Cork Strategic Water Study

Water Services Bill 2003

- Section 36 (2)

- “each water services authority shall, not later than such date as may be prescribed, make a water services strategic plan with regard to the provision of services in it functional area and submit it to the Minister for approval”.

Strategy Objectives and Scope

1. Strategy Objectives and Scope
2. Baseline Demand
3. Water Conservation & Demand Management
4. Future Demand Projections
5. Source Assessment
6. Strategic Models
7. General Levels of Service and Performance Indicators
8. Regional Water Supply Recommendations

Objective
- Blueprint for the development of the water supply infrastructure in the Greater Cork area over the next 25 years.

Background
- Cork Area Strategic Plan (CASP) 2001
- National Spatial Strategy
- County & City Development Plans

Legislative
- 2000 Drinking Water Regulations
- Water Framework Directive

Study Area

2 LA’s
5 Admin Areas
370,000 Pop.
Cork Strategic Water Study - Major Schemes

- Geo-Directory
  - Residential Properties
  - Commercial Properties
- Council Meter Billing Records for consumers using > 1,000 m³/year
- CSO Livestock Census – 2000
- 2000 National Water Study
- 2002 Census

Cork Strategic Water Study - Key Requirements

- Robust Supply / Demand Model for 2003, 2013, 2028
- Demand Management Plan (Water Conservation Programme)
- Asset Management Plan (Monitoring & Rehabilitation)
- System Capacity & Upgrading Needs (Capital Programme)
- Operational Management Plan (Standards and Levels of Service)
- Economic Implications (Capex, Opex & Implementation Plan)

Cork Strategic Water Study - Water Balance

Baseline Demand

Cork Strategic Water Study - Scheme Sub-Division
Cork Strategic Water Study - Innishannon WSS

Cork Strategic Water Study - Large Metered

Cork Strategic Water Study - Medium Metered

Cork Strategic Water Study - Geo-Directory

Cork Strategic Water Study - Example Carrigaline

Cork Strategic Water Study - Domestic Demand

For Carrigaline Town

- Number of Households: 2676
- Number of Commercial Properties (from GD): 239
- Number of Large Metered Consumers: 8
- Number of Small Consumers: 231
- Number of Connections (buildings from GD): 2760

Domestic Demand =

No Households x Occupancy Rate x Per Capita Consumption

Occupancy Rate from 2002 Census & Household Count from Geo-directory.

PCC taken from 2000 National Water Study:
- County: 138 l/property/day
- City: 141.7 l/property/day
6. Climate Change

5. Environmental

4. Asset Conditions

3. EU / National Policy

- Commercial/Industrial
  - Large (>10Ml/yr)
  - Medium (1Ml/yr & < 10Ml/yr)
  - Small (< 1 Ml/year) = No of Consumers x Base Demand of 580licon/day

- Agricultural (unmetered allowance)
  - Livestock numbers x base water usage

- Water Conservation
  - Operational, 1.32Ml/d, 1%
  - Domestic, 43.74Ml/d, 26%
  - Industrial & Commercial, 58.48Ml/d, 35%
  - Unmet, 65.20Ml/d, 38%

- Demand Management:
  - Active Leakage Control (Detect & Repair)
  - Pressure Management – Reduce Losses
  - Asset Management (Planned Rehabilitation)

- Tariff Control
- Awareness & Promotion of Water Saving
- Demand Reduction

- Water Conservation & Demand Management

- Water Conservation:
  - 'Polluter Pays' Objective
  - Rising Demand can be Serviced
  - Deferred Capital Savings (Long Run - LR ELL)
  - Increasing Age Impacts on Leakage
  - Permits Reduced Abstractions
  - Ability to cope with Droughts

- Estimated Unaccounted for Water (UFW) 65.2 Ml/d
- % UFW 38%
- % UFW excluding large metered consumers 48%

- Population 299,650
- Properties 126,800
- Domestic 43.74 Ml/d
- Non – Domestic 58.48 Ml/d
- Accounted for Water (AFW) 103.5 Ml/d

- Other Cattle 36.5
- Calves <1yr 20
- Dairy Cows 150
- Sheep 4

- Economic
  - Marginal Cost Savings (Short Run – SR ELL)

- Sustainable Development:
  - Rising Demand can be Serviced

- EU / National Policy:
  - Polluter Pays' Objective

- Asset Conditions:
  - Increasing Age Impacts on Leakage

- Climate Change:
  - Ability to cope with Droughts
In the ELLEL Model - Conna Regional WSS

Average Cost of repair
- €810/km
- Power & Chemicals

Average Cost of detection
- €210/km

Average Length, L
- km

Average Number of connections
- nr.

Average Number of faults
- nr.

Average Zone Night Pressure
- 34.6 m

Given

Length of mains
- 28,000 m

Given

% mains poor
- 62 assumed

% mains average
- 38 assumed

% mains good
- 0 assumed

Number of connections
- 660 nr.

Given

Average Cost of detection
- €210/km

Value of water lost
- '000

Economic Level of Leakage
is the level at which:

* The PV cost of leakage control

* The PV cost of the water lost

is a Minimum

Cork Strategic Water Study - Scheme Leakage Targets

<table>
<thead>
<tr>
<th>Water Operational Area</th>
<th>Length, L (km)</th>
<th>L/Prop (%)</th>
<th>Study Target</th>
<th>Study Target (ML/D)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cork Strategic Water Study - Admin Area Targets

<table>
<thead>
<tr>
<th>Admin Area</th>
<th>Length, L (km)</th>
<th>L/Prop (%)</th>
<th>Study Target</th>
<th>Study Target (ML/D)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2586</td>
<td>28.5</td>
<td>68.2</td>
<td>114</td>
</tr>
</tbody>
</table>

Potential Savings Demand Management

- Cistern Displacement - Hippo's
  - 1-2ML/day

- Regulation of Toilets
  - 2-3ML/day long term
Cork Strategic Water Study - Delivering Leakage Targets

Management / Structure:
- Independent Senior Engineer led Organisation
- Divisional Team for Detection / Repair / Records

Infrastructure & Mgt. Systems:
- 350 DMA's with Telemetry Reporting (Regional)
- 16 Teams Equipped & Trained
- CIS Compilation
- Asset Performance Databases
  - Bursts
  - Complaints
  - Water Quality
  - Failures and Shut Downs
- Modelling & Pressure Management Set-up
- Mgt. System and Costs Tracking – Link to JD Edwards

Detection & Repair Teams & Support Staffing
Promote Leak Reporting – Free phone Leak Line

Cork Strategic Water Study - WC & Demand Management Strategy

Short-Long Term
Water Conservation:
- Active Leakage Control - Targets
- Implement Data & Job Management Systems
- Pursue Consumer Side Leakage
  - Byelaws
- Implement Pressure Management
- Implement Rehabilitation Schemes
- Implement Integrated Building Control Policy

Medium – Long Term
Demand Management:
- Awareness & Promotion of Water Saving
  - Internal – Public Buildings, Depots
  - Domestic Consumer – Home & garden
  - Non Domestic Consumers
- Implement Pressure Management
- Implement Rehabilitation Schemes
- Implement Integrated Building Control Policy
- Demand Reduction
  - Water Saving Devices - Hippo
  - Large Users – Efficiency
  - Regulation – Cistern Size, Appliances
  - Water Butts
  - Grey Water

Cork Strategic Water Study - Planning Guidelines

Documents consulted:
- Cork Area Strategic Plan (CASP) – October, 2001
- North and West Cork Strategic Plan 2002-2020
- National Spatial Strategy (NSS)
- South West Regional Planning Guidelines - May, 2004
- Cork County Development Plans – 2003 and 1996
- Cork City Development Plan 2004
- LAPs & SLAPs, 2005

Cork Strategic Water Study - Indicative Resources & Budget

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Leakage Targets</th>
<th>Total Budget</th>
<th>Total Budget</th>
<th>Total Leakage</th>
<th>Total Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>County</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
* * * Effective structure in place
* * Primary Schemes Only
* 2 man full time leak detection team with full time foreman for every two crews

Cork Strategic Water Study - Population Projections

Future Demand Projections
Cork Strategic Water Study - Planning Impact

Planning Impact - Planning Scenario
- NSB Exceed Zonings
- Zonings Exceed NSB

Planning Impact - Forecast Scenario
- CASP High

Cork Strategic Water Study - Growth Scenarios

'Planning Scenario'
- upper bound estimate of future demand
- consistent with the high population forecast of the NSS
- allowance for development of all residential and commercial zoned lands
- equivalent proportional growth in the industrial / commercial components

'Forecast Scenario'
- lower bound estimate of future demand
- consistent with the CASP high population forecast
- equivalent proportional growth in the industrial / commercial components

Cork Strategic Water Study - Domestic PCC

Per Capita Consumption
- Typical daily breakdown (UK)
  - Toilet Use - 48 litres
  - Personal washing - 38 litres
  - Clothes washing - 30 litres
  - Kitchen & Cleaning - 25 litres
  - External (car washing etc) - 4 litres
- Total - 145 litres

- Expected Change (138 l/c/d rising to 162 l/c/d by 2028)
  - Reduction (eco-friendly washers, public awareness, use of grey water)
  - Increase (Power showers, waste disposal units, washing recyclables)

Cork Strategic Water Study - Commercial / Ind Demand

Small & Medium Commercial Demand
- Assumed growth is directly proportional to domestic growth.
- Distribution of Increase:
  - 50% in areas of predicted domestic demand growth
  - 50% in areas of predicted employment growth (CASP)

Large Commercial Demand
- Strategic provision made for zoned areas (e.g. Ringaskiddy & Carrigtwohill)

Cork Strategic Water Study - Agricultural Demand

- Future consumption to remain static at present levels
- For future scheme expansion areas, agriculture demand based on:
  - 75% of ‘take-up’ of dairy contribution
  - 25% of ‘take-up’ of dry-stock contribution
  - 100% uptake assumed for West Cork due to limited resources
Cork Strategic Water Study - Peak Factors

Cork Strategic Water Study - Headroom Factors

Typical international figure for headroom: 10%, outage: 5-7.5%

Headroom/Outage reduced to 5% for Primary Schemes study because:
- Inclusion of all available zoned residential lands results in 13.5% increase over projections planning publication projections;
- High growth NSS2 EGS2 Option 1 scenario would suggest that an underestimation of growth in the planning period would be most unlikely.

Headroom allowance of 10% applied to all Secondary Schemes & Un-serviced areas due to greater uncertainty in these areas

Headroom applied to ‘Accounted For Water’ Demand only i.e. not UFW or Strategic Industrial Allowances

Cork Strategic Water Study - Demand Summary

Cork Strategic Water Study - Effect of Passive Leakage

Cork Strategic Water Study - Demand Breakdown

Resource Assessment
Inishannon Bridge

Catchment Area = 519 km²
DWF = 0.57 m³/s (49.25 Ml/day)
Abstraction Order = 12.3 Ml/day (25% of DWF)

Cork Strategic Water Study

Cork Harbour & City WSS

Supply/Demand Balance - 2028

Strategic Mains Models

• Cork Harbour & City
  – 68 to 227 Ml/day (Significant potential)
• Cork City (Lee Road)
  – 37 to 80 Ml/day (Local potential)
• East of City (Glanmire, Midleton, Clonakilty, Whitegate & Youghal)
  – Surface Water 31 Ml/day (No potential)
    – Groundwater 10+ Ml/Day (Unknown potential)
• West of City (Inishannon, Bantry, Macroom)
  – Surface Water 20 to 23 Ml/d (Limited potential)
• Northern Region (Mallow, Fermoy, Connolly)
  – (Limited potential)
    – Surface Water 8 to 9 Ml/day (No potential)
    – Groundwater 6 to 17 Ml/Day (Local potential)

Cork Strategic Water Study - Resource Assessment

Cork Strategic Water Study - Cork Harbour & City WSS

Cork Strategic Water Study - Resource Assessment

Cork Strategic Water Study - Supply/Demand Balance - 2028

Cork Strategic Water Study - Strategic Mains Models
Cork Strategic Water Study - Strategic Models

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Flow</th>
<th>Level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cork Strategic Water Study - General Service Criteria, Levels of Service & Performance Indicators

- Levels of Service

“The achievement of the highest level of consumer satisfaction and service quality in line with the prevailing regulatory framework, whilst making best use of available resources” (Faria and Alegre, 1996)

- Performance Indicators

Cork Strategic Water Study - 5 Key Water Operator Objectives

- Consumer Satisfaction

Set Levels of Service (LOS) Objectives
Assess Performance Against LOS
Identify Needs and Plan Investment

Improving Performance

Classify Schemes
Identify Performance Indicators
Benchmark against other Schemes or Authorities
Identify Improvement Areas

Cork Strategic Water Study - 5 Key Water Operator Objectives

- to provide an appropriate level of service to consumers, while complying with national and regional policies and meeting statutory and other obligations;
- to plan, construct, maintain and operate the water operator’s physical assets as efficiently and effectively as possible;
- to make the most efficient use of water resources;
- to achieve the most efficient use of financial resources;
- to obtain the highest possible productivity from human resources and offer the best employment and career opportunities according to the individuals’ skills and aptitudes;

Cork Strategic Water Study - Performance Indicators

For Cork Authorities
- Facilitate Better Management;
- Allows Monitoring of the effects of Management Decisions;
- Provides decision support information;
- Aids pro-active management – reduce fire fighting
- Highlights strengths and weaknesses of schemes and assets;
- Assists with implementation of a Total Quality Management regime;
- Facilitates the implementation of benchmarking;

For the DoEHLG:
- Supports the formulation of policies for the water sector
- Aids Assessing investment priorities, project selection and follow up.

For consumers and pro-active stakeholders:
- Easy to understand measure of the quality of service provided.
Cork Strategic Water Study - Proposed Levels of Service

- Water Quality – EU & National Standards
- Security of Supply
  - Resources
  - Headroom 5-15% Risk Dependent
  - Demand Forecasting
  - Annual Review
  - Safety impact review
  - Water Use Restrictions – As required
- Network
  - Storage – 24 hours peak daily demand – risk assessed
  - WTW/Capacity: Capable Peak Week requirements + 10%
- Leakage Targets
  - Distribution – ELL
  - Consumer Side – Reduce to 40l/p/d – Monitor
  - Repair Times
    - Reported Bursts – 90% 12 hours
    - Detected Bursts 72 hours
- Emergency Plan – In Place

Consumer Service
- Min15m – Max 50m Pressure
- Supply Interruptions
  - 12 hours maximum for 99% properties for 10 year planning horizon.
  - Adequate monitoring/recording for 5 year planning horizon.
  - 24 hours notice of a planned interruption of water supply lasting more than 4 hours
- Bursts Target 200/1000km of main/annum
- Complaints & Queries – Respond within 10 days
- Appointments Policy

Regional Water Supply Recommendations

- Division of Study Area

Cork Strategic Water Study - Methodology

- Complete demand balance
- Identify the available supply options to meet the demand deficits.
- Identify service storage augmentation.
- Identify preferred solutions and programme of recommended works.

Cork Strategic Water Study - Eastern Region

- Eastern Region
Cork Strategic Water Study - Overall Capital Programme

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (€M)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Med</td>
</tr>
<tr>
<td>Production Upgrading</td>
<td>42.8</td>
</tr>
<tr>
<td>Reservoir Storage</td>
<td>28.3</td>
</tr>
<tr>
<td>Distribution</td>
<td>68.6</td>
</tr>
<tr>
<td>Asset Renewal (Mains Rehab – Annual)</td>
<td>15.4</td>
</tr>
<tr>
<td>Leakage Control (Annual)</td>
<td>4.4</td>
</tr>
<tr>
<td>Telemetry &amp; Information Management</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Cork Strategic Water Study - Overall Conclusion

- Immediate Deficits met from Leakage Reduction
- Sustainable Growth to 2028 can be served by:
  - Active Leakage Control and Realistic Demand Management Programme
  - Develop CH & C Reserve plus Local Schemes
  - Monitor and Maintain Asset Standards
  - Storage & Capacity Standards – matched to supply needs
- Operation and Maintenance Systems to integrate:
  - Production & Distribution
  - Leakage & Demand Management
  - Asset Monitoring & Management of Risk
  - Customer Services
  - Costs & Revenues Model
Cork Strategic Water Study - Steering Group

<table>
<thead>
<tr>
<th>Cork County Council</th>
<th>Cork City Council</th>
<th>DEHLG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ned Flynn</td>
<td>Jack O’Leary</td>
<td>O’Connor</td>
</tr>
<tr>
<td>Michael Lavelle</td>
<td>John O’Sullivan</td>
<td></td>
</tr>
<tr>
<td>Kevin Sugrue</td>
<td>Pat O’Sullivan</td>
<td></td>
</tr>
<tr>
<td>Pat O’Mahoney</td>
<td>Brendan Goggan (Technical)</td>
<td></td>
</tr>
<tr>
<td>Frank Cronin</td>
<td>Jerry Grant</td>
<td></td>
</tr>
<tr>
<td>Gerald Murphy (Technical)</td>
<td>Grellan McGrath</td>
<td></td>
</tr>
<tr>
<td>Pat Murphy (Technical)</td>
<td>Donal Lucey</td>
<td></td>
</tr>
<tr>
<td>Rob Andrews (Technical)</td>
<td>Alan Curran</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kevin Power</td>
<td></td>
</tr>
</tbody>
</table>

Cork Strategic Water Study - RPS Project Team

<table>
<thead>
<tr>
<th>Project Management</th>
<th>Demand Assessment</th>
<th>Treatment</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jerry Grant</td>
<td>Francis Finnetty</td>
<td>David McBirney</td>
<td>Kevin Power</td>
</tr>
<tr>
<td>Grellan McGrath</td>
<td>Andy Werhe</td>
<td>Brendan O'Halloran</td>
<td>Crona Doyle</td>
</tr>
<tr>
<td>Project Director</td>
<td>Grellan McGrath</td>
<td>Joanna Ommie</td>
<td>Louise Leahy</td>
</tr>
<tr>
<td>Alan Curran</td>
<td>Donal Lucey</td>
<td>Alan Curran</td>
<td></td>
</tr>
<tr>
<td>Assistant Project Manager</td>
<td>Kevin Power</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hydraulic Models

| Tim Holmes         | Donal Lucey       | Peter Noonan |
| James Holmshead    | Paul ORondan      | Carol ORondan |
| Adrian Duggan      | GIS               |             |
| Paul Rockley       | Tailing Humfrey   |             |