Managing Water Services
Response to Drought 2018

22.11.2018

Tom Cuddy
Major Emergency Management Conference, Athlone
Overview

- Drought IW CMT 25\textsuperscript{th} June – 27\textsuperscript{th} Sept.
- 130 WSS at Drought/Emergency, 151 at Risk.

Presentation Format

1. Context
2. Evolving Situation / Response / Outcomes
3. Review
1. Context
1.1 Context: IW Assets and Service Statistics

- 790 Water Treatment Plants
- 1.7 billion litres per day
- 3.3 million population on public water supply
- 1105 Wastewater Treatment Plants
- 31 Local Authorities
- C. 3000 Water Services Operational Staff
<table>
<thead>
<tr>
<th>Incident</th>
<th>CMT Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storm Darwin</td>
<td>12\textsuperscript{th} to 18\textsuperscript{th} February 2014</td>
</tr>
<tr>
<td>Lough Mask</td>
<td>31\textsuperscript{st} August 2016 to 13\textsuperscript{th} September 2016</td>
</tr>
<tr>
<td>Staleen I</td>
<td>20\textsuperscript{th} July 2017 to 28\textsuperscript{th} July 2017</td>
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<tr>
<td>Storm Ophelia</td>
<td>16\textsuperscript{th} October 2017 to 23\textsuperscript{rd} October 2017</td>
</tr>
<tr>
<td>Vartry Chlorination</td>
<td>29\textsuperscript{th} January 2018 to 1\textsuperscript{st} February 2018</td>
</tr>
<tr>
<td>Storm Emma</td>
<td>28\textsuperscript{th} Feb 2018 to 13\textsuperscript{th} March 2018</td>
</tr>
<tr>
<td>Staleen II</td>
<td>30\textsuperscript{th} May 2018 to 5\textsuperscript{th} June 2018</td>
</tr>
<tr>
<td>Drought 2018</td>
<td>25\textsuperscript{th} June 2018 to 27\textsuperscript{th} September 2018</td>
</tr>
</tbody>
</table>
1.3 Context: IW Incident Management Procedures

- IW Activities
  - IW Emergency Response Plan (HSQE-SOP-025)
  - IW Protest Response Plan (HSQE-SOP-39)
  - IW Crisis Response Plan (HSQE-SOP-036)
  - LA Procedures
  - Local Major Emergency
  - Regional Major Emergency Plan
  - National Major Emergency Plan
- SLA Activities
  - IW/LA Incident Management Protocols
  - IW/LA EPA Incident Reporting Protocols IW-PRT-EPA-001 & 002
- DBO Sites
  - DBO Procedures
  - IW/LA Incident Management Protocols
- Contractor Sites
  - Contractor Procedures
- Contractors Emergency Response Plan

Communications Incident Management Procedure CCS-SOP01
1.4 Context: IW Incident Management Structures

Objectives
1. Service Continuity
2. Fix Problem
3. Communications
2. Evolving Situation / Response / Outcomes
2.1 Preparedness: Pre-Incident

- Corporate Risk Register
- Incident Management Procedures
- Asset Management / Asset Stewardship Structures
- Water Resources Strategy
- Supply / Demand Headroom Knowledge
- Predictive Modelling
- Operational Knowledge / Vulnerable Supplies
- Production / Demand Monitoring - Telemetry
- Data / Information / Reporting Systems
- Weather Patterns / Forecasts / Warnings
- Year-Round Drought-Watch Arrangements
2.2 Establish Crisis Management Team

Objectives

1. Service Continuity (LA/IW)
2. Fix Problem (IMT+)
3. Communications (CMT+)
2.3 Incident Initiation and Escalation
2.4.1 Situation: Rainfall

North / West Region: Connacht Area Rainfall 2018

East / Midlands Region: GDA Area Rainfall 2018

Southern Region: South Central & South-East Area Rainfall 2018

Source: Met Eireann
## 2.4.2 Situation: River Flows

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NW</td>
<td>76</td>
<td>50</td>
<td>37</td>
<td>26</td>
<td>30</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>EM</td>
<td>43</td>
<td>29</td>
<td>23</td>
<td>25</td>
<td>32</td>
<td>23</td>
<td>28</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>S (ex Clare)</td>
<td>81</td>
<td>53</td>
<td>34</td>
<td>53</td>
<td>56</td>
<td>56</td>
<td>56</td>
<td>44</td>
<td>7</td>
</tr>
<tr>
<td>Clare</td>
<td>13</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total No</td>
<td>213</td>
<td>135</td>
<td>94</td>
<td>104</td>
<td>119</td>
<td>85</td>
<td>90</td>
<td>74</td>
<td>25</td>
</tr>
<tr>
<td>Total as % of 276 Stations</td>
<td>77%</td>
<td>49%</td>
<td>34%</td>
<td>38%</td>
<td>43%</td>
<td>31%</td>
<td>33%</td>
<td>27%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: OPW
2.4.3 Situation: Water Availability (Supply)
2.4.4 Situation: DI (Demand)

The graph illustrates the demand and source capacity over a period, with the source capacity set at a baseline level. The demand fluctuates around the base demand, showing variations over time.
2.4.5 Situation: Drought Tracker Accumulator

<table>
<thead>
<tr>
<th>Region</th>
<th>Waterbody Type</th>
<th>Drought / Emergency (Severe Drought) 25.06.18 - 27.09.18</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Midlands</td>
<td>Surface Water</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>21</td>
</tr>
<tr>
<td>North West</td>
<td>Surface Water</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>34</td>
</tr>
<tr>
<td>Southern</td>
<td>Surface Water</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>76</td>
</tr>
<tr>
<td>National</td>
<td>Surface Water</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Groundwater</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>131</td>
</tr>
</tbody>
</table>
2.5.1 Response: Immediate Measures

- Water Conservation Orders
  - (1st July, 4th July, 1st Aug, 1st Sept – 25th Sept)
- Alternative Water Supplies
- Water Conservation Campaign
- In-flight Projects Adjustments
- Leak Detection and Repair Intensification
2.5.2 Response: Leak Repair Statistics

7 Day Moving Average: Leak Investigation / Leak Repaired

Note: Customer Reactive WF Stats only
2.5.3 Response: Pressure Restrictions
### 2.5.4 Response: Plan on a Page

**Plans on a page were developed for the following:**

1. Greater Dublin Area (GDA)
2. Galway City
3. Glashaboy (Cork)
4. Foynes Shannon Estuary
5. Athlone
6. Mullingar
7. River Boyne Abstractions
8. Portlaoise

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Escalations from Level 2</th>
<th>Level 4 DI Target 500 Ml/d (7-day rolling average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Management</td>
<td>Change WSZ Boundaries to minimise BME and Ballyboden water: Re-zone at Stillorgan, North City, West City, Leixlip, Clondalkin, Old Kilcullen.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Leaks</td>
<td>Additional LAS, Full mobilisation</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>New PRVs</td>
<td>Increase no. of PRVs when none are currently in place.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Shuts</td>
<td>Night-time full shuts with network recovery characteristics.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Level 5 Escalation Options</td>
<td>Extended major water shut offs. Reduce Depressures – Water Stations, Civil Defence/Army</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Water Treatment</td>
<td>Increased production from abstraction points at Stillorgan, Ballyboden, Leixlip, Kildare Wellfields.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Customer</td>
<td>Water Conservation Public Campaign.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Resources</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
### 2.5.5 Response: Key Stakeholders

<table>
<thead>
<tr>
<th>Agency</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>NECG</td>
<td>IW, DHPLG, OPW, ESB, EPA, IFI, HSE.</td>
</tr>
<tr>
<td>ESB</td>
<td>Liffey, Lee</td>
</tr>
<tr>
<td>CRU</td>
<td>Finance / Emergency Expenditure</td>
</tr>
<tr>
<td>EPA</td>
<td>River gauges, Drinking Water Compliance, WW Compliance</td>
</tr>
<tr>
<td>OPW</td>
<td>River gauges</td>
</tr>
<tr>
<td>IFI</td>
<td>River levels, abstractions, temperature of rivers</td>
</tr>
<tr>
<td>HSE</td>
<td>Drinking Water</td>
</tr>
<tr>
<td>Met Eireann</td>
<td>Forecasts / Communications</td>
</tr>
<tr>
<td>Emergency Services</td>
<td>Fire Services / Civil Defence</td>
</tr>
<tr>
<td>WWI</td>
<td>Canal Feeds and Abstractions</td>
</tr>
<tr>
<td>NPWS</td>
<td>SACs</td>
</tr>
<tr>
<td>NFGWS</td>
<td>Public GWS Sources / Private GWS Sources</td>
</tr>
<tr>
<td>IFA/ICMSA/Teagasc</td>
<td>Agricultural Users</td>
</tr>
<tr>
<td>IBEC / Chambers</td>
<td>Business Users</td>
</tr>
<tr>
<td>NIW / SW</td>
<td>Cooperation / Procedures</td>
</tr>
<tr>
<td>Public Representatives</td>
<td>LRSD (Local Representatives Service Desk) Communications</td>
</tr>
</tbody>
</table>
## 2.5.6 Response: Domestic Customers

<table>
<thead>
<tr>
<th></th>
<th>GDA</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>+ 32 lpd</td>
<td>+ 32 lpd</td>
</tr>
<tr>
<td>July</td>
<td>- 3 lpd</td>
<td>+ 23 lpd</td>
</tr>
</tbody>
</table>
2.5.7 Response: Large Customers

- Top 1000 Customers – Review and Benchmark
- Meter-reading – Leak alarms and increased use
- Data-loggers installation on customer meters
- Specific very large customers – particular issues
- Campus sites
- Dept of Education / Schools – turn off water
- HSE Storage capacity – 80 priority sites
2.5.8 Response: Press / Media

July – August 2018

- 95 media queries.
- 80 broadcast interviews.
- 171 statements and press releases.
- 13,000 pieces of media coverage.
2.5.9 Response: Customer Call-Centre

<table>
<thead>
<tr>
<th>Water Conservation Order Queries</th>
<th>Vulnerable Customer Calls (Outbound)</th>
<th>First Fix Cases Raised (Private-side Leaks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ July – 1,147</td>
<td>➢ May - 2622</td>
<td>➢ May - 946</td>
</tr>
<tr>
<td>➢ Aug - 432</td>
<td>➢ June – 2334</td>
<td>➢ June – 1091</td>
</tr>
<tr>
<td>➢ Sept – 169</td>
<td>➢ July - 3435</td>
<td>➢ July - 2132</td>
</tr>
<tr>
<td></td>
<td>➢ Aug - 1779</td>
<td>➢ Aug - 2423</td>
</tr>
<tr>
<td></td>
<td>➢ Sept – 1615</td>
<td>➢ Sept – 2045</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Conservation Order Reports</th>
<th>Reduced Water Pressure Calls</th>
<th>Leak Calls (Public-side Leaks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ July – 402</td>
<td>➢ May - 426</td>
<td>➢ May - 1171</td>
</tr>
<tr>
<td>➢ Sept – 29</td>
<td>➢ July - 529</td>
<td>➢ July - 1480</td>
</tr>
<tr>
<td></td>
<td>➢ Aug - 735</td>
<td>➢ Aug - 1075</td>
</tr>
<tr>
<td></td>
<td>➢ Sept – 586</td>
<td>➢ Sept – 618</td>
</tr>
</tbody>
</table>
2.5.10 Response: IW Website
2.5.11 Response: Drinking Water Compliance

- Scouring programmes and reservoir cleaning were suspended.
- Maintaining Chlorine residuals was the key issue due to temperature.
- Increases in Turbidity levels in ground water sources due to low water tables.
- One Precautionary BWN issued due to Drought (Turbidity exceeded threshold at one borehole).
2.5.12 Response: Water Resources Interventions
2.5.13 Response: Asset Planning: Surface Water

- Emergency Hydrometrics
  - ~280 sites visited relating to 236 assets (158 DW & 78 WW) and 12 priority locations on the R. Liffey.
  - ~200 successful hydrometric gauging’s
- Wastewater Hydrometric Surveys
  - Additional 100 sites.
- Pollaphuca Bathymetric Survey & WQ sampling surveys.
- 21 reports issued to the IFI assessing impact of low flow interventions. 5 on-site meetings held with IFI.
- Remediation reworks at Freemount and Clogh / Castlecomer…
• Groundwater Abstraction Sites (121 No.)
  – 11 Trial Wells.
  – 5 Rehab of existing BHs
  – 67 Technical surveys and audits.
  – 23 desk-studies
  – 15 No further action
  – …
2.5.15 Response: Wastewater

- 29 WWTPs treatment was compromised +17 at risk.
- 27 WWTPs rivers compromised (low dilutions).
- Optimisation of treatment processes (increased retention / aeration / desludging).
- No impact on DW abstractions.
- 4 plants required tankering of effluent.
- 15 Odour issue locations. Generally Network and PS.
2.6.1 Outcome: Demand Reductions

1. Customer Demand Reduction
2. Pressure Management
3. Network Management
4. Leakage Management
5. Water Conservation

GDA Demand: 7 day Moving Average (Blue) & DI

- CMT Start
- Source Capacity Reduction
- Base Demand

- 01/05/2018
- 02/05/2018
- 03/05/2018
- 04/05/2018
- 05/05/2018
- 06/05/2018
- 07/05/2018
- 08/05/2018
- 09/05/2018
- 10/05/2018
- 11/05/2018
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- 26/06/2018
- 27/06/2018
- 28/06/2018
- 29/06/2018
- 30/06/2018

500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650

- Demand
- 7D-MA
2.6.2 Outcome: Data & Information
2.6.3 Outcome: Data Analysis / Applications
2.6.4 Outcome: Predictive Modelling
3. Review
3.1 Review: Post Incident Review

- Lessons Learned and Applied
- Incident Management Procedures & Tools
- CMT Structures
- Integrated Reporting
- Key Stakeholders Engagement
- Data Management Systems and Trackers
- Water Resources Strategy Reality-Check
- Asset Investment Programmes
- Standard Design Improvements
3.2 Review: What-If (eg Different Starting Point)
3.3 Review: Preparation (eg 2-year drought)

Vartry Water Treatment Plant May-Aug Rainfall (mm) 1866-2018

- 1975-76
- 2018
4. Recap
4.1 Presentation Recap

- Context
- Evolving Situation / Response / Outcomes
- Review

Thank You