

REPORT 025

WATER:

2008 – 2013 Five years of focus on water – summary of achievements

2014

Prepared by Carmen Snowdon on behalf of the Greening the Industry Working Group of the Green Construction Board



A contribution to delivering the targets in the joint government and industry Strategy for Sustainable Construction and the ambitions of the Green Construction Board



Working together for a world without waste



WATER: 2008 – 2013 Five years of focus on water – summary of achievements

This report is the final water focussed output in a series aimed at supporting the delivery of the targets within the Strategy for Sustainable Construction, a joint industry and government strategy published in June 2008.

More information about the strategy can be found at

www.bis.gov.uk/policies/business-sectors/construction/sustainable-construction

This progress report was prepared by the Water Subgroup of the Green Construction Board's Greening the Industry Working Group (formerly a Working Group of the Strategic Forum for Construction's Sustainable Construction Task Group (SCTG).

www.greenconstructionboard.org/

www.strategicforum.org.uk

The expert secretariat of the Water Subgroup is Carmen Snowdon of WRc plc.

www.wrcplc.co.uk



Funding for the secretariat and preparation of this report was provided by the Waste & Resources Action Programme (WRAP).

WRAP is backed by government funding and aims to help business and individuals to reap the benefit of reducing waste, developing sustainable products and using resources in an efficient way. www.wrap.org.uk

The "Delivering the Strategy Targets" series was initiated by Jane Thornback, Secretariat of the Greening the Industry Working Group and Sustainability Advisor at the Construction Products Association (CPA). The CPA is the umbrella body for construction product manufacturers and merchants.

www.constructionproducts.org.uk

Executive Summary

This report details the activities of the Water Subgroup of the Greening the Industry Working Group (GIG) of the Green Construction Board (GCB) since its formation in 2008. The Subgroup was formed prior to the GCB's formation (in 2011), and was initially set up and convened by the Sustainable Construction Task Group (SCTG) of the Strategic Forum for Construction (SFfC). This report documents the progress of the construction industry in reducing the volume of water used on construction sites. The group's achievements in driving the construction sector toward a water target within the joint government and industry Strategy for Sustainable Construction¹ launched in July 2008 are also documented.

This report provides an assessment of progress towards the Strategy target of:

“By 2012, water usage in the manufacturing and construction phase to be reduced by 20% compared to 2008 usage”.

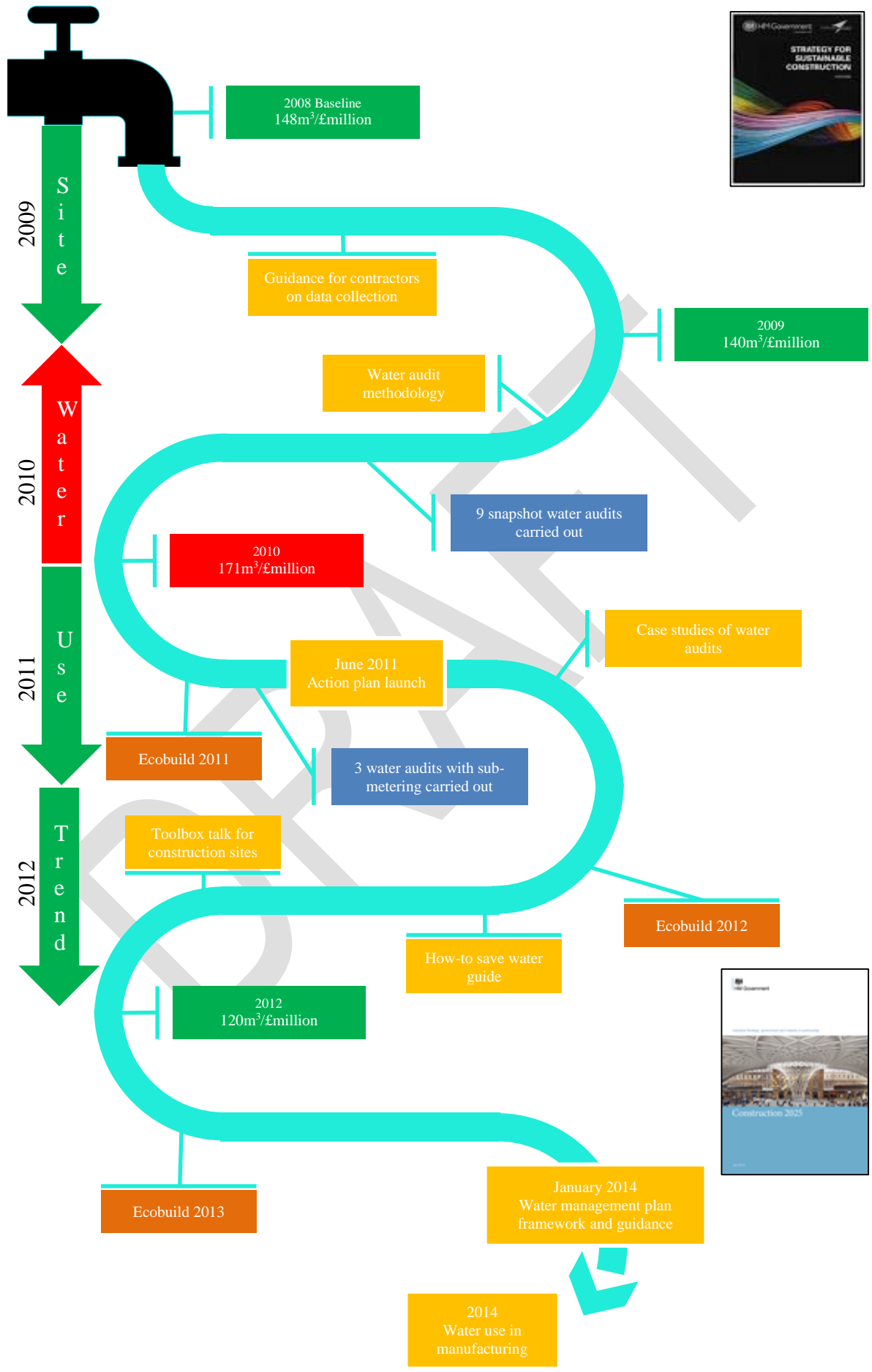
We have achieved a reduction in water use of 19% in 2012 against the 2008 baseline.

This report has been developed under direction from the GCB GIG (formerly SFfC) Water Subgroup. The group is made up of key representatives from the construction and manufacturing industries who are in a position to lead and take forward work to reduce water usage, as well as government officials and representatives from the regulatory agencies such as the Environment Agency. The Water Subgroup has been supported in its work by an expert secretariat provided by WRc plc.

Key achievements by 2013

1. [Methodology and pro-forma](#) for measuring water use on construction sites devised.
2. Commitment by UK Contractors Group (UKCG) members to measure water use on construction sites and year-on-year increase in number of companies contributing data for annual reporting, either directly or indirectly.
3. A 19% reduction on 2008 baseline water use on construction sites, just 1% short of the 2012 target.
4. Methodology for carrying out water audits on construction sites devised.
5. [12 Water audits](#) carried out to identify key areas of high water use and scope for improving efficiency.
6. Best practice activities for good water management identified.
7. [Top tips](#) for reducing water use on construction sites developed and published.
8. [Toolbox talk](#) for on-site briefings developed and promoted.
9. Construction site [water management plan framework and guidance](#) document developed and website output launched.
10. Manufacturers represented by the Construction Products Association have produced a [guide to water use in construction product manufacturing](#), including case studies of good water management practice.

¹ [BERR \(2008\) Strategy for Sustainable Construction.](#)



Contents

1. Introduction	6
2. The 2008 baseline for water use on construction sites	7
3. Activities of the Water Subgroup 2008-2013.....	8
4. Contributors to the Water Subgroup	10
5. Water use on construction sites 2012.....	11
6. Trends in water use 2008 - 2012	13
7. Water audits on construction sites	15
8. Promotion of best practice	16
Annex A Case studies of good water management.....	21

DRAFT

1. Introduction

- 1.1 This report details the activities of the Water Subgroup of the Greening the Industry Working Group (GIG) of the Green Construction Board (GCB). The Subgroup was formed in 2008 (prior to the GCB's formation in 2011), and was initially set up and convened by the Sustainable Construction Task Group (SCTG) of the Strategic Forum for Construction (SFfC). The report documents the progress of the construction industry in reducing the volume of water used on construction sites. The group's achievements in driving the construction sector toward a water target within the joint government and industry Strategy for Sustainable Construction² launched in July 2008 are also documented.
- 1.2 The joint government and industry Strategy for Sustainable Construction (2008) highlighted the issue of water use by construction activities and included a number of targets pertaining to the more efficient use of water on construction sites. One such target identified water usage on construction sites as a priority area. The target, identified by the industry itself, was:
- “By 2012, water use in the manufacturing and construction phase to be reduced by 20% compared to 2008 usage”*
- 1.3 The body responsible for delivering the water target was the Strategic Forum for Construction (SFfC); its Sustainable Construction Task Group (SCTG) therefore set up in 2008 the Water Subgroup to focus on this target. The Water Subgroup comprises key representatives from the construction industry (through UK Contractors Group (UKCG)) and the manufacturing industry (through the Construction Products Association (CPA) who are in a position to lead and take forward work to meet the target, as well as Government officials and representatives from the regulatory agencies. The Water Subgroup has been supported in its work by research from an expert secretariat provided by WRc plc. Funding support for the Secretariat was sought from, and provided by, the Government's Department of Business, Innovation and Skills (BIS) from 2008-09, Defra (2009-10) and WRAP (2010-14).
- 1.4 With the formation of the Green Construction Board (GCB), set up by the Coalition Government in 2011, the work to deliver the 2008 Strategy targets has been absorbed. The Board has therefore absorbed the work led by the Strategic Forum's Sustainable Construction Task Group on the Water target and the Water Subgroup activities now come within the remit of the Greening the Industry Group of the GCB. The ethos of the 2008 *Strategy for Sustainable Construction* of government and industry jointly working together continues
- 1.5 Prior to the formation of the Water Subgroup, relatively little work had been carried out in relation to water sustainability on construction sites. Water use has been traditionally considered a relatively low priority in comparison to the focus on reducing construction waste and improving the carbon footprint due to its relative low cost. However, this is changing as water moves up the political and environmental agenda.

² BERR (2008) Strategy for Sustainable Construction.

- 1.6 An Action Plan¹ to address the water use reduction target was developed by the Water Subgroup. The Action Plan was launched at an event held in June 2011.
- 1.7 In 2008 knowledge of where water is used on construction sites and the volumes involved was limited. The collection of additional data and identification of where water is wasted were the first steps identified in the Action Plan¹. To facilitate this process, the Water Subgroup developed a number of guidance materials including data collection pro-forma and an audit methodology.
- 1.8 The Water Subgroup calculated baseline water consumption on construction sites for 2008 using data available at the time, against which progress has been measured year on year. This report includes for the first time the 2012 water use figures for comparison with the baseline data in accordance with the target.
- 1.9. The GCB GIG (and former SCTG Subgroups) are pursuing similar work streams on targets relating to the reduction of carbon emissions and construction waste. There are some synergies between the work streams including the units by which baselines are declared, and elements of the construction life-cycle that are included and excluded from consideration.
- 1.10 This report details the work of the Water Subgroup from 2008 to 2013, including calculation of the 2012 water use on construction sites. Activities and outputs of the Water Subgroup during this time are referenced.

2. The 2008 baseline for water use on construction sites

- 2.1 The Water Subgroup has calculated the baseline water consumption on construction sites using data for 2008 against which progress can be measured. The agreed value for the 2008 baseline is 148m³ per £million contractors output at constant (2005) price.
- 2.2 The baseline was derived from 'bottom up' construction site data, corroborated against 'top down' data derived from the Environment Agency National Abstraction License Database, and information on mains water use by the construction industry held by water utilities. The corroboration activity was carried out to ensure that the sample data is representative of the wider industry.
- 2.3 Progress against the baseline has been measured in each year 2009 - 2012 using 'bottom up' project site water use data collected by the construction industry.

3. Activities of the Water Subgroup 2008-2013

- 3.1 The Water Subgroup commenced by agreeing a methodology for measuring water use to derive a 2008 baseline consumption figure. Guidance for contractors on data collection was developed to support future progress measurement that has been carried out and reported on annually³. The group then embarked on a process of identifying the major water using processes, and hence determined priorities for reduction activities. This information resulted in the development and launch of an action plan to 2012, to support the construction industry to meet the water use target.
- 3.2 Following publication of the [action plan](#) the group began to implement actions, initially working with the UKCG to identify a number of sites to audit for water activity. Sites were selected based on likelihood of it undertaking activities that have a potential to waste large volumes of water - particularly; dust suppression.
- 3.3 A series of one day water audits on construction sites were carried out by Mabbett and Associates, funded by WRAP, and complemented with a programme of longer audits including sub-metering of specific water use activities. Together the results contributed to the [evidence base](#) on water using activities and confirmed the main areas where there was scope for improved practices and technologies to be implemented.
- 3.4 To assist with dissemination of good practice the Water Subgroup devoted considerable resources to developing a series of guides and documents tailored to different target audiences. Initially contractors on site were targeted through provision of a [‘top-tips’ guide](#), with supporting [toolbox talk](#). Following this, a site water management plan framework and guidelines were developed and published as a [website](#), as well as an interactive document available as a download.
- 3.5 Throughout the period 2008 – 2013 the Water Subgroup undertook a number of activities to raise the profile, and increase understanding of better water use. These activities included presentations at Ecobuild (2011, 2012), hosting a Water Action Plan launch event (June 2011), and contributing to construction industry schemes such as CEEQUAL⁴, Considerate Constructors Scheme⁵, and CIRIA’s⁶ environmental good practice on site guide reviews.
- 3.6 More recently, as the Action Plan for reducing water use on construction sites has been largely implemented, and the focus of the group refreshed through incorporation into the GCB, Water Subgroup attention has been given to the manufacture of construction products. Specifically the group has considered the feasibility of the incorporation of water use information at the design stage to account for water footprints of products, and explored the scope for consideration of water scarcity at site of manufacture. The manufacturers, represented by the

³ Annual progress reports and other outputs from the group can be found at

<http://www.greenconstructionboard.org/index.php/working-groups/greening-the-industry/water>

⁴ CEEQUAL is the sustainability assessment, rating and awards scheme for civil engineering. More information is available at <http://www.ceequal.com/>

⁵ The Considerate Constructors Scheme is a national initiative set up by the construction industry to improve its image. More information is available at <http://www.ccscheme.org.uk/>

⁶ CIRIA is the construction industry research and information association. More information is available at <http://www.ciria.org/>

CPA have also contributed to the water agenda through development of a guide on water use in construction products manufacture⁷.

- 3.7 More information on each of these activities can be found in the following sections of this report along with links to the group's outputs.

DRAFT

⁷ The guide will be published in early 2014 and available from <http://www.constructionproducts.org.uk/>

4. Contributors to the Water Subgroup

- 4.1 The following people have given generously of their time to contribute to the Water Subgroup over the last five years. Individual names are provided along with their organisations at the time of their membership.

Martin Ballard	Willmott Dixon Chair 2013-2014
Gareth Brown	<i>Formerly of Morgan Sindall (Overbury Plc)</i>
Philip Charles	CIRIA
Alexandra Chourchouli	Environment Agency
Ray Doughty	Regulatory Affairs Consultant
Neil Fraser	Seddon
Jonathan Garrett	<i>Formerly of Balfour Beatty</i> Chair 2011-2012
Virginia Hall	Defra
Richard Hirst	Skanska
Dean Kerwick-Chrisp	Highways Agency
Tom Lawson	Considerate Constructors Scheme
Dawn Love	VINCI construction UK Ltd Chair 2012-2013
David Manley	Hanson
Juan Martinez	<i>Formerly of Kilby and Gayford Ltd</i>
Derek McNab	Mabbett and Associates
David Morrell	Marshalls
Somayeh Rahimi	Lend Lease
Albert Ree	Balfour Beatty
Martin Shouler	ARUP
Carmen Snowdon	WRc Plc Secretariat 2008-2014
Jane Thornback	Construction Products Association Secretariat to the GCB GIG / Secretariat to the SFFC Sustainable Construction Task Group
Joanne Turner	<i>Formerly of BRE</i>
Juliette Willems	Environment Agency
Graham Winter	Environment Agency
Jim Wiltshire	WRAP

- 4.1 Many other people have either attended meetings for specific purposes, or provided data to allow annual reporting of progress. The contributions of everybody to the work of the group is acknowledged.

5. Water use on construction sites 2012

- 5.1 Information relating to water use on construction sites during 2012 has been collected both directly from members of the UKCG and via the Civil Engineering Contractors Association (CECA).
- 5.2 Information relating to 2012 water use on construction sites has been provided by:
- Balfour Beatty
 - BAM Construct UK
 - Collated values for environmental reporting provided by CECA⁸
 - Galliford Try
 - Mace
 - Miller
 - Morgan Sindall
 - Shepherd Construction
 - Sir Robert McAlpine
 - Skanska
 - VINCI construction UK Ltd
 - Volker Fitzpatrick
 - Willmott Dixon
- 5.3 It was notable during the data collation for this report that many more companies are now routinely monitoring, recording and reporting on their water use on construction sites. This was apparent both through conversations with UKCG members contacted, and the ease with which companies were able to provide their water use data. It is anticipated that this trend will continue and that future reports will be based upon wider samples of the industry.
- 5.4 Unlike in previous years it was not possible to source data from Glenigans, who collate data from the construction sites via questionnaires for Constructing Excellence KPI reporting. Glenigans informed us that there had not been an adequate response level to the water use question to report a 2012 KPI. This finding reflected the trend seen for 2011, where response levels were lower than for 2009 and 2010.

⁸ Note, some data overlaps existed between this data set and the individually collected data from companies. This was identified and removed to ensure no double-counting within the analysis.

- 5.5 [WRAP](#) is updating its reporting data portal to include the capability for water use data and this would make future data collation easier and more consistent. WRAP also anticipates that this would allow increased breakdown of water use across different parts of the sector and, hence, a better understanding of which types of construction project use large and small volumes of water.
- 5.6 The total (2012) value of construction projects represented by the data collected is £13,601 million, against a total industry value for England, Wales and Scotland of £115,372 million (taken from the ONS Construction Statistics⁹). The data used to calculate the industry water use in 2012 represents almost 12% of the total industry. This is in line with the 2011 statistics, and an increase on 2010 where the data provided represented 8% of the total industry.
- 5.7 The total water use on construction sites for 2012 was reported to be 1,403,977 m³. Hence the water used by the industry is equivalent to 103m³ per £million contractors output at 2012 prices.
- 5.8 To allow for direct comparison against the 2008 baseline, a simple conversion was carried out to re-base the 2012 data against 2005 values using non-seasonally adjusted output price indices for the construction industry from the ONS¹⁰. Due to rebasing of the values to 2010, an adjustment was made to the statistics to convert back to 2005 as the baseline.
- 5.9 The 2012 water use figure is therefore calculated to be 120m³ per £million contractors output at constant prices. This represents a 19% decrease on the 2008 baseline.

For 2012, water use on construction sites is calculated to be 120m³ per £million contractors output at constant (2005) prices.

This represents a 19% decrease on the 2008 baseline of 148m³ per £million contractors output at constant (2005) prices.

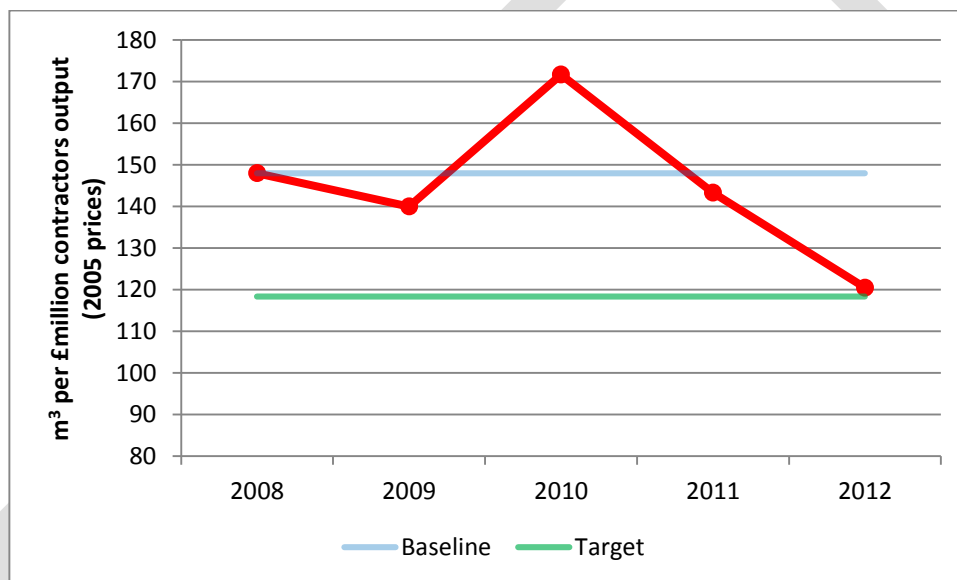
- 5.10 It has been possible to separate out the water use between civils and buildings projects for a sub-set of the data provided. The analysis indicates that the water use relative to project value for civils projects is approximately twice that for buildings projects. In 2012, the civils projects used an average of 203 m³ per £million contractors output. The buildings projects used an average of 103m³ per £million contractors output (both at constant 2005 prices). This is in line with a separate analysis in 2011 which indicated the values of 195m³/£million output for civils, and 98m³/£million output for buildings.
- 5.11 There is not enough information at the submetering level to identify why civils sites use more water per £million output than for building sites. More information on the water using activities and the volumes of water used for each would be needed to confirm this.

⁹ Output in the Construction Industry, November 2013 available at <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcn%3A77-318365>

¹⁰ Data taken from ONS construction industry statistics November 2013 edition available at <http://www.ons.gov.uk/ons/rel/construction/output-in-the-construction-industry/november-2013/stb-construction-nov-2013.html>

6. Trends in water use 2008 - 2012

- 6.1 There has been mixed success in driving down water consumption by the construction industry. There has been excellent progress in improving the level of measurement and monitoring of water consumption, from no or low activity in 2008 to virtually all large contractors (members of UKCG) regularly doing this in 2013. The improvement in the number of companies routinely measuring water consumption has been helped by the availability of a methodology and pro-forma for measuring water use on construction sites devised by the Water Subgroup, and a commitment by UKCG members to measure water use on construction sites.
- 6.2 The improved data availability has meant the calculation of water consumption is not representative of the industry over the 5 years and the resulting annual figure on water use has fluctuated – this is mostly evident between 2009 and 2010. Since 2010, there is a clear decrease in water use, and the industry has come close to achieving the 2012 water consumption reduction target.



- 6.3 The resolution of the data provided in each of the years has not been adequate to look at the breakdown between civils based projects, and buildings projects. A change in the proportion of each of these in given years could explain some of the change – for instance if there was a spike in the relative proportion of civils based work in 2010 this might go some way to explaining the increase in the apparent water use per £million contractors output.
- 6.4 There may be other, external, factors which influence the overall trend in water use and these have not been considered. For instance, in 2010 the annual average rainfall was low compared to prior and immediate future years. However, no detailed analysis has been carried out to identify whether or not there is a relationship between rainfall and construction site water use.

Key achievements by 2013

Methodology and pro-forma for measuring water use on construction sites devised.

Commitment by UKCG members to measure water use on construction sites.

Year on year increase in number of companies contributing data for annual reporting either directly or indirectly.

A 19% reduction on 2008 baseline for water use on construction sites, just 1% short of the 2012 target.

DRAFT

7. Water audits on construction sites

- 7.1 A prerequisite for understanding how to reduce water usage on construction sites is to have a clear understanding of where water is used, how much is used, where water is being wasted, and what behaviours and/or technologies can be introduced to successfully reduce water wastage.
- 7.2 Water audit work carried out by Mabbett and Associates Ltd during 2010-2011 improved understanding of these aspects, building upon initial identification of water using processes and best practices developed by the UKCG.
- 7.3 This work was further developed in 2012 with the completion of three more in-depth water audits along with a study of hydro demolition – again carried out by Mabbett and Associates Ltd. The purpose of these audits was to:
- Develop robust primary data quantifying where water is wasted, and the associated water using processes on construction sites; and
 - Establish an evidence base of good practice for reduction of water use in the construction process.
- 7.4 Key findings from both phases of work are available in a report published by WRAP. The report *Auditing of water use on construction sites – Phase I and II* is available at:
- www.wrap.org.uk/sites/files/wrap/Auditing%20of%20water%20use%20on%20co%20nstruction%20sites%20-%20Phase%201%20and%202.pdf
- 7.5 Three case study documents highlighting the main conclusions from each audit have been created and are available at:
- www.wrap.org.uk/content/water-efficiency-construction

Key achievements by 2013

Methodology for carrying out water audits on construction sites devised.

Audits carried out to identify key areas of high water use and scope for improving efficiency.

Best practice activities for good water management identified.

- 8.6 Development of a number of top tips for green construction was coordinated by the GCB GIG for the Ecobuild 2013 event. These tips were split into topic areas of water, carbon, waste, biodiversity and materials. The full list of tips can be found at: www.greenconstructionboard.org/index.php/resources/top-tips



ACT ON [WATER]

- 1] **MEASURE IT, MANAGE IT**
Know your water consumption. Set targets to minimise water usage, and measure progress both during construction and once the project is operational and in use.
- 2] **USE WATER-SAVING TECHNOLOGY**
Reduce mains water consumption by using appliances that save water or detect leaks, or tap into alternative water sources such as rainwater capture.
- 3] **SAVE WATER DURING CONSTRUCTION**
Keep track of your water use during the construction phase. Make sure your equipment is water efficient, and encourage everyone to report leaks and fix them fast.
- 4] **KEEP IT CLEAN**
Take care to prevent pollution, inspect drains regularly and keep them well maintained. Protect natural water courses and ground water sources.

Toolbox talk

- 8.7 A 'toolbox talk' on construction site water use has been developed to accompany the 'how to' guide. The talk that would be delivered as part of the daily or weekly training programme on site, aims to increase awareness of water scarcity issues and the impact that changes to construction site behaviours and technologies can have.

STRATEGIC FORUM FOR CONSTRUCTION

Toolbox Talk: Water

Water use in construction

1 Essential for construction 2 Limited supply 3 Increasing cost

Water is integral to the economy, we need it for energy production, industrial processes, to grow food and, of course, for construction. In the coming years, the combined effects of climate change and a growing population are likely to put increasing pressure on our rivers, lakes and aquifers. If we do not act now to manage our demand for water, the security of our water supplies could be compromised.

What is the situation in the UK?

It is a misconception that the UK has plenty of water.
FACT - already, parts of England have less rainfall per person than many Mediterranean countries.
FACT - increasing demand will result in increasing cost both at home and on site as we find new sources of supply.
FACT - water resources are under pressure and current levels of water abstraction are unsustainable in places.

What does this mean for construction?

- We can ensure no water is wasted.
- By reducing water usage, projects will benefit from cost savings.
- As an industry a commitment has been made to reduce water usage by 20% from a start position of 148m³/£million contractors output. We all have a responsibility to measure progress against this target.
- We will be able to identify if water from other sources might be an appropriate alternative to using water of drinking quality standard.

STRATEGIC FORUM FOR CONSTRUCTION

Toolbox Talk: Water

Water Hierarchy:

What can you do?

Hold a discussion with your team to identify where you use water on site. Refer to the 'SFIC How to Save Water on Construction Site' guide for the top ten quick reducing water use. Three of the most commonly applicable water saving measures are listed below;

- 1. Fix Leaks**

£ 😊 😊 😊 😊 😊

An unfixed leak can be the most significant water use on site. Leaks can come from damaged washers in taps, worn valves and corroded or damaged pipework.
- 2. Fit trigger guns to hoses**

£ 😊 😊 😊 😊 😊

Hoses left running when not in use waste a lot of water in a short time. Fit robust trigger guns to hoses so that flow can be controlled at the point of use.
- 3. Running taps**

£ 😊 😊 😊

Flow from taps is often more than is needed. Consider adapting taps by either fitting a flow restrictor or aerating tap insert. Changing the tap is another option. Turn taps off.

Take away message

- Apply the water hierarchy. Prevent use, improve efficiency, consider alternative sources, reuse and recycle.
- Water is our most precious resource and every one of us has responsibility to conserve it.

- 8.8 The 'toolbox talk' was launched at a presentation at Ecobuild 2012 and is available for download on the GCB website. The Water Subgroup will continue to promote the training material and encourage wider circulation and uptake.
- 8.9 The talk can be downloaded from:
www.greenconstructionboard.org/otherdocs/WatertoolboxTalk.pdf

Water management plan for contractors

- 8.10 A framework and guidance document for developing site water management plans by contractors has been developed by the Water Subgroup. Published in 2014, the document draws together available information on all aspects of water management and provides signposting to other guidance materials.
- 8.11 The framework and guidance document is intended to help manage water-related risks associated with construction work activities and provides an overview of aspects to consider in the development of site water management plans. The resultant plans should include clear information about how water will be used, sources of water available, and how water will be disposed of. It is envisaged that the site water management plans would be incorporated as part of the site environmental management plan. Contractors may adapt the information to develop guidelines or templates to suit individual site needs.
- 8.12 The framework document encourages consideration of efficient behaviours and technologies in the first instance, and requires that the water hierarchy is also followed. The framework and guidance are available at
www.greenconstructionboard.org/index.php/resources/water-management-planning/introduction



- 8.13 Alongside the guidance document exists a template for individuals to follow when preparing their own site water management plans. This document is

available to download from
www.greenconstructionboard.org/images/resources/Template-for-water-management-plan_v5.pdf

Key achievements by 2013

Top tips for reducing water use on construction sites developed and published
Toolbox talk for on-site briefings developed and promoted.
Site water management plan framework and guidance document developed.
Site water management plan website developed and launched.

DRAFT

9. Water use in construction product manufacturing

9.1 The Construction Products Association (CPA) has developed a publication on water use in construction product manufacturing. The report includes information on:

- How water is used by manufacturers;
- Sources of water and water reuse considerations;
- A discussion of the business risk of future water availability;
- Products that help others in the built environment to manage water efficiently in use;
- The relationship between energy, carbon and water use;
- How water is measured, including embodied water and water footprinting; and
- Case studies of good water management practices.

9.2 The context for the publication is green construction, promoting both the business benefits and environmental benefits of effective water management in the construction products industry.

9.3 The publication will be available on the CPA website

www.constructionproducts.org.uk/

10. Looking to the future

- 10.1 The Water Subgroup was set up in 2008 by industry to deliver on the 2012 target included in the 2008 Strategy for a Sustainable Construction, and with the 2012 reporting now complete and in line with the target, the project that supported the secretariat and the Subgroup has now concluded and the group set up for the purposes of the 2012 target has disbanded.
- 10.2 It is to be hoped that a focus on water activities will continue through the activities of the Green Construction Board, especially as a result of voluntary industry agreements to do so. The GCB has a renewed two year remit under the 2013 Construction Industrial Strategy (*Construction 2025*), through the Construction Leadership Council. The philosophy of the GCB is to demonstrate the business benefit of green construction, and exploiting the growth and export opportunities offered by low carbon resource efficient practices.
- 10.3 The successful outputs from the work carried out over the last five years by the Water Subgroup will continue to be promoted, and it is recommended that any future work should focus on the business risk of water availability and water stress to all phases of the construction lifecycle, as well as the carbon impact of water management.
- 10.4 The Water Subgroup has summarised its key recommendations for a future agenda on water as:
1. **Measurement.** Although significant progress has been made on measuring and monitoring water use on construction sites, there are still significant gaps in knowledge, particularly to explain differences between civils and buildings, and external factors which affect overall water use. The suggested target is that water use on **all** construction sites should be measured and reported on for the sector by 2020.
 2. **Reporting.** Ideally to maintain a focus on water use on construction sites through a mechanism for routine reporting of water use along with best practice case studies to continually promote and celebrate successes.
 3. **Promotion** widely across the industry of the different steps that can be taken to eliminate water wastage, use alternative sources to reduce potable water consumption, and reuse of water in line with the water hierarchy.
 4. **Quantify business risk.** Water availability is a real business risk right across the construction supply chain – including both water scarcity and flooding. The ‘value’ of water is a function of not just its cost but its relative local scarcity. Better understanding of the impact on the water environment from manufacture and supply of construction products will help determine the risk associated with their use, including resilience of supply, operational considerations and business growth or security risks.
 5. **Carbon.** Assessment of the potential carbon benefits from good water management, incorporating both direct and indirect water use would be valuable across the construction lifecycle from raw material extraction through to end-of-life demolition. Water use and wastewater treatment are significant emitters of carbon from pumping, heating and treatment activities.

Annex A Case studies of good water management



AVOIDING POTABLE WATER USE

Building swimming pools requires water in both construction and commissioning, specifically with the first structural integrity leak test. Gosport Leisure has two pools (a 25m pool and a teaching pool) that amounted to a volume of 435m³. Site conditions and nature of the build programme led to use of rainwater runoff as double benefit – avoiding use of potable water in first fill and also mitigating site flooding risk.

Due to the envelope works, the site team were unable to install the storm drainage until the end of the project. The roof works were completed early in the programme with nowhere to drain the run off apart from allowing it to soak away into the sandy soil. Early roof completion created building integrity but with the rain falls experienced in 2012, the ground soon became saturated particularly around the pool excavation as the water table rose, compounded by the roof run off.



The site team calculated that half of the roof's run off could be used by diverting rainwater pipes directly into both pools as part of their construction leak testing. Both pools were completely filled using this method prior to tiling works.

Once any leaks had been identified, the pools were emptied, with water reused for site activities, wash-down, tool cleaning and landscaping, with residual to foul sewer. The pool refill was made on completion of the tiling and finishing works with mains water via the pool's filtration plant.

435m³ of treated mains water was saved and the solution addressed site flooding/rising water table issues around the pool excavation, avoiding poor working conditions and programme impact.

The cost saved on mains water was modest (£652 at £1.5/m³) for first leak testing fill. However, Willmott Dixon recognise that the value of water is far greater to the sustainability of the natural environment and our communities. So the effective use of potable water resources, as well as mitigation of surface water risks to site flooding, can realise opportunities by addressing the risk and avoiding time and cost impact to critical programme delivery phases.

Contributed by Martin Ballard, Willmott Dixon



RAINWATER USED FOR BOOT WASHING

During the winter months construction teams can wash their boots anything up to four times a day. Traditionally on large construction projects mains water is used to supply the boot washing facilities. For a typical £50million construction project, this represents approximately 300,000 litres of water and 0.4 tonnes of carbon dioxide each year – just for boot washing!

Responding to the increased frequency of drought conditions in the UK and the need to conserve finite water resources, Lend Lease construction projects are now supplying boot washes with water captured from a closed-loop rainwater harvesting system.

The rainwater is collected from the roofs of the temporary site cabins to supply the boot washing facilities. The rainwater harvesting systems are generating enough water to supply 70% of the typically peak demand on a construction project saving approximately 210,000 litres of water, 0.2 tonnes of carbon dioxide and £300 per project per year.



Rainwater has replaced mains water for boot washing use. This is estimated to save over 210,000 litres of water and £300 per project per year.

Contributed by Gemma Bourne, Lend Lease, for the 2013 progress report

DEWATERING AND GROUNDWATER REUSE SAVES MONEY AND OFFERS DISPOSAL SOLUTION

Using water produced from dewatering activities and groundwater in place of mains water has resulted in estimated cost savings of £7,500 through reduced discharge costs and avoided mains water costs.



Water is used for lubricant and flushing agent, along with cleaning during grouting. 2,675m³ mains water are estimated to have been saved.

The main areas of water use on site are grouting, dust suppression and tunnel cleaning. Dewatering and use of groundwater, freely running on the site, were used for these activities to offset mains water use. This had the additional benefit of reducing the total volumes that were discharged to water courses and sewer.

2,675m³ water was estimated to be saved during grouting where water is used for lubricant and flushing agent as well as cleaning. By filling bowsers from dewatering for general damping down and specific dust suppression activities, 120m³ water was estimated to have been saved. In addition an additive was used to reduce the water used for dust suppression on another area of the site, with an estimated saving of 54m³ water.

100% water recycling in tunnel cleaning saved approximately 1,000 litres of water per day. In addition different applications and pressures were experimented with to identify further water savings.

Savings from avoided mains water use were estimated at 2,908m³, which also reduced water discharge to sewer and water courses. Total estimated cost savings were £7,500.

Contributed by Dawn Love, Vinci Construction UK, for the 2013 progress report



MAXIMISING USE OF ALL WATER SOURCES

At Kettering Science Academy, rainwater is harvested from site offices and stores - this includes subcontractor site offices. The resulting store of water; supplies the site toilets for around 150 men and women every day. Aerated taps have also been installed to further reduce water use.



At Oakfields community college a large underground attenuation tank has been installed. The water is kept and pumped into water 'cubes' that are used for dust suppression on site. This prevents groundwater being pumped into the nearby watercourse.

Collected rainwater at Gordano 6th Form College, Portishead, is being used by trades – such as bricklayers – to clean their tools at the end of the day rather than mains water. A water bowser to collect rainwater from the roof of an adjacent building has been set up to supply the water.

Contributed by Martin Ballard, Willmott Dixon, for the 2013 progress report

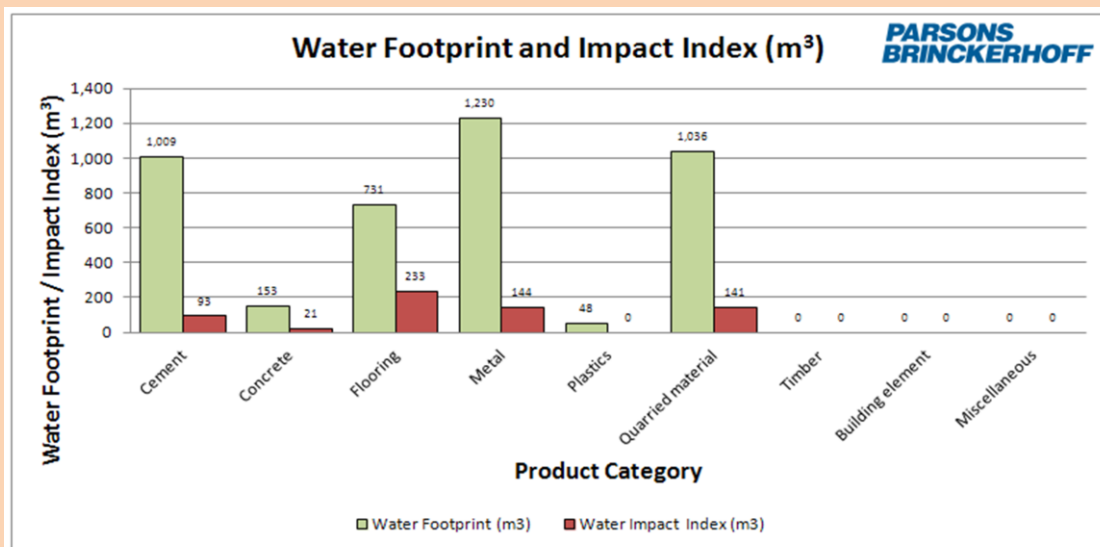
Case Study: Direct and Indirect Water Use at Heathrow T2B

The T2B project is part of the £4.5 billion major capital investment programme by BAA at Heathrow Airport. The project involves construction of Satellite Pier T2B that will complement the new Terminal 2. When in operation T2B will comprise 16 aircraft stands, retail provision of 1,275m², 3 lounges with 3,600m² floor area; and 4,000m² of airline operations accommodation.

Working collaboratively with Balfour Beatty, and one of its main suppliers, Marshalls, Parsons Brinckerhoff (a Balfour Beatty company) transposed an industry methodology, developed by the Water Footprint Network, into a suite of tools to enable estimation by designers and contractors of the volume of direct and indirect water used in construction projects and material suppliers to calculate the volume of direct and indirect water used in construction products. The tools also consider local water stress to estimate a water impact index.

The tools were trialled on Heathrow T2B and results indicate that the embodied water associated with procured materials and products greatly exceeds that used directly on site for construction purposes.

- Direct water footprint: 18,596m³ per year
- Indirect water footprint: 652,236m³ per year



Output Screenshot from Indirect Footprinting Tool

Although metals have the highest water footprint, it is flooring that has the greatest impact when the water impact index is considered.

This information can be used in the future to help target water use reductions within the supply chain. Limitations should be noted however, that there is currently very limited embodied water factor data ('cradle to gate') for typical UK construction materials. Data on water stress across the globe is also limited.

Contributed by Jim Wiltshire, WRAP, for the 2012 progress report

Case Study: Non-potable water use

Dust suppression is a major use of water on construction sites. At the Olympic Park, London, Skanska took steps to eliminate inappropriate use of drinking water by reusing over 7.5 million litres of non-potable water for dust suppression and other activities. This represented 35% of the total water use for the site.

The majority of the non-potable water was encountered during the dewatering of deep drainage excavations. The waters were pumped to a designated Skanska facility which filtered out the high silt content and any contaminants before being tested and stored in containers for reuse on site.



- Total water use on site: 22,689m³
- Potable water use: 14,670m³ (65%)
- Non-potable water use: 7,749m³ (35%)

Reduced charges for discharging to sewer, and avoided hydrant license costs resulted in cost savings.

Contributed by Richard Hirst, Skanska, for the 2012 progress report