Weather Station Closure Update

28th January 2013

Weather Station Closure: Background

- At the end of October 2012 Xoserve were informed of the imminent closure of Birmingham Edgbaston weather station

- Birmingham Edgbaston provides the 2 hourly observations of temperature for use in the CWV calculation for WM
  - Birmingham Coleshill provides the wind speeds and was not impacted

- Xoserve confirmed at 7th November DESC that there were no immediate implications to gas settlement and the main priority was the continuation of data after closure

- National Grid Distribution identified that 'Winterbourne 2' was a suitable replacement for the purposes of their LDZ demand forecasting processes

- Winterbourne 2 was also recommended by two separate Weather Service Providers due to its proximity to Edgbaston

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Weather Station Closure: Analysis

- Edgbaston closure was confirmed for 1st December 2012 and an initial replacement weather station of Winterbourne 2 was selected to provide the 2 hourly temperatures going forward for use in the CWV calculation

- Analysis required to understand the correlation between Edgbaston and Winterbourne to assess any significant impacts to CWV calculation

- Revisions to WM CWV would require analysis to derive new CWV parameters using optimisation process followed by restatement of CWV history

- Back runs for Spring modelling could not be started until process complete. WAALPs would also require re-calculating

- TWG asked to make recommendation to DESC on how to proceed
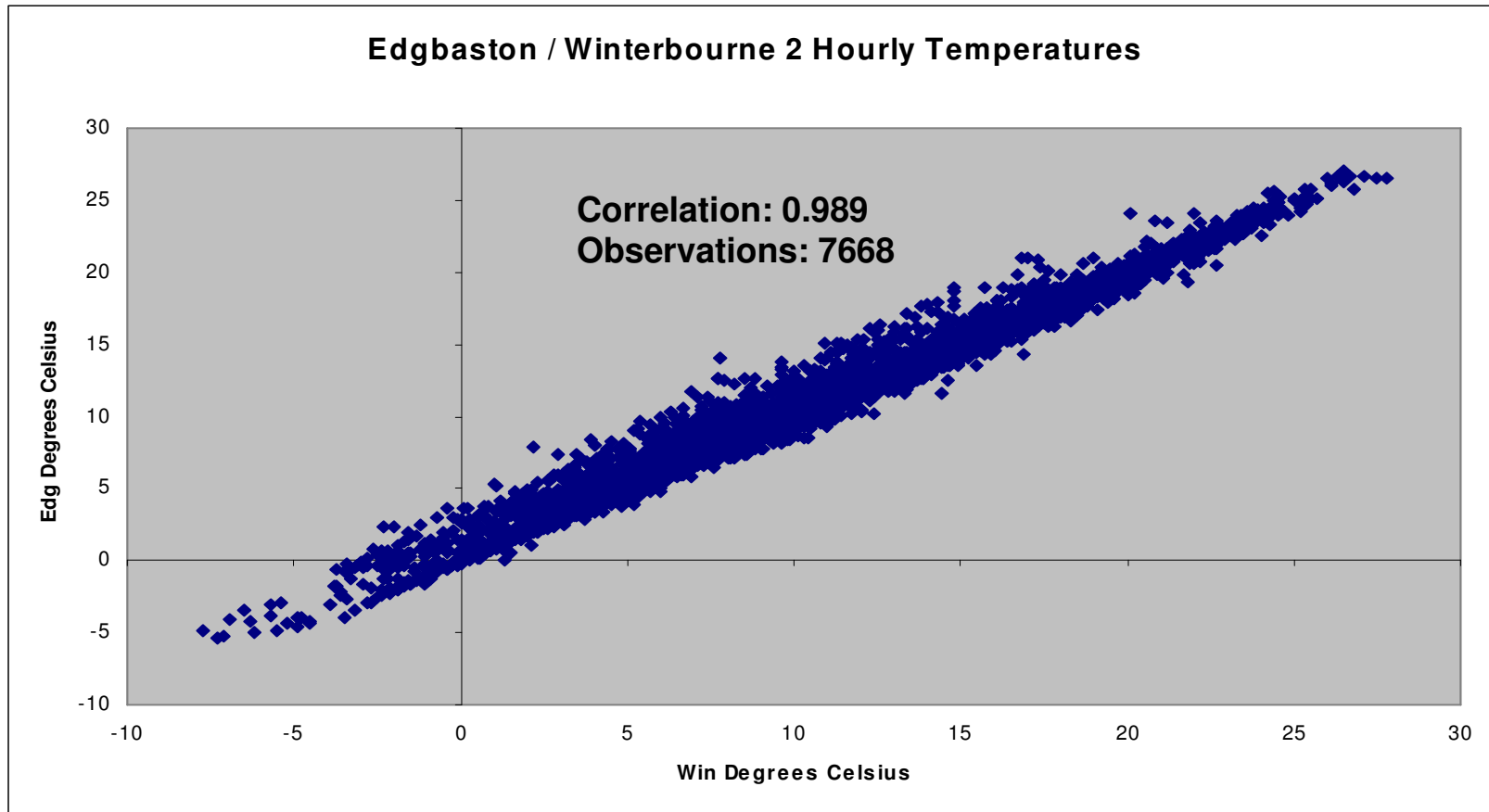
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Weather Station Closure: Analysis

- Xoserve obtained a weather history for hourly temperatures for Winterbourne 2 for the period 01/03/2011 to 28/11/2012

- Data was provided at 'UTC' and so this was converted to local time (BST/GMT) in order to compare to Edgbaston data series

- Edgbaston data only available at 2 hourly intervals as per CWV requirement (i.e. 7am to 5am). Therefore source data for analysis for both weather stations is as per these 2 hourly timeslots

- Tests run by Xoserve consistent with those suggested in initial draft of weather station substitution methodology report as well as reviewing the key component stages of the CWV calculation

- In order to achieve the above the data has been analysed at the following levels:
  - 2 hourly temperatures
  - Daily weighted average temperatures
  - Effective temperatures
  - Composite Weather Variable (CWV)

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Analysis – 2 Hourly Temperatures

- 2 hourly temperatures used in CWV calculation have been compared

- Hours analysed:
  - 7am, 9am,11am,1pm, 3pm, 5pm, 7pm, 9pm,11pm, 1am, 3am and 5am

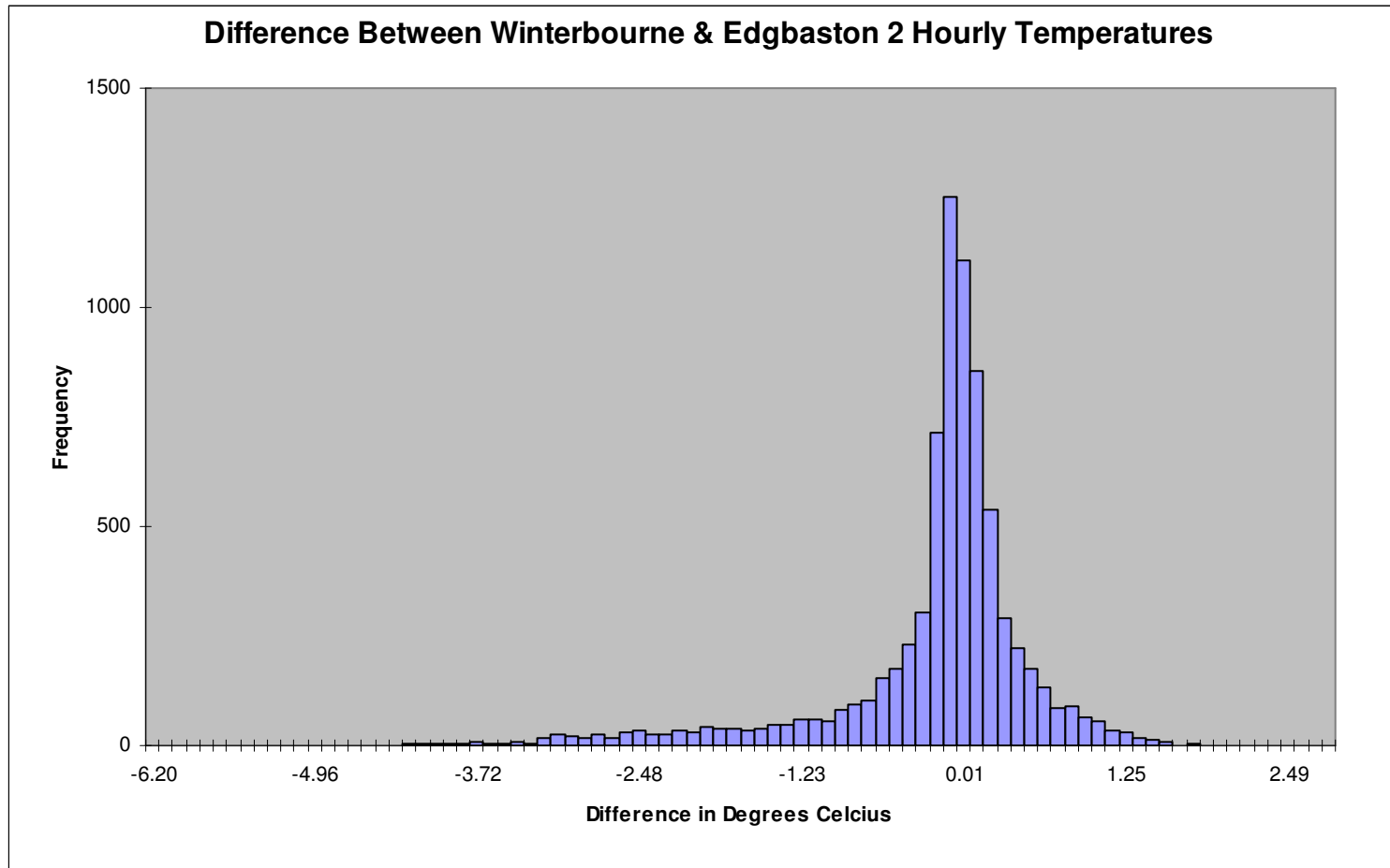- Gas days 01/03/11 to 28/11/12 which equates to 7,668 measurements

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Analysis – 2 Hourly Temperatures

Edgbaston / Winterbourne 2 Hourly Temperatures

Correlation: 0.989
Observations: 7668

Analysis – 2 Hourly Temperatures
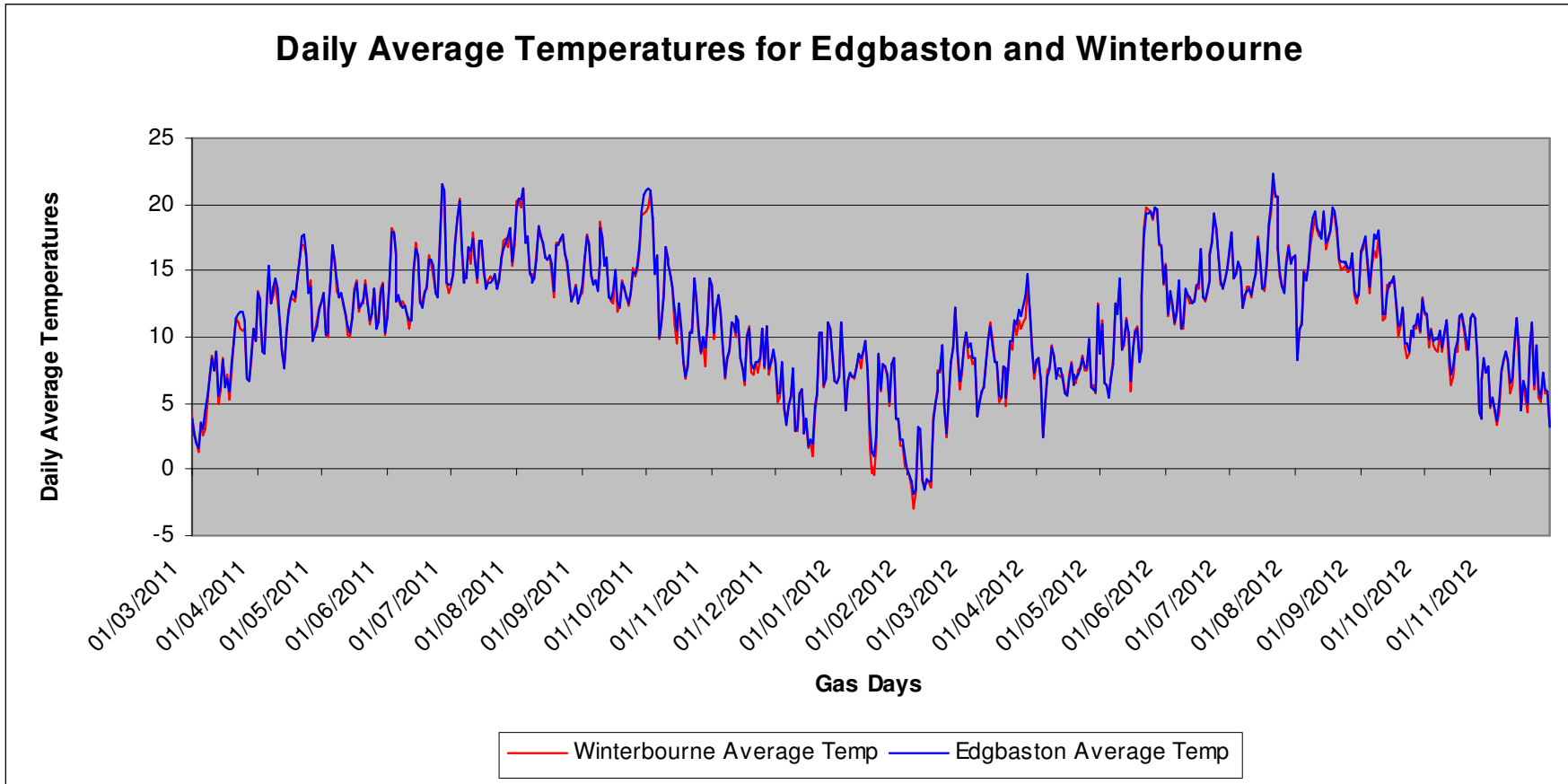

Difference Between Winterbourne & Edgbaston 2 Hourly Temperatures
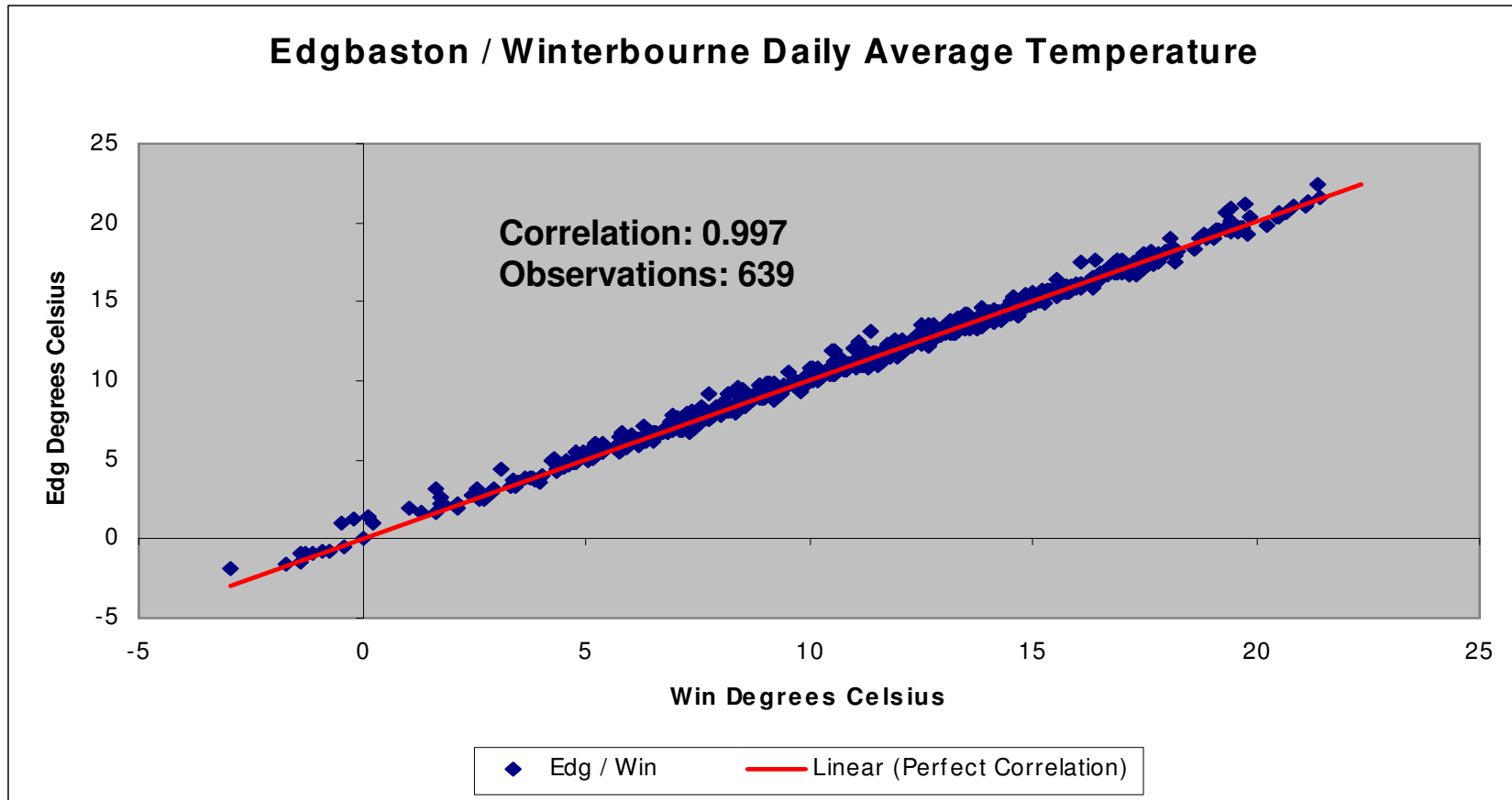
Analysis – Daily Average Temperatures

- Existing weightings have been applied to the 2 hourly temperatures in order to produce a daily average temperature

    - Weightings displayed in Appendix 12 of NDM Profiling booklet

- This replicates the treatment of the 2 hourly temperatures in the current CWV calculation

- An F-Test was performed to compare the variability in temperatures between both stations

- The t-test result confirmed there was no statistically significant difference in the temperatures between the two stations.
  t = -0.567: the direction of the difference shows that Winterbourne temperatures are slightly colder than Edgbaston temperatures on average

Analysis – Daily Average Temperatures

Daily Average Temperatures for Edgbaston and Winterbourne

Analysis – Daily Average Temperatures

Edgbaston / Winterbourne Daily Average Temperature

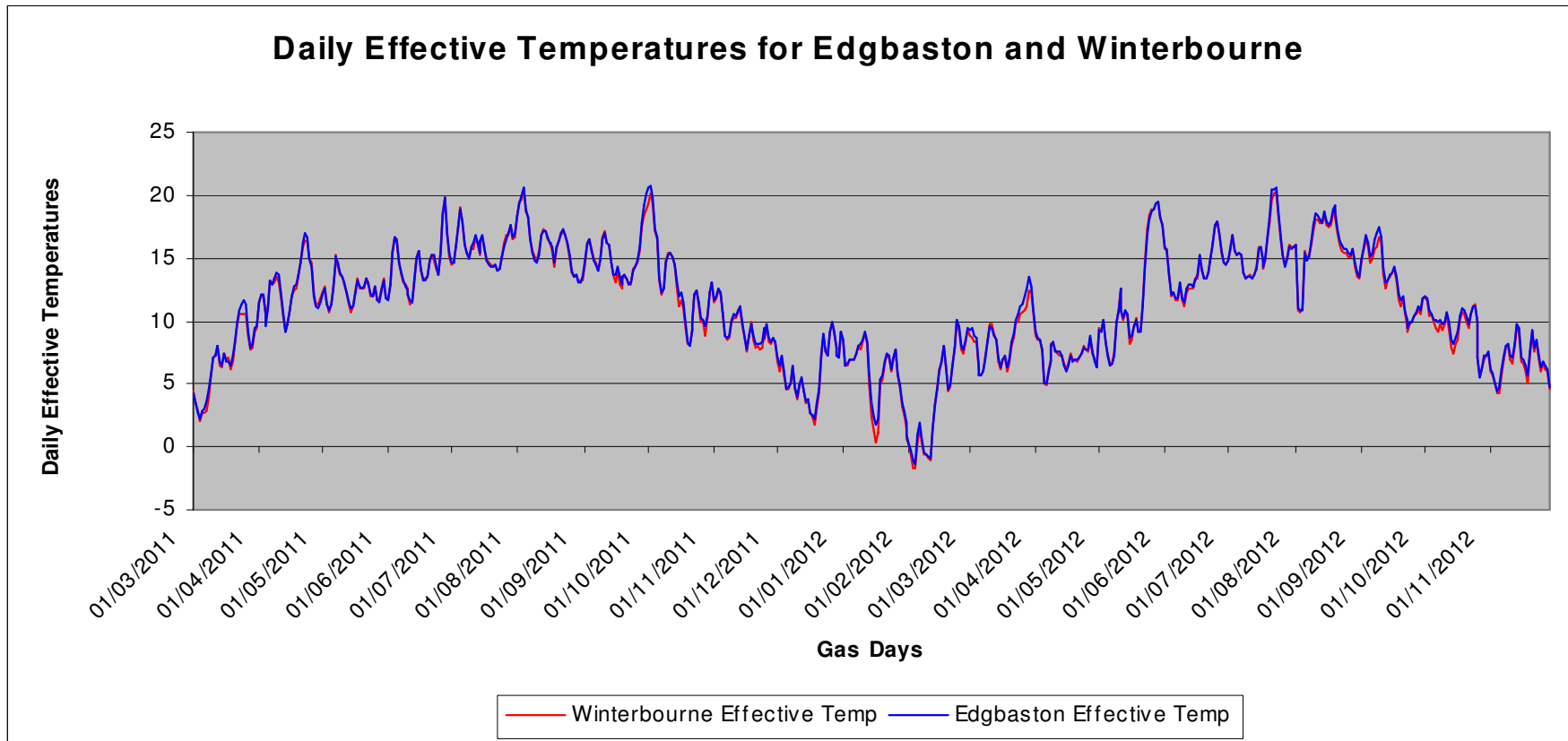Correlation: 0.997
Observations: 639

- Based on gas days 01/03/11 to 28/11/12

Analysis – Daily Effective Temperatures

- Effective Temperatures (ET) are a feature of the CWV calculation

- They represent half of today's weighted Actual Temperature and half of yesterday's Effective Temperature

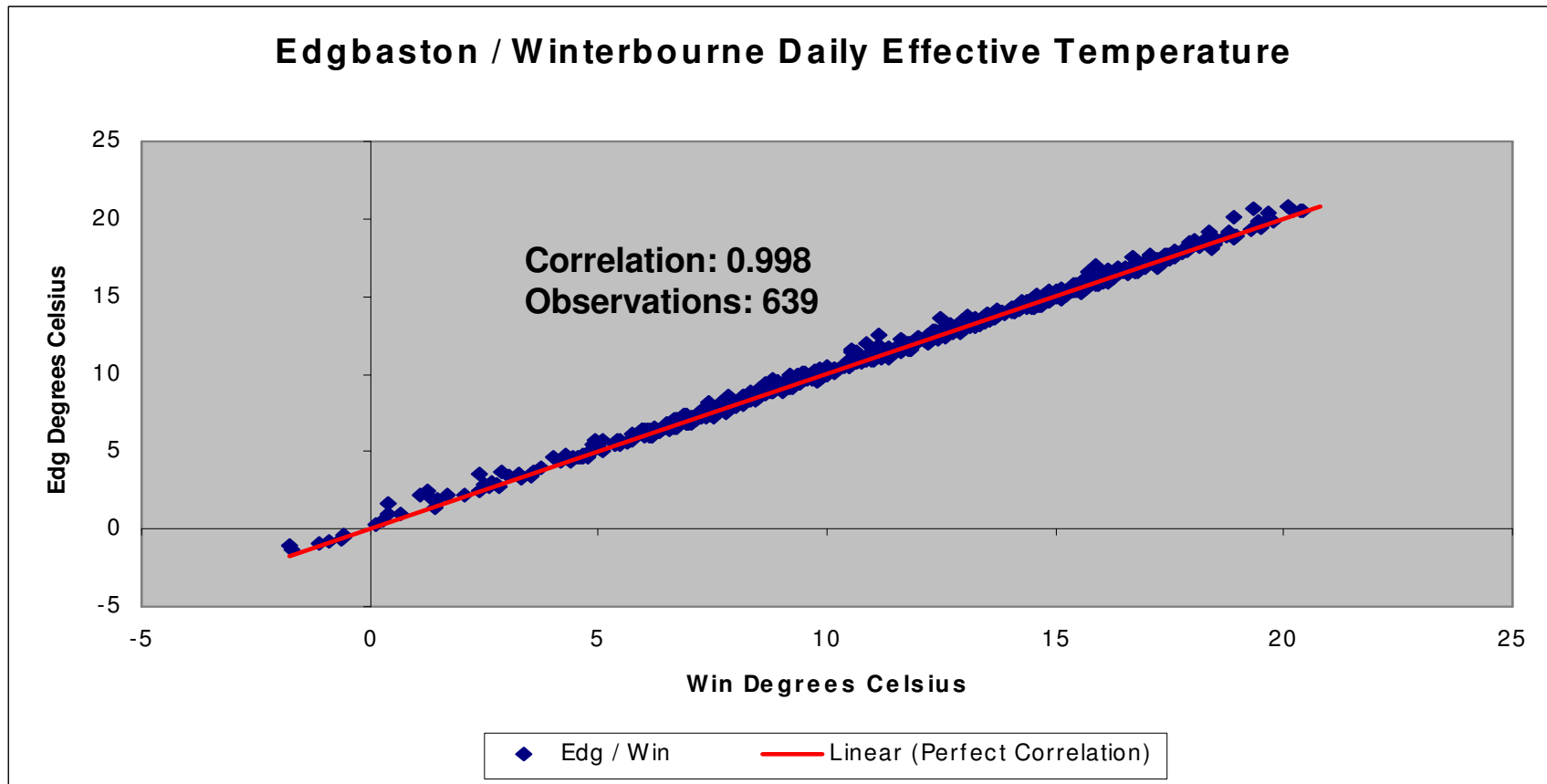- The ET has been calculated for Winterbourne and Edgbaston

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Analysis – Daily Effective Temperatures

Daily Effective Temperatures for Edgbaston and Winterbourne

Analysis – Daily Effective Temperatures

Edgbaston / Winterbourne Daily Effective Temperature

Correlation: 0.998
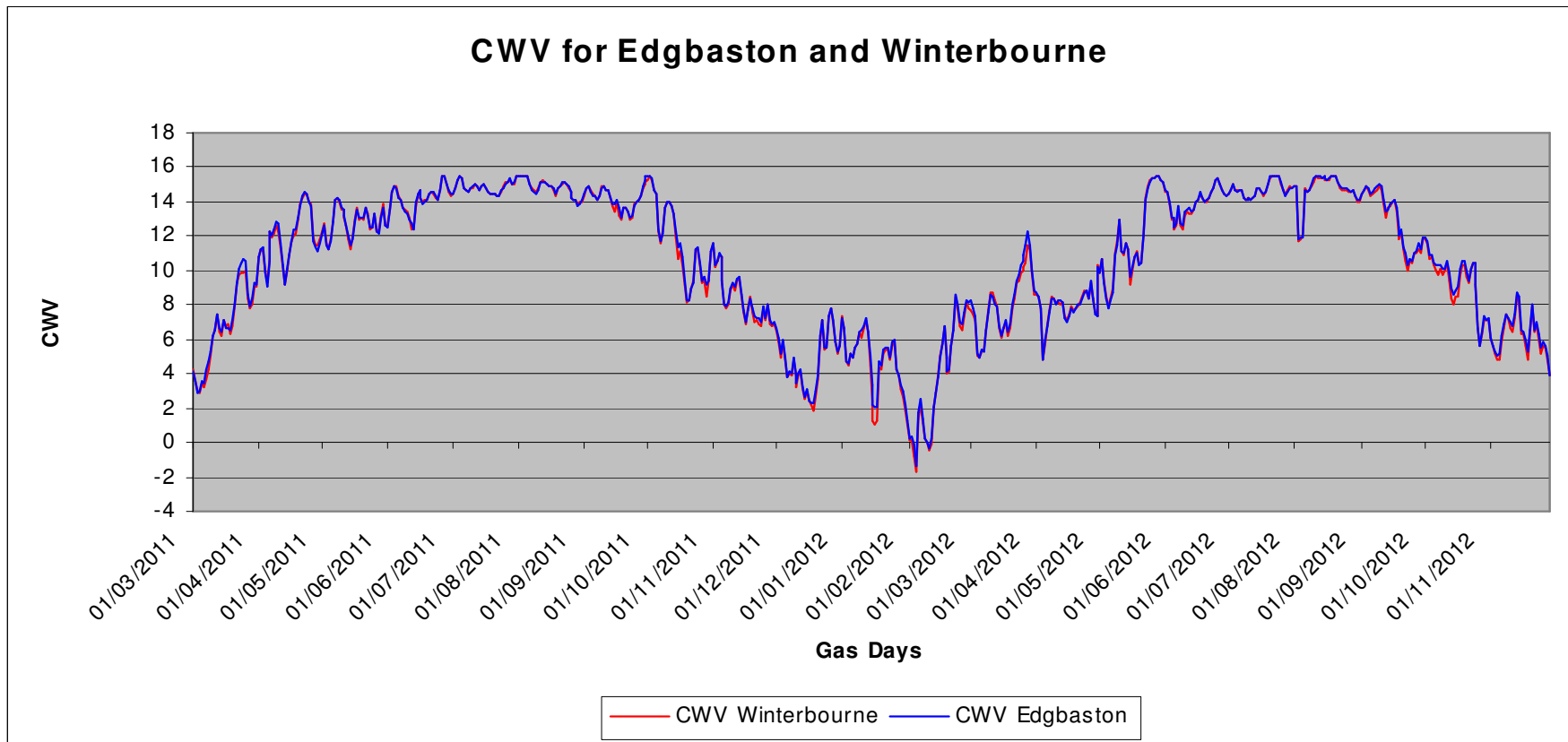Observations: 639

Analysis – CWV

- The Effective Temperature plus all the other CWV parameters and measurements were then used to derive a CWV for Edgbaston and Winterbourne

- The CWVs calculated from both stations were compared to aggregate NDM demand for WM for non-holiday Monday to Thursday days (in line with CWV optimisation process)
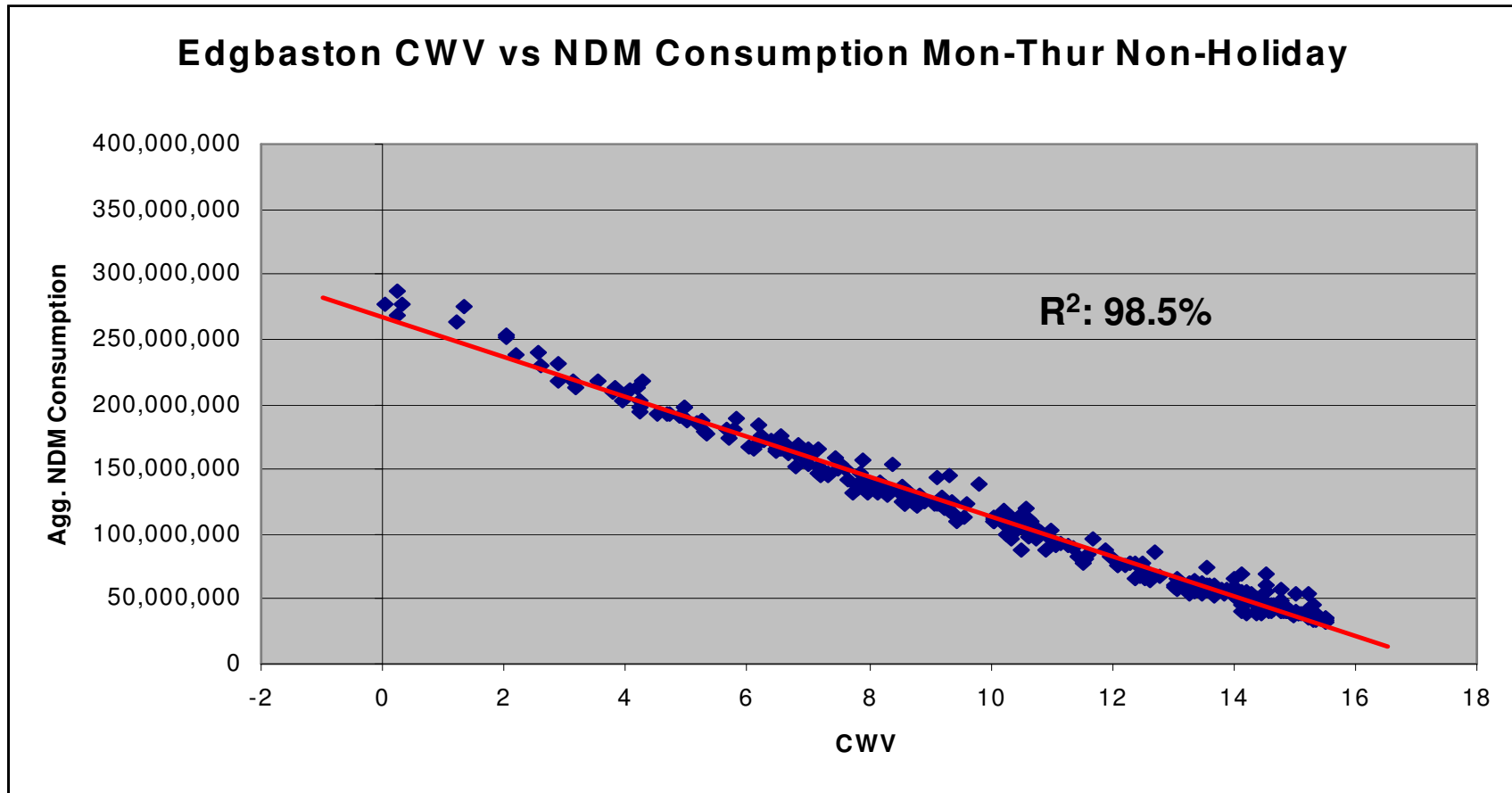
Analysis – CWV

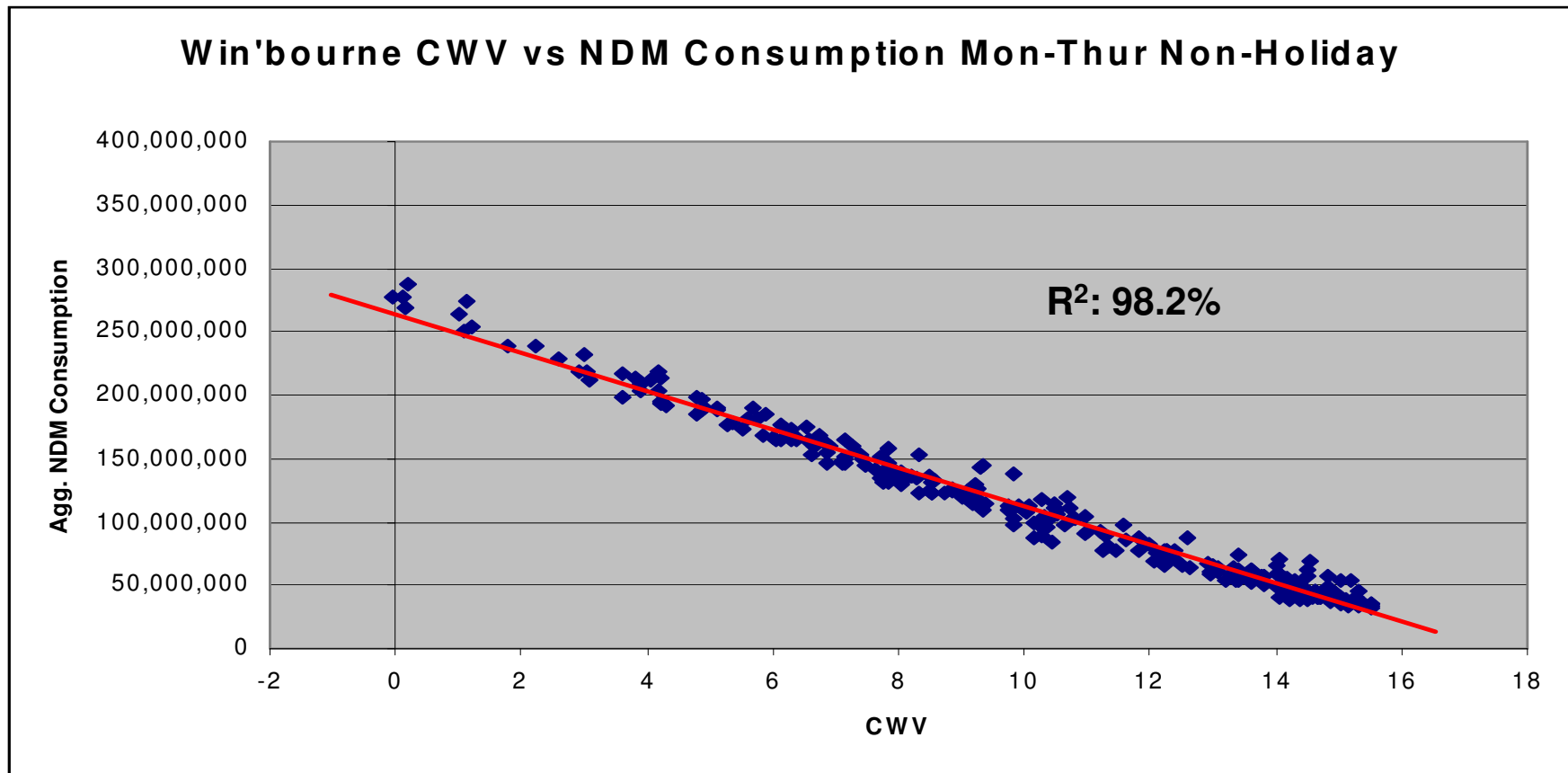CWV for Edgbaston and Winterbourne

Analysis – CWV

Edgbaston CWV vs NDM Consumption Mon-Thur Non-Holiday

R^2: 98.5%

Analysis – CWV

Win'bourne CWV vs NDM Consumption Mon-Thur Non-Holiday

R^2: 98.2%

(Y-axis: Agg. NDM Consumption; X-axis: CWV)

Analysis – Summary

Measure	2 Hourly Temps	Daily Average Temperature	Effective Temperature	CWV M to T All Data	CWV M to T Oct'11-Mar'12	CWV M to T Apr'12 - Sep'12
	Correlation	Correlation	Correlation	R Sq.	R Sq.	R Sq.
Edgbaston	0.989	0.997	0.998	98.5%	98.3%	94.7%
Winterbourne				98.2%	98.0%	94.3%

- First four columns summarises the results at the various stages of the CWV calculation over the whole 21 month period (01/03/11 to 28/11/12)

- Final two columns summarises the results over gas year 11/12 split into Summer and Winter months

- Overall correlation very good. As expected R sq. slightly worse with Winterbourne CWV

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Conclusions

- Analysis carried out wouldn't appear to suggest there is compelling evidence to review CWV parameters immediately

- DESC may wish to wait until new weather history is provided as per MOD330 work before deciding upon further action which could encompass all LDZs

- Recommendation to continue with Winterbourne 2 temperature data for WM CWV calculations with existing CWV parameter values