

# UK perspective on planning for water security

Visit to CEH Wallingford

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Wednesday 17<sup>th</sup> February 2016

# Structure

Introduction & background

Water Security – common principles

UK Public Water Supply (PWS):

- water resource planning
- drought planning
- *wastewater planning*

Looking ahead, planning for the future

Discussion - Q&A

# Atkins at a glance

Atkins is one of the world's leading design, engineering and project management consultancies.

Atkins has the depth and breadth of expertise to respond to the most technically challenging and time-critical infrastructure projects and the urgent transition to a low carbon economy.

In 2013 Atkins celebrated 75 years in business. At November 2015, Atkins employed over 18,000 staff worldwide, with over 1,800 in the Asia Pacific regions



# Water security – common principles

Common principles apply across:

- different climates
- different spatial scales
- range of physical characteristics
- range of environmental characteristics
- socio-economic circumstances;
  - Mega-cities, urban, rural
  - Consumptive use; agriculture
  - Non-consumptive uses; domestic, industrial, service sector, cooling, transportation, aquaculture

# Water security – common principles

Conceptual understanding developed through knowledge of:

- Hydrology and climate
- Regulation – e.g. water drawing permits, discharge permits
- Environmental pressures
- Infrastructure – reservoirs, groundwater boreholes, diversions, intakes, discharges, transfers

Effective planning achieved through:

- Robust spatial and timeseries data
- Models built on sound conceptual understanding
- Assessment of uncertainties and risk
- Policy and strategy, both short-term and long-term

# UK Public Water Supply (PWS) – water planning

## STATUTORY PLANS:

### Water Resource Management Plan (WRMP):

- every 5 years
- sets out investment to ensure balance of supplies and demands over a 25-year planning period, but now looking further ahead

### Drought Plan:

- every 5 years – timing now aligned with WRMP
- measures to be taken under more extreme conditions than assumed for WRMP

## REGULATORY PLANS

- Business Plan/Asset Management Plan (AMP): every 5 years: water supply and wastewater

# UK Public Water Supply (PWS) – water planning

Permissions – some long-standing (WRA 1963) but reviewed to meet changing environmental drivers

- Abstraction licences
- Discharge consents
- Can seek derogations under extreme conditions – Drought Order, Drought Permit

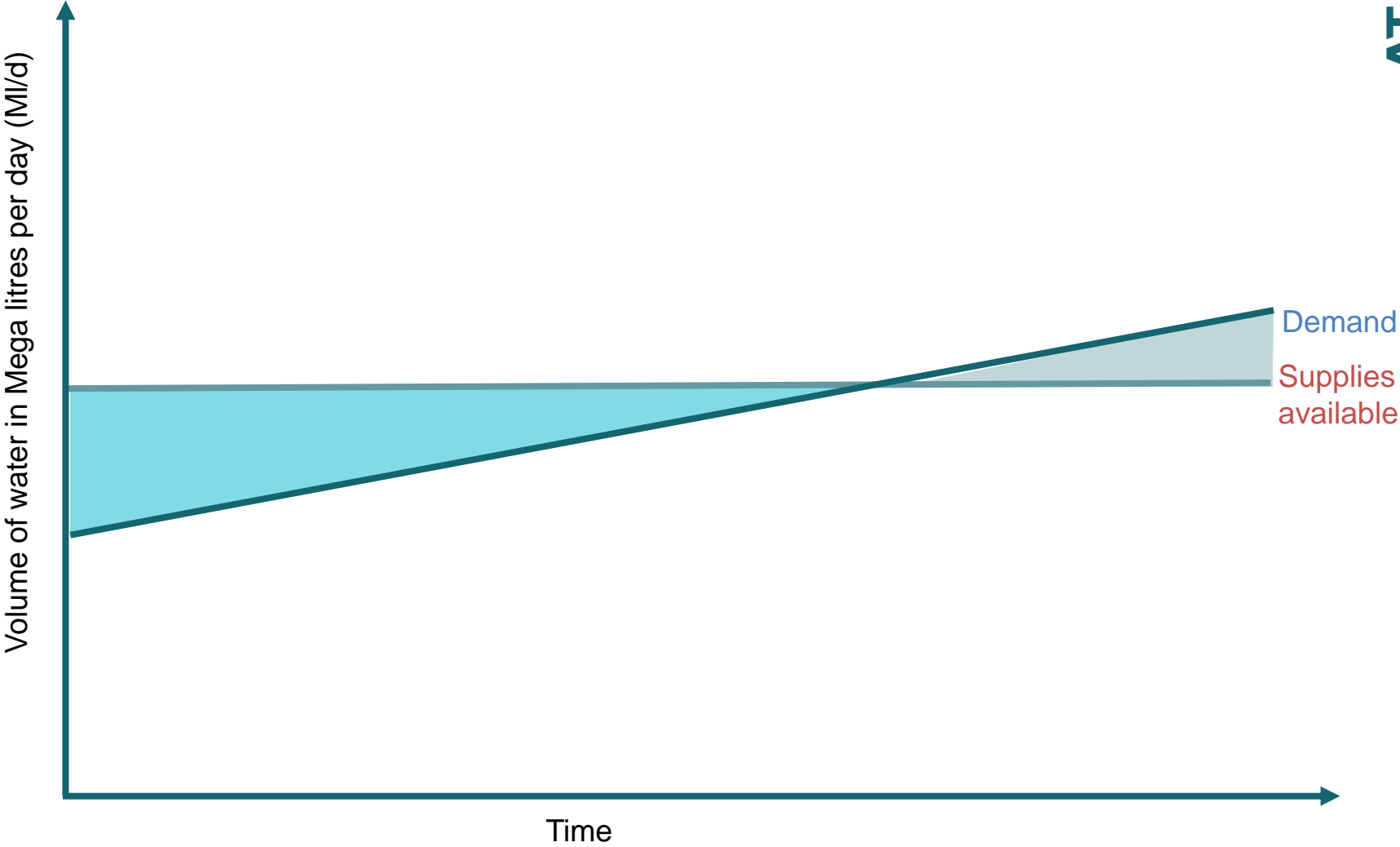
Environmental drivers:

- European Directives:
  - Water Framework Directive (WFD) – 6 year RBMP
  - Habitats Directive
  - Strategic Environmental Assessment (SEA)
- National initiatives:
  - Sites of Special Scientific Interest (SSSI)
  - Biodiversity Action Plan (BAP)
  - Etc.

Climate and Hydrology Demands

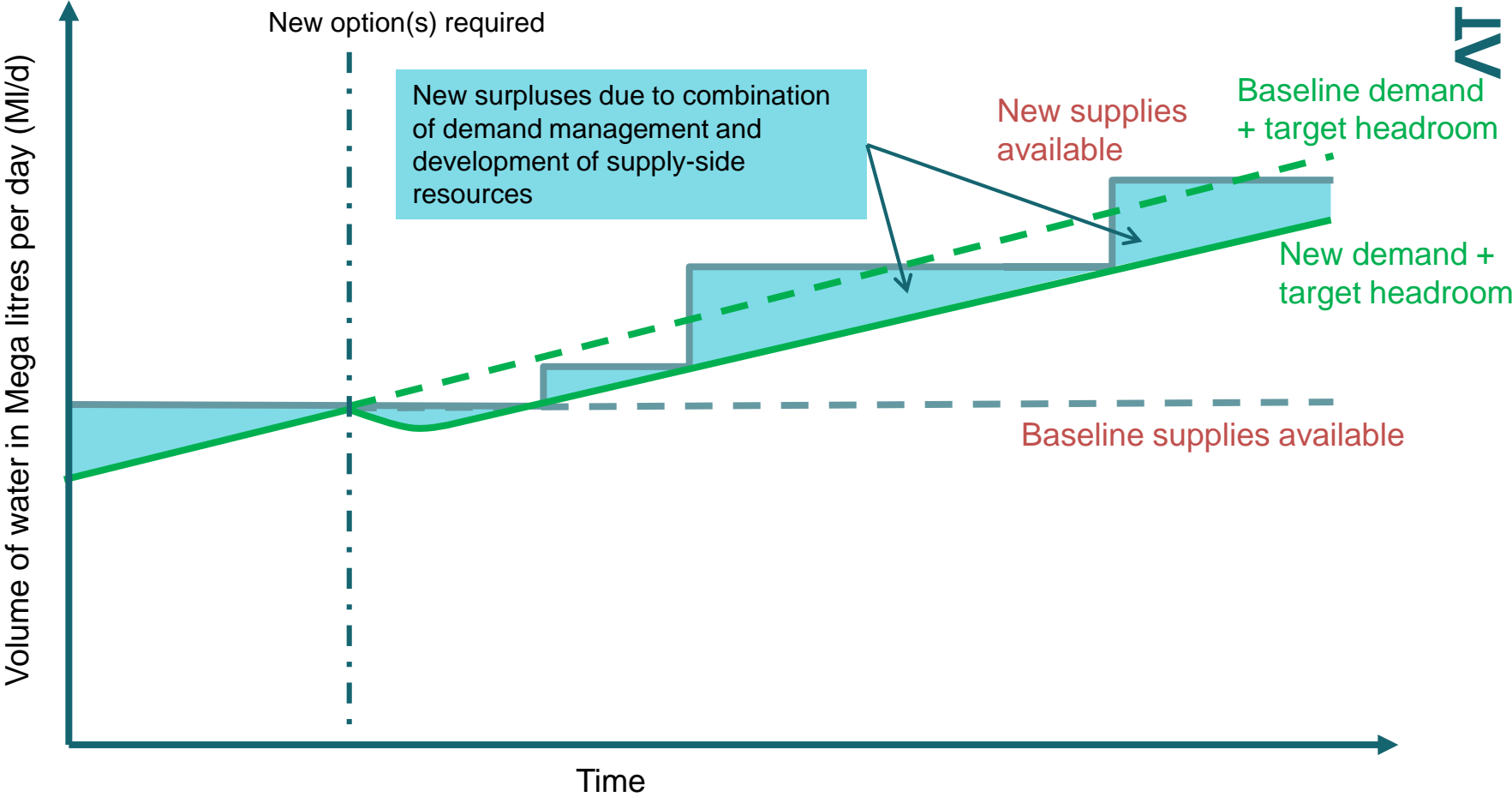


# Baseline supply demand balance:





# Balancing supplies and demands: new supply-side infrastructure and demand management



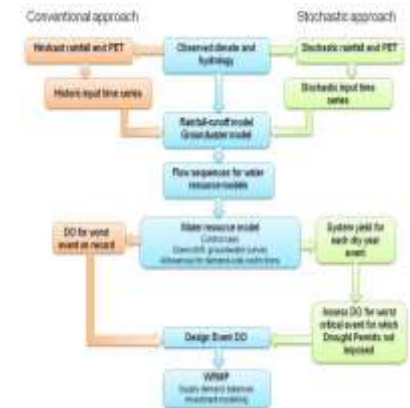
# UK PWS - water planning calculating water availability

Data:

- Abstraction licences – water drawing permits
- Hydrology – long-term rainfall and flow records
- Hydrogeology
- Existing abstraction, treatment and distribution infrastructure
- Operating rules

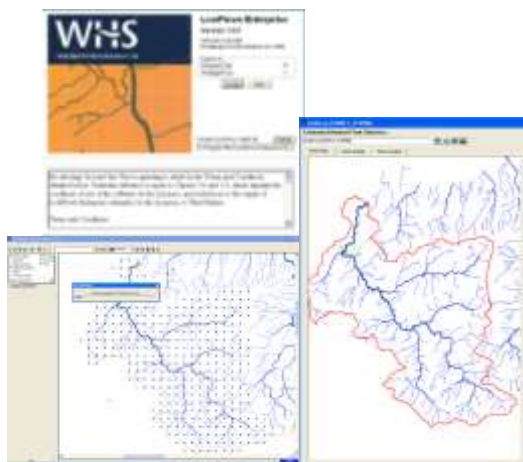
Water resource simulation models:

- supplies available under different design conditions

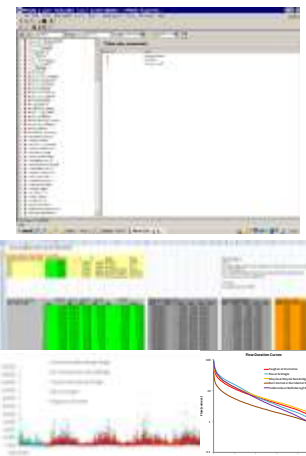


# UK PWS - Modelling supply availability

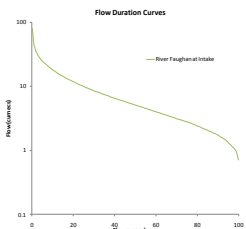
## Hydrology



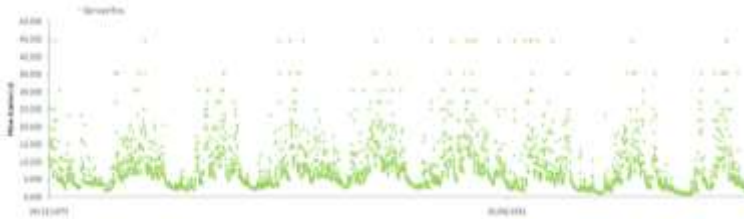
Catchment maps & Conceptual understanding



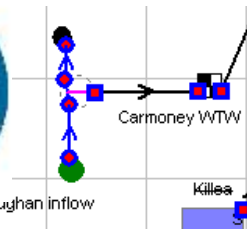
LowFlows Enterprise



Estimated mean daily flow timeseries at licensed intake

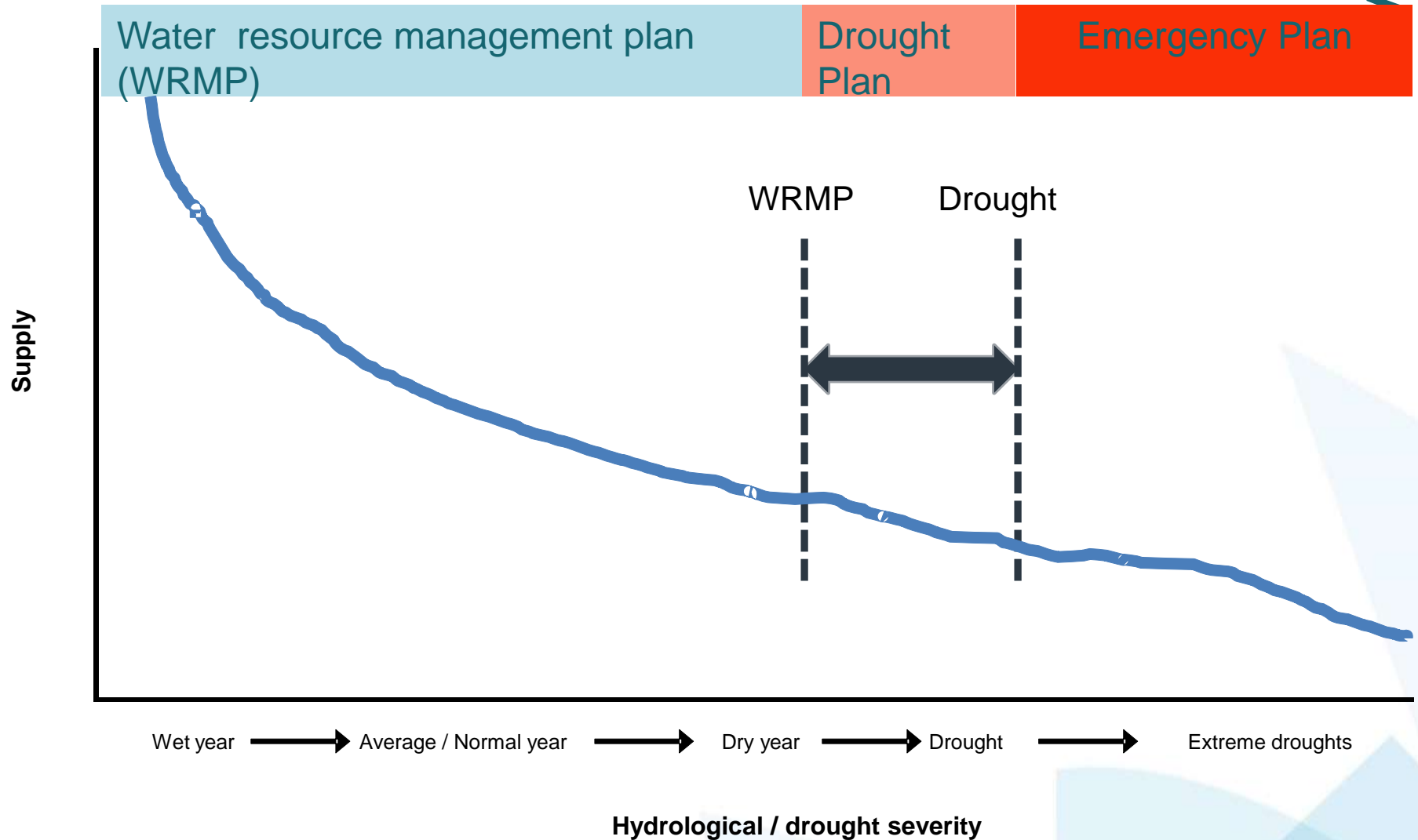


Import to Aquator



# UK PWS

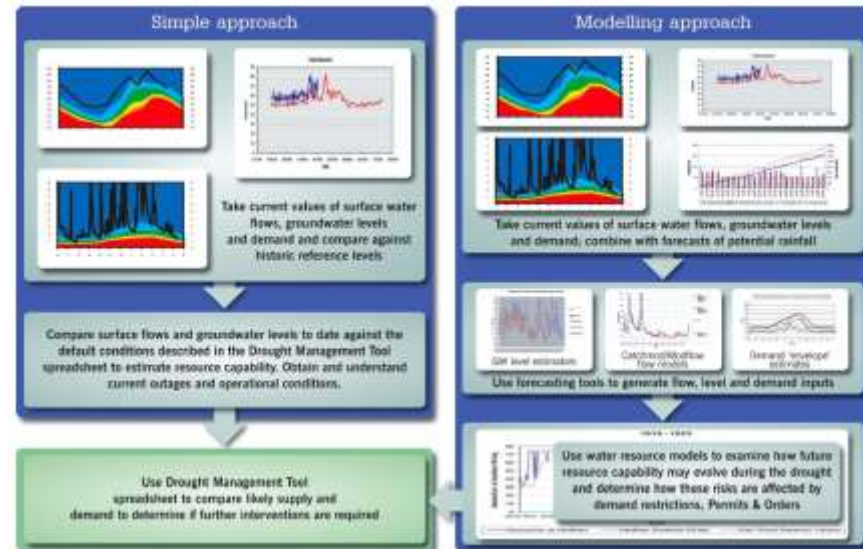
## water resource planning – design condition





# Recap - Planning for water security

- Balance supplies and demands:
  - Water resource infrastructure
  - Distribution infrastructure
  - Allocation at times of shortage
  - Response to evolving conditions
  - Protection from flooding
  - Protecting water quality





# UK PWS - Drought Management

What happens if hydrological events are more severe than planned for in the WRMP?

Water company Drought Plans:

- define measurable triggers for action to be taken
- additional demand management
- restrict consumption
- relax abstraction licence permissions subject to environmental constraints

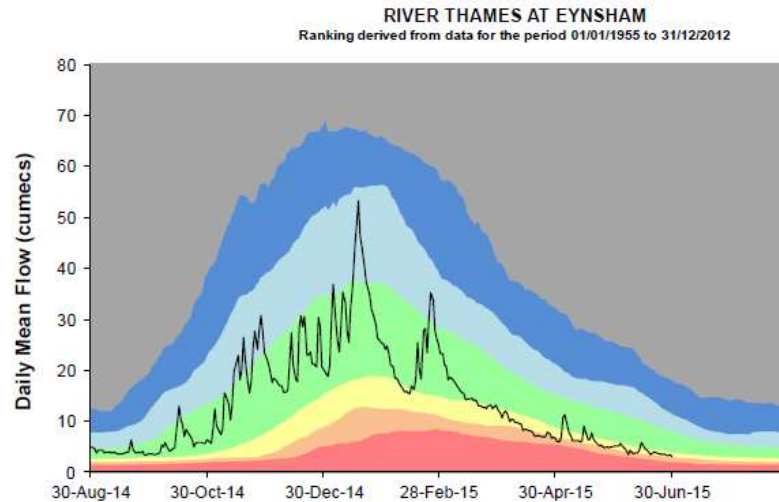


# UK PWS - Summary of relationships & phasing of drought monitoring & analysis tools

	Normal	Impending drought	Drought conditions	Severe Drought
<b>Monitoring:</b> <ul style="list-style-type: none"> <li>•Hydrology &amp; Environment</li> <li>•Rainfall</li> <li>•Operational status</li> </ul>				
<b>Tools &amp; analysis used:</b> <ul style="list-style-type: none"> <li>Rainfall deficit</li> <li>Flows &amp; river levels</li> <li>Supply demand balance deficit</li> </ul>				
<b>Triggers:</b> <ul style="list-style-type: none"> <li>Supply demand balance</li> <li>Flows and levels</li> <li>Rainfall deficit</li> </ul>				
<b>Interventions:</b> <ul style="list-style-type: none"> <li>Restrict demands</li> <li>Communications</li> <li>Increase supplies</li> </ul>				



# Situation reports – use to illustrate triggers: July 2015



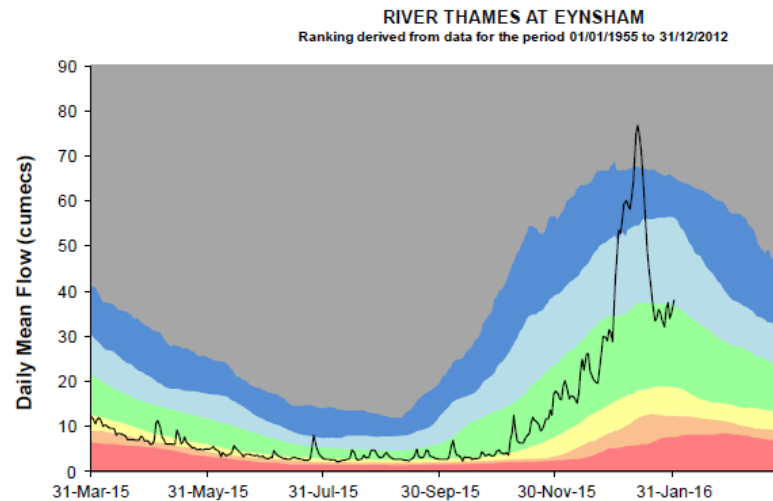
Exceptionally high  
Below normal

Notably high  
Notably low

Above normal  
Exceptionally low

Normal  
— Latest data

# Situation reports – use to illustrate triggers: January 2016



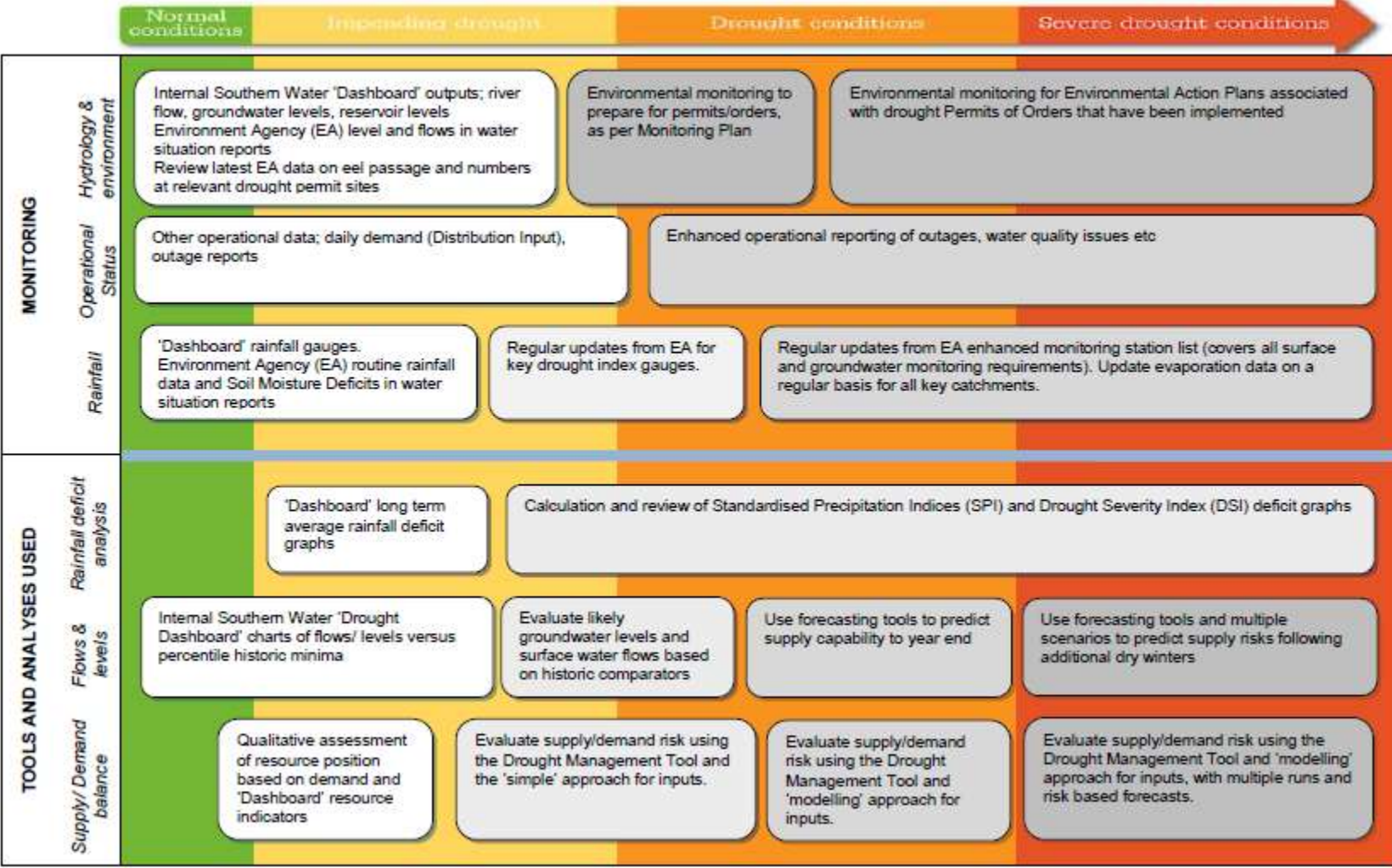
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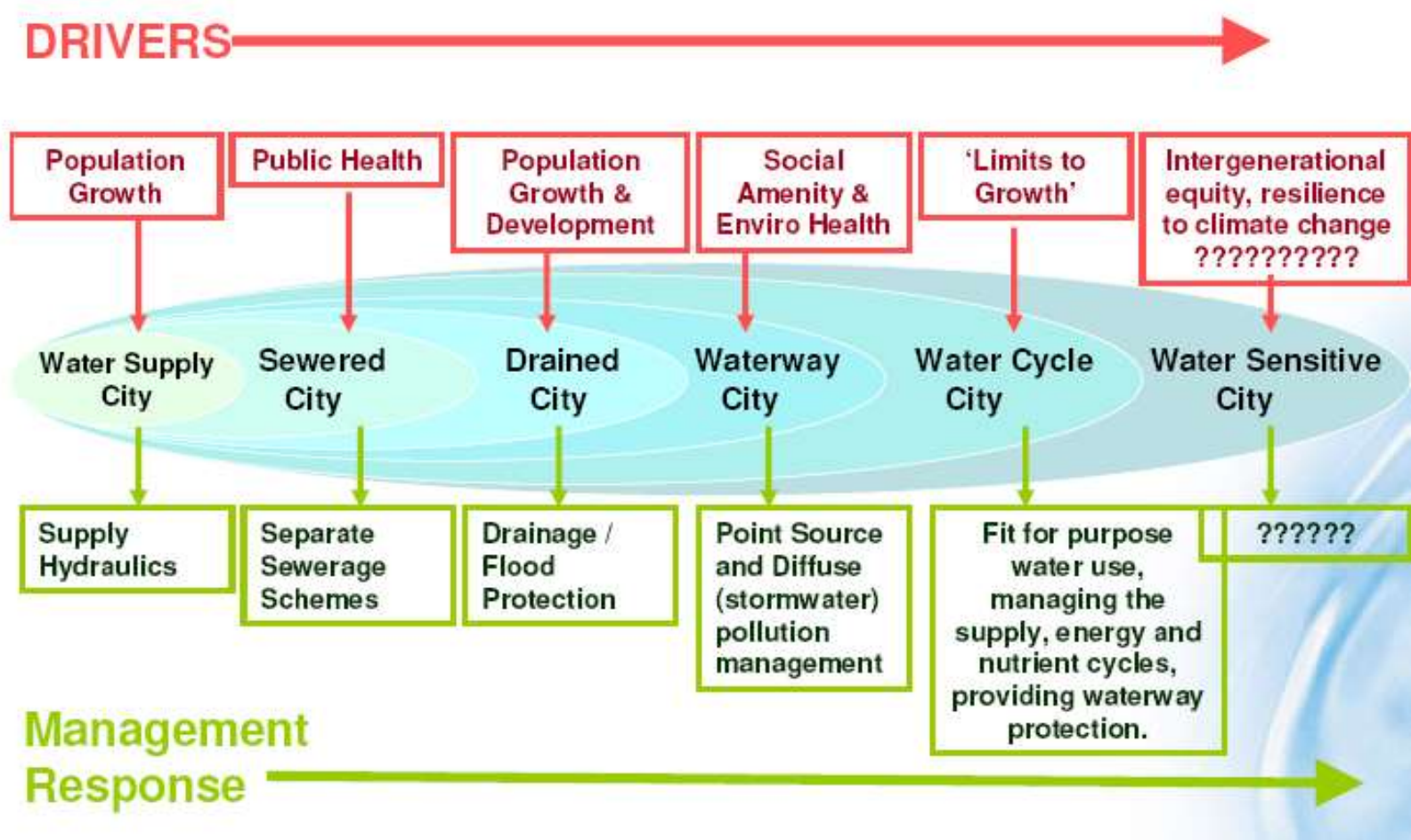
Above normal  
Exceptionally low

Normal  
— Latest data

# Extract to illustrate UK PWS drought management phasing



# Vision towards more resilient cities



# Planning for the future water security

## Assess uncertainties

- Climate variability & climate change
- Water & environmental quality
- Economy
- Socio-economics

## Balance risks

- Resilience
- No-regrets infrastructure
- Data and information
- Technical skills; hydrology, engineering, water quality etc.

## Challenge current approaches

# Planning for the future water security

## Requires

- Clear long-term objectives from which to develop appropriate strategy
- Prioritised programme developed to deliver immediate benefits
- Leading edge technical expertise
- Robust timeseries and spatial data
- Conceptual understanding to underpin model development and application
- Effective regulation and enforcement
- Stakeholder engagement and buy-in

## UK perspective on planning for water security

Questions and discussion