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Ensuring Public Safety: A Multi-Hazard Action Plan for Earthquake-Induced Chemical Spills and Their Respiratory Health Impacts in Calamba City, Laguna

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Abstract:
This action plan presents a proactive, data-informed strategy to address the risks of earthquake-induced chemical spills in Calamba City, Laguna. As a highly industrialized urban center situated along the West Valley Fault, Calamba faces an elevated threat of cascading hazards during a major seismic event, particularly chemical spills that could severely affect public health through airborne toxic exposure. The plan focuses on the respiratory health consequences of such events and outlines targeted Programs, Projects, and Activities (PPAs) aligned with the four pillars of Disaster Risk Reduction and Management (DRRM): prevention and mitigation, preparedness, response, rehabilitation and recovery. Drawing from international and local case studies, community survey findings, and hazard mapping data, the plan proposes actionable steps that enhance health monitoring, strengthen industrial safety, and increase public and institutional preparedness. It is aligned with the Philippine Disaster Risk Reduction and Management Act (RA 10121) and the Sendai Framework for Disaster Risk Reduction to build a resilient and health-secure Calamba City.

Keywords — **Calamba City, Chemical Spills, Respiratory Health, Earthquake, Multi-Hazard, Disaster Risk Reduction, West Valley Fault**

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I. INTRODUCTION

The Philippines is highly vulnerable to natural hazards due to its location in the Pacific Ring of Fire and the Western Pacific typhoon belt. It regularly experiences typhoons, earthquakes, volcanic eruptions, floods, and landslides—events that have caused significant loss of life and property, making disaster risk reduction a national priority [1]. The country sits at the convergence of tectonic plates, resulting in frequent seismic activity. The Philippine Fault System increases earthquake risk, particularly in urban areas where structural integrity is critical [2]. Among the most dangerous is the West Valley Fault (WVF), which runs through Metro Manila and nearby provinces, including Laguna. Studies warn of its potential to trigger a magnitude 7.2 earthquake, causing widespread destruction and secondary hazards like fires, liquefaction, and landslides [3].

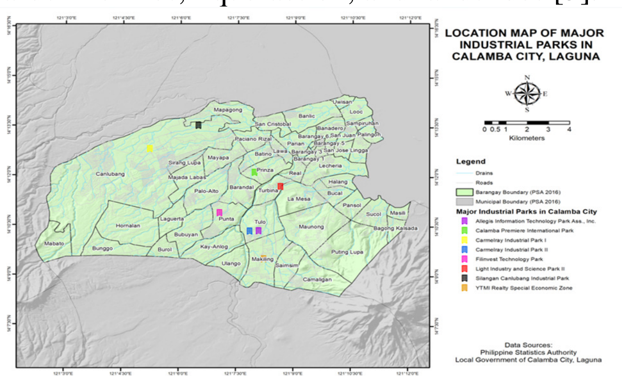

Fig. 1 Location Map of Major Industrial Parks in Calamba City, Laguna

Calamba City in Laguna lies directly along the WVF, as confirmed by the Valley Fault System Atlas [4]. With its rapid industrial growth, the city hosts numerous manufacturing and chemical facilities that store hazardous substances such as ammonia, chlorine, and sulfuric acid [5]. A major earthquake could lead to structural damage, pipeline ruptures, and chemical spills, threatening both public health and the environment. Populations living near these industrial zones face elevated risk, highlighting the urgency of disaster preparedness and mitigation efforts tailored to industrial hazards.

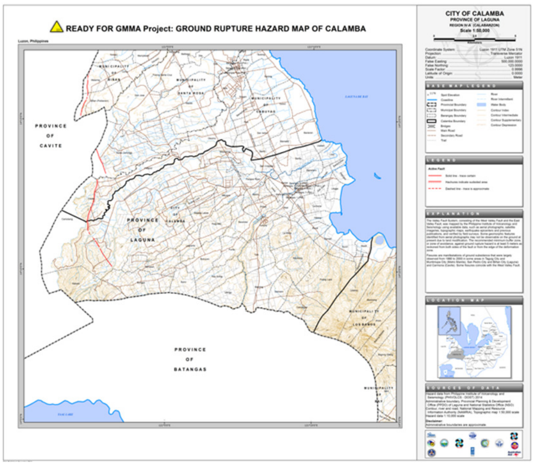

Fig. 1 Ground Rupture Hazard Map of Calamba City, Laguna from PHIVOLCS

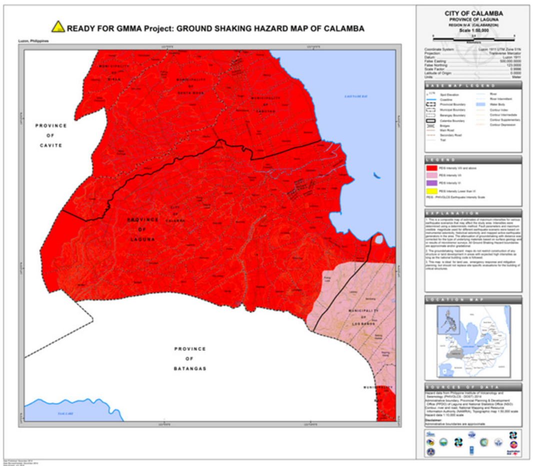

Fig. 3 Ground Shaking Hazard Map of Calamba City, Laguna from PHIVOLCS

Chemical spills caused by earthquakes pose serious respiratory health risks. Toxic airborne substances can trigger or worsen conditions such as asthma, COPD, and ARDS, especially among vulnerable populations like children and the elderly [6]. Long-term exposure and contamination of air, water, and soil may result in indirect health effects through food and water sources. To address these threats, a comprehensive action plan is essential—one that includes risk reduction strategies, rapid response systems, public health interventions, and strengthened inter-agency coordination. These measures are vital for protecting lives, ensuring environmental safety, and building resilience in high-risk areas like Calamba City.

II. SCOPE AND LIMITATION

This action plan aims to assess and mitigate respiratory health risks from earthquake-induced chemical spills in Calamba City, focusing on the industrial-adjacent barangays of Canlubang, Batino, and Real. It evaluates potential chemical release scenarios, local preparedness, emergency response systems, and public awareness, using a mixed-methods approach that includes surveys, interviews, document analysis, and GIS-based proximity mapping.

While the study is limited by the lack of actual spill incidents, restricted access to industrial safety data, and the absence of detailed health records, it still provides a valuable, risk-informed framework. By identifying gaps and promoting institutional coordination, the plan supports proactive measures to enhance public health and disaster readiness in anticipation of future chemical spill events.

III. METHODOLOGIES OF THE PLAN

This action plan used a mixed-methods approach, including surveys, interviews, GIS mapping, and document analysis. Thirty respondents from high-risk barangays were surveyed to assess awareness, preparedness, and access to protective measures. Key informants from CDRRMD, barangay officials, and industry stakeholders provided additional insights. Data triangulation helped identify vulnerable zones and informed the development of targeted programs and strategies.

IV. ASSUMPTIONS OF THE PLAN

This plan assumes that a high-magnitude earthquake could occur during its implementation period, potentially affecting critical infrastructure and industrial zones in Calamba. It also presumes strong collaboration among Local Government Units (LGUs), industries, and communities, as well as sufficient funding from the LDRRMF and partner organizations. The plan further relies on political stability, policy continuity, and active community participation in preparedness and health monitoring efforts.

V. SITUATIONAL ANALYSIS

This plan assumes that a high-magnitude earthquake could occur during its implementation period, potentially affecting critical infrastructure and industrial zones in Calamba. It also presumes strong collaboration among LGUs, industries, and communities, as well as sufficient funding from the LDRRMF and partner organizations. The plan further relies on political stability, policy continuity, and active community participation in preparedness and health monitoring efforts.

A. Results of the Survey

The survey was conducted through face-to-face interviews with support from barangay officials, ensuring smooth data collection and strong community participation. Insights from residents, responders, and workers were organized and supported by visuals and analysis. By combining quantitative and qualitative data, the study produced an action plan grounded in evidence and local experience.

1) Awareness of Hazards: Survey results indicate that Calamba City residents have a strong awareness of the risks posed by earthquake-induced chemical spills, especially their environmental and health impacts, with an overall weighted mean of 4.34 ("Strongly Agree"). The highest ratings were for understanding the effects of chemical spills (4.40) and the vulnerability of industrial facilities during earthquakes (4.37). However, slightly lower awareness of respiratory health risks (4.30) highlights the need for improved public education on the specific health effects of chemical exposure;

TABLE I
AWARENESS OF HAZARDS

Questions	WM	Verbal Interpretation
1. I am aware of the possible effects of earthquakes on industries and facilities storing chemicals	4.37	Strongly Agree
2. I understand how chemical spills can harm the environment and health.	4.40	Strongly Agree
3. I know the symptoms of respiratory illnesses caused by exposure to hazardous chemicals.	4.30	Strongly Agree
4. I understand how toxic chemicals affect air quality after a spill.	4.30	Strongly Agree
Total	**17.37**	
Weighted Mean	**4.34**	**Strongly Agree**

2) Preparedness Measures: Table 2 indicates a high level of preparedness among Calamba City residents for earthquakes and chemical spills, with a total weighted mean of 4.24 ("Strongly Agree"). While community drills and seminars scored highest, lower ratings for evacuation route awareness and spill response communication highlight areas for improvement in public information and coordination;

TABLE II
PREPAREDNESS MEASURES

Questions	WM	VI
1. The LGU and barangay officials regularly conduct earthquake preparedness seminars.	4.37	Strongly Agree
2. Regular drills and training are conducted at the barangay level for chemical spill response.	4.47	Strongly Agree
3. There is an early warning system in place for earthquakes and chemical spills.	4.33	Strongly Agree
4. The LGU has an established chemical spill response plan that is well-communicated to barangays and residents.	4.00	Agree
5. Community members are educated on emergency evacuation procedures related to earthquakes and chemical spills.	4.33	Strongly Agree
6. Emergency evacuation routes and shelters are clearly marked and known to the community.	4.07	Agree
7. The LGU and barangays ensure that industries handling	4.10	Agree

hazardous chemicals comply with safety regulations.		
Total	**29.67**	
Weighted Mean	**4.24**	**Strongly Agree**

*3) **Response Efforts:*** Table 3 shows generally positive perceptions of Calamba City's chemical spill preparedness, with a total mean of 4.08 ("Agree"). While timely medical treatment (4.43) and emergency coordination (4.17) were rated highly, lower scores for trained responders (3.80) and LGU-industry collaboration (3.93) highlight areas for improvement in response capacity and partnerships;

TABLE IIII
RESPONSE EFFORTS

Questions	WM	VI
1. The LGU coordinates effectively with emergency response teams during a chemical spill incident.	4.17	Agree
2. There are sufficient emergency response teams trained in handling chemical spills and respiratory illnesses.	3.80	Agree
3. Community members are encouraged to report chemical spills and hazardous situations immediately.	4.00	Agree
4. There is a hotline or reporting system for chemical spills that residents can easily access.	4.20	Agree
5. The LGU and barangays collaborate with private industries to manage chemical spills efficiently.	3.93	Agree
6. Affected individuals receive timely medical check-ups and treatments after exposure to hazardous chemicals.	4.43	Strongly Agree
7. There is a system in place to monitor long-term respiratory health effects among affected individuals.	4.00	Agree
Total	**28.53**	
Weighted Mean	**4.08**	**Agree**

*4) **Post-Disaster Recovery and Community Involvement:*** Table 4 shows strong public confidence in Calamba City's chemical spill recovery efforts, with an overall mean of 4.24 ("Strongly Agree"). High ratings for disaster funding (4.43) and rapid cleanup (4.33) reflect effective preparedness, while slightly lower scores for barangay recovery planning (4.10) point to the need for greater community involvement in long-term recovery.

TABLE IIIV
POST-DISASTER RECOVERY AND COMMUNITY INVOLVEMENT

Questions	WM	VI
1. The LGU ensures rapid cleanup of hazardous chemical spills to prevent further environmental and health impacts.	4.33	Strongly Agree
2. There is a clear post-disaster recovery plan in place at the barangay level to ensure the swift recovery of affected individuals.	4.10	Agree
3. Community members actively participate in rehabilitation and cleanup efforts following a chemical spill.	4.10	Agree
4. The LGU collaborates with industries to prevent future chemical spills and improve risk management practices.	4.23	Strongly Agree
5. There is a budget allocation for disaster response and recovery in Calamba City to maintain preparedness for such incidents.	4.43	Strongly Agree
Total	**21.20**	
Weighted Mean	**4.24**	**Strongly Agree**

B. SWOC ANALYSIS

The SWOC analysis evaluates current capabilities, gaps, and opportunities to guide community engagement, resource allocation, and policy improvement.

TABLE V
SWOC ANALYSIS

Strengths	**Weaknesses**
Calamba City has an organized LDRRMO, trained responders,	Coordination gaps between LGUs and industries, limited real-time chemical

GIS-based risk mapping, and active public awareness efforts. Strong policies, early warning systems, and partnerships with NGOs and private sectors support preparedness and response.	monitoring, and insufficient PPE and training hinder effective response. Some evacuation centers and barangay health units lack resources for chemical emergencies.
Opportunities Enhancing LGU-industry partnerships, expanding GIS and EWS systems, and launching multilingual awareness campaigns can strengthen community preparedness. Standardizing protocols and securing external funding will improve coordination and sustainability.	**Challenges** Bureaucratic delays, inconsistent safety compliance, limited barangay resources, and reliance on external funding pose ongoing risks to sustained DRRM implementation. Low adoption of advanced tech and inconsistent occupational safety also weaken preparedness.

C. PESTEL ANALYSIS

This PESTEL analysis examines the external political, economic, social, technological, environmental, and legal factors that influence Calamba City's preparedness and response to earthquake-induced chemical spills, providing strategic insights to strengthen disaster resilience and public safety.

*1) **Political Factors:*** Calamba City benefits from supportive DRRM policies, with coordination between the LDRRMO and national agencies on preparedness programs and industrial safety. However, bureaucratic delays, weak policy enforcement, and limited public-private coordination hinder unified emergency response efforts;

*2) **Economic Factors:*** As an industrial hub, Calamba faces risks from cost-cutting practices and limited enforcement of safety standards in some facilities. Funding gaps at the barangay level and among small businesses further restrict investment in modern DRRM infrastructure and training;

*3) **Social Factors:*** Community awareness and grassroots disaster response groups are active in many barangays, enhancing local preparedness. Still, inconsistent public participation, misinformation, and unequal access to healthcare services increase vulnerability, especially among at-risk populations;

*4) **Technological Factors:*** The city uses early warning systems and GIS mapping for hazard monitoring, improving disaster communication. Yet, limited real-time detection tools, high technology costs, and cybersecurity threats remain challenges to widespread and effective use;

*5) **Environmental Factors:*** Calamba's industrial profile and seismic exposure make it highly vulnerable to chemical spills that threaten air, water, and soil. Climate-related hazards and weak compliance with environmental regulations further elevate contamination risks;

*6) **Legal Factors:*** Existing national laws and local ordinances provide a foundation for DRRM and hazardous material management. However, weak enforcement, overlapping responsibilities, and the absence of legal mechanisms for long-term health monitoring and compensation hinder effective disaster recovery.

VI. ACTION PLAN

D. Disaster Prevention and Mitigation

In order to achieve Objective 1.1 of this Action Plan, the proposed Chemical Hazard Event Monitoring and Information System (CHEMIS-Calamba) will establish a centralized digital platform to monitor, document, and analyze chemical spill incidents in Calamba City, thereby strengthening local response and preparedness. Serving as a shared tool for agencies such as the City Disaster Risk Reduction and Management Division (CDRRMD), Bureau of Fire Protection (BFP), City Information Technology (CIT) Department, and local industry partners, it will capture key incident data, support trend analysis, and guide policy and enforcement actions. Scheduled for implementation from the third quarter of 2025 to the fourth quarter of 2027 with a ₱5 million budget, the system aims to enhance public health protection, improve inter-agency coordination, and reduce chemical hazard risks through real-time monitoring and data-driven decision-making.

TABLE VI
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.1

Goal 1	Reduce the risk of earthquake-induced chemical spills and their respiratory health impacts in Calamba City by achieving a 30% reduction in spill incidents, enhancing hazard assessment

	protocols, increasing infrastructure resilience by 40%, and ensuring 100% policy compliance by December 2027.
Objective 1.1	To enforce stricter compliance with industrial safety regulations by conducting quarterly inspections of hazardous material storage facilities, ensuring a baseline compliance rate of 60% in 2025, increasing to 80% by 2026, and achieving 100% compliance by December 2027.
Outcome	Improved compliance with industrial safety regulations, reducing chemical spill risks and improving workplace safety.
Programs, Projects, and Activities (PPA)	1.1.1 Chemical Hazard Event Monitoring and Information System (CHEMIS-Calamba)

To support the implementation of Objective 1.2, the Industrial Zone Hazard Mapping Project will develop a GIS-based hazard mapping system to identify chemical spill-prone areas within Calamba City's industrial zones by integrating seismic hazard data and facility locations. Targeting city planners, emergency responders, regulatory agencies, facility operators, and nearby communities, the project will create a digital GIS database through spatial analysis and field validation to support land use planning, risk communication, and emergency coordination. Scheduled from the fourth quarter of 2025 to the second quarter of 2026 with a budget of ₱1,100,000 from the local government and industry partners, the project will enhance disaster preparedness through evidence-based decision-making and foster collaboration through data sharing and joint risk assessments.

TABLE VII
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.2

Goal 1	Reduce the risk of earthquake-induced chemical spills and their respiratory health impacts in Calamba City by achieving a 30% reduction in spill incidents, enhancing hazard assessment protocols, increasing infrastructure resilience by 40%, and ensuring 100% policy compliance by December 2027.
Objective 1.2	To integrate Geographic Information System (GIS)-based risk mapping for all industrial zones by mid-2025 to identify and mitigate high-risk areas, with annual updates to assess improvements and maintain accuracy.
Outcome	Creation of an accurate and comprehensive GIS-based risk map for all industrial zones in Calamba City, which will enable improved identification of high-risk chemical spill zones and enhanced decision-making for disaster mitigation and emergency response.
Programs, Projects, and Activities (PPA)	1.2.1 Industrial Zone Hazard Mapping Project

The Contingency Plan Development Workshops aim to strengthen industry preparedness by guiding high-risk facilities in crafting site-specific response plans for earthquake-induced chemical spills. From the third quarter of 2025 to the first quarter of 2027, the CDRRMD, in partnership with industry representatives, will conduct capacity-building sessions for safety officers, planners, and emergency staff, providing technical guidance, planning templates, and regulatory alignment. With an estimated cost of ₱150,000 per meeting funded by the Local Disaster Risk Reduction and Management Fund (LDRRMF), the program seeks to promote a unified and well-defined emergency response framework, enhancing disaster readiness among Calamba City's industrial stakeholders.

TABLE VIII
ACTION PLAN FOR GOAL 1 OBJECTIVE 1.3

Goal 1	Reduce the risk of earthquake-induced chemical spills and their respiratory health impacts in Calamba City by achieving a 30% reduction in spill incidents, enhancing hazard assessment protocols, increasing infrastructure resilience by 40%, and ensuring 100% policy compliance by December 2027.
Objective 1.3	To require industries to develop and submit an Earthquake-Induced Chemical Spill Contingency Plan by March 2027, ensuring a compliance rate of 50% by 2025, 75% by 2026, and 100% by 2027 for a coordinated emergency response framework.

Outcome	Establishment of a well-defined, efficient, and collaborative emergency response plan
Programs, Projects, and Activities (PPA)	1.3.1 Contingency Plan Development Workshops for Earthquake-Induced Chemical Spills

E. Disaster Prevention and Mitigation

The Specialized Emergency Response Training for Earthquake-Induced Chemical Spills aims to strengthen the capacity of Calamba City's first responders, barangay officials, and industry emergency teams through scenario-based training on life support, hazardous materials handling, CBRNE response, and the use of protective equipment. Led by the City Disaster Risk Reduction and Management Division with support from the Bureau of Fire Protection and Barangay Quick Response Teams, the program includes full-scale drills, technical workshops, and expert-led sessions, with participants receiving two-year certifications. Each session is funded with ₱300,000 from the Local Disaster Risk Reduction and Management Fund and industry contributions to ensure a certified and prepared emergency workforce.

TABLE IX
ACTION PLAN FOR GOAL 2 OBJECTIVE 2.1

Goal 2	Enhance the emergency preparedness and response capabilities of Calamba City by training stakeholders, increasing public awareness, and strengthening collaboration by achieving 90% emergency readiness by 2027.
Objective 2.1	To conduct semi-annual emergency response training for first responders, industries, and barangay officials, ensuring an initial participation rate of 60% in 2025, 75% in 2026, and 90% by 2027.
Outcome	Establishment of a fully trained and prepared workforce, including first responders, barangay officials, and industries capable of responding to earthquake-induced chemical spills.
Programs, Projects, and Activities (PPA)	2.1.1 Specialized Emergency Response Training for Earthquake-Induced Chemical Spills

The next set of programs aim to increase household awareness of earthquake-induced chemical spills and their respiratory health impacts through a coordinated public information campaign. The approach includes three integrated components: the production and distribution of 30,000 print and digital Information, Education, and Communication (IEC) materials in local dialects (PPA 2.2.1), the training and certification of at least 100 community educators and barangay focal persons through a Training of Trainers program (PPA 2.2.2), and the conduct of 54 barangay-level assemblies targeting vulnerable populations such as senior citizens, women, and those with respiratory conditions (PPA 2.2.3). Implemented from the third quarter of 2025 to the fourth quarter of 2026 with a combined budget of ₱1,550,000 from the LDRRMF, these programs will promote inclusive, sustained, and community-led risk communication to strengthen Calamba City's preparedness for chemical hazards triggered by earthquakes.

TABLE X
ACTION PLAN FOR GOAL 2 OBJECTIVE 2.2

Goal 2	Enhance the emergency preparedness and response capabilities of Calamba City by training stakeholders, increasing public awareness, and strengthening collaboration by achieving 90% emergency readiness by 2027.
Objective 2.2	To launch a city-wide public information campaign on earthquake-induced chemical spills and their health impacts, ensuring at least 50% household awareness by 2025, 75% by 2026, and 90% by 2027.
Outcome	Increased public awareness on earthquake-induced chemical spills and related respiratory health impacts
Programs, Projects, and Activities (PPA)	2.2.1 Development of IEC (Information, Education, and Communication) Materials for Earthquake-Induced Chemical Spills 2.2.2 Training of Trainers (ToT) on Earthquake-Induced Chemical Spills Awareness 2.2.3 Barangay-Level Information Drives and Seminars

To help reduce public health risks during earthquake-induced chemical spills, especially in industrial-adjacent communities, two programs have been developed to achieve Objective 2.3. PPA 2.3.1 will distribute 60,000 basic personal protective equipment kits—containing respirators, goggles, gloves, coveralls, and instruction cards—to vulnerable households from the first to fourth quarter of 2026, with a ₱60,000,000 budget from the LDRRMF and LGU General Fund. To ensure proper usage, PPA 2.3.2 will conduct 30 orientation sessions in high-risk barangays, featuring live demonstrations and IEC materials, with a ₱500,000 budget, helping communities become both equipped and informed in responding to chemical emergencies.

TABLE XI
ACTION PLAN FOR GOAL 2 OBJECTIVE 2.3

Goal 2	Enhance the emergency preparedness and response capabilities of Calamba City by training stakeholders, increasing public awareness, and strengthening collaboration by achieving 90% emergency readiness by 2027.
Objective 2.3	To distribute emergency preparedness kits, including respiratory protective gear, to 50% of vulnerable households by 2025, 70% by 2026, and at least 90% by 2027.
Outcome	Vulnerable households in Calamba City equipped with emergency preparedness kits, including respiratory protective equipment, contributing to enhanced community-level emergency response and health protection.
Programs, Projects, and Activities (PPA)	2.3.1 Procurement and Distribution of Basic Chemical Spill PPE Kits for Vulnerable Households 2.3.2 Information Campaign on Emergency Kit Usage

F. Disaster Response

To strengthen Calamba City's emergency response to earthquake-induced chemical spills, a specialized Chemical Spill Rapid Response Unit (CSR-RU) will be established by the end of 2026. PPA 3.1.1 will formalize the unit's structure under the CDRRMD, while PPA 3.1.2 will deliver intensive HAZMAT training in early 2027. PPA 3.1.3 will provide the unit with essential gear and a response vehicle, supported by a combined ₱5.75 million budget from local funds and grants.

Fully operational by 2027, the CSR-RU aims to cut chemical spill-related health risks by 40% by 2028. It will also lead joint drills and improve coordination among key agencies, building public confidence and boosting preparedness in high-risk communities.

TABLE XII
ACTION PLAN FOR GOAL 3 OBJECTIVE 3.1

Goal 3	Establish a rapid and effective response mechanism for earthquake-induced chemical spills, minimizing public health risks and environmental damage by reducing response time to under 30 minutes and decreasing reported health complications by 40% by 2028
Objective 3.1	To establish a specialized chemical spill rapid response unit within the Local Disaster Risk Reduction and Management Office (LDRRMO) by June 2026, ensuring full operational capacity by 2027
Outcome	A fully operational Chemical Spill Rapid Response Unit (CSR-RU) under the CDRRMD
Programs, Projects, and Activities (PPA)	3.1.1 Establishment of Chemical Spill Rapid Response Unit (CSR-RU) 3.1.2 Intensive Training Program for CSR-RU Members 3.1.3 Procurement of Specialized Equipment and PPE for CSR-RU

To cut chemical spill reporting and response time to under 30 minutes by 2027, Calamba City will launch a centralized web and mobile reporting system. PPA 3.2.1, led by the City IT Department, will develop the platform with a ₱2.4 million budget, allowing real-time reports from residents, barangays, and responders.

To ensure public use, PPA 3.2.2 will run 30 barangay rollout sessions with demonstrations and training, supported by a ₱600,000 budget. These efforts will boost coordination, speed up response, and empower communities, reinforcing the city's commitment to safety and resilience.

TABLE XIII
ACTION PLAN FOR GOAL 3 OBJECTIVE 3.2

Goal 3	Establish a rapid and effective response mechanism for earthquake-induced chemical spills, minimizing public health risks and environmental damage by reducing

	response time to under 30 minutes and decreasing reported health complications by 40% by 2028
Objective 3.2	To develop and implement a centralized chemical spill reporting system accessible to the public by 2027, reducing incident reporting and response time from the current 60 minutes to under 30 minutes
Outcome	Establishment of a fully operational, publicly accessible, and centralized chemical spill reporting system that enables real-time incident alerts
Programs, Projects, and Activities (PPA)	3.2.1 Development and Integration of the Reporting Platform (Web and Mobile) 3.2.2 Public Rollout and Community Engagement for the Chemical Spill Reporting System

To strengthen disaster readiness in Calamba City's 30 most high-risk barangays, three programs will provide chemical spill response kits, ensure their delivery, and train local responders. PPA 3.3.1 covers the procurement of fully equipped kits, funded by ₱2.1 million, while PPA 3.3.2 handles their distribution and inventory tracking with a ₱400,000 budget. PPA 3.3.3 will train barangay officials and first responders through 30 sessions in early 2027, backed by ₱900,000 for materials, logistics, and drills.

Together, these efforts ensure that barangays are prepared to act quickly during chemical emergencies, reducing delays and easing pressure on city-level teams. By pairing equipment with training and maintenance systems, the city builds long-term local capacity for faster, safer emergency response.

TABLE XIV
ACTION PLAN FOR GOAL 3 OBJECTIVE 3.3

Goal 3	Establish a rapid and effective response mechanism for earthquake-induced chemical spills, minimizing public health risks and environmental damage by reducing response time to under 30 minutes and decreasing reported health complications by 40% by 2028
Objective 3.3	To allocate and preposition emergency response kits with respirators and chemical spill containment materials in all barangays by 2026, ensuring a 100% distribution rate among high-risk areas
Outcome	100% of high-risk barangays in Calamba City are equipped with prepositioned emergency response kits containing respirators and chemical spill containment materials by 2026.
Programs, Projects, and Activities (PPA)	3.3.1 Procurement of emergency response kits for highly vulnerable barangays 3.3.2 Prepositioning and distribution of kits to barangay halls 3.3.3 Training of Barangay Officials on the Use and Management of Emergency Chemical Spill Response Kits

G. Disaster Rehabilitation and Recovery

To strengthen Calamba City's emergency response to earthquake-induced chemical spills, a specialized Chemical Spill Rapid Response Unit (CSR-RU) will be established by the end of 2026. PPA 3.1.1 will formalize the unit's structure under the CDRRMD, while PPA 3.1.2 will deliver intensive HAZMAT training in early 2027. PPA 3.1.3 will provide the unit with essential gear and a response vehicle, supported by a combined ₱5.75 million budget from local funds and grants.

Fully operational by 2027, the CSR-RU aims to cut chemical spill-related health risks by 40% by 2028. It will also lead joint drills and improve coordination among key agencies, building public confidence and boosting preparedness in high-risk communities.

TABLE XV
ACTION PLAN FOR GOAL 4 OBJECTIVE 4.1

Goal 4	Facilitate the recovery and rehabilitation of affected communities, ensuring environmental restoration and public health protection by restoring at least 80% of contaminated sites within two years post-incident and reducing long-term respiratory health complications by 50% by 2029
Objective 4.1	To establish a long-term health monitoring program for residents exposed to hazardous chemicals by June 2027, conducting annual health assessments, providing medical support for affected individuals, and achieving a 30% reduction in respiratory illnesses by 2029
Outcome	Creation of a long-term health monitoring program to track, support, and reduce respiratory

	illnesses among residents exposed to hazardous chemicals
Programs, Projects, and Activities (PPA)	4.1.1 Establishment of a Long-Term Health Monitoring System for Chemical Exposure Cases 4.1.2 Provision of Respiratory Care and Subsidized Treatment for Chemically Exposed Residents

To ensure that at least 80% of affected households receive emergency aid within 30 days of a chemical spill by 2028, Calamba City will implement PPA 4.2.1 – Immediate Financial Assistance Post-Spill. Backed by a ₱10 million budget, the program will provide fast financial support for food, shelter, and medical needs, coordinated by the City Social Services Department with support from key offices. Additional funding from national agencies, NGOs, donor grants, and industry Corporate Social Responsibility (CSR) programs will help sustain the initiative, supporting quicker recovery and reinforcing the city's commitment to responsive and compassionate disaster relief.

TABLE XVI
ACTION PLAN FOR GOAL 4 OBJECTIVE 4.2

Goal 4	Facilitate the recovery and rehabilitation of affected communities, ensuring environmental restoration and public health protection by restoring at least 80% of contaminated sites within two years post-incident and reducing long-term respiratory health complications by 50% by 2029
Objective 4.2	To create a financial assistance program for families affected by earthquake-induced chemical spills, ensuring at least 50% of affected households receive aid within 30 days post-incident, increasing to 80% by 2028
Outcome	Creation of a financial assistance system that supports at least 80% of affected households within 30 days after a chemical spill by 2028
Programs, Projects, and Activities (PPA)	4.2.1 Immediate Financial Assistance Post-Spill (Contingency Allocation)

To support Goal 4 – Objective 3, Calamba City will establish a sustainable disaster recovery fund primarily financed by industries handling hazardous chemicals. PPA 4.3.1 will develop the policy and legal framework through stakeholder consultations and ordinance drafting from Q1 to Q4 2026, with a ₱500,000 budget. Following the ordinance's approval, PPA 4.3.2 will institutionalize the City Chemical Spill Recovery Fund in 2027 with ₱400,000 allocated for setup and oversight—enabling long-term recovery, environmental rehabilitation, and shared responsibility in risk reduction.

TABLE XVII
ACTION PLAN FOR GOAL 4 OBJECTIVE 4.3

Goal 4	Facilitate the recovery and rehabilitation of affected communities, ensuring environmental restoration and public health protection by restoring at least 80% of contaminated sites within two years post-incident and reducing long-term respiratory health complications by 50% by 2029
Objective 4.3	To require industries to contribute to a city-wide chemical spill disaster recovery fund by December 2027, securing financial resources for rehabilitation and long-term risk reduction efforts, with an annual evaluation of fund sufficiency and distribution effectiveness
Outcome	Creation of a city-managed disaster recovery fund supported by industries to ensure timely rehabilitation and reduce long-term risks from chemical spills
Programs, Projects, and Activities (PPA)	4.3.1 Stakeholder Consultation and Legal Framework Development 4.3.2 Creation of the City Chemical Spill Recovery Fund (CCSRF)

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