Project 9: BINCOL Online Commercial Waste Collection System

About the Client

BINCOL is one of Australia's leading recycling and waste management companies with operations in the building and demolition and commercial and industrial sectors across the east coast of Australia.

Our vision is for a waste-free Australia. With a focus on transforming the recycling and waste industry, particularly in innovating to increase recycling rates and the diversion of valuable waste materials from landfill.

As we grow, we're ensuring we follow sustainable, Zero Harm practices, to protect our people, the environment and the communities we operate in.

Our state-of-the-art processing facilities across NSW, Victoria and Queensland accept mixed waste that would otherwise be sent to landfill and achieves industry-leading recovery rates in excess of 80%, creating a range of recycled materials. By diverting waste from landfill to our resource recovery and recycling centres, we are helping to drive Australia towards a circular economy.

Project Brief and Business Problem Specifications:

Client is facing a big challenge in urban cities for the solid waste management not only in Victoria but in most states in Australia. Hence, the client needs such a system to be built that can eradicate this problem or at least reduce it to the minimum level. BinCol requires a web-based platform enabling business customers, waste collection companies and administrators to manage all waste collection services online. The system will allow businesses to request waste pickups, schedule recurring services, view invoices, track collection status and communicate with waste service providers. Partner waste companies can manage trucks, drivers, service zones, pickup schedules, invoices and route optimization.

System Modules Requirements

The Commercial Waste Collection System Project is a Web-based application. Commercial Waste Collection Project will have the following modules:

- **User Management Module**
- **Business Customer Management Module**
- **Waste Category and Bin Type Module**
- **Pickup Request and Scheduling Module**
- **Service Assignment and Driver/Truck Management Module**
- **Route Planning and Map Module**
- **Payment and Billing Module**
- **Notification and Communication Module**
- **Admin Management Module**
- **Reports and Analytics Module**
- **Feedback and Rating Module**

User Modules (User Frontend):

Developers need to research and discuss with the client to finalise the modules and requirements.

UI Design

User Interface Design is concerned with the dialogue between a user and the computer. It is concerned with everything from starting the system or logging into the system to the eventually presentation of desired inputs and outputs. The overall flow of screens and messages is called a dialogue.

UI Design Requirements

1. The system user should always be aware of what to do next.
2. The screen should be formatted so that various types of information, instructions and messages always appear in the same general display area.
3. Message, instructions or information should be displayed long enough to allow the system user to read them.
4. Use display attributes sparingly.
5. Default values for fields and answers to be entered by the user should be specified.
6. A user should not be allowed to proceed without correcting an error.
7. The system user should never get an operating system message or fatal error.

The aim of proposed system is to develop a system of improved facilities. The proposed system can overcome all the limitations of the existing system. The system provides proper security and reduces the manual work.

- Security of data.
- Ensure data accuracy's
- Proper control of the higher officials.
- Minimize manual data entry.
- Minimum time needed for the various processing.
- Greater efficiency.
- Better service.
- User friendliness and interactive.
- Minimum time required.

Functional Requirements

User Management

FR1: The system should allow new users to register using email, business name, ABN and password.
FR2: The system should verify new accounts via email verification.
FR3: The system should allow users to securely log in and log out.
FR4: The system should support role-based access control: Customer, Waste Company Staff, Driver and Admin.
FR5: The system should allow users to update their profiles and change passwords.
FR6: The system should allow customers to view their service history, invoices and scheduled pickups.
FR7: The system should allow admins to add, edit or deactivate any user account.

Business Customer Management

FR8: The system should allow customers to update business information (address, contact person, business type).
FR9: The system should allow customers to specify waste storage locations for pickups.
FR10: The system should allow customers to upload documents (permits, compliance forms).
FR11: The system should allow customers to add multiple business branches.
FR12: The system should allow customers to select preferred waste collection companies (if multiple providers exist).

Waste Category and Bin Type Management

FR13: The system should allow admin to define waste categories (general waste, recycling, organic, industrial, hazardous).
FR14: The system should allow admin to manage bin types and sizes (120L, 240L, 660L, 1100L).
FR15: The system should allow customers to select waste category and bin size for each request.
FR16: The system should validate waste type compatibility (e.g. hazardous waste cannot use standard bins).
FR17: The system should allow staff to update availability of bin types.

Pickup Request and Scheduling

FR18: The system should allow customers to request a one-time pickup service.
FR19: The system should allow customers to schedule recurring pickups (daily,

weekly, fortnightly, monthly).
FR20: The system should allow customers to specify the pickup date, time, waste type and bin quantity.
FR21: The system should display the estimated cost before confirmation.
FR22: The system should allow staff to review and approve pickup requests.
FR23: The system should allow staff to reschedule or modify pickup requests.
FR24: The system should allow customers to cancel or modify a request prior to approval.
FR25: The system should allow tracking of pickup request statuses (Pending, Approved, Assigned, In Progress and Completed).
FR26: The system should prevent scheduling conflicts for trucks or drivers.

Service Assignment and Driver/Truck Management

FR27: The system should allow staff to assign a truck and driver to approved pickup requests.
FR28: The system should allow admin to manage driver records (name, license type, contact).
FR29: The system should allow admin to manage trucks (registration number, capacity, type).
FR30: The system should check truck capacity before assignment.
FR31: The system should allow drivers to view their daily scheduled pickups.
FR32: The system should allow drivers to update status (route, arrived, collected, unable to collect).
FR33: The system should send real-time assignment updates to drivers.

Route Planning and Map Module

FR34: The system should provide a map view showing customer locations.
FR35: The system should allow staff to view optimised collection routes.
FR36: The system may use AI or algorithms to suggest the best route based on location and truck capacity (optional).

Payment and Billing Module

FR37: The system should automatically generate invoices for completed pickup services.
FR38: The system should support online payments (PayPal/Stripe/credit card).
FR39: The system should allow customers to download and view all past invoices.
FR40: The system should record all payment transactions with timestamps.
FR41: The system should notify customers of outstanding payments.

Notification and Communication Module

FR42: The system should send notifications for request approval, assignment, collection status and payment reminders.
FR43: The system should allow automated email and dashboard alerts.
FR44: The system should allow customers to message support or waste company staff.

Reports and Analytics Module

FR45: The system should generate reports on total pickups, waste quantities, customer usage and payments.
FR46: The system should allow exporting reports in PDF or Excel.
FR47: The system should show dashboard analytics (daily pickups, revenue, driver performance).

Feedback and Rating Module

FR48: The system should allow customers to rate completed pickup services.
FR49: The system should allow staff to review and respond to feedback.

Non-Functional Requirements

- NFR1: Pages should load within 3 seconds under normal network conditions.
- NFR2: The system should support at least 100 concurrent users without performance issues.
- NFR3: Map and route planning features should load within 5 seconds.
- NFR4: The system should maintain a minimum uptime of 99%.
- NFR5: Data (pickups, billing, user records) should remain accurate and consistent at all times.
- NFR6: All passwords must be encrypted using a secure hashing algorithm (e.g. bcrypt).
- NFR7: The system should protect against SQL injection, XSS and CSRF attacks through input validation and sanitisation.
- NFR8: All payment transactions should be processed using HTTPS/SSL for secure data transmission.
- NFR9: The interface should be fully mobile responsive and accessible on all modern browsers.
- NFR10: The system should comply with WCAG 2.1 AA accessibility standards.
- NFR11: The system should follow the MVC architecture to support efficient maintenance and scalability.
- NFR12: The source code should include documentation and comments to assist future developers.

- NFR13: Daily automated database backups should be performed and stored securely for at least 30 days.
- NFR14: The system should be recoverable within 30 minutes in case of system failure.
- NFR15: The system should comply with the Australian Privacy Principles (APPs) for all data handling.

Hardware Requirement: Should be recommended by the developers.

Software Requirement: Should be recommended by the developers.