

Water Supply Project *Eastern and Midlands Region*

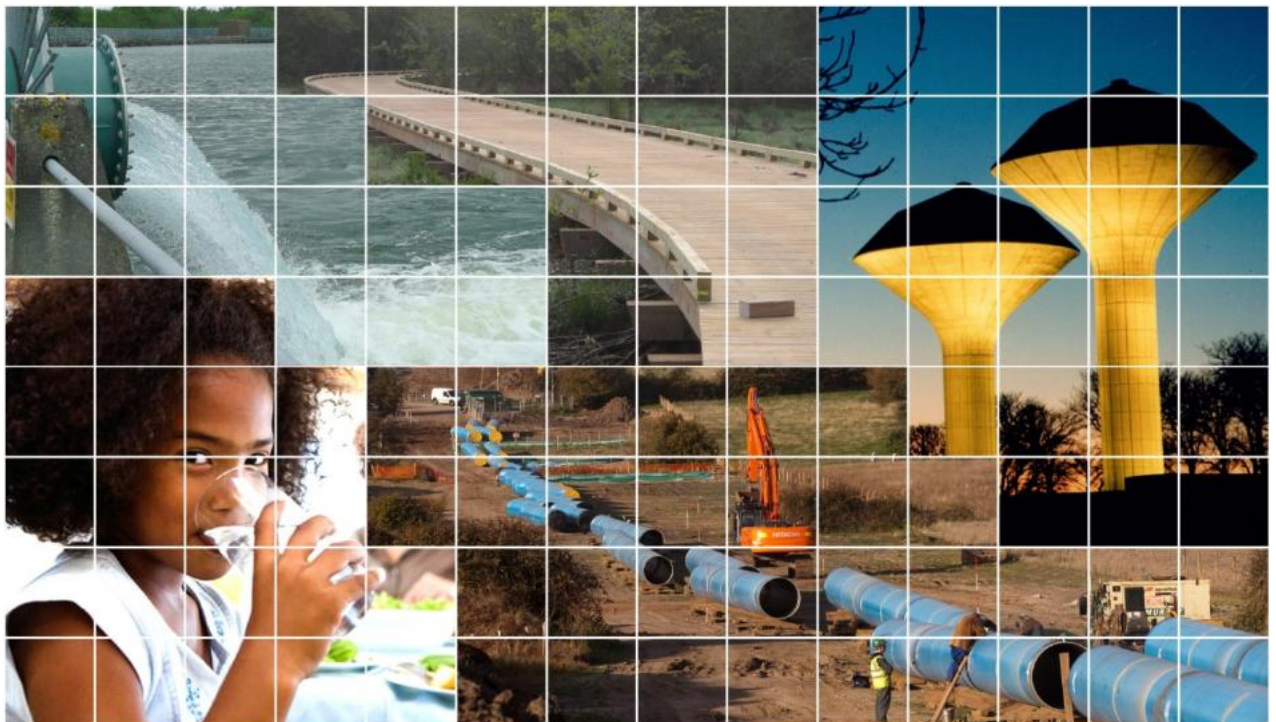
Water Supply Options Working Paper

Appendix C Strategic Environmental Assessment (2007-2011) Habitats Directive Review



June 2015

Revision A01



Contents

1	Introduction	1
2	Scope of Review	2
3	Changes to Legislation	3
3.1	Legislative background	3
4	Methodology	4
4.1	Appropriate Assessment Guidance documents	4
4.2	Appropriate Assessment Methodology outlined in 2008 Report	4
5	Potential Changes to Plan since 2008	7
6	Designated Sites in Ireland	8
7	Update on studies and available baseline information	10
8	Review of Options	11
8.1	Option A: Shannon - Lough Ree	11
8.2	Option B: Shannon - Lough Derg	13
8.3	Option C: Shannon – Parteen Basin	14
8.4	Option D: Shannon – Lough Ree and Lough Derg	14
8.5	Option E: Shannon with Groundwater – Lough Ree & Groundwater & Storage	15
8.6	Option F1: Shannon Groundwater – Lough Derg & Groundwater & Storage	15
8.7	Option F2: Shannon – Lough Derg & Storage	16
8.8	Option G: Shannon– Lough Ree or Lough Derg & Impoundment	17
8.9	Option H: Irish Sea – Desalination	17
8.10	Option I: Groundwater	18
8.11	Option J: Rivers Liffey and Barrow	18
8.12	Summary of Options	19
9	Conclusion	21
10	References	22
Appendix C1		



1 Introduction

This report outlines the Habitats Directive Review carried out as part of Phase 1 of the option appraisal methodology.

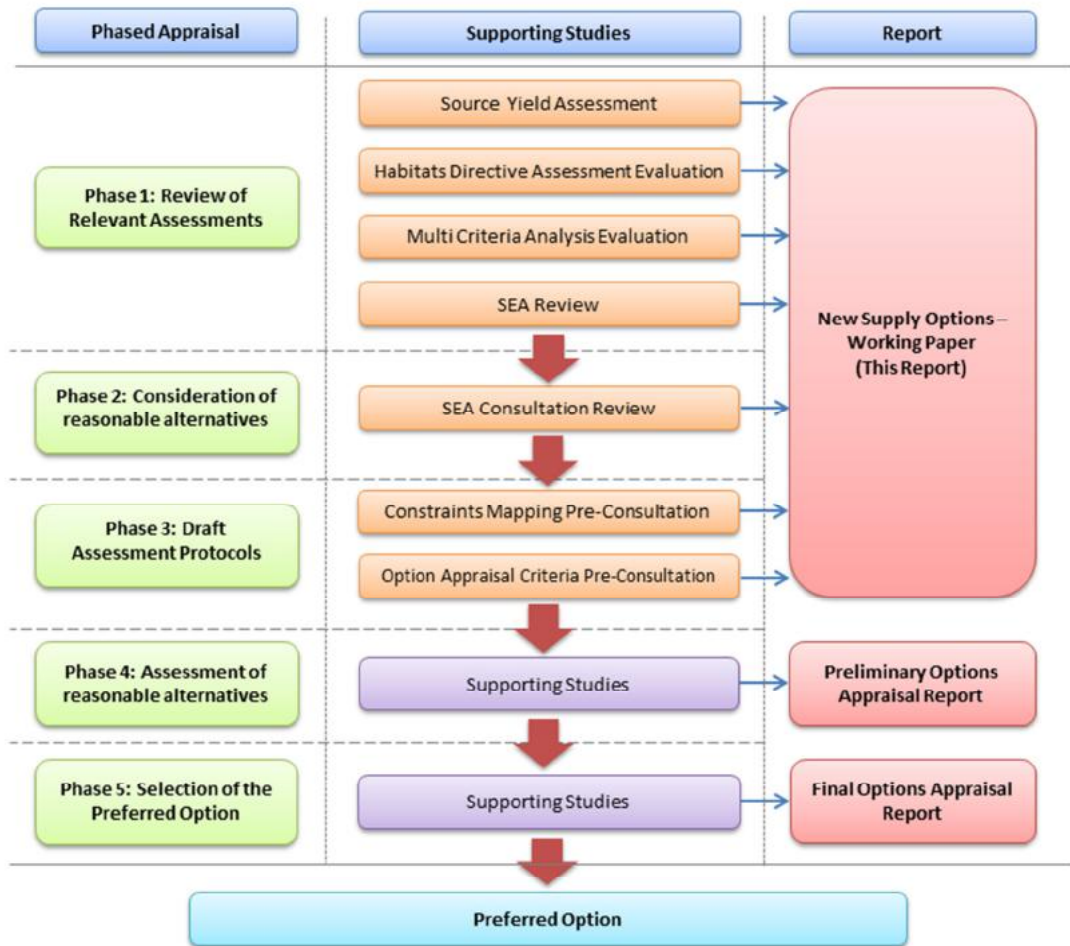


Figure 1-A Options Appraisal Methodology

2 Scope of Review

The purpose of this review is to assess the validity of the Habitat Directive Assessment Report 2008¹ report in current times with regard to changes in legislation, guidelines and European designated sites (as per NPWS website in 2014²). This report then assesses how these changes may impact upon the conclusions of the 2008 report, on the further stages of the WSP-DR.

Table 2-A below lists each of the 10 options and sub-options reviewed within the 2008 Report¹ of which option's B, C, F1, F2 and H were noted not to have a risk to the integrity of European Sites, with mitigation. Options A and D did not meet the criteria of Stage 2 of the Appropriate Assessment process and therefore were not considered viable options. Options E and G were not conclusive due to a lack of data and therefore were excluded on the basis of the precautionary principle. However further studies were outlined which would be required if the latter two options were to be considered further.

2008 Options
Option A – Lough Ree (Direct)
Option B – Lough Derg (Direct).
Option C – Parteen Basin (Direct)
Option D – Lough Ree and Lough Derg
Option E – Lough Ree and Storage
Option F – Lough Derg and Storage
Option F1 – Lough Derg and Storage (Rochfortbridge)
Option F2 – Lough Derg and Storage (Garryhinch)
Option G –Lough Ree with Impoundment
Option H – Desalination
Option I – Groundwater
Option J – Conjunctive use of the River Barrow

Table 2-A List of options in 2008 Habitat Directive Assessment¹

This report reviews each of the options including the ninth and tenth options, option I & J, which relate to groundwater and surface water abstraction from the Barrow. These latter two options were not considered technically feasible in terms of supplying the required water quantities in 2008. The outcome of this current 2014 review has been based primarily on changes in legislation and changes in European designated sites in the interim period since 2008. This report does not form part of an Appropriate Assessment, but rather provides commentary on the previous study with reference to changes in legislation over the intervening period.

¹ RPS and Veolia Water Habitat Assessment Report, 2008.

² www.npws.ie. Site Viewed March 2014.

3**Changes to Legislation****3.1 Legislative background**

An Appropriate Assessment (AA) or Habitats Directive Assessment, as per the 2008 report¹, is a requirement of Article 6 of the Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (hereafter referred to as the “Habitats Directive”). In 2008, the Habitats Directive was transposed into Irish legislation mainly by the European Communities (Natural Habitats) Regulations, 1997 (S.I. 94/1997), however this has since been replaced by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477). In addition, the Habitats Directive is now also transposed into Irish legislation via the Planning and Development (Amendment) Act 2010, in particular by Part XAB.

A review of the proposed project and its options has been undertaken under this new legislation to ensure compliance of the options appraisal with its requirements. In addition, clarifications and rulings on the interpretation of the Habitats Directive have been issued from the European Court of Justice (ECJ) since 2008. These have provided clearer interpretation on key terminology and implementation of the Habitats Directive in member states. An example from Ireland includes the ECJ ruling on Galway City Outer Bypass where the loss of approximately 1.47 hectares of limestone pavement (Priority Annex I habitat type) from 85 hectares of limestone pavement was deemed to adversely affect the integrity of the Lough Corrib European Site. The Court ruled that:

“Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that a plan or project not directly connected with or necessary to the management of a site will adversely affect the integrity of that site if it is liable to prevent the lasting preservation of the constitutive characteristics of the site that are connected to the presence of a priority natural habitat whose conservation was the objective justifying the designation of the site in the list of sites of Community importance, in accordance with the directive. The precautionary principle should be applied for the purposes of that appraisal”³.

This ruling has direct implications for all projects/plans not related to the management of European Sites, in Ireland and EU countries, with regard to the integrity of the European Site, where the projects/plans have potential to result in permanent impacts to the qualifying interests, in particular priority annexed habitats.

Based on the above changes in Irish legislation and the ECJ interpretation of the Habitats Directive, a review of such changes has been undertaken to ensure the findings of the 2008 Habitats Assessment Report are still valid. Under current planning legislation (Planning and Development (Amendment) Act 2010) a “Natura Impact Statement” is required as opposed to a “Habitats Directive Assessment” to provide information to the Competent Authority to undertake the Appropriate Assessment.

³ InfoCuria - Case-law of the Court of Justice:
<http://curia.europa.eu/juris/document/document.jsf?jsessionid=9ea7d2dc30db7f4097720e964be69b1fb2f4e44d61d3.e34KaxiLc3qMb40Rch0SaxuNaxv0?text=&docid=136145&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=107493>. Site Viewed 03.04.14

4.1 Appropriate Assessment Guidance documents

The methodology used, or rather the process, in undertaking the 2008 Report¹ was based on guidance documents, many of which are still relevant in today's terms. New guidance documents have since become available however, providing further clarification on this process and requirements. Examples of such guidance include:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. (Department of Environment, Heritage and Local Government, 2010).
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 & PSSP 2/10.

4.2 Appropriate Assessment Methodology outlined in 2008 Report

It is noted that the 2008 Assessment involved the following steps:
Determination of the qualifying feature and conservation objective of the European Sites:

- Determination of the sensitivity of the qualifying feature.
- An Appropriate Assessment in combination with other plans/programmes/projects which will consider the characteristics of the Draft Plan options and their potential significant adverse effects on the integrity of the European Sites¹.

It was considered likely that a large proportion of the information collected and assessed from these steps by RPS & Veolia¹ has since been updated, potentially affecting the outcomes of the Appropriate Assessment. Checks were therefore undertaken to identify changes to European Sites and their qualifying interests within abstraction areas. This may have occurred for example, when smaller SPAs were subsumed into larger SPAs. Review of the conservation objectives for each of these sites was also undertaken as generic conservation objectives were generally assigned to European Sites in 2008, many of which have since been updated or are in the process of being updated, based on available scientific data detailing specific conservation objectives.

Determination of the sensitivity of the qualifying feature was undertaken by RPS & Veolia¹ based on the type of habitat or species present at the site. In addition habitat sensitivities were based on Natura 2000 screening protocol – Water Services plans and projects issued by the NPWS and the ecological experience by Natura Environmental Consultants and Ecological consultancy Services¹. In addition to this method of determining the sensitivity of qualifying interests, NPWS currently have more up to date data on the status of qualifying interest habitat and species in Ireland which is comparable with 2007 data reported to the EU (NPWS, 2013⁴ and

⁴ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 1, 2 & 3, Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland

2007⁵). This data may affect the assessment of the sensitivity of the qualifying features undertaken in 2008.

The third step involved in undertaking the 2008¹ AA in combination with other plans/programmes/projects was to consider the characteristics of the draft Plan options and their potential significant adverse effects on the integrity of the European Sites¹. Plans considered in-combination include local, regional and national plans, many of which have since been updated or conditions have altered, including for example County Development Plans, Local Area Plans, small and large scale planning applications and projects. In addition a review of existing and required water supply schemes (including the potential for an increase in use of domestic wells due to water charges), waste water treatment systems and potential in-combination pressures on each of the proposed water sources and on surrounding European Sites, including their qualifying interests was undertaken. Cumulative impacts considered changes in climatic conditions, including alterations in precipitation and evaporation rates.

In addition to the above steps, the Screening Stage of the 2008 report¹ involved:

- An outline of the options proposed for the draft Plan.
- An outline of the characteristics of the draft Plan that could have adverse effects on the European Sites.
- An outline of other plans/programmes/projects that could have adverse effects on the European Sites within the draft Plan study area.
- Identification of the European Sites within the draft Plan study area.
- Identification of European Sites within a 15km radius of the outer boundary of the draft Plan study area¹.

It is necessary in this review to take into account any changes in the characteristics of the options. Where such changes have occurred these changes are considered for potential adverse effects on European Sites, alone and or in-combination with other plans and/or projects.

An important aspect of the AA process is the identification of European Sites that have potential to be directly and/or indirectly impacted by the plan. For the purpose of the 2008 Habitats Assessment these included sites within the study area and 15km surrounding the study area. It is important to note that 15km is a guidance distance for assessing the potential impacts of plans or projects (DoEHLG, 2010). However depending on the likely impacts of the project and the sensitivities of the ecological receptors, bearing in mind the precautionary principle, it is noted that potential impacts may occur more than 15km from the project (DoEHLG, 2010). The DoEHLG guidance highlights water dependent habitats or species in particular noting it may be necessary to consider the full extent of the upstream and/or downstream catchment (2010). Therefore once the initial preferred options have been selected based on the 15km buffer area, a wider assessment will be required given the nature and large scale of the potential development, to ensure no adverse impacts on qualifying interests or site integrity outside of the 15km buffer area. This

⁵ NPWS (2007) The Status of EU Protected Habitats and Species in Ireland. Backing Documents, Article 17 Forms, Maps, Volume 1, 2 & 3, Unpublished Report, National Parks & Wildlife Services. Department of the Environment, Heritage and Local Government, Dublin, Ireland

was not in the practice at the time of the 2008 report¹ and it should be completed on the later shortlisted option(s).

In addition to the above, it is considered good practice that an AA report is a stand-alone document. In this instance it is recommended that reference to figures be contained within the report. At an appropriate time, AA screening in options appraisal moving forward will base conclusions on scientific evidence from further investigative studies now under way.

5**Potential Changes to Plan since 2008**

As noted above, all aspects of the selected options must be carefully re-screened for AA based on best available information and through consultation with the National Parks and Wildlife Service and Inland Fisheries Ireland. The AA must consider, but is not limited to, the project design, extraction area, water storage area, pipeline routes, construction methodology, operational phase, maintenance phase and decommissioning phase. Any changes in the project since 2008 must be fully assessed. Additionally Options H, I and J (which are further discussed below in Section 7) for desalination, groundwater and surface water abstraction from the Barrow were not assessed as part of the 2008 report¹, because they did not meet the more fundamental requirement of providing the required water yield.

It is also recommended that the outcomes of AA for selected options should rank option alternatives based as potential risks identified or on uncertainty regarding impacts on all European Sites (qualifying interests). Selection of the final abstraction and pipeline route option will include consideration of the ranking outcome for each option, with sites and routes which minimise risk to European Sites, a favourable factor in the selection process. A Natura Impact Statement will be submitted along with the planning application documents for the final option selected.

6 Designated Sites in Ireland

As noted, since the 2008 report was produced, additional European Sites have been designated, alterations have occurred to existing site boundaries and some sites have been subsumed into other sites (pers. comm., NPWS 2014). Detailed comparison between 2008 and 2013 mapping of European Sites is required to review the locations of such changes however this could not be fully undertaken due to a lack of availability of the original 2008 digital mapping. Figure 1 in Appendix C1 illustrates cSAC's designated within the original study area as per the 2008 report¹. Figure 2 illustrates SPA's within the original study area and Figure 3 illustrates all designated sites (National and European) within the study area¹.

A visual check was undertaken of each of the options abstraction locations (limited to Loughs and the Irish Sea) displayed in figures contained within RPS & Veolia Strategic Environmental Assessment (2008) to ensure there has been no substantive change in site boundaries since completion of the 2008 report¹. In addition a comparison was undertaken of conservation objectives to ascertain if there have been any changes since 2008. A summary of the main findings are listed below.

Option	Designated Site	Obvious change in site boundary (Yes/No)	Changes to Qualifying Interests	Detailed Conservation Objectives available (Yes/No)
Option A: Shannon - Lough Ree (Direct)	Lough Ree cSAC Lough Ree SPA	No	Yes (Lowland hay meadows listed in 2008 as QI for cSAC - not in 2014) ⁶	No
Option B: Shannon - Lough Derg (Direct)	Lough Derg North East Shore cSAC Lough Derg (Shannon) SPA	No	No – cSAC	No
Option C: Shannon – Parteen Basin (Direct)	Lower River Shannon cSAC	No	No	Yes
Option D: Shannon – Lough Ree and Lough Derg (Direct)	Lough Ree cSAC Lough Ree SPA Lough Derg North East Shore cSAC Lough Derg (Shannon) SPA	No	As above	No

⁶

<http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO000440.pdf>

Option	Designated Site	Obvious change in site boundary (Yes/No)	Changes to Qualifying Interests	Detailed Conservation Objectives available (Yes/No)
Option E: Shannon & Groundwater – Lough Ree & Groundwater & Storage	Lough Ree cSAC Lough Ree SPA	No	Yes (Lowland hay meadows listed in 2008 as QI for cSAC - not in 2014) ⁷	No
Option F1: Shannon & Groundwater – Lough Derg & Groundwater & Storage	Lough Derg North East Shore cSAC Lough Derg (Shannon) SPA	No	No – cSAC Yes – SPA	No
Option F2: Shannon – Lough Derg & Storage	Lough Derg North East Shore cSAC Lough Derg (Shannon) SPA	No	No – cSAC Yes – SPA	No
Option G: Shannon – Lough Ree or Lough Derg & Impoundment	Lough Ree cSAC Lough Ree SPA Lough Derg North East Shore cSAC Lough Derg (Shannon) SPA	No	As above	No
Option H: Irish Sea – Desalination (Direct)	Rockabilly to Dalkey Island cSAC	Yes	N/app	Yes
Option I: Groundwater	N/app (not assessed in 2008 Habitat Assessment)	N/app	N/app	N/app
Option J: Rivers Liffey & Barrow	N/app (not assessed in 2008 Habitat Assessment)	N/app	N/app	N/app

Table 6-A Changes in European Site at Extraction/Storage Options

⁷

<http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO000440.pdf>

7**Update on studies and available baseline information**

Environmental studies and data collection have been ongoing since 2008 on a wide range of factors including ecological, ornithological and hydrological factors. This data is available from a range of sources including the Environmental Protection Agency, Office of Public Works, National Parks and Wildlife Service, Inland Fisheries Ireland, Local Authorities, a wide range of independent stakeholders and project based studies, and discussed in this report.

8**Review of Options**

A high level review was undertaken with the results contained within this report on each of the 10 options and sub-options, based on the 2008 report¹. The review took cognisance of current guidelines, legislation, additional available information and good practice to ascertain if the conclusions of the 2008 report are still valid.

It was noted by RPS & Veolia¹ that the feasible pipeline corridor options do not cross or impede on any cSAC's or SPA's within the draft plan study area with the exception of the abstraction facility of the pipelines for both the Lough Ree and Lough Derg options, which would impact directly on cSAC's and SPA's. Due to the designation of a number of additional European Sites across Ireland since 2008, potential exists for project infrastructure to cross or be located within such sites, in particular SPA's which often follow linear river corridors through the landscape e.g. River Boyne and River Blackwater SPA, advertised in 2011. Due to the early stage of the project and lack of detailed pipeline design at this stage, this review does not include appraisal of pipeline routes. Section 3.3.3 of the 2008 report provides a brief summary of the pipeline route and distances from European Sites. Phase II screening in section 3.7 was undertaken based on distance of the route options to Natura 2000 sites (RPS & Veolia, 2008). The report does not explicitly state that hydrogeological links were considered, therefore it is recommended that all potential links are reviewed. Nine options were screened in the Habitats Directive Assessment report (RPS & Veolia, 2008) and each was noted to have potential to result in likely significant impacts to European Sites.

All of the 11 options (including 2 not screened in the RPS & Veolia HDA report, 2008) are discussed further below.

8.1 Option A: Shannon - Lough Ree

At the time of writing, Lough Ree SPA and cSAC are contained within the Lough Ree study area (as highlighted in Figure 4.3 of the SEA (RPS & Veolia, 2008)). The qualifying interests of Lough Ree SPA, as per NPWS website⁸, differ from those listed in Table 4.4 of the 2008 report as highlighted below in Table 8-A. The Qualifying Interests for Lough Ree cSAC (Site Code: IE000440) have not changed since 2008⁹.

⁸ NPWS Website: <http://www.npws.ie/protectedsites/specialprotectionareasspa/loughreespa/>. Site Viewed 04.04.14

⁹ NPWS Website: <http://www.npws.ie/protectedsites/specialareasofconservationsac/loughreesac/>. Site Viewed 04.04.14

2008 Qualifying Interests ¹	2014 Qualifying Interests ⁸
Lough Ree SPA (Site Code: IE004064)	
Teal (<i>Anas crecca</i>)	Teal (<i>Anas crecca</i>) [A052] (Wintering)
Mallard (<i>Anas platyrhynchos</i>)	Mallard (<i>Anas platyrhynchos</i>) [A053] (Wintering)
Tufted Duck (<i>Aythya fuligula</i>)	Tufted Duck (<i>Aythya fuligula</i>) [A061] (Wintering)
Common Scoter (<i>Melanitta nigra</i>)	Common Scoter (<i>Melanitta nigra</i>) [A065] (Breeding)
Golden Plover (<i>Pluvialis apricaria</i>)	Golden Plover (<i>Pluvialis apricaria</i>) [A140] (Wintering)
Lapwing (<i>Vanellus vanellus</i>)	Lapwing (<i>Vanellus vanellus</i>) [A142] (Wintering)
Common Tern (<i>Sterna hirundo</i>)	Common Tern (<i>Sterna hirundo</i>) [A193] (Wintering)
Goldeneye (<i>Bucephala clangula</i>)	Goldeneye (<i>Bucephala clangula</i>) [A067] (Wintering)
	Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] – wintering (Wintering)
	Coot (<i>Fulica atra</i>) [A125] (Wintering)
	Whooper Swan (<i>Cygnus cygnus</i>) [A038] (Wintering)
	Wigeon (<i>Anas penelope</i>) [A050] (Wintering)
	Shoveler (<i>Anas clypeata</i>) [A056] (Wintering)
	Wetlands

Table 8-A Comparison between Qualifying Interests of European Sites

The 2008 report¹ summarised the potential effects from Option A, which centred mainly on concerns that indirect disturbance to wintering and breeding birds may be an issue and loss of habitat which may reduce attractiveness of the site to qualifying species of the SPA. It is not clear if potential impacts examined at that time include the construction, operation and decommissioning phase or all phases¹. In addition there is no description of the duration of impacts e.g. temporary or permanent (generally based on EPA, 2000 or CIEEM, 2006 guidelines). It is also recommended that non-toxic contamination effects including the release of silt be considered during construction into surrounding areas.

The generic conservation objectives for Lough Ree cSAC are listed within the 2008 report¹, however there was no mention of the conservation objectives for Lough Ree SPA. Table 4.4 listed the selection (inferred as the qualifying interest species) and sensitivities for both qualifying and other species of interest for L. Ree SPA.

Modelling options note that lake levels would fall below simulated/target levels as a result of abstraction¹. One noted impact of the continuous abstraction would be reducing the rate of drawdown from L. Ree resulting in greater retention of water in the lake which could be problematic at the expense of increasing flood risk around L. Ree and downstream on the Shannon Callows¹. The assessment of potential impacts noted the potential for significant impacts on qualifying interests on the cSAC and SPA both directly and indirectly. The report notes that mitigation cannot avoid adverse effects to European Sites through the alteration of water levels, prolongation of low flow period and potential impact on retention times downstream in Lough Derg¹. Mitigation measures do exist however and these are related to options D, E and G. Option A would require further assessment under Stage 2 of the Appropriate Assessment process, if it were shortlisted.

To conclude, there is a high risk of adverse effects from Option A to European Sites. There is also uncertainty that mitigation measures could be implemented in a satisfactory manner given the high number of stakeholders such as OPW, navigation interests, ESB, Local Authorities, farmers etc. which will influence the success of water flow controls measures, even if such could be agreed. In this option the precautionary principle should be applied and this option should not be taken further.

8.2 Option B: Shannon - Lough Derg

The proposed abstraction area is located within Lough Derg, North East Shore cSAC (Site Code: IE002241) and Lough Derg (Shannon) SPA (Site Code: IE004058). As per the 2008 report¹ it is agreed that there is potential for significant impacts on European Sites from the then proposed abstraction location and associated works.

Lough Derg (Shannon) SPA current qualifying interests include the following which were not listed as qualifying interests in 2008:

- Goldeneye *Bucephala clangula* [A067]
- Wetlands and Waterbirds

Modelling options for Lough Derg concluded that “if” Ardnacrusha generation output is marginally modified (requires approval from ESB), to reflect the reduction in flows as a result of abstraction, the Lough Derg water level will remain the same as for the non-abstraction recorded levels. Based on this, simulated abstraction levels were similar¹. The report does not consider the level of impact if generation output could not be modified, but stakeholder discussions with ESB in November 2013 indicated that generation output can be modified by agreement. In addition the 2008 report noted that it is not expected that an increase in retention time will result in a significant adverse impact on European Sites. It continued by noting that further baseline investigations would be required to allow accurate modelling of operation and monitoring of water quality impacts. The report also noted that the principal mitigation measure required to address any significant impact on European Sites relates to maintaining the flow in the River Shannon downstream of the abstraction area. Further Water Quality Monitoring surveys, lake bathymetry study and a model have been commissioned for L. Derg with fieldwork expected to commence in the autumn of 2014. Water quality monitoring works are due to run for 3 years and analysis of factors will include nutrients, temperature, raw water parameters and phytoplankton. The model build has already commenced using existing data however the bathymetry data will form an important element of the model. The model requires one year of water quality survey data to ensure it will be fully calibrated therefore the model will not be complete until late 2015.

Based on such further data and once it is confirmed that the required mitigation measures can be fully implemented, from a high level review, potential adverse impacts to European Sites (including the Lower River Shannon cSAC) may be avoided. For the purposes of this “high level” assessment, it is suggested that Option B should not be ruled out at this stage until further information, including the studies described above is provided on potential impacts of the option. We believe this option presents a relatively lower risk to European Sites and conclude that with appropriate mitigation this can be considered as an option.

8.3 Option C: Shannon – Parteen Basin

The extraction point is located within the Lower River Shannon cSAC (Site Code: IE002165) along the eastern shore, approximately 3km south of Killaloe, subject to proper siting with respect to the ESB embankments there. This section of the Shannon is dammed by the Parteen weir forming a basin or reservoir. On the southern part of the basin both shores are artificially embanked with extensive areas of land flooded to form the basin. Potential significant adverse impacts to European Sites were noted therefore the option required Phase 2 of an Appropriate Assessment¹. Detailed conservation objectives are currently available for the cSAC¹⁰ which were not available for the 2008 report¹. Assumptions were made in the 2008 report¹ regarding modelling results for Parteen Basin including the assumed modification of Ardnacrusha generation output to reflect abstraction flows resulting in Parteen Basin water levels remaining the same as for non-abstraction levels¹. In addition to this mitigation measure, appropriate design mitigation is required to ensure any abstraction from the Shannon would be undertaken without significant change to the hydrological regime on European Sites to prevent adverse impacts on habitats and species dependent on the current regime. Until the results of further studies on L. Derg are available (as described in section 8.2) and confirmation of applicability of proposed mitigation is provided, it is suggested that Option C is not ruled out at this stage of the project until further information is provided on potential impacts of the option. We conclude that with appropriate mitigation this can be considered as an option.

8.4 Option D: Shannon – Lough Ree and Lough Derg

Option D proposes to combine water abstraction from two locations within Lough Ree cSAC and SPA and Lough Derg, North East Shore cSAC and Lough Derg (Shannon SPA). As noted above, qualifying interests for L. Ree cSAC have been updated since preparation of the 2008 report¹. Modelling results are similar for L. Ree though the abstraction has been reduced from 350MI/d to 250MI/d, with the remaining 100MI/d to be extracted from L. Derg. This reduced abstraction from L. Ree can only be achieved where sluice operations are modified to ensure target levels are reduced, as per option A. RPS & Veolia¹ noted that the reduced abstraction from L. Ree would result in breaches of current regulations, as per option A. Based on this information it is assumed that, as per option A, continuous abstraction could be problematic through either increasing flood risk around L. Ree or impacting downstream on the Shannon Callows. It does note however that abstraction quantities would have to be scaled back for short periods during dry years to ensure compliance with regulations¹. It is noted in the report that while the impact is less pronounced than option A, the impact of the increased low flow period was considered to constitute a significant adverse impact on the River Shannon Callows¹. Potential adverse impacts were noted to exist with regard to L. Ree therefore using the precautionary principle, we concur that adverse impacts from Option D to European Sites are likely and conclude that the precautionary principle should be applied and this option should not be taken further.

¹⁰

<http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO002165.pdf>

8.5 Option E: Shannon with Groundwater – Lough Ree & Groundwater & Storage

Option E proposes to abstract water from Lough Ree which would be combined with storage and available groundwater from former bogland areas in the midlands, southeast of Rochfortbridge, Co. Westmeath. The storage facility would be at a former bog that is currently being quarried for sand and gravel which has resulted in the creation of two lakes. The proposed storage area is not contained within a European designated site.

The purpose of the proposed storage facilities would enable abstractions from L. Ree to be modified to reflect periods of high water flow over the year. In periods of high water flow or flood conditions, water from the Shannon can be pumped from L. Ree to storage facilities at Rochfortbridge where it can be later used during drier weather periods when abstractions from the Shannon can be reduced to reflect low flow levels.

In terms of abstraction, option E is similar to option A, with the main difference being the volumes and period of proposed extraction. Option E proposes to abstract 500MI/d from November to June with a reduced abstraction of 50MI/d from July to October inclusive, as opposed to continuous abstraction of 350MI/d with option A.

Hydrological modelling results for option E noted that the durations of minimum flow periods will be marginally extended as a result of the abstraction regime¹. The 2008 report¹ noted that abstraction from L. Ree could cause changes in water levels, particularly during summer months or dry spells. The water levels within the lake are mainly controlled by sluices at Athlone weir. Management of L. Ree water levels and flow rates will directly impact water levels and associated flow rates downstream in L. Derg and the Shannon Callows. As noted by RPS & Veolia (2008) if conditions change along the Shannon Callows from dryer conditions in the spring/early summer, this would negatively affect the species diversity of plant communities and ground nesting birds, for which this European Site is designated. The 2008 report notes that although the annual winter flooding will remain largely unchanged from the current regime, as predicted by the model, the effect of prolonged low flow at the beginning of autumn may lead to drier habitat conditions until much later in the season which could lead to a significant adverse effect on the River Shannon Callows. RPS & Veolia¹ note that the effects of option E are similar but less pronounced than those of option A and the influence of the altered hydrological regime was considered to constitute a possible significant adverse impact to the L. Ree site. Based on the lack of data and precautionary principle, we conclude that there is high risk of potential adverse effects and this option should not be taken further.

8.6 Option F1: Shannon Groundwater – Lough Derg & Groundwater & Storage

Option F1 proposes to abstract water from Lough Derg which will be combined with storage and available groundwater from former bogland areas in the midlands, southeast of Rochfortbridge, Co. Westmeath. The storage facility would be at a former bog that is currently being quarried for sand and gravel which has resulted in the creation of two lakes. The proposed storage area is not contained within a European designated site. Similar to option E, the theory behind option F1 is to abstract water from L. Derg at a higher rate when flows are high and at a reduced rate when flows are low. RPS & Veolia¹ note that the

effects of option F1 would be similar in nature but reduced with regard to option B and it was therefore expected that option F1 would further reduce any risk of a significant effect. However a significant risk exists due to the potential to spread invasive species from the Shannon catchment to waterbodies outside the catchment, including zebra mussel, which would be considered a significant adverse effect on designated sites. Potential exists for the design stage of the project to mitigate against such a threat.

As the abstraction is located downstream of L. Ree and the Shannon Callows, no significant adverse effect was considered likely to occur to these sites¹. Potential risks do however exist to Lough Derg East Shore cSAC, Lower River Shannon cSAC (Site Code: IE002165) and Lough Derg SPA (Site Code: 004058). The water levels in L. Derg are controlled for the purposes of electricity generation therefore the abstraction of water from this source will not result in a reduction in water levels. Potential effects related to the reduction in flow, increased residency time and possibly resulting in concentration of nutrients. The flow into the lake from upstream will be unaffected as will the influx of nutrients. Nutrient levels within the lake are affected by the presence of zebra mussel however phosphorus levels in the lake are high, even though studies by RPS & Veolia¹ note that retention time explains only a small percentage of the total concentration found in the lake. Any reduction in flows leaving the lake and downstream must be managed to ensure no adverse impacts to downstream habitats and species. Data from further studies on L. Derg due to commence in 2014 (as described in Section 8.2 above) will enable further assessment on potential adverse impacts on European sites at L. Derg and downstream. However, based on the “high level” approach and information contained within RPS & Veolia report¹ no adverse impacts are anticipated at this stage from option F1 and conclude that with appropriate mitigation this can be considered as an option.

8.7 Option F2: Shannon – Lough Derg & Storage

Option F2 proposes to abstract water from Lough Derg which will be combined with storage in a cutaway peatland in Garryhinch, near Portarlington, Co. Laois. The peatland was previously milled for peat production and has gone out of production. The bog contains a variety of recolonising habitats and exposed bare peat. The Cushina River flows from the south of the site and joins the Figile River downstream before entering the River Barrow, a designated European Site.

Hydrological modelling results note that the abstraction is similar to option B. The main difference is the increase in abstraction from 250Ml/d in option B to 410Ml/d between mid October to mid August and 50Ml/d from mid August to Mid October for Options F1 and F2. RPS & Veolia¹ note that the effects of option F2 are the same as those for F1 at all sites except for Raheenmore Bog and Portarlington. Raheenmore Bog does not form part of this proposal, therefore no effects to this area would occur, however similar impacts would occur on Portarlington as those predicted for Raheenmore Bog under F1. These include the risk of spreading invasive species to the River Barrow catchment, a designated European Site. RPS & Veolia¹ noted that this option provides greater operational flexibility than option B and therefore presents a better ecological impact profile than option B. The potential impacts on groundwater from the raw water storage proposal, given the enactment of the Groundwater Regulations of 2010 will need to be assessed. Further data, analysis and design is required, following the planned subsoil investigations in Autumn 2014 to

ensure potential adverse impacts to the integrity of European Sites are avoided. For the purposes of this review, it is suggested that option F2 should not be ruled out at this stage of options appraisal until further information is provided on potential impacts of this option. We conclude that with appropriate mitigation this can be considered as an option

8.8 Option G: Shannon– Lough Ree or Lough Derg & Impoundment

Option G proposes to abstract water from Lough Ree or Lough Derg and impound the water in the Wicklow Mountains, west of Glenasmole Valley cSAC. The abstraction from L. Ree for option G is also similar to option A with the principal difference being an increase in abstraction volumes from 350MI/d between January and December for option A to 420MI/d between November to June and a reduction of minimum throughput of 60MI/d from July to October for option G. As noted for other options (E, F1 & F2), the pattern of abstraction is to enable increased abstraction for storage during wetter periods to allow reduced abstraction during drier periods.

The impact on L. Ree is considered to be less pronounced than that described in option A as levels abstracted during drier periods will be much lower allowing retention of a more natural flow regime, however the impact to the Wicklow Mountains has not been considered to date in any of the other options. The transfer of water to the Wicklow Mountains impoundment area, which will require construction of a new dam and reservoir, has high potential to result in adverse impacts to surrounding waterbodies and European Sites. RPS & Veolia¹ note that the transfer of water has potential to alter the water chemistry of the receiving water bodies, if mixed, with potential for the spread of invasive species (including zebra mussel from the Shannon). Given that much of the Wicklow Mountains is designated as Natura 2000 sites, it is likely that this option will cause significant adverse effects to Natura 2000 sites especially in combination with effects on Lough Ree SAC/ SPA. RPS & Veolia¹ note that it is uncertain whether potential impacts will constitute a likely significant impact on European Sites and further studies are therefore required and the precautionary principle must be applied. We conclude that there is high risk of potential adverse impacts and that the precautionary principle should be applied and this option not taken further.

8.9 Option H: Irish Sea – Desalination

The study area is located along the coast between the towns of Rush and Skerries in Co. Dublin. A range of European Sites fall along the Dublin coast including sites designated mainly for wetlands and bird species. It is proposed to abstract 300MI/d from the Irish Sea and discharge the by-product back to the marine environment – with or without sludge dispersion. The effluent is noted to be comprised of coagulants and antiscalants along with the brine. If the sludge is not discharged, it will require treatment and possible disposal to a landfill facility.

Modelling of the brine (expected to have a salinity twice that of the intake water 69g/l) to simulate the dispersion of effluent associated with the desalination process was undertaken as part of 2008 report¹. Modelling identified that discharge at 2km from shore was required to ensure the brine was dispersed in an environmentally sustainable manner¹. Suspended solids and salt were found to be within acceptable levels outside of the immediate vicinity of the discharge site¹. However the report does not state how far away from the

discharge point or how large an area will the discharge location encompass. Impacts associated with sludge dispersion were deemed likely to result in significant effects on surrounding environmental conditions resulting in an adverse impact to the surrounding ecology and European Sites.

Rockabill to Dalkey Island cSAC (Site code: IE003000), a marine site located c. 1km offshore from the abstraction area¹ has been designated for Reef habitats and Harbour porpoise *Phocoena phocoenas* since the 2008 Habitats Directive Assessment was undertaken. Potential impacts to this cSAC could therefore not have been considered at the time but if selected as a viable option will require consideration and detailed analysis in order to ensure no adverse impacts occur to this site. Based on the description of potential impacts to surrounding environment, it is considered likely that adverse impacts to this designated site exist, mainly from brine dispersion. Appropriate design and location of the seawater abstraction and brine return facility will be required to ensure no adverse impacts occur to European Sites, if an alternative option for sludge disposal is plausible. RPS & Veolia¹ highlight a range of additional surveys required in order to ensure no adverse impacts occur, some of which are planned within the scope of similar studies for the Greater Dublin Drainage Scheme. In addition to this, in-combination impacts with the Greater Dublin Drainage Scheme (in particular the Northern Outfall Study Area) requires assessing. Due to a lack of data and detailed analysis of potential impacts to European Sites, potential adverse impacts to European Sites cannot be ruled out at this stage. Further information is therefore required to conclusively rule out potential adverse impacts. However, due to the current high level analysis stage of the project and potential to mitigate any adverse impacts through detailed analysis at further stages, it is suggested that Option H is not currently ruled out until further information is provided on potential impacts of the option.

8.10 Option I: Groundwater

This option relates to the use of groundwater resources within Counties Kildare, Meath and Fingal. In 2008 option I was noted not to meet the objective of the draft plan to supply the Dublin Region with the required volume of 300MI/D of water as this option would only provide potential abstraction of approximately 25-50MI/d from multiple widespread sources. For this reason this option was not assessed within the Habitats Assessment Screening process¹. A number of wetland European Sites occur in this area which are groundwater fed, hence potential adverse effects would require careful consideration and be informed by detailed studies on groundwater flows, volumes etc. These sites include Pollardstown Fen SAC which is fed by the largest potential aquifer source in this area. Pollardstown Fen is a highly sensitive site which has already been impacted by local groundwater effects associated with development including the M7 motorway. We conclude that there is high risk of potential adverse impacts (in-combination with other impacts) and conclude that the precautionary principle should be applied and this option should not be taken further.

8.11 Option J: Rivers Liffey and Barrow

Option J relates to the use of abstracted surface water resources from the Rivers Liffey and Barrow within Counties Kildare, Meath and Fingal. In 2008 option I was noted not to meet the objective of the draft plan to supply the Dublin Region with the required volume of 300MI/D of water, as this option could only provide the potential abstraction of approximately 25-50MI/d. For this reason this option was not assessed within the Habitats Assessment Screening

process¹. For completeness it is however considered within this report. The existing water treatment plant at Srowland, near Athy, is already designed to abstract approximately 29% of the 50 Year Dry Weather Flow in the River Barrow, which is a designated European Site. Further summer abstraction would be very likely to have adverse impacts on the River Barrow, and further seasonal winter abstraction, if considered, would have to be considered for potential impacts in combination with the existing year-round abstraction. Given the scale of available water, and the baseline conditions with the existing abstraction, it is considered that this option should not be taken further.

8.12 Summary of Options

Option	Is there a risk to site integrity (2008 ¹)	Is there a risk to site integrity (2014)	Further Information Required	Potential to mitigate impacts
Option A: Shannon - Lough Ree	Yes	Yes	Yes	Low
Option B: Shannon - Lough Derg	No	Yes	Yes	Medium
Option C: Shannon – Parteen Basin	No	Yes	Yes	High
Option D: Shannon – Lough Ree and Lough Derg	Yes	Yes	Yes	Low
Option E: Shannon Groundwater – Lough Ree & Groundwater & Storage	Yes	Yes	Yes	Low
Option F1: Shannon Groundwater – Lough Derg & Groundwater & Storage	No	Yes	Yes	Medium
Option F2: Shannon – Lough Derg & Storage	No	Yes	Yes	Medium
Option G: Shannon– Lough Ree or Lough Derg & Impoundment	Yes	Yes	Yes	Low
Option H: Irish Sea - Desalination	No	Yes	Yes	High
Option I: Groundwater	Not available	Yes	Yes	Low
Option J: Rivers Liffey & Barrow	Not available	Yes	Yes	Low

Table 8-B Summary of options and review of findings compared with RPS & Veolia (2008)

Given the large scale of the project there is a high degree of “uncertainty” regarding potential effects on European Sites. The precautionary principle must therefore be used as a primary tool for assessing risk, based on connectivity of the development to sensitive qualifying interests, in particular those of unfavourable conservation status.

Following an appraisal of the key constraints summarised above and detailed within the 2008 report¹, it was considered that the Lough Ree and groundwater options are substantially more constrained at this stage of the project with regard to adverse impacts on European Sites. Lough Derg and Parteen basin options are considered to be less constrained along with the desalination option (based on the implementation of mitigation measures noted above) mainly due to existing hydrological conditions and potential for mitigation through design. It is vital to highlight that this is a high level review, intended to contribute to an options appraisal process. Options taken forward will require additional data in order to undertake a continuing validation of the conclusions within the 2008 report¹, and which are endorsed in this report. Once available, detailed data, including mitigation measures, may alter our views on the severity and/or type of potential impacts.

9

Conclusion

Eleven options and sub-options for the Dublin Water Supply Scheme were presented and reviewed within this report with regard to potential significant adverse impacts to European Sites. RPS and Veolia¹ concluded that:

- Options B, C, F1, F2 and H did not present a risk to the integrity of European Sites.
- Options A and D did not meet Stage 2 of the Appropriate Assessment process and therefore were not considered viable options.
- Options E and G were not conclusive due to a lack of data at the time and therefore the precautionary principle was applied.

Jacobs - TOBIN undertook a high level review of the 2008 report undertaken by RPS & Veolia¹, and considered further information which had become available over the intervening period, including relevant qualifying interest sensitivity, project details, potential impacts and relevant ecology research data. Based on the overall review it is recommended that the following options are not taken forward at this stage; A, D, E, G, I and J. based on the precautionary principle. This is because there is deemed to be a high risk of adverse impacts to specific Natura 2000 Sites from these options. It is also likely that suitable, appropriate mitigation is not possible or implementable.

Based on appropriate mitigation, relevant qualifying interest sensitivity and existing site conditions options B, C, F1, F2, and H were considered much less constrained options. It is determined that with detailed studies, careful design and appropriate mitigation, none of these options presents a high risk of adverse effects to European Sites. In this regard all these options can likely satisfy stage two of the Appropriate Assessment process without triggering Article 6(4) of the Habitats Directive (compensatory habitat/ IROPI).

10

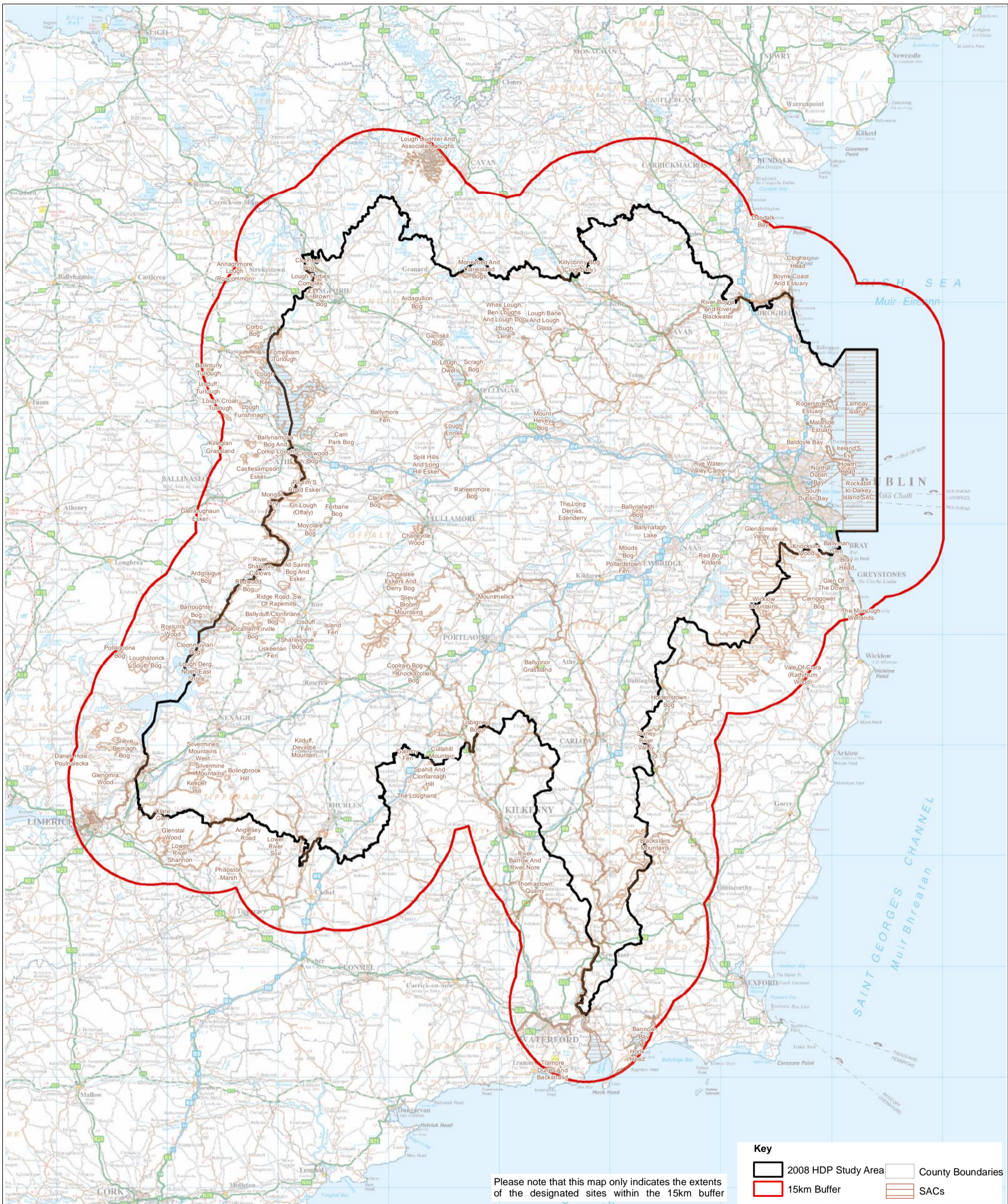
References

- Biodiversity Data Centre (2013). Mapping Centre Viewer. Available online at <http://maps.biodiversityireland.ie/#/Home>.
- DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, Rev Feb 2010).
- European Commission (2000). Communication from the Commission on the precautionary principle.
- European Commission (2001) Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission Environment Directorate-General,).
- European Commission (2000) Managing Natura 2000 sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC Environment Directorate-General, 2000).
- Environmental Protection Agency (2013). EPA ENVision Service (internet-based environmental information portal). Available online at: <http://maps.epa.ie/internetmapviewer/mapviewer.aspx>.
- National Parks & Wildlife Service (2013). The Status of EU Protected Habitats and Species in Ireland.
- National Parks & Wildlife Service. NATURA 2000 Data Form. Available online at <http://www.npws.ie/>.
- National Parks & Wildlife Service. Natura 2000 Conservation Objectives. Available online at <http://www.npws.ie/>.
- RPS & Veolia (2008). Water Supply Project – Dublin Region (Draft Plan). Habitats Directive Assessment.
- RPS & Veolia (2008). Water Supply Project – Dublin Region (Draft Plan). Strategic Environmental Assessment (SEA Phase II); Environmental Report.

Appendix C1



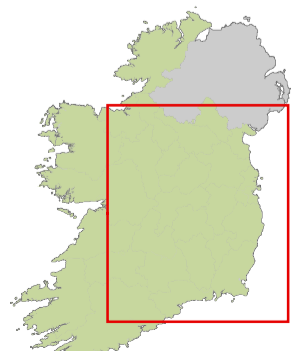




Key

- 2008 HDP Study Area
- 15km Buffer
- County Boundaries
- SACs

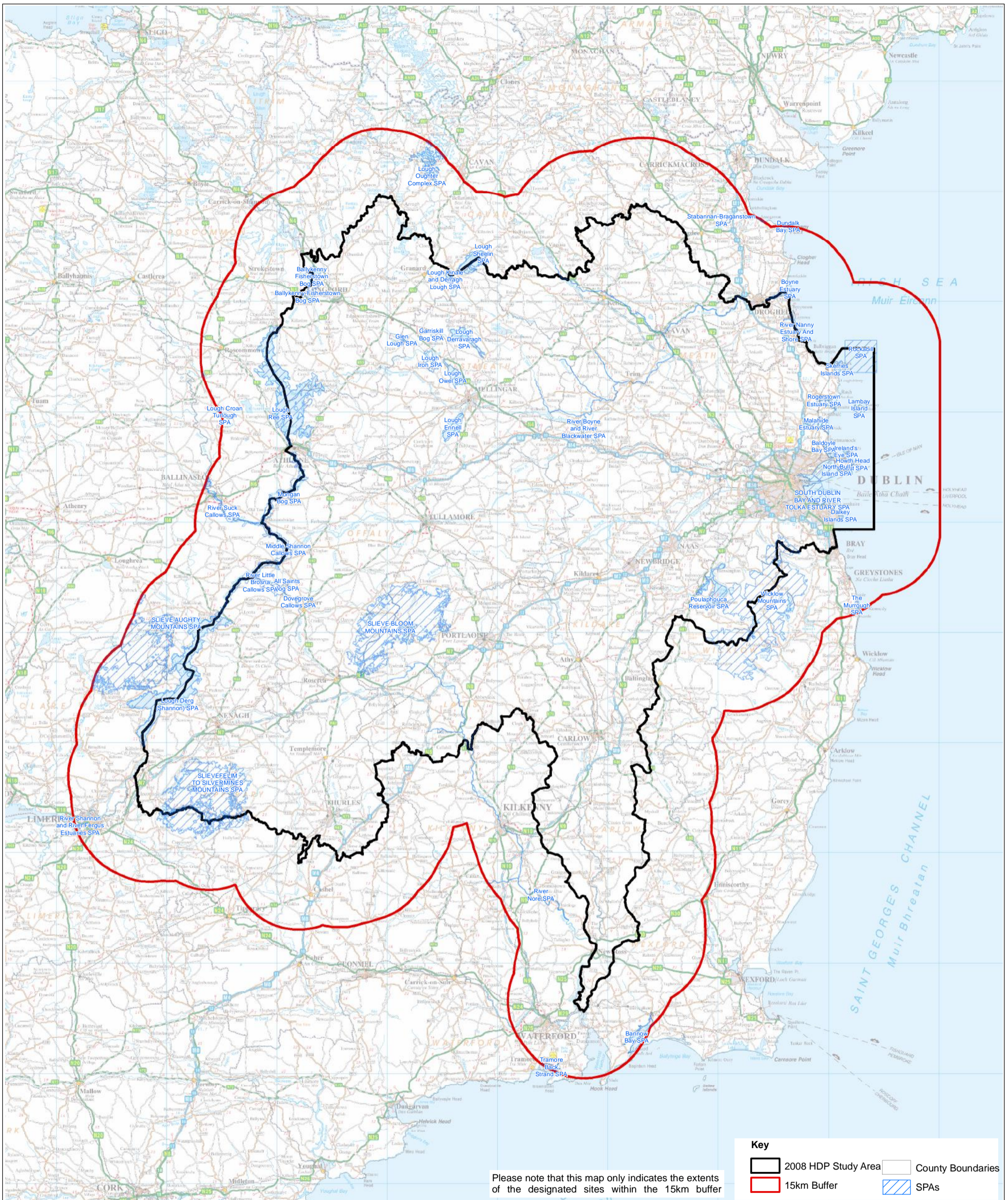
Please note that this map only indicates the extents of the designated sites within the 15km buffer



Drawing Title
Water Supply Project - Eastern and Midlands Region
 Ecological Constraints
 Special Areas of Conservation

A	15/04/14	For Issue	PW	PMcG	PMcG	MG
Rev.	Date	Purpose of Revision	Drawn	Check'd	Rev'd	Appr'd
© Ordnance Survey Ireland. All rights reserved. Licence number 3/3/34/Irish Water						
This drawing is not to be used in whole or in part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.						

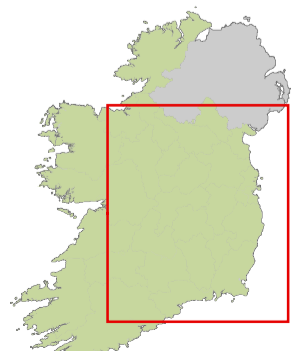
Drawing Status	ISSUED	
Scale @ A3	1:800,000	DO NOT SCALE
Job No.	32105802	
Drawing No.	FIGURE 1	



Key

- 2008 HDP Study Area
- 15km Buffer
- County Boundaries
- SPAs

Please note that this map only indicates the extents of the designated sites within the 15km buffer

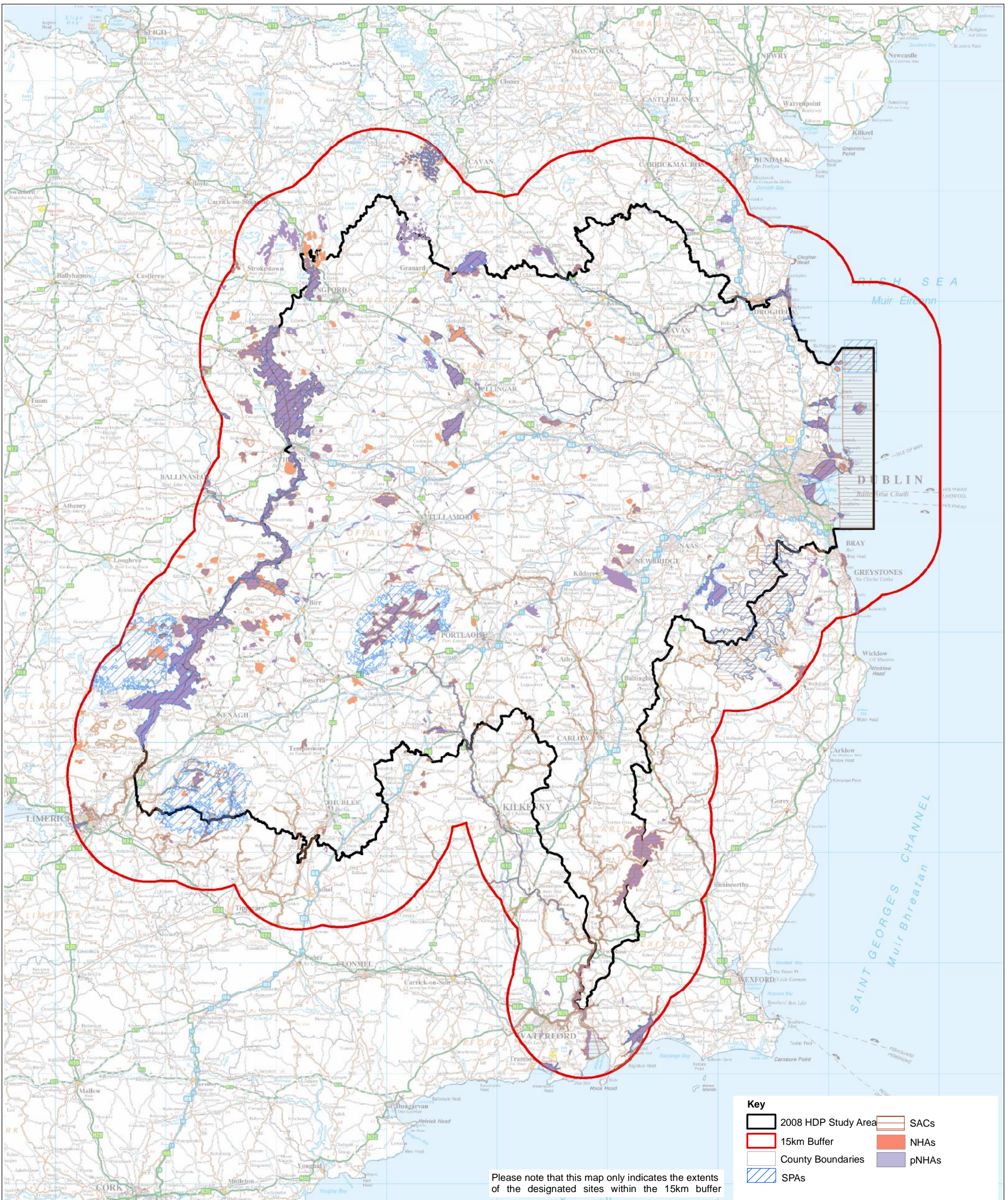


Drawing Title
Water Supply Project - Eastern and Midlands Region
 Ecological Constraints
 Special Protection Areas

A	15/04/14	For Issue	PW	PMcG	PMcG	MG
Rev.	Date	Purpose of Revision	Drawn	Check'd	Rev'd	Appr'd

Drawing Status	ISSUED	
Scale @ A3	1:800,000	DO NOT SCALE
Job No.	32105802	
Drawing No.	FIGURE 2	

© Ordnance Survey Ireland. All rights reserved. Licence number 3/3/34/Irish Water
 This drawing is not to be used in whole or in part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.



Key

- 2008 HDP Study Area
- 15km Buffer
- County Boundaries
- SPAs
- SACs
- NHAs
- pNHAs

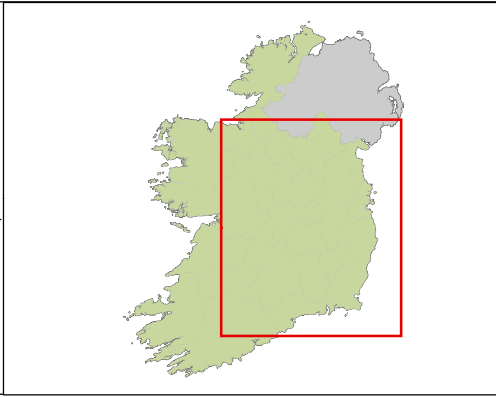
Please note that this map only indicates the extents of the designated sites within the 15km buffer



**Water Supply Project
- Eastern and Midlands Region**

Ecological Constraints


Designated Sites



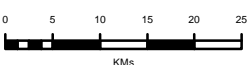
Rev.	Date	Purpose of Revision	Drawn	Check'd	Rev'd	Appr'd
A	22/05/2015	For Issue	PW	PMcG	PMcG	MG

© Ordnance Survey Ireland. All rights reserved. Licence number 3/3/34/Irish Water



This drawing is not to be used in whole or in part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.



W N E S



Kms

Drawing Status	ISSUED	
Scale @ A3	1:800,000	DO NOT SCALE
Job No.	32105802	
Drawing No.	FIGURE 3	