

Wastelink_Report_E2500021_E2 500066_E2500023_E2500016

by HRIDAYA MANANDHAR -

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Assignment Cover Sheet

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We are equally indebted to our friends and family members, whose unwavering support, motivation, and words of encouragement have been our driving force. Their presence and belief in our abilities have made this journey not only achievable but also memorable.

Chapter 1: Project Overview

The primary objective of this project is to bridge theoretical knowledge with practical skills to create a fully functional, dynamic web application that demonstrates front-end and back-end design, server-side scripting, and database connectivity. The web-based solution is designed to offer seamless interaction between users and the system, utilizing modern web frameworks and technologies such as **React-Vite, Html, Css, Javascript, Gsap, Three.js, React3Fiber, Tailwind, Drei, Paralax effect, Photoshop and many more other APIs**. The web application incorporates a user-friendly interface with an intuitive navigation system to enhance the user experience. It integrates both client-side and server-side scripting to ensure smooth data processing and functionality. The database connectivity is established using SQLite3 to store, retrieve, and manage data efficiently, while the web interface is built using React-Vite. The project follows a modular directory structure to maintain clean and organized code, ensuring scalability and easy maintenance.

Our website **Wastelink** is a **Eco-friendly** and a striking problem solver platform, as a inhabitant of Kathmandu since birth we realized that the waste management in our city is very bad condition the furthest we could look back to in our childhood we still remember our city suffering from waste management crisis .As a lifelong resident we could not stand ideally and took the initiative to clean our city and enhance its beauty further so we utilized this opportunity
to initiate our idea through this project .

Wastelink is not just any other platform but a special one specifically to **Asian city's** as majority of them suffers from waste management crisis. Our platform not only offers digital solution but also encourages responsible waste segregation, recycling, and effective disposal services by integrating modern technologies and user-friendly interfaces. Our website empowers citizen to a cleaner, more sustainable city.

Additionally, the application code is hosted on GitHub to promote version control, collaboration, and transparency. The repository follows a structured naming convention and includes all relevant source code files. Various functionalities of the system are demonstrated through detailed test cases, which outline the expected outcomes and verify the accuracy of the application's performance.

This report provides a comprehensive overview of the web application's features, including screenshots of key web pages, descriptions of assigned functionalities, and highlighted code snippets. The project also discusses the database structure, technologies used, and the overall development experience. The outcome of this assignment serves as a testimony to the practical application of web design and development principles, reflecting the knowledge acquired throughout the course.

Chapter-2

Website Functionalities

Github link of the source code repository:

https://github.com/Hearttech-Hridaya/Wastelink_E2500021_E2500066_E2500023_E2500016

2.1 Final look of Wastelink and Functionalities

2.1.1 Login page

Screenshot of Login:



Description:

This is the first page that appears on opening **Wastelink**. In this webpage, there is **3D Dustbin model** precisely animated on scroll and continuous particle animation in the background enhancing the visual effect. This page is our landing page indicating users that **Wastelink** is the future of waste management revolutionizing the waste managing system potentially making an impact on a world wide scale. This page acts as a gateway, inspiring visitors to acknowledge Wastelink's revolutionary approach could drive a global impact. This page indicates our Bold, visionary messaging and an intuitive design guides user through the narrative fostering curiosity and engagement.

Functionality : Animated Background importing and 3d model.

```
1 <AnimatedBackground /> {/* This will run in the background */}
2   <section className="relative grid place-items-center h-[100vh]">
3     <p className="text-white text-center absolute top-[5%] mx-4 w-fit text-8xl font-bold">
4       Waste Link
5     </p>
6     <p className="text-white text-center absolute bottom-[5%] mx-4 w-fit text-6xl font-bold">
7       The Future of Waste Management
8     </p>
9
10    <div ref={sceneRef} className="absolute inset-0 text-white">
11      <Canvas>
12        <ambientLight />
13        <Scenel progress={progress} />
14      </Canvas>
15    </div>
```

```
1 function Particles() {
2   const particlesRef = useRef();
3
4   useEffect(() => {
5     gsap.to(particlesRef.current.rotation, {
6       duration: 20, // Slower, smoother rotation
7       y: Math.PI * 2,
8       repeat: -1,
9       ease: "linear",
10     });
11   }, []);
12
13 // Generate 10,000 particles with a wider spread
14 const particles = new Float32Array(10000 * 4).map(() => (Math.random() - 0.5) * 50);
15
16 return (
17   <group ref={particlesRef}>
18     <Points positions={(particles)} stride={3} frustumCulled={false}>
19       <PointMaterial
20         transparent
21         color="black" // Greyish particle color
22         size={0.1}
23         sizeAttenuation
24         depthWrite={false}
25       />
26     </Points>
27   </group>
28 );
29 }
30
31 export default function AnimatedBackground() {
32   return (
33   <Canvas
34     camera={{ position: [0, 0, 10], fov: 75 }}
35     style={{
36       position: "absolute",
37       top: 0,
38       left: 0,
39       width: "100%",
40       height: "100%",
41       background: "#609B73" // Aesthetic greenish background color
42     }}
43   >
44     <ambientLight intensity={0.3} />
45     <Particles />
46   </Canvas>
47 );
48 }
```



Description:

On Scrolling the 3D Dustbin model is animated and comes down which further engages user and grabs their attention . Here this page give a short intro about our website and what **Wastelink** actually is. The page serves as an introduction, offering visitors a concise yet impactful overview of the website's purpose. It highlights Wastelink's mission and vision, emphasizing its role in reshaping waste management on a global scale. Every element, from the scrolling animation to the succinct introductory text, is thoughtfully crafted to intrigue users, inspire curiosity, and invite further exploration of Wastelink's innovative solutions.

Functionality : On Scroll Effect using gsap

```

1  gsap.registerPlugin(ScrollTrigger);
2
3  function App() {
4    const mainRef = useRef(null);
5    const navigate = useNavigate();
6    const sceneRef = useRef(null);
7    const [progress, setProgress] = useState(0);
8    const [formData, setFormData] = useState({
9      name: "",
10     phone: "",
11     password: "",
12     role: "user",
13   });
14
15   useEffect(() => {
16     gsap
17       .timeline()
18         .scrollTrigger({
19           trigger: mainRef.current,
20           start: "top top",
21           end: "bottom bottom",
22           scrub: true,
23           onUpdate: (self) => {
24             setProgress(self.progress);
25           },
26         })
27       .to(sceneRef.current, {
28         ease: "none",
29         x: "-25vw",
30         y: "100vh",
31       })
32       .to(sceneRef.current, {
33         ease: "none",
34         x: "25vw",
35         y: "-200vh",
36       })
37       .to(sceneRef.current, {
38         ease: "none",
39         x: "-25vw",
40         y: "300vh",
41       })
42     }, []);
43
44   const handleChange = (e) => {
45     setFormData({ ...formData, [e.target.name]: e.target.value });
46   };
47 }

```



Description:

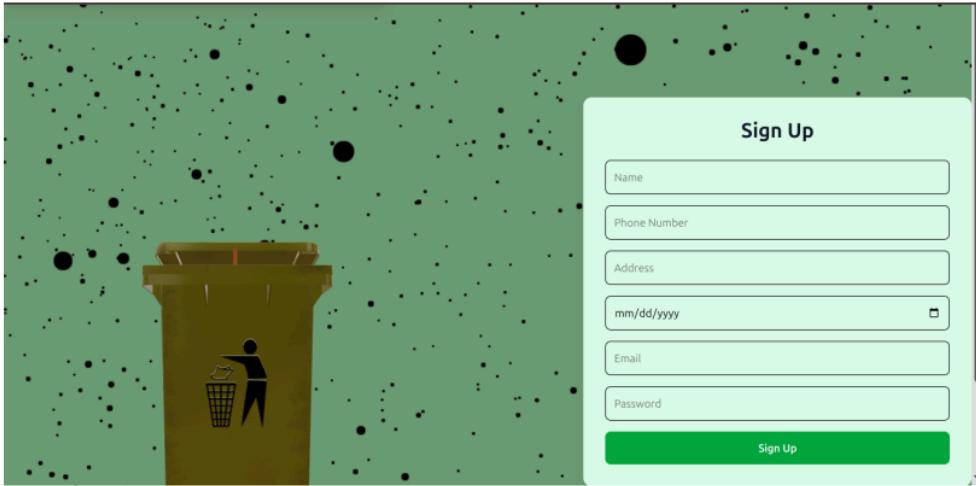
The login page of Wastelink is designed with simplicity and functionality at its core. Users are prompted to enter essential details such as their **Name**, **Phone Number**, and **Password**, ensuring a secure and personalized experience. An additional input field allows users to select their **role** be it "User" or "Collector" tailoring the platform's features to their specific needs.

Functionality : Login form

```

1 <section className="relative flex items-center justify-start h-[100vh]>
2   <div className="w-[140px] bg-green-100 p-0 rounded-lg shadow-lg mr-12">
3     <div className="text-3xl font-bold text-center mb-6 text-gray-900">
4       Login
5     </div>
6     <form onSubmit={handleSubmit} className="flex flex-col gap-4">
7       <input
8         type="text"
9         name="name"
10        placeholder="Name"
11        value={formData.name}
12        onChange={handleChange}
13        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
14        required
15      />
16      <input
17        type="text"
18        name="phone"
19        placeholder="Phone"
20        value={formData.phone}
21        onChange={handleChange}
22        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
23        required
24      />
25      <input
26        type="password"
27        name="password"
28        placeholder="Password"
29        value={formData.password}
30        onChange={handleChange}
31        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
32        required
33    </form>
34    <select
35      name="role"
36      value={formData.role}
37      onChange={handleRoleChange}
38      className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
39      required
40      >
41        <option value="user">User</option>
42        <option value="collector">Collector</option>
43      </select>
44      <button
45        type="submit"
46        className="w-full bg-green-600 text-white p-3 border rounded-lg font-semibold hover:bg-green-700 transition"
47        >Login
48      </button>
49    </div>
50  </div>
51</section>

```



Description:

The sign-up page of Wastelink is designed to be user-friendly and inviting, encouraging seamless registration for new users. On this page, visitors are required to provide their essential details, including their **Name**, **Phone Number**, **Address**, **Date of Birth**, **Email** and **Password**, ensuring a personalized and secure account creation process. The layout is intuitive, with clearly labeled input fields and a clean design to reduce any potential confusion. It sets the tone for a smooth on-boarding experience, reinforcing Wastelink's commitment to accessibility and innovation. The page is the first step in connecting users to a transformative waste management journey.

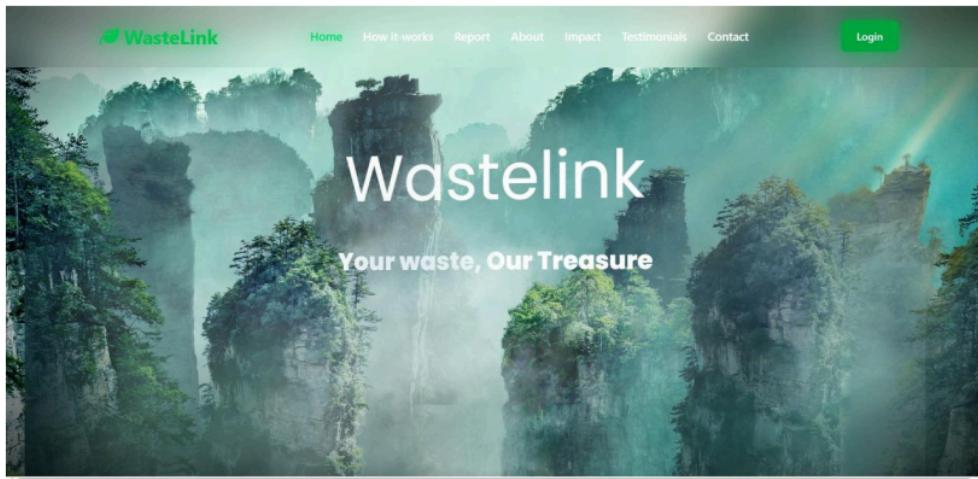
Functionality : Signup form

```

1 <section className="relative flex items-center justify-end">
2   <div className="w-(40%) bg-green-100 p-8 rounded-lg ml-12">
3     <h2 className="text-3xl font-bold text-center mb-6 text-gray-900">
4       Sign Up
5     </h2>
6     <form className="flex flex-col gap-4">
7       <input
8         type="text"
9         placeholder="Name"
10        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
11        required
12      />
13      <input
14        type="tel"
15        placeholder="Phone Number"
16        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
17        required
18      />
19      <input
20        type="text"
21        placeholder="Address"
22        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
23        required
24      />
25      <input
26        type="date"
27        placeholder="Date of Birth"
28        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
29        required
30      />
31      <input
32        type="email"
33        placeholder="Email"
34        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
35        required
36      />
37      <input
38        type="password"
39        placeholder="Password"
40        className="w-full p-3 border rounded-lg focus:outline-none focus:ring-2 focus:ring-green-500"
41        required
42      />
43      <button
44        onClick={() => navigate("/Hero")}
45        type="submit"
46        className="w-full bg-green-600 text-white p-3 rounded-lg font-semibold hover:bg-green-700 transition"
47      >
48        Sign Up
49      </button>
50    </form>
51  </div>
52</section>

```

2.1.
2
Ho
me
pag
e



Description of this webpage:

Welcome to Wastelink homepage. This webpage is the homepage of our website **WasteLink**. Our home page indicates to be an eco-friendly platform focused on waste management and sustainability. The design features a visually appealing and striking hero section with a parallax effect background, emphasizing environmental consciousness. The WasteLink website features a responsive background calculating cursors position in x, y, z and rotation values and animates pictures accordingly which enhances its visual appeal and the addition of mist gives it a surreal and immersive feel. At the top, the navigation bar includes links to essential sections such as **Home, About, Report, Impact, and Contact**, allowing users to explore different aspects of the platform. Additionally, there is **Log Out** button, with the latter highlighted in green, likely encouraging new user registrations. The homepage prominently displays the WasteLink branding with a bold heading and the tagline, "YOUR WASTE, OUR TREASURE," suggesting that the platform aims to transform waste into valuable resources. The combination of nature-themed visuals and sustainable messaging indicates that the website may offer services related to waste recycling, tracking, or environmental impact reporting. Overall, the design and content suggest that WasteLink is an initiative dedicated to promoting sustainability and responsible waste management.

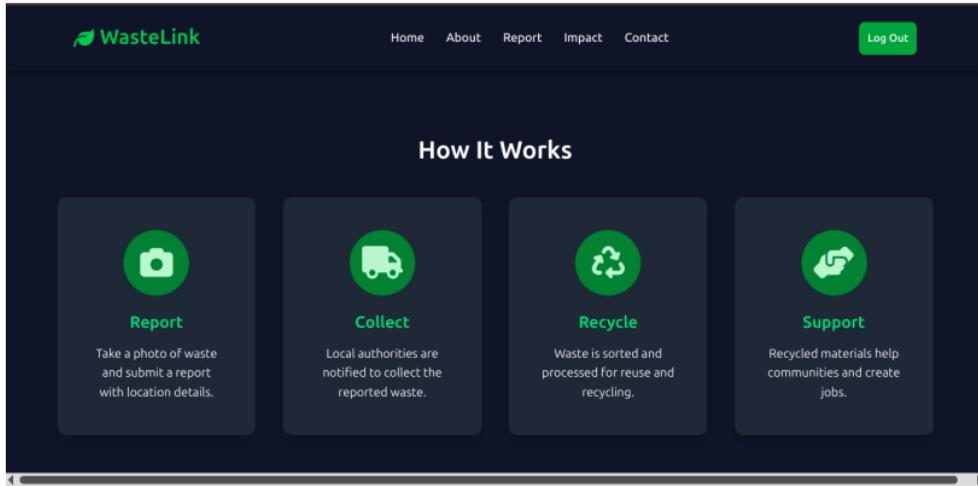
Functionality : Home page parallax effect

```

1 <!DOCTYPE html>
2 <html lang="en">
3
4 <head>
5   <meta charset="UTF-8">
6   <meta http-equiv="X-UA-Compatible" content="IE=edge">
7   <meta name="viewport" content="width=device-width, initial-scale=1.0">
8   <title>Wastelink</title>
9   <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.2.0/css/all.min.css">
10
11  <link rel="stylesheet" href="style.css">
12 </head>
13
14 <body>
15
16
17 <main>
18   <div class="vignette"></div>
19   
20   
21   
22   
23   
24   
25   
26   
27   <div data-speedx="0.07" data-rotation="0" data-speedy="0.07" data-speedz="0" class="text parallax">
28     <h2>Wastelink</h2>
29     <h1>Your waste, Our Tresure</h1>
30   </div>
31   
32   
33   
34   
35   
36   
37   
38   
39   
40   
41   
42   
43 </main>
44
45
46 <script src=".app.js"></script>
47
48 </body>
49
50 </html>

```

2.1.3 How It Works



Description of this webpage:

Our How It Works section features a dark-themed interface with green highlights, emphasizing sustainability. The navigation bar at the top provides links to Home, About, Report, Impact, and Contact, along with a "Log Out" button. The "How It Works" section outlines the waste management process in four steps: **Report** (users submit waste reports with location details), **Collect** (local authorities collect the waste), **Recycle** (waste is processed for reuse), and **Support** (recycled materials benefit communities and create jobs). The design is clean and user-friendly, promoting an eco-friendly waste management system.

2.1.4 Report Waste

Description of this webpage:

The report page for WasteLink would serve as a central hub for users to view and analyze waste management data, track recycling progress, and generate reports. The report page for WasteLink would include features such as **waste type**, **location**, **image upload**, and **description** to provide comprehensive waste management information. Users could select the type of waste (ex: plastic, paper, organic, etc.) and input the location where the waste was collected. The page would allow users to upload images of the waste, which could be used for documentation or verification purposes. A description field would enable users to provide additional details about the waste, such as its condition, quantity, or any other relevant context. This combination of features would make the report page interactive and informative, helping users to generate detailed reports and track the status of waste management efforts more effectively. And a google map is also stationed at the right side to further enhance the convenience for the users.

2.1.5 Our Mission

Description of this webpage:

This page highlights our mission to create a sustainable waste management ecosystem that benefits everyone. It emphasizes the commitment to reducing, reusing, and recycling waste to promote environmental conservation and a circular economy through efficient waste management. The page also showcases key achievements and impact, featuring real-time statistics such as the number of wastes collected, reports resolved, and jobs created. These features would provide visitors with a clear understanding of the organization's progress and dedication to sustainable practices. The design would be clean and informative, reinforcing WasteLink's mission while encouraging users to contribute to the cause.

2.1.5 Our Impact

The screenshot shows the WasteLink website's 'Our Impact' page. At the top, there is a navigation bar with links for Home, About, Report, Impact (which is highlighted in blue), and Contact, along with a Log Out button. Below the navigation is a title 'Our Impact'. The page features three cards, each with an image and a caption:

- Empowering Local Communities**: An image of people working with large bags of collected waste. The caption reads: "Through our waste collection program, we've created jobs for 50+ individuals from underprivileged backgrounds."
- Turning Plastic into Products**: An image of a large pile of plastic waste. The caption reads: "Collected plastic waste is transformed into affordable household items for families in need."
- Cleaner Neighborhoods**: An image of two people working in a park. The caption reads: "Over 200 communities have seen significant reduction in illegal dumping since our program began."

Description of this webpage:

WasteLink's impact functionality is designed to revolutionize waste management practices while creating a significant positive influence on both local communities and the environment. Through a combination of innovative recycling solutions, community empowerment initiatives, and sustainable practices, WasteLink has made strides in transforming the way waste is viewed, managed, and processed. The core features of WasteLink's impact functionality are centered on empowering local communities, turning plastic waste into useful products, and fostering cleaner, more sustainable neighborhoods.

Through its platform and programs, WasteLink provides tools, resources, and opportunities that allow local residents to take charge of their waste, leading to improved environmental and economic outcomes. One of the primary ways WasteLink empowers local communities is by creating jobs that revolve around waste collection, recycling, and management. These jobs not only offer financial stability but also provide a sense of purpose, as workers play a critical role in maintaining cleaner and healthier environments. Rather than allowing plastic to end up in landfills or polluting natural ecosystems.

WasteLink works to recycle and repurpose it into useful items that can be reintegrated into the market. WasteLink's focus on waste collection, recycling, and responsible disposal has contributed significantly to improving the cleanliness and overall quality of life in local communities.

2.1.5 Our Impact

The screenshot shows the "Impact" section of the WasteLink website. At the top, there is a dark header bar with the WasteLink logo on the left and navigation links for Home, About, Report, Impact (which is highlighted in green), and Contact, along with a Log Out button on the right. Below the header is a large blue rectangular area with a testimonial slider. The title "What People Say" is centered at the top of this area. A quote is displayed: "*Wastelink transformed our community by turning waste into opportunities!*". Below the quote is a circular placeholder for a user profile picture, followed by the name "Ramesh Karki" and the title "Community Leader". Navigation arrows (left and right) are positioned below the testimonial area, and a horizontal scrollbar is visible at the bottom.

Description of this webpage:

This webpage is the "Impact" section of our platform, highlighting user testimonials. It features a testimonial slider showcasing feedback from users who have benefited from the platform. The section has a soft blue background, with a centered heading "What People Say" followed by a testimonial quote. In this instance, Ramesh Karki, a Community Leader, expresses how Waste Link has positively transformed his community by turning waste into opportunities. Navigation arrows indicate that users can browse through multiple testimonials. This section builds trust and credibility by showing real-world impact.

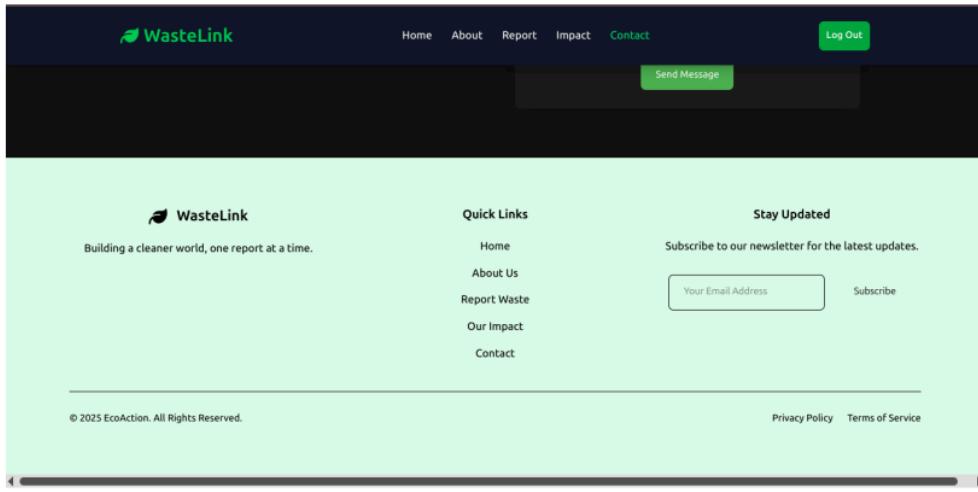
2.1.6 Contact Us

The screenshot shows the "Contact Us" page of the WasteLink website. The header is identical to the previous page, with the WasteLink logo, navigation links for Home, About, Report, Impact, and Contact, and a Log Out button. The main content area has a black background. It features a section titled "Get in Touch" with a descriptive paragraph about reaching out for collaboration or suggestions. Below this are four contact details: a location entry (123 Green Street, New York, NY 10001), an email entry (info@wastelink.org), and a phone number entry (+1 (555) 123-4567). To the right is a large, rounded rectangular form for sending a message. It contains fields for "Your Name", "Your Email", "Subject", and "Your Message", each with a placeholder text. A "Send Message" button is located at the bottom right of the form. A horizontal scrollbar is visible at the bottom of the page.

Description of this webpage:

The Contact Us page for WasteLink provides users with easy access to reach the organization. It features a simple contact form for inquiries, as well as alternative contact methods such as email, phone. The page includes the office address with an embedded Google Map for easy navigation, along with phone number. A section for Your Message is also there, as you can leave your name, email, subject to contact, while a clear call-to-action encourages engagement. The design is user-friendly, responsive, and accessible, ensuring seamless communication and promoting WasteLink's mission of sustainability.

2.1.7 Footer



Description of this webpage:

The footer of the Waste Link platform has a light green background and is divided into three sections: a brand message with the slogan "Building a cleaner world, one report at a time," quick links for easy navigation, and a newsletter subscription option. It also includes a copyright notice for Wastelink (2025) and links to the Privacy Policy and Terms of Service. The design maintains the website's eco-friendly theme while ensuring accessibility.

Chapter-3

Test-Cases

Table no 1: Test Case for Signup

Test Case	
Test Case ID	Test1
Test Scenario	To authenticate a successful user signup
Test Steps	<ul style="list-style-type: none"> • The user clicks on the signup page • User enters their name in the 'name field' • User adds phone number in the 'phone field' • User add their address in the 'address field' • User adds their birth date in the given format • User enters the passwords • User adds email in the 'email field' • User clicks 'Signup'
Prerequisites	Fill out the Signup field properly
Browser	Google Chrome
Test Data	Valid name and password
Expected Results	Once name and password are entered, the user will be redirected to the login.
Actual Results	Once name and password are entered, the user will be redirected to the login.
Test Status	Pass

WasteLink Database Admin			
Users			
id	username	email	password_hash
1	Indoya manandhar	indoya@email.com	zbfbfbfbfb329fbdf94v43bf
2	suman kothiyat	suman23@email.com	hsdd9cb78rbOs3hbvr09
3	asmita bhujel	asmita34@email.com	hsfshb489b48fb38fbh3y

Table no 2: Test Case for login

Test Case	
Test Case ID	Test2
Test Scenario	To authenticate a successful user login
Test Steps	<ul style="list-style-type: none"> • The user clicks on the login page • User enters their name in the 'name field' • User adds phone number in the 'phone field' • User enters the passwords • User clicks 'Login'
Prerequisites	Fill out the login field properly
Browser	Google Chrome
Test Data	Valid name and password on signup
Expected Results	Once name and password are entered, the user will be redirected to the homepage.
Actual Results	Once name and password are entered, the user will be redirected to the homepage.
Test Status	Pass

WasteLink Database Admin			
Users			
id	username	email	password_hash
1	hridaya manandhar	hridaya@email.com	zhbfssfbf1jb3289bd94v438f
2	suman kathayat	suman23@email.com	hsd4b9sdb98rb0s3hbvr09
3	asmita bhujel	asmita34@email.com	hbfsb489rb48fjh38fibh3y

Table no 3: Test Case for Report Waste

Test Case	
Test Case ID	Test3
Test Scenario	To collect the wastes successfully from different location
Test Steps	<ul style="list-style-type: none"> • The user clicks on the waste type • User selects waste type in the 'waste type' • User adds location in the 'location filed' • User adds the description about waste and situation in the 'description filed' • User uploads the chosen file/image in the 'Upload Image' • User clicks on 'Submit Report'
Prerequisites	Fill out the waste type and location clearly
Browser	Google Chrome
Test Data	Valid location
Expected Results	Once the real location and waste type are entered, waste will be collected.
Actual Results	Once the real location and waste type are entered, waste will be collected.
Test Status	Pass

Reports					
id	name	email	location	message	created_at
1	Hridaya Manandhar	hridaya@email.com	Kathmandu	Plastic waste near the pond	2025-03-10 09:30:12
2	Suman Kathayat	suman23@email.com	Dharan	Plastic waste near the park	2025-03-10 09:30:12
3	Asmita Bhujel	asmita34@email.com	Chitwan	Plastic waste near the river bank	2025-03-10 09:30:12

Chapter-4

Database

We have used SQLite, lightweight file base database which stores all its data in a single file called database. Typically it is located in the root directory of your project. The system is built with several scripts that work together.



First, setup Database.js creates the database structure by setting up three tables: users (for storing user account details like username and email), reports (for pollution report submissions with fields like location and message), and contacts (for contact form data including a subject field) each table has an auto-incrementing ID and specific columns tailored to its purpose. Next, add TestData.js populates these tables with sample data, like fake users and reports, using safe, parameterized queries to insert the records. Then, admin-panel.js sets up an Express web server running on port 3002, which serves an HTML admin panel; this panel fetches data from the database through API endpoints (like /api/users or /API/reports) and displays it in neat, auto-refreshing tables in your browser. Meanwhile, viewData.js offers a simpler way to see the data by logging it directly to the console. The database file itself is portable and easy to back up just copy database.sqlite but since SQLite is designed for smaller applications, it's great for development or prototyping, though it might not scale well for big, production-level apps. The whole system flows from setting up the database, adding test data, and then either viewing it in the console or through the web interface, all while keeping the data stored locally in that single file.

Chapter-5

The Technologies, Frameworks and Libraries Used

Frontend

For the frontend of Waste Link, I utilized the following technologies to ensure an interactive, visually appealing, and high-performance user experience:

HTML, CSS, JavaScript – The core building blocks for structuring content, styling, and adding interactivity.

React – A component-based JavaScript library that enhances UI development with reusable components and efficient rendering.

Tailwind CSS – A utility-first CSS framework that speeds up styling with a clean and responsive design approach.

Three.js & React Three Fiber (R3F) – Enables 3D rendering for an immersive experience, particularly for visualizing waste bins and other elements.

Drei – A collection of useful helpers for React Three Fiber, simplifying scene management and enhancing 3D interactions.

GSAP – A powerful JavaScript animation library used to create smooth transitions and animations for a dynamic feel.

Parallax Effect – Enhances visual depth and engagement by creating a scrolling effect that adds motion to background elements.

React-Vite – A fast and optimized development environment that improves performance and efficiency in project builds.

Photoshop – Used for designing UI elements, optimizing images, and enhancing graphics for a polished visual experience.

Backend

Node.js & SQLite

We used Node.js as the backend framework and SQLite3 as the database to manage and retrieve data. Node.js is a JavaScript runtime that executes the backend server code. It allowed us to create an HTTP server, define routes, and handle requests. SQLite3 is a file-based relational database that stores application data(database.sqlite). We used SQLite3 for managing user, report, and contact data.

```
import express from 'express';
import sqlite3 from 'sqlite3';
import { open } from 'sqlite';

const app = express();
const PORT = 3002;

// Log database operations for debugging
const logDbOperation = (operation, result) => {
| console.log(`[DB ${operation}]`, result);
};

app.use(express.json());

// Setup database connection
async function getDb() {
| return open([
|   filename: './database.sqlite',
|   driver: sqlite3.Database
| ]);
}
```

Node.js is used to create a backend server, define API routes, and handle HTTP requests. SQLite3 is used as a database to store and manage data in a lightweight, file-based manner.

Node.js and SQLite3 work together by:

- Handling requests in Node.js.
- Querying the database using SQLite.
- Returning JSON responses.
- Dynamically displaying data on the frontend.

PHP

PHP is a server-side scripting language commonly used to build backend systems, handling requests from clients and interacting with database. We used PHP in Backend Development in following

- Database Operations to connect to databases (SQLite3).
- Authentication to handle user login, signup, and session management.
- Processing Data to Validate, processing user input.
- Returning Responses in sending JSON or HTML responses to clients.

Frameworks

1. **JSON** : JSON is used for interchanging the data between frontend and backend.

```
// API endpoints
app.get('/api/users', async (req, res) => {
  try {
    const db = await getDb();
    const users = await db.all('SELECT * FROM users');
    logDbOperation('GET users', users);
    await db.close();
    res.json(users);
  } catch (error) {
    console.error('Error getting users:', error);
    res.status(500).json({ error: error.message });
  }
});

app.get('/api/reports', async (req, res) => {
  try {
    const db = await getDb();
    const reports = await db.all('SELECT * FROM reports');
    logDbOperation('GET reports', reports);
    await db.close();
    res.json(reports);
  } catch (error) {
    console.error('Error getting reports:', error);
    res.status(500).json({ error: error.message });
  }
});
```

- The database is queried (db.all('SELECT * FROM users')).
- The result is an array of objects, where each object represents a user.
- The response is returned in JSON format (res.json(users)).

2. React

This React component is used to display an About Us section with statistics that animate when they appear on the screen.

```
const [jobsCreated, setJobsCreated] = useState(0);
const statsRef = useRef(null);

const animateCounter = (setter, target, duration = 2000) => [
  let start = 0;
  const increment = target / (duration / 16);
  const timer = setInterval(() => {
    start += increment;
    if (start >= target) {
      setter(target);
      clearInterval(timer);
    } else {
      setter(Math.floor(start));
    }
  }, 16);
];
```

- Animates the counter by incrementing the value smoothly over 2000ms (2 seconds).
- Uses setInterval() to gradually increase the value.
- Calls the setter function (ex., setWasteCollected) to update the state.

Chapter-6

Reflection

The assignment of creating a website was a rewarding experience that helped me strengthen my skills as a beginner to interact with different frameworks, technologies that are available. . From the initial stages of planning and designing to the final stages of testing and deploying, We faced numerous challenges and learned valuable lessons along the way. We gained hands-on experience with both frontend and backend development, tackled debugging issues, and improved our time management skills.

Throughout the development process, we explored modern libraries and tools that enhanced the website's functionality, responsiveness, and aesthetics. Implementing 3D elements using Three.js and React Three Fiber was an exciting challenge that pushed our creativity and technical abilities. We also leveraged GSAP animations and the parallax effect to create smooth transitions and interactive user experiences. Additionally, working with React-Vite allowed us to optimize the development workflow and improve overall application performance.

This project also reinforced the importance of team collaboration, version control (Git), and structured coding practices. We learned how crucial it is to plan thoroughly before coding, conduct regular testing, and iterate based on feedback to refine the final product. The use of Tailwind CSS streamlined our styling process, while Photoshop helped us design and enhance visual elements for a more polished UI.

In the future, We will approach web development projects with a greater understanding of the importance of planning, testing, and iterative development. We will continue to focus on user experience, accessibility, and optimization, ensuring that every aspect of the website is both functional and user-friendly. Moreover, We will seek to learn more about advanced technologies and frameworks to further enhance my development process.

Overall, this assignment has been an invaluable learning experience, equipping us with practical skills and knowledge that will be instrumental in future projects. It has ignited a passion for continuous learning and innovation in web development, inspiring us to push boundaries and create even more impactful digital solutions.

Chapter-7

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Chapter-7

Marking Scheme

Project Marks (40%) - All marking criteria are to cover CLO3.

Criteria	Weightage	Limited (1)	Developing (2)	Adequate (3)	Proficient (4)	Exceptional (5)	Marks
Project Overview	5	The project overview is unclear, incomplete, or missing.	The project overview is basic but lacks detail or is somewhat unclear.	The project overview provides a basic understanding of the project but lacks depth or detail.	The project overview provides a clear understanding of the project with sufficient detail.	The project overview is comprehensive, well-written, and provides an excellent understanding of the project.	
Web Functionalities	10	Screenshot and description are missing or incomplete. Assigned functionalities are not clear. Main web coding is missing or not relevant.	Screenshot and description are incomplete or lack detail. Assigned functionalities are somewhat clear. Main web coding is somewhat relevant but lacks detail.	Screenshot and description provide a basic understanding of the website functionalities. Assigned functionalities are clear. Main web coding is relevant but web coding lacks some detail.	Screenshot and description provide a clear understanding of the website functionalities. Assigned functionalities are well-defined. Main relevant and includes web coding is highly important points corresponding to the web output.	Screenshot and description provide a description of the website functionalities. Assigned functionalities are clearly defined. Main web coding is highly relevant and includes all important points corresponding to the web output.	
Web Interface Design	10	Barely used required HTML elements, leading to poor functionality. Lacks proper use of semantic elements, affecting structure and meaning	Used limited HTML elements, and semantic elements need more focus. Needs significant improvement for proper functionality and structure.	Included enough HTML elements for functionalities. Some semantic elements used, but room for better organization and accessibility.	Used a good variety of HTML elements for required functionalities. Included semantic elements to improve structure and meaning, supporting accessibility.	Appropriately used a wide range of HTML elements, boosting functionalities. Chose semantic elements thoughtfully for better structure and meaning, enhancing user experience.	

Category	Score	Description	Code Analysis	Design & UX	Test Cases
PHP Scripting	10	Minimally applied CSS with limited selector use. Interface's visual appeal and consistency need more work. Use a wider array of selectors for better styling.	Applied CSS styles acceptably with moderate selector variety. Interface is visually acceptable, but more cohesion and precision could be improved.	Minimally applied CSS with limited selector use. Interface's visual appeal and consistency need more work. Use a wider array of selectors for better styling.	Meticulously applied CSS using various selectors, showcasing deep understanding. Resulted in cohesive, visually appealing interface with different selector levels.
PHP Scripting	20	Used minimal PHP, lacking functions. Validation, cookies, and file handling missing or basic. Code comments insufficient, affecting clarity.	Applied PHP for essential functions. Validation maintains data integrity. Cookies used suitably. Managed files sufficiently. Code comments offer understanding.	Used PHP for client-server app effectively. Solid validation ensures accuracy. Cookies manage user data well. Managed files sufficiently. Code comments enhance clarity.	Mastered PHP to create a full client-server app with all functions needed. Validation is strong. Cookies used seamlessly for user data. Skilled file handling. Clear comments enrich the code.
Test Cases (validation, w3c)	10	Test case is missing or incomplete.	Test case lacks detail or clarity.	Test case provides a basic understanding but lacks some detail.	Test cases provide a clear understanding of testing procedures.
Database Structure & Properties	10	Database structure and properties are missing or unclear. Weak relationships. Limited PHP use. Web server hosting has major problems.	Database structure and properties lack detail or are somewhat unclear.	Database structure and properties provide a basic understanding but lack depth or detail.	Database structure and properties are comprehensive, well-documented, and effectively describe the database used in the project.

		Simple PHP for data. Web server hosts with some problems. App minor issues.	Used PHP for data. Web server hosts app, minor issues.	appropriate relationships. Managed data using PHP effectively. Web server hosts app PHP effectively for data. Web server works flawlessly.	set up complex database tables perfectly, with strong relationships. Used PHP effectively for without issues.
The Technologies, Frameworks and Libraries Used	10	Technologies, frameworks, and libraries used are missing or incomplete. Description of usage is unclear.	Technologies, frameworks, and libraries used lack detail or are somewhat unclear. Description of usage provides a basic understanding.	Technologies, frameworks, and libraries used are listed but lack depth or detail. Description of usage provides a basic understanding.	Technologies, frameworks, and libraries used are comprehensive, well-documented, and effectively describe how they have been used throughout the project.
Reflection	5	Reflection is missing or incomplete. Opinions are unclear or unsupported.	Reflection lacks detail or depth. Opinions are somewhat unclear or unsupported.	Reflection provides a basic understanding but lacks depth or detail. Opinions are somewhat clear but lack support.	Reflection provides a clear understanding with sufficient detail. Opinions are clear and supported by evidence.
Presentation	10	Comprehensive content with exceptional structure and seamless flow. Highly engaging with outstanding visual aids. Exceptionally clear and confident speech with perfect timing and pacing.	Strong understanding and thorough content. Clear structure with smooth transitions and good audience engagement. High-quality visual aids. Clean and articulate speech with minimal nervousness. Good pacing and timing.	Solid understanding and clear content with minor depth issues. Well-structured with reasonable engagement. Effective visual aids. Generally clear speech and confidence, with slight timing and	Content is unclear and off-topic. No structure, audience interaction, or effective use of visual aids are basic and not aids. Speech is mumbled, with visible nervousness and poor timing.

			Total
			Late Submission Penalty (-5 marks per day)
			Submission without Source Code (-10 marks)
			Submission does not adhere to the template (-5 marks)
			Report with significant issues and writing quality are minimal (-5 marks)
			TOTAL MARKS OUT OF 100

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