

Water Resources Management Plan 2012



Non Technical
Summary

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ATKINS

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Overview

This document is the Non Technical Summary of Northern Ireland Water's Final Water Resource Management Plan (WRMP). The WRMP explains how Northern Ireland Water (NI Water) intends to meet the drinking water needs of the population of Northern Ireland over the period from 2010 to 2035. The Draft WRMP was made available for public consultation from October 2010 to February 2011; the preparation of this Final WRMP has been informed by the consultation responses received.

It is important to note that the WRMP is concerned only with the supply of drinking water. It is neither concerned with drinking water quality, nor the provision of sewage services within Northern Ireland. The plan is a strategic plan, so it does not address issues such as the process of obtaining planning permissions and other consents that might be required to design, build, commission and operate water related infrastructure.

The overarching objective of the WRMP is to look ahead 25 years and describe how the company aims to secure a sustainable supply of water taking into account expected demands and the implications of climate change. The WRMP will be complemented by the company's Drought Plan that will set out the short-term operational steps that the company will take if a drought develops which increases the risk to security of supplies and whether capital investment is needed to mitigate such events.

The WRMP is a stand-alone document that provides a strategic plan for managing water resources. It does not alone provide the case for strategic investment decisions; rather it sets the framework at the Water Resource Zone (WRZ) level within which such decisions should be taken. There may also be other drivers for investment which should be assessed – for instance, operational resilience. Investment at smaller spatial scales will still need to be justified through other more local studies, such as trunk main studies, detailed zonal studies and targeted leakage initiatives.

The WRMP builds on the legacy of NI Water's existing water supply infrastructure, which is the result of earlier water supply strategies and investment. This new WRMP also builds on the decisions taken as the result of previous strategies and proposes a balance of strategic trunk main links between resource zones and leakage reduction. In short, the WRMP seeks to make the best and most cost effective use of existing assets wherever this is possible within the current environmental and regulatory regimes, rather than to propose a whole new set of costly infrastructure.

Since earlier water resource strategies there has been a gradual and increasing recognition that environmental impacts of any strategic plan, as well as the potential impacts of climate change, need to be factored into any long term decision making process. This WRMP has addressed these important issues in two ways. Firstly, the WRMP was subject to a Strategic Environmental Assessment (SEA), which ensures that environmental considerations have been taken into account in the development of the WRMP. Secondly, the WRMP takes account of the latest outputs from the UK Climate Change programme and in particular UKCP09.

Finally, as the understanding of climate change and other environmental and technical issues is always developing, the Final WRMP will be regularly reviewed and updated in the light of changing environmental, technical and regulatory requirements.

Background

As the appointed undertaker for water and sewerage services in Northern Ireland, NI Water is responsible for supplying drinking water to the people of Northern Ireland. NI Water is also required to produce a WRMP which sets out the following:

- NI Water's estimate of the quantities of drinking water required to meet the needs of the population of Northern Ireland over a long term period (this plan covers the period up to 2035);
- The measures which NI Water intends to take or continue in order to supply the estimated quantity of drinking water; and
- The activities which will be required to implement the WRMP.

The WRMP has been compiled using recognised UK water industry best practice and guidance. The WRMP examines Northern Ireland's existing system for the supply of drinking water to assess current levels of consumption and to project how demands might change over the next 25 years. The WRMP then assesses whether there are sufficient supplies available to meet projected demands. The baseline supply demand balance is derived from estimates of available supplies and projected demands under dry year annual average conditions to provide an indication of the levels of surplus or deficit over the whole of the planning period. If any deficits are shown then the WRMP identifies options to redress any imbalances and selects a package of "preferred" options to meet the deficits at least-cost.

Main factors that influenced the plan

In following UK water industry best practice there were a number of factors which influenced the development of the Draft WRMP and now this Final WRMP. These factors and how they influenced development of the WRMP are discussed in turn:

Regulatory and policy factors

The need to produce a WRMP is a requirement under the 'Water and Sewerage Services (Northern Ireland) Order 2006'. The Department for Regional Development (DRD) has produced guidelines for the development of a WRMP; the Draft and this Final WRMP have been produced in accordance with the guidelines.

It was anticipated that the measures contained in the WRMP would have the potential to cause significant environmental impact. NI Water therefore decided that a Strategic Environmental Assessment (SEA) under the terms of 'The Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004' should be carried out to ensure that environmental issues were taken into consideration during the development of the WRMP.

These two pieces of legislation require consultation with a number of Statutory Consultees. The following Statutory Consultees were consulted on the Draft WRMP and their responses considered during preparation of the Final WRMP:

- Department for Regional Development (DRD);
- Department of the Environment (DoE) – in this case the Northern Ireland Environment Agency (NIEA);
- Northern Ireland Authority for Utility Regulation (NIAUR); and

- The Consumer Council for Northern Ireland (CCNI).

Strategic Approach

This WRMP recognises that earlier water resource investment and operational strategies created an infrastructure that has up to the present, notwithstanding some local supply difficulties, served the needs of the people of Northern Ireland. It is the challenge of the WRMP to ensure that adequate supplies of drinking water are available over the 25 year life of the WRMP whilst at the same time taking into account increased environmental constraints, the potential impacts of climate change, and increasing customer expectations. The implementation of the plan will also need to be achieved in an increasingly demanding regulatory and financial environment.

To allow water supply planning at an appropriate and logical scale, Northern Ireland has been sub-divided into 5 Water Resource Zones (WRZ). The locations of these WRZs are shown on Figure 1. WRZs vary in size, depending upon the way that the water supply network functions.

The WRMP Guidelines require that estimates of available supplies (Deployable Output) are made at the WRZ scale. This requires a high-level representation of the water resource system, which takes into account strategic transfer links between sources and demand centres. The characteristics and capacities of such links are represented in the water resource model which is used to calculate Deployable Output. These were informed using the Trunk Mains Model (TMM) that has been developed in parallel to the WRMP. This high level representation for the WRMP comprised a small number of demand centres; therefore it does not take into account distribution or operational constraints at smaller spatial scales such as District Meter Areas (DMA). Distribution system investment requirements would be addressed using the TMM, carrying out trunk main capacity studies and/or some other distribution system model such as those used in detailed zonal studies.

Water treatment works (WTW) fed by run-of-river abstractions are particularly sensitive to periods of low flow. Analysis undertaken for this WRMP in relation to the Derg WTW (taking account of the current understanding of hydrological conditions and agreement reached between NI Water and NIEA regarding the drought contingency management plan included in the terms of the abstraction licences) shows that for the dry year annual scenarios that must be considered for a WRMP sufficient raw water would be available to allow the WTW to operate at its full capacity. However, under more extreme drought conditions that would need to be assessed under a drought plan, supplies from the WTW might be at greater risk. The construction of new infrastructure links (such as the Carmoney to Strabane link main) between neighbouring WRZs would provide additional resilience to such conditions, and also provide operational flexibility to other extreme weather events such as the “freeze-thaw” events of recent winters.

Water Availability and Demand

For each WRZ data was collated for the availability of raw water, the output from water treatment works, measured and estimated consumption, and leakage. The WRMP then forecasts how water availability and consumption might change over the 25 year planning period. The plan also took as its starting point the existing infrastructure of water treatment works (WTW) and strategic transfer mains the size and location of which are a legacy from earlier planning and investment decisions.

The WRMP also considers a number of different scenarios that may occur over the 25 year planning period. The main scenario considered is known as the dry year annual average scenario. This scenario represents conditions when a period of high consumption resulting from low rainfall and high temperatures occurs at the same time as a period of low river flows and depleted reservoir storage. This is the most important scenario because it is the primary objective of the

WRMP to ensure that under hot and dry drought conditions, there is enough water available to meet projected demands without restrictions across all of Northern Ireland.

A WRMP also needs to recognise that unforeseen short term events can occur that have the potential to disrupt supplies. For example, severe winter conditions can cause pipes to burst with a rapid loss of water from the supply system which may require emergency supply measures to be taken.

The abstraction of raw water from rivers, reservoirs and loughs is subject to an abstraction licensing regime managed by Northern Ireland Environment Agency. Under the terms of the current abstraction licences, NI Water is authorised to abstract almost 1075 million litres per day (Ml/d) from its sources that are currently used for public water supply. Since the 2002–2030 Water Resources Strategy (WRS 2002) NI Water has surrendered abstraction licences for a number of groundwater sources; that process continues.

The water resource modelling work undertaken for the WRMP shows that under existing abstraction licences and infrastructure the deployable output of the system (NI Water's own sources and outputs from the PPP schemes) is 773 Ml/d. In the base year of 2008–09 the total treated water into NI Water's distribution system was 633 Ml/d, some 140Ml/d less than the calculated deployable output. Assuming no changes or additions to existing abstraction licences and infrastructure, the Final WRMP shows that there will be three WRZs where there would be supply demand balance deficits by 2034–35. The other two WRZs will have small surpluses of water.

The relevant values are as follows:

- East WRZ in deficit from 2021–22, reaching 18 Ml/d by the year 2034–35;
- South WRZ in deficit from 2016–17, reaching 20 Ml/d by the year 2034–35;
- Central WRZ in deficit from 2013–14, reaching 4 Ml/d by the year 2034–35;
- West WRZ will have a 6 Ml/d surplus by the year 2034–35 (*it is recognised that there are issues and risks associated with the ability to move water within zones, ref p7 'Internal WRZ Interconnectivity Issues' for details*); and
- North WRZ will have a 7 Ml/d surplus by the year 2034–35.

Climate Change and other uncertainties

Any long term plan will need to make allowance for a number of uncertainties and risks which may occur during the lifetime of the plan. In this WRMP UK water industry best practice has been used to identify the additional capacity required to account for these unknowns. This additional capacity is referred to as target headroom. The calculation of target headroom combines estimates of uncertainties in the supply demand balance of individual components such as accuracy of data, natural variations in hydrology, assumed outputs from new schemes, variation in future demand forecasts, climate change and so on. The main uncertainties included in the assessment of the supply demand balance and allowed for at an appropriate level for NI Water's target headroom are as follows:

- Climate Change: Climate change has the potential to alter the level of future demands and the availability of water from the environment. The potential impact of climate change on river flows, and hence on the availability of water has been assessed using outputs from UKCP09. Under existing abstraction licence conditions the potential impacts are considered to be small, but this might not continue to be the case if new flow constraints are imposed on

existing abstraction licences. Similarly the potential impacts on demands are considered to be small.

- Population and Economic / Property Development: these factors have clear implications for forecasting water supply requirements – in basic terms, the more people there are and the greater the level of economic development, then the more water is needed. Increasing affluence may also lead to increasing customer expectations. The best and most up to date data from both the University of Ulster and the Northern Ireland Statistics and Research Agency (NISRA) were used in forecasting these aspects. This forecast also included modifications to the data to allow for the recent economic downturn.
- Outage: this is a recognised component in the supply demand balance that accounts for unforeseen circumstances such as equipment failure or a pollution incident when a Water Treatment Works may not be able to operate at its full capacity. The level of 'outage' used reflects current operational practice and assumes that all existing infrastructure will be maintained at a level that ensures the existing output and performance is not compromised.
- Reduction in abstraction licence levels / water charging: Under the Water Framework Directive all water abstraction licences will be reviewed over the next few years. At the time of the Draft and Final versions of this WRMP there has been no advice with regard to, the magnitude and timing of any changes associated with this proposed review. Similarly there are no plans to introduce domestic water charges. It has therefore not been possible to allow for these uncertainties in the Final WRMP.

Development of the Proposed Plan

A range of potential options was proposed during the development of the Draft WRMP and refined for the Final WRMP. These options were examined and tested against a range of technical criteria in order to identify a range of feasible options. In parallel to these optioneering studies, a SEA of the proposed potential options was carried out to ensure that environmental issues were considered.

The 'basket' of feasible options was analysed with an investment model to identify the least-cost selection of options that maintains an acceptable supply demand balance over the whole of the 25 year planning period and in all WRZs under current abstraction license conditions.

The broad range of options identified in the optioneering assessments and the output from these and the investment model are as follows:

- Develop new river/lake/groundwater abstractions – options of this type are not required over the 25 year planning period.
- Develop new reservoirs – options of this type are not required over the 25 year planning period.
- Increase abstraction from existing sources – options of this type are not required over the 25 year planning period.
- Desalination (treating sea water to remove salt etc, to make it drinkable) – options of this type are not required over the 25 year planning period.
- Indirect effluent reuse (basically reusing water from Wastewater Treatment Works effluent) – options of this type are not required over the 25 year planning period.

- Refurbish existing sources – options of this type, over and above normal refurbishment, were not required.
- Leakage control (reducing the amount of water that leaks from existing pipes) – options to reduce leakage across Northern Ireland in line with revised targets discussed with NIAUR in November 2011 are included in the Final WRMP.
- Domestic metering (meters to measure the amount of water used by domestic households with a view to charging for water used) – options to introduce domestic metering are not included in the Final WRMP because there are no plans to introduce charging for domestic customers.
- Water efficiency measures (e.g. encouraging use of low flush toilets) – no new options to encourage water efficiency measures in addition to NI Water’s existing initiatives are included in the Final WRMP, though the impacts of NI Water’s new Water Demand Management Strategy (WDMS) will need to be factored into future WRMPs.
- Strategic transfers of water (large trunk mains) – a number of new trunk mains linking various areas in Northern Ireland identified in WRS 2002 were considered for the Draft WRMP; any update to status of implementation of these trunk mains has been allowed for in the Final WRMP. The main proposed trunk mains link Killyhevlin WTW to Dungannon, Castor Bay to Newry and Carmoney WTW to Strabane (see Figure 2).

Changes from Draft to Final WRMP

The main changes incorporated into the Final WRMP have been:

- Revised leakage targets to be achieved by 2014–15;
- Revisions to the costs of incremental leakage reductions taking account of carbon costs;
- Revisions to the estimated costs of water resource infrastructure options taking account of latest out-turn costs;
- Use of the Trunk Main Model (TMM) developed over the course of the WRMP process to confirm the baseline model and refine the configuration, capacity and hence cost of strategic transfer schemes;
- Recognition of the status of implementation of strategic trunk mains originally scheduled for planning period 2013–2018; and
- Preparation of a Strategic Environmental Assessment (SEA) statement that sets out how responses to the consultation have been taken into account.

Whilst the Final WRMP is fit for purpose given the current regulatory regimes, it is possible that changes to abstraction licences and/or the introduction of water charging will require a major revision to the plan. The strategy of further leakage reductions, combined with the progressive investment in trunk mains identified in WRS-2002 is a “no-regrets” strategy that will be resilient to such future challenges and also provide the operational flexibility to respond to short-term extreme events.

Internal WRZ Interconnectivity Issues

Through discussions in the preparation and finalisation of the WRMP it has become clear that although, as stated in the plan, the supply demand balance can be met at the WRZ level there are issues and risks associated with the ability to move water to where it is needed within smaller zones in scenarios outside of normal operation.

The Water Resource Management Plan Steering Group therefore highlights the documents;

- ‘Supply Options in the West Water Resource Zone’, which has been included as Annex A to the Final WRMP and highlights the issues in continuing to supply water to Omagh in dry conditions and the potential of the Carmoney to Strabane link trunk main to mitigate this and other local operational issues.
- Single Source Watermains Project Appraisals and the resultant Major Incident Mitigation Projects which focussed on the District Meter Area (DMA) scale.

Both of these pieces of work highlight the need for the level of interconnectivity within zones to be increased to provide operational flexibility and resilience in the event of source and other distribution system failures. Recent discussions have highlighted concerns over these issues in the West WRZ. The priority for NI Water at this time is to address these issues through a separate study of network operation under emergency scenarios.

Conclusion

The objective of this Final WRMP is to set out the strategic supply demand balance issues that will allow NI Water to plan and prepare for the supply of drinking water to the population of Northern Ireland over the next 25 years.

The final plan has been developed using the best available information, guidelines and techniques to make use of and build upon the existing water supply infrastructure and provide the best use of public funds. In doing so, the development of this plan from draft, through consultation to final, has taken account of a wide range of technical, environmental and financial issues with the goal of balancing these issues against the objective of providing a drinking water supply that is, and will remain, fit for purpose.

The Water and Sewerage Services (Northern Ireland) Order 2006 requires that the Final WRMP is reviewed annually, and that a revised WRMP has to be produced every 5 years. These reviews will be informed by the most recent out-turn data reported by NI Water. Future revisions to the plan will also need to take into account new data, information and methodologies for issues that remain uncertain at the present time, for example the issue of climate change and how the cost of carbon is incorporated into analysis. In addition new environmental regulations are likely to be introduced which may impose environmental constraints that are more stringent than those on existing abstraction licences. This will restrict the availability of water from existing sources and will reduce the opportunity for new and/or increased abstractions. This would then lead to an increased requirement for demand-side measures to reduce consumption and leakage so may stimulate further consideration of the need for some form of water charging.

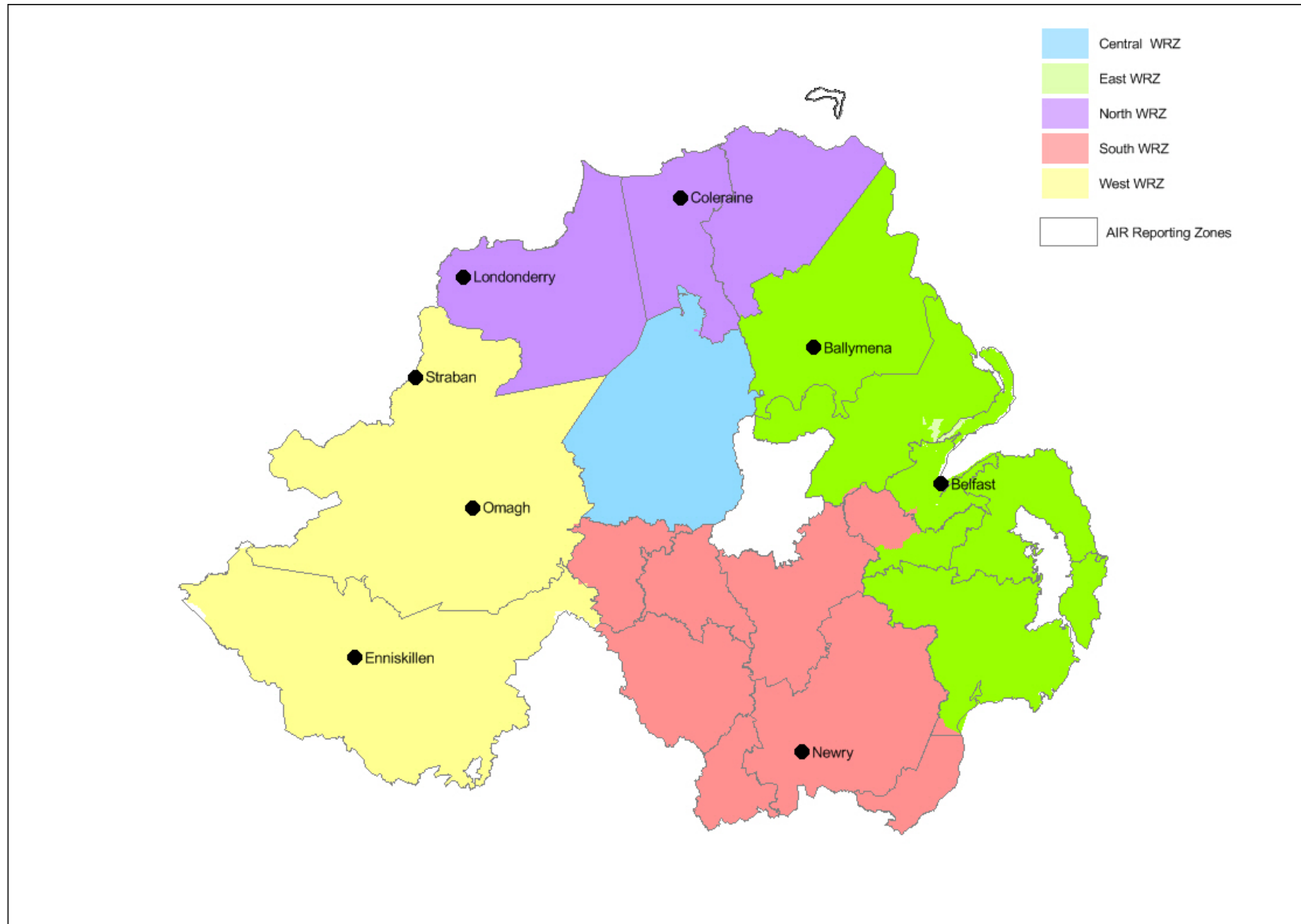


Figure 1 Water Resource Zones (WRZ) and Annual Information Return (AIR) Reporting Zones

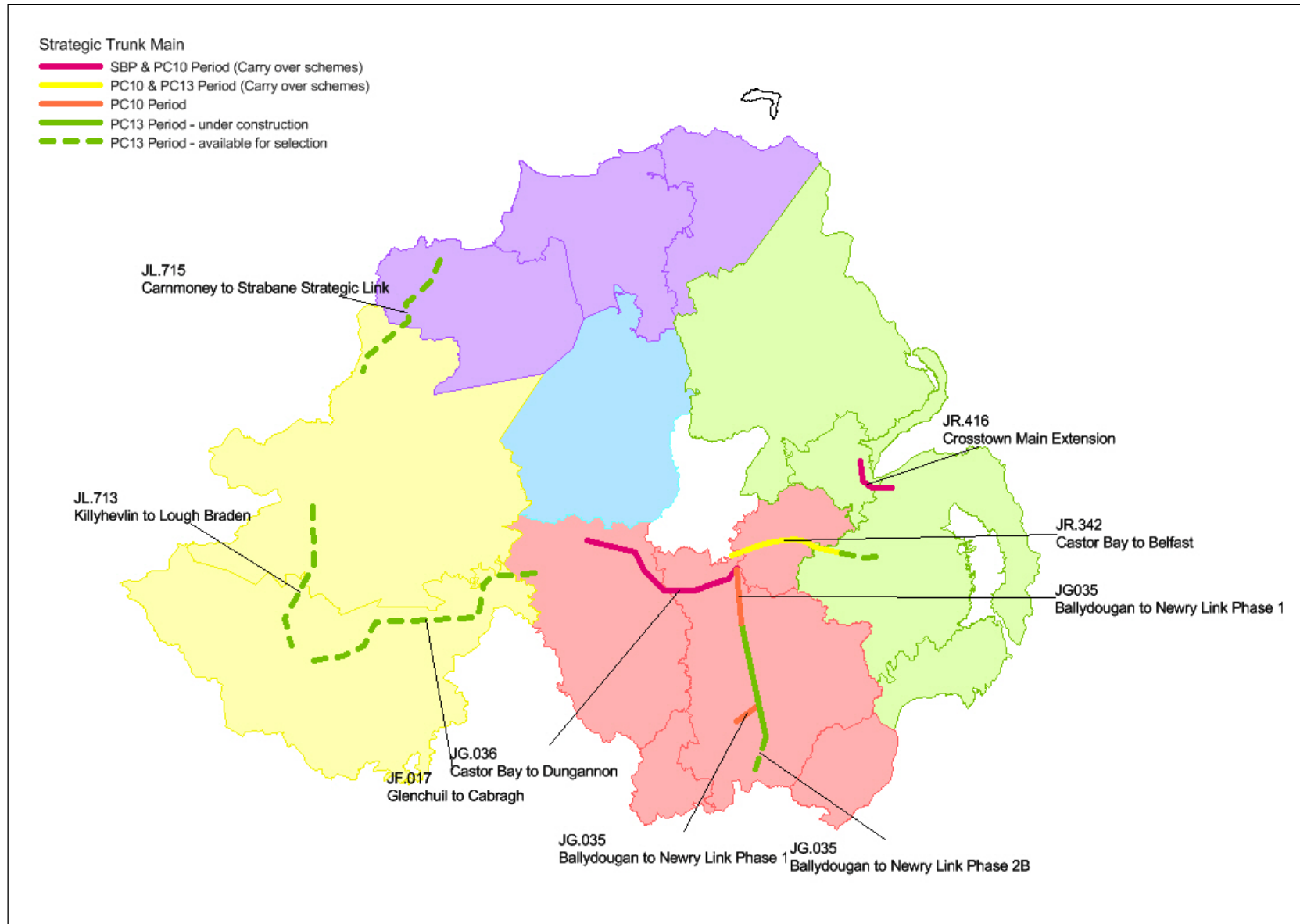


Figure 2 Strategic Transfers

Final Water Resources Management Plan 2012 Non-Technical Summary

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