Project Design Phase
Proposed Solution Template

Date	27 December 2025
Team ID	LTVIP2026TMIDS83736
Project Name	Rising Waters: A Machine Learning Approach to Flood Prediction
Maximum Marks	2 Marks

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Communities in flood-prone areas lack access to timely, accurate, and data-driven flood predictions. Traditional methods are reactive rather than proactive, resulting in inadequate preparation time, property damage, loss of life, and economic losses. There is a critical need for an accessible, scientific tool that can predict floods in advance based on multiple environmental and geographical factors.
2.	Idea / Solution Description	Rising Waters is a web-based machine learning application that predicts flood probability using 8 key parameters: monsoon intensity, topography, drainage systems, river management, deforestation levels, urbanization, climate change impact, and dam status. Users input these parameters through a simple web interface, and a pre-trained ML model (using scikit-learn) processes the data to generate accurate flood risk predictions within seconds. The system is built on Flask framework with HTML/CSS frontend, making it accessible from any web browser without requiring technical expertise.
3.	Novelty / Uniqueness	Multi-factor Analysis: Considers 8 comprehensive parameters simultaneously, unlike traditional single-metric approaches. ML-Driven Accuracy: Uses historical flood data patterns for scientific predictions, not subjective estimates. Proactive not Reactive: Predicts floods before occurrence, enabling preparation time. Accessibility: Simple web interface accessible to common people without technical knowledge. Fast Inference: Real-time predictions in under 3 seconds. Updatable Model: Can be retrained with new data to improve accuracy over time. No Registration Required: Instant access without barriers.
4.	Social Impact / Customer Satisfaction	Social Impact: Saves lives through early flood warnings and timely evacuations. Reduces property damage and economic losses for vulnerable communities. Empowers residents with data-driven decision-making tools. Supports disaster management authorities in emergency planning. Increases community preparedness and resilience. Addresses climate change adaptation needs. Customer Satisfaction: Provides peace of mind with reliable predictions. Builds trust through scientific, data-driven approach. Easy to use with no technical skills required. Fast results enable quick action. Free and accessible 24/7. Reduces anxiety and uncertainty about flood risks.
5.	Business Model	Phase 1 (Current - Free Access): Free public service for communities. Government/NGO sponsorship and grants. Research and academic

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	(Revenue Model)	partnerships. Phase 2 (Future Revenue Streams): Freemium Model with basic predictions free and advanced features paid. B2G (Business-to-Government) licensing to local governments and municipalities. B2B (Business-to-Business) premium API access for insurance companies, real estate developers, and construction firms. Subscription Model for premium alerts and notifications. Data Analytics providing aggregated flood risk reports for urban planners. Consulting Services for custom model development for specific regions. Cost Structure: Low operational costs (web hosting, server maintenance), primary investment in model development and data collection.
6.	Scalability of the Solution	Technical Scalability: Horizontal Scaling with Flask app deployed on multiple servers with load balancers. Cloud Deployment ready for migration to AWS, Azure, or Google Cloud for global reach. Database Expansion to handle larger datasets as historical data grows. Model Updates enable retrainable model that adapts to new patterns and regions. Geographical Scalability: Can be extended to any flood-prone region globally. Modular design allows region-specific model training. Multi-language support can be added for different countries. Feature Scalability: Add satellite imagery analysis for real-time monitoring. Integrate IoT sensor data for live water level tracking. Mobile app development for wider accessibility. SMS/email alert system integration. API for third-party integrations. Advanced visualization and mapping features. User Scalability: Architecture supports thousands of concurrent users. Lightweight system with minimal resource requirements. CDN integration for fast global access.