River Basin Management Plans 2015 - 2021

Economic Assessment Report Required for Article 5

December 2015

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Economic assessment required for Article 5

1. Introduction

Northern Ireland has the capacity to make savings and avoid huge costs through the development and implementation of River Basin Management Plans (RBMPs). Investing in the management of floodplains and through the promotion of sustainable development near our rivers can save millions of pounds in restoring water quality, flood alleviation, and insurance costs, whilst simultaneously providing mental and physical health benefits which ultimately benefit our economy in the longer term[1].

The Water Framework Directive refers to Good Water Quality and an objective for members states to achieve 'good surface water status' and 'good groundwater status', and to prevent deterioration in the quality of waterbodies, which are already 'good status'.[2]

1.1 Article 5 Reporting Requirements

This report provides information required under the Water Framework Directive (WFD).

These requirements cover the following areas:

- An overview of the socio-economic importance of water uses in the River Basin Districts together with information relating to how this analysis was carried out and how it may be improved in the future.
- An assessment of the current level of cost recovery for water services for household, agriculture and industry, with some indication of a first picture related to subsidies, and information relating to how this analysis was carried out and how it may be improved in the future.

1.2 Structure of the report

This report contains the following sections:

[1] NIEA, '*Creating prosperity and well being through Environmental and Heritage excellence.'*
[2] '*The economic Value of Water Use: Implications for implementing the WFD in Scotland*', the journal of environmental management.

- Driving Forces: This section sets out the socio-economic characteristics of Northern Ireland in terms of employment, growth, investment etc.
- Pressures: This section attempts to link economic information with the most important activities for the characterisation/risk assessment.
- Water Services and Cost Recovery: This section presents information received from Northern Ireland Water (a Government Owned Company which is responsible for the provision of water and sewerage services in Northern Ireland) in regard to cost recovery.
- Cost Effectiveness: This is covered within the Economic Analysis report which looks more specifically at the POMs and options for delivery and will not be discussed in detail within this report.

1.3 Data Sources

This supporting document should be read in association with the Significant Water Management Issues overview reports and the final 2nd Cycle RBMPs and supporting documents. These have been prepared by the Department of the Environment.

A number of data sources have been used in compiling this document. These are detailed as they are encountered in the text, but in summary include data from government, local authorities, environment agencies, university research departments, assessments of pressures and impacts on water quality and consultancy reports. This assessment is based on pragmatism and the use of existing data sources.
The acquisition of new data and integrated data management will form part of the process of improving the knowledge and the information base.

1.4 Public Participation

The need for public involvement is an important feature of the WFD and, in certain areas, such as the development of the RBMPs, is statutory. The Department has consulted throughout each stage of the compliance process and public participation will continue to be encouraged throughout the 2nd cycle planning implementation phase after the publication of the second RBMPs. The Department will continue to

encourage participation through formal groupings such as the Northern Ireland Water Framework Directive Stakeholder Forum and the River Trusts where appropriate. Engagement will also take place with key stakeholders within each River Basin District through annual meetings and biennial conference style events throughout the 2nd cycle.

2. Driving Forces

This section provides an overview of the socio-economic characteristics of the Northern Ireland Economy and includes the following information:

- Economic History
- General Profile: presents an introduction to Northern Ireland's River Basin Districts and IRBDs (RBDs and IRBDs) and details key limitations faced when gathering information.
- Employment: presents an overview of employment and unemployment in manufacturing and services.
- Output and Growth Forecasts.
- Construction and Investment.

2.1 Economic History

Northern Ireland was the only part of the island of Ireland to participate to a significant degree in the birth of the industrial revolution. Development was initially concentrated in the Lagan Valley but subsequently extended to the Bann and Foyle basins. A mix of immigrant expertise and good local raw materials led to the development of a major linen industry in the region, which used water both for motive power and as part of the wet spinning process. Servicing this industry led in turn to the development of a major engineering sector.

The growth of Belfast, in particular, was dramatic. The town with a population of well under 50,000 in 1821 had grown to a city with a population of over 250,000 by 1900. In Belfast early development of linen mills was dictated by the availability of water for motive power and this led to the clustering of mills in north and east Belfast. While the linen industry quickly converted to coal powered steam equipment, these early locational choices by the linen industry are still reflected in Belfast's human and industrial geography today.

The early part of the 20th century was marked by the decline of traditional industries as they struggled to face global competition. This was a period of rising

unemployment and low productivity. In the 1960s however, inward investment in a range of new industries brought new jobs and new techniques. The man-made fibres industry was very prominent in these new industries and placed particular demands on Northern Ireland's water infrastructure. By the start of the 1980s, however, both the man-made fibre industries and the traditional Northern Ireland sectors were in decline and unemployment rose to over 120,000 on a claimant count basis. While clusters of textile manufacturing and the traditional Northern Ireland heavy engineering still remain, they are small in scale and increasingly specialist in nature.

2.2 General Profile

Belfast (with a population of 283,166 in 2014[3]) is the capital and major centre of population of Northern Ireland which has a total population of around 1.8 million. One River Basin District (North Eastern) and three international River Basin Districts (IRBDs) (North Western, Shannon and Neagh Bann) have been identified within Northern Ireland.

For the purposes of this report the scale analysis is at the 'All Northern Ireland' level and not RBD level. River Basin Districts in Northern Ireland are relatively small in terms of land area, but are very small in terms of socio-economic scale. For example, the North West IRBD in Ireland/Northern Ireland contains approximately one fortieth of the population that resides in the North West RBD in England. This gives rise to a number of unique factors applying in Northern Ireland that have shaped the analysis, namely: fairness regarding the appropriateness of connecting a single user to a pressure unless there is positive evidence to connect them; and confidentiality because Northern Ireland often has a single company in a particular sector where larger economies have a number of companies in an industry. It is therefore not always possible to extract data from official sources for much of the sector analysis that would ideally be sought.

Originally, Northern Ireland did not participate in the restructuring of the water sector as undertaken in the rest of the United Kingdom (UK) but is now undergoing strategic change which is discussed in detail later in this document. This change

[3] Mid-year estimates from 'NISRA' http://www.nisra.gov.uk/demography/default.asp42.htm

ranges from ongoing debate on whether to raise additional contributions from domestic users, demand management, leakage management, interconnectivity of supply, to the structure of the industry itself.

2.3 Employment[4]

There has been further improvement in Northern Ireland's labour market. The latest employee jobs figure of 721,410 is a seasonally adjusted increase of 0.4% on the previous quarter and 1.2% rise over the same quarter in the previous year. The current unemployment rate of 6.2%[5] is 3.4 percentage points below the EU 28 rate of 9.8%. The unadjusted total employee jobs figure for March 2015 was 719,030 which represent a decrease of 2,920 jobs over the quarter but a rise of 8,680 jobs (1.2%) over the same quarter in 2014.

Table 2.1: Employee Jobs, change over 1 year (seasonally adjusted).

Sector	Numbers (NI)	Percentage (NI)	Percentage (UK)
Manufacturing	+ 1,870	+ 2.4%	+ 1.8%
Services	+ 5,640	+ 1.0%	+ 2.8%
TOTAL	+ 8,680	+ 1.2%	+ 2.8%

Note: Employee Jobs figures as at March 2015 (seasonally adjusted)

Table 2.2: Employee Jobs, change over 5 years (seasonally adjusted).

Sector	Numbers (NI)	Percentage (NI)	Percentage (UK)
Manufacturing	+ 6,970	+ 9.5%	+ 1.3%
Services	+ 10,010	+ 1.7%	+ 7.6%
TOTAL	+ 11,690	+ 1.6%	+ 6.9%

Note: Employee Jobs figures as at March 2015(seasonally adjusted)

In the period May – July 2015, unemployment in Northern Ireland stood at 53,000 or 6.1% (seasonally adjusted) of people aged 16 and over; a decrease of 0.5 percentage points on the previous year. In Northern Ireland the unemployment rate for young people (aged 18–24, unadjusted) for the period May – July 2015 was 20.2%.

[4] DETI Employment statistics http://www.detini.gov.uk/index/what-we-do/deti-stats-index/labour_market_statistics/stats-labour-market-employment.htm

[5] A NI employment rate comparable to the EUROSTAT figures has been produced from the Calendar Quarter 4 LFS dataset. It is based on the population aged 15-64 and differs from the working age rates (16-64 for men and for women) published elsewhere in this publication, which take account of both the school-leaving and state pension age.

The agricultural sector accounted for 1.4%[6] of Gross Value Added (GVA) in 2014, with agricultural enterprises employing around 26,000 employees, 3.1% of total employment (2014)[7]. However, employment in agriculture continues to fall. Over the last 5 years, the number of people employed in agriculture has fallen by around 13.3% (share has fallen from 3.9% of employment to 3.1%).

2.4 Output and Growth Forecasts

The latest figures for Q4 2014 show the UK recovery continuing after a period of recession as a result of the financial crisis, with GDP in real terms growing by 0.5% compared with the previous quarter; by 2.7% between Q4 2013 and Q4 2014, and by 2.6% between 2013 and 2014[8].

The highest growth levels in total GVA between the periods 2012-2013[9] were found in London (4%), Wales (3.7%) and the North West of England (3.6%). Northern Ireland showed the lowest rate of Growth in GVA at 1.2% of all the UK regions which is below the overall UK growth in 2013 of 3.3% and was the smallest growth of all the UK regions.

Despite GVA per head having increased in all regions only London and the South East of England had GVA per head above the corresponding figure for the UK. Northern Ireland's GVA per head of population is 76.7% of the corresponding UK figure for 2013, down from 78.0% in 2012 and was the third lowest of the UK regions; both Wales and the North East had a lower GVA per head than Northern Ireland.

All other regions were below the UK average, with Northern Ireland (0.9%) having the lowest GVA per head growth between 2012-2013, followed by the South East of England and East midlands (2.0%). This can be attributed to the fact that the economy continues to attract lower value added jobs with lower level of productivity hence the GVA gap that remains between the province and other areas outlined above.

[6] Northern Ireland Agri-Food Sector Key Statistics, June 2015
[7] Northern Ireland Agri-Food Sector Key Statistics, June 2015.
[8] Second Estimate of GDP, Q4 October to December 2014, ONS, Feb 2015
[9] ONS, Regional GVA (December 2014), http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Regional+GVA

As a result of the budget, Northern Ireland will benefit from an additional £11 million through to 2015/16 as a result of the Barnett formula consequential. A number of new measures were announced as part of the Chancellors budget including increased personal tax allowance, tax relief for savers and cancelling of the planned fuel duty rise. In addition the Investment Strategy for Northern Ireland covers 2011-2021 and envisages £8.2 billion of investment over the next 5 years[10]; it represents a huge injection of capital investment into the physical and social infrastructures. Whilst this is positive the forecasted signs are that the Northern Ireland economy is also set for testing times with budget cuts across most Government departments.

Manufacturing output decreased by 2.1%[11] in Q2 2015, and output was 1.6% higher than the same period in 2014. Results from the Index of Services for the second quarter of 2015 showed that output in Northern Ireland increased by 0.5% in real terms over the quarter, compared with an increase of 0.7% reported in the UK as a whole. Output was 0.7% higher in Q2 2015 compared to the same period one year earlier[12].

Northern Ireland had experienced a prolonged period of rapidly rising house prices but data showed that this came to an end in Q4 2007. The Northern Ireland residential Property Price Index shows that local house prices have increased by 3% over the year to Q2 2015[13], although they still remain less than half their peak in Q3 2007. ONS estimate that Northern Ireland house price growth has been higher over the past year to July 2015[14], than all other UK regions except, South East and East of England. The Monetary Policy Committee has kept interest rates at 0.5% since March 2009; any rate rise would reduce disposable incomes.

Manufacturing exports (sales outside the UK) from Northern Ireland were worth £6.1 billion[15] in 2013/14, and external sales (outside of Northern Ireland) were worth £14.3 billion. This rise was largely driven by an increase in sales to the Rest of the EU. Exports have risen significantly over the last decade from £4.4 billion to £6.1 billion, an increase of £1.7 billion (39.7%) and by 8.7% from 2012/13.

[10] http://www.sibni.org/investment_strategy_for_northern_ireland_2011_-_2021.pdf
[11] DETI, Index of Production Q2 2015
[12] DETI, Index of Service Q2 2015
[13] DFP, NI Residential House Price index
[14] ONS, House price Index
[15] DETI, Manufacturing sales and exports, Dec 2014

Total R&D spending has increased by 88% between 2008 and 2013, driven by a 162% rise in business spend (BERD). This increase has moved Northern Ireland from being one of the poorest performing regions (on R&D as % GVA) up to being fifth highest in the UK in 2012.

Business Expenditure on R&D accounts for 75% of overall expenditure on R&D in 2013. Business R&D expenditure in 2013 was £481.8 million, up £20.5 million (4%) in cash terms on the previous year.

Small and medium-sized enterprises (SMEs) continue to be the main driver of BERD growth, since 2008, SME expenditure had increased by 64% to £173.8 million.

The number of visitors to Northern Ireland (non-resident) increased by 4% in 2014[16], whilst overall spending was down by 3%. The split by market shows very different trends. The GB market had 1% growth in visitors but a 6% fall in spending. ROI visitor numbers were down by 3% but spending increased by almost one fifth (19%). The driver of growth in visitor numbers was from destinations outside the UK and ROI, which increased by 16% despite spending falling by 6%.

Economic activity is rising and job growth has been strong; with a range of business surveys reporting positive signals. The local economy is in a better place than it has been for some time, although there is still some way to go. The outlook is more positive for 2014 but slightly more muted into 2015 and beyond. In order to support economic growth we need modern and sustainable infrastructure. We must ensure that adequate investment is made in our water, sewerage and drainage infrastructure to facilitate new industrial and residential development, promote tourism and attract inward investment to Northern Ireland.

OBR has upgraded its economic growth forecasts for the UK to 2.5% and 2.3% growth for 2015 and 2016 respectively reflecting the boost to real incomes and consumer spending from lower oil prices and lower inflation.

Recent growth estimates and forecasts for Northern Ireland are shown in table 2.3 below.

[16] DETI Economic Commentary , June 2015

Table 2.3: Recent Growth Estimates and Forecasts

	2014	2015	2016
Oxford Economics	2.1%	2.3%	2.2%
University of Ulster	2.2%	1.9%	1.1%
Danske Bank	2.0%	2.2%	2.2%
PricewasterhouseCoopers	2.2%	1.7%	-
Ernst & Young	2.6%	1.4%	1.5%
Average	2.3%	1.9%	1.8%

Source: DETI economic commentary June 2015

2.5 Construction and Investment

The key findings from the Quarterly Construction Bulletin for Q1 2015 covering the period Jan – Mar 2015 shows that construction output was 99.8 (99.8% of the average reported in 2011), an increase of 6.5% over the quarter and 13.8% higher compared to the same quarter in 2014. Over the same time period the construction output in Great Britain was 103.2 (103.2% of the average reported for 2011), a decrease of 0.2% on the previous quarter.

This new volume of construction in Q1 2015 was the highest level of output reported for almost 3 years. Despite this improvement, the recent levels of construction output remain well below the historical levels of output.

The increases in output are mainly due to increases in New Work[17] and Repair & Maintenance[18] which over the quarter showed an increase of 6.5% and 6.7% respectively. There was a sharp increase of 18.7% in Other work[19] output which was accompanied by a 9.6% rise in infrastructure output[20]. Housing output[21] decreased by 4.6%.

[17] New work is defined as the construction of any new housing or non-housing structure. It includes output for the public and private sectors covering housing, infrastructure and the industrial & non-industrial sub sectors of construction.
[18] Repair and Maintenance is all on site work not defined as new construction, e.g. housing conversions, extensions and improvements.
[19] Other work includes: factories, warehouse, oil, steel, gas and coal, school, colleges, offices, banks, shops, universities, entertainment, agriculture, health, welfare, garages and other miscellaneous projects, covering, both private and public sectors.
[20] Infrastructure refers to any private or public work on roads and car parks, water and sewerage, electricity, gas, communications, air transports, railways, harbours and waterways.
[21] Housing refers to all housing construction activity both private and public sector.

The estimated value of construction output (current prices) was £623 million[22], an increase of 7.5% (£43 million) on the previous quarter (£580 million) and an increase of 15.6% on the corresponding quarter in 2014 (£539 million).

Invest NI is the main economic development organisation in Northern Ireland. During 2014/15 Invest NI supported £683 million of Inward Investment, an increase of 51% over the year. This is the second highest level in Invest NI's history, behind only 2008-09. Invest NI assistance was offered towards 350 Foreign Direct Investment (FDI) projects which plan to create 5,661 jobs, an all time high and a 19% increase on the previous year's total.

Northern Ireland remains a prime investment location, having attracted many investments from firms around the world. The region offers very good international connectivity, accessible to key EU and US markets, a competitive cost environment, and a highly educated, English-speaking workforce which provides a stream of talent, especially for knowledge-based companies. Expenditure on research and development, and levels of entrepreneurship are on the rise. This highlights the extent to which the Northern Ireland economy is undergoing a structural shift. From a WFD standpoint, therefore, the nature of this investment is at least as important as the present state and distribution of industry. This investment is concentrated in the knowledge economy - rather than traditional sectors such as textiles. Belfast is the world's top destination city for financial services technologies investments. The impact of this investment focus will be to reduce the water requirement per unit of Gross Value Added (GVA).

[22] Northern Ireland Construction bulletin Q1 2015. Not seasonally adjusted are prices are in current prices

3. Pressures

3.1 Sectors Impacting on Water Status

The Water Framework Directive requires NIEA to protect the status of waterbodies from deterioration and, where necessary and practicable, to restore waterbodies to good status.

The environmental objectives established in the RBMPs set the water status to be achieved for surface water bodies for each six-year planning cycle which began in 2009. The second cycle runs from 2015-2021.

Northern Ireland faces a significant challenge in the years ahead. In 2013 only 28% of our surface waters (rivers, lakes, transitional and coastal waters) achieved 'good' ecological status or 'good' ecological potential and 88% of ground waters were classified as 'good'. Further improvements in water quality are required. This will be a major challenge for all sectors and for NIEA and Northern Ireland Departments to deliver within a context of strict limits to government spending and decreasing budgets.

The Significant Water Management Issues (SWMI)[23] overview reports give a detailed assessment of the current pressures and impacts on the water environment and the significant water management issues that we still need to address. Based on those the NIEA has identified the main pressures on the waterbodies not achieving good status to be:

- abstraction and flow regulation;
- diffuse pollution from rural and urban land;
- nutrient enrichments;
- point source pollution from sewerage and industry;
- changes to morphology (physical habitat); and
- invasive alien species.

[23] Significant Water Management Issues – consultation document reports for each RBD (Dec 2013)

Water pollution incidents are investigated by NIEA. In 2013 there were 2,112 incidents reported to NIEA, of which 1,310 (62%) were confirmed as having an impact on water quality of the receiving waterway. Of these 16% were considered to be of high or medium severity[24].

There will be some correlation between the incident sources and economic activity i.e. farm related incidents are more prevalent in rural areas and Northern Ireland Water (NIW) related incidents will correlate more closely to urban areas.

In 2013, farming accounted for the largest portion of substantiated incidences investigated by NIEA (26.9%), followed by industry and other (18.5% each), domestic (18.3%) and NIW (16.3%). NIEA field based activities, proactive work in catchment areas, educational programmes and enforcement actions against polluters have acted to reduce the number of substantiated water pollution incidences since the mid 1990's.

Effluent discharges to our water environment can affect its quality and come from many different sources such as commercial and industrial premises, wastewater and water treatment works and private dwellings.

This section provides information on the sectors that significantly impact on water status. The sectors with a particularly important relationship are:

- Water and Sewerage services;
- Agriculture (reference also made to forestry and fishing); and
- Industry.

Article 5.1 of the Directive requires that each Member State carries out an economic analysis of water use for each RBD or portion of an international RBD falling in its territory. In practice it has not been possible to work at the scale of the RBD for this reporting requirement and reporting is detailed here on an "All Northern Ireland" scale.

[24] DOE, Northern Ireland Environmental Statistics report, Feb 2015

Water Services

Responsibility for delivering water and sewerage services in Northern Ireland rests with NIW - an independently regulated company owned by government. NIW took over responsibility for water and sewerage services from central government on 1 April 2007. NIW abstracts, treats and distributes over 560 million litres of drinking water every day through a network of over 26,700 km of water mains. It also collects and treats around 320 million litres of waste water every day from around 660,000 households and organisations connected to the sewerage system. This involves operating and maintaining around 1,030 waste water treatment works and more than 15,400 km of sewers.

Significant resources are needed to maintain this infrastructure. Under the Northern Ireland Executive's Investment Strategy, £1.5 billion pounds has been invested in water and sewerage networks since April 2007. During the PC13 Period (2013/14 & 2014/15) around £326 million of capital investment was delivered. This included the completion of 62 Wastewater Treatment works including 25 small Wastewater Treatment works, remediation of 67 unsatisfactory intermittent discharges and the laying of approximately 46 km of new and replacement sewers. A £20 million investment to improve security of water supply infrastructure for Belfast and Lisburn is currently underway and has involved laying a 29km water pipeline from Castor Bay Water Treatment Works in Craigavon to South Lisburn.

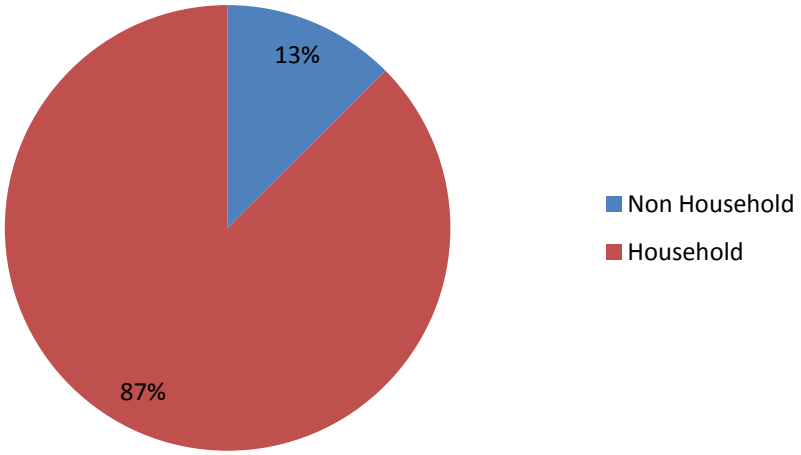
The £160 million Belfast Sewers Project was completed in 2010; this involved an upgrade of over 500 sewers and the construction of over 9.5 km of storm tunnels up to 4m in diameter. This measure not only reduces the pollutant loading on the river Lagan by 85% but also reduces instances of flooding. This will provide an efficient infrastructure for the future economic development of the Belfast area.

The Water Mains Rehabilitation Programme during PC13 invested £54 million in upgrading and improving our water mains. NIW laid more than 449km of mains as part of this programme. The upgrades helped to improve the quality, reliability and flexibility of water supply. A new prioritisation process has been introduced in the programme development ensuring customer focussed outputs are delivered.

In addition, a further £230 million invested through two large Public Private Partnership Projects is providing further improvements to drinking water quality and waste water treatment. Since 2010 the Omega Waste Water PPP Project has delivered improved treatment standards for 25% of the total waste water received by Northern Ireland Water. Since 2009, the Alpha Water PPP Project is delivering new enhanced treatment facilities for over 50% of drinking water supplied in NI.

In order to assess water supply, the domestic and non-domestic activities for which water is supplied are detailed in Figure 3.1 below. This chart does not include information on private abstractions.

Figure 3.1 Water Demand in Northern Ireland (Source: NIW[25])



The majority of water is supplied for domestic use, with non-domestic (including agricultural, industrial and commercial) users supplied with approximately 126,000 m^3 per day.

The proposed long term target under the Department for Regional Development's Sustainable Water: A Long Term Water Strategy for Northern Ireland to 2040[26] is to reduce average consumption currently at 146 l/h/day to 130 l/h/day by 2040. However, water demand needs to be reduced further if we are to protect our water

[25] NIW have provided this split but please note these percentages are based on connected properties and not consumption.
[26] DRD, Sustainable Water: A long term Water Strategy for NI, June 2014 http://www.drdni.gov.uk/index/long-term-water-strategy.htm

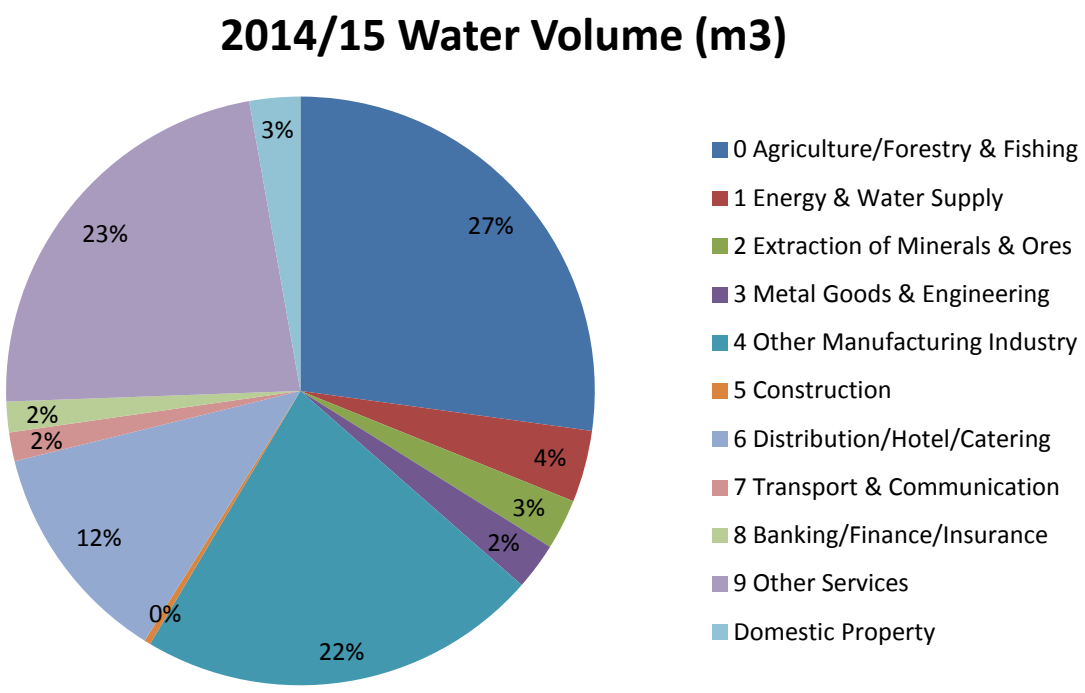
sources, facilitate future development and reduce the carbon and financial costs of drinking water provision in the future[23]

Over 99% of households in Northern Ireland are connected to the mains for the supply of clean water[23]. It is estimated that approximately 1,600 households have no access to mains water (approximately 4,000 people) and are reliant on private sources. There may be additional use of private abstractions by those supplied with mains water. In Northern Ireland, the Department of the Environment's Drinking Water Inspectorate is responsible for regulating and assessing the quality of the public water supply and works with Local Councils in monitoring private water supplies. Over one hundred thousand tests are made each year by NIW and the Drinking Water Inspectorate to ensure that drinking water quality is maintained.

For the disposal of sewage, 98% of population are served by compliant wastewater treatment works[27]. The remaining households have private septic tanks, many of which are emptied by NIW. As a result of an increasing population and a trend towards ever smaller households, the Regional Development Strategy 2035 indicates a need for around 11,000 new housing units per year[28]. This will place pressure on existing water and sewerage networks. NIW has planned investment from 2015 onwards (through PC15) to address some of the significant problems with old sewers which, during periods of heavy rainfall, overflow and spill waste water into rivers causing pollution and flooding. Defective or poorly maintained privately owned septic tanks and small treatment works can also be a source of localised pollution in rural areas.

[27] NIW, Annual report and accounts 2013/14
[28] DSD, Facing the Future: The Northern Ireland Housing Strategy 2012-2017

Figure 3.2 Water supply to Non-Domestic Sector (Source: NIW)



Biggest users in terms of overall NIW volumes consumed by non-domestic customers comes from the 'other' services sector and 'other manufacturing' 22% each (44%), followed by Agriculture/forestry and fishing (20%) and then Distribution/Hotel/Catering sector (11.0%).

Agriculture

Farms cover about 70% of the total land areas of Northern Ireland; therefore this sector has a major role in the protection and improvements of the environment with over one million hectares used for agricultural production[29]. The Agriculture sector has the potential to have a number of impacts on water quality. Agriculture is an abstractor of water as well as a source of water pollution, both diffuse, from fertiliser and pesticides spread on the land, and point sources such as runoff from livestock buildings. The main areas of concern are nitrate pollution in surface and groundwater, phosphorus levels in surface water and contamination by Pesticides. Sediment run-off can also impact on morphology and affect natural habitats.

[29] DRD, Sustainable Water A long term Water Strategy Part 4. June 2014

Within the sector, the majority of farms are based on livestock, particularly cattle, which are found on 83% of farms, while sheep are found on 36% of farms. This is shown below in table 3.1. Going forward, output forecasts for key agricultural sectors depend on a range of factors, with economics and the EU Common Agricultural Policy (CAP) being key drivers.

Table 3.1: Composition of Agriculture Sector in Northern Ireland

% Farm with	2007	2014
Diary Cows	16%	14%
Beef Cows	65%	62%
Other Cattle	85%	72%
Sheep	33%	36%
Pigs	2%	2%
Cereals	10%	10%

Source: DARD, The Agricultural Census in Northern Ireland 2014 http://www.dardni.gov.uk/index/statistics/statistical-reports/agricultural-census-ni.htm

The local agricultural sector plays a more significant role in the economy than is the case in other UK regions. Farm gate sales or gross output was estimated to be worth £1.89 billion for 2014[12]. The GVA[30] of the agricultural industry in Northern Ireland is £451 million which represents 1.4% of total GVA. By comparison the UK figures are £9,922 million and 0.6% of total GVA. Likewise 3.4% of the population in Northern Ireland are employed in agriculture against a UK average of 1.3%. When the food and drinks processing sector is included, this rises to 5.9%. Agriculture employs 29,000 full time equivalents, which translates to an estimated 48,000 people engaged in some form of agricultural activity in 2014. The processing sector employs around 19,778 full-time equivalents. There are currently around 24,000 farm businesses in Northern Ireland. Agriculture is predominantly grazing livestock based, with dairying, beef cattle and sheep accounting for approximately 58%[31] of gross output. Agriculture land in Northern Ireland is almost all under grass, with only 5%[20] of the areas farmed used for arable or horticultural purposes. Pigs and poultry, contribute 21% of total sales.

[30] DARD, 2015 *Statistical Review of Northern Ireland Agriculture 2014* .
[31] DARD, 2015 *The Agricultural census in Northern Ireland 2014*

Under the Nitrates Directive Member State administrations must report every four years to the EC on the impact of NAP on water quality and agriculture practices. The latest Water Quality report[32] Nitrate levels in both groundwater and surface waters in Northern Ireland (as monitored from 2008-2011) are generally low and show either stable or decreasing trends. However, when eutrophic status is considered under the WFD, over half of river water bodies are classed as Moderate/Poor status (indicative of eutrophic conditions). Phosphorus levels in the majority of river monitoring sites are at levels which indicate a risk of eutrophication, but all show either stable or decreasing trends. For lakes, both overall trophic status and total phosphorus (TP) concentrations have remained generally stable since the last reporting period (2004-2007), with approximately one quarter of lakes being classed as Good and the remainder being classed as having Moderate or lower trophic status (indicative of eutrophic conditions). Diffuse contributions of phosphorus from agricultural land are a significant source of phosphorus inputs to rivers and lakes.

Water quality assessments show that over half of the rivers and three quarter of lakes in Northern Ireland still show signs of nutrient enrichment (eutrophication), this causes problems for plant and fish life and also for drinking water purification, stock watering and leisure interests[33]. Eutrophication is a major water quality issue for Northern Ireland and has had a negative effect on Northern Ireland's overall WFD target of 59% of water bodies achieving good status by the end of 2015. Performance is significantly below this target – currently sitting at 32%.

Further growth in the agri-food sector is planned through the implementation of the Industry led 'Going for Growth' Strategy. This could provide a major boost to our economy but it must be delivered in an environmentally sustainable way to avoid loss of essential natural capital. Threats to our natural capital through development and unsustainable use of natural resources must also be addressed[34].

[32] **DOE,** Review of 2011-2014 Action Programme for the Nitrates Directive in Northern Ireland and associated regulations, March 2014 **http://www.doeni.gov.uk/ni_nap_review_report_2014_-_final_-_for_web.pdf**

[33] [33] Northern Ireland Executive, Water Quality report published, May 2013 http://www.northernireland.gov.uk/news-doe-310513-water-quality-report

[34] **NIEA,** State of the Environment for Northern Ireland 2013**, '***Chapter 11, Environment and economy'*, Dec 2013

Forestry

Forestry includes managed and natural forests and can affect the water yield. Northern Ireland has 111,000 hectares of forestry (Forestry Commission, 2014), of which 55% is owned by Forest Service of the DARD. This is equivalent to 8.2% of total land area, the lowest proportions of land used for forestry in the UK[35]. This sector is not significant in Northern Ireland, accounting for 0.03% of total employee jobs and 0.03% GVA[36]

Forestry can be a source of water pollution. Diffuse pollution is associated with heavy rainfalls when pollutants are flushed into watercourses this in turn can affect water quality. Cultivation and drainage may affect the sedimentation and, therefore, the turbidity of water. This can result in disruption to water supply and water treatment plants but can be improved through effective forestry management to minimise soil disruption. Acidification of water courses may occur in upland forests where sulphur and nitrogen is scavenged from the atmosphere. This is more significant in mature forests, and concern relates principally to sulphur which has an established role in acidification of surface waters.

Fishing

Fishing is of relatively low significance to the Northern Ireland economy, accounting for just 0.03% of employment[37] and 0.3% GVA[38].

The sector covers Aquaculture (covering all main types of fish farm, marine, freshwater, producing fish and shellfish), commercial fishing, and angling.

In terms of aquaculture, fish farms can consist of cages situated in the sea or Loughs. In this case no abstraction of water occurs, but fish farms are reliant on the condition of the water body in terms of quantity and quality. Where fish are kept in tanks, large volumes of water are abstracted, piped though tanks and returned to rivers or sea. However, net abstraction is low. Both types of fish farm can affect

[35] Forestry Statistics, Forestry Commission, 2014
[36] Figures provided from Annual Business Enquiry, Dec 2014, GVA figures (2013) at basic prices,
[37] DETI, Employee Jobs Figures, March 2015
[38] Annual Business Enquiry, DETI, Dec 2014 figures for (2013) at basic prices,

water quality in terms of diffuse pollution via discharges of excretory products and veterinary treatment chemicals. The main particulate is that of faecal matter, which can affect the nutrient content of water, as fish excreta consist of urea, ammonia, salt and nitrate and phosphate, which can stimulate eutrophication.

In 2012 the aquaculture sector produced 4,920 tonnes of shellfish valued at £4.53 million and over 946 tonnes of finfish valued at £4.12 million. In total the aquaculture sector directly employs 73 full time and 40 part time employees.[39]

Commercial fishing has little affect on water, either in terms of volume or discharges. Commercial shellfish have an important economic and social role and so water quality standards (such as that set in Shellfish Directive) are maintained to support this role.

The quantity and value of fish landed in Northern Ireland in 2014 is shown is table 3.2 below (DARD 2015).

Table 3.2: Recorded landing of fish in Northern Ireland, 2014[40]

	Tonnes	£('000)
Total Wet Fish	12,324	7,936
Total Shell Fish	10,689	20,352
Total Fish	23,013	28,288

Source: DARD, Fisheries Division

With regard to angling, recreational fishing can have significant impacts for local economies in terms of supporting recreation and tourism and health benefits.

A study commissioned by NITB to look into the social and economic impact of recreational fishing in Northern Ireland noted the following[42]:

- The reports estimated that the overall net economic impact (taking account of multiplier and displacement effects) of recreational angling (both domestic and visitor angling) on the Northern Ireland economy was £22.5 million (2005 prices).

[39] http://www.dardni.gov.uk/index/fisheries/aquaculture.htm
[40] DARD, NI Agri Food Stats, June 2015

- These expenditure impacts are estimated to support approximately 778 FT equivalent jobs in the Northern Ireland economy.

The study also noted benefits beyond just economic contributions. These wider benefits can make significant contributions to environmental and social goals in Northern Ireland i.e. Anglers also make a positive impact on the environment in Northern Ireland via protection and development. Anglers regularly report areas of pollution to watchdog organisations such as FCB, angling clubs and are involved with private fisheries in developing nursery areas that nurture fish and other wildlife[41]. Angling is also recognised as a relaxing outdoor activity and can improve healthy living lifestyles and contribute to health benefits. Angling has the ability to encourage and facilitate participation and interaction amongst a wide range of individuals and groups across all ages, social classes and levels of income (it is however recognised as a predominantly male sport). Evidence has also suggested it can divert young people away from anti social behaviours.

Evidence suggests that promoting a number of these benefits can result in significant savings to departments and agencies. This is particularly the case for crime and health prevention.

Angling is very dependent on the existence of good water quality environments and habitats and is reliant on the ecosystem of fisheries remaining intact. Therefore reductions in water quality status can have a detrimental impact on angling in Northern Ireland which would result in losses to the Northern Ireland economy and the local environment.

Abstraction and Impoundment of Water

The Department of the Environment introduced the Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) in 2006. These regulations

[41] **'Pricewaterhousecoopers and Indecon,** '*The Social and Economic Impact to Northern Ireland, and areas within the Loughs Agency, or Recreational Fisheries Angling and Angling resources'*, final report (July 2007), Department of Culture Arts and Leisure, The Loughs Agency of the Foyle, Carlingford and Irish Lights Commission and Northern Ireland Tourist Board.

aim to provide a single and consistent environmental risk based approach to the assessment and authorisation of water abstraction and impoundment activities within Northern Ireland.

Abstraction of water and regulation of flow are activities that occur on Northern Ireland water bodies. These activities are necessary in order to meet the demand for public water supply, and for agricultural and industrial processes. They are needed for flood defence, navigation, fish farming and hydroelectric schemes.

Water levels are managed by NIEA via controls on quantity of water abstracted and management of dams. NIW has developed targets to control water supply leakage levels within its Water resource Management Plan (2012) and promotes efficient use by the industry and agriculture sectors through charging incentives. The Water Resource Management Plan is reviewed annually and revisited every 5 years. The 2017 revision is substantial and this work is already underway. Further water efficiency measures on managing water demand are outlined in the Water Efficiency Plan. Also the Department for Regional Development's Long-Term Water Strategy for Northern Ireland, which is with the Executive for approval is due to be published by the end of 2015, will also help to address these issues**.**

Industry

Industrial demand is expected to fall slightly, as limited increases in overall levels of output are offset by increased efficiency in use and a sectoral shift towards the knowledge economy.

Below we take a look at the main industrial sectors in Northern Ireland.

Mining and Quarrying

This sector is not significant in Northern Ireland, accounting for just 0.1% of GVA and around 0.2% of total employee jobs. Mining that does take place focuses on quarrying of bulk mineral products, such as stone but also sand and clay. The impact of mining is in terms of diffuse pollution as result of contaminants entering the water sources, although the sector is relatively small within Northern Ireland.

Manufacturing

This is a significant sector within the Northern Ireland Economy accounting for 14% of total GVA (2012) and for 11% of employee jobs within Northern Ireland (March 2015). Manufacturing impacts on water bodies' through a number of pressures discussed below. Pressures include point source pollution, diffuse and abstraction and flow and can have impacts on morphology of the water bodies. The sectors are made of the following key sub sectors:

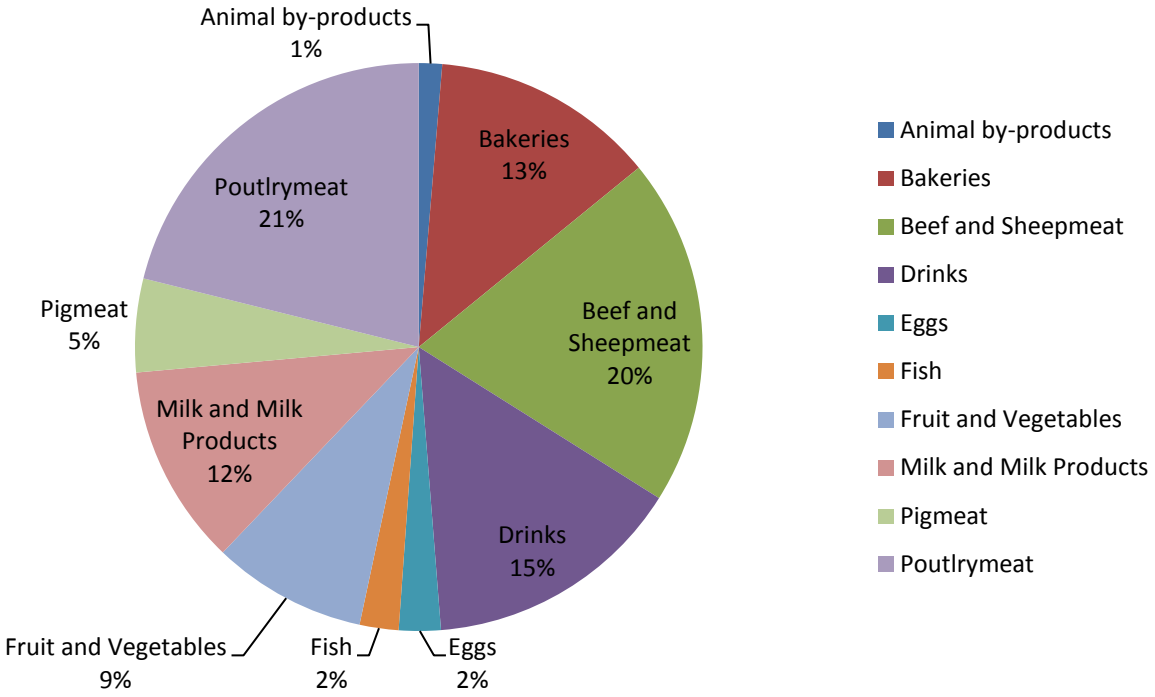
Manufacture of Food and Drinks

The food and drinks sector accounts for approx 26% of employment within manufacturing (2.9% of total employment of Northern Ireland economy), employing just over 20,000 people. It contributes 3.7%[42] of GVA to economy of Northern Ireland (DARD, 2012). Water is used and must be of good quality. It is used in a number of ways from cleaning, cooling, washing, heating, sterilisation and domestic purposes. Water quality is especially important in the production of drinks beverages especially in the case of breweries.

Within the sector the most significant contributions to gross value added are in processing of poultry meat, beef and sheep meat, manufacture of drinks, milk and milk products and in bakeries. As shown in Figure 3.3 below:

[42] DARD, Size and Performance of NI food and drinks processing sector, 2012

Figure 3.3: Gross value added in the food and drink sector, 2012



The sector is dominated by a number of large companies, with the ten largest in the sector accounting for 47% of gross turnover, 45% of value added and 45% of total employment in the sector 2012[43]. (DARD, 2012)

Manufacture of Textiles and Leather Products

Textiles vary in terms of how much water they use. It is the coursing, dyeing and wet finishing that uses the majority of water. However, textile firms such as spinners and garment makers use very little water. Main pressure from this sector is on water abstraction. The sector is of low significance in terms of the Northern Ireland economy, accounting for just 0.5%[44] GVA and 0.4% of total employment[45]. The GVA and employment has also reduced over the last year.

Manufacture of woody, pulp and paper products.

Although forestry is of low economic significance to the Northern Ireland economy, the manufacture of wood based products account for 0.8% GVA (ONS, 2013) and

[43] DARD, Size and Performance of NI food and drinks processing sector, 2012
[44] ONS, regional GVA, industry breakdown 2012
[45] DETI, Employee jobs March 2015

0.8% of employment in Northern Ireland. Water is used in paper mills for dilute suspension of the pulp, to add chemicals, for cooling and for specific mechanical processes. Water is usually re-circulated throughout the process; however water will then be discharged with effects on biological and chemical content. Used water may be treated before discharge (under pollution prevention and control permits), or can be discharged to mains sewers as trade effluent.

Manufacture of Petroleum and petroleum based products.

This sector is not particularly significant to the Northern Ireland economy, contributing 0.2% to total GVA and accounts for 0.003% of total employment. There are no oil or gas refineries in Northern Ireland, but oil and gas are used for electricity generation. Water pollution can result from many of the processes involved in the manufacture of chemicals, from overflows of storage tanks to leakage from pipes during products storage. Pollutants can include mixtures of oil and organic compounds in water, biodegradable organics, to suspended solids and heat.

Other Manufacturing

The rest of manufacturing which includes: chemicals, pharmaceuticals, rubber, plastic products, non metallic, basic metal products, machinery and equipment, office machinery, electrical machinery, communications equipment, medical instruments, motor vehicles and transport equipment, furniture, amongst other more specific manufacturing uses has been grouped to form ‘other manufacturing’. The ‘other manufacturing’ sector accounts for 8.7% of GVA (ONS) and 7.1% of employment (DETI). Many of the uses of water in these manufacturing industries has already been highlighted in previous sectors which use more significant volumes, these uses include heating and cooling processes.

Electricity, gas and Water supply

In the Non Hydroelectric Power industry (i.e. Coal, oil, Gas, and Nuclear), freshwater or seawater is primarily used for cooling purpose and then returned to the water body. There are three main fossil fuel power stations operational in Northern Ireland

(as of end May 2012, DECC); Kilroot (coal/oil), Ballylumford (oil/gas) and Coolkeeragh (oil). These three stations have a combined installed capacity of 2,365 MW[46]. Northern Ireland also has in place the first tidal energy turbine (SeaGen 1.2MW) installed in Strangford Lough in Northern Ireland in 2008.

The value of water to the water supply industry (NIW) is not considered here. The water supplied by NIW is used by the sectors considered elsewhere in the report and not discussed here. However it should be noted the NIW is a very large consumer of electricity in order to enable it to deliver its services.

This sector as a whole is a relatively significant sector within the Northern Ireland economy, accounting for 2.1% of GVA and 0.8% of Northern Ireland Employment.

Construction

Water is used during construction for plant and wheel washing, irrigation, dust control with most significant impacts on water bodies through discharge rather than abstraction. Water quality is at risk from fuel spills and from contamination with concrete which is highly alkaline and can have a damaging effect on water bodies.

The construction sector is a significant sector in Northern Ireland contributing 5.6% of GVA and employing 30,750 people (4.3% of the workforce).

Services Sector

This is the largest sector of the Northern Ireland economy contributing the most to GVA (77.4% of total GVA comes from services) and 81.8% of total Employment. Services use of water is similar to that of households. Services are considered in the sub categories below:

[46] DECC, Digest of UK Energy Statistics, 2012 Power stations in the UK Table 5.11.

Commercial premises[47]

This is the most significant for the Northern Ireland economy, accounting for 47.2% of employment, and 52% of GVA. The most notably significant sector in this section is: Wholesale and retail, then Public admin, social security and defence and real estate activities.

Water users in this sector use mains water for purposes similar to private households (drinking, water discharge and limited washing).

Non-Households[48]

This sector use water for purposes similar to that of private households, and in some cases for technical purposes specific to the institution. This sector covers mainly, nursing homes, schools, hospitals. The potential for pollution is largely dependent on effective water management, and the risk to water bodies is considered to be minimal if water used is discharged into foul water rather than surface water drains. The sector accounts for 18.6% of Northern Ireland GVA and 27.1% of employment.

Amenity and Recreation

There is a wide range of recreational uses of water resources. These include activities on outdoor water bodies, such as jet-skiing, kayaking, rafting etc. and activities that abstract water to swimming pools. These activities can have an impact on the economy via spending. Angling is also a form of water dependent recreation but this has already been discussed above and will not be repeated here.

Public use of bathing and paddling pools is influenced by factors relating to perceived water quality. The Blue Flag standard is a symbol of environmental quality as well as sanitary and safety facilities at beaches and marinas. Of the 105 blue flag beaches and 12 marinas in the UK; in 2015 Northern Ireland has ten beaches and

[47] Commercial Sector is taken to be Wholesale and retail trade; repair of motor vehicles and motor cycles, Accomodation and food service activities, Information and communication, Financial and insurance activities, Real estate activities, Professional, scientific and technical activities, Administrative and support service activities and Public administration and defence: compulsory social security does not include transport and storage sector

[48] Non Households are defined as, Education and human health and social work.

two marinas with blue flags. Swimming pools differ to activities that use natural water bodies and they abstract and discharge water altering the chemical composition of the water between times.

A number of non water dependent recreational and lifestyle choices depend on the proximity to water. Many people enjoy a day at the seaside or walks along the coast river paths because of the aquatic scenery. This desirability can have economic benefits for an area and it can also bring pressures to maintain a healthy environment and control new property developments with a waterside location.

Inland and coastal waters can be used for navigation purposes. This can be for leisure i.e. canal holidays, or for commerce access and transport of goods and materials.

The aquatic environment also contributes to other activities including tourism and attracts visitors to natural settings. The top visitor attraction in Northern Ireland was Lagan Valley Regional Park and third was Giant's Causeway visitor centre attracting 1,347,000 and 788,000 visitors respectively. Murlough National Nature reserve and Oxford Island Reserve attracted 241,000 and 217,000 visitors respectively in 2014. The characteristics of all these centres and fundamental part of their appeal relates to Sea and Loughs. Other visitor attractions include The Peace Bridge (1,071,000) and Carrick-A-Rede Rope Bridge (323,000). Whilst valuable to the economy, large numbers of visitors can bring pressures to the local environment such as increased litter and potential for disturbance to habitats and wildlife.

3.2 Summary of Gross Value Added by Sector in Northern Ireland in 2012[49]

More detail on water use in Industry and Households is described generally in section 4.3 below. However the importance of water use depends on the structure of the economy and the relative importance of the different sectors as explained above.

[49] ONS, Regional GVA data 2012, [Own analysis has been carried out using these figures]

Putting an economic valuation on our environment is difficult, but a 2007 report on Environmental Economy of Northern Ireland[50] estimated that it generates GVA of £573 million and supports 32,749 jobs.

The Northern Ireland Economic Strategy identifies protecting and enhancing the environment as a key measure for business growth[51].

The summary of the relative economic importance of the different sectors is shown in chart 3.4 below (Source ONS and DETI). The activities for which water is used are detailed and can be consumptive, as for production of mineral water, or non-consumptive, as for cooling of industrial facilities. The value of these processes is considered here in terms of Gross Value Added (GVA) to the economy and employment.

By far the most significant sector in the economy in terms of Gross Value added is the sectors that make up the services sector (accounts for around four fifths of economy (by GVA)) for use of water in cooking, sanitation and related uses. Water also has a significant cooling use in power stations and along with the rest of the utilities sector together with other key water-users, agriculture and manufacturing industry. The least significant sectors are mining and quarrying and textiles which account for less than 1% of total GVA.

[50] DOENI, GHK Consulting and the Countryside Consultancy, commissioned by environmental NGOs and the Environment and Heritage Service, Environmental Economy of Northern Ireland, April 2007
[51] http://www.northernireland.gov.uk/ni-economic-strategy-revised-130312.pdf

Figure 3.4: Gross Value Added by sector in Northern Ireland in 2012 (Source ONS, regional GVA) – Contribution of Industrial sectors to GVA

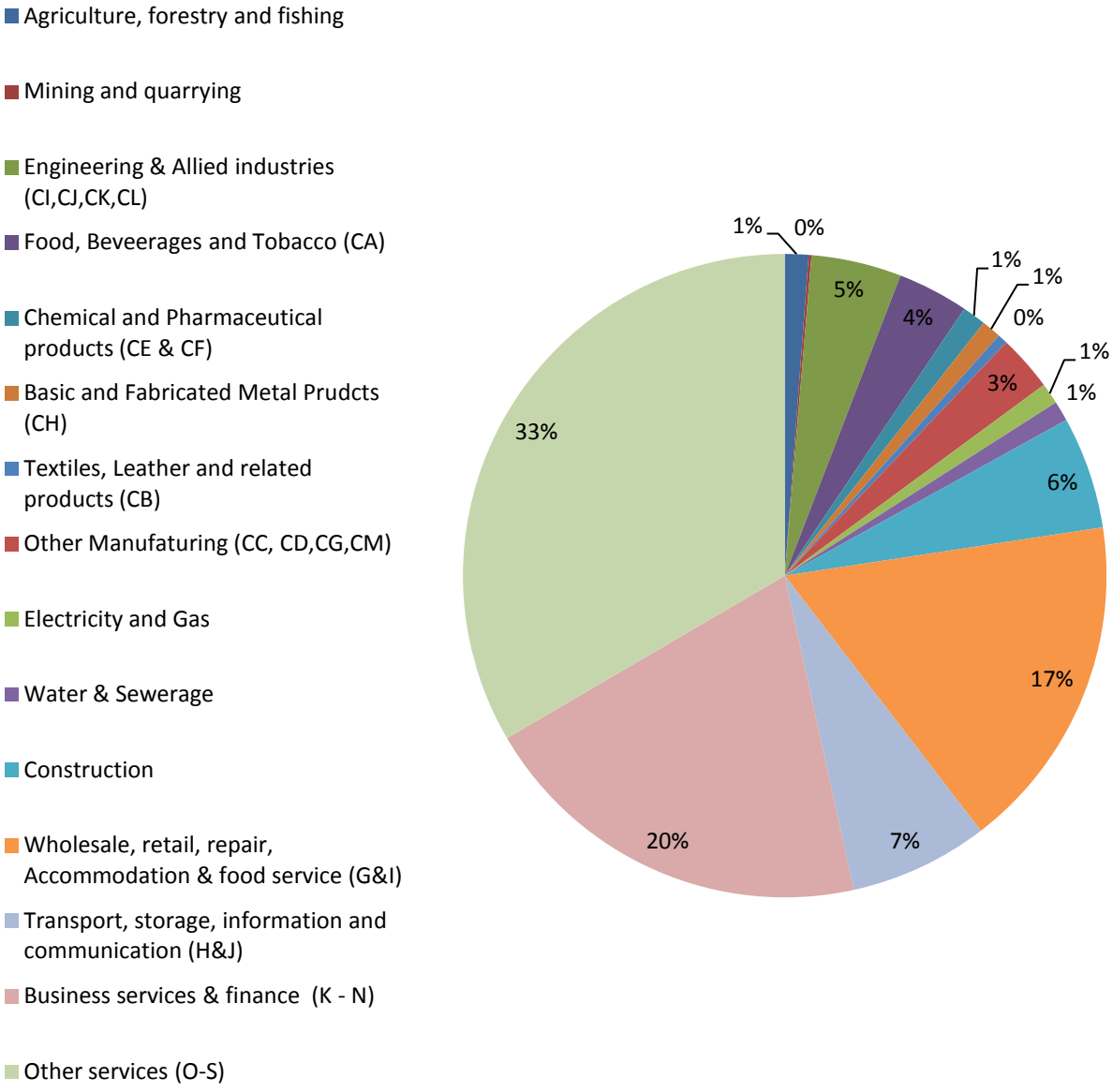


Figure 3.5: Proportion of total Manufacturing GVA by Sub sector 2012

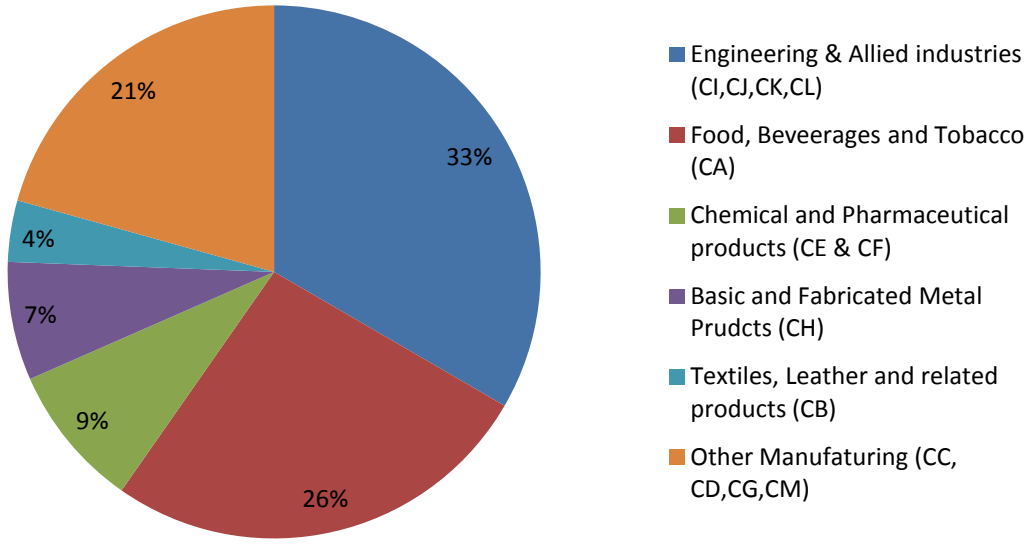
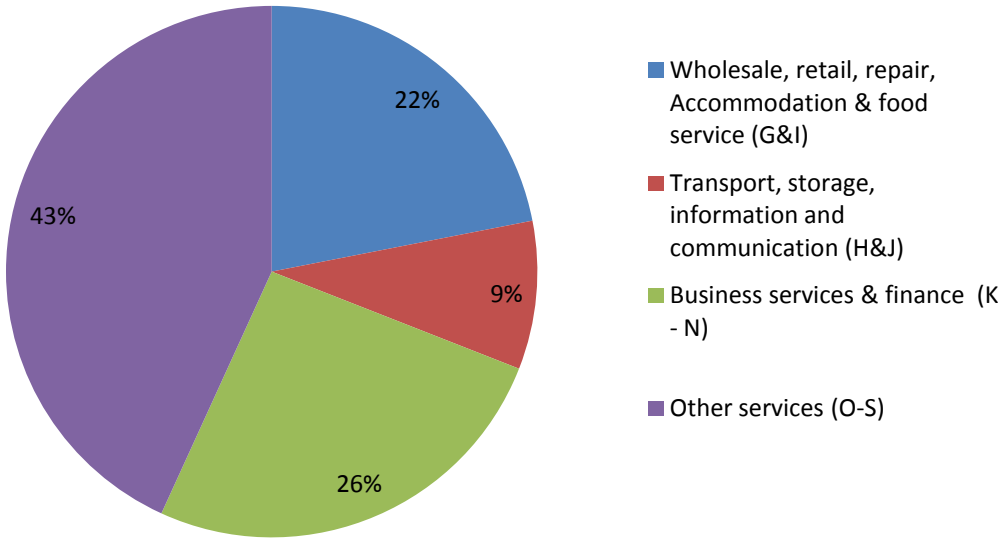


Chart 3.5 shows that engineering and allied industries, food, beverages and tobacco and other manufacturing make up the largest proportion of GVA within the manufacturing sector.

Figure 3.6: Proportion of total GVA by Services Sub sector 2012



The above chart 3.6 for the services sub sectors shows that other services (which includes the Public sector) and business service and finance make up the largest proportion of GVA within services (accounts for nearly three quarters of GVA).

All the industry sectors have seen GVA growth in the last ten years with the exception of agriculture, forestry and fishing which has seen a decline in GVA of 20%[52]. Water and sewerage has seen the largest GVA growth (79%) followed by the services sector. However, over the year to 2012, construction seen the largest fall (13.5%) in GVA. The biggest GVA growth in 2012 was in the electricity and gas sectors (33% - this could be due to the notable increase in number of wind farms within Northern Ireland).

Figure 3.7: Growth in GVA across industrial sectors (2012)

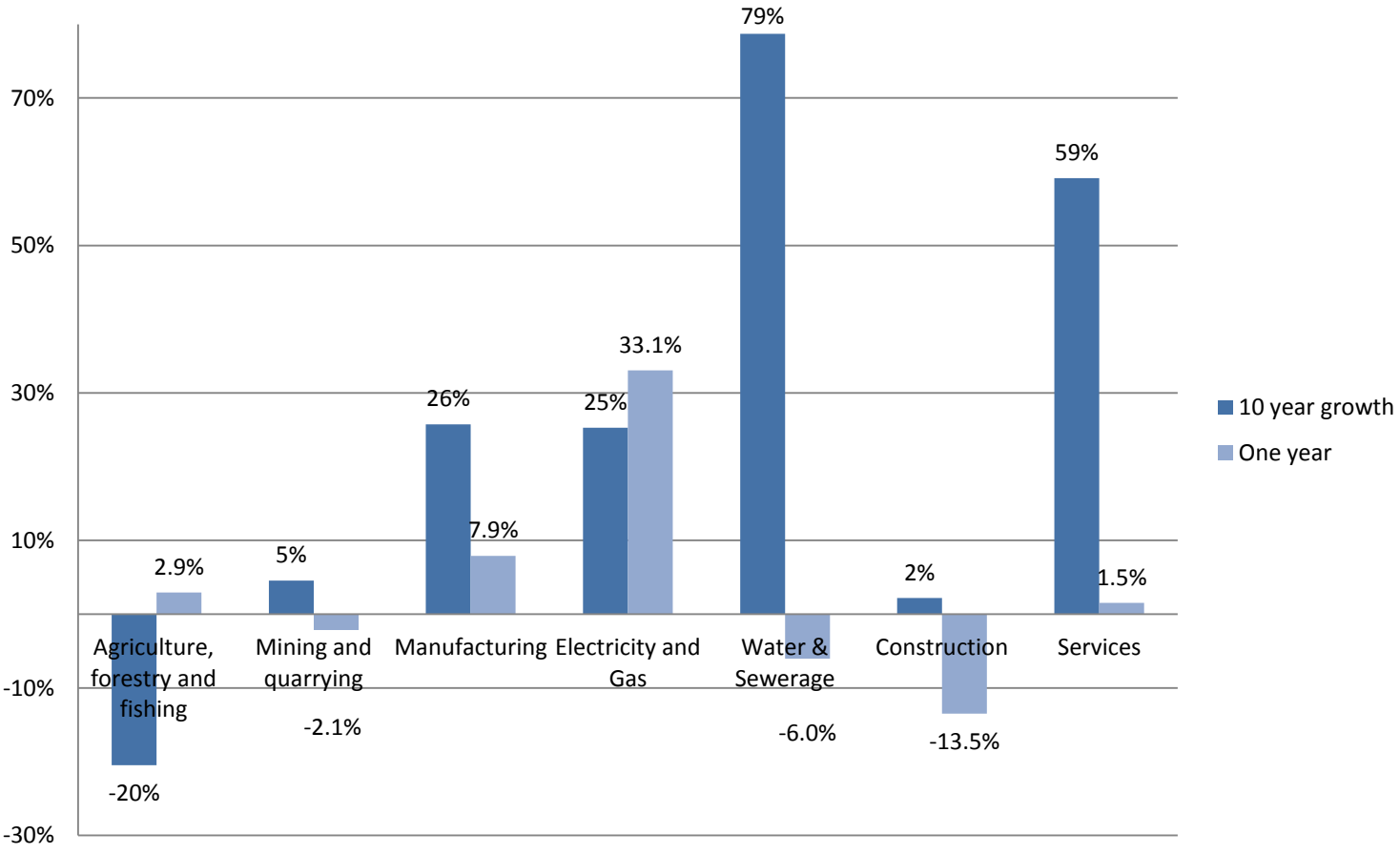


Table 3.3 shows the annual average compound growth of the sectors over the ten-year period from 2002-2012. During that time, both agriculture, forestry and fishing

[52] Note these GVA figures differ to what is found in the DARD agri food publications but ONS figures are used here to enable comparisons to be made across the sectors.

and textiles, leather and related products have seen declines on average of -2.3% and -2.6% per annum. The sectors with the largest per annum growth has been business services and finance (6.1%), water and sewerage (6%), wholesale, retail, repair, accommodation & food service (4.7%), Chemical and Pharmaceutical products (4.7%), Engineering & Allied industries (4%) and other services (4.4%).

Table 3.3: Sub sector GVA growth (2002-2012)

	10 year growth	One year	Annual Compound Growth over last 10 years
Agriculture, forestry and fishing	-20%	3%	-2.3%
Mining and quarrying	5%	-2%	0.4%
Engineering & Allied industries (CI,CJ,CK,CL)	48%	6%	4.0%
Food, Beverages and Tobacco (CA)	24%	16%	2.2%
Chemical and Pharmaceutical products (CE & CF)	58%	-4%	4.7%
Basic and Fabricated Metal Products (CH)	41%	6%	3.5%
Textiles, Leather and related products (CB)	-23%	-12%	-2.6%
Other Manufacturing (CC, CD,CG,CM)	1%	12%	0.1%
Electricity and Gas	25%	33%	2.3%
Water & Sewerage	79%	-6%	6.0%
Construction	2%	-13%	0.2%
Wholesale, retail, repair, Accommodation & food service (G&I)	59%	4%	4.7%
Transport, storage, information and communication (H&J)	36%	2%	3.1%
Business services & finance (K - N)	81%	-2%	6.1%
Other services (O-S)	53%	2%	4.4%

The trends observed here should not be surprising given the move of economic activity towards higher valued added sectors this is likely to continue to be the case moving forward. It is also anticipated that the industrial demands on water is expected to fall as limited increases in overall levels of output are offset by increases in efficiency (for example in the production processes and also in more efficient farming practices) and sector shift towards the higher value added knowledge economy.

4. Water Services and Cost recovery

4.1 Introduction

Article 9 of the Water Framework Directive aims to ensure that pricing policies improve the sustainability of water resources and requires pricing policies to perform the following functions by 2010:

- Take account of the principle of the recovery of the costs of water services, including environmental and resource costs.
- Embody the polluter pays principle.
- Provide adequate incentives to use water resources efficiently.
- Ensure that water use groups (separated into at least industry, households and agriculture) make an adequate contribution to the costs of water services.

4.2 Water service in Northern Ireland

Water Services are defined by the Directive as in Box 4.1

Box 4.1 Definition of Water Services

"All services which provide, for households, public institutions or any economic activity:
(a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater;
(b) waste-water collection and treatment facilities which subsequently discharge into surface water."

Definition of Water Services, WFD Article 2 Paragraph 38

NIW was appointed the sole water and sewerage undertaker for Northern Ireland, under the Water and Sewerage Services (Northern Ireland) Order 2006. NIW is a company 100% owned by the government which assumed responsibility from central government on 1st April 2007.

Through NIW's PC 10 and PC13 Business Plans investment has increased in recent years, leading to improved quality in both drinking water and waste water discharges. Drinking water quality at customers' taps is assessed using the index

'Mean Zonal Compliance' (MZC). MZC has increased from 98.65% in 2004 to 99.84% in 2014[53]. The MCZ for 2014 exceeded the requirement of the Department for Regional Development's Social and Environmental Guidance of 99.7%. This compares to England and Wales levels of 99.97%.

NIW's Business Plan for the next six years (2015-2021) has been determined through the industry's Price Control Process 2015 (PC15). This has determined the strategic priorities, costs, plans, targets, and customer prices for water and sewerage services over the 2015/2021 period. The process begins with the issuing of Social & Environmental guidance providing government direction on the strategic priorities for the water industry. The water company (NIW) identifies the costs to customers for delivering the government's policies through a Business Plan, submitted to the utility regulator (NIAUR) for determination. In this plan, the Company demonstrates how it will deliver to agreed targets within a specified revenue limit. The process finishes with the utility regulator determining service performance targets and revenue (customer bill) limits for the period. Each year, the Regulator must approve a charges scheme from the water company before it can start to charge water and sewerage customers. More information on PC15 is available on the utility regulator's website at http://ofreg.nics.gov.uk.

Building on the investments and improvements made by NIW through its strategic business plan, and its PC10, PC13 and PC15 plans, the key benefits to be realised in PC15 are:

- Improved services to customers as a result of over £990 million of investment during the PC15 period 2015-2021(subject to PC settlement).
- Improved water quality and reduced environmental pollution.
- Building on operating expenditure efficiencies already achieved and delivery of further expenditure efficiencies by 2020/21.
- Improved organisational capability to deliver outcomes and meet stakeholder needs.

[53] NI Water's Drinking Water Quality Annual Report 2014

- Financial sustainability – NIW aims to become fully self financing and will have the ability to plan for the future investment and customer improvements needed.

The Department for Regional Development is also in the process of publishing a Long Term Water Strategy for Northern Ireland (entitled Sustainable Water: A Long Term Water Strategy for Northern Ireland) and NIW has contributed to the development of this process. The strategy has helped inform the development of NIW's plans for the provision of water and wastewater services to 2040. The Long Term Water Strategy aims to help achieve the vision to have a sustainable water sector in Northern Ireland. The strategy highlights four high level aims to cover the key water needs within a catchment:

- provide high quality sustainable supplies of drinking water to households, industry and agriculture;
- manage flood risk and drainage in a sustainable manner;
- achieve the environmental requirements of the Water Framework Directive in a sustainable manner: and
- provide sustainable reliable water and sewerage services that meet customers' needs.

More detail on the Department for Regional Development's draft Long Term Water strategy can be found at http://www.drdni.gov.uk/index/long-term-water-strategy.htm.

4.3 Water service providers, users and polluters

Service Providers

In addition to NIW there are a number of ***private providers of water services***. Over 4,000 people are reliant on private sources in Northern Ireland and there may be additional use of private abstractions by those supplied with mains water. NIW currently provides a service to empty privately owned septic tanks.

Water Uses

Water use is defined in Article 2 of the Water Framework Directive as: “water services together with any other activity identified under Article 5 and Annex II having a significant impact on the status of water. This concept applies for the purposes of Article 1 and of the economic analysis carried out according to Article 5 and Annex III, point (b).” Article 9 of the Directive specifies that the water uses should include at least households, agriculture and industry.

An attempt is made as far as possible to report the information on water uses into these categories, however some uses cannot be disaggregated in this way and this will need to be subject of further analysis after the Article 5 report. This further work will also consider the appropriate sub-categorisation in the context of water pricing and the programmes of measures. Current sub-categorisation is on the basis of the uses identified in the pressures and impacts analysis carried out for the purposes of developing the SWMI reports.

Some water uses, such as land reclamation, drainage etc. do not fit easily within the categories of households, industry and agriculture. It is necessary to include these “other uses” which are identified on the basis of the river basin characterisation. For the purposes of this report, water uses that have a significant impact on the status of water are disaggregated into Water Services, Agriculture and Industry.

Water Services

Water services are defined in the Directive as “all services which provide for households, public institutions or any economic activity”, including abstraction and treatment of surface or groundwater and waste water collection and treatment facilities.

NIW supplies around 560 million litres of water each day to approximately 825,000 properties, both domestic and non-domestic. NIW also collects and treats around 320 million litres of wastewater every day from 660,000 households and organisations connected to the sewerage system. The proposed long-term target

under the Long Term Water Strategy for Northern Ireland is to reduce average consumptions from 146 l/h/day (2014) to 130 l/h/day by 2040. With a population of 1,840,498 in 2014[54], this suggests a total household consumption of 306 mL/D[55]. Growth in households (small rise in population coupled with a fall in average household size) is expected to increase domestic demand for water. The NIW Water Resources Management Plan (WRMP) estimates the household demand to rise to 347.22 mL/D by 2022/23.

Households receive services from NIW, including the supply of clean water and the discharge of effluent. NIW does not directly charge households in Northern Ireland but receives a subsidy from the Government. Northern Ireland is unlike other parts of the UK where households are charged directly for their use of water services.

A recent study[56] by the Journal of Environmental Management had attempted to derive values for water on a sector basis using a number of methods. In the case of households two techniques were used: 'Gibbons Willingness to Pay formula' this assumed all consumers pay volumetric charges levied to metered customers in England, Wales and Scotland including value of both clean and dirty water. This found the marginal value to be 0.102-0.2449 p/m^3. Another method was via 'benefits transfer from stated preference study' and this only considered value of supply of clean water. This value was found to be 0.067 p/m^3. This cannot be directly applicable to Northern Ireland but at least gives us an idea of the potential value of water to households.

Agriculture

Agriculture relies on water for a variety of purposes. Whilst this is largely provided for by precipitation, with some additional irrigation for arable and horticultural crops water is used by farmers for livestock watering and for cleaning equipment.

[54] NISRA , Mid Year Population estimates, June 2015, http://www.nisra.gov.uk/demography/default.asp42.htm
[55] Please note that this figure is significantly higher than the 217 mL/D suggested in the Water Resource Strategy. At least some of this difference can be accounted for by metered agricultural premises, which were excluded from the lower figure, and by direct abstractions. From a figure for average domestic consumption of 0.6 m^3/day in rural areas, Robins (1996) estimates that those domestic properties reliant on private sources may abstract as much as 2 mL/D in Northern Ireland.
[56] '*The economic value of water use: Implications for implementing the Water Framework Directive in Scotland*', Journal of Environmental management, Dominic Moran, Sabrina Dann. June 2007.

The Water Resource Strategy (2002-2030) estimated total agricultural water consumption (incorporating domestic agriculture; cattle troughs; out farm and intensive units) at 39.20Ml/d. Furthermore, it was estimated that agriculture water use from boreholes could be as high as 11Ml/d (Robins, 1996).

Industry

Industry water consumption according to the Water Resource Strategy (2002-2030) is 31.79Ml/d. Industry is required to adhere to trade effluent discharge consents, although compliance varies between activities.

The measured non household demand figure is 145.44 Ml/d (2008/09) and is forecasted to be 164.96 Ml/d by 2034/35.[57]

4.4 Identification of significant polluters

Water pollution incidents are investigated by NIEA. In 2013[58], there were 2,112 incidents either reported to NIEA or discovered by NIEA during inspections, of which 1,310 (62%) were substantiated (confirmed) as having an impact on the water quality of the receiving waterway.

The total number of reported incidents has increased by 6% compared with the previous year (1,986) and the number of substantiated incidents has increased by 11% compared with 2012 (1,175). The total number of substantiated incidents has, however, still fallen by 16% from the level recorded in 2001. Substantiated pollution incidents are classified according to their environmental impact severity. A total of 215 (16%) High and Medium severity incidents were investigated during 2013. This was an increase of 5% compared with 2012 figures (205).

There will be some correlation between incident sources and economic activity i.e. farm related incidents are more prevalent in rural areas and NIW related incidents will correlate more closely to urbanisation.

[57] NIW, Water resource Management Plan 2012, Atkins, Demand Forecasts for HHs, March 2012
[58] NI environmental statistics, DOE, Feb 2015

In 2013, farming accounted for the largest proportion of substantiated incidences investigated by NIEA (26.9%), followed by Industry and Other (18.5% each), Domestic (18.3%) and NIW (16.3%). NIEA field based activities, proactive work in catchment areas; educational programmes and enforcement action against polluters have acted to reduce the number of substantiated water pollution incidents since the mid 1990s.

4.5 Current level of financial costs of Northern Ireland Water

The Statement of Comprehensive Income for NIW, year ended 31st March 2015 is summarised in table 4.1 below.

Table 4.1: Statement of Comprehensive Income for NIW, Year ended 31st March 2015 in £ millions (IFRS59)

	2015 £m
Revenue	**425.6**
Other Income	0.9
Operating Expenses	(233.1)
Research and development expenses	(0.3)
Results from Operating Activities	**193.1**
Finance Income	0.3
Finance Costs	(61.9)
Net Finance Costs	**(61.6)**
Profit before Income Tax	**(131.5)**
Income tax	(24.2)
Profit for the year	**107.3**
Other comprehensive income	
Defined benefit plan acturarial losses	(11.0)
Total Comprehensive income for the period	**96.3**
Profit Attributable to:	
Owner of the Company	**107.3**
Total Comprehensive income attributable to:	
Owner of the Company	**96.3**

Source: NIW Annual Report and Accounts 2014-2015

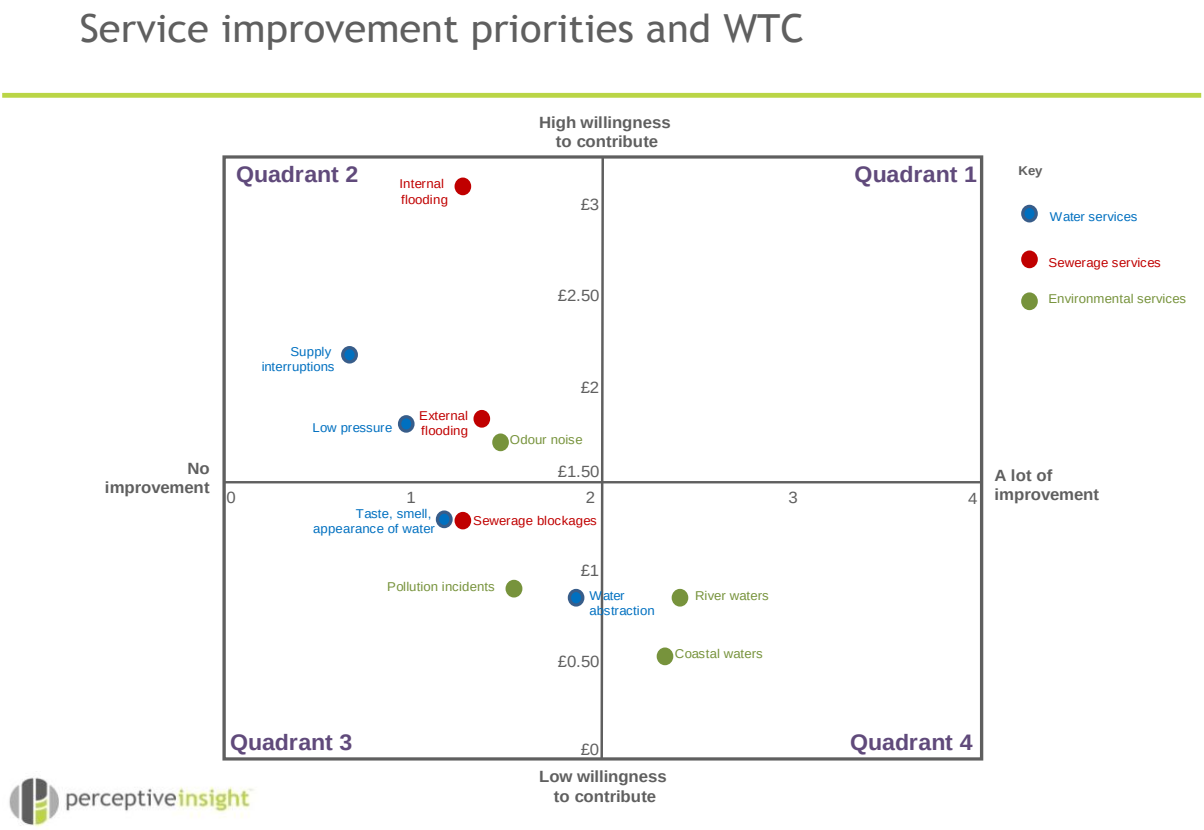
A dividend of £25 million in relation to the 2014/15 year was declared and paid post year end.

4.6 Current level of environmental and resource costs

Environmental and resource costs arise where costs are imposed on water service providers from polluting activities. Environmental and resource costs also arise where water services abstractions and discharges contribute to water bodies failing to achieve good ecological status.

NIW, in conjunction with the Consumer Council (CCNI), the Utility Regulator and the Department for Regional Development (DRD), has undertaken a comprehensive study to establish which service areas customers want NIW to prioritise and improve in the future. Figure 4.1, below displays improvement priorities against the consumers' willingness to contribute (WTC) extra to improve the service with the following commentary detailing customer opinion across a wide spectrum of the enhancement programme.

Figure 4.1: Summary of domestic priorities and WTC



Findings from the research found that most customers are satisfied with the service provided most of the time.

Customers simply expect the service to work. Provided it does, customers rarely think about water and sewerage services or how they are provided. In other words, customers expect their water and sewerage service to be resilient.

Research identified that customers expect local service ‘hot-spots’ to be addressed.

Customers are more willing to prioritise investment to address local issues, such as supply interruptions and flooding which have a direct impact on daily life over environmental aspects of service such as quality of rivers.

Customers want strategic decision making preferring long-term solutions over short-term ‘fixes’. Customers also requested more information from NIW in order

to inform the public of what they can and cannot dispose of in the sewerage system and to educate customers to reduce water wastage.

Customers currently receive a reliable service from NIW most of the time. However, there are occasions when issues arise. In relation to specific areas for service improvement, research findings from both business and household customers show:

Internal sewer flooding - Internal sewer flooding is abhorrent for the householder and customers want NIW to focus on improving services for those affected by internal sewer flooding. Those affected want a more proactive approach from NIW at times of flooding to manage the situation and minimise the impact.

Supply interruptions - Research findings confirm that continuous water supply is crucial to both domestic and non-domestic customers alike. When interruptions occur, customers want to be kept informed of the cause of the problem, the extent of the interruption and when it will be rectified.

External sewer flooding - Customers continue to highly prioritise incidents of sewer flooding that are external to properties as these are unsightly and potentially hazardous to the public. Focus groups noted that a number of bodies share the responsibility to prevent and rectify damage caused by flooding. They expect those bodies to work together when flooding occurs

Low water pressure – Customers recognise the impact that continual low pressure can have on both lifestyle and business operation and would like to see moderate investment to ensure sufficient levels of pressure.

Noise and odour – Noise and odour are recognised as localised affecting those living close to some works. The challenge for NIW is to identify and work towards addressing ‘hot-spot’ areas.

Sewer blockages - Customers requested improvements to reduce the number of sewer blockages. Research indicated that customers wished to be better educated about what they can/cannot dispose of in the sewerage system.

Taste, smell and appearance of water - Taste, smell and appearance of tap water is a very important aspect of service provision to customers and is regarded as a core function of NIW. Although generally acceptable, there may be pockets of provision that do not currently meet customer expectations.

Pollution incidents - Both domestic and business customers expect NIW to reduce pollution from operations and processes.

Quality of river waters – While customers considered improvement to the quality of river waters is required, they recognised that pollution of rivers can stem from many sources, and queried the extent to which investment by NIW would have any marked improvement on river water quality.

Quality of coastal waters - While the majority of customers requested improvements to coastal waters, they are much more willing to contribute towards aspects of service which have an immediate impact on the householder.

Customer service - Customers were also asked about customer service. Around one third of non-domestic customers believe that improvements are required to the customer service experience. In relation to non-domestic billing, 29% requested improvements to billing and invoicing processes. However, non-domestic customers are not willing to pay any extra to improve the customer service experience.

Customer education - Customers placed high priority on education in water efficiency and waste disposal. Feedback revealed that domestic and non-domestic customers tend to lack knowledge of the information and support materials available from NIW in both areas.

Households' value for good ecological water quality (i.e. the WFD standard) was investigated by a 'willingness to pay' (WTP) survey carried out by Queen's University, Department of Agriculture and Food Economics: Hutchinson et al (2004). The preliminary results are shown in the table below, for two levels of provision; a 'maintenance' programme and an 'improvement' programme.

Table 4.2: **Willingness-to-pay per household (expressed as the additional payment consumers would pay on top of their current annual rates bill).**

	Mean (2004)	Mean (2014)*	Standard Deviation (2004)	Standard Deviation (2014)
Maintenance Programme	£10.04	£12.69	£17.34	£21.91
Improvement Programme	£15.92	£20.12	£25.35	£32.04

*Source: QUB, Dept of Agriculture and Food Economics: Preliminary results 2004 inflated to 2014 prices**

The preliminary results show that the Mean WTP for the Maintenance Programme was £10.04 per year (standard deviation = £17.34) and Mean WTP for the Improvement Programme was £15.92 per year (standard deviation = £25.35). Given that there are 627,000 households in Northern Ireland, the Total Economic Value per year of good ecological water quality is £6.3 million for the maintenance option and £10.0 million for the improvement option.

No update to this study has been made, therefore the Department has updated the figures to 2014 prices this results in a mean WTP for the maintenance programme of £12.69 (Standard Deviation = £21.91) and Mean WTP for the Improvement programme is £20.12 per year (Standard deviation - £32.04). Given there is projected to be 717,287 households in Northern Ireland in 2014[59] the Total Economic Value per year of good ecological water quality is £9.1 million for the maintenance options and £14.4 million for the improvement options.

The assessments carried out during the development of the significant water management issues reports and the second cycle RBMPs have shown that NIW together with industrial sector abstractions and discharges were associated with some instances where water bodies are at risk of failing to achieve good ecological status.

4.7 Revenues and Cost Recovery

Ultimately the analysis of cost recovery needs to be undertaken at a RBD scale. However, for Article 5 reporting it is acceptable to report rates of cost recovery on the

[59] NISRA, Household Projections for Northern Ireland, 2012-2037, March 2015

basis of water service areas. Hence the following analysis of cost recovery in Northern Ireland is at the NIW scale, i.e. all of Northern Ireland.

The Water and Sewerage Services (Northern Ireland) Order 2006 sets out the framework for the funding of water and sewerage services to be met by consumers. NIW is run on a commercial basis and is subject to independent environmental and economic regulation. Water pricing is in place for agriculture and industry through (largely) metered water charges. Trade effluent charges are also in place. It is considered that households already make a financial contribution to these services through the Regional rate.

It is acknowledged that Northern Ireland's water and sewerage infrastructure has suffered from deterioration in the past. Large parts of the water mains network are cast iron and vulnerable to bursts after severe cold spells. Furthermore, large parts of the Belfast sewerage network rely on Victorian brick sewers which can be vulnerable to collapse.

The Northern Ireland Asset Management Plan (NIAMP2) estimated that over the next 20 years investment of £3 billion is required to improve water and sewerage services. NIW's water mains rehabilitation programme renewed 1,503 km of water mains between 2007 and 2013 and the Belfast Sewers Project has begun to address infrastructure improvement issues. Subject to agreement by the Northern Ireland Executive, water and sewerage investment of the order of £990 million is anticipated over the next six years under NIW's Price Control settlement (PC15: 2015-21).

Through the Price Control process NIW has submitted a detailed Business Plan to the Utility Regulator which sets out its total revenue and debt requirements for the period. The PC 15 Business Plan has now been finalised, reflecting the Utility Regulator's final determination, which set performance targets, funding requirements and price (customer tariff) limits for the period. Each year, the Regulator must approve a charges scheme from the water company before it can start to charge water and sewerage customers. Revenue limits (customers' charges) determined through the price control process take account of the true costs of water and sewerage service provision by not only including the operational and maintenance

costs but also including costs associated with capital investment in the infrastructure and financing costs. More information on PC15 is available on the utility regulator's website at http://ofreg.nics.gov.uk.

It is also worth noting that NIW is our largest single consumer of electricity. In 2014/15 its annual power bill was over £32 million. Predicted increases in energy prices could see this rise to over £40 million by 2020. This will increase the cost burden to NIW in future, which is already facing budget pressures as a result of cuts to Northern Ireland Executive budgets.

Charges

Agriculture & Industry

Water pricing arrangements for the agriculture and industrial sectors have been in place for many years. The majority of these customers are metered and charged according to usage. This is in line with the Directive's requirement for users to use water resources efficiently and promotes the polluter pays principle. Charging encourages businesses to conserve and use water efficiently. The bulk of non-essential or discriminatory water use is by non-domestic water users which accounts for around 30% of the total water consumed in Northern Ireland. The continued roll out of metering in that sector will incentivise efficient use of water resources and help achieve the aims of the Directive. Water and sewerage charges were extended to all non-domestic customers on 1st April 2008 although unmeasured charges continue to be phased in.

However other water efficiency initiatives should also continue to be implemented to incentivise reduced consumption. Current initiatives include the Water Champions Awards, development by the Consumer Council, with support from Invest NI and NIW. This award is aimed at helping businesses improve water efficiency and reduce business costs. The Consumer Council have also produced an 'Every Drop Counts' guide to help businesses and farms save money on their water bills.

Managing our resources more efficiently will enhance competitiveness and reduce business costs. Investment in our environment and heritage will help to meet these challenges and also provide new opportunities for growth in our key agriculture, food and tourism sectors[60].

Household

It is considered that households make a contribution towards the costs of water and sewerage services through contributions paid through the domestic regional rate. It is estimated that this contribution equated to about half of the level of funding required to provide services to domestic customers in 2008/09. In the absence of specific additional household water and sewerage contributions, the Northern Ireland Executive, through DRD, provides NIW with monthly payments (on behalf of domestic customers), raised through central Government taxes to cover the remaining cost for its services.

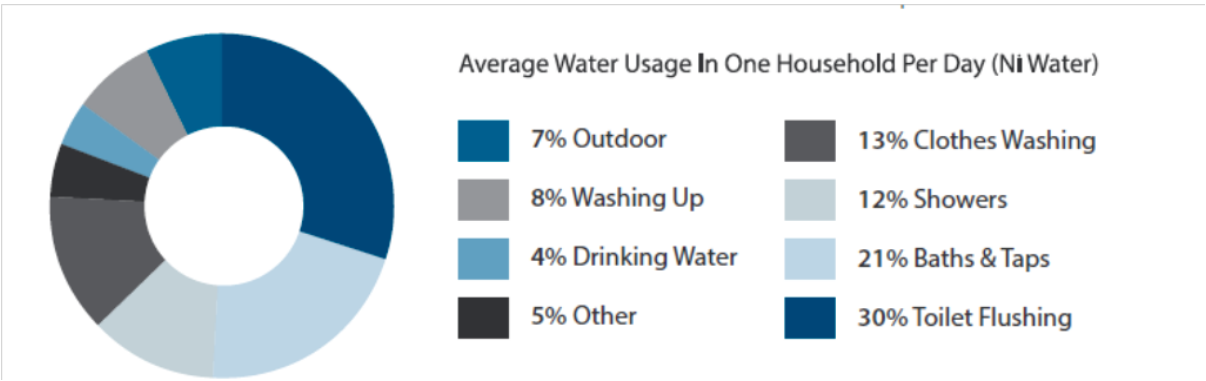
The necessary regulatory and financial structures are in place to implement any Northern Ireland Executive decisions on future funding arrangements. In line with Article 9 of the Directive, and to ensure compliance with the terms of NIW's Licence, the costs of providing water and sewerage services are apportioned between each of the customer groups (including households) on a fair and equitable basis.

The Northern Ireland Executive has not agreed a methodology by which domestic customers will make payments. Any policy decisions will take account of the fact that there have not been any water scarcity issues within the river basin area during the last 10 years. NIW continually monitors the storage levels in all impounding reservoirs and takes all reasonable steps to maximise water storage so as to minimise the effect to customers of any prolonged dry weather spells

In the absence of metered charges, households will continue to be encouraged to use water efficiently through targeted education and public awareness campaigns. It

[60] **NIEA,** State of the Environment for Northern Ireland 2013**, '***Chapter 11, Environment and economy'*, Dec 2013.

is worth noting that around 4% of water supplied to an average household is used for drinking.



Source: Long Term Water Strategy: Part 2 Water demand and supply, June 2014

Promotion of Efficient and Sustainable Water Use

To help meet the sustainable water use aims as described under Article 1 of the Water Framework Directive, the Water and Sewerage Services (Northern Ireland) Order 2006 places a duty on NIW to promote the efficient use of water by customers. The independent Utility Regulator has the power to enforce this duty. It is also an offence to waste water from a water source through either allowing a water source to run to waste or by abstracting more than is licensed under the Abstraction and Impoundment Licensing Regulations (Northern Ireland) 2006. The Regulations fulfil Northern Ireland's obligation to the European Commission under the Habitats and Water Framework Directives, by establishing a water resource management, assessment and licensing regime.

These regulations aim to provide a single and consistent environmental risk based approach that covers all abstraction and impoundment operations.

The fees and charges scheme has been developed with the aim of recovering the full costs associated with implementing the legislation. The scheme comprises of application fees and annual charges and came into effect on 1 April 2011. Details of these fees can be found at the following link: http://www.doeni.gov.uk/niea/water-home/water_resources/abstraction/fees_and_charges-2.htm

The abstraction licenses issued to NIW will also be reviewed in coming years to ensure compliance with the Directive in terms of both water quantity standards and ecological need and ensure that water is drawn from the environment in a manner that is sustainable, cost effective and resilient.

NIW currently has an extensive programme for promoting and improving water efficiency and conservation. This includes:

- Continuing to invest in reducing water mains leakage; in 2014/15 the leakage was at 166 Ml/d;
- Reducing the total water put into the Northern Ireland Water network from 632Ml/d in 2008/9 to 565Ml/d in 2014/15;
- Publishing education leaflets for customers on water topics such as using water wisely;
- Running campaigns designed to increase awareness of the need for water conservation and more environmentally friendly lifestyle choices and behaviours i.e. NIW's 'Bag it and Bin it' highlights the importance of not flushing inappropriate items down toilets;
- Attending major public exhibitions, hosting events at its Silent Valley Education Centre and organising educational visits to schools and communities;
- Travelling throughout the River Basin areas using its Waterbus (mobile classroom) to teach pupils about issues such as water efficiency;
- Implementing and enforcing the requirements of the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009 which include an offence for installing or failing to maintain a fitting which wastes or misuses water supplied by NIW;
- By adding to the monitoring network in Northern Ireland to more accurately measure the volumes abstracted from each of the surface and groundwater sources currently operated by NIW; more detailed monitoring may identify reductions in volume and or sources in the future;
- The delivery of catchment scale projects with support from NIEA officials to monitor and identify mitigation works which may be required under the Directive to ensure compliance;and

- Preparing a Water Resource and Supply Resilience Plan.

4.8 Cost effectiveness

The WFD requires Member States to “make judgements about the most cost-effective combination of measures in respect of water uses to be included in the programme of measures” [Annex II (b)]. Where there are a number of potential measures that could be implemented to achieve a WFD objective, the most cost-effective combination of measures is that which delivers the objective for the least overall cost.

The supplementary measures in the PoMs have been assessed for costs and benefits across all three of the Northern Ireland RBMPs. This assessment is discussed in more detail within the Economic Analysis report.

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