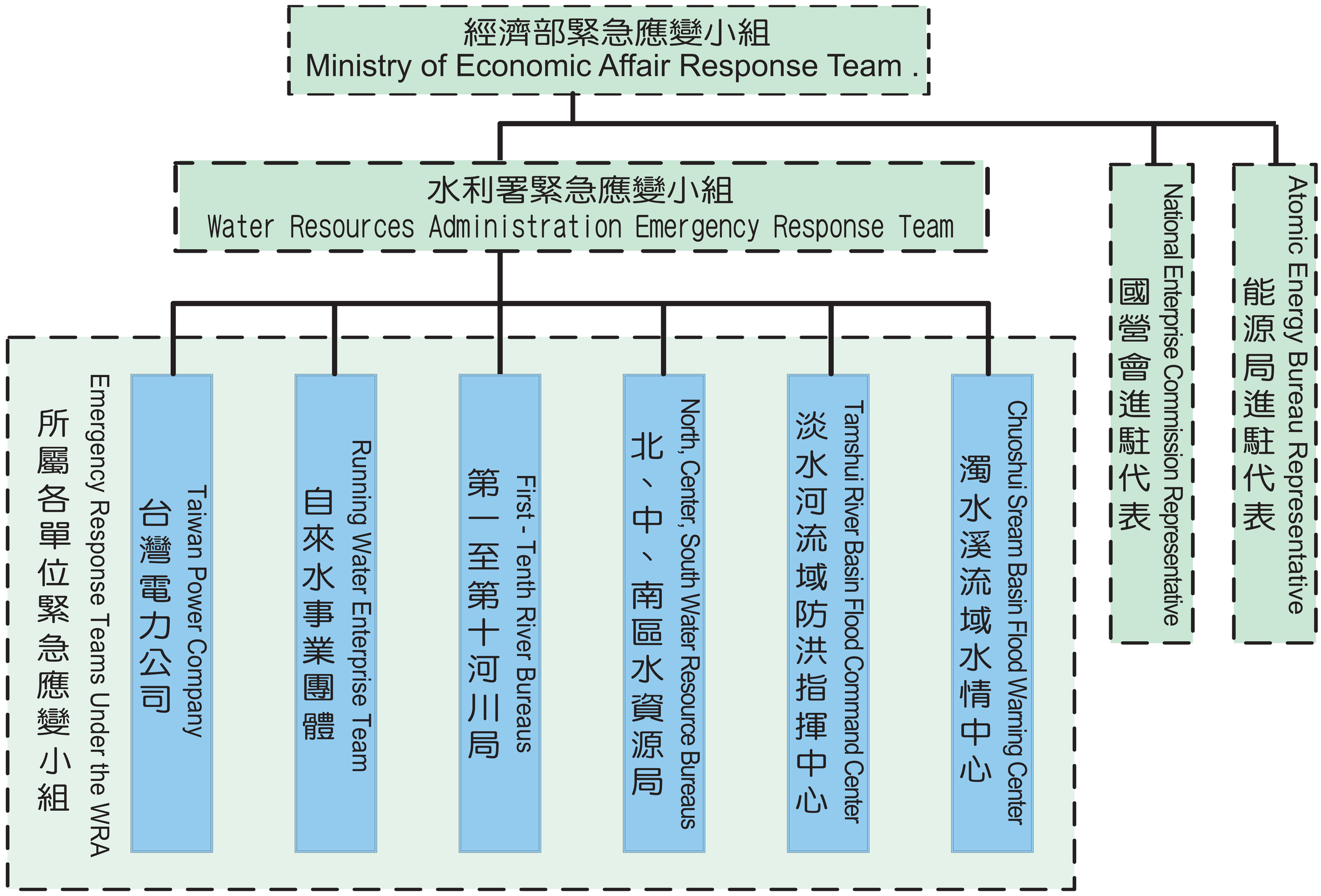
經濟部水利署水災、旱災指揮體系
MOEA Water Resources Administration, Drought Command System



經濟部依『災害防救法』第三條第二款規定為水災中央災害防救業務主管機關，負責指揮、督導及協調水災災害防救各級相關行政機關及公共事業執行及各項水災災害預防、緊急應變及災後復原重建工作。

經濟部水利署統合所有治水單位，針對全台各區域不同的水利需求，成立第一至第十河川局與水資源局、淡水河流域防洪指揮中心、濁水溪流域水情中心、台灣電力公司、自來水事業團隊、北中南區水資源局等單位，而『經濟部水利署緊急應變小組』，更強化災害之預防、災害發生時之緊急應變及災後之復原重建措施，有效執行防汛檢查等工作。

According to the "Disaster Prevention and Relief Law", Section 3.2, the Ministry of Economic Affairs is responsible for flood and disaster prevention and relief operations. It handles commanding, supervising and coordinating flood and disaster prevention and relief among all relevant administrative agencies and public enterprises, as well as all flood and disaster prevention, emergency response and post-disaster reconstruction.

Coordinating all water control agencies, the Ministry of Economic Affairs responding to the diverse water conservation needs of Taiwan´s various regions has set up the 1st through 10th River Management Office and Water Resources Office,The Tamshui Flood Control Command Center, Chuoshui Stream Basin Water Flood Warning Center, Taiwan Power Company, Running Water Business Team, as well as North, Center and South Water Resource Offices. The Water Resources Agency´s "Emergency Response Team" strengthens disaster prevention, emergency response when disaster strikes, and post-disaster reconstruction measures. These effectively implement flood prevention inspections and other jobs.

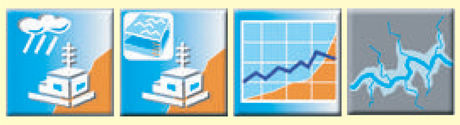
淡水河流域防洪指揮作業示意圖
Tamshui River Basin Flood Prevention Command Operations Chart

中央氣象局
Center Weather Bureau

提供颱風動態、即時雨量、
各式氣象雲圖、雷達回波圖
Provides Typhoon Updates ,
Real-time Rainfall,
Meteorological Cloud Charts ,
Radar Echo Charts

點對點 VPN 專線
Peer-to-Peer VPN Dedicated Line

水利署第十河川局
WRA Tenth River Bureau



提供淡水河流域
即時雨量、水位
及影像監控資訊
Provides Tamshui River
Basin Rainfall、Water Levels
and Video Monitor Data

無線電、微波、專線、撥接
Wireless, Microwave,
Dedicated Line, Dial-up

員山子分洪管理中心
Yuanshantzu Flood Detention Center

提供員山子分洪道、攔河堰
即時水位及影像監控資訊
Provides Yuanshantzu Diversion
Channel, Dam,
Real-time Water Level
and Video Monitor Data

衛星、專線
Satellite, Dedicated Line

北區水資源局
Narthern Water Resourse Bureau

提供石門水庫運轉現況及上游
集水區之雨量、水位與影像資訊
Provides Shihmen Reservoir
Current Operations Conditions
and Upstream Catchment
Area Rain Level,Water Level
and Video Monitor Data

微波、水利署VPN專線
Microwave,
WRA VPN Dedicated Line

翡翠水庫管理局
Feitsui Reservoir Manegemend Bureau

提供翡翠水庫運轉現況及上游
集水區之雨量、水位與影像資訊
Provides Fuitsui Reservoir Current
Operations Conditions
and Upstream Catchment Area Rain
Levels, Water Levels
and Video Monitor Data

微波、專線、撥接
Microwave,
Dedicated Line, Dial-up

自動化即時水情資料收集與檢核系統
Automatic real-time water infomation collection and inspection system

通訊方式：無線電、衛星、微波、專線及多埠撥接系統，確保資訊通道暢通
收集方式：定時傳送、主動轉入資料庫
工作流程導向：從收集、檢核、資料補遺以及資料儲存，至後續的洪水預報及決策支援展示一系列串接整合
檢核機制：自動監控，掌握資料進出狀態，提供各式維護報表，作為問題原因分析及改善追蹤

Communication Method: Wireless, satellite, microwave, dedicated line and multi-port dial-up system. Methods for ensuring smooth data collection: fixed-time transmission, automatic insertion in data bank.
Direction of Work Flow: The system is connected and integrated, from collection, inspection and data addendum and saving, to updated flood alert and decision support display.
Inspection Mechanism: Automatic control, keeps abreast of data flow and provides all maintenance reports for troubleshooting and improvements.

淡水河流域洪水預報系統
Tamshui River Flood Forecasting System

系統以淡水河流域16集水分區為基礎，預報淡水河流域各支流(大漢溪、新店溪、基隆河)1-6小時之水位及流量
自動化驅動並執行淡水河流域預報系統，達成全天候水情預報能力
系統正進行石門水庫、翡翠水庫集水區入流量預報，以及員山子分洪分洪量預測
系統可依照颱風或是豪雨事件將預報結果儲存，可作為預報分析或是參數調整依據

The system is based on the Tamshui River Basin's 16 catchment zones, and issues an alert for the water level and volume during the next 1-6 for the main tributaries in the Tamshui River Basin (Tahan Stream, Hsintien Strearm, Keelung River), plus automatically starts and engages the Tamshui River Basin alert system. This achieves round-the-clock water condition alert capabilities and inflow volume alerts for the Shihmen and Feitsui Reservoir catchment areas. Plus the flood diversion alert system for the Yuanshantzu diversion can save the results for the typhoon or torrential rain event for prediction analysis or reference adjustment

淡水河流域防洪資訊既展示系統
Tamshui River Basin Flood Warning System

氣象展示：颱風軌跡圖、衛星雲圖、累積雨量圖、分區/全區雷達回波圖等
水情展示：雨量/水位/抽水站分布圖、雨量組織圖、水位/抽水站歷線圖、逐時雨量/水位表、抽水站即時影像
水庫展示：大壩現況圖、水庫歷線圖、水庫運轉規線圖、水庫逐時水位/流量表
Meteorological Display: Typhoon Trajectory Chart, Satellite Cloud Chart, Accumulated Rainfall Chart, Partial/Full District Radar Echo Chart
Water Condition Display: Distribution of Rainfall/Water Level/Water Pump Station, Rainfall Organization Chart, Water Level/Water Pump Historical Chart, Rainfall/Water Level Chart Over Time, Water Pump Station Real-time Video
Reservoir Display: Dam Conditions, Reservoir Historical Charts, Reservoir

洪水預報展示：水位歷線計算與實測比較圖、水位流量率定曲線圖、全流域水位 /流量縱波圖、16分區平均雨量圖表、河口天文潮位預測圖、橫段面及水位流量圖
Meteorological Display: Typhoon Trajectory Chart, Satellite Cloud Chart,
Flood Alert Display: Comparison of Water Level Historical Calculations and Actual Results, Water Level Volume Rate Fixed Flow Chart, Complete Basin Water Level Volume Longitudinal Wave Chart, 16 District Average Rainfall Chart, Estuary Astronomical Tide Alert Chart, Cross Section and Water Level Volume Chart Operation Chart, Reservoir Water Level/Volume Chart Over Time

- 中央防災應變中心 Central Flood Prevention Response Center
- 經濟部水利署 Ministry of Economic Affairs Water Resources Administration
- 台北市政府 Taipei City Government
- 台北縣政府 Taipei County Government
- 基隆市政府 Keelung City Government
- 其他相關作業單位 Other Relevant Operations Units

淡水河流域水文氣象通信網路
Tamshui River Basin Hydrology and Meteorology Communications Network

CCTV DATA FAX TEL

北區水資源局
(提供石門水庫水情)
Northern Water Resources Office
(Provides Shihmen Reservoir
Water Information)

大棟山微波中繼站
Tatung Mountain
Microwave Relay Station

中央氣象局
(提供氣象雨量資料)
Central Weather Bureau
(Provides Meteorological
and Rainfall Data)

第十河川局
暨淡水河流域防洪指揮中心
(提供淡水河水情)
10th River Management Office and
Tamshui River Basin Flood Command Center
(Provides Tamshui River Water Information)

水利署
緊急應變小組
(淡水河水情)
WRA Emergency Responsev Team
(Tamshui River Information

市消防局
縣消防局
(提供災情資料)
City Fire Department,
County Fire Department
(Provides Disaster Data)

觀音山微波中繼站
Kuanying Mountain
Microwave Relay Station

圖示說明
Instructions

微波通信
Microwave
Communication

GSN

T1專線
T1 Dedicated Line

資料聯線
Data Connection

北市府養工處
(提供抽水站、水門資料)
Taipei City Government
Maintenance Office

菜刀崙反射板
Tsaidaolun Baffle Plate

DATA FAX TEL

北市府翡翠水庫管理局
(提供水庫水情)
Taipei City Government Feitsui
Reservoir Management Bureau
(Provides Reservoir Water Conditions)

CCTV DATA FAX TEL

淡水河自動化洪水預警系統
Automatic Flood Early Warning System For Tamsui River

	預報參數調整 Forecast Parameter Adjustment	全天候預報 24-Hour Forecast

測預報資料收集 Collection of Forecast Measurement Data

- 員山子分洪即時水位雨量 Yuanshantzu Channel Data Collection and Transmission
- 淡水河流域即時水情 Tamshui River Basin Real-time Water Information
  - 水位流量 Water Leveland Discharge
  - 雨量 Rainfall
- 中央氣象局雷達與地面雨量站校核之雨量 Checked Rainfall by Central Weather Bureau and Precipitation Stations
- 石門、翡翠即時水位流量 Shihmen , Feitsui Real-time Discharge
- 水位流量轉換 Water Level and Discharge Conversion
- 即時水位流量提供介面 Real-time Water Level and Discharge Display
- 即時雨量提供介面 Real-time Discharge Display
- 淡水河流域測預報系統即時水資料收集 Tamshui River Flood Forecasting System Real-time Water Data Collection
- 河口潮位預報介面 Estuary Tide Level Forecasting System
- 預報雨量提供介面 Rainfall Forecasting System
- 水位流量 Water Leveland Discharge
- 雨量 Rainfall
- 測預報資料檢核 Forecasting Water Data Check
- 河口流量預報介面 Estuary Discharge Fo recasting System
- 雨量、水位、預報雨量、河口預報潮位 Rainfall Water Level Rainfall Alert Estuary Alert Volume

資料核發 Data Issue

- 預報參數 Forecast Parameter
- 預報參數調整 Forecast Parameter Adjustment

洪水預報 Flood Forecast

- 淡水河流域測預報系統 Tamshui River Forecasting System

預報展示與儲存 Forecasting Data Display and Storage

- 洪水預報結果輸出介面 Flood Forecasting Result Output
- 預報結果儲存與展示 Forecasting Result Storage and Display
- 淡水河流域防洪暨展示系統 Tamshui River Flood Prevention and Display System
- 十河局局內資訊網 10th River Management Office Internal Data Network
- 報表產生 Chart Generation
- 水情資料庫 Water Condition Data Bank

淡水河流域洪水預測模式流程圖
Flow Chart for Tamshui River Basin Flood Alert Model

降雨預測
Rainfall Prediction

計算員山子分洪集水區平均降雨量(90km^2)
Calculate Average Rainfall Level for the Yuantzushan Diversion Catchment Zone 90KM

計算翡翠水庫集水區平均降雨量(307km^2)
Calculate Average Rainfall Level for Feitsui Reservoir Catchment Zone 307KM

計算石門水庫集水區平均降雨量(756km^2)
Calculate Average Rainfall Level for Shihmen Reservoir Catchment Zone 756KM

計算13個自然流出集水區平均降雨量(1573km^2)
Calculate Average Rainfall Level for 13 Natural Catchment Zones 1573KM

水桶模式 Bucket Model

水桶模式 Bucket Model

水桶模式 Bucket Model

水桶模式 Bucket Model

操作模式 Operation Model

操作模式 Operation Model

操作模式 Operation Model

河口潮位預測模式(含暴潮)
Estuary Tide Level Prediction Model

上游邊界流量 Upstream Boundary Volume

Qout

Qout

Qout

Qout

下游邊界水位 Downstream Boundary Water Level

一維河川變量流模擬模式
One Dimensional River Volume Alteration Simulation Model

淹水模式 Flood Model

水質模式 Water Quality Model

生態模式 Ecology Model

抽水站排水模擬模式(自然集水區的面積要扣除)
Water Pump Station Simulation Model (Natural Catchment Area must be Deducted)

預報河川1至6小時水位及流量
Predict river water level and volume for next 1-6 hours

未來輸出結果:
1. 各斷面的水位、流量、水質指標、生物指標。
2. 淹水地區水位及淹水體積。
3. 抽水站控制地區的水位、淹水體積、抽水量。

Output Analysis:
1. Water Level, Volume, Water Quality Index, Ecology Index at every Cross Section
2. Flood Area Water Level and Flood Area Size
3. Water Pump Station Control Area Water Level, Flood Area Size, Amount of Water Pumped

回到降雨預測，並重複執行所有步驟。
Return to Rainfall Prediction, Repeat all Steps

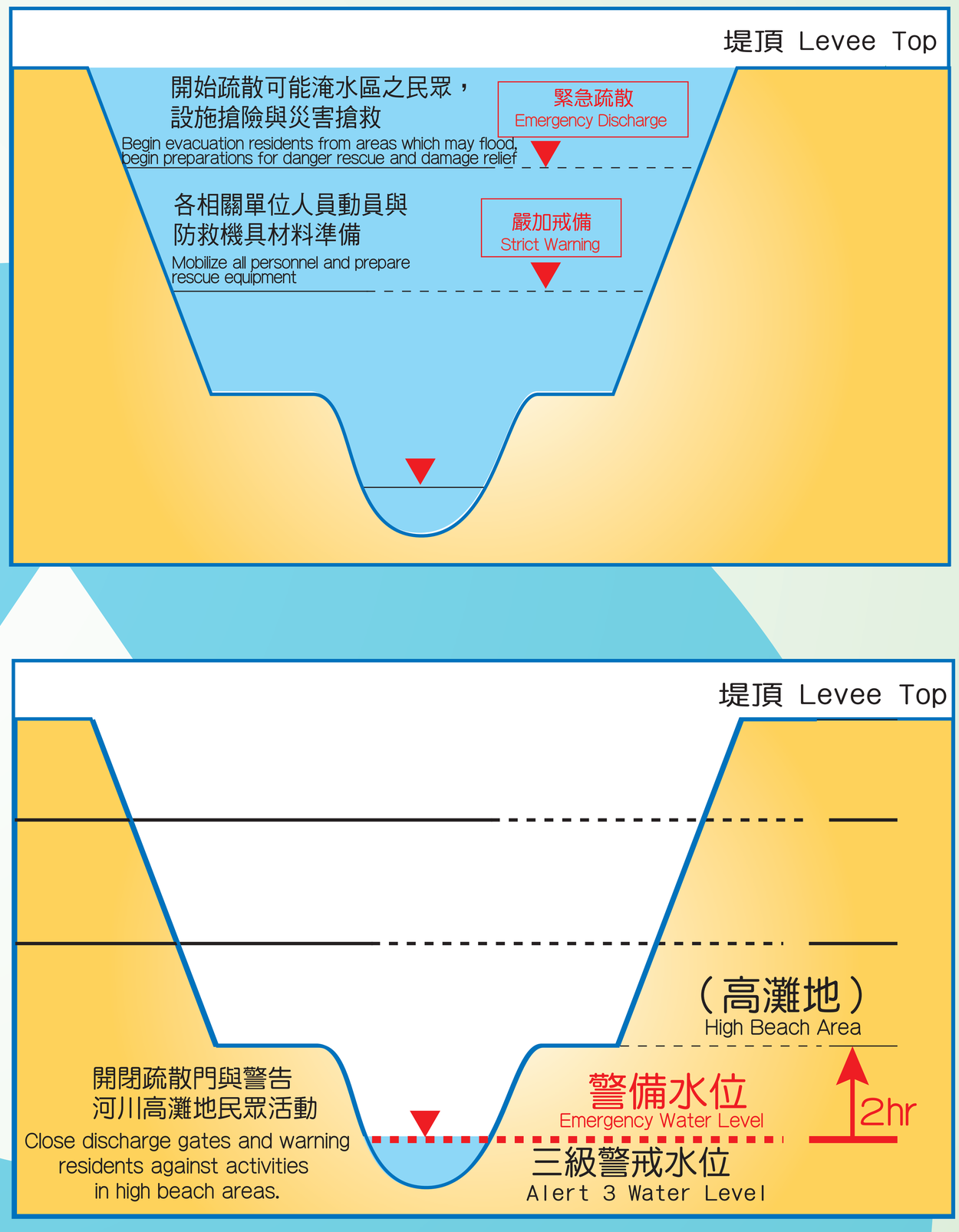
註：實線為已完成，虛線則尚在建構中。
Note: Solid Line Already Completed, Dotted Line Under Construction

洪水預報系統的警戒分級機制
Flood Alert System Warning Level Mechanism

洪水預警報系統三級警戒水位定義
(以淡水河為例)

Definitions of Flood Prediction Systems Three Levels of Alerts
(ex : Tanshui River)

警戒水位與河道斷面關係示意圖
Alert Water Level and River Cross-Section Chart



三級警戒水位：係為水防準備
當河川水位未來二小時內可能超過高灘地高程
立即通知縣市政府關閉水門、疏散門及抽水站
準備防汛工作，民眾應離開行水區。

Alert Level 3 Water Level: Refers to preparation level for possible flooding. Indicates that within the next two hours the water levels may surpass the highest level along the riverbank, and local government must be notified to close water gates and discharge gates, and that pumping stations should prepare for flood waters. Residents should leave water flow areas.

二級警戒水位：
即表示未來五小時河川水位可能超過現堤岸高程時，
疏散低窪地區居民，各防汛單位動員準備防救災機具材料
及嚴加戒備。並管制橋樑、封堵涵洞及啟動防汛應變措施。

Alert Level 2 Water Level: Indicates the river's water level may surpass the dike levels within five hours. Low-lying residents should be evacuated, all flood control agencies should mobilize flood prevention equipment and be sternly prepared. Plus, restrictions should be imposed on bridges, tunnels shut and flood control response system initiated.

一級警戒水位：
即河川水位已達到計畫洪水位，或未來二小時可能超過
現有堤岸高程之緊急水位時，決定疏散低窪地區居民時機
及開始疏散可能淹水民眾，設施搶險，災害搶救，
做緊急疏散措施。

Alert Level 1: The river's water level has already reached the predetermined flood level, or within 2 hours the water level may reach the emergency level and possibly exceed existing dikes. The time for evacuating low-lying areas and residents must be decided. In areas that may flood, plans must made to evacuate resident, begin relief and rescue operations and commence and emergency evavuations.

基隆河流域淹水警戒系統
Keelung River Basin Flood Warning System

台北縣、基隆市淹水警戒站分布
Distribution of Taipei County, Keelung City Flood Warning Stations

設置目的：
配合基隆河洪水預報系統及淹水預警系統之建置，將各警戒站目前淹水狀況回傳至淡水河防洪指揮系統，以適時提供決策者整合之資訊。

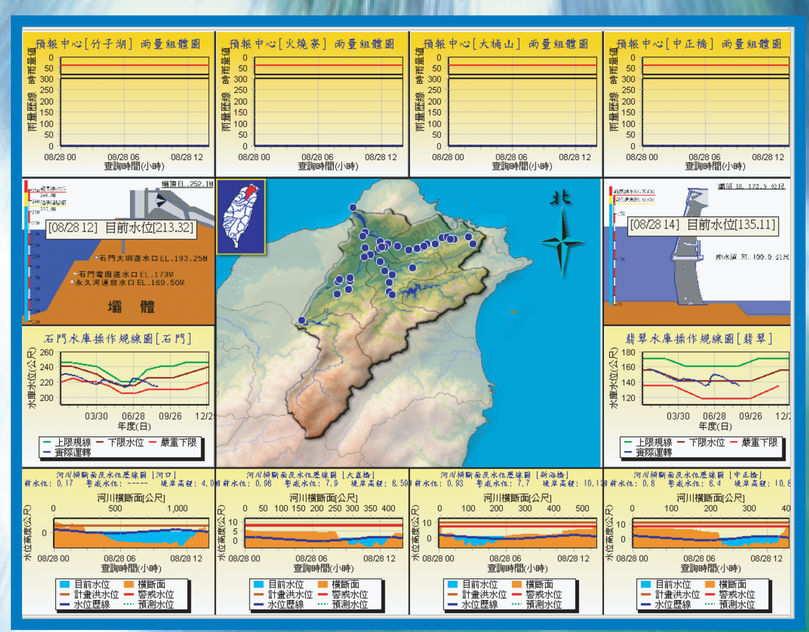
預期成果：
整合水文監測系統、洪水預報系統、淹水偵測及淹水潛勢資料成果。

Construction Goal:
Working in tandem with the completion of the Keelung River Flood Alert System and On-land Flood Alert System, it reports the current status of each warning station to theTanshui River Flood Command System to provide timely and integrated data to the decision makers.

Prediction Results:
Integrates the results from the Hydrological Monitoring System, Flood Alert System, Flood Detection and Flooding Potential.

架構說明：
1.由台北縣政府、基隆市政府分別在容易淹水地區架設淹水警戒站
2.當颱風豪雨事件發生，各淹水警戒站透過專用網路即時傳回目前各地區淹水深度
3.執勤人員使用淡水河流域防洪資訊暨展示系統，整合各地區雨量、水位、淹水資料快速掌握水情現況並可提供各縣市政府應變參考

Framework Explanation:
1. Taipei County and Keelung City governments each install flood-warning stations in areas prone to flooding.
2. During typhoons or torrential rainfalls, each flood warning station provides updates on floodwater depths via a dedicated network.
3. Personnel use the Tamshui River Basin Flood Data and Display system to collate rainfall, water level and flood data from each area and keep abreast of the current situation, and then provide this to the county and city governments for their reference and response.



創新思維・再造水利新願景

Innovative Thinking - Rebuilding a New Future for Water Resources

落實水岸環境改善，復育近自然水環境。

Implementing Improvements to Shoreline Environment, Rebuilding Water Conditions of Nearby Environment

涵養水土，保育地下水，提升水源利用效率。

Controlling Water and Soil, Conserving Underground Water, Improving Utilization of Water Resources

推動回收再生利用，促進水源供應多元化。

Promoting Recycling and Reuse, Encouraging Diversified Water Supplies

合理有效使用水量，確保水源穩定供應。

Promoting General Water Conservation within Basin, Lowering Flood Disasters and Damage

推動流域綜合治水，降低淹水災害及損失。

Reasonable and Effective Water Use, Ensuring Stable Water Resource Supplies

Objective

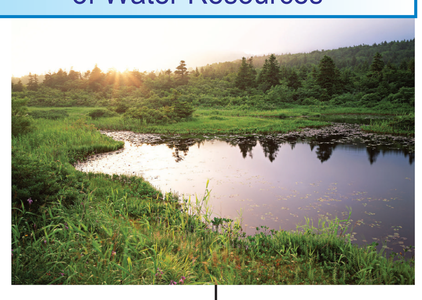
展望未來，水利署已提出流域整合治水、生態治河、水源開發水政管理一元化、多元化水資源管理等方案，作為工作指南。以「提供量足質優水資源」及「保障人民免於洪澇威脅」，為水利署責無旁貸的責任，和全體人民共同攜手，再造台灣水利新願景。

Looking to the Future, the Water Resources Administration has already proposed numerous solutions that serve as a guide for our work, including river basin integrated water conservation, ecological river control, unified water resource development and management and diversified water resource management. WRA's duty bound responsibilities are "Providing Sufficient Superior Water Resources" and "Protecting the Public from the Threat of Floods". We work together with the people to build a new future for Taiwan's water resources.

計畫架構 Framework of Plan

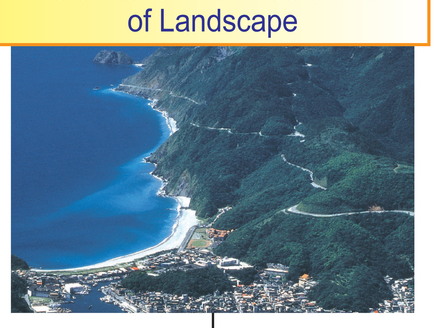
水資源與綠化工程 Water and Green Construction

水資源規劃與運用 Planning and Use of Water Resources



- 推動合理水價和水資源保育 — Promoting rational water price and water conservation
- 水資源分配與利用管理 — Allocation and operation management of water resources
- 水庫永續利用 — Sustainable use of reservoir
- 多樣化的水資源開發 — Diversity of water sources development

景觀改造與復原 Reformation and Restoration of Landscape



- 國土規劃 — National land planning
- 生態復原與造林 — Ecology restoration and forestation
- 生態河流與水資源復原工程 — Ecological river and water rapprochement construction
- 海岸生態復原與環境改善 — Coast ecology restoration and environment improvement
- 城鄉地景復原 — Landscape Reformation of city and town

開發可再生能源 Developing Renewable Energy

- 推動可再生能源立法 — Promoting renewable energy legislation
- 推動可再生能源研發應用 — Promoting R&D & application of renewable energy
- 太陽能城市 — Solar city
- 風力農場 — Wind-power farm
- 地熱園區 — Geothermal park

污水處理系統工程 Sewage System Construction

綠化工程計畫 Green Construction Plan

- 綠色建築 — Green Building
- 校園永續發展永續工程 — Sustainable campus sustainable construction
- 推動生態工程 — Promoting ecological engineering
- 推動公共工程利用可再生工程資源 — Promoting renewable construction resources in public construction