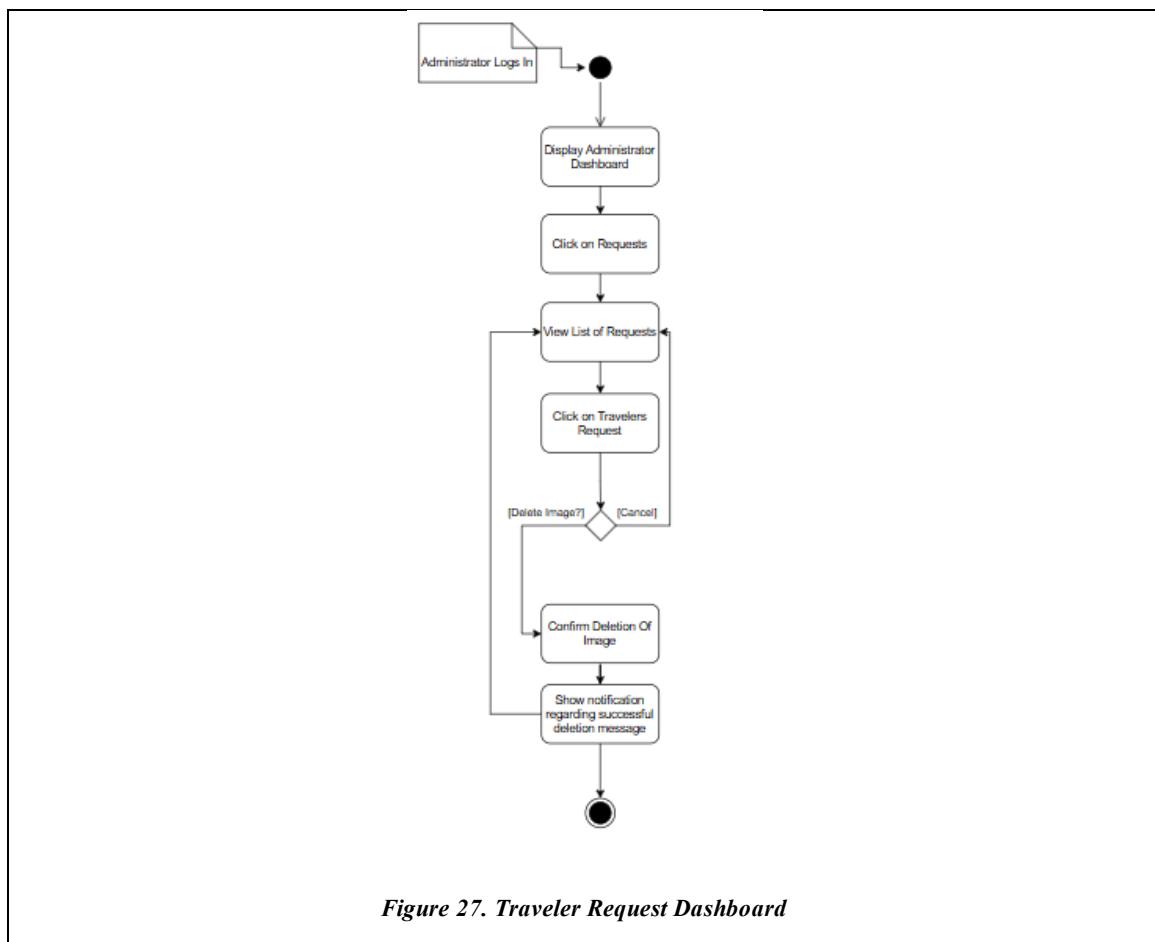
Activity Diagram of Administrator Deleting Traveler Account	Reference Number: AD-13
	Version Number: 1.0
System Name: Gabay	
Subject: Administrator Deleting Traveler Account	



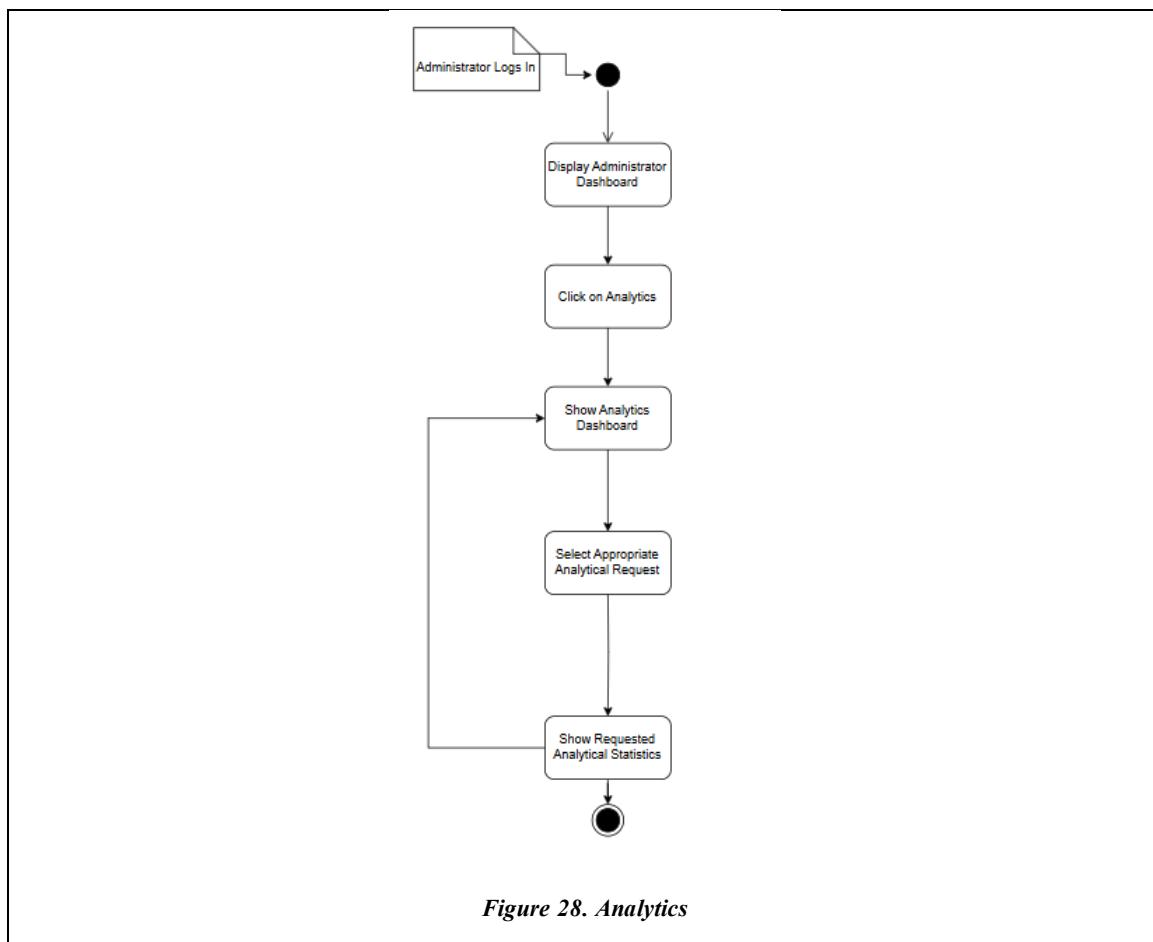
Activity Diagram of Review Archived Reports	Reference Number: <i>AD-14</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Review Archived Reports	



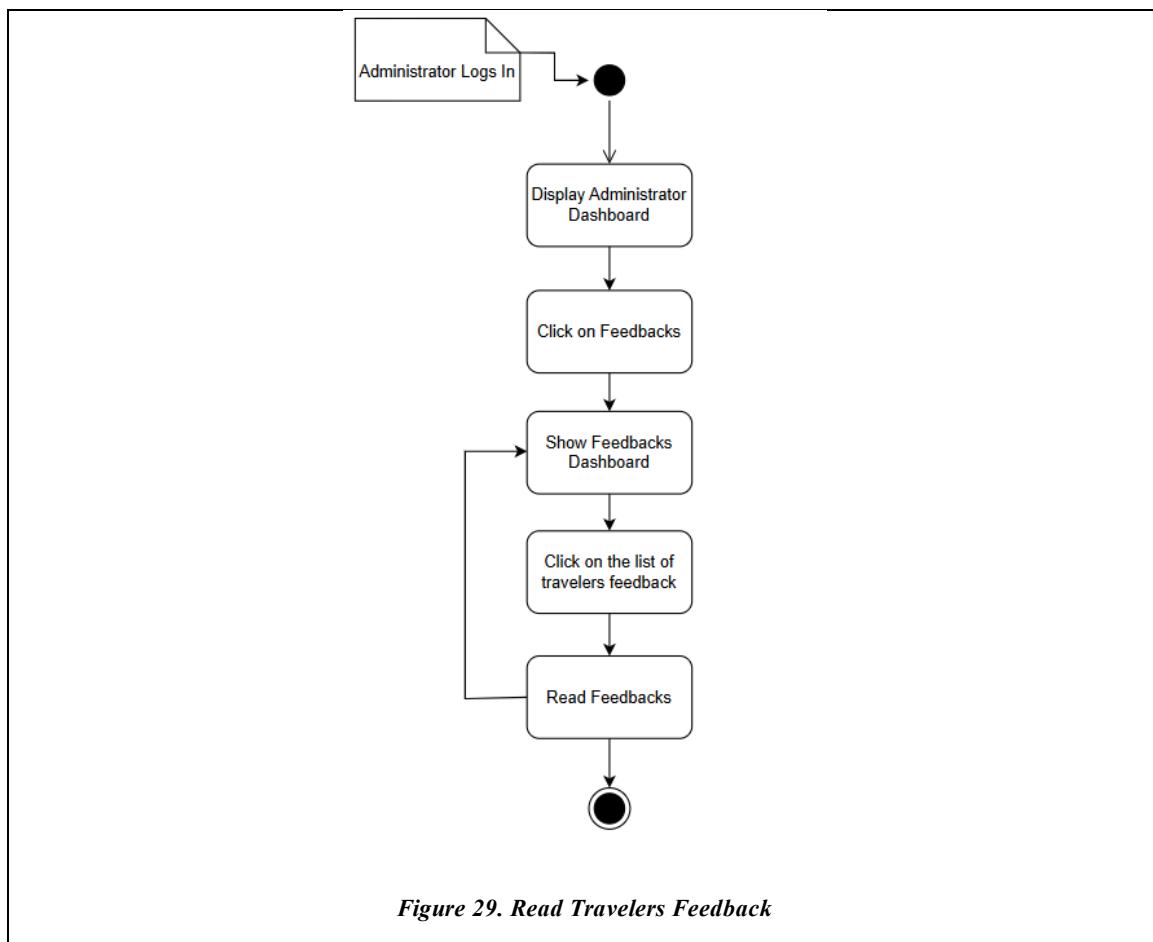
Activity Diagram of Traveler Request	Reference Number:
	<i>AD-15</i>
Version Number:	
	<i>1.0</i>
System Name: Gabay	
Subject: Traveler Request Dashboard	



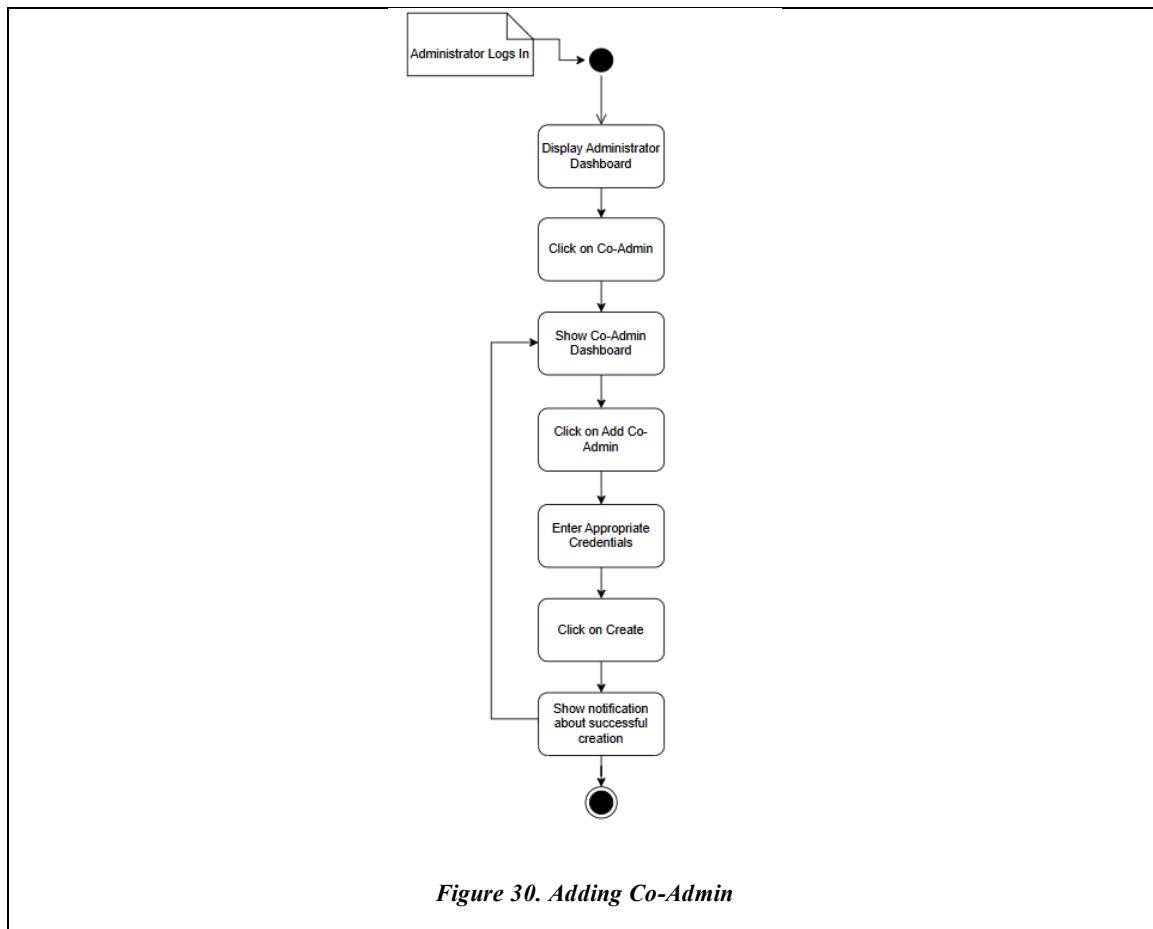
Activity Diagram of Analytics	Reference Number: <i>AD-16</i> Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Analytics	



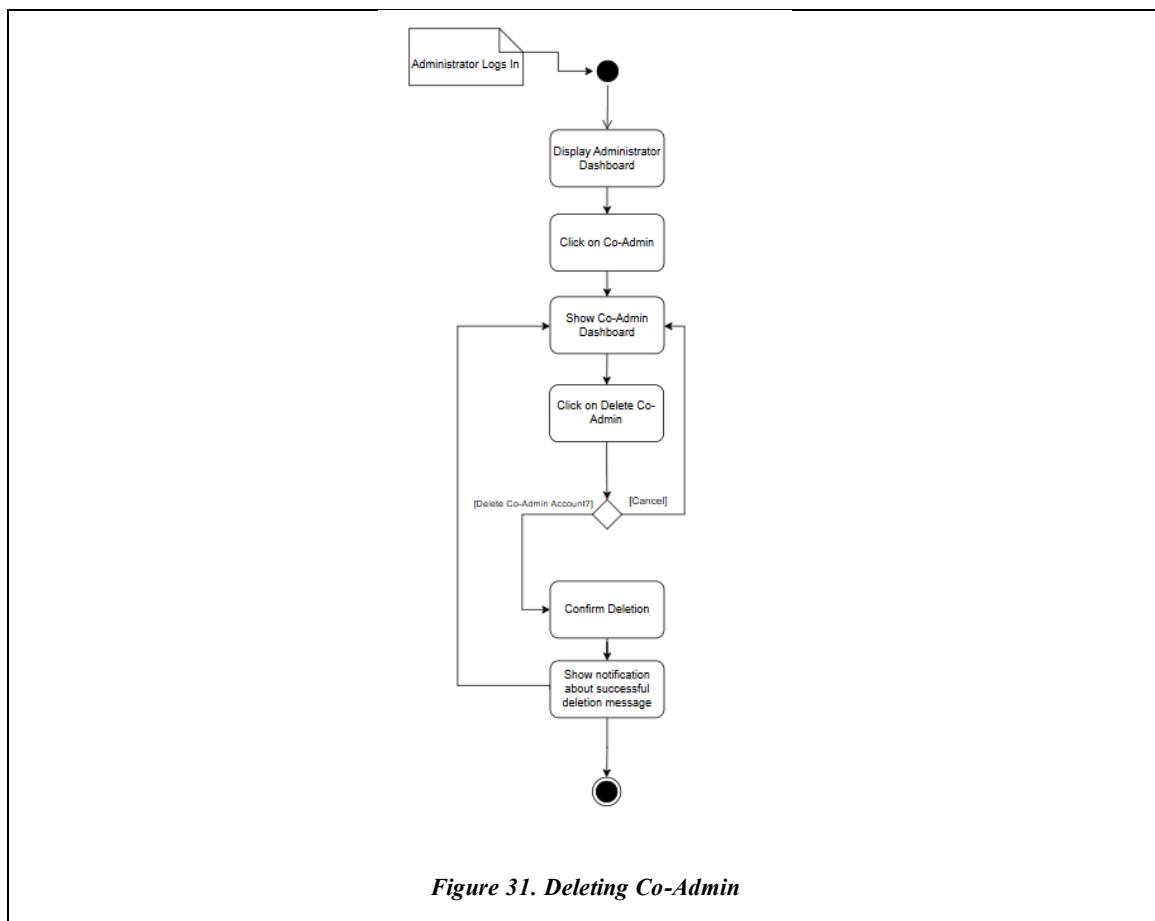
Activity Diagram of Read Travelers Feedback	Reference Number:
	<i>AD-17</i>
	Version Number:
<i>1.0</i>	
System Name: Gabay	
Subject: Read Travelers Feedback	



Activity Diagram of Adding co-admin	Reference Number: <i>AD-18</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Adding co-admin	



Activity Diagram of Deleting co-admin	Reference Number: <i>AD-19</i>
	Version Number: <i>1.0</i>
System Name: Gabay	
Subject: Deleting co-admin	



System Design

User Interface Wireframe (Travelers/Mobile Applications)

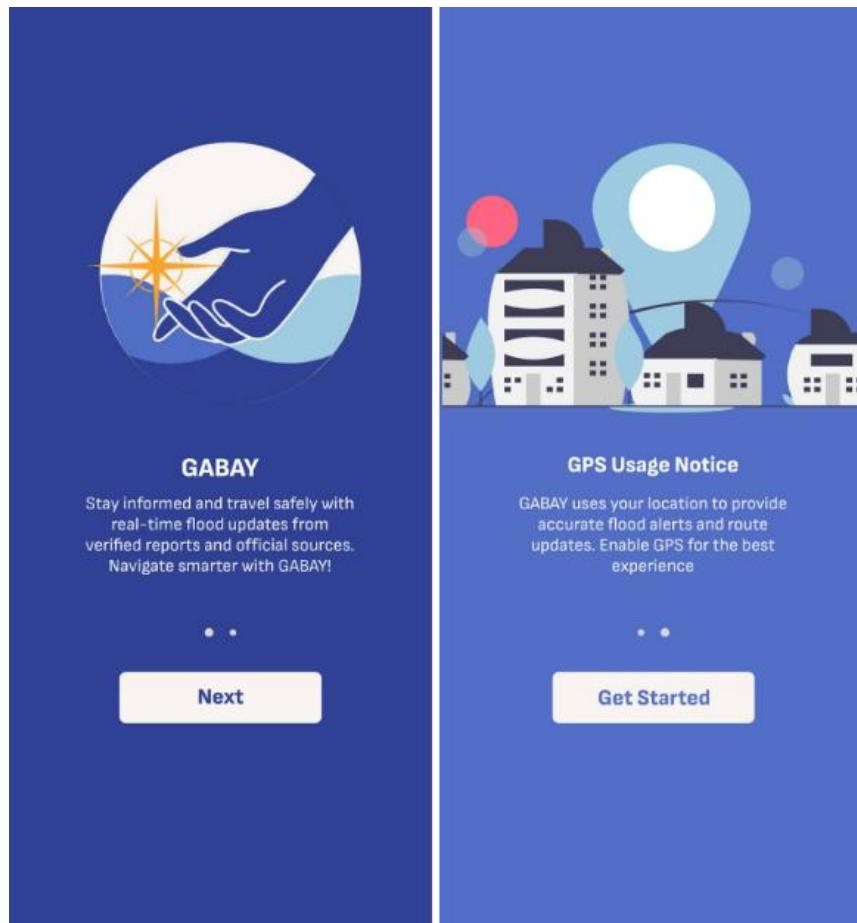


Figure 32. Splash Screens for the first time booting (about and notice for GPS Usage)

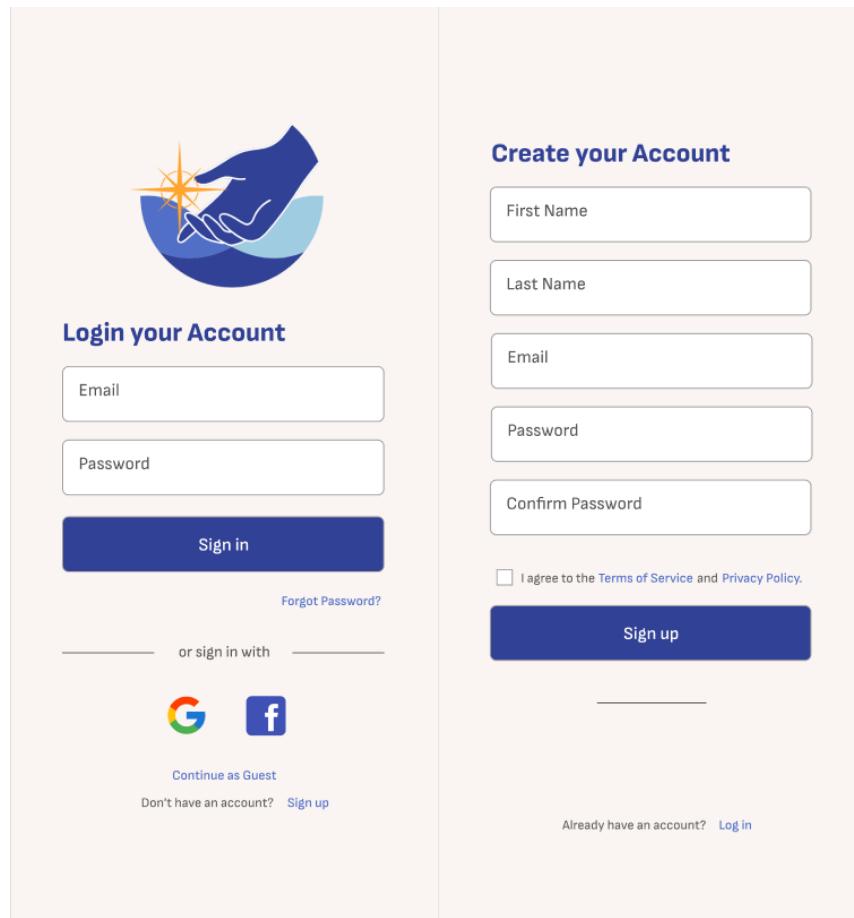


Figure 33. Traveler Login and Sign Up

```
graph TD; A[Forgot Password] --> B[Email Verification]; B --> C[Reset Password]
```

The image displays a three-step process for password recovery:

- Forgot Password:** This step features a blue padlock icon with four asterisks in its center and a red circle containing a question mark at the bottom right. Below the icon, text reads "Please Enter Your Email Address to Receive a Verification Code". It includes a text input field labeled "Email" and a blue "Send" button.
- Email Verification:** This step features a blue envelope icon. Below it, text reads "Please Enter the 4-digit Code Sent to Your Email Address". It shows a sequence of four blue boxes containing the digits "5", "4", "7", and "4". To the right is a blue "Verify" button.
- Reset Password:** This step features a blue padlock icon with four asterisks in its center and a red circle containing a checkmark at the bottom right. Below the icon, text reads "Enter the New Password" and "A strong and unique password is recommended to secure your account.". It includes two text input fields: "Password" and "Confirm Password", and a blue "Continue" button.

Figure 34. Forgot Password Process

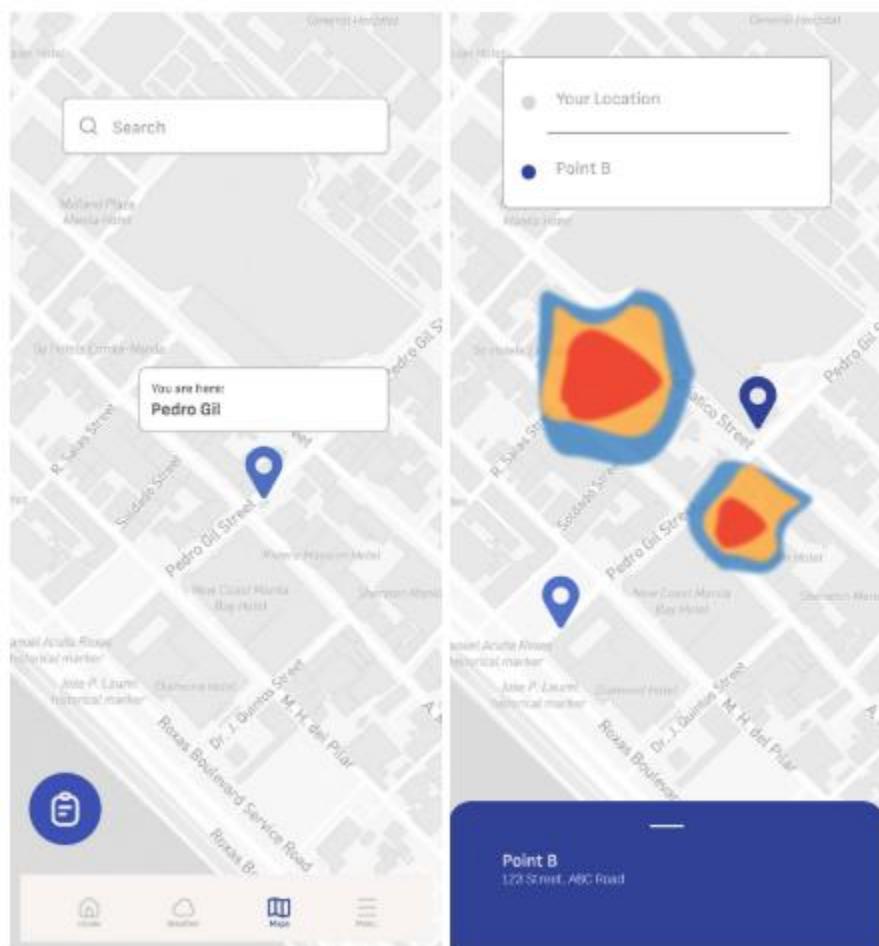


Figure 35. Point A to B and Heatmap

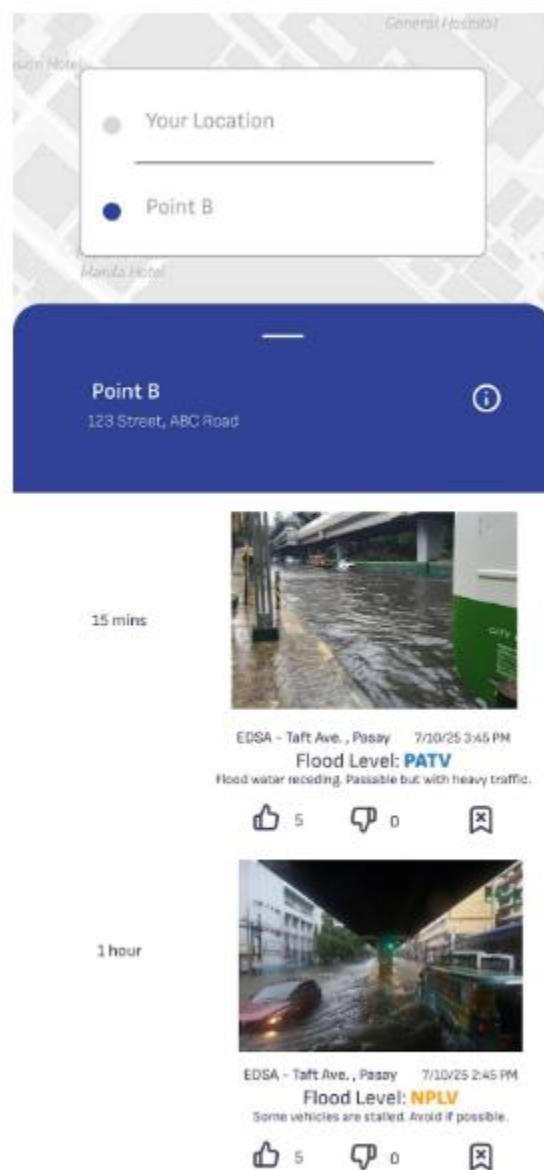


Figure 36. Crowdsourced Report From Travelers

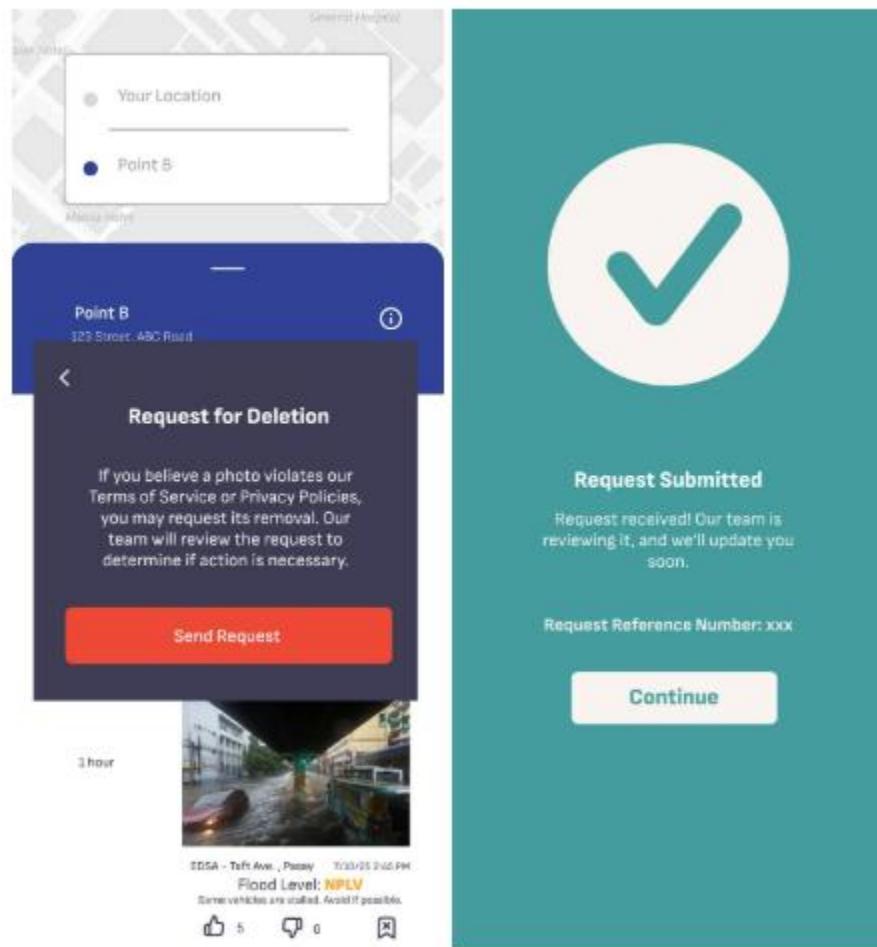


Figure 37. Request For Deletion

< Report Flooding

The image shows a mobile application interface for reporting flooding. On the left, there's a graphic of a person with an umbrella standing next to a car that is mostly submerged in water. To the left of the person is a vertical scale with arrows pointing to specific height markers. The scale starts at 8" at the bottom and goes up to 45" at the top. The markers are labeled: 8", 10", 13", 19", 26", 37", and 45". To the right of each marker, there are corresponding text labels: Gutter Level, Half Knee Level, Half Tire Level, Knee Level, Tire Level, Waist Level, and Chest Level. Below the scale, there's a legend with three colored boxes: red, yellow, and blue. The red box is labeled 'NPATV' (Not Passable in All Types of Vehicles). The yellow box is labeled 'NPLV' (Not Passable in Light Vehicles). The blue box is labeled 'PATV' (Passable in All Types of Vehicles). At the very bottom of the scale, it says 'NPATV - Not Passable in All Types of Vehicles', 'NPLV - Not Passable in Light Vehicles', and 'PATV - Passable in All Types of Vehicles'. Below the scale, there are two small icons: a camera and a location pin. At the bottom center is a large blue 'Send' button.

< Additional Comments

Provide more details about the flood situation to help others make informed decisions. Your report matters!

Comment

Save

Figure 38. Report Flooding

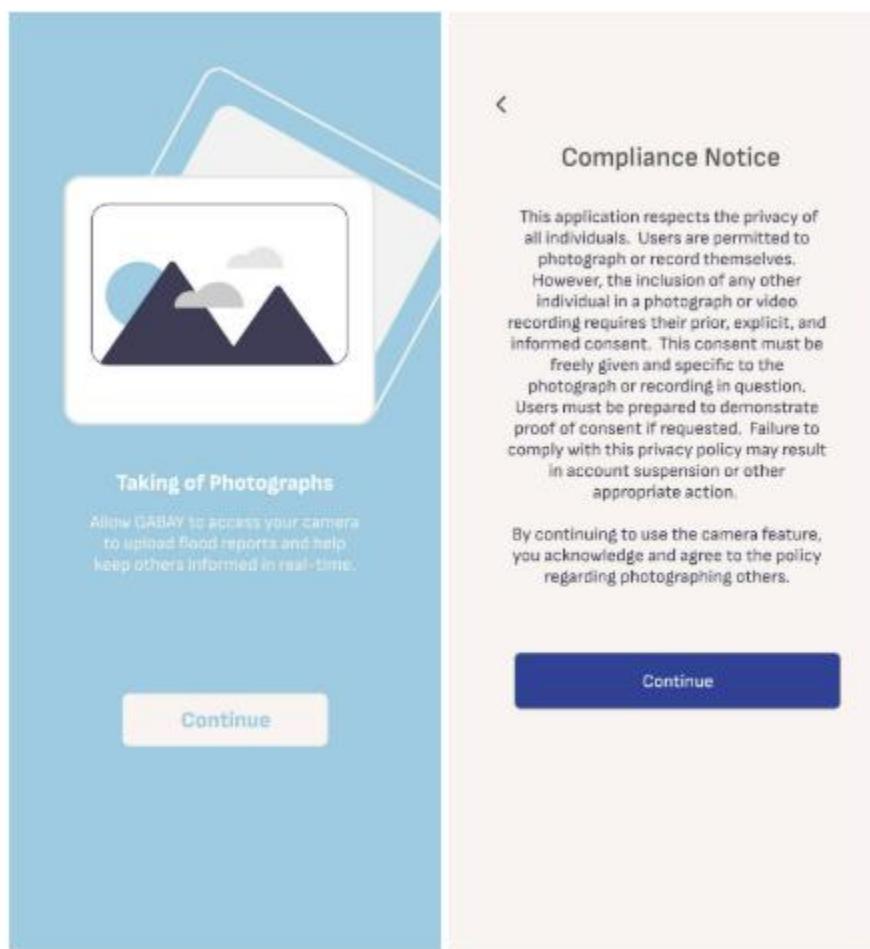


Figure 39. Notice for photo taking

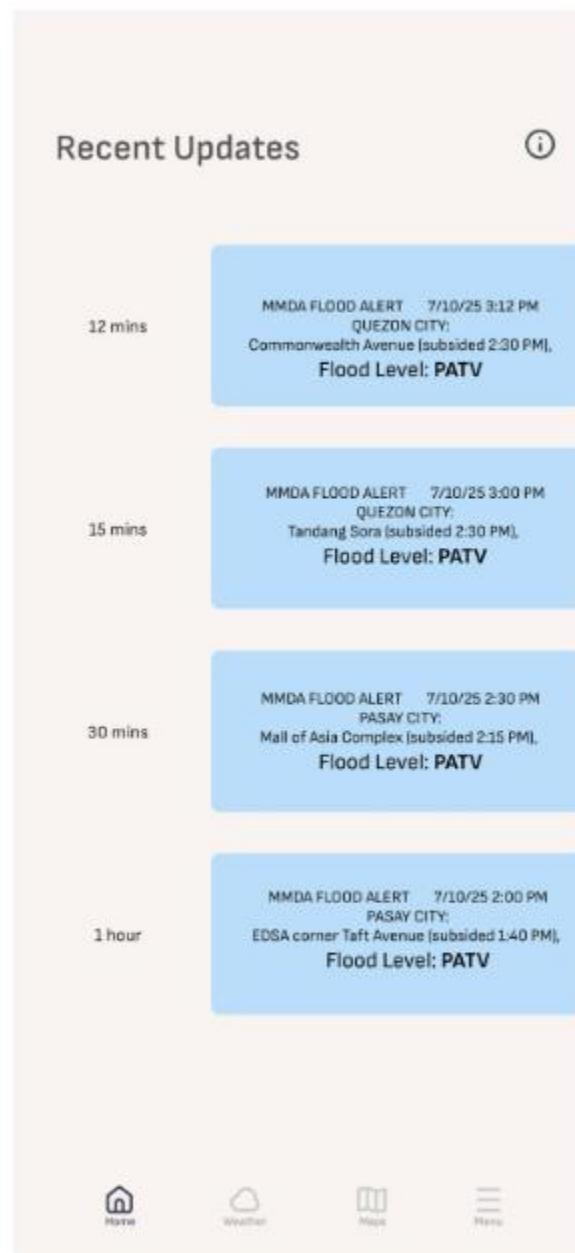


Figure 40. Homepage

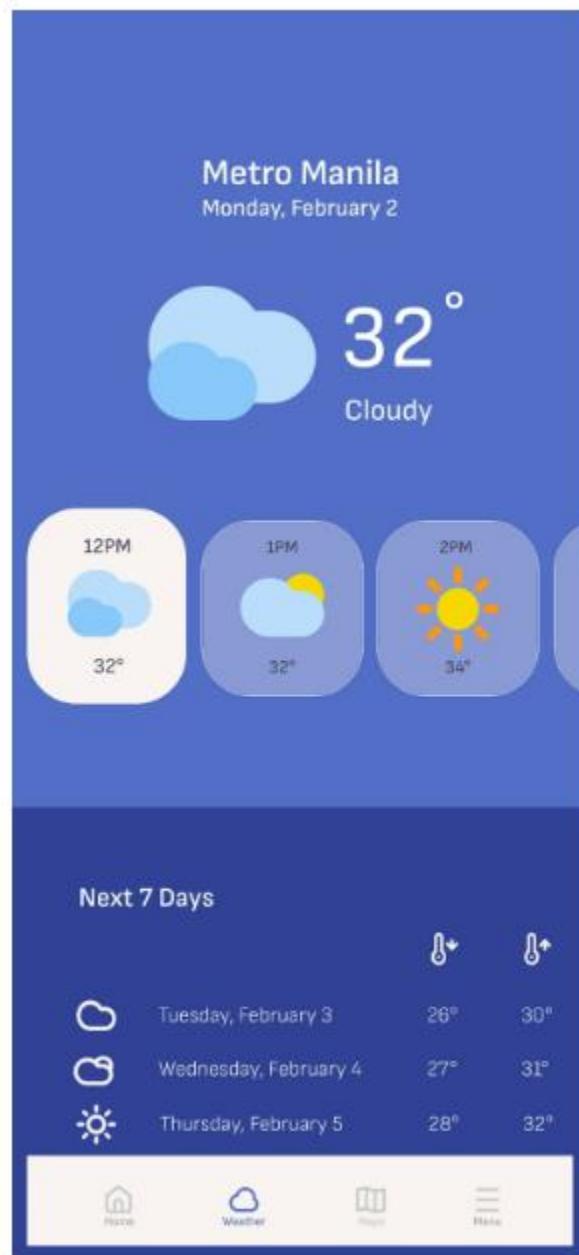


Figure 41. Weather Forecast Page

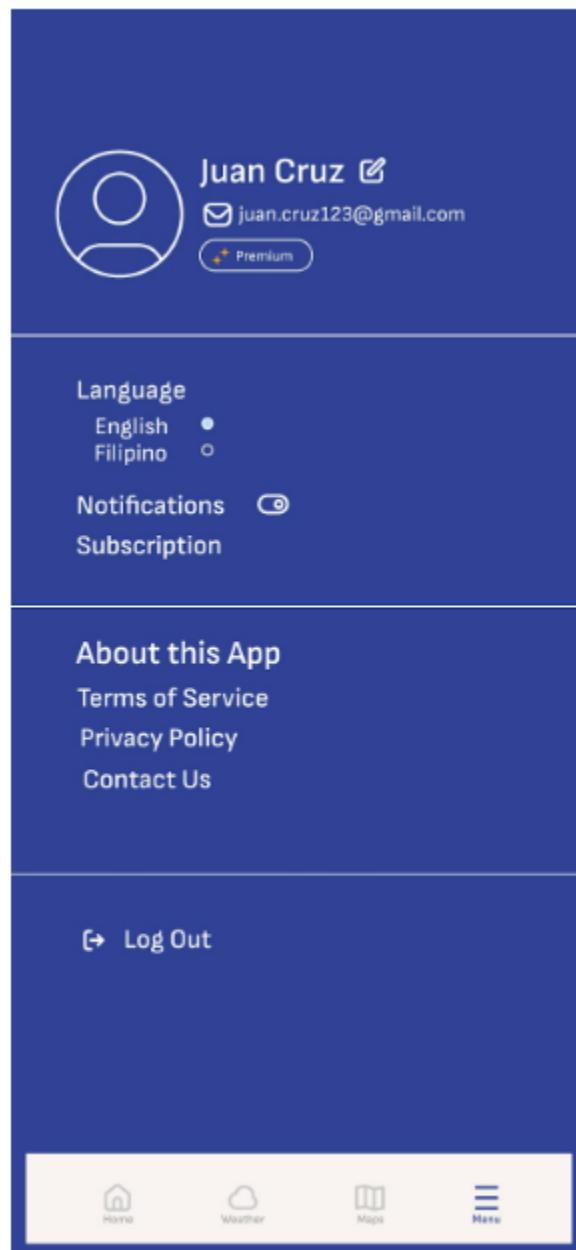


Figure 42. Menu Page

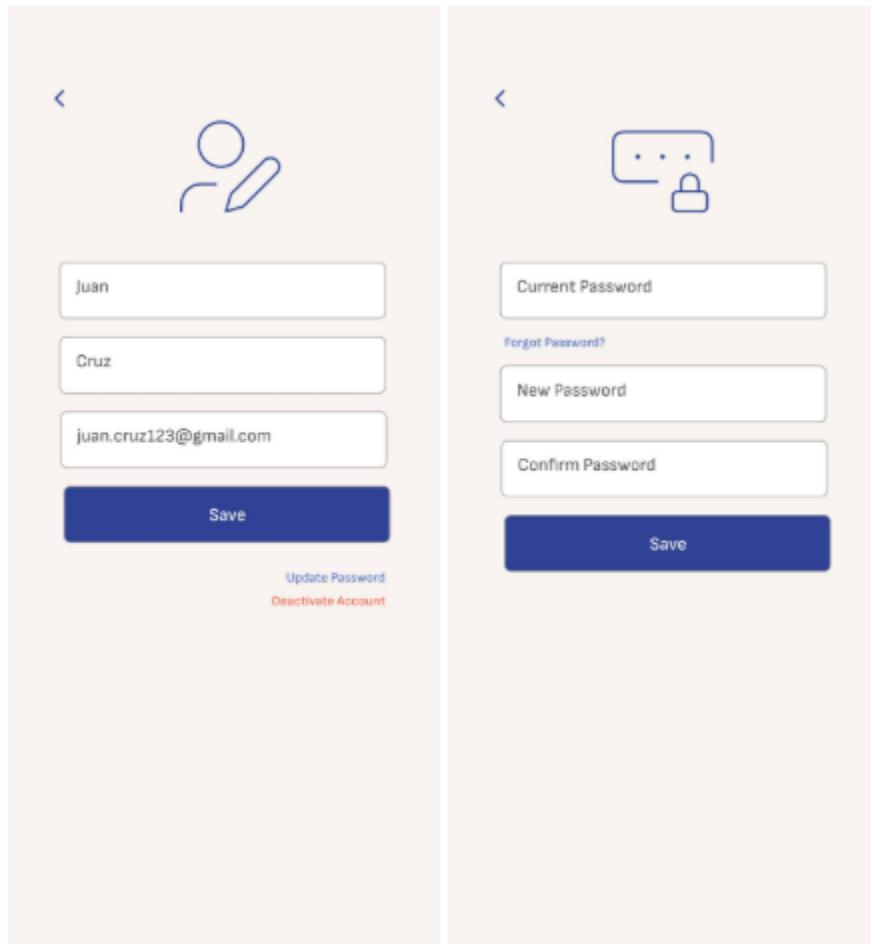


Figure 43. Edit Profile and Password for Traveler

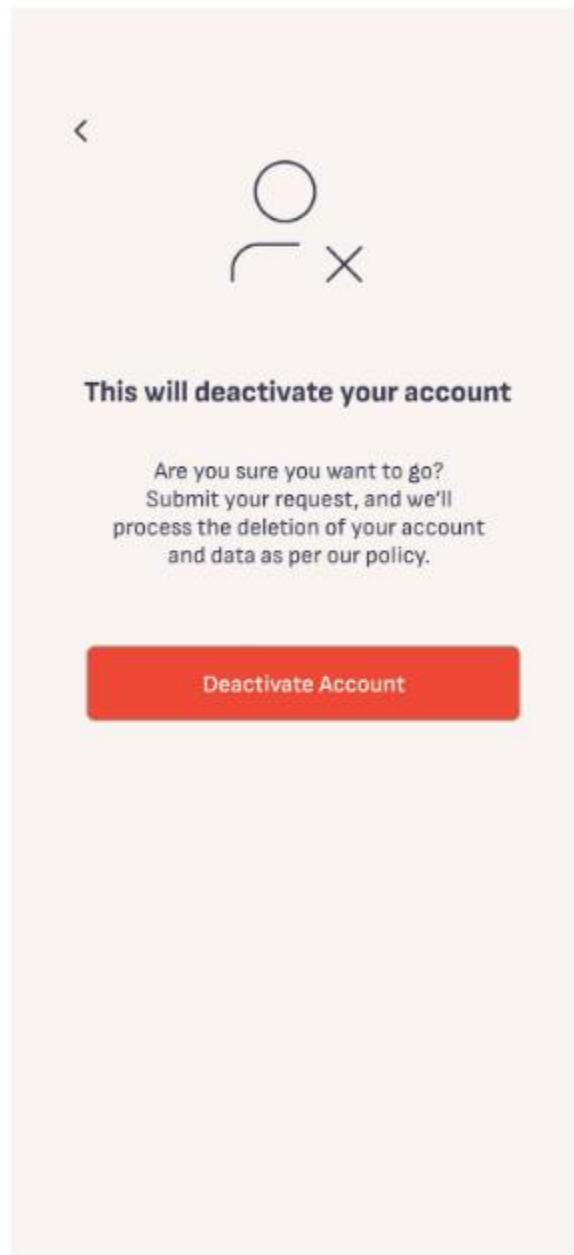


Figure 44. Request for Account Deactivation

<

Contact Us

Need help or have any questions?
Reach out to us, and we'll be happy to
assist you!

Subject

Message

Send

Figure 45. Contact Us Page

The image shows a mobile application interface with two main sections: 'Terms of Service' on the left and 'Privacy Policy' on the right. Both sections have a back arrow at the top left.

Terms of Service

Article 1. Application of Rules and Regulations These Terms of Service (hereinafter referred to as "the Terms") set forth the terms and conditions for the use of the GABAY Intelligent Flood Alert System (hereinafter referred to as "the Service") provided by GABAY (hereinafter referred to as "we" or "the Company"). By using the Service, users (hereinafter referred to as "the User") agree to abide by all provisions outlined in these Terms. If the User is a minor, they must obtain consent from a parent, guardian, or other legal representative before using the Service.

Article 2. Changes to the Terms of Service We reserve the right to modify these Terms at any time without prior consent from the User. Changes will take effect once we notify Users via our website, mobile application, or other appropriate means. Continued use of the Service after such changes constitutes acceptance of the revised Terms.

Privacy Policy

GABAY recognizes that your personal information is entrusted to us for a specific purpose by your own will. To protect your personal information and to use it with respect for your intentions, we have established the following policy on the appropriate handling of personal information.

- 1. Definition of Personal Information** GABAY recognizes that personal information includes information about a living individual (such as name, email address, and other details that could identify a specific person) as defined by applicable privacy laws. This also includes user IDs, passwords, and other identifiers linked to a specific individual, as well as demographic attributes like company affiliation, gender, and age.
- 2. Access and Location Information** Access information (hostnames, IP addresses, cookies, browser details, etc.) and location data are not considered personal information by themselves, as they do not identify a specific individual. However, if used in conjunction with personal information, they shall be treated as such. GABAY will disclose the purpose and method of cookie and IP address usage within our services. Users can disable cookies through browser settings; however, some features may not function properly without them. If disabling cookies affects service accessibility, an announcement will be made.

Figure 46. Terms of Service and Privacy policy

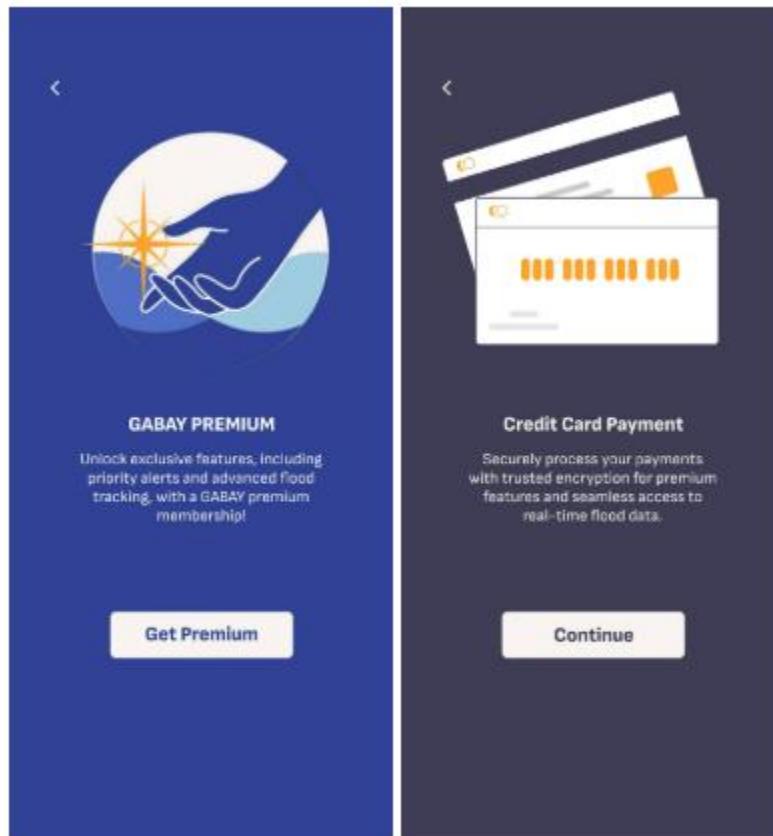


Figure 47. Splash Screen For Subscriptions

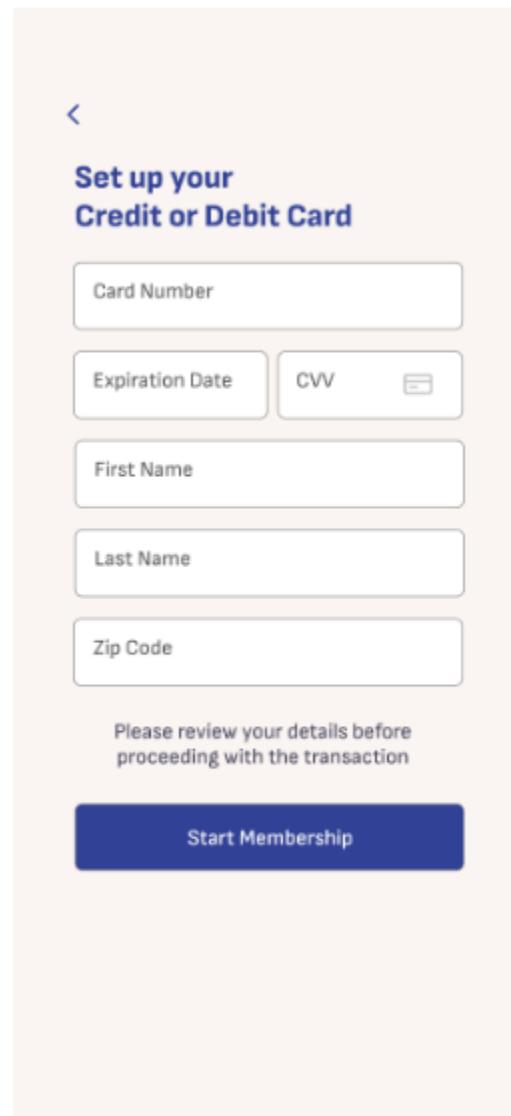


Figure 48. Payment Page

User Interface Wireframe (Administrator/Web Application)

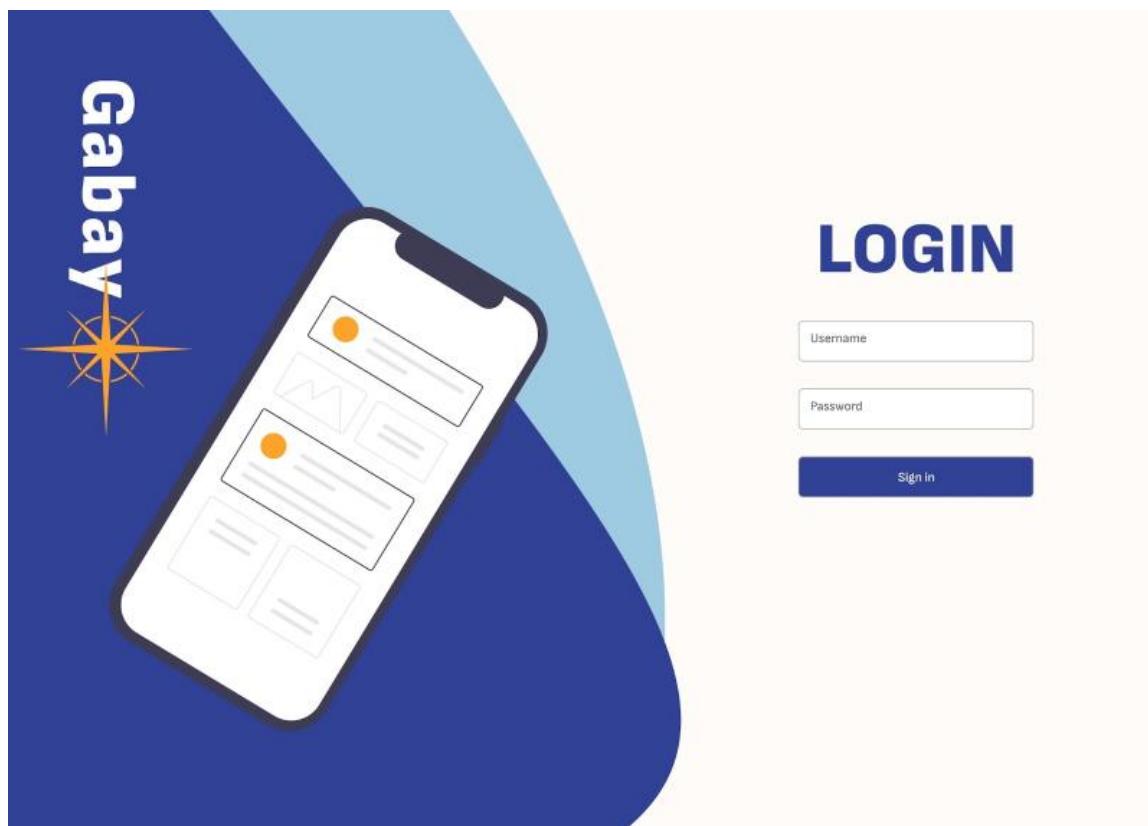


Figure 49. Login Page for Admins

The screenshot shows a web-based application interface titled "Gabay". At the top right, there are user profile and navigation icons. The main content area has a blue header bar with the title "Travelers". Below this, on the left, is a sidebar with several menu items: "Travelers" (selected), "Archive", "Requests", "Statistics", "Feedback", and "Co-Admins". The main content area displays a table titled "Travelers" with the following data:

Traveler No.	Fist Name	Last Name	Email	Date Registered	Membership	Status
1	John	Doe	john.doe@gmail.com	2024-07-05	Premium	Active
2	Jane	Santos	jane.santos@gmail.com	2024-07-05	Basic	Active
3	Louie	Rodriguez	james.rodriguez@mail.com	2024-07-07	Guest	Suspended

Each row in the table includes small edit and delete icons. A search bar is located at the top right of the main content area.

Figure 50. Dashboard for Managing Travelers

The screenshot shows the Gabay application interface. At the top, there is a blue header bar with the word "Gabay" on the left and a user icon with "Admin" and a right-pointing arrow on the right. Below the header is a sidebar on the left containing several menu items with icons: "Travelers" (person icon), "Archive" (document icon), "Requests" (list icon), "Statistics" (bar chart icon), "Feedback" (speech bubble icon), and "Co-Admins" (person plus icon). The main content area is titled "Archive" and contains a table with three rows of data. The table has columns for Report No., Location, Image, Comments, Date Uploaded, Traveler No., and Status. The first row has a status of "Flagged" (yellow background). The second row has a status of "Approved" (green background). The third row has a status of "Rejected" (red background). A search bar with a magnifying glass icon is located at the top right of the main content area.

Report No.	Location	Image	Comments	Date Uploaded	Traveler No.	Status
1	ABC Road	img123.jpg	Lorem ipsum dolor..	2024-07-05	1	Flagged
2	EFG Road	img456.jpg	N/A	2024-07-05	34	Approved
3	HIJ Road	img789.jpg	N/A	2024-07-05	5	Rejected

Figure 51. Dashboard for Archive

The screenshot shows a web-based application interface titled "Gabay". The top navigation bar includes a user icon labeled "Admin", a search bar with the placeholder "Search", and a menu icon. On the left, a sidebar lists navigation options: "Travelers", "Archive", "Requests" (which is selected and highlighted in blue), "Statistics", "Feedback", and "Co-Admins". The main content area is titled "Request" and displays a single row of data in a table format:

Request No.	Location	Image	Comments	Date	Traveler No.	Action
1	ABC Road	img123.jpg	Lorem ipsum dolor sit amet, adipiscing elit.	2024-07-05	1	

A "Search" input field is located at the top right of the main content area.

Figure 52. Dashboard for Requests

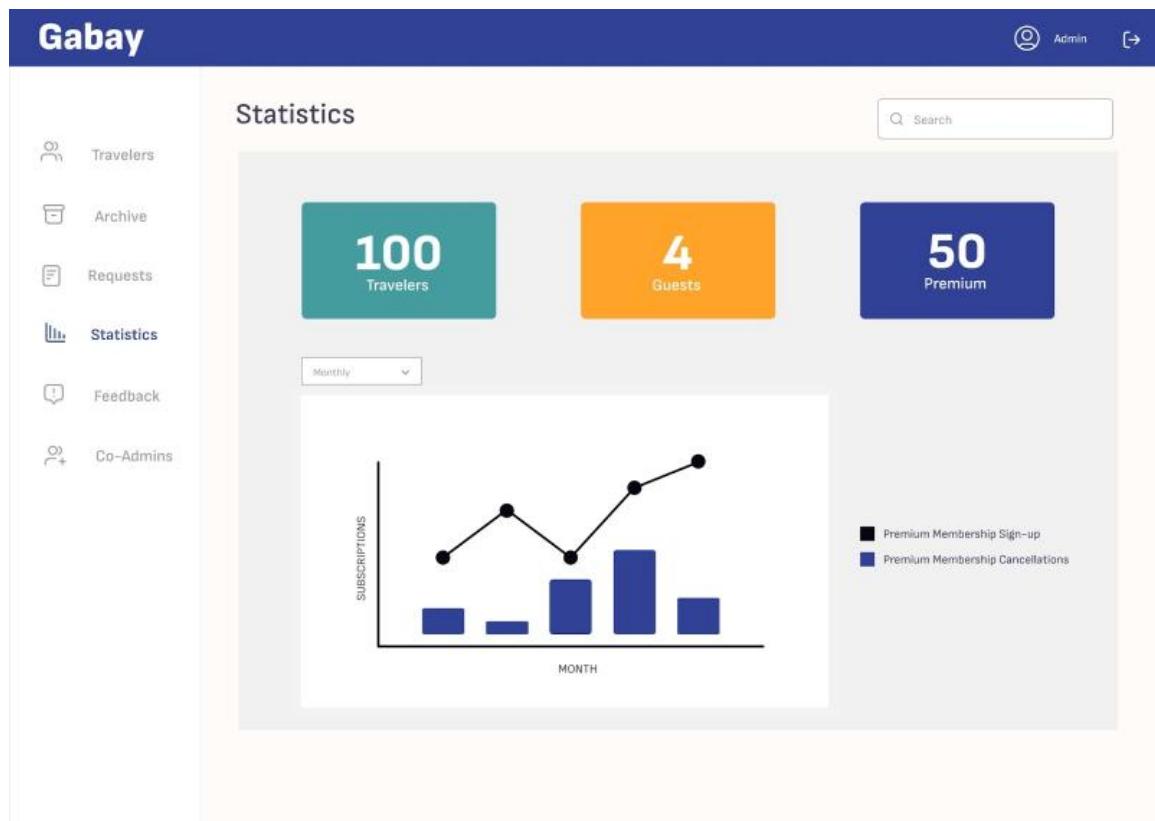


Figure 53. Dashboard for Statistics

The screenshot shows a dashboard titled "Gabay" with a blue header bar. On the right side of the header are icons for "Admin" and a user profile. Below the header is a sidebar with the following menu items:

- Travelers
- Archive
- Requests
- Statistics
- Feedback
- Co-Admins

The main content area is titled "Feedback" and contains a table with three rows of data:

Feedback No.	Subject	Content	Email	Date
1	ABC	Lorem ipsum dolor sit amet.....	john.doe@gmail.com	2024-07-05
2	EFG	Lorem ipsum dolor sit amet.....	jane.santos@gmail.com	2024-07-05
3	HJ	Lorem ipsum dolor sit amet.....	james.rodriguez@gmail.com	2024-07-05

A search bar is located at the top right of the main content area.

Figure 54. Dashboard for Feedbacks

<

ABC

john.doe@gmail.com

2024-07-05

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean pulvinar lobortis facilisis. Vestibulum quis diam in lacus tincidunt porta. Quisque a massa ipsum. Cras tincidunt massa lectus. Pellentesque bibendum, lacus eu bibendum posuere, ante eros facilisis elit, ac eleifend dolor elit suscipit erat. Nulla euismod eros ut mauris rutrum tincidunt. Sed id mauris volutpat, malesuada metus id, porttitor felis.

Sed consectetur ante in est vehicula, ut maximus purus dignissim. Fusce vel ullamcorper enim. Nulla maximus malesuada leo, vitae vestibulum odio pulvinar posuere. Nunc imperdiet, diam vel maximus molestie, sem sem maximus urna, vitae ultricies ligula odio dictum metus. Mauris accumsan sed magna non vehicula. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Vivamus felis libero, pharetra eget sollicitudin quis, convallis id libero. Phasellus vitae augue dictum, volutpat justo at, varius ex. Duis sagittis ligula arcu, a aliquet felis efficitur ut. Pellentesque at tristique nisl. Integer non turpis in ante pellentesque suscipit et non turpis. Ut vitae est lacinia, aliquet nisl vitae, molestie mauris. Quisque scelerisque augue eget tortor commodo, eget porta ligula pharetra. Etiam viverra id libero vel dapibus.

Figure 55. Full Feedback Popup

The screenshot shows a user interface for managing co-administrators. At the top, there's a blue header bar with the word "Gabay" on the left and three icons on the right: a user profile, "Admin", and a search bar. Below the header is a sidebar on the left containing links: "Travelers", "Archive", "Requests", "Statistics", "Feedback", and "Co-Admins". The main content area is titled "Co-Admin" with a plus sign icon. It features a search bar at the top right. A table lists three co-administrators with columns: Co Admin No., First Name, Last Name, Email, and Date Created. Each row has a red trash can icon on the far right. The table data is as follows:

Co Admin No.	First Name	Last Name	Email	Date Created
1	John	Doe	john.doe@gmail.com	2024-07-05
2	Jane	Santos	jane.santos@gmail.com	2024-07-05
3	Louie	Rodriguez	james.rodriguez@gmail.com	2024-07-07

Figure 56. Dashboard for Managing Admins

<

Create Co-Admin

First Name

Last Name

Email

Password

Confirm Password

Create

Figure 57. Creating a Co-Admin

Database Design (ERD)

Database Schema	Reference Number: <i>DS-01</i>
Version Number: <i>2.0</i>	

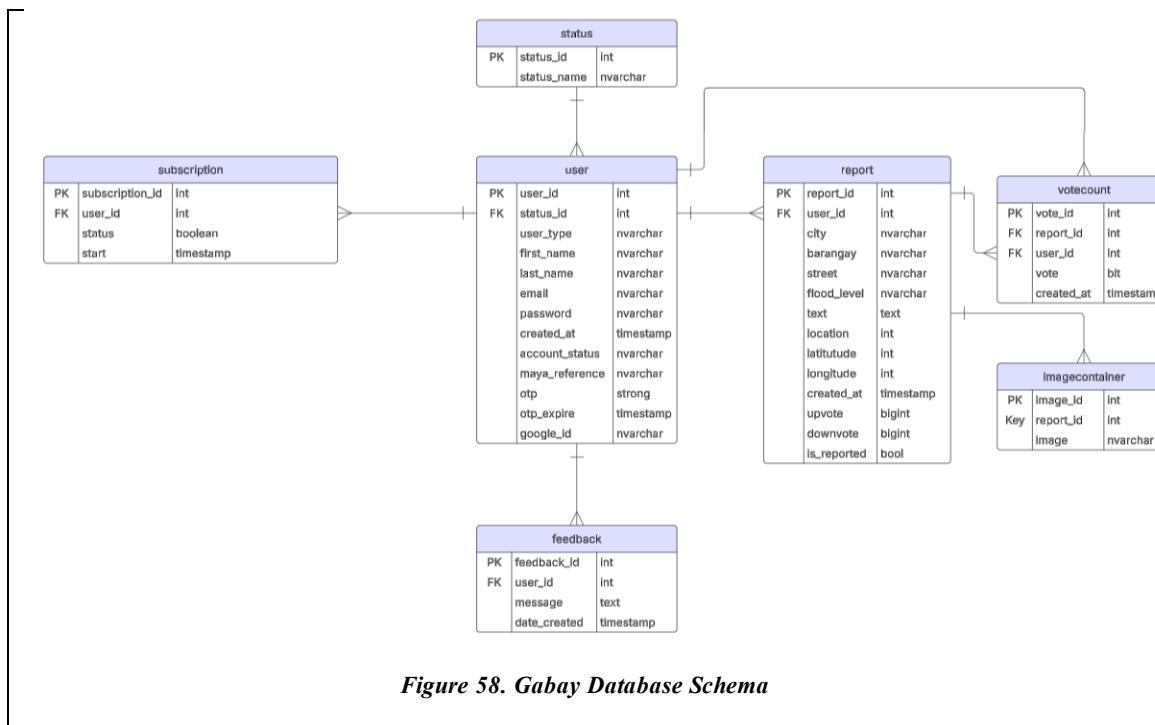


Figure 58 represents the database schema when using a relational database such as MSSQL, PostgreSQL, MariaDB, or other similar systems. It outlines how the data is structured using tables, columns, and keys (primary and foreign keys). The schema illustrates the use of normalized relationships between entities, which is a typical approach

in relational databases. However, it is important to note that the schema shown above is for illustrative purposes only. While the goal of the illustration above is to accurately show how data would be structured in a relational database, the actual implementation of our system will utilize a NoSQL database. The NoSQL database will allow developers for a more flexible, scalable, and dynamic approach to handling data relationships, as opposed to rigid table structures in a relational model.

Data Dictionary*Table 5. Data Dictionary of users collection*

Data Dictionary	Reference Number: DD-01
	Version Number: 2.0
System Name: Gabay	
Collection name: users	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	user_id	int		No		Unique Traveler id for each user
Reference	status_id	int		No		Identifier used to determine whether user is guest, registered, premium
	user_type	bit	1	No		Determine whether user is an admin or a traveler
	first_name	nvarchar	32	Yes		First name of the user
	last_name	nvarchar	32	Yes		Last name of the user
	email	nvarchar	256	Yes		Email address of the user
	password	nvarchar	20	Yes		Password of the user
	created_at	timestamp	N/A	Yes	Current timestamp	Date that is the basis on when the account was created
	account_status	nvarchar	24	No		Determines whether the account is active,

						deleted or suspended
	maya_referenc e	nvarchar	10			Provides the reference number for payments
	otp	nvarchar	4			Otp for verification of user credentials
	otp_expire	timestamp				Time before the otp token will expire this is set to 5 minutes
	google_id	nvarchar				This is the id provided by google when using google sign in

Table 6. Data Dictionary of report

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Data Dictionary	Reference Number: DD-02 Version Number: 2.0
System Name: Gabay	
Collection name: report	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	report_id	int		No		Unique ID for identification of reports
Reference	user_id	int		No		Unique ID for each users
	city	nvarchar		No		
	barangay	nvarchar		No		
	street	nvarchar		No		
	flood_level	nvarchar		No		Flood level submitted by the traveler
	text	text		No		Main content of the text submitted by the traveler
	location	int				This is added above latitude and longitude.
	latitude	int	4	No		Current latitude location of the traveler
	longitude	int	4	No		Current longitude location of the traveler
	created_at	timestamp	N/A	No	Current timestamp	Time when the report was created
	upvote	bigint	8	Yes		Count of travelers noting that the information is accurate

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	downvote	bigint	8	Yes		Count of travelers noting that the information is inaccurate
	isReported	bool				This field is used to differentiate reported reports and non reported reports.

Table 7. Data Dictionary for votecount

Data Dictionary	Reference Number: DD-03
	Version Number: 2.0
System Name: Gabay	
Collection name: votecount	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	vote_id	int		No		Unique ID to keep track on the votes on each report
Reference	report_id	int		No		Unique ID of the report to keep things on track
	user_id	int		No		Unique ID for each users
	vote	bit		Yes		Can either be 1 or 0, 1 = upvote, 0 = downvote
	created_at	timestamp		Yes	Current time when vote was casted	Time when the vote was casted

Table 8. Data Dictionary of status

Data Dictionary	Reference Number: DD-04
	Version Number: 2.0
System Name: Gabay	
Collection name: status	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	status_id	int		No		Unique ID for the status of each accounts.
	status_name	nvarchar	32	No		Can either be Guests, Registered, or Premium.

Table 9. Data Dictionary for subscription

Data Dictionary	Reference Number: DD-05
	Version Number: 2.0
System Name: Gabay	
Collection name: subscription	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	subscription_id	int		No		Unique ID to keep on track on who are currently subscribed
Reference	user_id	int		No		Unique ID for each users
	status	boolean	1	No	0	Determine whether the current status of each travlers are Unsubscribed or Subscribed
	start	timestamp		No	Current time when subscription starts	Showcases the start date of the subscription

Table 10. Data Dictionary of feedback

Data Dictionary	Reference Number: DD-06
	Version Number: 2.0
System Name: Gabay	
Collection name: feedback	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	feedback_id	int		No		Unique ID for tracking the feedbacks
Reference	user_id	Int		No		Unique ID for each travlers
	message	Text		No		This is where the contents of the feedbacks are placed
	date_created	timestamp		No	Current time when the feedback was created	Time when the feedback was created and submitted.

Table 11. Data Dictionary of image

Data Dictionary	Reference Number: DD-07
	Version Number: 2.0
System Name: Gabay	
Collection name: image	

Key	Field Name	Data Type	Length	Nullable	Default Value	Description
Document ID	image_id	int		No		Unique ID for each images uploaded by the travelers
Reference	report_id	int		No		Unique ID for each report
	image	nvarchar		No		Image path

Implementation Plan

Gantt Chart

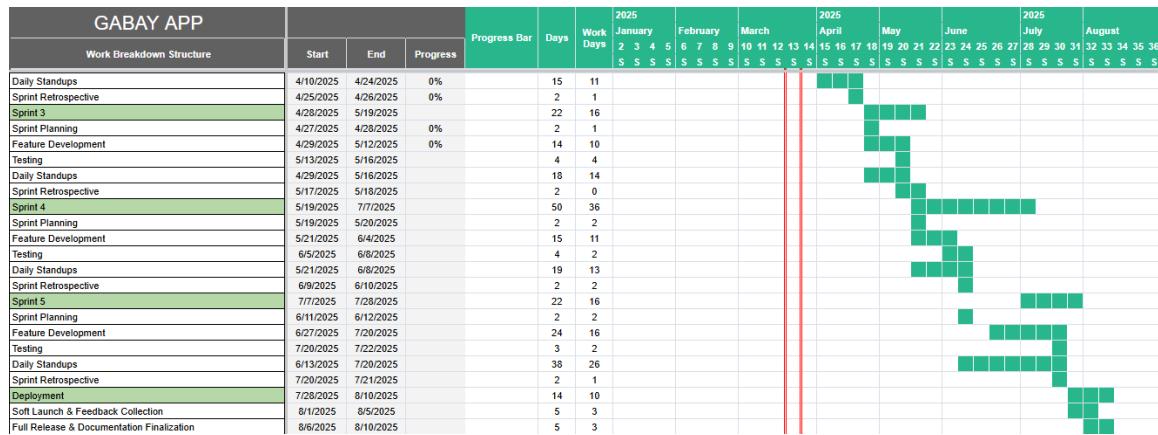


Figure 59. Gantt Chart

The Gantt chart of our proposed mobile application system “GABAY”, follows an agile approach with regards to system development. The process is divided into phases and sprints, this is to ensure that the system follows an iterative and incremental flow which is the core aspect of an agile methodology. The Planning phase, consists of tasks like providing roles and responsibilities of the team, finalizing features and functionalities of the system, preparing documentation and developing the architecture of the system. Following this phase are five sprints with each sprint consists of sprint planning, development, testing, daily standups, and sprint retrospective. Finally, the last part of the gantt chart is the Development phase which consists of the soft launch and the full release and final documentation of the Gabay system.

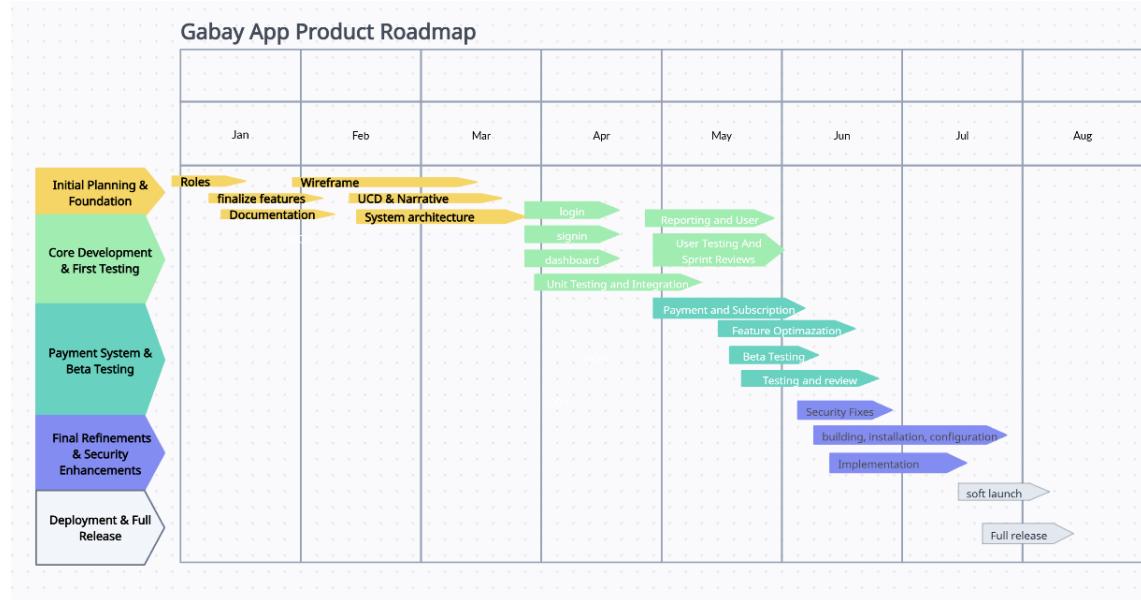


Figure 60. Product Roadmap of Gabay

Figure 60 describes the whole product roadmap of the Gabay system, which starts with planning and setting the foundation. The next part is the core development which includes important functions such as user authentication, authorization, creating the dashboards. Payment system, on the other hand, is will be focused on during the months of May and June, while security enhancements are expected to be the focus of the team during the months of June and July. Lastly, the soft launch of Gabay is expected to be released on late July to Early August, followed by a full release within a week or two after the soft launch.

Hardware Requirements

According to Bin et al., hardware refers to any physical device used for input, processing, output, and storage within a computer system. They also enumerated the basic components of hardware, which include the Central Processing Unit (CPU); primary storage, such as Random Access Memory (RAM) and Read-Only Memory (ROM); secondary storage devices, such as Hard Disk Drives (HDDs) and Solid-State Drives (SSDs); input devices, which accept data and instructions from the user; and output devices, which present data in a form that users can understand.

Table 12. Hardware Requirements

Hardware	Specification	Description
Monitor	1080p resolution (1920x1080)	A device that is used to display translated data and information to the user.
Central Processing Unit	Intel Core i5 13600K	A mid range processor that is capable of doing general tasks.

Graphics Processing Unit	Nvidia GTX 1650 or newer	A mid range processing unit that is capable of delivering light to moderate graphical workloads.
Random Access Memory (RAM)	16GB DDR5 RAM	An ideal RAM for multitasking and providing efficient application operation.
Hard Disk Drive (HDD) / Solid-State Drive (SDD)	512 GB SSD or 1TB HDD	A hardware device that stores data permanently. HDD provides a cheaper alternative to SDD with a drawback in terms of slower speed.

A monitor with a 1080p resolution provides a better viewing experience (Teja, R., 2024). The article also mentions that 1920x1080p is becoming the standard in the market, as videos and games are widely available in this format. Furthermore, according to Adobe, standard definition (SD) is losing its dominance

as the "standard" for viewing experiences, with anything below 720p now considered standard definition.

Meanwhile, when it comes to the processing unit of the hardware component a midrange level of both the Central processing unit (CPU) and Graphics Processing unit (GPU) is suitable for the development of the proposed mobile application. Intel Core i5 13600K is the newest release by Intel.

Additionally, a minimum storage device of at least 512 gb either Solid State Hard Drive or Hard Disk Drive to store files are considered as the recommended storage size in today's period. Furthermore, when it comes to the use of Solid State Drive or Hard Disk Drive, it all comes down to the pricing of the hardware component, Solid State Drive (SSD) tend to come at a higher cost in exchange for faster read and write speed, and provides less energy consumption leading to a more cooler device (Holm, T).

Software Requirements

According to [tutorialspoint](#), The software requirements are description of features and functionalities of the target system. Requirements convey the expectations of users from the software product, such as Operating Systems (OS), Web Framework, Database, and Programming Language.

For Development*Table 13. Software Requirements (Development)*

Software	Specification	Description
Operating System (OS)	Microsoft Windows 10 or 11	The primary purpose of the Operating System is to manages the computer's resources
Web Browser	Google Chrome, Microsoft Edge, Safari	These three web browsers are the frequently used browsers by the users, also, various tools that helps for debugging are also included via plugins
Mobile Android Framework	Flutter	A framework that is suitable for creating cross platform mobile application
Web Framework	Laravel	A PHP-based web framework for creating

		web apps. Open source and free.
Database Management	MongoDB	MongoDB is an open source document database that stores data in a JSON format. This database is also classified as a NoSQL database.
Programming Language (Mobile Application)	Dart	This open source programming language developed by google, with it's strong integration with Flutter framework it provides a good choice for cross platform development
Programming Language (Web Application)	PHP	Open source programming language for server-side programming that used to create apps and websites.

Developmental Tools	Visual Studio Code	The Integrated Development Environment (IDE) of choice for our proposed mobile application system
Application Programming Interface	Leaflet	An open-source JavaScript API that helps developers to develop interactive maps for mobile devices.
	Maya	Provides a payment method for credit cards.
	Openweathermap	An API that provides updated weather updates
	Sightengine	An API that helps in image analysis

For the operating system of the development environment the preferred OS is Windows 11 although Windows 10 is still acceptable. However, due to the latest announcement of Microsoft regarding the upcoming end of support of Windows 10 (Joos.T, 2025), we recommend using Windows 11 for development purposes.

Meanwhile, for the mobile application framework, the researchers have chosen Flutter framework due to its cross-platform compatibility. Furthermore, Flutter also uses Dart as its programming language, which aligns with our choice regarding the programming language. This framework is an open-source UI that was developed by Google (Montano,2024).

For the web application, we will employ Laravel Framework. This is an open source PHP framework that follows the concept pattern of Model-View-Controller (MVC).

Regarding the concern of our database, MongoDB will be used in this proposed application. It is a cloud based NoSQL database that is designed to handle large and unstructured data such as images, videos, and texts.

For Deployment*Table 14. Requirements for Deployment*

Hardware/Software	Specification	Description
Operating System (OS)	Android (At least having a minimum requirement of Android 13 (Tiramisu))	Android is a mobile operating system that was mainly created for smartphones and other touchscreen-based mobile devices. The latest version of Android is Android 15 codenamed as “Vanilla Ice Cream”.
	Windows (At least having a minimum requirement of Windows 10 but Windows 11 is more preferred)	The Operating system for web application is Windows which is developed by Microsoft Corporation and is considered as one of the most common operating

		systems currently in the market.
Handheld Device	Android Smartphone	A mobile phone with an internal computer and other functions
Device	Personal Computer	A device with information processing and storage capabilities.
Brower	Google	Cross-platform web browser developed by Google.

Testing and Evaluation Methodology

Table 15. Test Case for Register an Account

Test Case	Register an Account	Test Case Author	Desmond John Tubije	
Priority	HIGH	Test Case Number	TC01	
Test Case Reviewer				
Test Case Execution Date				
Test Case #	Action	Steps	Input	Expected Output
TC01-001	Ensures that potential users registers an account using a valid email address	<ol style="list-style-type: none"> 1. Click the sign up button 2. Enter your credentials (First name, Last name, valid email address, and password) 3. Click Sign Up 4. Check email address and wait for the verification code to be sent 5. Input the appropriate 	Example: First Name: John Last Name: Doe Email: JohnDoe@gmail.com Password: <u>Helloworld123!</u> Example Verification code sent: 1234 Verification code entered: 1234	Account is successfully created, redirect the users to the login page

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		verification code		
TC01-002	Register users with an existing registered email address	<ol style="list-style-type: none"> 1. Click the sign up button 2. Enter same email credentials 3. Click Sign Up 	Example: First Name: John Last Name: Doe Email: <u>JohnDoe@gmail.com</u> Password: <u>Helloworld123!</u>	Show an error message indicating that existing email address is already in use Sample Error Message: <u>Email address already in use</u>
TC01-003	Register with invalid password credentials	<ol style="list-style-type: none"> 1. Click the sign up button 2. Check email address and wait for the verification code to be sent 3. Input the appropriate verification code 4. Input a password that doesn't 	Example First Name: John Last Name: Doe Email: <u>JohnDoe@gmail.com</u> Password: <u>hello</u> <u>helloworld</u> <u>12345678</u>	Show an error message indicating that password doesn't follow proper format Sample Error Message: <u>Password must have at least 8 characters</u>

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		fit the criteria		<u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>
TC01-004	Register with password and confirm password not matching	1. Repeat steps #1-3 of TC01-003 2. Input a valid password 3. Input an incorrect password at the confirm password field	Example: Password: <u>staphylococcusAureus12</u> Confirm Password: <u>staphylococcusAureus12</u>	Show an error message indicating that password does not match Sample Error Message: <u>Password must match!</u>
TC01-005	Input of Incorrect Verification code	1. Repeat steps #1-4 in TC01-001 2. Input Incorrect Verification Code	Example: First Name: John Last Name: Doe Email: <u>JohnDoe@gmail.com</u> Password: <u>Helloworld123!</u> Example Verification code sent:	Show an error message indicating that the verification code that was entered was incorrect Sample Error Message:

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			1234 Verification entered: 4321	code	<u>Incorrect</u> <u>verification</u> <u>code</u> <u>please</u> <u>enter</u> <u>the</u> <u>correct</u> <u>verification</u> <u>code</u>
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Table 16. Test Case for Account Login (Traveler)

Test Case	Account Login	Test Case Author	Desmond John Tubije	
Priority	HIGH	Test Case Number	TC02	
Test Case Reviewer				
Test Case Execution Date				
Test Case #	Action	Steps	Input	Expected Output
TC02-001	Login attempt with correct email address and incorrect password	<ol style="list-style-type: none"> Enter email address and password on the respective field provided Click the login button 	Example: Email: JohnDoe@gmail.com Password: <u>Helloworld12</u>	Show an error message that mentions incorrect login credentials Sample Error Message: <u>IncorrectPassword</u>
TC02-002	Login attempt with unregistered email address and correct password	<ol style="list-style-type: none"> Enter email address and password on the respective field provided Click the login button 	Example: Email: JonDoe@gmail.com Password: <u>Helloworld123!</u>	Show an error message that mentions user is not found Sample Error Message: <u>User does not exist</u>

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TC02-003	Forgot Password with correct email address and verification code	<ol style="list-style-type: none"> 1. On the login page click Forgot Password? 2. Enter verification code provided 3. Click verify 	<p>Example:</p> <p>Email: <u>JohnDoe@gmail.com</u></p> <p>Verification Code sent: <u>1234</u></p> <p>Verification Code entered: <u>1234</u></p>	Redirect to reset password page
TC02-004	Forgot Password with correct email address and incorrect verification code	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC-02-003 	<p>Example:</p> <p>Email: <u>JohnDoe@gmail.com</u></p> <p>Verification Code sent: <u>1234</u></p> <p>Verification Code entered: <u>4321</u></p>	<p>Show an error message indicating that the verification code that was entered was incorrect</p> <p>Sample Error Message: <u>Incorrect verification code please enter the correct verification code</u></p>
TC02-005	Forgot password with incorrect email address	<ol style="list-style-type: none"> 1. Repeat step #1 of TC02-003 	<p>Example:</p> <p>Email: <u>JonDoe@gmail.com</u></p>	<p>Show an error message that mentions user is not found</p> <p>Sample Error Message:</p>

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				<u>User does not exist</u>
TC02-006	Change new password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC02-003 2. Enter new password 3. Click on continue 	Example: Password: <u>worldhello321!</u> Confirm Password: <u>worldhello321!</u>	Show a message that password was successfully changed Example: <u>You have successfully changed your password</u>
TC02-007	Change new password while not following the criteria in creating password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC02-003 2. Enter new password 3. Click on continue 	Example Password: <u>hello</u> <u>helloworld</u> <u>12345678</u>	Show an error message indicating that password doesn't follow proper format Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>
TC02-008	Change new password while password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC02-003 	Example: Password:	Show an error message indicating that

	and confirm password does not match	<ol style="list-style-type: none"> 2. Enter new password 3. Enter confirm password 4. Click on continue 	<u>worldhello321!</u> Confirm Password: <u>worldhello321</u>	password does not match Sample Error Message: <u>Password must match!</u>
TC02-009	Change new password while using old password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC02-003 2. Enter new password 3. Enter confirm password 4. Click on continue 	Example: Password: <u>Helloworld123!</u> Confirm Password: <u>Helloworld123!</u>	Show an error message indicating that new password cannot be the same as the previous password Example: <u>New password must be different from your current password!</u>
TC02-010	Login attempt using valid email address and password	<ol style="list-style-type: none"> 1. Enter your email address and password 2. Click on Sign in 	Example: Email: <u>JohnDoe@gmail.com</u> Password: <u>Helloworld123!</u>	User is redirected to the homepage

Table 17. Test Case for Traveler Upload Content

Test Case	Flood level submission	Test Case Author	Desmond John Tubije	
Priority	HIGH	Test Case Number	TC03	
Test Case Reviewer				
Test Case Execution Date				
Test Case #	Action	Steps	Input	Expected Output
TC03-001	Uploading media content that follows the file size requirement	<ol style="list-style-type: none"> 1. Click on submit flood details 2. Drag the estimated level of flood 3. Click on the camera icon 4. Upload image 5. Click on the bubble speech icon 6. Upload text content 7. Click on Send 	Example: Image: img123.jpg (700kb) Text: helloworldhelloworld	Show a message that you have successfully uploaded your report Sample Message: <u>You have successfully uploaded your report</u>

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TC03-002	Uploading media content that does not follow the file size requirement	1. Repeat Steps #1-4 of TC04-001	Example Image: img456.jpg(10mb)	Show a message that image does not follow the proper file size format Sample Message: <u>The file you are trying to upload is too large the maximum allowable size is 2mb</u>
TC03-003	Uploading content report without media files being included	1. Click on submit flood details 2. Drag the estimated flood level 3. Click on the bubble speech icon 4. Upload Text 5. Click on Send	Example: Text: helloworldhelloworld	Show a message that you have successfully uploaded your report Sample Message: <u>You have successfully uploaded your report</u>
TC03-004	Sending flood level	1. Click on submit flood	Example:	Show a message that you have successfully

		2. Drag the estimated flood level	Drag the icon towards Chest Level	uploaded your report Sample Message: <u>You have successfully uploaded your report</u>
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Table 18. Test Case for Admin Login

Test Case	Admin Login		Test Case Author	Desmond John Tubije
Priority	HIGH		Test Case Number	TC04
		Test Case Reviewer		
		Test Case Execution Date		
Test Case #	Action	Steps	Input	Expected Output
TC04-001	Login attempt with correct email address and incorrect password	<ol style="list-style-type: none"> Enter email address and password on the respective field provided Click the login button 	Example: Email: JohnSnow@gmail.com Password: <u>Helloworld12</u>	Show an error message that mentions incorrect login credentials Sample Error Message: <u>IncorrectPassword</u>
TC04-002	Login attempt with unregistered email address and correct password	<ol style="list-style-type: none"> Enter email address and password on the respective field provided Click the login button 	Example: Email: JonSnow@gmail.com Password: <u>Helloworld123!</u>	Show an error message that mentions user is not found Sample Error Message: <u>User admin does not exist</u>

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TC04-003	Forgot Password with correct email address and verification code	<ol style="list-style-type: none"> 1. On the login page click Forgot Password? 2. Enter verification code provided 3. Click verify 	<p>Example: Email: JohnSnow@gmail.com</p> <p>Verification Code sent: <u>1234</u></p> <p>Verification Code entered: <u>1234</u></p>	Redirect to reset password page
TC04-004	Forgot Password with correct email address and incorrect verification code	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC04-003 	<p>Example: Email: JohnSnow@gmail.com</p> <p>Verification Code sent: <u>1234</u></p> <p>Verification Code entered: <u>4321</u></p>	<p>Show an error message indicating that the verification code that was entered was incorrect</p> <p>Sample Error Message: <u>Incorrect verification code please enter the correct verification code</u></p>
TC04-005	Forgot password with incorrect email address	<ol style="list-style-type: none"> 1. Repeat step #1 of TC04-003 	<p>Example: Email: JohnDoe@gmail.com</p>	<p>Show an error message that mentions user is not found</p> <p>Sample Error Message:</p>

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				<u>User does not exist</u>
TC04-006	Change new password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC04-003 2. Enter new password 3. Click on continue 	Example: Password: <u>worldhello321!</u> Confirm Password: <u>worldhello321!</u>	Show a message that password was successfully changed Example: <u>You have successfully changed your password</u>
TC04-007	Change new password while not following the criteria in creating password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC04-003 2. Enter new password 3. Click on continue 	Example Password: <u>hello</u> <u>helloworld</u> <u>12345678</u>	Show an error message indicating that password doesn't follow proper format Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>
TC04-008	Change new password while password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC04-003 	Example: Password:	Show an error message indicating that

	and confirm password does not match	<ol style="list-style-type: none"> 2. Enter new password 3. Enter confirm password 4. Click on continue 	<u>worldhello321!</u> Confirm Password: <u>worldhello321</u>	password does not match Sample Error Message: <u>Password must match!</u>
TC04-009	Change new password while using old password	<ol style="list-style-type: none"> 1. Repeat step #1-3 of TC04-003 2. Enter new password 3. Enter confirm password 4. Click on continue 	Example: Password: <u>Helloworld123!</u> Confirm Password: <u>Helloworld123!</u>	Show an error message indicating that new password cannot be the same as the previous password Example: <u>New password must be different from your current password!</u>
TC04-010	Login attempt using valid email address and password	<ol style="list-style-type: none"> 1. Enter your email address and password 2. Click on Sign in 	Example: Email: <u>JohnSnow@gmail.com</u> Password: <u>Helloworld123!</u>	Admin is redirected to the Admin page

Table 19. Test Case for Adding Co-Admin

Test Case	Adding Co-Admin	Test Case Author	Desmond John Tubije
Priority	HIGH	Test Case Number	TC05
			Test Case Reviewer
			Test Case Execution Date
Test Case #	Action	Steps	Input
TC05-001	Creating a new co-admin using valid credentials	<ol style="list-style-type: none"> 1. Login in the admin webpage 2. Click on Co-Admin 3. Click on the add button 4. Enter valid credentials 5. Click on Create 	<p>Example:</p> <p>First Name: <u>Jane</u></p> <p>Last Name: <u>Doe</u></p> <p>Email: <u>JaneDoe@gmail.com</u></p> <p>Password: <u>HelloWorld12!</u></p> <p>Confirm Password: <u>HelloWorld12!</u></p> <p>Show a message indicating that admin user created successfully</p> <p>Sample Message: <u>You have successfully added a co-administrator</u></p>

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TC05-002	Creating a new co-admin using existing email address	<ol style="list-style-type: none"> 1. Repeat steps #1-3 of TC05-01 2. Enter a used email address 	<p>Example:</p> <p>First Name: <u>Jane</u></p> <p>Last Name: <u>Doe</u></p> <p>Email: JohnDoe@gmail.com</p> <p>Password: <u>HelloWorld12!</u></p> <p>Confirm Password: <u>HelloWorld12!</u></p>	<p>Show an error message indicating that existing email address is already in use</p> <p>Sample Error Message: <u>Email address already in use</u></p>
TC05-003	Register with invalid password credentials	<ol style="list-style-type: none"> 1. Repeat steps #1-3 of TC05-01 2. Enter a valid email address 3. Enter invalid password combination 	<p>Example</p> <p>First Name: Jane</p> <p>Last Name: Doe</p> <p>Email: JaneDoe@gmail.com</p> <p>Password: <u>hello</u> <u>helloworld</u> <u>12345678</u></p>	<p>Show an error message indicating that password doesn't follow proper format</p> <p>Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u></p>

				<p><u>lowercase letters</u></p> <p><u>Password must have numbers</u></p>
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Table 20. Test Case for Managing Users (Administrator)

Test Case	Managing Users (Admin Side)		Test Case Author	Desmond John Tubije
Priority	HIGH		Test Case Number	TC06
			Test Case Reviewer	
			Test Case Execution Date	
Test Case #	Action	Steps	Input	Expected Output
TC06-001	Re-Activating User account	<ol style="list-style-type: none"> 1. Login Admin web page 2. Click on travelers 3. Click on the suspended user account you wish to activate 4. Click Continue 		<p>Show a message that indicates user successfully reactivated</p> <p>Sample Message:</p> <p><u>You have reactivated the account of the user</u></p>
TC06-002	Suspending active user account	<ol style="list-style-type: none"> 1. Repeat Steps #1-2 of TC06-001 2. Click on active users 3. Click suspend button 4. Click Continue 		Show a message that indicates user is temporarily suspended

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				Sample Message: <u>You have temporarily suspended the user</u>
TC06-003	Deleting Users	<ol style="list-style-type: none">1. Repeat Steps #1-2 of TC06-0012. Click on either active/suspended travelers3. Click the delete icon4. Click Continue5. Click Confirm		Show a message that indicates that the user account is deleted Sample Message: <u>You have deleted the account</u>

Table 21. Test Case for Image Deletion

Test Case	Image Deletion		Test Case Author	Desmond John Tubije
Priority	Medium		Test Case Number	TC07
		Test Case Reviewer		
		Test Case Execution Date		
Test Case #	Action	Steps	Input	Expected Output
TC07-001	Delete images reported by the users and confirming it	<ol style="list-style-type: none"> 1. Admin login 2. Click on requests 3. Click on the report sent by the travelers 4. Click on the image 5. Close the image 6. Click on the delete button 7. Click Confirm 		<p>Show a message that indicates image deleted successfully</p> <p>Sample Message:</p> <p><u>You have removed the image</u></p>

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TC07-002	Delete images reported by the users without confirming	<ol style="list-style-type: none">1. Repeat Steps #1-6 of TC07-0012. Do not click the confirm button		Image is not successfully deleted no notification message indicating successful image deletion
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Table 22. Test Case for Reporting Flood Information

Test Case	Reporting Flood Information		Test Case Author	Desmond John Tubije
Priority	Medium		Test Case Number	TC08
			Test Case Reviewer	
			Test Case Execution Date	
Test Case #	Action	Steps	Input	Expected Output
TC08-001	Travelers Clicked upvote succeeded by downvote	<ol style="list-style-type: none"> 1. Traveler logged in to their account 2. Traveler Selects area of interest 3. Traveler Looks for an update from crowdsourced information 4. Traveler clicked upvote 5. Traveler clicked downvote 	Example: Report123 - Lorem ipsum dolor img123 Upvote +1 Downvote +1	The expected output must show that Upvote result would be back to 0 and the number of downvote will increase by 1
TC08-002	Travelers Clicked upvote succeeded by downvote	1. Repeat Steps #1-3 of TC08-001	Example:	The expected output must show that Downvote result would be back to 0 and the

		2. Reverse the step 4 and 5 of TC08-001	Report123 - Lorem ipsum dolor img123 Upvote +1 Downvote +1	number of upvote will increase by 1
TC08-003	Registered travelers reporting an image	1. Repeat Steps #1-3 of TC08-001 2. Click on the report image icon 3. Click on the confirm button to send the report	Example: Report123 - Lorem ipsum dolor img123 Sample Message: Are you sure you want to remove this image ?	Show a message that the report was successfully created and for further investigation Sample Message: <u>We have received your report please wait until we resolve this issue on hand</u>

CHAPTER IV. RESULTS AND DISCUSSIONS**Project Technical Description**

This chapter presents the results and discussions of the Gabay system. It covers the findings from the system's testing phase, including test case results, feedback from the User Acceptance Testing (UAT) survey, and the system's overall performance.

The Gabay system was designed to help commuters stay safe during floods by providing real-time alerts and predictions. To build this system, modern technologies were used to make it fast, scalable, and secure for both users and administrators.

For the mobile application, the team used Flutter, a framework that enables the app to run on Android devices. The app is written in Dart, a programming language known for building fast and responsive mobile applications.

On the backend, Laravel framework was chosen for its reliability and ease of use in building the system's server and handling key tasks like user accounts, flood data, and database interactions.

To store the data, the system uses MongoDB, a NoSQL database that handles various types of data, such as flood reports, weather updates, and images. MongoDB enables the system to grow and manage large volumes of data without slowing down.

The system also integrates several APIs to enhance functionality:

- The OpenWeather API provides real-time weather data, used to predict flooding and send timely alerts to users.
- Maya API is integrated to allow secure in-app payments for premium features.
- Mailtrap a sandbox used to receive emails when verification of OTP was prompted.
- Nominatim is used to provide suggestions on landmark destinations to be selected by the mobile application users
- Google OAuth service to provide sign in with google functions
- Meta Developer API for facebook account log in

By combining real-time weather data, user-reported flood information, and advanced image analysis, Gabay provides accurate, location-specific alerts, helping commuters plan safer routes during floods. With Maya handling payments and MongoDB managing data, the system can continue to operate smoothly and scale as needed.

In this chapter, the results from the test cases will be reviewed to evaluate the system's performance. Feedback from the UAT survey will also be discussed to understand user experience and real-world functionality. The chapter will highlight both the system's strengths and areas that need improvement.

Prototype Description

UI Prototype for Mobile

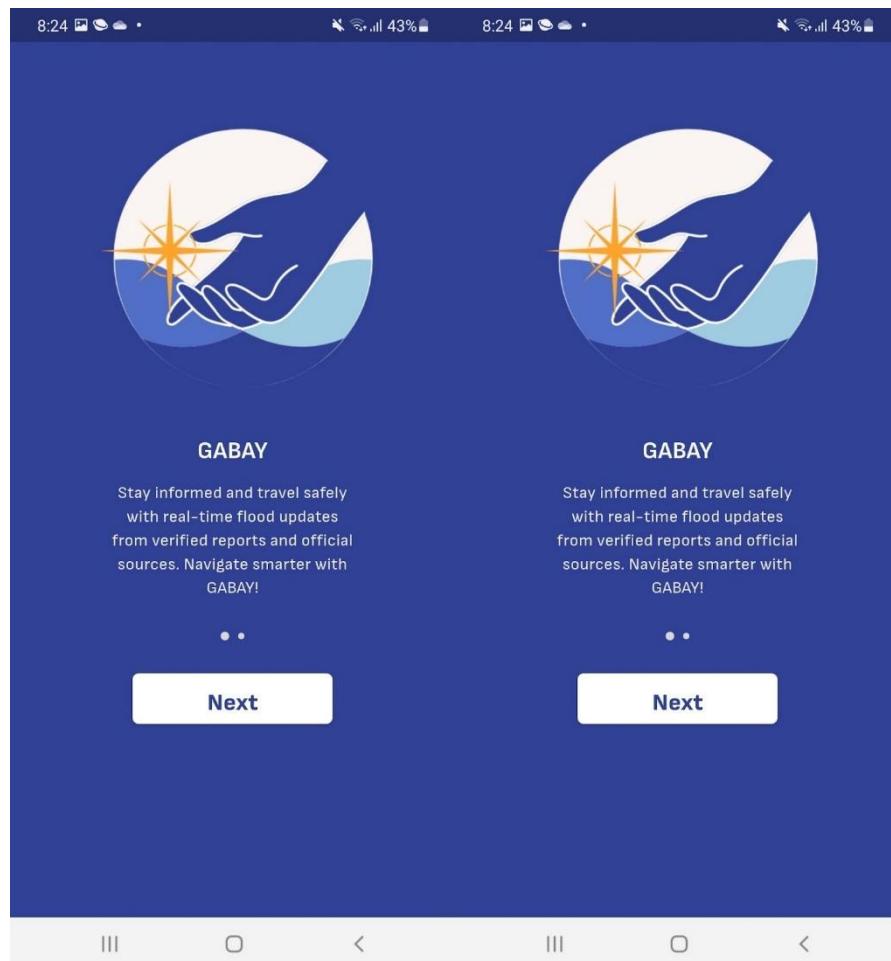


Figure 61. Gabay Introduction and GPS Usage Notice

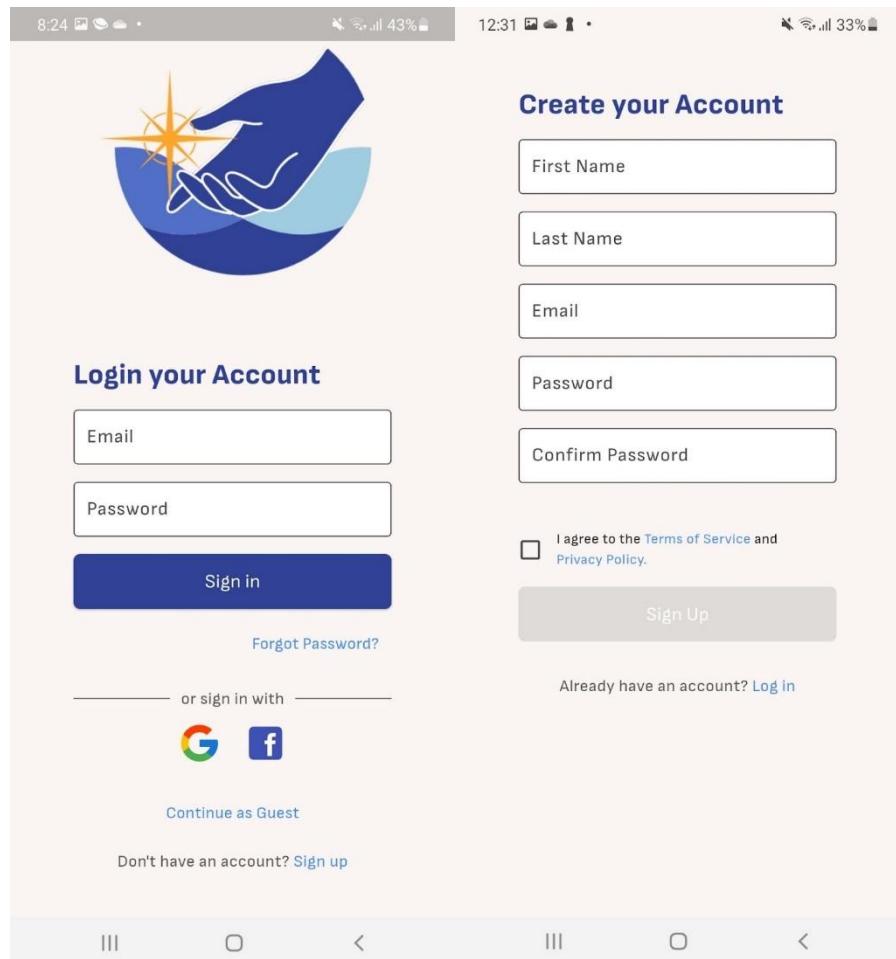


Figure 62. Sign in and Sign up page of Gabay Mobile Application

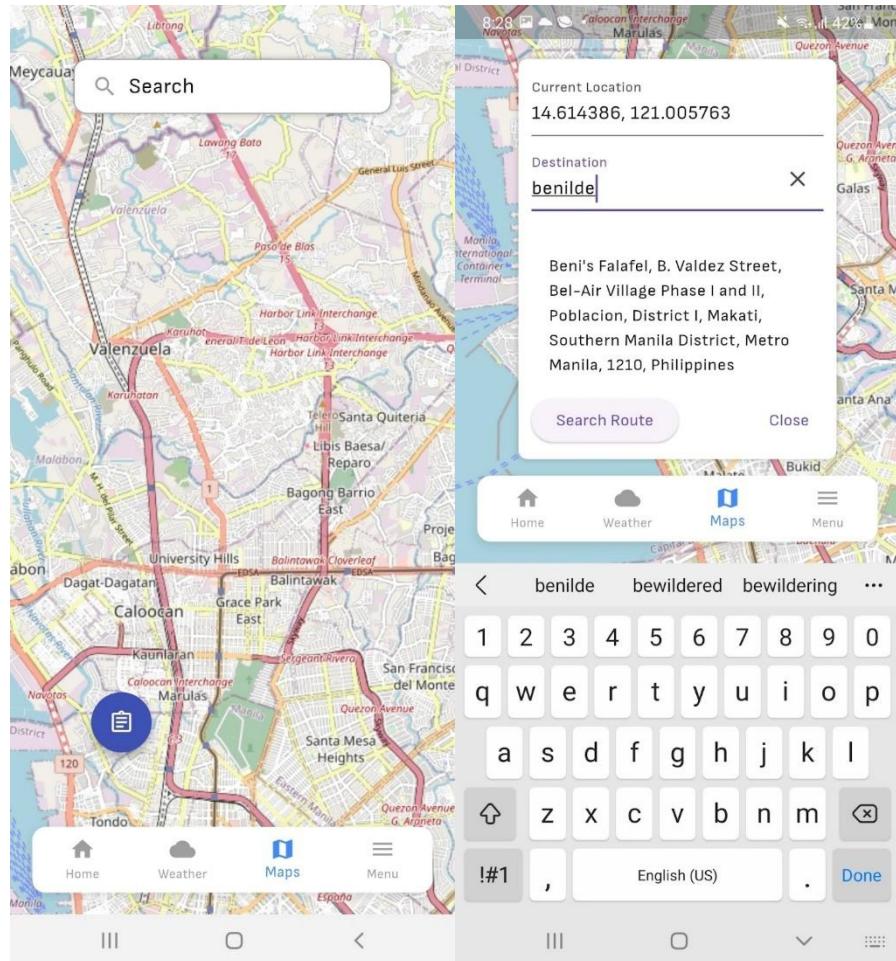


Figure 63. Landing page of Gabay Mobile Application

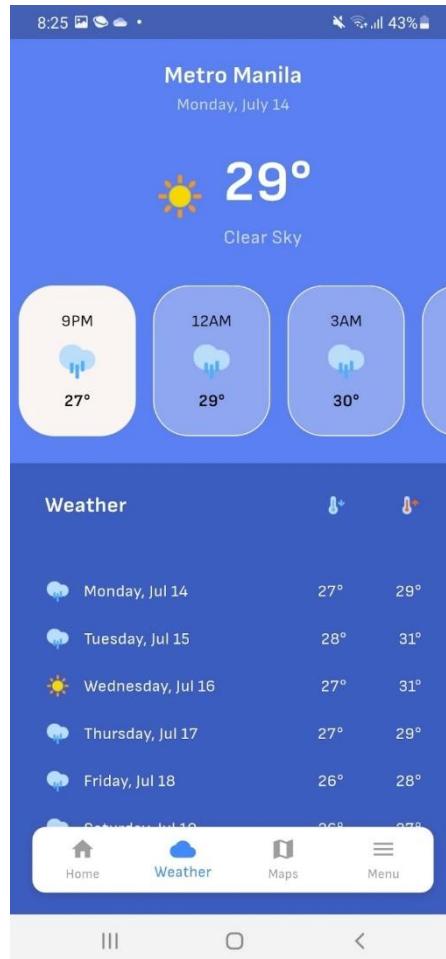


Figure 64. Weather section- Forecasts, and weather details

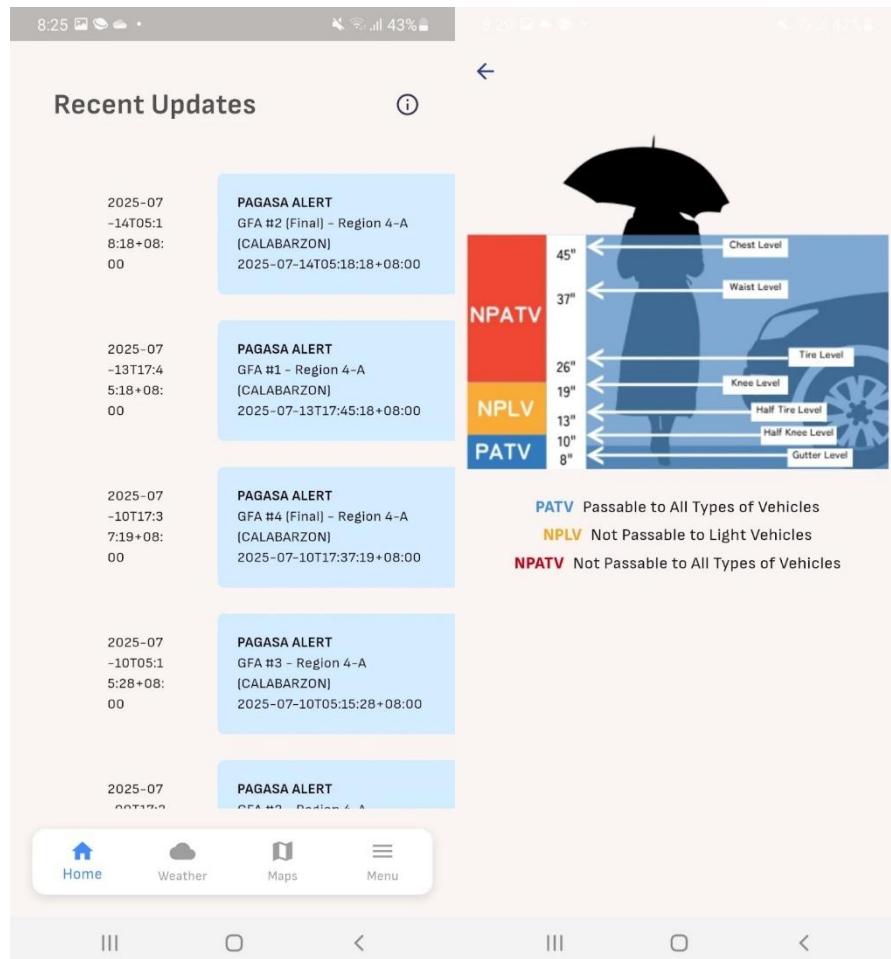


Figure 65. Home section- PAGASA Alerts, Flood Level Guides

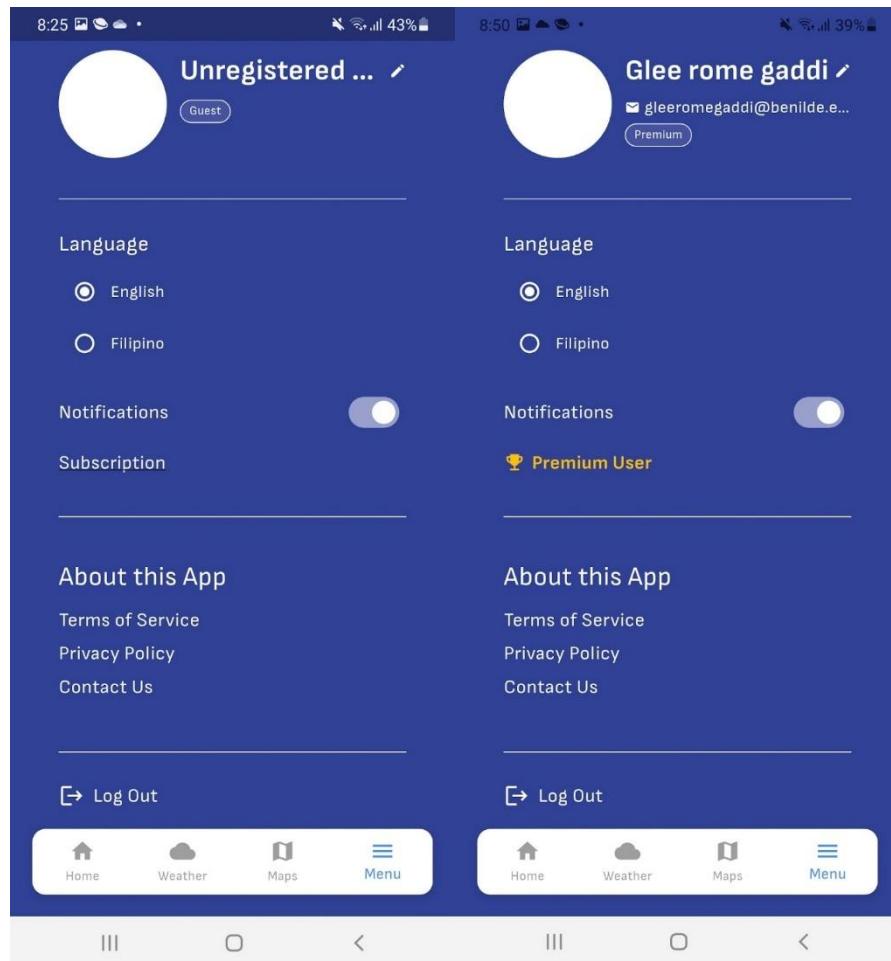


Figure 66. Menu section - Settings, Language, and Legal Information

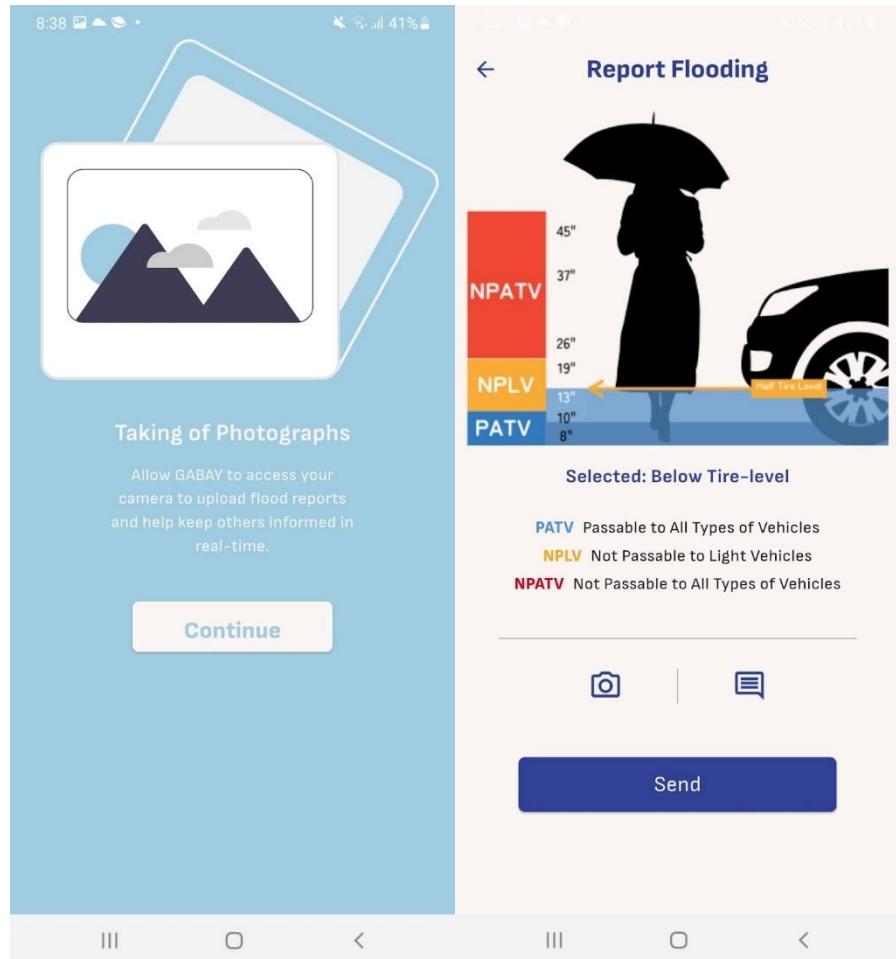


Figure 67. Flood Report Creation - User Interaction

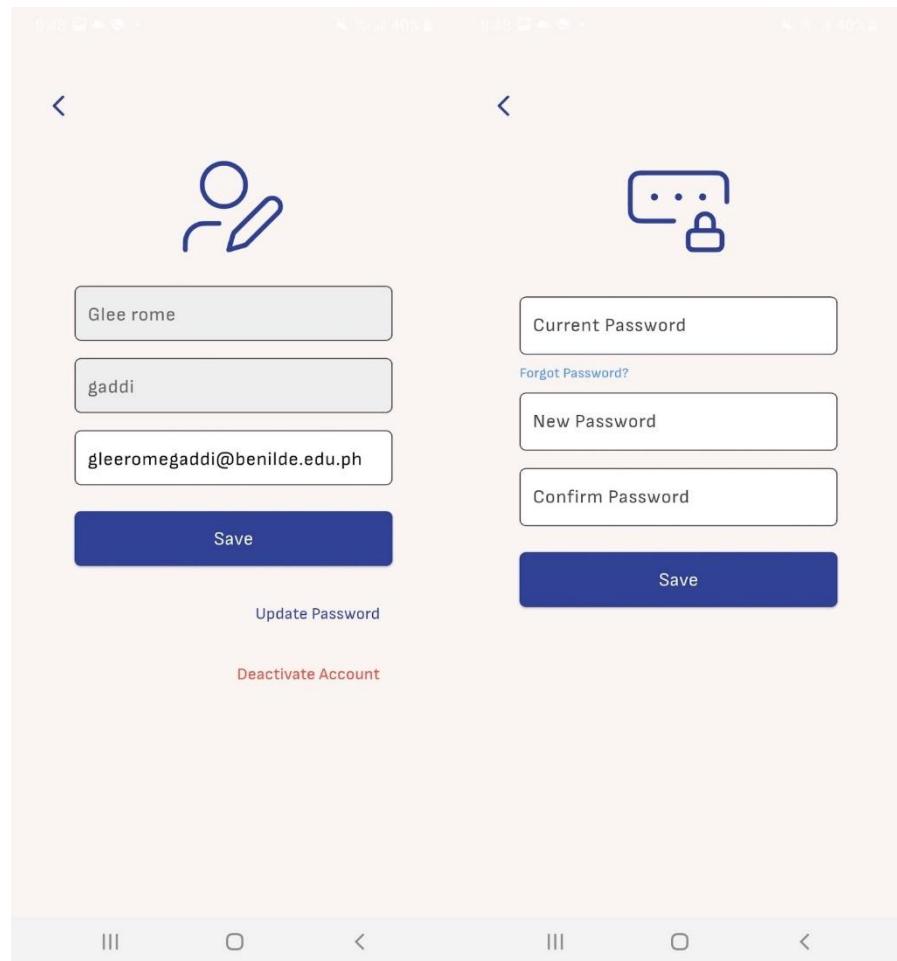


Figure 68. User Account Management - Change Password/Deactivate Account

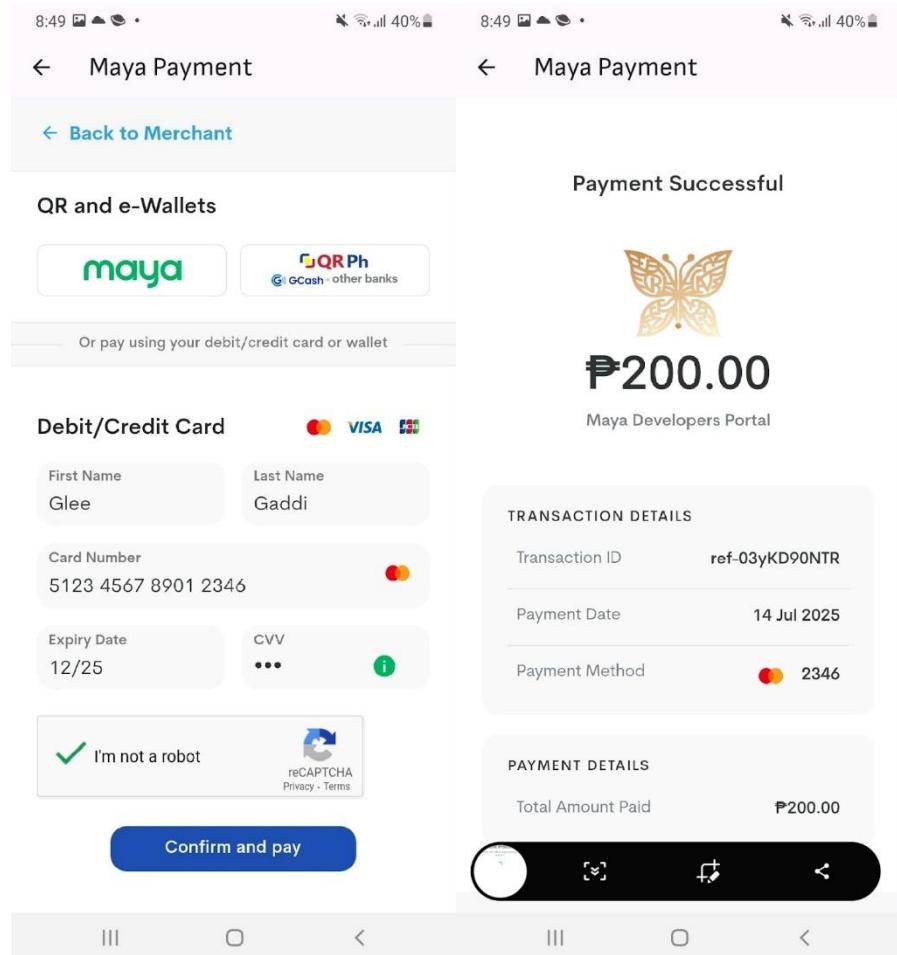


Figure 69. Payment Gateway using MAYA Api

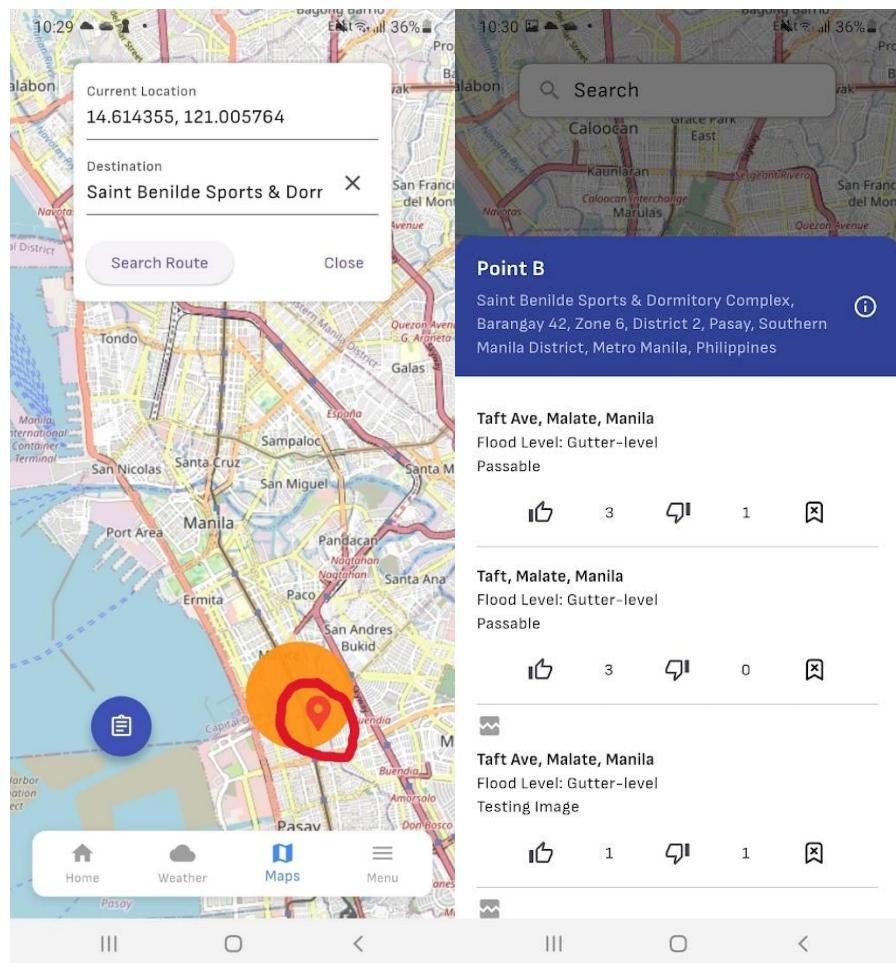


Figure 70. Viewing Reports - Viewing Traveler Feedbacks

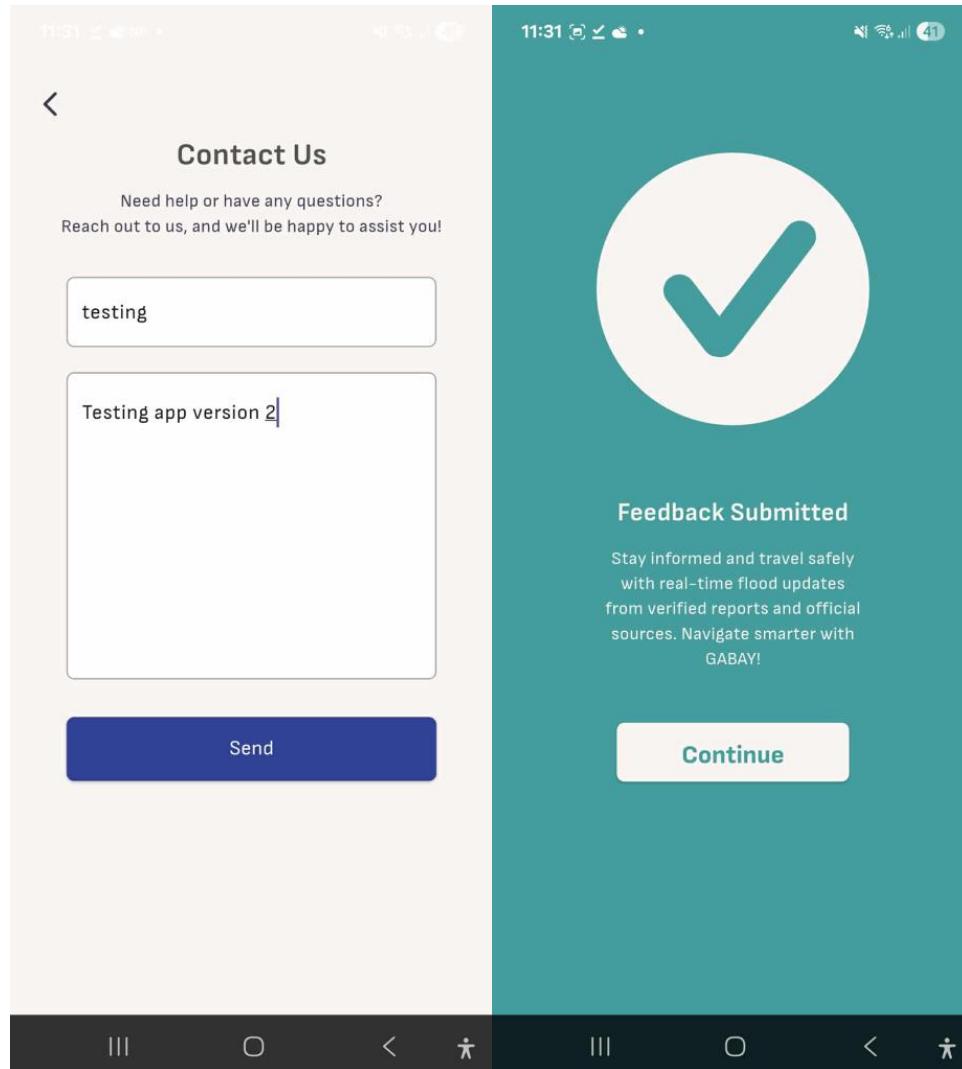


Figure 71. Feedback Page - Users can send concerns for admins to address.

The Gabay mobile app begins with the Introduction and GPS Usage Notice (Figure 61), which explains what the app does and how it uses GPS data to give users flood alerts based on their location. After this, users can either sign up using Facebook or Gmail accounts, or they can choose to continue as a guest (Figure 62) to explore the app's basic features without logging in.

Once logged in (or using the app as a guest), users are taken to the Maps Section (Figure 63), where they can see their current location and nearby places. The app shows flood-prone areas on a heatmap, helping users avoid risky zones during floods.

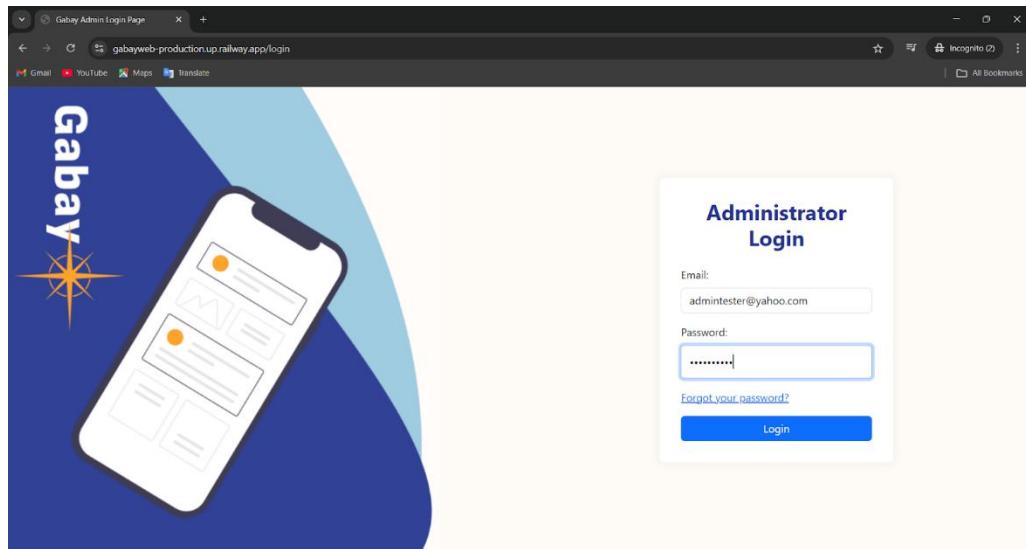
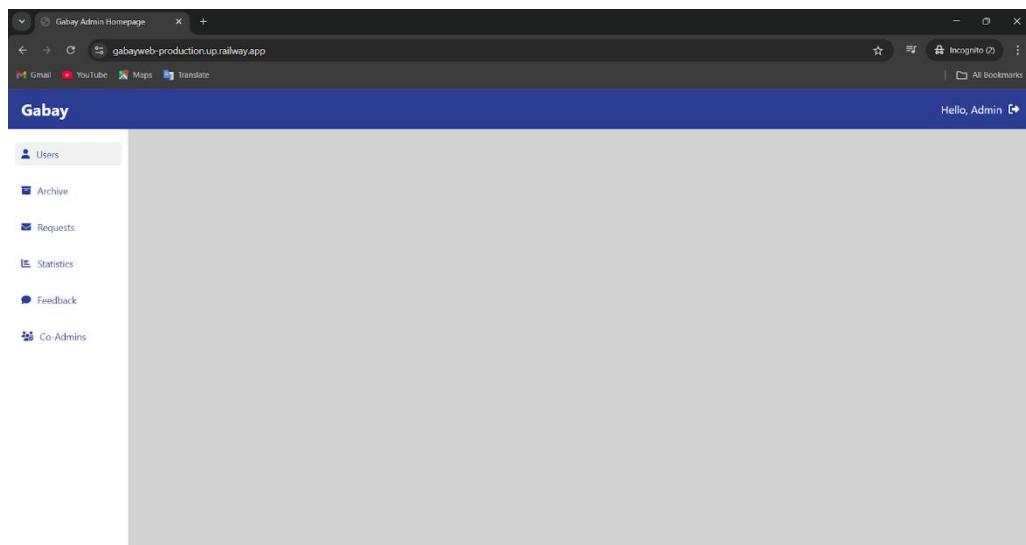
The Weather Section (Figure 64) displays the 7-day weather forecast and real-time weather updates, keeping users informed of any potential flooding or weather hazards. On the Home Section (Figure 65), users can find the latest news, flood level guides, and important alerts to stay up-to-date on weather and flood risks. The Menu Section (Figure 66) lets users adjust language settings, access important legal documents, and manage their app preferences.

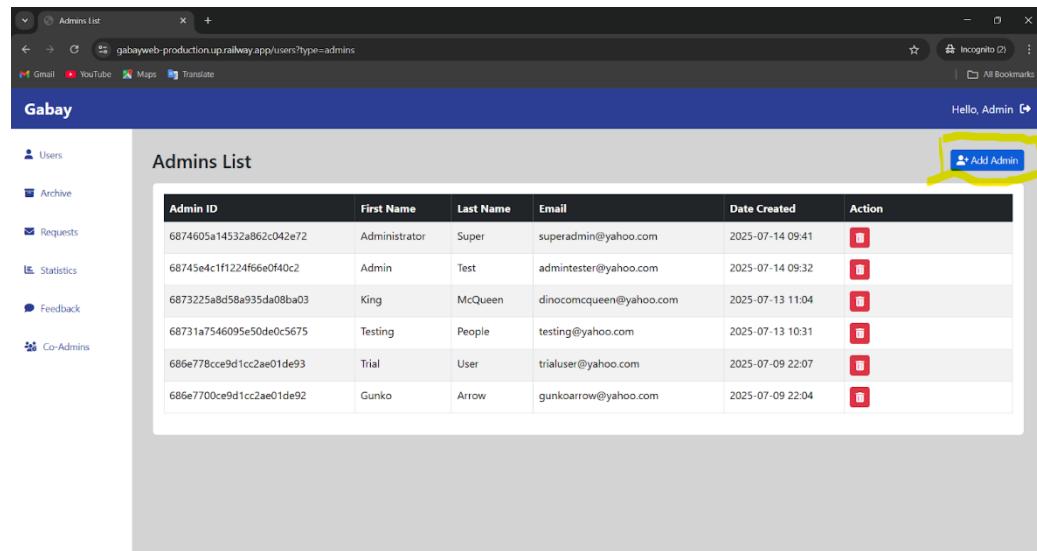
For users who want to help others, the Flood Report Creation feature (Figure 67) allows them to submit flood reports by uploading photos, adding comments, and choosing the flood level. This helps alert other users to current conditions.

In the User Account Management section (Figure 68), users can edit their profile, and change their password. Users can also subscribe to premium features through the Payment for Premium Account section (Figure 69), which allows users to pay securely and unlock additional benefits like priority alerts.

For Viewing of reports (Figure 70) allows the users and administrator to see and respond to feedback from users, helping improve the app based on their experiences.

Lastly, (Figure 71) showcases the feedback page where users of the Gabay mobile app can express their concern regarding bugs or other glitches found within the mobile application system.

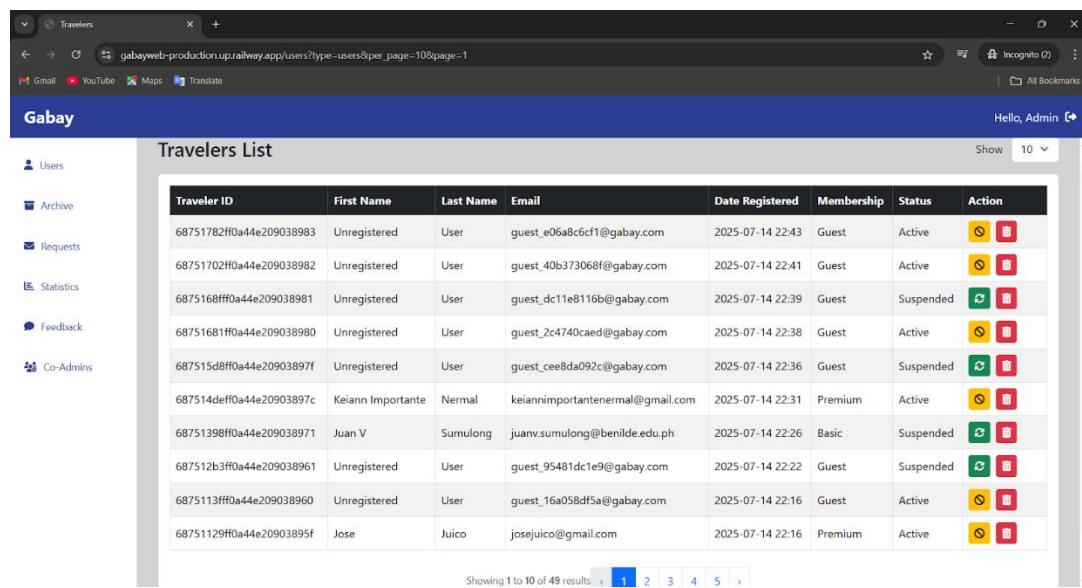
UI Prototype for Web(Admins)*Figure 72. Gabay Administrator Login Page**Figure 73. Gabay Administrator Main Dashboard*



The screenshot shows a web-based administration interface for 'Gabay'. The main title is 'Admins List'. On the left sidebar, there are links for 'Users', 'Archive', 'Requests', 'Statistics', 'Feedback', and 'Co-Admins'. The 'Co-Admins' link is underlined, indicating it is selected. The main content area displays a table titled 'Admins List' with columns: Admin ID, First Name, Last Name, Email, Date Created, and Action. There are seven entries in the table. A blue button labeled 'Add Admin' is located in the top right corner of the table area, with a yellow box highlighting it.

Admin ID	First Name	Last Name	Email	Date Created	Action
6874605a14532a062042e72	Administrator	Super	superadmin@yahoo.com	2025-07-14 09:41	 
68745e4c1f1224f66bf40c2	Admin	Test	admintester@yahoo.com	2025-07-14 09:32	 
6873225a8d58a935da08ba03	King	McQueen	dinocomcqueen@yahoo.com	2025-07-13 11:04	 
68731a7546095e50de0c5675	Testing	People	testing@yahoo.com	2025-07-13 10:31	 
686e778cce9d1cc2ae01de93	Trial	User	trialuser@yahoo.com	2025-07-09 22:07	 
686e7700ce9d1cc2ae01de92	Gunko	Arrow	gunkoarrow@yahoo.com	2025-07-09 22:04	 

Figure 74. Admin User Management - Co Admins



The screenshot shows a web-based administration interface for 'Gabay'. The main title is 'Travelers List'. On the left sidebar, there are links for 'Users', 'Archive', 'Requests', 'Statistics', 'Feedback', and 'Co-Admins'. The 'Co-Admins' link is underlined, indicating it is selected. The main content area displays a table titled 'Travelers List' with columns: Traveler ID, First Name, Last Name, Email, Date Registered, Membership, Status, and Action. There are ten entries in the table. Each entry includes a small circular icon with a letter (e.g., G, S, P) and a delete icon. A 'Show' dropdown menu is visible at the top right of the table area, currently set to '10'.

Traveler ID	First Name	Last Name	Email	Date Registered	Membership	Status	Action
68751782ff0a44e209038983	Unregistered	User	guest_e06a8c6cf1@gabay.com	2025-07-14 22:43	Guest	Active	 
68751702ff0a44e209038982	Unregistered	User	guest_40b373068f@gabay.com	2025-07-14 22:41	Guest	Active	 
6875168ff0a44e209038981	Unregistered	User	guest_dc11e8116b@gabay.com	2025-07-14 22:39	Guest	Suspended	 
68751681ff0a44e209038980	Unregistered	User	guest_2c4740caed@gabay.com	2025-07-14 22:38	Guest	Active	 
687515d8ff0a44e20903897f	Unregistered	User	guest_cee8da092c@gabay.com	2025-07-14 22:36	Guest	Suspended	 
687514def0a44e20903897c	Keiann Importante	Nermal	keiannimportantemail@gmail.com	2025-07-14 22:31	Premium	Active	 
6875139eff0a44e209038971	Juan V	Sumulong	juanv.sumulong@benilde.edu.ph	2025-07-14 22:26	Basic	Suspended	 
687512b3ff0a44e209038961	Unregistered	User	guest_95481dc1e9@gabay.com	2025-07-14 22:22	Guest	Suspended	 
6875113ff0a44e209038960	Unregistered	User	guest_16a058dff5a@gabay.com	2025-07-14 22:16	Guest	Active	 
68751129ff0a44e20903895f	Jos	Juico	josejuico@gmail.com	2025-07-14 22:16	Premium	Active	 

Figure 75. Admin User Management - Users/Traveler

The screenshot shows a web browser window titled "Feedbacks" with the URL "gabayweb-production.up.railway.app/feedbacks". The page is titled "Gabay" and has a sidebar with links: "Users", "Archive", "Requests", "Statistics", "Feedback", and "Co-Admins". The main content area is titled "User Feedbacks" and contains a table with the following data:

ID	Subject	Body	Email	Date Created	Action
68750620ff0a44e209038954	Testing for Version 1.0.1	This feedback contact us focuses on user improveme...	mockreporter@yahoo.com	2025-07-14 21:29	<button>Read</button>
6874a41fb7ff2f8ba803f72f	hallo	world	elmosworld@yahoo.com	2025-07-14 14:30	<button>Read</button>
687351188d58a935da08ba0b	In APK	Working but still has missing icons on the bottom....	jason@gmail.com	2025-07-13 14:24	<button>Read</button>
6870c4f8739ee8e3e9031f9c	minor bug	Missing icons	jason@gmail.com	2025-07-11 16:02	<button>Read</button>
686fbcc53bfa5a1c4dd03d292	Minor bug in menu bar	I didn't see the icons below	jason@gmail.com	2025-07-10 21:12	<button>Read</button>

Figure 76. Admin User Management - Feedback Handling

The screenshot shows a web browser window titled "Gabay Dashboard" with the URL "gabayweb-production.up.railway.app/statistics". The page is titled "Gabay" and has a sidebar with links: "Users", "Archive", "Requests", "Statistics", "Feedback", and "Co-Admins". The main content area is titled "Reports" and displays four visualizations:

- A bar chart titled "Reports" comparing Manila and Makati, showing 14 reports for Manila and 12 for Makati.
- A pie chart showing the distribution of users: Guest Users (yellow) and Registered Users (cyan).
- A donut chart showing the status of users: Suspended (red) and Active (green).
- A summary box stating "Reports this month 26".

Below the reports section is a table titled "Report Statistics" showing the number of reports by city:

City	Number of Reports
Manila	14
Makati	12

Figure 77. Gabay Statistical Data Reports

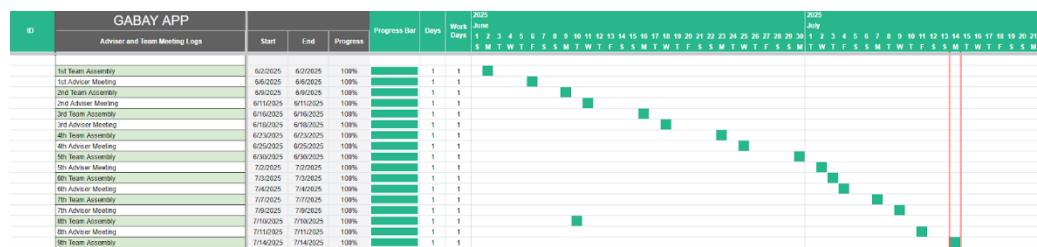
For the administrators, the Admin Login page (Figure 72) allows authorized personnel to log into the system securely. After logging in, administrators are taken to the Admin Dashboard (Figure 73), where they can see user activity, track flood reports, and manage the app's overall performance.

The Admin User Management section (Figure 74) lets administrators add or remove co-admins to help manage the system. They can also manage traveler accounts by suspending, reactivating, or deleting them (Figure 75), depending on the situation.

The Feedback Handling section (Figure 76) allows administrators to view and respond to user feedback, addressing concerns and improving the app's functionality.

In the Statistical Data for Reports section (Figure 77), administrators can access useful data and reports about flood reports and user activity, helping them make decisions about improving the app's performance and keeping it running smoothly.

Implementation Results



The development of the Gabay system followed an agile methodology, which allowed us to work in phases and sprints. This approach helped us focus on specific tasks and refine the system incrementally. The first phase focused on planning, where we

assigned roles, finalized the system's features, and created the necessary documentation. We also worked on designing the system architecture to ensure everything was set for the development phase.

Once the planning was complete, we moved on to the core development of the system. During this phase, we built and tested important features such as user authentication and flood reporting. The user authentication process initially faced challenges, especially with integrating Google and Facebook sign-ins, but these issues were resolved through multiple iterations. We also developed the flood reporting feature, which allows users to report the flood level in their area. Along with this, we integrated a heat map to visualize flood-prone areas based on the data provided by users.

Throughout the development, we conducted several rounds of testing, including unit tests and integration tests, to make sure everything was working smoothly. One of the key components tested was the integration of MongoDB to store user reports and flood data. During testing, we found some bugs in the user interface and issues with the payment system. These were fixed in later sprints to improve the overall user experience.

The payment system was another crucial part of the development. We integrated the Maya payment API, allowing users to make in-app purchases for premium features. This feature went through rigorous testing to ensure that payments worked correctly across different devices.

As we progressed, we also worked on improving the security and accessibility of the app. We implemented a translation system to support both Tagalog and English, making the app more accessible to a wider audience. We also addressed several security concerns, particularly around user data and authentication processes.

By late July, the system was ready for the soft launch, with plans to follow up with a full release shortly after. During the final stages, we focused on user acceptance testing (UAT) to ensure that the app met the expectations of its users. We tested the app on physical devices and fixed any remaining issues.

In the end, the Gabay system was built and tested through a series of iterative steps, with each phase helping to refine and improve the app. While there were challenges along the way, such as integration issues and user interface bugs, these were successfully resolved, ensuring the app is ready to help commuters make safer travel decisions during floods.

Testing And Evaluation Results

Table 23. Test case scenario for Account Registration

Test Case	Register an Account	Test Case Author		Desmond John Tubije	
Priority	HIGH	Test Case Number		TC01	
		Test Case Reviewer			
		Test Case Execution Date			
Test Case #	Action	Steps	Input	Expected Output	Status
TC01-001	Ensures that potential users registers an account using a valid email address	<ol style="list-style-type: none"> 1. Click the sign up button 2. Enter your credentials (First name, Last name, valid email address, and password) 3. Click Sign Up 4. Check email address and wait for the verification code to be sent 5. Input the appropriate verification code 	Example: First Name: John Last Name: Doe Email: JohnDoe@gmail.com Password: <u>Helloworld123!</u> Example Verification code sent: 1234 Verification code entered: 1234	Account is successfully created, redirect the users to the login page	PASSED I was redirected to the login page.
TC01-002	Register users with an existing registered email address	<ol style="list-style-type: none"> 1. Click the sign up button 2. Enter same email credentials 	Example: First Name: John Last Name: Doe Email: JohnDoe@gmail.com Password:	Show an error message indicating that existing email address	PASSED Error message shown.

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		3. Click Sign Up	<u>Helloworld123!</u>	is already in use Sample Error Message: <u>Email address already in use</u>	
TC01-003	Register with invalid password credentials	1. Click the sign up button 2. Check email address and wait for the verification code to be sent 3. Input the appropriate verification code 4. Input a password that doesn't fit the criteria	Example First Name: John Last Name: Doe Email: <u>JohnDoe@gmail.com</u> Password: <u>hello</u> <u>helloworld</u> <u>12345678</u>	Show an error message indicating that password doesn't follow proper format Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>	PASSED Error message shown.
TC01-004	Register with password and confirm password not matching	1. Repeat steps #1-3 of TC01-003 2. Input a valid password 3. Input an incorrect password at the confirm password field	Example: Password: <u>staphylococcusAureus12</u> Confirm Password: <u>staphylococcusAureus12</u>	Show an error message indicating that password does not match Sample Error Message: <u>Password must match!</u>	PASSED Error message shown.
TC01-005	Input of Incorrect	1. Repeat steps #1-4 in TC01-001	Example: First Name: John Last Name: Doe	Show an error message indicating that the verification	PASSED

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	Verification code	2. Input Incorrect Verification Code	Email: JohnDoe@gmail.com Password: <u>Helloworld123!</u> Example Verification code sent: 1234 Verification code entered: 4321	code that was entered was incorrect Sample Error Message: <u>Incorrect verification code please enter the correct verification code</u>	Error message shown.
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Table 24. Test Case Scenario for Account Login

Test Case	Account Login	Test Case Author	Desmond John Tubije
Priority	HIGH	Test Case Number	TC02
		Test Case Reviewer	
		Test Case Execution Date	

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Test Case #	Action	Steps	Input	Expected Output	Status
TC02-001	Login attempt with correct email address and incorrect password	<ol style="list-style-type: none"> Enter email address and password on the respective field provided Click the login button 	Example: Email: <u>JohnDoe@gmail.com</u> Password: <u>Helloworld12</u>	Show an error message that mentions incorrect login credentials Sample Error Message: <u>IncorrectPassword</u>	PASSED Error message shown.
TC02-002	Login attempt with unregistered email address and correct password	<ol style="list-style-type: none"> Enter email address and password on the respective field provided Click the login button 	Example: Email: <u>JonDoe@gmail.com</u> Password: <u>Helloworld123!</u>	Show an error message that mentions user is not found Sample Error Message: <u>User does not exist</u>	PASSED Error message shown.
TC02-003	Forgot Password with correct email address and verification code	<ol style="list-style-type: none"> On the login page click Forgot Password? Enter verification code provided Click verify 	Example: Email: <u>JohnDoe@gmail.com</u> Verification Code sent: <u>1234</u> Verification Code entered: <u>1234</u>	Redirect to reset password page	PASSED Redirected to reset password page.
TC02-004	Forgot Password with correct email address and incorrect verification code	<ol style="list-style-type: none"> Repeat step #1-3 of TC-02-003 	Example: Email: <u>JohnDoe@gmail.com</u> Verification Code sent: <u>1234</u> Verification Code entered: <u>1234</u>	Show an error message indicating that the verification code that was entered was incorrect Sample Error Message:	PASSED Error message shown.

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			<u>4321</u>	<u>Incorrect verification code please enter the correct verification code</u>	
TC02-005	Forgot password with incorrect email address	1. Repeat step #1 of TC02-003	Example: Email: <u>JonDoe@gmail.com</u>	Show an error message that mentions user is not found Sample Error Message: <u>User does not exist</u>	PASSED Error message shown.
TC02-006	Change new password	1. Repeat step #1-3 of TC02-003 2. Enter new password 3. Click on continue	Example: Password: <u>worldhello321!</u> Confirm Password: <u>worldhello321!</u>	Show a message that password was successfully changed Example: <u>You have successfully changed your password</u>	PASSED Successful password reset, redirected to login.
TC02-007	Change new password while not following the criteria in creating password	1. Repeat step #1-3 of TC02-003 2. Enter new password 3. Click on continue	Example Password: <u>hello</u> <u>helloworld</u> <u>12345678</u>	Show an error message indicating that password doesn't follow proper format Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>	PASSED Error message shown.
TC02-008	Change new password while password	1. Repeat step #1-3 of TC02-003	Example: Password: <u>worldhello321!</u> Confirm Password:	Show an error message indicating that	PASSED Error message shown.

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	and confirm password does not match	2. Enter new password 3. Enter confirm password 4. Click on continue	<u>worldhello321</u>	password does not match Sample Error Message: <u>Password must match!</u>	
TC02-009	Change new password while using old password	1. Repeat step #1-3 of TC02-003 2. Enter new password 3. Enter confirm password 4. Click on continue	Example: Password: <u>Helloworld123!</u> Confirm Password: <u>Helloworld123!</u>	Show an error message indicating that new password cannot be the same as the previous password Example: <u>New password must be different from your current password!</u>	PASSED Error message shown.
TC02-010	Login attempt using valid email address and password	1. Enter your email address and password 2. Click on Sign in	Example: Email: <u>JohnDoe@gmail.com</u> Password: <u>Helloworld123!</u>	User is redirected to the maps page.	PASSED User redirected to maps page.

Table 25. Test Case Scenario for Flood reporting

Test Case	Flood level submission		Test Case Author	Desmond John Tubije	
Priority	HIGH		Test Case Number	TC03	
		Test Case Reviewer			
		Test Case Execution Date			
Test Case #	Action	Steps	Input	Expected Output	Status

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TC03-001	Uploading media content that follows the file size requirement	<ol style="list-style-type: none"> 1. Click on submit flood details 2. Drag the estimated level of flood 3. Click on the camera icon 4. Upload image 5. Click on the bubble speech icon 6. Upload text content 7. Click on Send 	Example: Image: img123.jpg (700kb) Text: helloworldhelloworld	Show a message that you have successfully uploaded your report Sample Message: <u>You have successfully uploaded your report</u>	PASSED A confirmation message displayed.
TC03-002	Uploading media content that does not follow the file size requirement	1. Repeat Steps #1-4 of TC04-001	Example Image: img456.jpg(10mb)	Show a message that image does not follow the proper file size format Sample Message: <u>The file you are trying to upload is too large the maximum allowable size is 2mb</u>	PASSED Error message shown.
TC03-003	Uploading content report	1. Click on submit	Example:	Show a message that	PASSED

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	without media files being included	<ol style="list-style-type: none"> 2. flood details 3. Drag the estimated flood level 4. Click on the bubble speech icon 5. Upload Text 6. Click on Send 	Text: helloworldhelloworld	you have successfully uploaded your report Sample Message: <u>You have successfully uploaded your report</u>	A confirmation message displayed.
TC03-004	Sending flood level	<ol style="list-style-type: none"> 1. Click on submit flood 2. Drag the estimated flood level 	Example: Drag the icon towards Chest Level	Show a message that you have successfully uploaded your report Sample Message: <u>You have successfully uploaded your report</u>	PASSED A confirmation message displayed.

Table 26 Test Case for Admin Login

Test Case	Admin Login		Test Case Author	Desmond John Tubije	
Priority	HIGH		Test Case Number	TC04	
		Test Case Reviewer			
		Test Case Execution Date			
Test Case #	Action	Steps	Input	Expected Output	Status
TC04-001	Login attempt with correct	1. Enter email address	Example:	Show an error message that mentions	PASSED

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	email address and incorrect password	and password on the respective field provided 2. Click the login button	Email: <u>JohnSnow@gmail.com</u> Password: <u>Helloworld12</u>	incorrect login credentials Sample Error Message: <u>Incorrect Password</u>	Error message shown.
TC04-002	Login attempt with unregistered email address and correct password	1. Enter email address and password on the respective field provided 2. Click the login button	Example: Email: <u>JonSnow@gmail.com</u> Password: <u>Helloworld123!</u>	Show an error message that mentions user is not found Sample Error Message: <u>User admin does not exist</u>	PASSED Error message shown.
TC04-003	Forgot Password with correct email address and verification code	1. On the login page click Forgot Password? 2. Enter verification code provided 3. Click verify	Example: Email: <u>JohnSnow@gmail.com</u> Verification Code sent: <u>1234</u> Verification Code entered: <u>1234</u>	Redirect to reset password page	PASSED redirected to reset password page.
TC04-004	Forgot Password with correct email address and incorrect verification code	1. Repeat step #1-3 of TC04-003	Example: Email: <u>JohnSnow@gmail.com</u> Verification Code sent: <u>1234</u> Verification Code entered: <u>4321</u>	Show an error message indicating that the verification code that was entered was incorrect Sample Error Message: <u>Incorrect verification code please enter the</u>	PASSED Error message shown.

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				<u>correct verification code</u>	
TC04-005	Forgot password with incorrect email address	1. Repeat step #1 of TC04-003	Example: Email: JohnDoe@gmail.com	Show an error message that mentions user is not found Sample Error Message: <u>User does not exist</u>	PASSED Error message shown.
TC04-006	Change new password	1. Repeat step #1-3 of TC04-003 2. Enter new password 3. Click on continue	Example: Password: <u>worldhello321!</u> Confirm Password: <u>worldhello321!</u>	Show a message that password was successfully changed Example: <u>You have successfully changed your password</u>	PASSED A confirmation message displayed.
TC04-007	Change new password while not following the criteria in creating password	1. Repeat step #1-3 of TC04-003 2. Enter new password 3. Click on continue	Example Password: <u>hello</u> <u>helloworld</u> <u>12345678</u>	Show an error message indicating that password doesn't follow proper format Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>	PASSED Error message shown.
TC04-008	Change new password while password and	1. Repeat step #1-3 of TC04-003 2. Enter new password	Example: Password: <u>worldhello321!</u> Confirm Password: <u>worldhello321</u>	Show an error message indicating that password does not match	PASSED Error message shown.

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	confirm password does not match	3. Enter confirm password 4. Click on continue		Sample Error Message: <u>Password must match!</u>	
TC04-009	Change new password while using old password	1. Repeat step #1-3 of TC04-003 2. Enter new password 3. Enter confirm password 4. Click on continue	Example: Password: <u>Helloworld123!</u> Confirm Password: <u>Helloworld123!</u>	Show an error message indicating that new password cannot be the same as the previous password Example: <u>New password must be different from your current password!</u>	PASSED Error message shown.
TC04-010	Login attempt using valid email address and password	1. Enter your email address and password 2. Click on Sign in	Example: Email: <u>JohnSnow@gmail.com</u> Password: <u>Helloworld123!</u>	Admin is redirected to the Admin page	PASSED Redirected to admin dashboard.

Table 27. Test Cases for Adding Co-Admin

Test Case	Adding Co-Admin		Test Case Author	Desmond John Tubije	
Priority	HIGH		Test Case Number	TC05	
		Test Case Reviewer			
		Test Case Execution Date			
Test Case #	Action	Steps	Input	Expected Output	Status
TC05-001	Creating a new co-admin using	1. Login in the admin webpage	Example: First Name: <u>Jane</u>	Show a message indicating that admin	PASSED A confirmation message displayed.

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	valid credentials	<ol style="list-style-type: none"> 2. Click on Co-Admin 3. Click on the add button 4. Enter valid credentials 5. Click on Create 	<p>Last Name: <u>Doe</u></p> <p>Email: JaneDoe@gmail.com</p> <p>Password: <u>HelloWorld12!</u></p> <p>Confirm Password: <u>HelloWorld12!</u></p>	<p>user created successfully</p> <p>Sample Message: You have successfully added a co-administrator</p>	
TC05-002	Creating a new co-admin using existing email address	<ol style="list-style-type: none"> 1. Repeat steps #1-3 of TC05-01 2. Enter a used email address 	<p>Example:</p> <p>First Name: <u>Jane</u></p> <p>Last Name: <u>Doe</u></p> <p>Email: JohnDoe@gmail.com</p> <p>Password: <u>HelloWorld12!</u></p> <p>Confirm Password: <u>HelloWorld12!</u></p>	<p>Show an error message existing email address is already in used</p> <p>Sample Error Message: Email address already in used</p>	PASSED Error message shown.
TC05-003	Register with invalid password credentials	<ol style="list-style-type: none"> 1. Repeat steps #1-3 of TC05-01 2. Enter a valid email address 3. Enter invalid 	<p>Example</p> <p>First Name: Jane</p> <p>Last Name: Doe</p> <p>Email: JaneDoe@gmail.com</p> <p>Password: <u>hello</u></p> <p>Confirm Password: <u>helloworld</u></p>	<p>Show an error message indicating that password doesn't follow proper format</p>	PASSED Error message shown.

		password combination	<u>12345678</u>	Sample Error Message: <u>Password must have at least 8 characters</u> <u>Password must have both uppercase and lowercase letters</u> <u>Password must have numbers</u>	
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Table 28. Test Case for Managing Users (Admin Side)

Test Case	Managing Users (Admin Side)		Test Case Author	Desmond John Tubije	
Priority	HIGH		Test Case Number	TC06	
		Test Case Reviewer			
			Test Case Execution Date		
Test Case #	Action	Steps	Input	Expected Output	Status
TC06-001	Re-Activating User account	1. Login Admin web page 2. Click on travelers 3. Click on the suspended user		Show a message that indicates user successfully reactivated	PASSED A reactivation message displayed.

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		<p align="center">account you wish to activate</p> <p align="center">4. Click Continue</p>		<p>Sample Message:</p> <p><u>You have reactivated the account of the user</u></p>	
TC06-002	Suspending active user account	<p align="center">1. Repeat Steps #1-2 of TC06-001</p> <p align="center">2. Click on active users</p> <p align="center">3. Click suspend button</p> <p align="center">4. Click Continue</p>		<p>Show a message that indicates user is temporarily suspended</p> <p>Sample Message:</p> <p><u>You have temporarily suspended the user</u></p>	PASSED A user suspension message displayed.
TC06-003	Deleting Users	<p align="center">1. Repeat Steps #1-2 of TC06-001</p> <p align="center">2. Click on either active/suspended travelers</p> <p align="center">3. Click the delete icon</p> <p align="center">4. Click Continue</p> <p align="center">5. Click Confirm</p>		<p>Show a message that indicates that the user account is deleted</p> <p>Sample Message:</p> <p><u>You have deleted the account</u></p>	PASSED A user deletion message displayed.

Table 29. Test Case for Image Deletion

Test Case	Image Deletion		Test Case Author	Desmond John Tubije	
Priority	Medium		Test Case Number	TC07	
		Test Case Reviewer			
			Test Case Execution Date		
Test Case #	Action	Steps	Input	Expected Output	Status
TC07-001	Delete images reported by the users and confirming it	1. Admin login 2. Click on requests		Show a message that indicates image deleted successfully Sample Message:	PASSED An image deletion message displayed.

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		<ol style="list-style-type: none"> 3. Click on the report sent by the travelers 4. Click on the image 5. Close the image 6. Click on the delete button 7. Click Confirm 		<u>You have removed the image</u>	
TC07-002	Delete images reported by the users without confirming	<ol style="list-style-type: none"> 1. Repeat Steps #1-6 of TC07-001 2. Do not click the confirm button 		Image is not successfully deleted no notification message indicating successful image deletion	PASSED Image not deleted.

Table 30. Test Case Scenario for Reporting Flood Information

Test Case	Reporting Flood Information		Test Case Author	Desmond John Tubije	
Priority	Medium		Test Case Number	TC08	
		Test Case Reviewer			
			Test Case Execution Date		
Test Case #	Action	Steps	Input	Expected Output	Status
TC08-001	Travelers Clicked upvote	1. Traveler logged in to their account	Example:	The expected output must show that Upvote result increased by 1	PASSED Downvote increased by 1

	succeeded by downvote	<ol style="list-style-type: none"> 2. Traveler Selects area of interest 3. Traveler Looks for an update from crowdsourced information 4. Traveler clicked upvote 5. Traveler clicked downvote 	Report123 - Lorem ipsum dolor  Upvote +1 Downvote +1	would be back to 0 and the number of downvote will increase by 1	
TC08-002	Travelers Clicked downvote succeeded by upvote	<ol style="list-style-type: none"> 1. Repeat Steps #1-3 of TC08-001 2. Reverse the step 4 and 5 of TC08-001 	Example: Report123 - Lorem ipsum dolor  Upvote +1 Downvote +1	The expected output must show that Downvote result would be back to 0 and the number of upvote will increase by 1	PASSED Upvote increased by 1
TC08-003	Registered travelers reporting an image	<ol style="list-style-type: none"> 1. Repeat Steps #1-3 of TC08-001 2. Click on the report image icon 3. Click on the confirm button to send the report 	Example: Report123 - Lorem ipsum dolor  Sample Message: <u>We have received your report please wait until we resolve this issue on hand</u>	Show a message that the report was successfully created and for further investigation Sample Message: <u>We have received your report please wait until we resolve this issue on hand</u>	PASSED A confirmation message displayed.

User Acceptance Test Result

The overall feedback from the results of our user acceptance test is highly positive, indicating that users found the system intuitive and effective in supporting its intended

purpose. Most participants reported that navigation was easy on their first try, with the majority rating both usability and user experience at 4 or 5 out of 5.

The app's bilingual language options (Tagalog and English) were deemed helpful, though most users preferred to operate in English, with some appreciating the ability to choose between both languages. Almost all key features—including registration, login, flood reporting, and payments—functioned as expected for users, who experienced minimal errors or issues throughout their interactions. Text and icon visibility, as well as interface readability, were frequently commended for clarity, with multiple users noting that the colors and overall aesthetic were pleasing and aligned with the app's purpose.

Most users felt their personal data was secure and found the login process straightforward. Suggestions for improvement included adding a dark mode, enhanced navigation prompts for first-time users, a back button in certain map sections, and minor enhancements to map usability and text sizing. Users agreed that the app would help them make better travel decisions during flood events and expressed strong willingness to recommend it to others. Overall, the system delivered a smooth, accessible, and visually engaging experience, with only minor adjustments needed for further optimization.

System Framework

Gabay App Framework

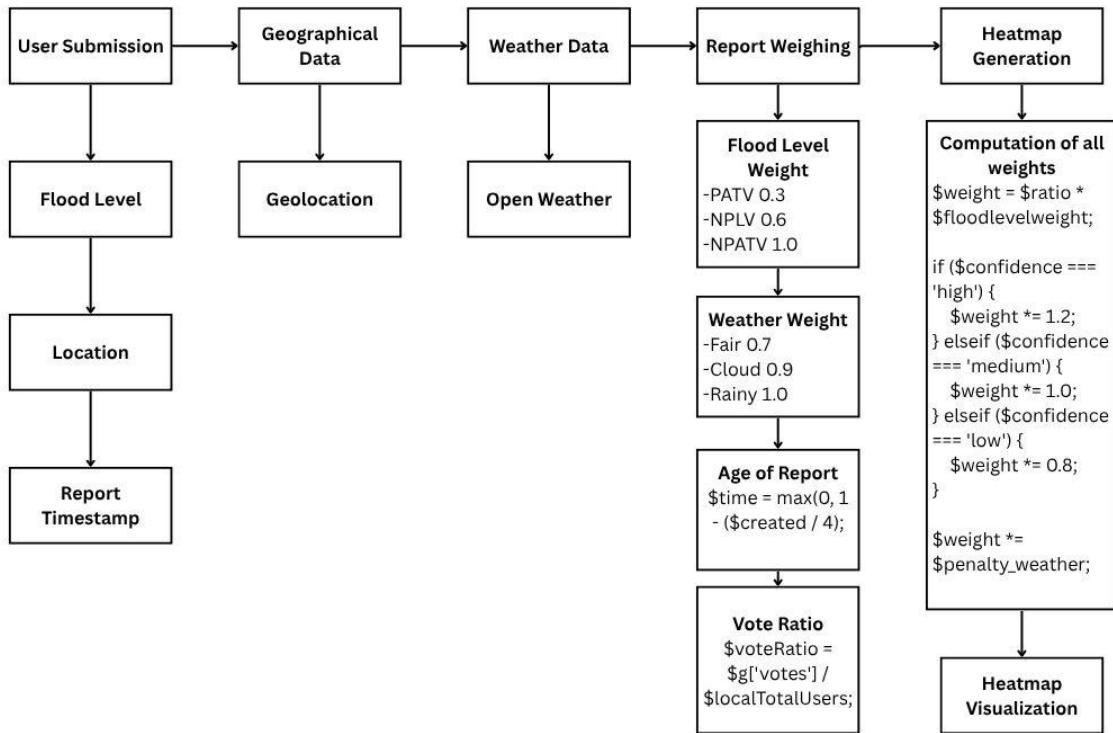


Figure 78. Gabay Application Framework

A brief overview of our system framework:

Our system, called “Gabay,” works by collecting flood reports from users. These reports are checked against real-time weather data from trusted sources like the OpenWeather API to help confirm if they are accurate. To make sure reports are still relevant, we use a time-based system where older reports become less important, and newer reports have more impact. We also include a voting system where people can upvote or

downvote reports. This helps us know which reports are more trustworthy. With all of these combined, Gabay creates a more accurate and reliable flood heatmap.

Breakdown of the framework:

User submission of reports:

Users have the ability to report a flood based on the MMDA standard of flood levels as illustrated below.

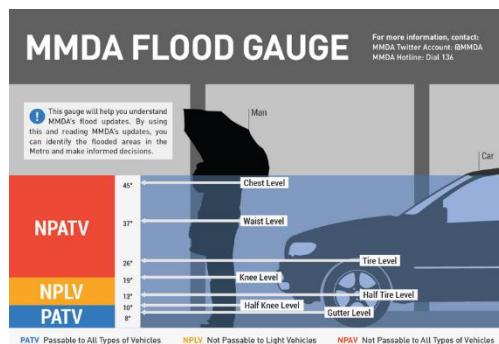


Figure 79. MMDA Flood Level Chart

Each of the flood levels (PATV, NPLV, NPATV), has various subcategories for users to choose from, additionally each one of these flood levels has an associated weight PATV = 0.3, NPLV = 0.6, NPATV = 1.0.

Additionally, these reports are grouped together based on their geographical location as the system will require users to enable the location access for the system to obtain their current latitude and longitude which is used for the said function.

Weather penalties:

The system also relies on the weather forecast to cross reference each report whereas if a user reported a flood despite having a fair and sunny weather the report would weigh less compared to a report generated by the users when the weather is rainy below is the table (Table 31.) to show the breakdown of the weight of each weather.

Table 31. Weight penalties assigned to each weather condition

Sunny/Fair Weather	A weight of 0.7 is computed
Cloudy	A weight of 0.9 is computed
Rainy	A weight of 1.0 is computed

Old vs New Reports: Why it matters

Another factor that the system considers in determining the heatmap is the so-called time-based approach where older users weigh less compared to newer reports which the researchers believe a logical approach in creating the system since flood level is frequently changing from time to time as it depends on the current weather conditions, such as continuous heavy rain will lead to increasing flood level.

Formula for getting the weight of each report based on the time generated:

Equation 1. Formula Assigned to provide weight to each report.

$$\$time = \max(0, 1 - (\$created / 4));$$

Whereas \$time is calculated weight for each report, and \$created is based on the time in hours the report was submitted. The formula $\max(0, 1 - (\$created/4))$ is to ensure that the weight of each report is gradually reduced over time and that reports that are greater than or equal to 4 hours will be automatically given a weight of 0 to ensure that the heatmap to be generated is accurate.

Sample computation:

\$created	Formula	\$time
0	$1 - (0/4)$	1
1	$1 - (1/4)$	0.75
2	$1 - (2/4)$	0.5
3	$1 - (3/4)$	0.25
4	$1 - (4/4)$	0
5	$1 - (5/4)$	-0.25 (Since the formula has $\max(0, \dots)$ then this is set to 0)

Upvote/Downvote:

Additionally, aside from weather forecast, user reporting of flood levels, and the factor of old vs new reportings, another factor that our system includes is the voting function whereas, a user reports confidence level can affect the weight of the heatmap, based on the formula given below

Equation 2. Formula used for getting the confidence level of a report.

$\$voteRatio = \$g['votes'] / \$localTotalUsers;$

Whereas voteratio is the calculated amount of votes where upvote minus downvote towards a number of respondents or users in the report, meanwhile depending on the result of the voteratio it will determine the confidence level of the respective report higher vote ratio will yield to a higher confidence level.

Computation of all the weights:

Finally, the system will take into account all of the weights from various factors such as votes (crowdsourced report), the time the report was submitted, flood level, and most importantly the weather based on the forecasted weather when we combine all of this we can get the desired weight of that report which will then be visualized to the users.

This is the formula that the researchers have come up with:

Equation 3. Formula for getting the weight of a report.

```
$weight = $ratio * $floodlevelweight;

if ($confidence === 'high') {
    $weight *= 1.2;
} elseif ($confidence === 'medium') {
    $weight *= 1.0;
} elseif ($confidence === 'low') {
    $weight *= 0.8;
}

$weight *= $penalty_weather;
```

Whereas we first computed the initial weight with each report based on the total weight of each report that was already computed as mentioned above, multiplied by the weight of the flood level which can either be 0.3, 0.6 or 1.0, then after computing the initial weight we will now multiply the weight based on the corresponding confidence level then multiply the product of it based on the weather forecast by OpenWeather API.

CHAPTER V. RECOMMENDATIONS

Summary of Findings

The study thoroughly investigated the gaps in existing sources of flood information, such as social media, weather applications, and government advisories, all of which commuters found to be inconsistent, delayed, or lacking in locality-specific detail. The research confirmed that commuters, especially in Metro Manila and Makati, experienced significant difficulties in accessing real-time updates, often resulting in unsafe travel, lost productivity, and increased personal risk. Data gathered through surveys and system evaluations indicated that more than half of commuters made travel decisions within 30 minutes of receiving a flood alert, underscoring the critical need for timely, accurate information. The GABAY application was developed using an agile methodology and incorporated key features such as real-time notifications, interactive flood maps, crowdsourced report verification, multilingual support, and user-friendly design. System testing showed that the platform effectively consolidated data, reduced duplicate or unverified reports, and delivered tailored alerts to commuters.

Furthermore, the GABAY system was positively received by users, who reported increased confidence in travel route planning and a growing reliance on the platform over traditional sources. The aggregation of real-time commuter input and official data not only improved information credibility but also fostered a sense of community participation and ownership in disaster response. Pilot user responses and usability tests indicated notable

improvements in travel safety, reduction in unnecessary travel during floods, and greater satisfaction with the specialized, localized alert system. Lastly, the data collected was found to be potentially valuable for local government units (LGUs) and disaster response agencies, as it allowed for better mapping of flood-prone areas and more informed resource allocation decisions.

Conclusions

Based on the findings, the following conclusions are drawn:

- GABAY provides a credible, real-time, and comprehensive platform for flood information, addressing the major shortcomings of traditional and social media channels with its integrated, multi-source data approach.
- Commuters who utilize the GABAY application are better equipped to make timely and informed travel decisions, resulting in increased commuter safety and reduced exposure to hazardous conditions during flooding events.
- The combination of crowdsourced verification and official data sources significantly enhances the credibility of the information delivered by the system, mitigating the risks of misinformation that typically affect user-generated content alone.

- User engagement with GABAY fosters community-driven disaster response, as commuters actively contribute to real-time flood reporting, creating a collaborative network that benefits all users.
- The platform's data outputs have added value for government and emergency response agencies, as they enable more effective monitoring of flood-prone zones and support improved disaster preparedness and resource management.
- Mobile and crowdsourcing technologies are effective tools for urban disaster risk reduction and can serve as models for similar solutions in neighboring regions or other disaster scenarios.

Recommendations

Based on our findings, done through User Acceptance Testing, the following recommendations are proposed by the researchers:

- Widen Coverage

Expand GABAY's services beyond Manila and Makati. Include other flood-prone cities and provinces in the Philippines to help more commuters across the country.

- Develop for iOS

Release an iOS version of GABAY so that both Android and Apple users can access the app and contribute data.

- o Integrate AI and Predictive Features

Use artificial intelligence and machine learning to predict flood risks, using historical data and real-time reports. This can provide earlier warnings for users.

- o Strengthen Partnerships

Work closely with more local government units, disaster agencies, and communities to collect and share reliable flood information, especially in new areas.

- o Improve Multilingual Support

Add more Filipino languages to ensure the app is helpful for users in different regions.

- o Further Studies

Research how GABAY can be adapted for other natural disasters (like earthquakes or landslides) and continually review commuter feedback for ongoing improvement.

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30. Team, A. E. C. (n.d.). *Learn how to use the input-process-output (IPO) model*.
<https://business.adobe.com/blog/basics/learn-about-the-input-output-model>
31. Teja, R. (2024, July 8). *1280x720 vs 1920x1080 Which one better?* ElectronicsHub.
<https://www.electronicshub.org/1280x720-vs-1920x1080/>
32. YANG, Y., OHIRA, N., & Hideomi GOKON. (2024). Time and Spatial Analysis of Flood Disaster based on GPS Data: A Case Study of Flood Disaster in Nagano City in 2019. Journal of Social Safety Science, 44, 121–130.
<https://doi.org/10.11314/jisss.44.121>
- 33.

APPENDIX A. PRIVACY POLICY

GABAY recognizes that your personal information is entrusted to us for a specific purpose by your own will. To protect your personal information and to use it with respect for your intentions, we have established the following policy on the appropriate handling of personal information.

1. Definition of Personal Information GABAY recognizes that personal information includes information about a living individual (such as name, email address, and other details that could identify a specific person) as defined by applicable privacy laws. This also includes user IDs, passwords, and other identifiers linked to a specific individual, as well as demographic attributes like company affiliation, gender, and age.

2. Access and Location Information Access information (hostnames, IP addresses, cookies, browser details, etc.) and location data are not considered personal information by themselves, as they do not identify a specific individual. However, if used in conjunction with personal information, they shall be treated as such.

GABAY will disclose the purpose and method of cookie and IP address usage within our services. Users can disable cookies through browser settings; however, some features may not function properly without them. If disabling cookies affects service accessibility, an announcement will be made.

Specifically, disabling cookies may impact the following features:

- Session Management and Login – Users may need to log in repeatedly, as session cookies help maintain active sessions.
- Customized Notifications – Flood alert notifications may not work or show efficiently.
- GPS-Based Flood Reports and Location Tracking – The app may have difficulty accessing and storing real-time location data, affecting the accuracy of flood reports and reducing the effectiveness of location-based alerts.
- Submitting Reports on Flooded Areas – Users may encounter issues when submitting flood reports, as the system may not retain location data or recognize recurring problem areas.

If disabling cookies significantly affects service accessibility, GABAY will issue an announcement to inform users about potential limitations and alternative solutions.

3. Compliance with Laws and Regulations When handling personal information, GABAY complies with applicable privacy laws, relevant regulations, and ministerial guidelines, as well as this policy.

4. Use within the Scope of the Purpose of Use GABAY will handle personal information only as necessary to achieve the purposes specified in advance unless consent is obtained or permitted by law. Exceptions include cases where:

Notifying the purpose may harm an individual's rights or interests.

Cooperation with governmental duties requires withholding such information.

5. Acquisition of Personal Information When acquiring personal information, GABAY will clearly specify the purpose of use, scope of data sharing, and contact points for inquiries while obtaining the individual's consent.

6. How We Use Your Personal Information GABAY will use collected personal information solely for:

- Operating and maintaining our services.
- Providing real-time flood alerts and updates.
- Responding to inquiries and improving service quality.
- Statistical analysis of anonymized data for disaster preparedness.

7. Account Deletion and Data Retention Users may request to delete their account at any time. Upon deletion:

- All personal information, reports, and activity logs will be permanently removed.
- Any reports submitted by the user will also be deleted.
- System-generated reports that utilize anonymized data will be retained for statistical and analytical purposes.

8. Changes in Purpose of Use of Personal Information GABAY will not change the use of personal information beyond what is reasonably relevant to the original purpose and will notify users of any such changes.

9. Supervision of Contractors If personal information is outsourced, GABAY will enter into confidentiality agreements and ensure appropriate supervision of contractors to maintain data security.

10. Restrictions on the Provision of Personal Information to Third Parties GABAY will not provide personal information to third parties without prior consent, except in cases where:

- Required by law.
- Necessary to protect life, health, or property.
- Needed for public health improvements or children's well-being.
- Governmental cooperation is necessary and obtaining consent may hinder duties.

None of the following cases are considered third-party disclosures:

- Outsourcing data handling within the necessary scope.
- Business transfers due to mergers or other reasons.

11. Responding to Comments and Inquiries GABAY will respond appropriately to any requests regarding personal data access, corrections, suspensions, deletions, or other inquiries, in accordance with legal provisions.

Supplementary Provision This Privacy Policy takes effect from March 31, 2025.

APPENDIX B. TERMS OF SERVICES

Article 1. Application of Rules and Regulations These Terms of Service (hereinafter referred to as "the Terms") set forth the terms and conditions for the use of the Gabay Intelligent Flood Alert System (hereinafter referred to as "the Service") provided by GABAY (hereinafter referred to as "we" or "the Company").

By using the Service, users (hereinafter referred to as "the User") agree to abide by all provisions outlined in these Terms. If the User is a minor, they must obtain consent from a parent, guardian, or other legal representative before using the Service.

Article 2. Changes to the Terms of Service We reserve the right to modify these Terms at any time without prior consent from the User. Changes will take effect once we notify Users via our website, mobile application, or other appropriate means. Continued use of the Service after such changes constitutes acceptance of the revised Terms.

Article 3. Handling of Personal Information Personal information is handled in accordance with our Privacy Policy, which is separately established. The User agrees that location data, flood reports, and other submitted content may be processed for the purpose of improving the accuracy of flood warnings.

Article 4. Use of Service Content Users may access content provided through the Service, including flood maps, reports, and weather updates ("Service Content"). All rights to

Service Content belong to the Company or authorized third parties. Users may not redistribute, modify, or misuse the content outside the intended functionality of the Service.

Article 5. Free and Paid Features The Service offers both free and premium features. Premium features may require a subscription, with the fees, payment methods, and terms communicated within the Service or the Company's website.

Article 6. User-Generated Content Users who submit flood reports, images, or other data ("User Content") through the Service assert that they have the legal right to do so and that their content does not infringe upon any third-party rights. By submitting content, the User grants the Company a worldwide, non-exclusive, royalty-free, sublicensable, and transferable license to use, modify, and display the content for disaster response and system improvement.

The Company may remove User Content without prior notice if it is deemed to be false, misleading, or in violation of applicable laws or these Terms.

Article 7. Prohibited Activities Users shall not engage in the following activities:

- Submitting false, misleading, or offensive flood reports.
- Interfering with or disrupting the operation of the Service.
- Unauthorized access, hacking, or data manipulation.
- Reverse engineering, modifying, or tampering with the Service's code.

- Using the Service to spread false or harmful information.
- Violating any laws or regulations.

Article 8. Suspension or Termination of Service The Company may suspend or terminate a User's access to the Service without prior notice if:

- The User violates these Terms.
- The User submits false or misleading reports that impact public safety.
- The Company deems suspension necessary for system maintenance, security, or operational reasons.
- The Company is not obligated to disclose reasons for such actions.

Article 9. User Responsibility Users are responsible for ensuring that the information they submit is accurate and not misleading. Users acknowledge that they rely on the Service at their own risk and that the Company does not guarantee the accuracy of all reports.

If a User's actions result in harm to the Company, other Users, or third parties, the User shall be responsible for any damages, including legal and attorney fees.

Article 10. Disclaimer The Company makes no guarantees regarding the absolute accuracy of flood reports or weather data. The Service relies on crowdsourced reports, which may contain errors. The Company shall not be held liable for any damages arising from reliance on the Service, except in cases of intentional misconduct or gross negligence.

Article 11. Account Deletion Users may delete their accounts upon request. Upon deletion:

- All personal information, reports, and activity logs will be permanently erased.
- Reports submitted by the User will also be deleted.
- System-generated reports that use anonymized data will be retained for research and statistical purposes.

Article 12. Advertisements The Company may display advertisements within the Service.

Users acknowledge that the Service may contain promotions from third parties. Premium subscribers may have the option to disable ads.

Article 13. No Transfer of Rights Users may not transfer, lease, or assign their rights and obligations under these Terms without prior written consent from the Company.

Article 14. Contact Method All inquiries related to the Service shall be directed to the Company through designated contact forms on the Service or the Company's website.

Supplementary Provisions These Terms take effect from March 31, 2025.

APPENDIX C. SAMPLE PRINTED REPORT

Monthly Flood Report

GABAY

July 2025

Summary of Users and Reports

Total number of users:	Total flood reports submitted:
5,356	1,032
Premium:	Verified reports:
2,489	978 (94.8%)
Guests:	False reports:
423	54 (5.2%)

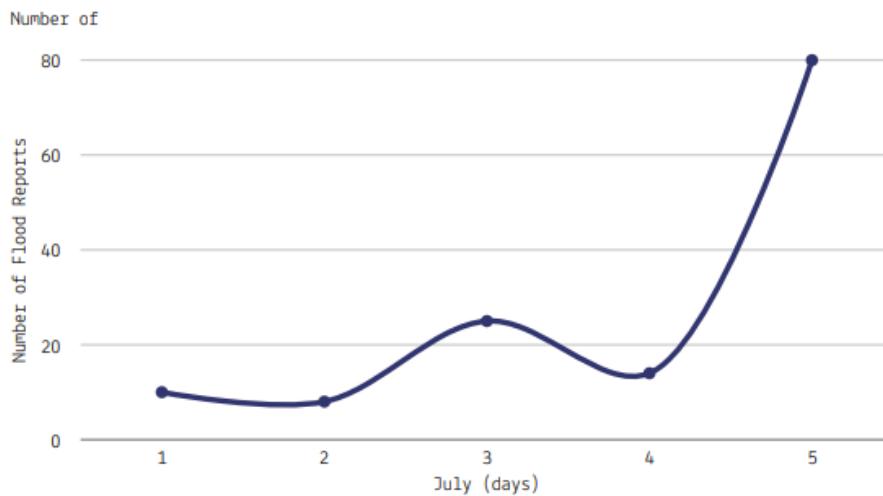
Area Breakdown

Location	Total Reports	Verified Reports	Average Severity	Flood Duration (minutes)
Makati CBD	312	298	Tire Level	85 mins
España	275	260	Waist Level	110 mins
Taft Ave	198	185	Half Tire Level	95 mins
Poblacion	145	91	Knee Level	87 mins

Daily Report Trends

Highest Flood incidents: July 5 (80 reports)

Lowest Flood incidents: July 2 (8 reports)



Peak Reporting Periods

Time Range	Average Reports Per Minute
6:00 AM - 9:00 AM	6 reports/min
12:00 PM - 2:00 PM	4 reports/min
5:00 PM - 9:00 PM	7 reports/min

APPENDIX D. SYSTEM/USER MANUAL



GABAY Mobile Application User/Traveler Manual

Table of Contents**1. Guest Access**

- 1.1 Download and Open the App
- 1.2 Explore Home, Weather, Maps, and Menu
- 1.3 Maps and Location Features
- 1.4 Weather Details
- 1.5 Menu and Language Settings

2. Basic User

- 2.1 Sign Up and Log In
- 2.2 Explore Home, Weather, Maps, and Menu
- 2.3 Create a Flood Report
- 2.4 Weather Forecast and Updates
- 2.5 Change Password and Contact Us

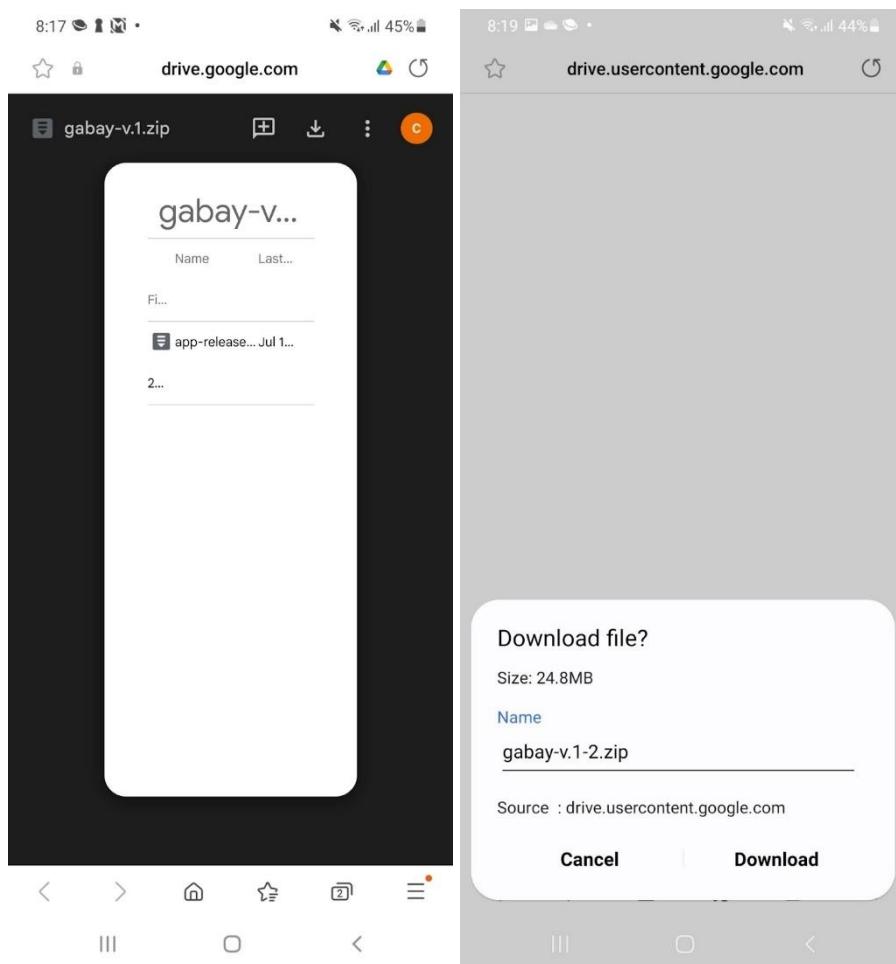
3. Premium User

- 3.1 Subscribe to Premium
- 3.2 Access Premium Features
- 3.3 Log Out

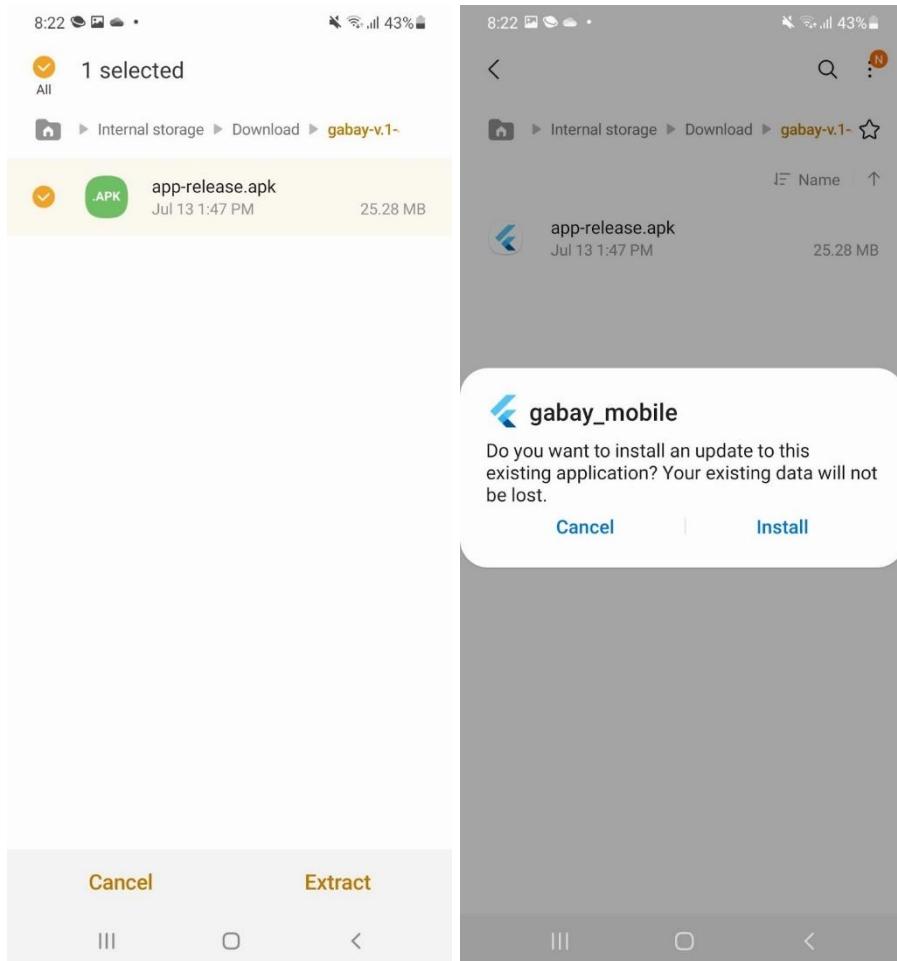
1. Guest Access (No Login Required)**1.1 How to Download and Open the App**

- Download the **GABAY.apk** from the official source.

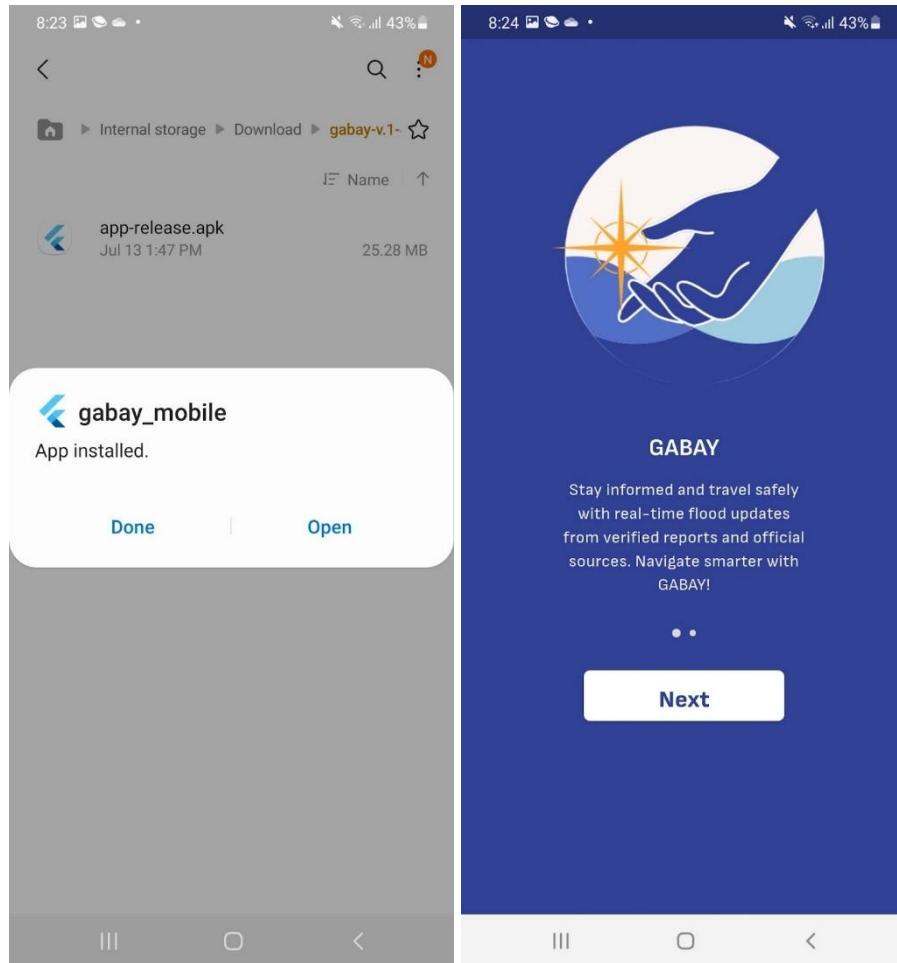
<https://drive.google.com/file/d/1mGfk9zmCpX5aQJCpkP-2CRPedPYWyY/view?usp=sharing>



- After downloading, extract the file and install it.

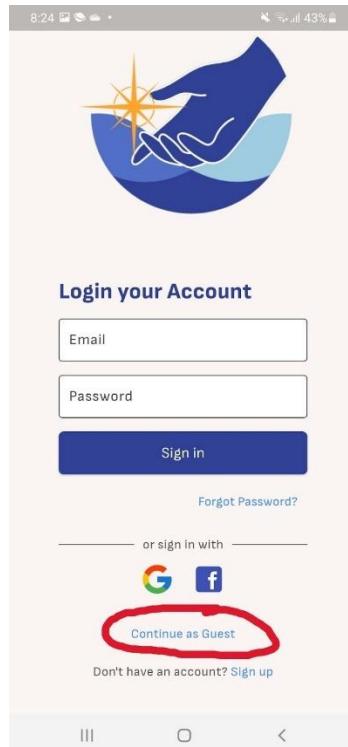


- After installing, open the **Gabay** app.

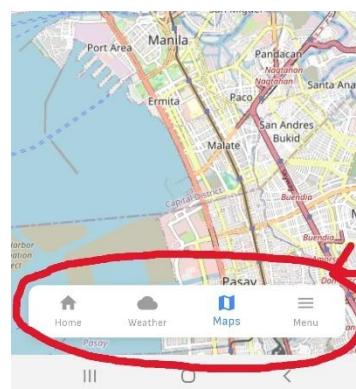


1.2 Exploring the Main Sections: Home, Weather, Maps, Menu

- Open the app and select **Continue as Guest**.

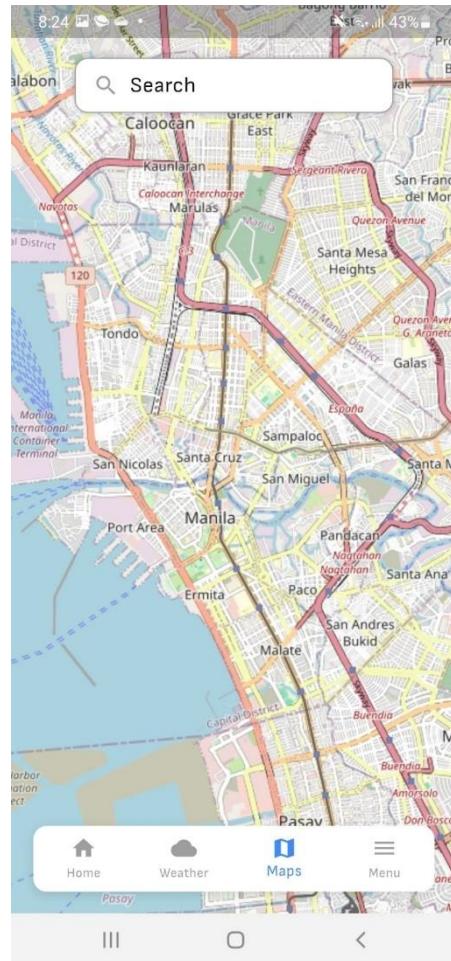


- Explore the app by tapping the icons on the bottom navigation bar: **Home, Weather, Maps, and Menu**.

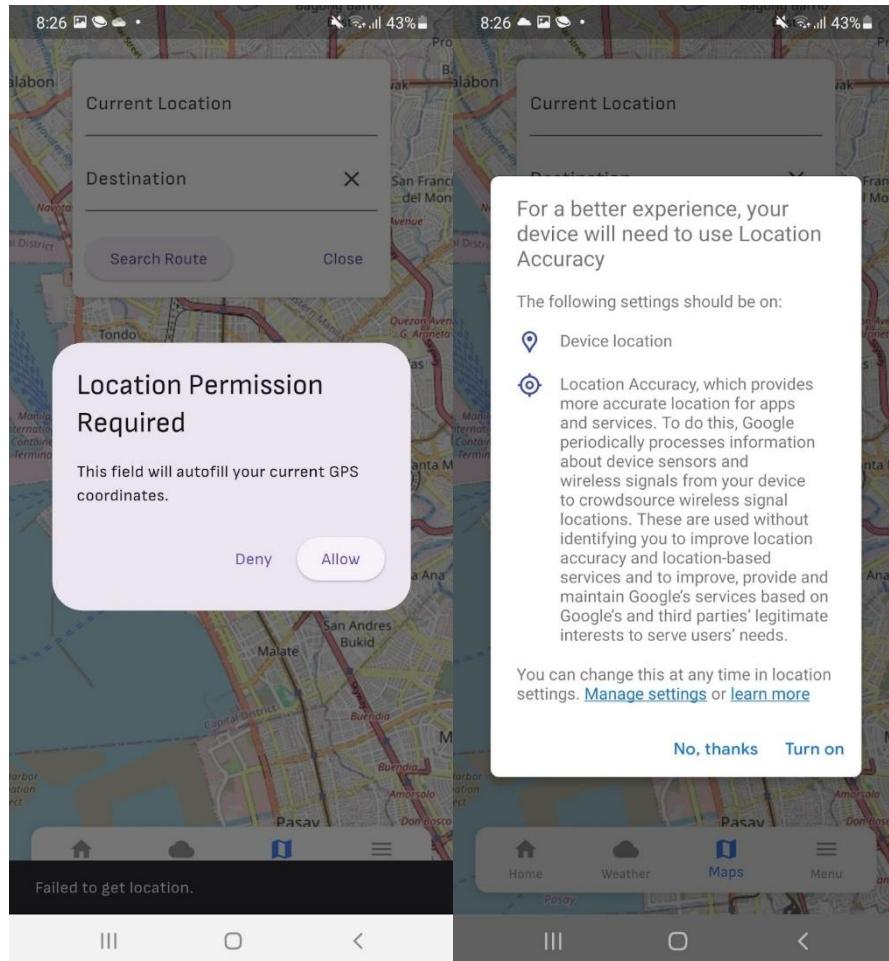


1.3 Maps Screen Interaction

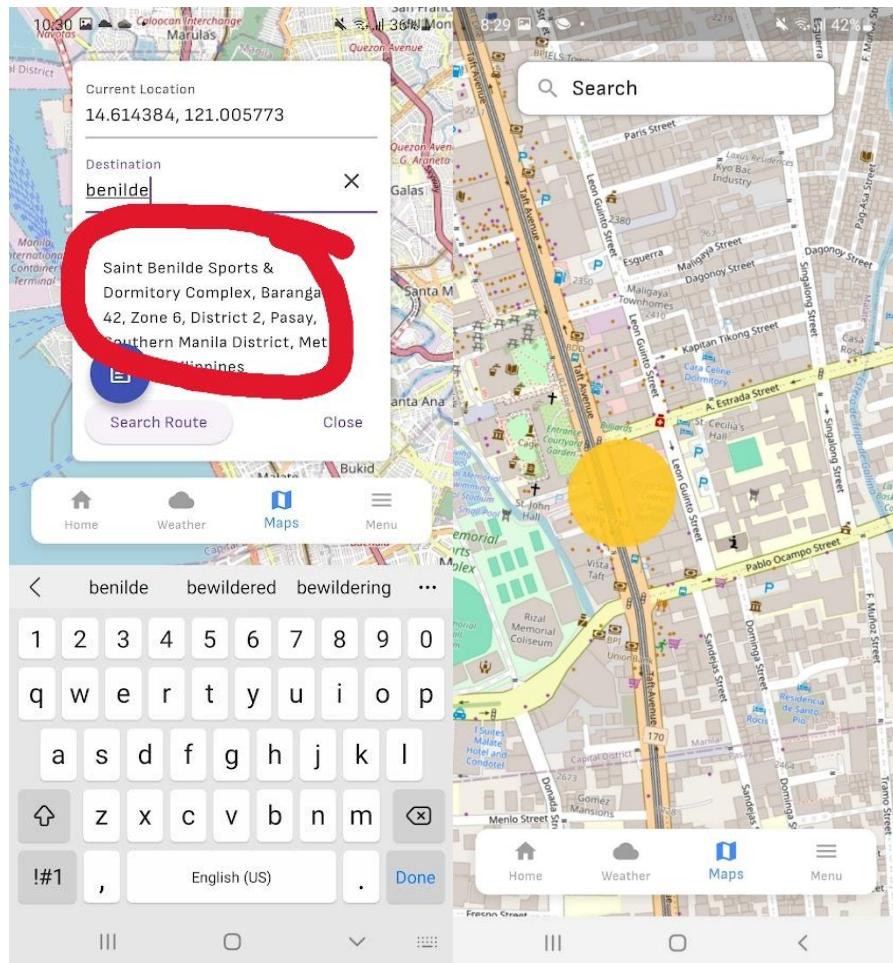
- **Interact with the map:** Verify that all relevant locations are clearly displayed.



- **Search for your current location:** Tap the search bar and enable GPS access.

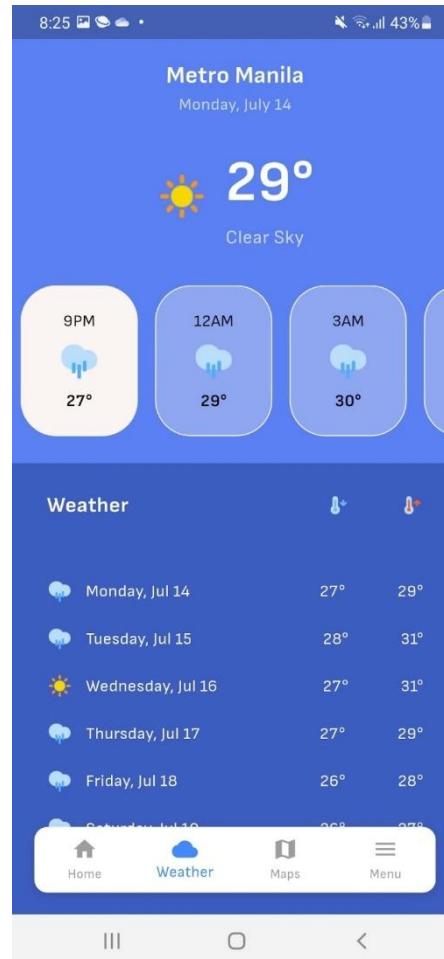


- After allowing location permissions, ensure your current location is automatically filled in the search field.
- **Input destination:** Type Benilde and confirm that the **heatmap overlay** is visible and functioning.
- Tap the **Navigation Icon** to open the reports page from other users.



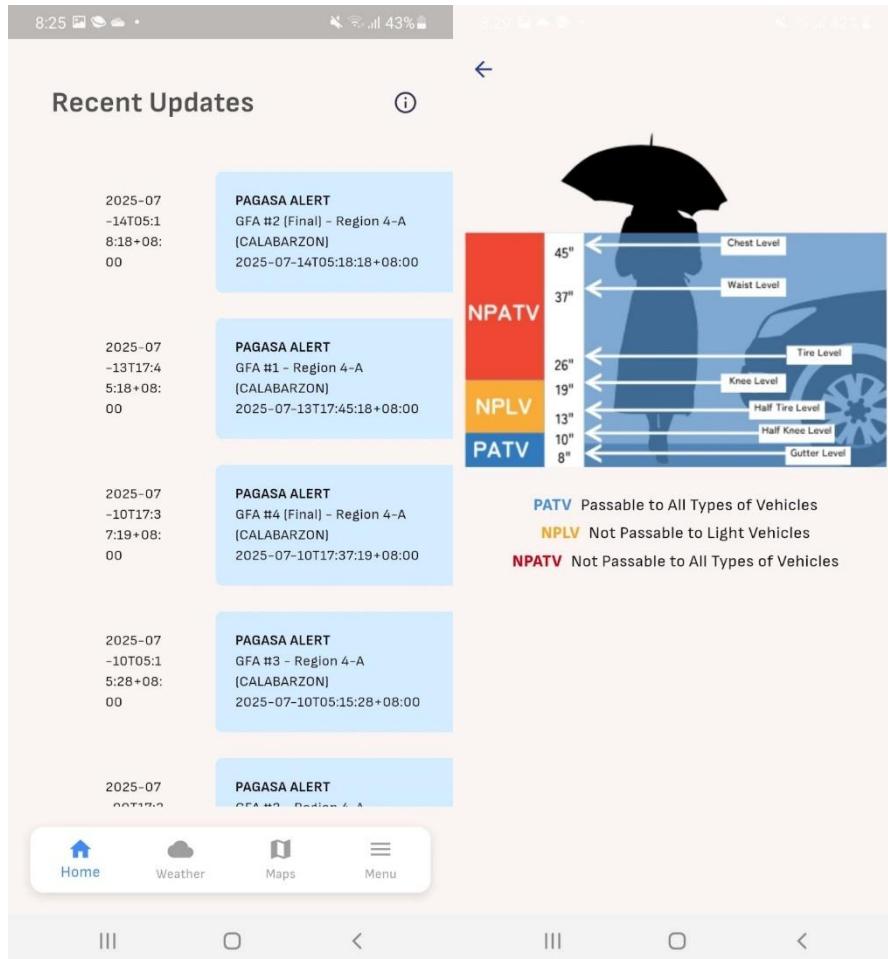
1.4 Weather Screen Overview

- Ensure that the weather screen displays the correct dates, including today and the next few days.
- Verify that today's weather details are shown in **3-hour intervals**.



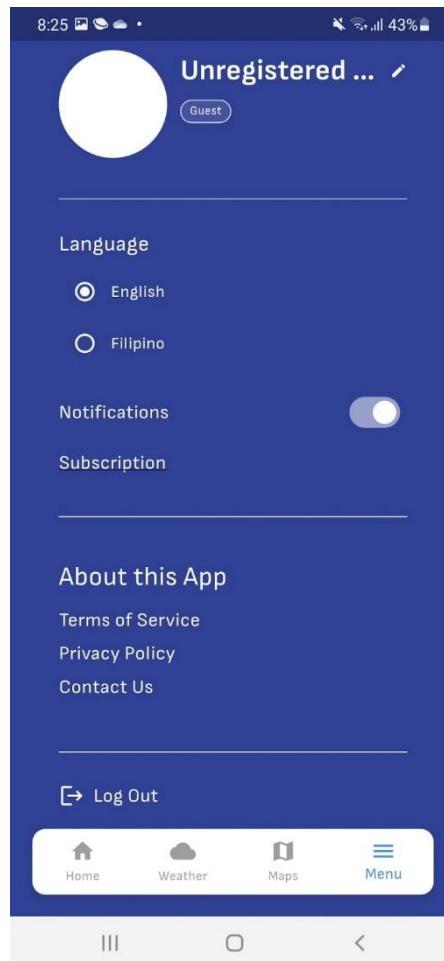
1.5 Home Screen Overview

- Check that **news updates** are visible with **timestamps** on the left and **notifications** on the right.
- Ensure the information icon at the top-right works, showing a flood level guide.



1.5 Menu Screen & Language Settings

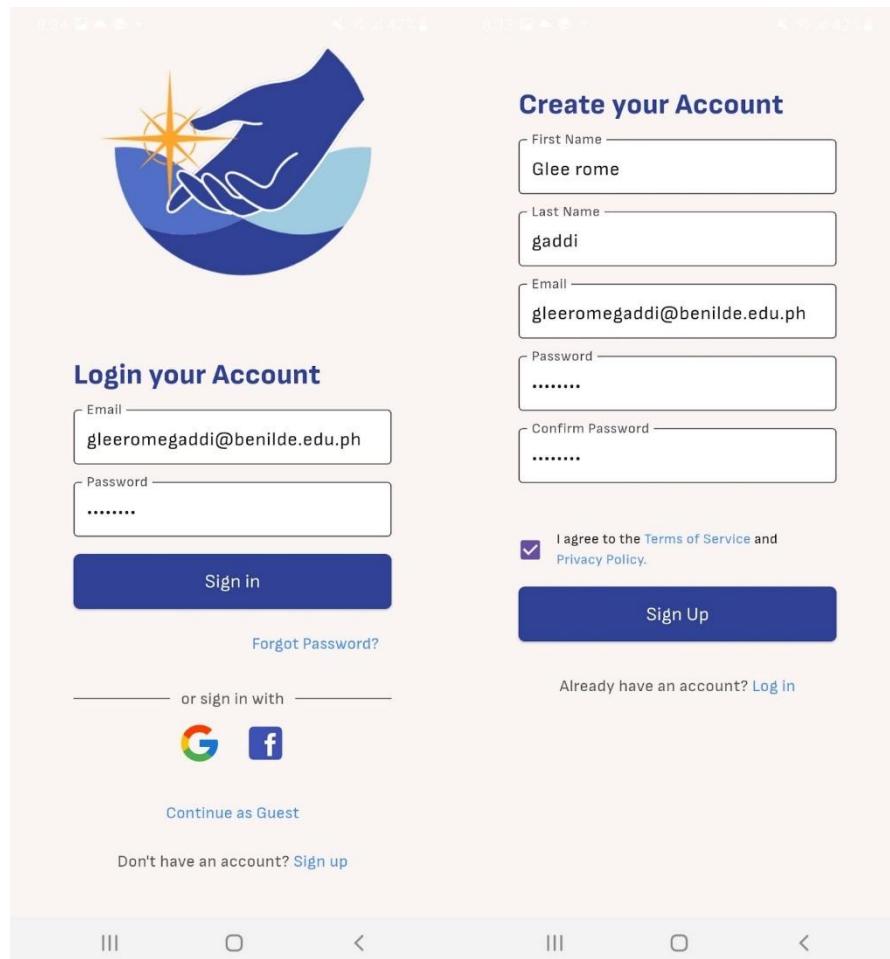
- Navigate to **Terms of Service** and **Privacy Policy** to ensure they are accessible.
- Language Settings: Toggle between English and Filipino. Ensure the app updates its interface accordingly and that the translation is consistent (except for the news section).



2. Basic User (After Sign Up & Login)

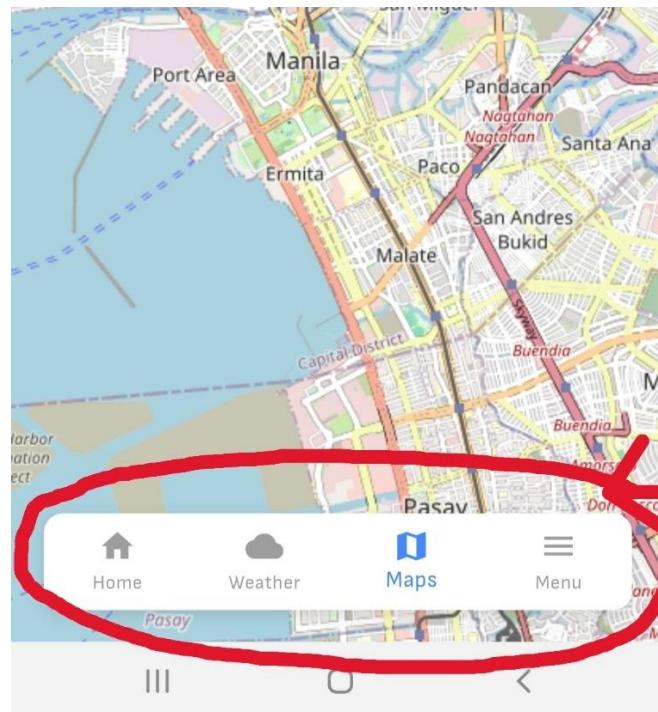
2.1 Signing Up and Logging In

- From the **Home screen**, tap **Sign Up** to register. Complete the sign-up form or use your **Google/FB account** to log in.
- **Log in** with your newly created credentials.



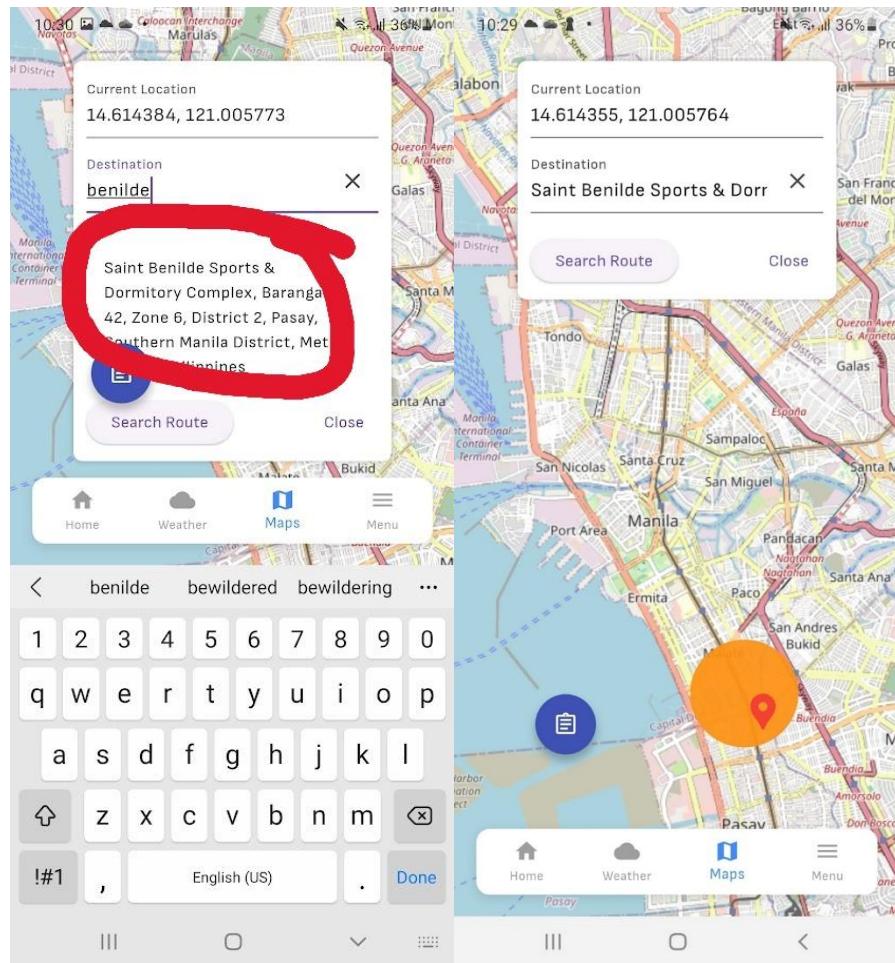
2.2 Exploring the Main Sections: Home, Weather, Maps, Menu

- After logging in, tap each icon on the bottom navigation bar to explore the **Home**, **Weather**, **Maps**, and **Menu** screens.

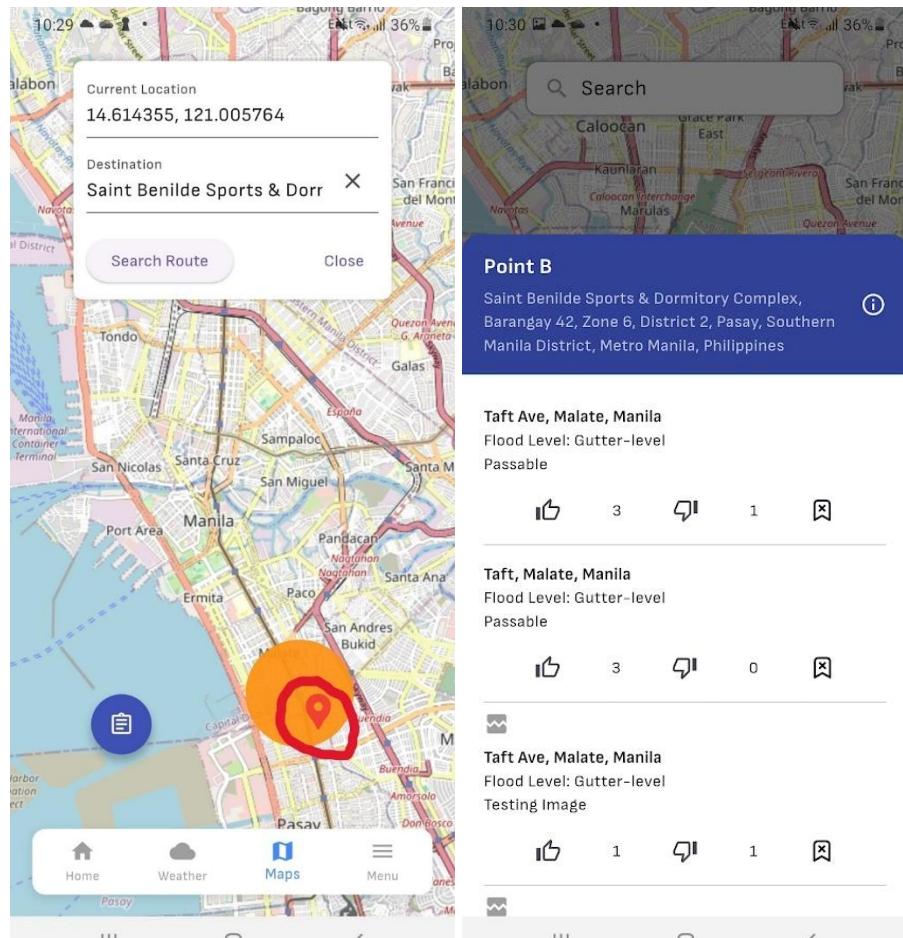


2.3 Maps Screen Interaction

- **Search for your location:** Tap the search bar and allow **GPS access**.
- After enabling location permissions, the **current location** should auto-fill in the search field.
- **Input destination:** Type **Benilde** and confirm the **heatmap overlay** is visible.

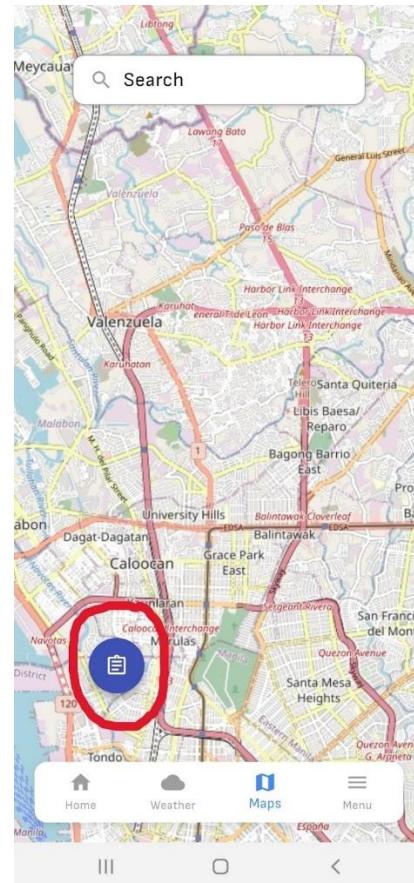


- Tap the navigator icon to see the user feedbacks

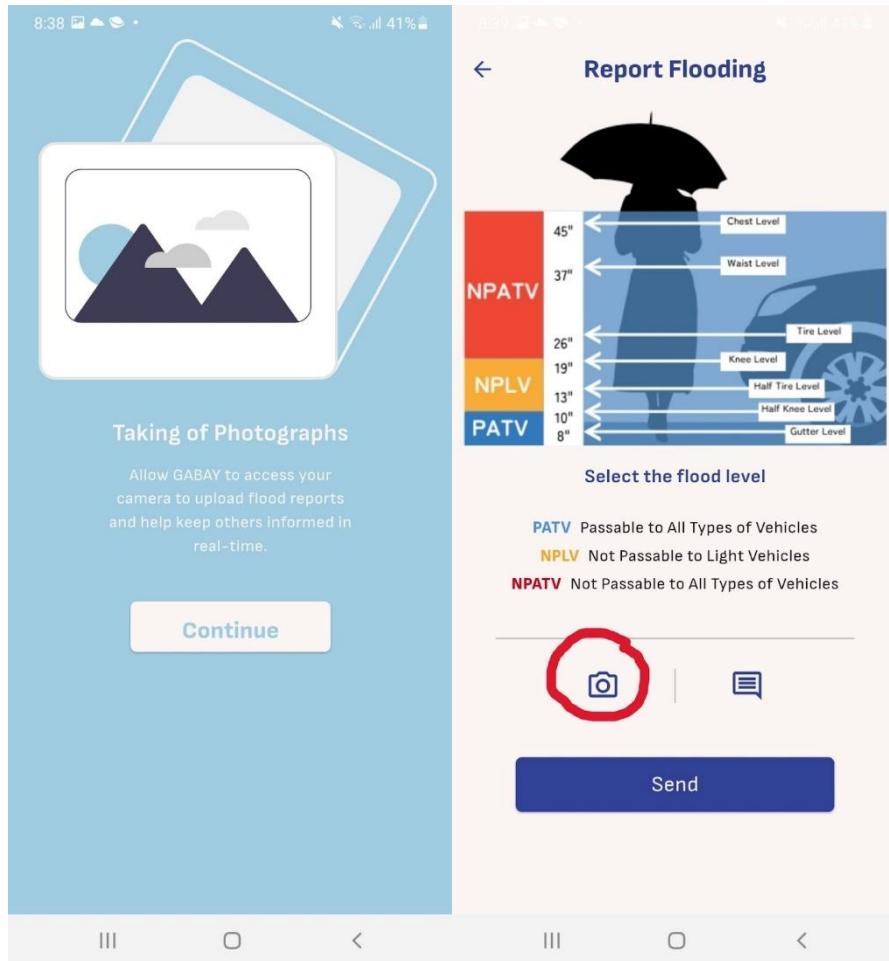


2.4 Creating a Flood Report

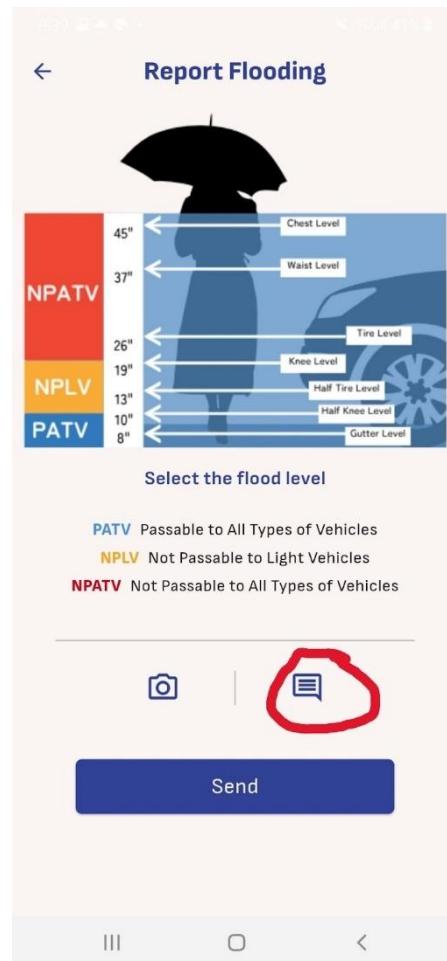
- Tap the report button on the maps



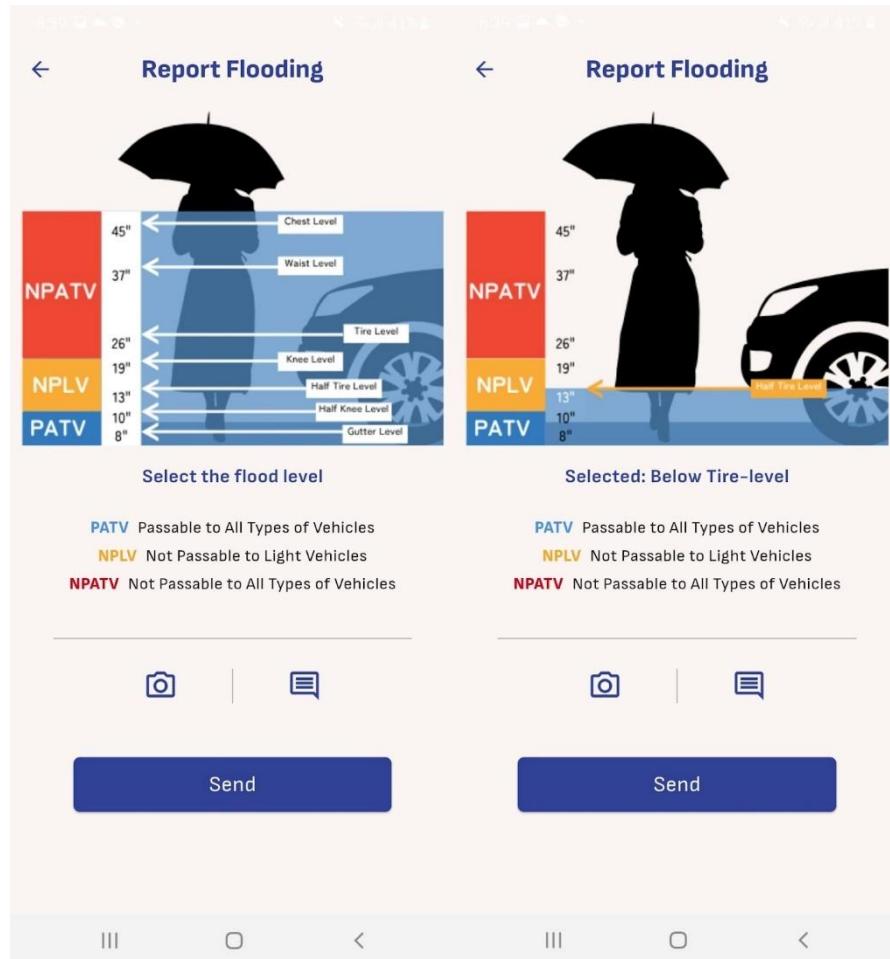
- Allow the app to access your camera then tap the camera icon to take a photo.



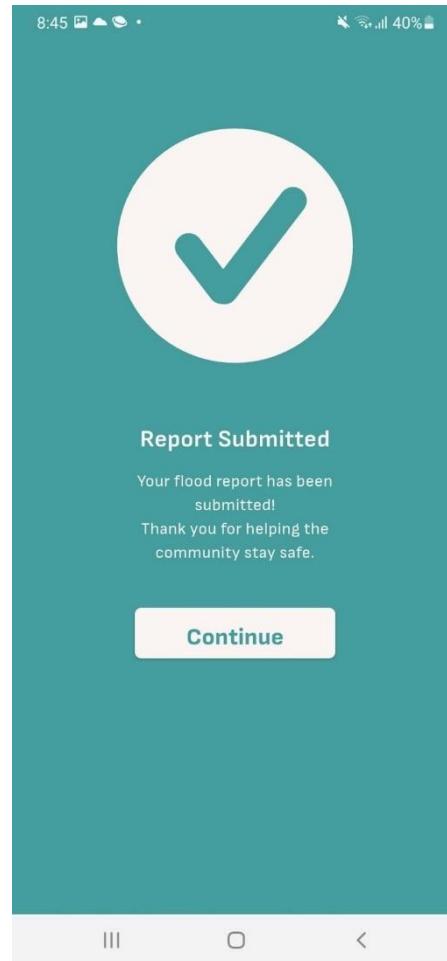
- **Add comments** by tapping the comments icon.



- Select **flood level** from the options provided.



- Send the report.



2.5 Weather Screen Overview

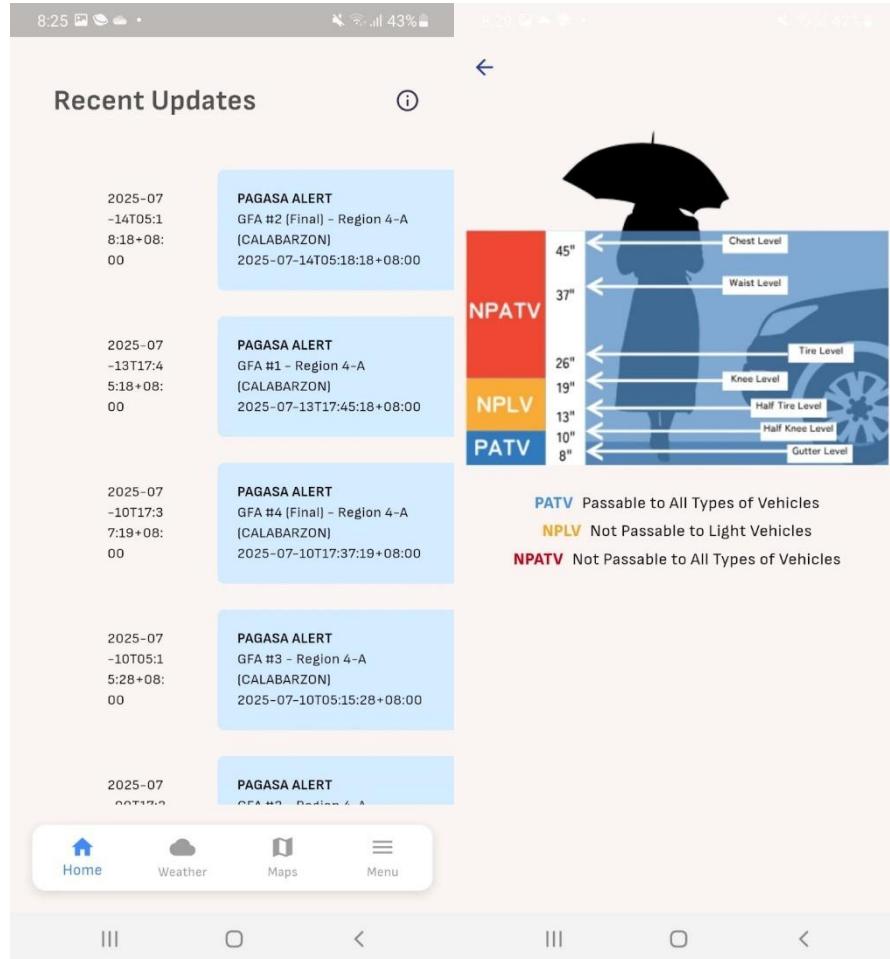
- Check that the weather screen displays **7-day forecast**.
- Ensure **today's weather** is shown in **3-hour intervals**.



2.6 Home Screen Overview

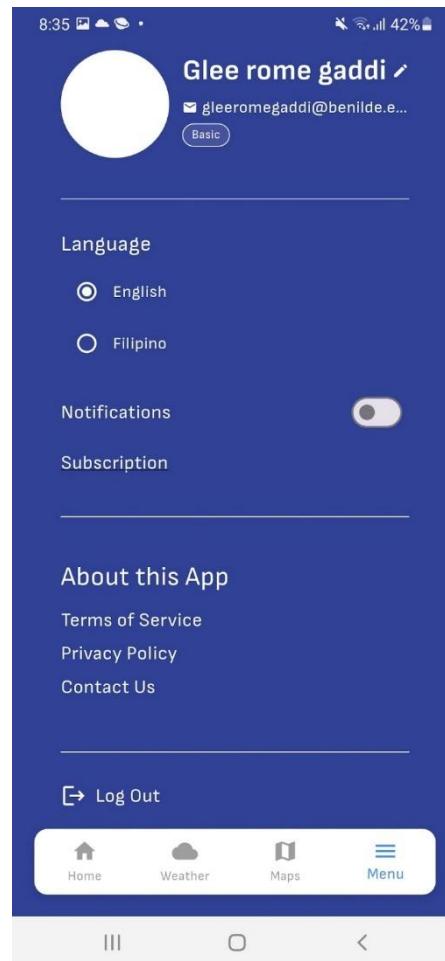
- Ensure that **news updates** are visible and up-to-date.

- Confirm that the **information icon** at the top-right works to show the **flood level guide**.



2.7 Menu Screen & Language Settings

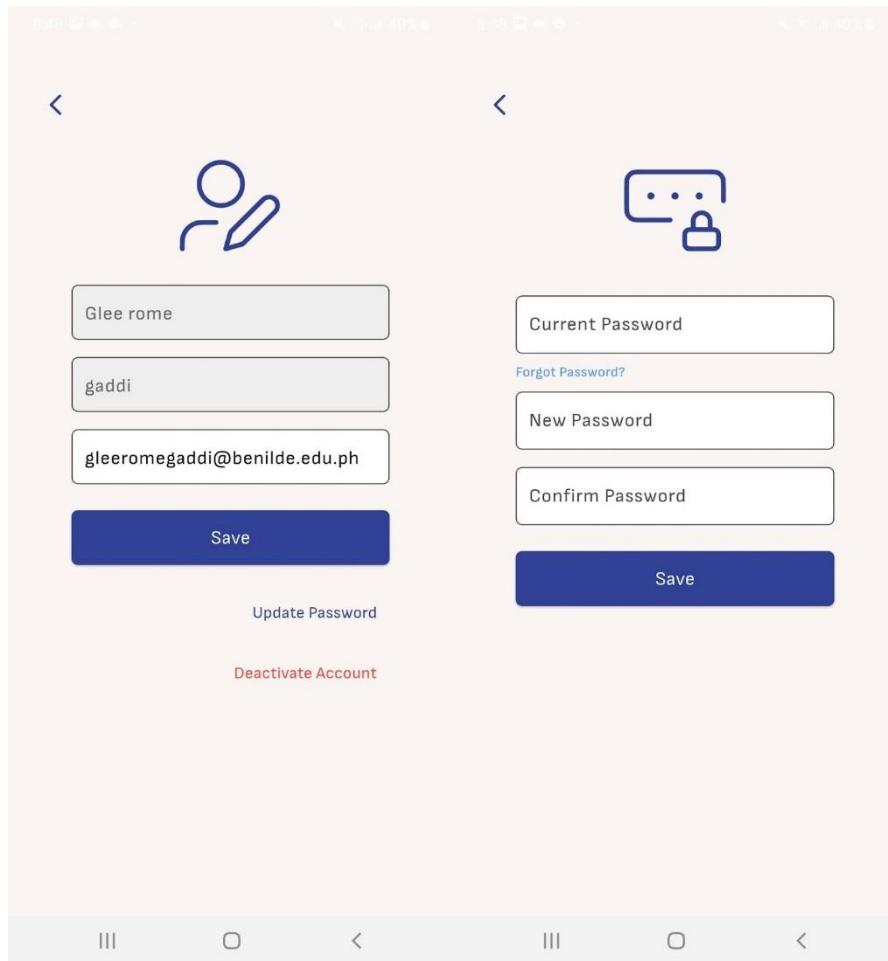
- Navigate to **Terms of Service** and **Privacy Policy** to ensure they are accessible.
- Toggle between **English** and **Filipino**, ensuring the interface updates accordingly.



2.8 Changing Account Settings

- **Edit account:** Tap the edit icon beside your name to change details.

- **Change password:** Confirm that after changing your password, you will be **logged out**.

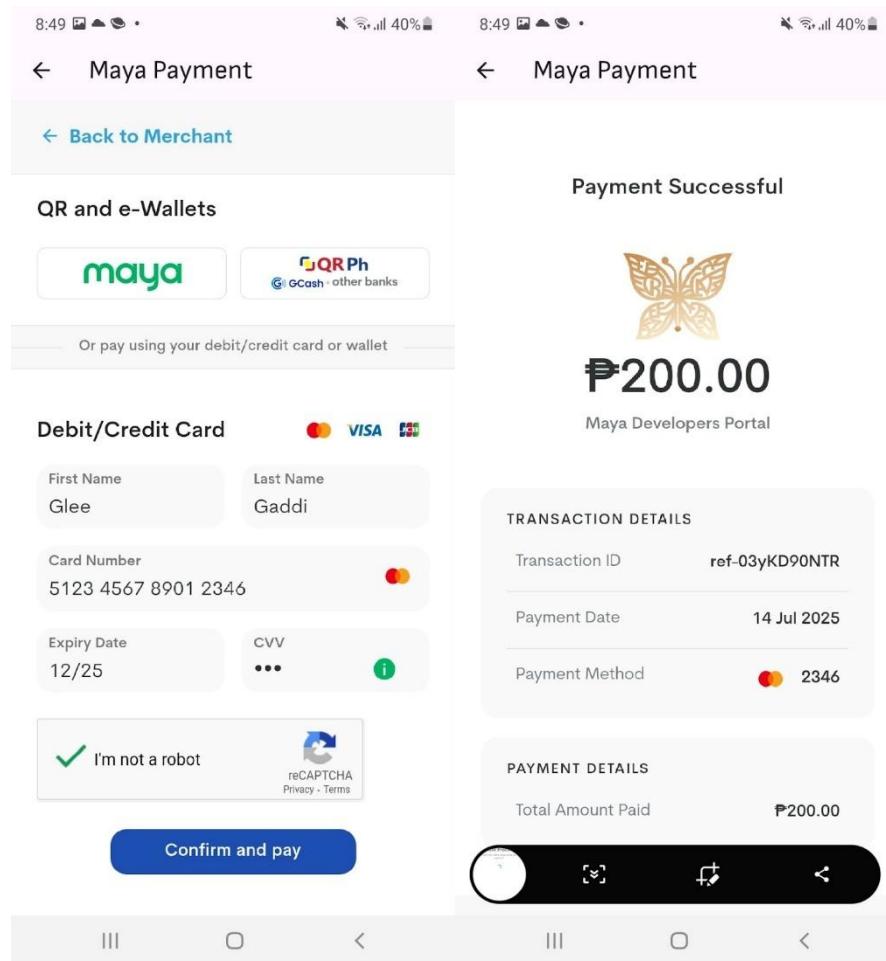


1. Premium User

3.1 Subscribing to Premium

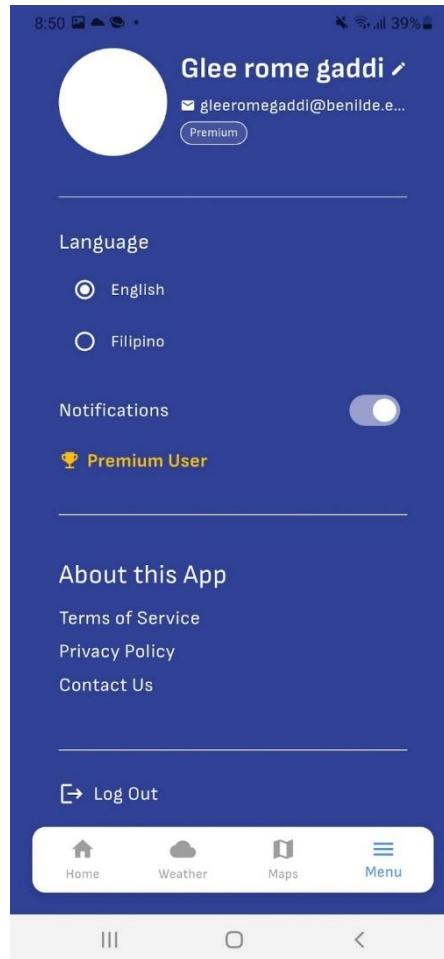
- Go to the **Subscription section** and **add payment details**:
 - **Card number:** 5123 4567 8901 2346
 - **Expiry:** 12/25
 - **CVV:** 111

- Complete the process and ensure your account is now a **premium user**.



3.2 Premium Features

- As a **premium user**, access exclusive features like **priority alerts** and **premium flood forecasts**.



3.3 Logging Out

- After using premium features, you can log out of the app by tapping the Log Out button in the Settings menu.

APPENDIX E. SYSTEM ADMINISTRATOR MANUAL



GABAY System Administrator Manual

Table of Contents

1. Starting up

1.1 How to get to the gabay system administrator page

2. Exploring the Gabay Dashboard

2.1 Adding a Co-Administrator

2.2 Removing a Co-Administrator

2.3 How to Suspend/Reactivate Traveler

2.4 Removing a Traveler

2.5 How to view Feedbacks from Travelers

2.6 How to view Flood Reports

2.7 How to Delete a Flagged Report

2.8 View Statistical Data for Reports

3. Retrieving your credentials

3.1 How to reset your password

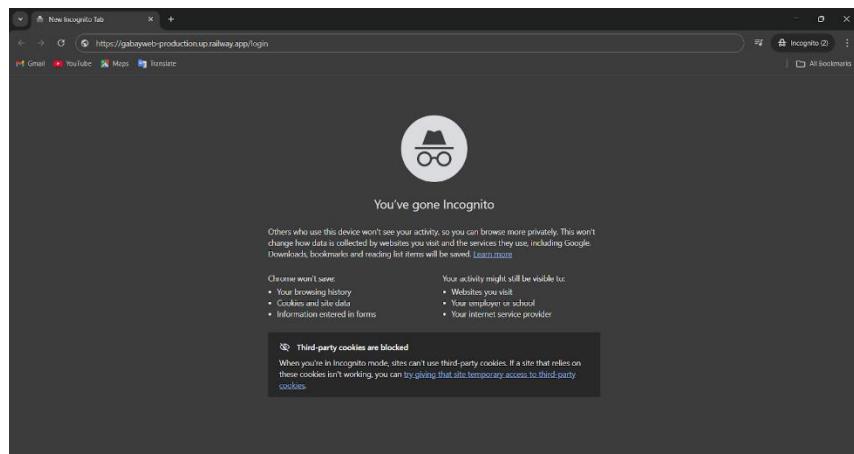
1. Starting up

1.1 How to get to the gabay system administrator page

- Open your Internet browser (Google Chrome is recommended)

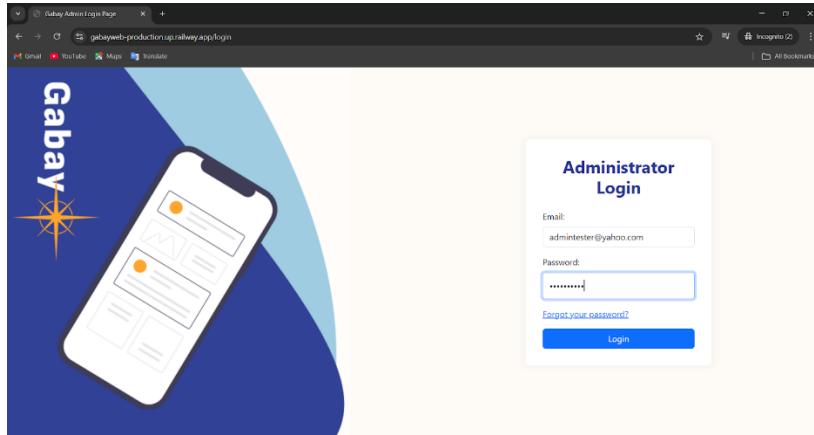


- After opening your preferred browser (Google Chrome is recommended) go to
<https://gabayweb-production.up.railway.app/login>

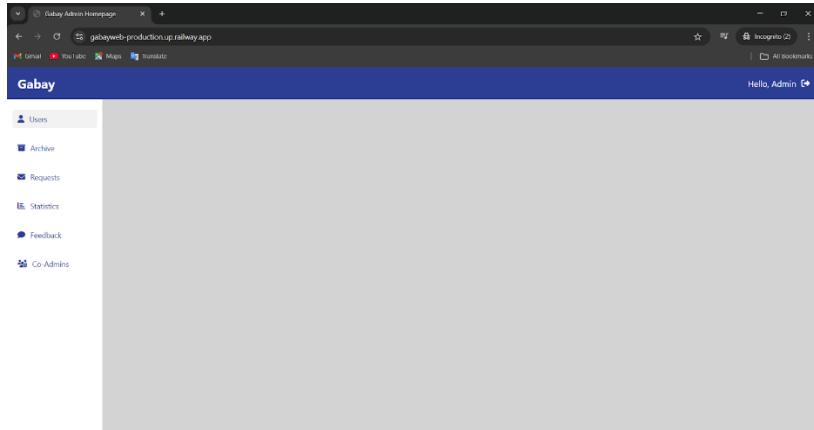


- Once in the login page enter the following credentials username:

admintester@yahoo.com, and password: Password12



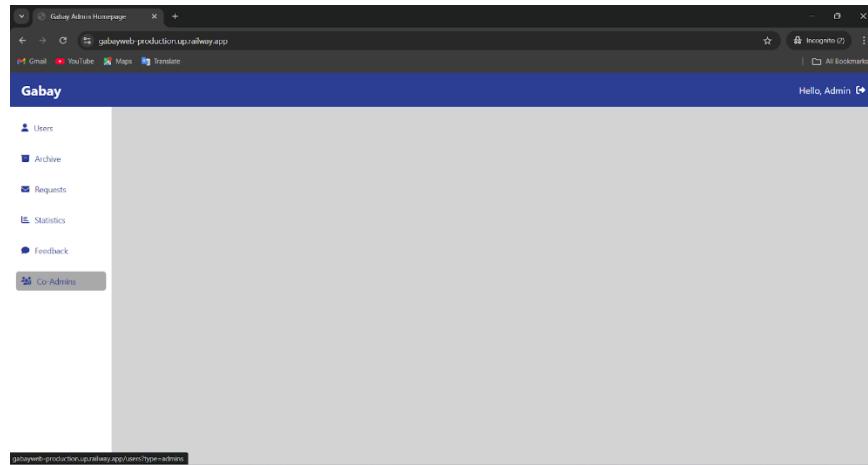
- Congratulations you have successfully entered the gabay system administrator



2. Exploring the Gabay Dashboard

2.1 How to Add a Co-Administrator

- On the system administrator dashboard click on the Co-Admins

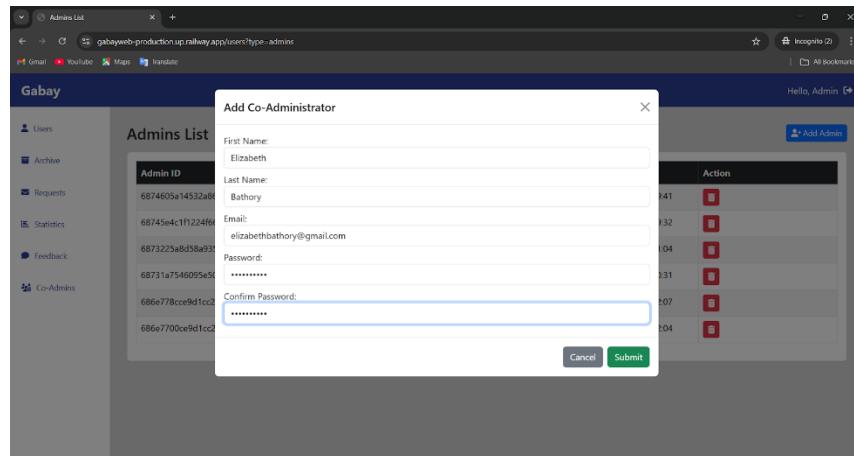


- After clicking on Co-Admins, you will be redirected to the Co-Admins dashboard page, click on the Add Admin to Proceed.

A screenshot of a web browser window titled "Admins List". The address bar shows the URL "gabayweb-production.up.railway.app/users?type=admin". The page has a dark blue header with the word "Gabay" in white. Below the header is a navigation menu with the following items: "Users", "Archive", "Requests", "Statistics", "Feedback", and "Co-Admins". The "Co-Admins" item is highlighted with a grey background. The main content area displays a table titled "Admins List" with the following columns: "Admin ID", "First Name", "Last Name", "Email", "Date Created", and "Action". There are seven rows of data in the table. At the top right of the table, there is a blue button with a white icon and the text "Add Admin", which is highlighted with a yellow box.

Admin ID	First Name	Last Name	Email	Date Created	Action
6874605a14532a862c042e72	Administrator	Super	superadmin@yahoo.com	2025-07-14 09:41	
68745e4cf1f224f66e0f40c2	Admin	Test	admintester@yahoo.com	2025-07-14 09:32	
687325a8d58a935da08ba03	King	McQueen	dinocommcqueen@yahoo.com	2025-07-13 11:04	
68731a7546095e0bd0c5675	Testing	People	testing@yahoo.com	2025-07-13 10:31	
686e778cc9d1cc2ae01de93	Trial	User	trialuser@yahoo.com	2025-07-09 22:07	
686e7700ce9d1cc2ae01de92	Gunko	Arrow	gunkoarrow@yahoo.com	2025-07-09 22:04	

- Add the First name, Last name, email address, Password of the Co-Administrator.



- After a successful registration a message “Admin Created” will be displayed, furthermore you will now be able to see the newly created co-administrator

Admins List					
Add Admin					
Admin Created					
Admin ID	First Name	Last Name	Email	Date Created	Action
687517aff0a44e209038984	Elizabeth	Bathory	elizabethbathory@gmail.com	2025-07-14 22:43	
6874605a14532a862c042e72	Administrator	Super	superadmin@yahoo.com	2025-07-14 09:41	
68745e4c1f1224f66e0f40c2	Admin	Test	admintester@yahoo.com	2025-07-14 09:32	

- Congratulations, you have successfully added a co-administrator.

2.2 Removing a Co-Administrator

- To Remove a Co-Administrator, simply click on the red icon button under actions

The screenshot shows a browser window with the URL gabayweb-production.up.railway.app/users?type=admins. The page title is "Admins List". On the left, there's a sidebar with links: Users, Archive, Requests, Statistics, Feedback, and Co-Admins. The main content area has a header "Admin Created" and a table with columns: Admin ID, First Name, Last Name, Email, Date Created, and Action. The table contains seven rows of data. The "Action" column for the first row is highlighted with a yellow box.

Admin ID	First Name	Last Name	Email	Date Created	Action
687517aa1044e209038984	Elizabeth	Bathory	elizabethbathory@gmail.com	2025-07-14 22:43	<input type="checkbox"/>
6874605a14532ab62c042e72	Administrator	Super	superadmin@yahoo.com	2025-07-14 09:41	<input type="checkbox"/>
68745e4c1f1224f66e0f40c2	Admin	Test	admintester@yahoo.com	2025-07-14 09:32	<input type="checkbox"/>
6873225a8d58a935da08ba03	King	McQueen	dinocommcqueen@yahoo.com	2025-07-13 11:04	<input type="checkbox"/>
68731a7546095e50de0c5675	Testing	People	testing@yahoo.com	2025-07-13 10:31	<input type="checkbox"/>
686e778cce9d1cc2ae01de93	Trial	User	trialuser@yahoo.com	2025-07-09 22:07	<input type="checkbox"/>
686e7700ce9d1cc2ae01de92	Gunko	Arrow	gunkoarrow@yahoo.com	2025-07-09 22:04	<input type="checkbox"/>

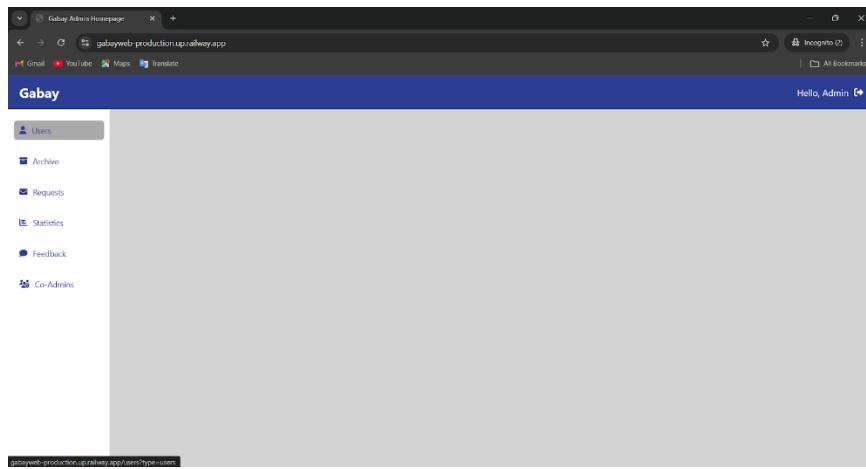
- You will be notified that the Account has been deleted.

The screenshot shows the same browser window and URL as the previous one, but the header now says "Account Deleted". The table data remains the same as in the previous screenshot, with the first row's "Action" column highlighted by a yellow box.

Admin ID	First Name	Last Name	Email	Date Created	Action
6874605a14532ab62c042e72	Administrator	Super	superadmin@yahoo.com	2025-07-14 09:41	<input type="checkbox"/>
68745e4c1f1224f66e0f40c2	Admin	Test	admintester@yahoo.com	2025-07-14 09:32	<input type="checkbox"/>
6873225a8d58a935da08ba03	King	McQueen	dinocommcqueen@yahoo.com	2025-07-13 11:04	<input type="checkbox"/>
68731a7546095e50de0c5675	Testing	People	testing@yahoo.com	2025-07-13 10:31	<input type="checkbox"/>
686e778cce9d1cc2ae01de93	Trial	User	trialuser@yahoo.com	2025-07-09 22:07	<input type="checkbox"/>
686e7700ce9d1cc2ae01de92	Gunko	Arrow	gunkoarrow@yahoo.com	2025-07-09 22:04	<input type="checkbox"/>

2.3 Suspending and Reactivating a Traveler

- To Suspend or Reactivate a Traveler, simply go to the Users page found in the sidebar



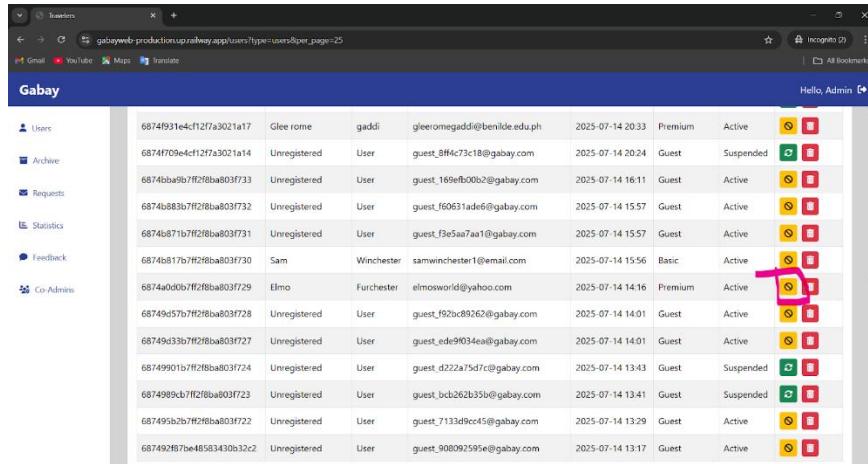
- After being redirected to the Users page, the administrator can suspend (if they discovered that the traveler violates the terms and policies of Gabay Application), or reactivate (if traveler requests to reactivate their account).

The screenshot shows a table titled 'Travelers List' with the following columns: Traveler ID, First Name, Last Name, Email, Date Registered, Membership, Status, and Action. The table lists 10 entries, with a total of 49 results shown at the bottom.

Traveler ID	First Name	Last Name	Email	Date Registered	Membership	Status	Action
68751782ff0a44e209038983	Unregistered	User	guest_e06a8c8cf1@gabay.com	2025-07-14 22:43	Guest	Active	
68751702ff0a44e209038982	Unregistered	User	guest_40b27306bf@gabay.com	2025-07-14 22:41	Guest	Active	
6875168ff0a44e209038981	Unregistered	User	guest_dc11e8116b@gabay.com	2025-07-14 22:39	Guest	Suspended	
6875168ff0a44e209038980	Unregistered	User	guest_2c4740cae@gabay.com	2025-07-14 22:38	Guest	Active	
687515dbff0a44e20903897f	Unregistered	User	guest_cee8da092c@gabay.com	2025-07-14 22:36	Guest	Suspended	
687514def0a44e20903897c	Keiann Importante	Nermal	keiannimportante@gmail.com	2025-07-14 22:31	Premium	Active	
68751398ff0a44e209038971	Juan V	Sumulong	juanv.sumulong@benilde.edu.ph	2025-07-14 22:26	Basic	Suspended	
687512b3ff0a44e209038961	Unregistered	User	guest_95481dc1e9@gabay.com	2025-07-14 22:22	Guest	Suspended	
6875113ff0a44e209038960	Unregistered	User	guest_16a5bd5a@gabay.com	2025-07-14 22:16	Guest	Active	
68751129ff0a44e20903895f	Jose	Juico	josejuico@gmail.com	2025-07-14 22:16	Premium	Active	

**Guest users will be automatically suspended if they logged out of their current session.*

- Click the yellow icon on the action column to suspend the user



Users	6874f931e4cf12f7a3021a17	Glee rome	gaddi	gleeromegaddi@benilde.edu.ph	2025-07-14 20:33	Premium	Active			
Archive	6874f709e4cf12f7a3021a14	Unregistered	User	guest_8ff4c73c18@gabay.com	2025-07-14 20:24	Guest	Suspended			
Requests	6874fbab9b7ff2f8ba803f733	Unregistered	User	guest_169efb0b2@gabay.com	2025-07-14 16:11	Guest	Active			
Statistics	6874b883b7ff2f8ba803f732	Unregistered	User	guest_f60631ade6@gabay.com	2025-07-14 15:57	Guest	Active			
Feedback	6874b871b7ff2f8ba803f731	Unregistered	User	guest_f3e5au7aa1@gabay.com	2025-07-14 15:57	Guest	Active			
Co-Admins	6874db1757ff2f8ba803f730	Sam	Winchester	samwinchester1@email.com	2025-07-14 15:56	Basic	Active			
	6874ad0db7ff2f8ba803f729	Elmo	Furchester	elmosworld@yahoo.com	2025-07-14 14:16	Premium	Active			
	68749d57b7ff2f8ba803f728	Unregistered	User	guest_f92b089262@gabay.com	2025-07-14 14:01	Guest	Active			
	68749d33b7ff2f8ba803f727	Unregistered	User	guest_edc9034ea@gabay.com	2025-07-14 14:01	Guest	Active			
	68749901b7ff2f8ba803f724	Unregistered	User	guest_d22fa75dc7@gabay.com	2025-07-14 13:43	Guest	Suspended			
	6874989cb7ff2f8ba803f723	Unregistered	User	guest_bcd262b35@gabay.com	2025-07-14 13:41	Guest	Suspended			
	6874995b7ff2f8ba803f722	Unregistered	User	guest_7133d9cc45@gabay.com	2025-07-14 13:29	Guest	Active			
	687492f97be48583430b32c2	Unregistered	User	guest_908092959e@gabay.com	2025-07-14 13:17	Guest	Active			

After clicking the yellow icon the traveler account will be suspended, and the icon will be turned to green which indicates the reactivate account button.

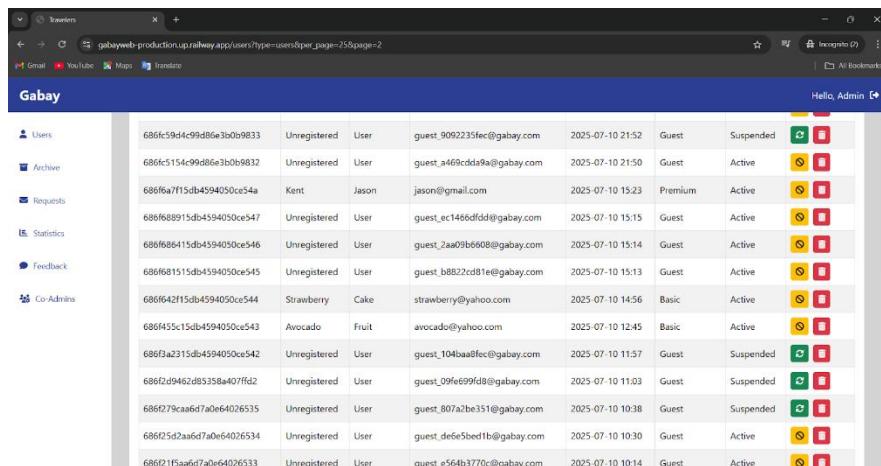
6874a0db7ff2f8ba803f729	Elmo	Furchester	elmosworld@yahoo.com	2025-07-14 14:16	Premium	Suspended		
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- To reactivate simply click on the green icon (reactivate button)

6874a0db7ff2f8ba803f729	Elmo	Furchester	elmosworld@yahoo.com	2025-07-14 14:16	Premium	Active		
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2.4 Removing a Traveler

- To delete a traveler account simply click the red icon on the action column.



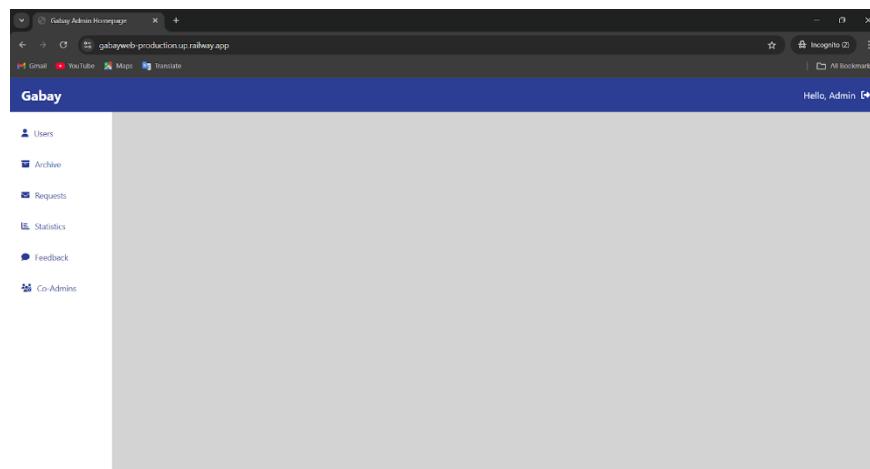
Users	686fc59d4c98d86e3b0b9833	Unregistered	User	guest_9092235fec@gabay.com	2025-07-10 21:52	Guest	Suspended			
Archive	686fc5154c99d86e3b0b9832	Unregistered	User	guest_a69cdadd9a@gabay.com	2025-07-10 21:50	Guest	Active			
Requests	686fba7f15db4594050ce54a	Kent	Jason	jason@gmail.com	2025-07-10 15:23	Premium	Active			
Statistics	686f689915db4594050ce547	Unregistered	User	guest_ec1468ddfd@gabay.com	2025-07-10 15:15	Guest	Active			
Feedback	686f686415db4594050ce546	Unregistered	User	guest_2aa09b6608@gabay.com	2025-07-10 15:14	Guest	Active			
Co-Admins	686f681515db4594050ce545	Unregistered	User	guest_b8822cd81e@gabay.com	2025-07-10 15:13	Guest	Active			
	686f64215db4594050ce544	Strawberry	Cake	strawberry@yahoo.com	2025-07-10 14:56	Basic	Active			
	686f45515db4594050ce543	Avocado	Fruit	avocado@yahoo.com	2025-07-10 12:45	Basic	Active			
	686f3a2315db4594050ce542	Unregistered	User	guest_104baa8fec@gabay.com	2025-07-10 11:57	Guest	Suspended			
	686f2d9462d85358a407ff42	Unregistered	User	guest_09fe699fd8@gabay.com	2025-07-10 11:03	Guest	Suspended			
	686f279caaf6d7a0e64026535	Unregistered	User	guest_807a2be351@gabay.com	2025-07-10 10:38	Guest	Suspended			
	686f25d2aa6d7a0e64026534	Unregistered	User	guest_de6e5bed1b@gabay.com	2025-07-10 10:30	Guest	Active			
	686f21f5aa6d7a0e64026533	Unregistered	User	guest_e564b3770c@gabay.com	2025-07-10 10:14	Guest	Active			



A message indicating Account Deleted will be displayed indicating that the account has been removed.

2.5 How to View Feedbacks from Travelers

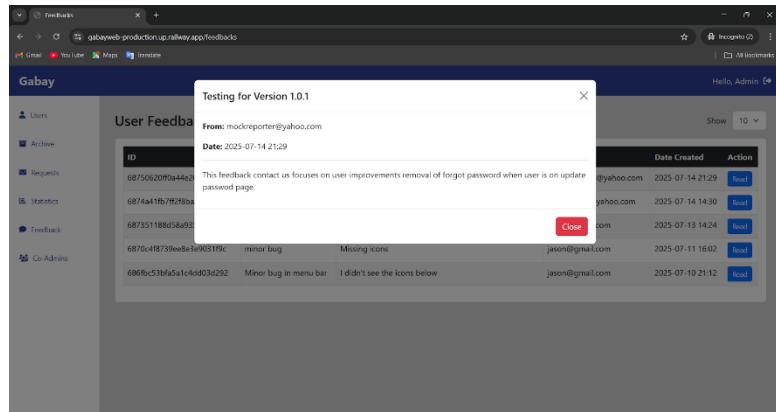
- To view a traveler's feedback simply click on the Feedback on the sidebar



- After being redirected to the User Feedback you will be able to see their messages, just simply click on the read button found on the Action column to fully read the message.

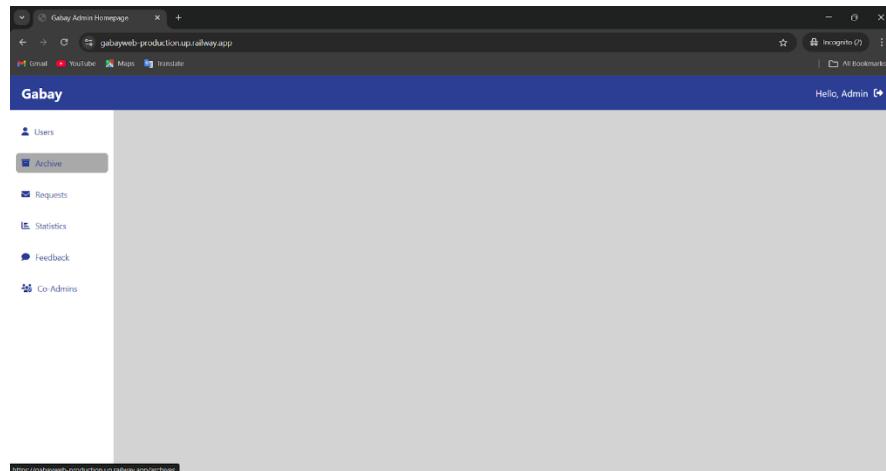
ID	Subject	Body	Email	Date Created	Action
68750620ff0a44e209038954	Testing for Version 1.0.1	This feedback contact us focuses on user improvement.	mockreporter@yahoo.com	2025-07-14 21:29	<button>Read</button>
6874a41fb7ff2f8ba803f72f	hallo	wold	elmosworld@yahoo.com	2025-07-14 14:30	<button>Read</button>
687351188d58a935da08ba0b	In APK	Working but still has missing icons on the bottom...	jason@gmail.com	2025-07-13 14:24	<button>Read</button>
6870c4f8739ee8e3e90319c	minor bug	Missing icons	jason@gmail.com	2025-07-11 16:02	<button>Read</button>
686fb53bfa5a1c4dd03d292	Minor bug in menu bar	I didn't see the icons below	jason@gmail.com	2025-07-10 21:12	<button>Read</button>

After clicking on the read button



2.6 How to view Flood Reports

- To view a traveler's feedback simply click on the Feedback on the sidebar



- After clicking on the Archive, you will see all lists of Reports, the Status column signifies reports that have been either flagged by other users or approved by the community.

ID	Location	Image	Comment	Date	Status
6871106739ee8e3e9031f9e	Makati, Guadalupe Viejo	No image	Please	July 11, 2025	Open
687110a2739ee8e3e9031fb4	Makati, Forbes Park	No image	Unit Test	July 11, 2025	Open
6870c4bd739ee8e3e9031f9a	Manila, Malate		Very rainy day and heavy weather	July 11, 2025	Open
6870c4bc739ee8e3e9031f9f	Manila, Malate		Very rainy day and heavy weather	July 11, 2025	Open
6870cd2739ee8e3e9031f97	Manila, Oxfam	No image	As	July 11, 2025	Open
6870becc739ee8e3e9031f9e	Manila, Malate	No image	Testing	July 11, 2025	Open
686fd590739ee8e3e9031f92	Manila, Malate		Raining and heavy flooding, stay safe	July 10, 2025	Open

Showing 21 to 27 of 27 results | 1 2 3 4

687470851a9b045bd0f8602 Manila, Malate No image Passable July 14, 2025 Flagged

Sample image showing a flagged report, this report will be found in the Requests page found in the sidebar.

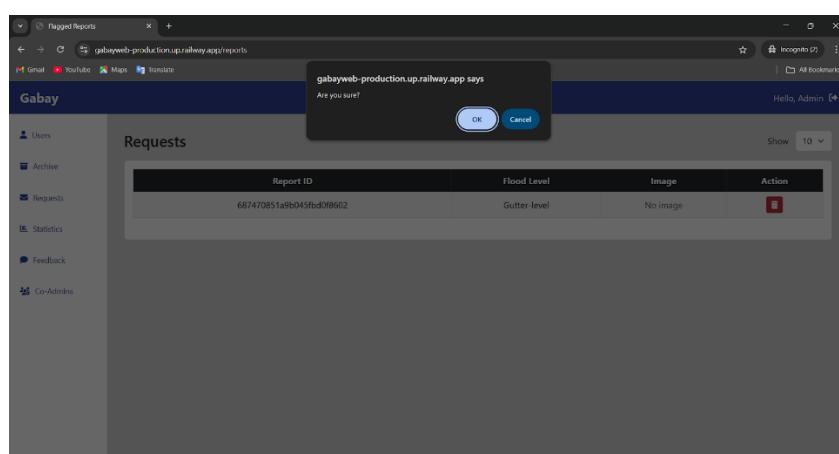
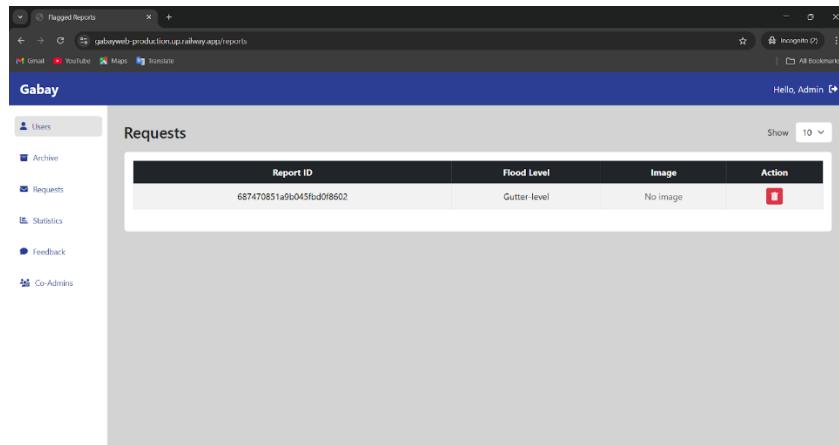
Some of the images (showing broken image icon) is due to continuous redeployment of the web application.

2.7 How to delete a Flagged Report

- To view and delete a flagged report simply go to the reports page found in the sidebar.

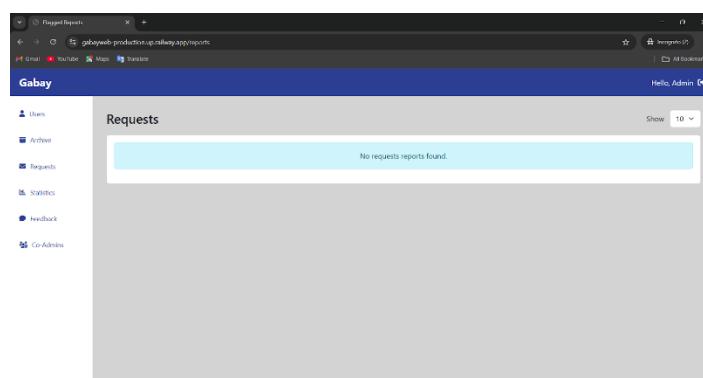
https://gabayweb-production.up.railway.app/reports

- To delete a flagged report simply click the delete icon found in the action column



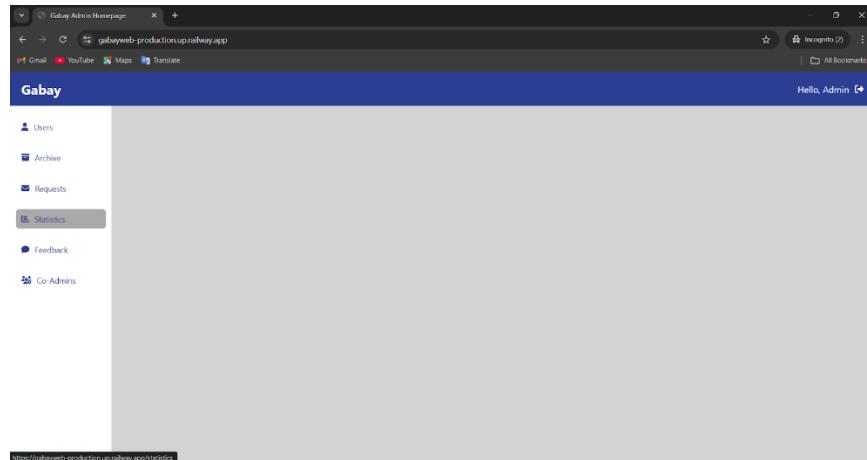
Click OK to Proceed and cancel to cancel the action.

- After clicking OK the report will be removed from the database.

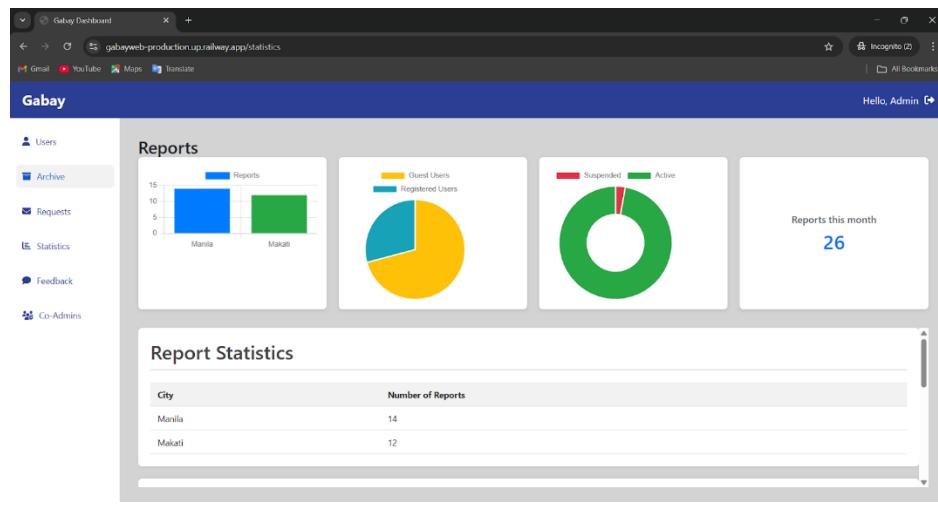


2.8 How to delete a Flagged Report

- To view statistical data such as charts simply click on the Statistics page found on the sidebar.



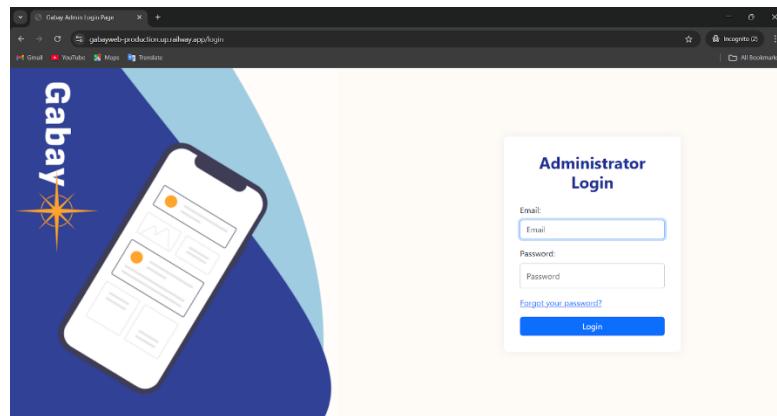
- Inside the statistical page you can see different charts and tables.



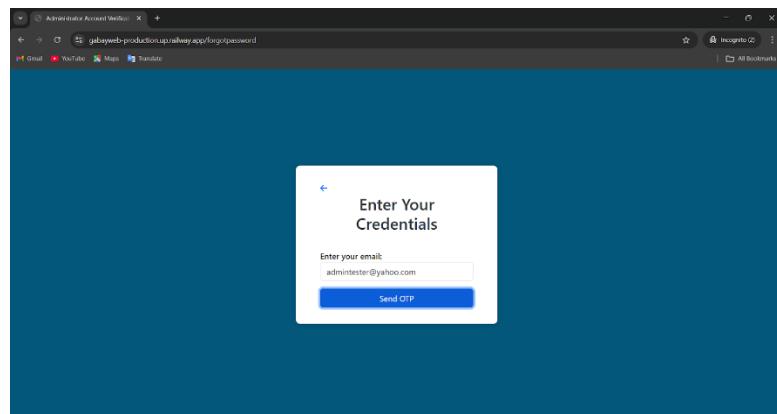
3. Retrieving your credentials

3.1 Changing your password

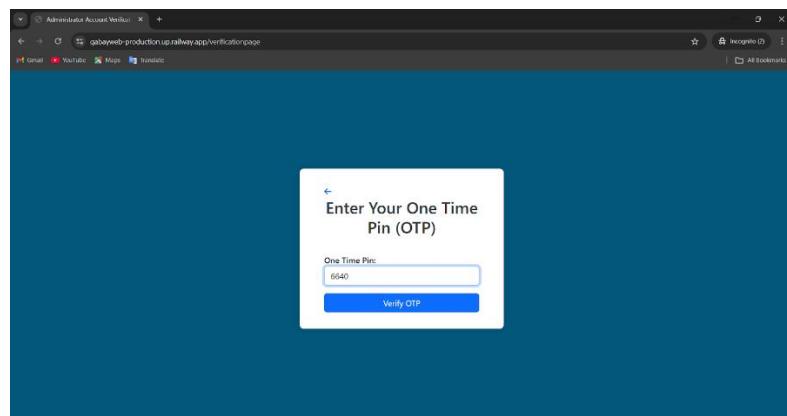
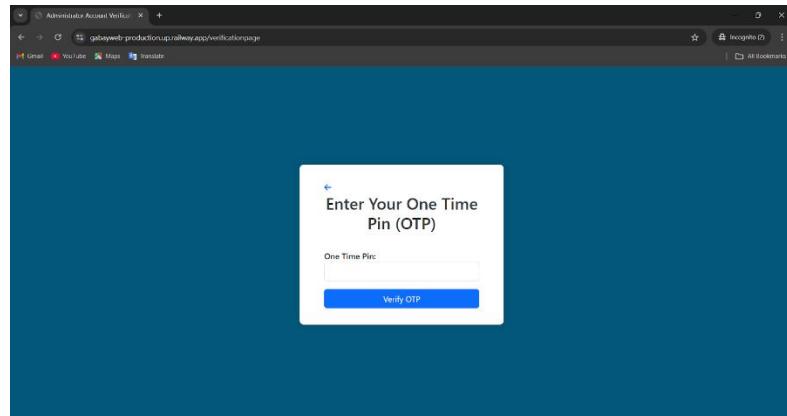
- Changing your password can only be done by clicking the “Forgot Password” found in the login page.



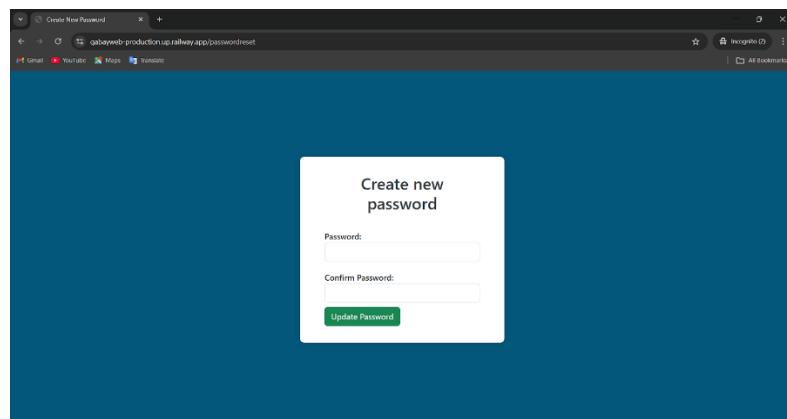
- After clicking the Forgot Password the administrator email address



- Enter your One Time Pin (OTP) the OTP is only valid for 5 minutes



- If Successful you will be redirected to the create new password page simply enter your new password and click on the Update Password button to confirm.



APPEDNIX F. THIRD PARTY SOURCE CODE AND API'S USED**A. Authentication and Email**

1. Google OAuth – Providing User Authentication for Google Sign in
2. Meta Developer - Providing User Authentication for Facebook Sign in
3. Mailtrap.Io – Email delivery platform that has a sandbox functionality used for receiving One Time Pin (OTP)

B. Official and Reputable Sources

1. PAGASA Feeds – By connecting the publicalert from Pagasa's website we are able to provide live PAGASA feeds to Gabay users.
2. Openweather API – Provide weather update for the users

C. Payment Gateway

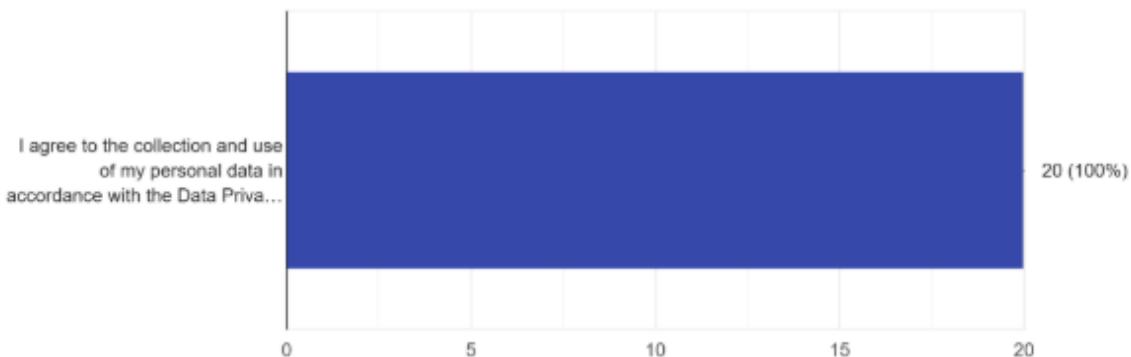
1. Maya API – Use as a payment gateway for potential premium users this API has public API keys for sandboxing payment transactions.

D. Geolocation Services

1. Openstreet Map – Map used in our Gabay Mobile Application
2. Nominatim – Provides landmark suggestions which our app recognizes its latitude and longitude to segregate reports needed to be seen by users.

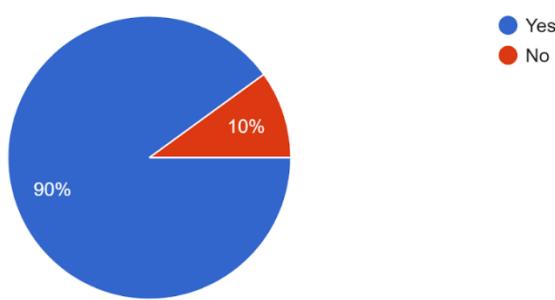
APPENDIX G. USER ACCEPTANCE TEST RESULTS

DATA PRIVACY NOTICE De La Salle–College of Saint Benilde (DLS-CSB) respects your right to privacy and is committed to safeguarding the conf...CSB Data Protection Office at dpo@benilde.edu.ph.
20 responses



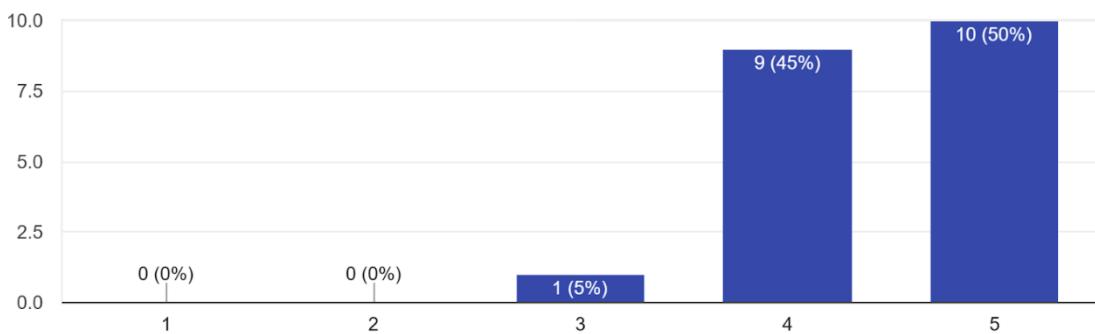
Do we have your permission to contact you in the future for follow-up questions or feedback regarding this User Acceptance Test?

20 responses



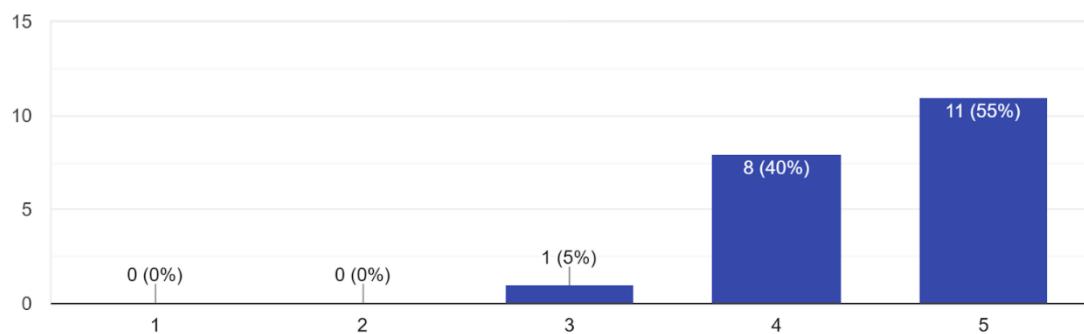
How easy was it for you to navigate the system on your first try? (Paano kadali mong na-navigate ang system sa unang pagsubok?)

20 responses



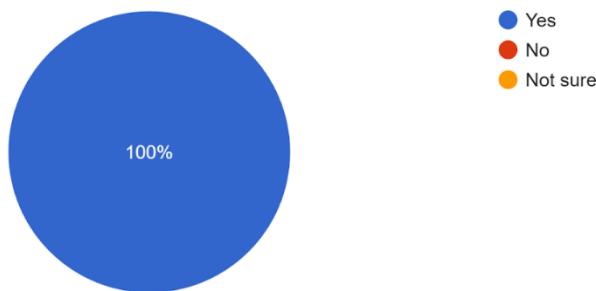
How would you rate the overall user experience of the system? (Paano mo irere-rate ang kabuuang karanasan sa paggamit ng system?)

20 responses



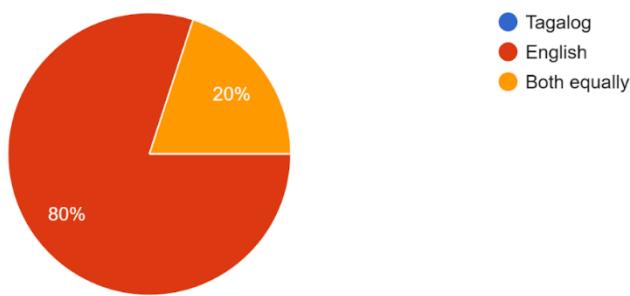
Did you find the language options (Tagalog/English) helpful for using the app? (Nakatulong ba sa iyo ang mga opsyon ng wika (Tagalog/Ingles) sa paggamit ng app?)

20 responses



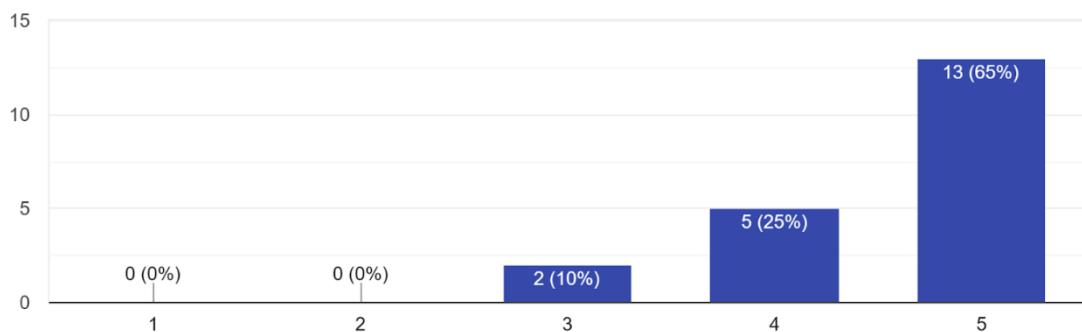
Did you prefer using the app in Tagalog or English? (Mas gusto mo bang gamitin ang app sa Tagalog o Ingles?)

20 responses



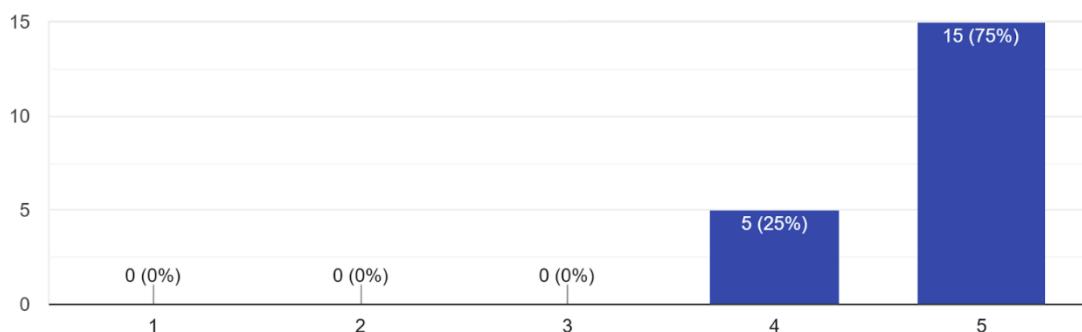
Were you able to complete the tasks you set out to do with ease? (Nagawa mo ba ang mga tasks na nais mong tapusin ng walang kahirapan?)

20 responses



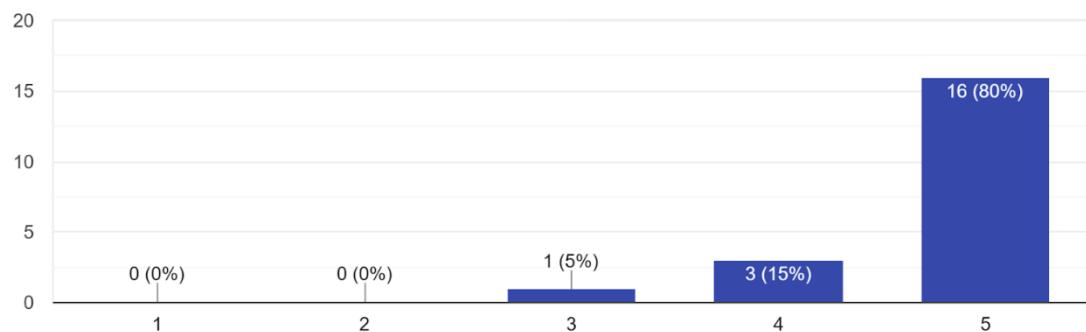
How would you rate the overall visibility and contrast of text and icons on the screen? (Paano mo irere-rate ang kabuuang visibility at contrast ng mga teksto at icon sa screen?)

20 responses



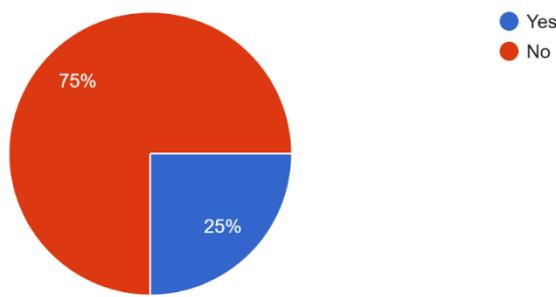
Was the text easy to read throughout the system? (Madali bang basahin ang mga teksto sa buong system?)

20 responses

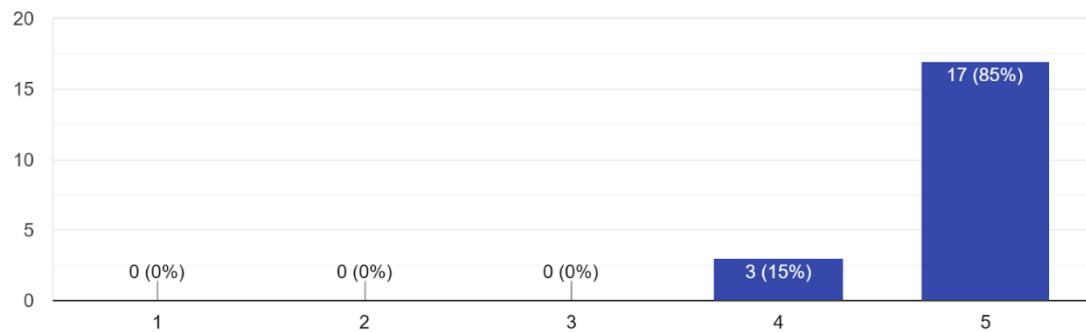


Did you experience any difficulty distinguishing between different sections or elements on the screen? (Nahirapan ka bang makilala ang pagkakaiba ng mga bahagi o elemento sa screen?)

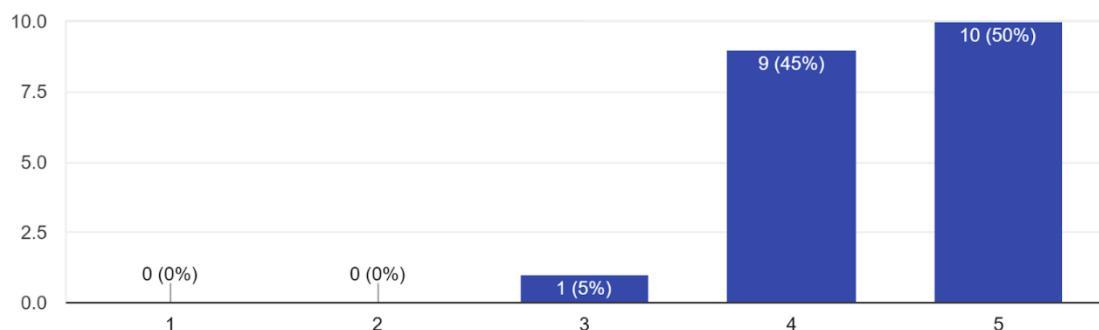
20 responses



Did all features (e.g., registration, login, flood reporting, payments) work as expected? (Ang lahat ba ng mga feature (hal. pagpaparehistro, login, pag...baha, mga bayad) ay gumagana ayon sa inaasahan?)
20 responses

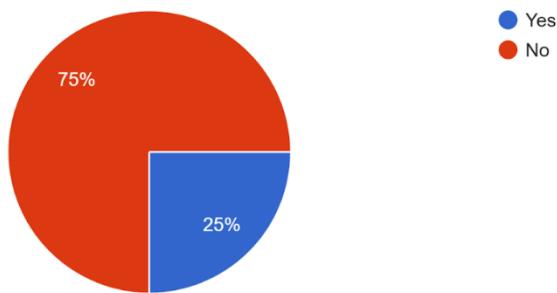


How would you rate the speed of the system? (Paano mo irere-rate ang bilis ng system?)
20 responses



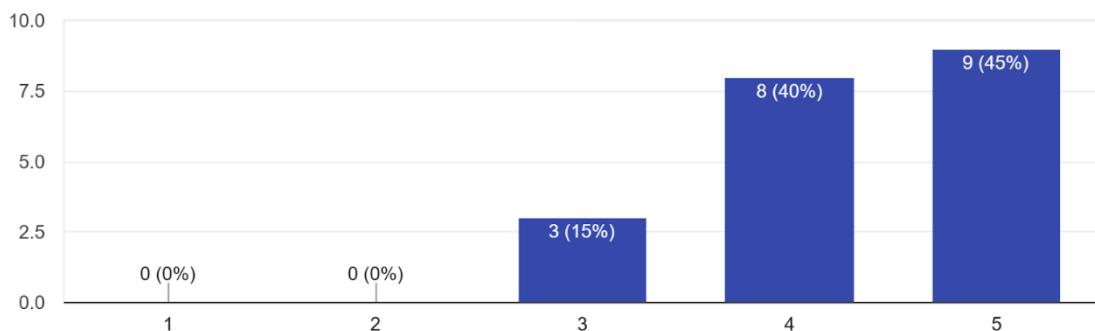
Did you experience any delays or lag while interacting with the system? (Nakaranas ka ba ng pagkaantala o pagka-bagal habang ginagamit ang system?)

20 responses



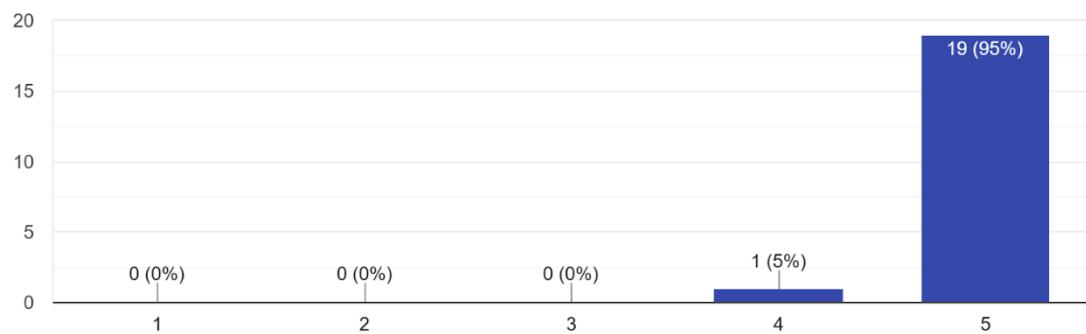
Did you feel that your personal data was secure while using the system? (Naramdaman mo bang ligtas ang iyong personal na impormasyon habang ginagamit ang system?)

20 responses



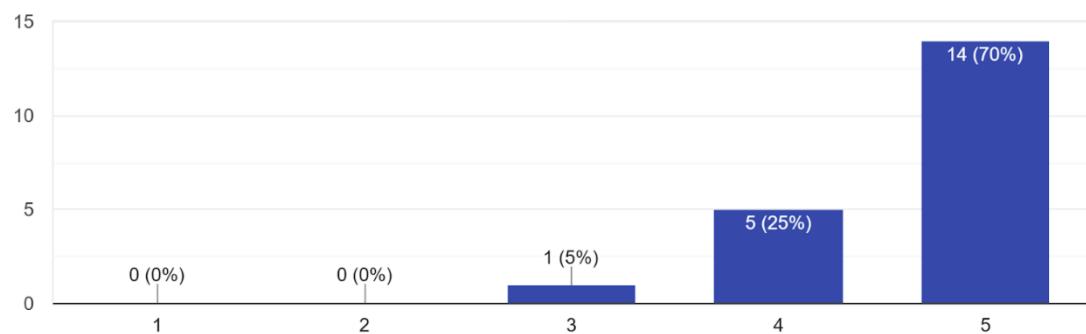
How easy was the login and authentication process for you? (Paano kadali ang proseso ng login at authentication para sa iyo?)

20 responses



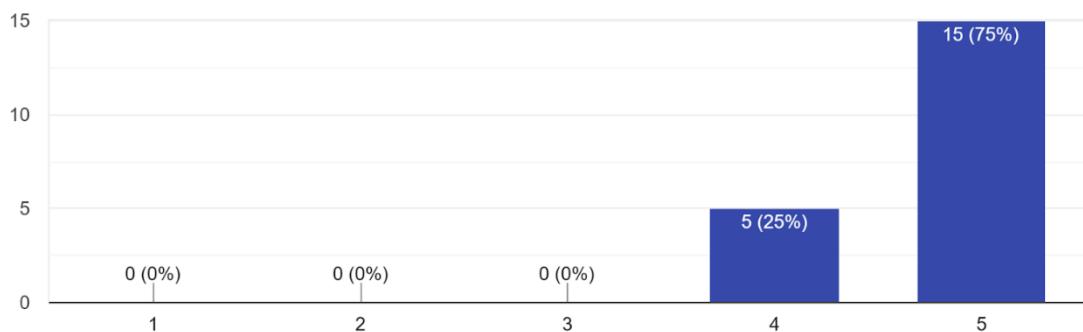
Was there any clear guidance on what to do next, such as tooltips or prompts? (May malinaw bang gabay kung ano ang susunod na hakbang na gagawin, tulad ng tooltips o mga prompt?)

20 responses



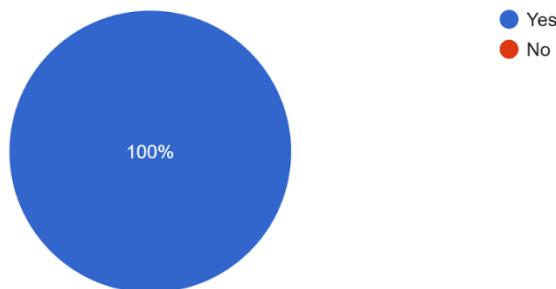
How easy was it sending your feedback within the system, if needed? (Gaano kadali magpadala ng iyong feedback sa loob ng system, kung kinakailangan?)

20 responses



Do you think this app will help you make better travel decisions by knowing where floods are? (Iniisip mo ba na makakatulong ang app na ...a pamamagitan ng kaalaman kung saan may baha?)

20 responses



How likely are you to recommend this system to a friend or colleague? (Gaano ka-possible na irekomenda mo ang system sa iyong kaibigan o kasamahan?)

20 responses

