A REGIONAL WATER SUPPLY SCHEME FOR THE GLENAMADDY AREA
ENVIRONMENTAL IMPACT STATEMENT

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GLOSSARY OF TERMS AND ABBREVIATIONS

Term / Abbreviation	Definition
DEHLG	Department of the Environment, Heritage and Local Government
Drinking Water Regulations	S.I. No. 106 of 2007, European Communities (Drinking Water) Regulations 2007
DED	District Electoral Division
RWSS	Regional Water Supply Scheme
DGRWSS	Dunmore/Glenamaddy Regional Water Supply Scheme
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
LEA	Local Electoral Area
NHA	National Heritage Area
NSS	National Spatial Strategy
SCADA	Supervisory Control and Data Acquisition
RBD	River Basin District. "River basin district" means the area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters, which is identified as the main unit for management of water resources under the Water Framework Directive.
AADD	Average Annual Day Demand
CSO	Central Statistics Office
cSAC	Candidate Special Area of Conservation designated under the EU Habitats Directive (92/43/EEC) enacted in Irish legislation by the European Communities (Natural Habitats) Regulations, 1997 (S.I. 94 of 1997).
SEA Directive	Directive on Strategic Environmental Assessment (Directive 2001/42/EC of 27 June 2001)
SPA	A Special Protection Area designated under the EU Birds Directive (79/409/EEC) enacted in Irish legislation by the S.I. No. 397/1985: European Communities (Wildlife Act, 1976) (Amendment) Regulations, 1985.
The Project	Glenamaddy Regional Water Supply Scheme
WFD	Water Framework Directive. Directive 2000/60/EC establishing a framework for Community action in the field of water policy and commonly referred to as the Water Framework Directive. The WFD is implemented in Ireland by S.I. No. 722 of 2003, the European Communities (Water Policy) Regulations 2003.
WTW	Water Treatment Works
AOD	Above Ordnance Datum
Study Area	The area served by the Glenamaddy Regional Water Supply Scheme
QNHS	Quarter National Household Survey

PART I – BACKGROUND

1 FOREWORD

1.1 Procedural Context

The Glenamaddy RWSS involves the development of a new water supply scheme using Glenamaddy Turlough as its source. The scheme will serve an area including Glenamaddy village and the surrounding environs in north east County Galway.

This EIA will be carried out in accordance with the requirements of the Local Government (Planning and Development) Regulations 2001[1] as amended by the Planning and Development Regulations 2006[2] (the Planning Regulations) and the European Communities (Environmental Impact Assessment) Regulations 1989 to 2006[3], herein referred to as 'the EIA Regulations'. This report has been prepared with due regard to the criteria set out in these regulations. *(Tobin, 2007)*

1.2 Purpose and Scope of the EIS

An Environmental Impact Assessment (EIA) is a systematic integrated evaluation of the positive and negative impacts of a project on the natural environment; on beneficial uses of the environment, including man-made structures, amenities and facilities; and on the socio-cultural environment.

The aim of the EIA is to identify and predict any impacts of consequence; to describe the means and extent by which they can be reduced or ameliorated; to interpret and communicate information about the impacts; and to provide an input into the decision making and planning process. It is my intention to establish the potential impact that this proposal will have on the study area, and to explore mitigating circumstances, so as to protect and enhance the environment to its fullest potential.

The Environmental Impact Statement is an essential element of the EIA process required under the provisions of Council Directive 85/337/EEC and the European Communities (Environmental Impact Assessment) Regulations, SI No. 349 of 1989,

[1] S.I. No. 600 of 2001

[2] S.I. No. 685 of 2006

[3] S.I. No. 349 of 1989; S.I. No. 84 of 1994; S.I. No. 101 of 1996; S.I. No. 351 of 1998; S.I. No. 93 of 1999; S.I. No. 450 of 2000, S.I. No. 538 of 2001 and S.I. No 659 of 2006 SI No. 93 of 1999 and SI No. 450 of 2000.

SI No. 93 of 1999 and SI No. 450 of 2000. It should be noted that it is just one of three constituent parts of the process, the three being as follows:

- The Environmental Impact Statement
- The Comments of the public, local or state authorities or EC Member States
- The Assessment by the Competent Authority

Under the European Communities (Environmental Impact Assessment) (Amendment) Regulations, 2000 SI No. 450 of 2000 and Local Government (Planning and Development) (No. 2) Regulations, 2000, SI No. 458 of 2000 provision is made to transfer to An Bord Pleanála the functions previously performed by the Minister for the Environment and Local Government in relation to the certification of local authority developments requiring Environmental Impact Assessment.

The European Communities (Environmental Impact Assessment) (Amendment) Regulations, S.I. No. 93, 1999 has laid down a standard list of aspects of the environment, which must be addressed in any EIS. These aspects comprise:

- Human Beings; Flora; Fauna
- Soil; Water; Air; Climate; Landscape
- Material Assets
- Cultural Heritage
- The inter-relationship between the foregoing

It is necessary to scope each of these aspects of the environment with respect to the impacts that the proposed development will have. The purpose of this exercise is to shape the EIA so as not to dismiss any impacts, which may be significant, and to focus on issues that need to be resolved.

With respect to the headings described in paragraph 2(b) of the Second Schedule of the European Communities (Environmental Impact Assessment) Regulations, 1999, the likely and significant impacts of the project on each aspect are described in the following sections. *(Tobin, 2007)*

Headings in SI 93 of 1999	Relevant Sections in EIS
Human Beings	6,7
Flora	n/a
Fauna	n/a
Soil	n/a
Water	5
Noise	8
The Landscape	n/a
Traffic	9
Cultural Heritage	n/a
The Interaction between the Foregoing	10

1.3 Format of the Environmental Impact Statement

Environmental Impact Statements require the assimilation, co-ordination and presentation of a wide range of relevant information in order to allow for the overall assessment of a proposed development. This document is presented in a 'Grouped Format' structure, as recommended in the draft guidelines produced by the Environmental Protection Agency, to provide a consistent and coherent discussion of the various elements.

1.3.1 Receiving Environment

In describing the receiving environment, an assessment is made of the context into which the proposed development will fit.

1.3.2 Characteristics of the Proposal

The consideration of the 'Characteristics of the Proposal' allows for a projection of the 'Level of Impact' on any particular aspect of the environment, which could arise.

1.3.3 Potential Impacts of the Proposed Development

This section allows for a description of the specific, direct and indirect impacts that the proposed development may have. This is done with reference to the receiving environment, while also referring to the magnitude, duration, consequences and significance of the impacts.

1.3.4 Mitigation Measures

This includes a description of any remedial or mitigation measures that are considered necessary and practicable or reasonable having regard to the potential impacts. *(Tobin, 2007)*

1.4 EIS Team

I have prepared this EIS as part of a minor thesis, a requirement of the Masters of Science in Environmental Systems course at GMIT, Galway. My supervisor is Noelle Jones, a lecturer at the college. Noelle is the module leader for the EIA module which is part of the course.

1.5 Methodology

The environmental impact statement was prepared based on literature search, consultation and fieldwork as appropriate based on the scoping exercise undertaken.

The EIS was prepared with due account to the following:

- Planning and environmental legislation as referred to throughout this document
- Relevant planning documents as referred to in Section 2 of the EIS
- Relevant Guidance Documents including the following:
  - *Guidelines on Information to be Contained in Environmental Impact Statements (EPA, 2002)*
  - *Advice Notes on Current Practice (on the preparation of Environmental Impact Statements) (EPA, 2003)*
  - *Framework and principals for the protection of the Archaeological Heritage* - Government of Ireland 1999 *(DAHGI, 1999)*
  - *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (EU, 2007)*

(Tobin, 2007)

2 INTRODUCTION

2.1 The Need for the Scheme

A Glenamaddy Regional Water Supply Scheme is required in order to provide a water supply, in compliance with the Drinking Water Regulations, to cater for existing and future populations in the Glenamaddy Region.

Currently, the Glenamaddy area receives its water supply from the Dunmore/Glenamaddy Regional Water Supply Scheme (DGRWSS). The scheme encompasses the catchment area of public schemes in Dunmore, Williamstown, Ballymoe and Glenamaddy. There are four existing water sources serving the scheme. These are located at Gortgarrow, Bushtown, Ballymoe and Springfield (Williamstown). A map of the existing scheme is included in Appendix A.

The Gortgarrow Spring (**Plate 1**) is the principle source for the DGRWSS. The spring supplies the DGRWSS and the Boyounagh/ Ballyedmond Group Water Scheme. In the public scheme, water is pumped to a reservoir at Monairmore which serves the villages of Dunmore, Clonberne, Kiltullagh, the southern and eastern parts of Glenamaddy and the surrounding rural areas.

Plate 1: Gortgarrow spring and stream

Bushtown Spring (**Plate 2**) feeds a small stream from which water is abstracted by Galway County Council. Water is pumped to a reservoir and booster pumps on the reservoir outlet pump water to the northern and western parts of Glenamaddy village and the rural area to the north of the village.

Plate 2: Bushtown Spring and pumphouse

There are numerous group water schemes in the Dunmore/Glenamaddy catchment area. Some of these are connected to the regional water supply scheme, while others have been taken in charge and are effectively now part of the public scheme. **Table 2.1** shows the general breakdown of the existing water supplies in the study area.

- There are sections of the scheme where water is in the pipework for over seventy two hours before reaching the consumer. This is generally considered to be unsatisfactory as there may not be sufficient chlorine residual in the water. *(Mott MacDonald Pettit, 2007)*

Interim Report – Assessment of Sources

The report states that at the Bushtown Spring, "there is chlorination provided here but not fluoridation." In February 2003, there was biological contamination of the drinking water when total coliforms were found in the supply. This, the report said "demonstrates the vulnerability of the treatment system to breakdown.... and highlights that the source is vulnerable to pollution."

At the Gortgarrow Spring, the presence of coliforms in the raw water is a cause for some concern and this demonstrates the potential for pollutants to reach the groundwater at this source. There were also serious problems with this source's capacity in the summer of 2006, leading the Area Engineer at the time to comment: "The depletion in level of the spring, in the course of the regular pumping regime is a cause for serious concern."

The report concluded that all four existing sources are vulnerable to pollution and in terms of capacity all four sources struggle to meet current demands and will not be able to meet future demands." *(Mott MacDonald Pettit, 2007)*

Interim Report – Existing and Future Demands

This report predicts a 16% increase in consumer demand for water over the next twenty years. The estimated future water demand for the DGRWSS is 8,738m^3/day. The report concluded that "delivering this volume of water will present a significant challenge in terms of the water supply network and storage capacity and the capacity of the existing water sources".

This report also refers to the Galway Rural Water Strategic Plan Stage I, November 2000 by Atkins McCarthy, the Dunmore-Glenamaddy RWSS Preliminary Report, December 1979 by H.G.L. O'Connor & Co. and the Glenamaddy Water Supply Scheme – Improvement of Supply Preliminary Report, July 2000 by Mott McDonald Pettit. From analysing these reports, it is noted that:

- There is insufficient source yield to meet future demand in Glenamaddy
- Proposals made with regard to scheme upgrading have not been undertaken
- High Leakage is present in the system *(Mott MacDonald Pettit, 2006)*

2.2 Description of Area

The study area for the Preliminary Report comprised the general Glenamaddy region and included the following sub-areas:

- Glenamaddy village
- Clooncon
- Clooncon West
- Stonepark
- Mountkelly
- Cloondoyle
- Gortnagier
- Scotland
- Kiltullagh
- Stoolpark

2.3 Planning Context

2.3.1 Introduction

This section sets out the relevant planning policies governing the proposed development. The policy framework consists of the:

- National Spatial Strategy 2002-2020
- Regional Planning Guidelines for the West Region 2010 -2022
- Galway County Development Plan 2009 - 2015

Section **2.3.2** sets out the National Planning Framework for Ireland, whilst Section **2.3.3** sets out the Regional Planning Guidance for the West Region. The Galway County Development Plan is outlined in Section **2.3.4**, including a description of the policies and objectives of the Rural Water Programme.

2.3.2 National Planning Framework

The Planning and Development Act 2010 consolidates all previous Planning Acts and much of the EIA legislation. The key legislative instruments governing planning in Ireland are as follows:

- Planning and Development Acts 2010
- Planning and Development Regulations 2001 to 2012
- European Communities (Environmental Impact Assessment) Regulations

Where a local authority (that is a planning authority) provides an EIS, as required under the Planning Regulations, they must have due regard to Part X (Section 175) of the Act. Provision is made in this part of the Act for the submission of the EIS to An Bord Pleanála (Planning Appeals Board) for approval.

Regard also should be had to the provisions of the Development Plan, the provisions of any special amenity area order relating to that area, any European or other site, government policy and/or any provision or requirement of the 2010 Act. *(Tobin, 2007)*

In 2002, the government published the National Spatial Strategy (NSS) for Ireland 2002 to 2020. The NSS is a coherent national planning framework that includes the following five core messages:

- A wider range of work opportunities
- A better quality of life
- Better places to live
- Effective urban and rural planning
- Getting things done

The Spatial Strategy covers all regions in Ireland, including the provision of a framework for spatial policy for the West Region, within, which the Glenamaddy Region is located.

Glenamaddy is identified in the NSS as a village in a remote area where the overall urban structure is weak. Such villages play a key role in delivering services and supporting employment in physically remote and peripheral areas. This role must be acknowledged and supported in relevant county and regional strategies, through promoting improvements in accessibility and supporting opportunities for development. Villages such as Glenamaddy will in particular have a vital role in establishing local employment and service functions to drive the process described in the strategy document.

The policies within the Spatial Strategy are being translated into regional and local policy. *(National Spatial Strategy 2002-2020)*

2.3.3 Regional Planning Guidelines for the West Region

Section 1 – Introduction

The West Regional Authority adopted Regional Planning Guidelines for the West Region on 19th October 2010. The aim of the guidelines is to provide a framework for long term strategic development of the West Region for the period 2010 – 2022 which is consistent with the National Spatial Strategy 2002 – 2020 and which ensures the successful implementation of the NSS at regional, county and local level. Sections from the guidelines with relevance to the Glenamaddy RWSS are referred to below.

Section 2 – Strategic vision for the West

"By 2022, the West region will be an innovative and highly competitive region with sustainable settlements located in an outstanding environment with excellent opportunities and quality of life for its citizens." Strategic goals are detailed in this section and the goals that are relevant to the Glenamaddy RWSS are:

- SG3A – "Continuing upgrading and improving the regions….water supplies."
- SG5 – "Improve the quality of life and accessibility for the people of the West Region as a uniquely attractive place in which to live, work and visit and ensure that the cultural and natural environment of the region such as built heritage, community facilities and water quality and biodiversity are maintained and enhanced."
- SG6 – "To promote a balanced economic and social development of the region by supporting vibrant rural communities, promoting efficient competitive enterprises and improving the quality of life while also respecting and enhancing the physical environment."

Section 4 – Economic Development Strategy

"In order to sustain the population of the West Region, each Local Authority within the Region has its own Development Plan(s) and Local Area Plan(s) to ensure that there is sufficient land zoned to accommodate increasing population in urban areas where there is water and waste water capacity, a broad mix of uses to encourage employment opportunities and sustainable work and travel patterns. Proposals, plans and zonings (including re-zoning or removal of zoning) for development, including reservation of land for development/supporting infrastructure should be informed and guided by 'constraints' or 'option selection' type studies or relevant environmental assessment which involves an examination of the full range of environmental topics."

Section 5 – Infrastructure Strategy

"Investment in the key economic infrastructures of water and wastewater services, waste, energy and telecommunications is a key element in the promotion of competitiveness and the generation of economic growth and employment. It also contributes to balanced spatial development and assists environmental sustainability. Notwithstanding the progress made in the last decade, a continued high level of investment is necessary to bridge the deficit which still exists in the region. It will be necessary to implement the current and future Water Service Investment Programmes. A high standard of water and sewerage infrastructure is fundamental to achieving orderly sustainable development." *(Galway County Council, 2010)*

2.3.4 Galway County Development Plan

The 2009 to 2015 Galway Development Plan has a number of policies and objectives for the development of Water Services in Rural Galway, which are relevant to the Glenamaddy RWSS. These policies and objectives are:

Water Supply Policies

Policy IS3: Adopt the provisions of the strategic rural water plan and implement Stage 2 of the Rural Water Strategic Plan.

Policy IS4: Provide and maintain quality water and wastewater services necessary for environmental purposes, and for economic, regional and rural development purposes.

Policy IS5: Ensure that the provision of water and sewerage facilities is undertaken in accordance with EU policies and directives and national legislation.

Policy IS6: Work to eliminate existing deficiencies in water supply and drainage facilities.

Policy IS7: Use a mixture of public and private partnerships together with funding under the Serviced Land Initiative to deliver the necessary services.

Policy IS8: Identify, prioritise and progress the implementation of the Water Investment Programme.

Policy IS9: Develop and augment the supply of water through the regional water supply networks including the interlinking of networks to ensure continuity and security of supply throughout the expanded network.

Policy IS12: Plan to provide services in unserviced towns, villages and countryside, so that all citizens have access to high quality services.

Water Supply Objectives

Objective IS1: Implement water conservation measures in the County and seek to prepare a water conservation strategy for County Galway. *(Galway County Council, 2009)*

2.3.5 Water Services Planning

The Dunmore Glenamaddy Regional Water Supply Scheme is included in the Water Services Investment Programme 2010 – 2012 published by the DEHLG and is shown as one of the projects to start between 2010 and 2012. *(DEHLG, 2009)*

2.4 Scoping

The potential environmental effects of the water scheme were investigated under the following headings:

- Water Hydrology
- Human Beings – Public Health
- Human Beings – Socio Economics
- Noise
- Traffic
- The interaction between the foregoing

Other areas such as cultural heritage, soil and flora and fauna were not considered as there were not relevant specialist contractors available to the EIS team.

2.5 Public Consultation

As this EIS is being undertaken for a scheme that may never go ahead, no general public consultation took place.

However, a poster outlining the proposed scheme and the key elements of the environmental assessment will be on display in GMIT during the 2012/2013 academic year.

PART II – PROJECT DESCRIPTION AND ALTERNATIVES CONSIDERED

3 PROJECT DESCRIPTION

3.1 Objectives

The objective of the development is to provide an area in north east County Galway with a water supply to cater for existing and future populations within the supply area in compliance with the Drinking Water Regulations.

An area of the study area has been designated as a Special Area of Conservation (SAC). This SAC is Lough Lurgeen Bog/Glenamaddy Turlough (SAC 000301). Lough Lurgeen Bog/Glenamaddy Turlough covers almost 1,200 ha and is situated east of the town of Glenamaddy. It consists of a very large turlough, over 170 ha in area and a vast expanse of over 1,000 ha of typical intact western raised bog. A small lake occurs on top of the bog. A very large turlough of high conservation value in such close proximity to a vast expanse of raised bog is quite unique. The whole ecosystem is therefore of high conservation value. *(NPWS, 2012)*

3.2 Description of Project Elements

The proposals for the Glenamaddy Regional Water Supply Scheme set out in this EIS are as follows:

- Regulating weir on Glenamaddy Turlough
- Intake works and pumping station on Glenamaddy Turlough (at regulating weir site)
- 200mm raw water rising main from the pumping station to the proposed treatment works at Mountkelly
- 200mm rising main from proposed treatment works at Mountkelly to Stoolpark Reservoir
- Water treatment works at Mountkelly
- New watermain network
- Reservoir at Stoolpark
- Access roads, site development and ancillary works at each site

These elements are described in detail in Sections **3.2.1** to **3.2.6**

3.2.1 Network Infrastructure

The proposed network is to serve the overall Glenamaddy region, including the supply areas of:

- Glenamaddy village

- Clooncon
- Clooncon West
- Stonepark
- Mountkelly
- Cloondoyle
- Gortnagier
- Scotland
- Kiltullagh
- Stoolpark

The network includes the following proposed trunk and distribution mains:

- 200mm dia. rising main from Glenamaddy Turlough to Mountkelly WTW
- 200m dia rising main from Mountkelly WTW to Stoolpark Reservoir
- 200mm dia. distribution main
- 100mm dia. distribution main

The total length of pipework to be installed is approximately 15km. Watermains will be laid in the roads. At bridge crossings the pipework will be laid in the road (if depth is suitable) or attached to the bridge itself.

The extent of the network is shown in Appendix A – Maps.

3.2.2 Regulating Weir and Intake Works

The regulating weir and intake works will be constructed at the northwest area of the Glenamaddy Turlough. The intake arrangement will consist of a single 450mm diameter intake pipe, incorporating a 'Johnson' type screen which will convey water to an intake sump, located below ground. It is intended that two pumps will be installed initially in the intake sump, operated on a duty/standby basis. Provision has been made in the intake sump design for a future pump. A control house will be constructed to the south of the intake sump and will house regulating weir controls and instrumentation, an office and an ESB transformer room. The low-profile control house, which will have a ground level of 80mOD will be finished in local stone to harmonise with its surroundings and will have a flat roof.

The regulating weir will be constructed near the intake works. The ends of the regulating weir area will be fenced off using 2.4m high unclimbable-type fencing. A

control regime will be developed for the regulating weir with the objective of controlling the water level in Glenamaddy Turlough for the purpose of providing a water supply to the Glenamaddy RWSS.

A 5m wide access road will be constructed to allow vehicle access to the intake works. The construction of the access road may in some cases involve the excavation of rock in order to lay the 200mm rising main in a trench at the road edge. There are two possible methods by which rock can be excavated, rock blasting or rock breaking. It is considered that the environmental impacts of rock blasting would be of a shorter duration and a lower impact than those of rock breaking. Prior to construction, a method statement for rock excavation will be submitted by the contractor for approval.

Surface water will generally be allowed to run directly off this road to the surrounding bog. Power will be brought to the entrance of the access road, from where power cables will be laid underground in ducts along this access road to the intake works.

The entire access road will be fenced using 1.2m high post and sheepwire fencing, and farm gates will be provided at the entrance to the access road, and at the entrance to the intake site. The access road will be surfaced using gravel, while at the intake site macadam surfacing will be used. The intake site will also be fenced off using 1.2m high fencing, while temporary fencing delineating the works area to be reinstated will be removed upon completion of the works.

Although the intake site works will involve the removal of local areas of shallow peat, areas which are required to be disturbed for construction will be reinstated as follows:

- A detailed topographical survey of the disturbance area will be carried out by the contractors at the pre-works stage
- Peat/heather will be stripped by the contractor and stored on terram on flat ground within the intake site works area (clearly delineated by 1.2m high fencing). The storage location will be set sufficiently back from the bank to prevent run-off of material to the turlough
- The peat will be protected and kept moist by frequent wetting
- Following completion of the works, the areas designated for reinstatement will be filled using locally excavated rock to the levels shown on the pre-works

survey. The original peat/heather will be replaced onto the filled ground and peat habitats will be allowed to regenerate naturally

- The contractor will be obliged to prevent release of material to the turlough. Silt traps will be used in this regard

(*Tobin, 2007)*

The location of the proposed Intake Works site at Mountkelly is shown in Appendix A - Maps.

3.2.3 Water Treatment Works at Mountkelly

The water treatment works should be procured using the Design Build Operate form of contract (as discussed in Section **3.3**). For this reason it is not possible at this stage to describe the site layout in detail. However it is possible to provide an outline of the footprint of the water treatment works as part of this Environmental Impact Assessment.

It is proposed to construct a water treatment works at Mountkelly for 1000m^3/d. In the design, the 200mm dia. rising main from the intake works terminates in a raw water balancing tank with a TWL of 85mOD (Malin Head), designed to hold 4 hours supply.

The DBO contractor will determine the exact treatment method for the new works. Given the raw water quality described elsewhere in the document, it is likely that the water treatment works will consist of the following elements:

- Chemical dosing/sludge dewatering building, including soda ash, alum and polyelectrolyte dosing to provide optimum conditions for settlement and filtration of suspended matter
- Treated water pumping station, which will incorporate a treated water storage tank and will also house the pumpsets serving the scheme
- Administration building, consisting of a single storey building with a pitched roof. This building will house SCADA controls for the treatment works, together with welfare facilities for staff
- Main Treatment Building, incorporating settlement tanks and rapid gravity filters. This building will also house air blowers and other necessary plant for backwashing

- Washwater settlement tank (mostly below ground). The washwater settlement tank will be open to the air. Settled water sludges from the settlement tanks and backwash water containing sludges will drain to the washwater settlement tank
- Sludge thickening and dewatering facilities. Following settlement, sludges will be transferred to the sludge thickening and dewatering process. Sludge thickening will be carried out in a free-standing structure, while dewatering will take place in the chemical dosing/sludge dewatering building. Supernatant will be pumped to the local road drainage system, while thickened sludge will be removed off-site for disposal in accordance with the Galway County Sludge Management Plan
- Access roads and site development. Access around the treatment works site will require 5m wide internal access roads and footpaths. Outside of these paved surfaces, the site will be finished in such a way as to blend with the natural environment. Native flora will be used for landscaping around the site. In addition site lighting will only operate during site visits outside normal daylight hours
- Domestic wastewater treatment. The site will require two toilets, and both will be located in the administration building. Waste from these toilets will drain to the foul sewerage system which serves Glenamaddy village

(Tobin, 2007)

The location of the proposed Water Treatment Works site at Mountkelly is shown in Appendix A - Maps.

3.2.4 Reservoir

3.2.4.1 Stoolpark Reservoir

There is an existing site owned by Galway County Council at Stoolpark. The proposed reservoir can be accommodated within the lands at that site. The access road to the reservoir site will be constructed, as currently vehicular access to the reservoir is not possible.

It is recommended that storage at the reservoir should be 24 hours at AADD (average annual day demand). The total storage at Stoolpark is to be 500 m^3.

The location of the proposed Reservoir at Stoolpark is shown in Appendix A - Maps.

3.2.5 Development Works

Development works will include:

- Temporary construction structures such as offices, stores, cranes, scaffolding and other supports
- Tanks and buildings associated with treatment processes and pumping facilities
- Roads and paving works
- Landscaping works
- Ancillary Works – Telecom, Electricity

3.3 Procurement

Some elements of the project will be procured using traditional forms of contract, and other elements will be procured under a Design/Build/Operate form of contract.

As a DBO contractor under a Design/Build/Operate contract will design certain elements of the scheme infrastructure, this EIS examines the impacts of these elements using an envelope approach, by examining the potential impact of a typical generic design for each element. As this method of procurement encourages alternative design options in accordance with *Best Available Technology Not Entailing Excessive Cost* (BATNEEC) this Environmental Impact Statement has been prepared to reflect performance values rather than detailed design. *(Tobin, 2007)*

The proposed procurement options are outlined below in **Table 3.1**

Table 3.1 – Summary of Procurement Options

Description	**Form of Contract**
Pipelines	
Rising Main from Turlough intake to Treatment Works	DBO
Rising Main from Mountkelly to Stoolpark	Traditional
Storage	
Raw Water Balancing Tank	DBO
Regulating Weir and controls	DBO
Stoolpark Reservoir	Traditional
Intake Pumping Station	DBO
Access Road	DBO
Water Treatment Works	DBO

3.4 Method Statements

The use of the Design/Build/Operate form of contract means that it is not possible at this stage to provide method statements for the various elements of construction. However the EIS sets boundary conditions for critical construction elements. Detailed method statements (at a minimum) will be required for:

- Excavation, storage and disposal of peat
- Pipeline testing and sterilisation
- Regulating weir construction
- Intake works construction (to prevent pollution of Glenamaddy Turlough)
- Access road construction and laying of rising main

These detailed method statements will be reviewed by the Project Ecologist (appointed by Galway County Council) prior to their submission to National Parks and Wildlife, Galway Divisional Office for consideration.

In preparing method statements, contractors will be required to take account of the mitigation measures as stated in the EIS.

3.5 Design Data

3.5.1 Introduction

In order to determine the existing and future water demands for the Glenamaddy Regional Water Supply information is taken from Mott McDonald Pettit's preliminary report, Interim Report – Existing and Future Demand for the Dunmore/Glenamaddy Regional Water Supply Scheme.

The purpose of this report was to:

- Identify the current situation vis-à-vis population
- Allow for identification of future populations and the proposed extent of the Regional Water Supply Scheme

Reference was also made to:

- Census of Population, 2011
- National Spatial Strategy, November 2002
- County Galway Rural Water Strategic Plan
- National Water Study

3.5.2 Existing Resident Population

Domestic

The most reliable information on population is the Census information obtained from the Central Statistics Office. This information however is more relevant for larger areas than Glenamaddy. Therefore, for the purposes of the Mott McDonald Pettit report, census figures were used to assess average housing occupancy and trends in population only. In determining the current resident population in the supply area, reference was made OSI maps, which identified the number of residential properties within the system. The National Water Study Report was referred to in order to obtain a per capita figure for water consumption by domestic users.

Non-Domestic

The non domestic water usage is made up of agricultural and commercial/industrial. Commercial and industrial units were counted on the OSI map and an allowance was made per unit. The number of farms was obtained from the CSO and livestock numbers were estimated from this. Water usage allowances per animal were then applied.

Unaccounted for Water

The unaccounted for water for the supply area is approximately 45%. This is calculated by subtracting the total demand from the distribution input which was obtained from meter readings for the supply area.

A summary of the existing distribution input for the year 2012 is shown in **Table 3.2.**

Table 3.2 Summary of Existing (2012) Distribution Input (m3/d)

	Glenamaddy
No. of households	700
Housing Occupancy Rate	3.16
Population	2212
Per Capita Consumption (l/cap.d)	143
Domestic Demand (m3/d)	316
Agricultural Demand (m3/d)	70
Commercial Demand (m3/d)	90
Total Demand (m3/d)	**476**
Distribution Input (m3/d)	**866**
UFW (m3/d)	390
UFW (%)	45%

3.5.3 Future Population Projections

Domestic

The future domestic demands were calculated using appropriate population projections, occupancy rates and per capita water consumption figures.

The baseline for the future projections for domestic demand was based on the Census of Population, 2011.

Non-Domestic

It is assumed that commercial, industrial and institutional demand will rise due to an increase in commercial activity to service any increase in the resident population, and an increase in industrial activity. A 1% annual growth rate has been assumed to cover increased demand.

In accordance with the recommendations of the National Water Study Report, there is no allowance being made for future increases in agricultural demands. *(Atkins, 2000)*

Unaccounted for Water

The future unaccounted for water is assumed to be 25% in line with advice from the Department of Environment.

Table 3.3 Estimation of Future (2032) Distribution Input (m3/d)

	Glenamaddy
No. of households	750
Housing Occupancy Rate	3.16
Population	2370
Per Capita Consumption (l/cap.d)	151
Domestic Demand (m3/d)	358
Agricultural Demand (m3/d)	70
Commercial Demand (m3/d)	90
Total Demand (m3/d)	**518**
Distribution Input (m3/d)	**691**
UFW (m3/d)	173
UFW (%)	25%

Looking at **Table 3.3**, the total required distribution input for the Glenamaddy RWSS supply area is 691m^3/d, based on 2003 demands. The overall distribution input for the future is lower than the existing distribution demand shown in **Table 3.2**. This is

due to the future reduction in Unaccounted for Water and the fact that future population allowance is not considered to increase that much on existing numbers due to emigration and the movement of young people away from rural areas to cities.

4 ALTERNATIVES

This section examines the alternatives considered for the source of the water supply, the location of the treatment works, intake works, gauging station, regulating weir, pumping station and reservoir.

4.1 Outline

The alternative sites were screened for suitability against a variety of criteria including:

- environmental constraints
- area of land available
- proximity to existing or planned developments
- ease of access
- economics of development
- economics of operation

4.2 Alternative Water Sources

The ideal source of water from an economic and an environmental point of view would be one that is located close to the supply area, thereby minimising costs, and outside of the cSAC, thereby minimising the impact on the environment. Possible sources are considered in sections **4.2.1** to **4.2.5**

4.2.1 Bushtown Spring

Bushtown townland is located approximately three kilometres north of Glenamaddy village. Bushtown spring currently feeds a stream from which water is abstracted and pumped to a 909m^3 reservoir. From here, water is pumped to the northern and western parts of Glenamaddy village and the rural area to the north of the village. The location of the Bushtown Spring is shown in Appendix A - Maps.

In 2003, there was biological contamination of the drinking water when total coliforms were found in the water supply. This shows that this source is vulnerable to pollution. Mott McDonald Pettit's preliminary report on the Assessment of Sources shows the average current output from the Bushtown Spring as 394m^3/d. The future distribution input for the Glenamaddy RWSS is 691m^3/d which means the Bushtown spring has not the capacity to serve the scheme. In the Mott McDonald report, the existing

scheme caretaker advised that the "system appears to operating at capacity and struggles to meet demand".

In summary, the Bushtown spring is not considered suitable as a source for the Glenamaddy Regional Water Supply scheme for the following reasons:

- The spring will not have the capacity to meet the future demands on it
- The spring is vulnerable to pollution

(Mott Macdonald Pettit, 2007)

4.2.2 Gortgarrow Spring

The Gortgarrow spring is located approximately 6km West of Glenamaddy village. This spring is the current principle source for the existing Dumore/Glenamaddy RWSS. As well as other areas, it feeds the southern and eastern parts of Glenamaddy and the surrounding rural areas. The location of Gortgarrow Spring is shown in Appendix A - Maps.

The Mott McDonald preliminary report – Assessment of sources refers to the "presence of coliforms in the raw water". This demonstrates the potential for pollutants to reach the groundwater at this source. There is a history of capacity problems at the spring. In 1995, inlet levels had to be lowered to allow water to flow into the sump. In 2006, the area engineer noted that the depletion in the level of the spring was a cause for serious concern. *(Mott MacDonald Pettit, 2007)*

While this spring has a current output of 2700m^3/d which would easily cater for the Glenamaddy scheme, it has to be considered that this spring will have to serve other areas such as Dunmore and Clonberne as well as numerous group water schemes.

In summary, the Gortgarrow spring is not considered suitable as a source for the Glenamaddy Regional Water Supply scheme for the following reasons:

- The spring will not have the capacity to meet the future demands on it
- The spring is vulnerable to pollution.
- The spring is 6km from the centre of the supply area and therefore the cost of construction would be high

4.2.3 Glenamaddy Turlough

The Glenamaddy Turlough (170Ha lake area) is situated less than 1km from the centre of Glenamaddy village. Although it is located within a cSAC it is close to the supply area, it has a large catchment area and requires relatively minor impoundment to deliver the required amount of water to the scheme.

The proposed scheme would involve the abstraction of 700m^3/d from Glenamaddy Turlough. This would be achieved by regulating the turlough level during the summer months. It is proposed to set up a gauging station to measure flow at the turlough. The location of this device or other methodology to measure flow would be agreed with NPWS at the advanced design stage.

The location of Glenamaddy Turlough is shown in Appendix A - Maps.

4.2.4 Lough Corrib

The capacity of the Lough Corrib/River Corrib system to serve the Glenamaddy RWSS is not in doubt. There are options for treated water storage at sufficient elevation between that source and the general Glenamaddy area. However the development of Lough Corrib as a source for the Glenamaddy RWSS would require significant investment if the trunk main were laid from Lough Corrib as the source would be more than 30km from the main population centre of Glenamaddy. Head losses in the pipeline over that long distance would have to be overcome with pumping and the project would require high-energy usage and not be economically viable. In addition, the source itself is a cSAC and abstraction pipework would be located on the bed of the lake. Therefore for both economic and environmental reasons the development of Lough Corrib as a source for the Glenamaddy RWSS is not appropriate.

4.2.5 Preferred Source Selection

In summary, it is considered that there is no viable source outside the cSAC local to the supply area and that Glenamaddy Turlough is the optimum source within the cSAC based on both environmental and economic criteria. The turlough has a large catchment area, requires only minor impoundment and is located in close proximity to the Glenamaddy area.

Other potential sources have water quality problems and do not have the capacity to solely feed the Glenamaddy Regional Water Supply Scheme.

The selection of the source for the Glenamaddy Regional Water Supply Scheme sets the framework for the review of alternatives for other elements of the project, including:

- Gauging station
- Regulating weir
- Intake works and pumping station
- Water Treatment Works
- Pipeline routes and reservoir

4.3 Alternative Sites for Water Treatment Works

4.3.1 Initial Site Screening

The treatment works should be located as close as possible to Glenamaddy Turlough (the preferred source for the water supply scheme) to avoid unnecessary capital expenditure and to minimise pumping costs.

4.3.2 Site Identification and Assessment

Two possible sites were identified. One site is located approximately 100m north west of Glenamaddy Turlough at Mountkelly. The other site is approximately 300m north east of the turlough at Barna.

Option No. 1 – Mountkelly

This site (**Plate 3**) for the treatment works is located on agricultural land and its boundary is along a section of the R362 road from Glenamaddy to Creggs.

This site is located in a cSAC. The site is well screened with existing trees and bushes located at the northern boundary of the site which reduces the visual impact from the R362 road. The treatment works would be constructed on the southern part of the site to reduce visual and any noise impacts.

The main advantages of this option are:

- The site is well screened
- The site is in close proximity to the intake works at the source

The disadvantage of this option is:

- The site is located entirely in an SAC

Option No. 2 – Barna

This site (**Plate 4**) for the treatment works is located on agricultural land and its boundary is along a section of the R362 road from Glenamaddy to Creggs.

This site is located in a cSAC. The site is not well screened, meaning the visual impact from the R362 road would be substantial.

The main advantages of this option are:

- The site is in close proximity to the intake works at the source

The disadvantages of this option are:

- The site is located entirely in an SAC
- The site is not well screened

Plate 3: Option 1: Treatment Works site at Mountkelly

Plate 4: Option 2: Treatment Works site at Barna

4.3.3 Framework Criteria and Rating

The two sites were subjected to further technical, economic and environmental evaluation.

The treatment works located on Site No. 1 would be supplied by a 200mm raw water rising main from the pumping station at Glenamaddy Turlough to the treatment works. This would require some 100m of rising main.

The treatment works located on Site No. 2 would be supplied by a 200mm raw water rising main from the pumping station at Glenamaddy Turlough to the treatment works. This would require some 300m of rising main.

Both sites are currently free of any road or track access. An obvious road access will break the 'isolated' character. The access road will be kept to minimum width and without kerbing and fencing and the vegetation reinstated.

The topography of both sites is flat and suitable to construction.

Generally, the cost of construction of the water treatment works would be similar in both the sites - site 1 and site 2. The two sites are located in the same vicinity.

The distance from the intake works to site 1 is less than the distance from the intake works to site 2. Site 2 would therefore have greater pumping costs.

Development at both sites would affect the ecology of the area as both are in the SAC.

4.3.4 Preferred Site Location for Water Treatment Works

Based on technical, economic and environmental criteria, Option No. 1 is the preferred site option for the location of the Treatment Works.

The main advantages of Option 1 are:

- The location of the treatment elements would be screened from the adjacent R362 road
- The cost of construction would be cheaper due to a shorter distance of rising main being laid

4.4 Alternative Sites for Gauging Station

Given the choice to use Glenamaddy Turlough as the source, the only option for locating the gauging station is on the turlough. A gauging station will be constructed on the turlough near the intake to measure the flow. While in theory there are many possible sites for this gauging station on a local level, it must be located at a site that has relatively steady flow conditions. Given this criterion, the location chosen for the gauging station is the optimal location in terms of having the most favourable hydraulic conditions for flow measurement.

4.5 Alternative Sites for Intake Works and Pumping Station

4.5.1 Initial Site Screening

The site of the intake works and pumping station is to be located on the turlough perimeter. The choice of treatment works site provides a framework for the choice of site for the intake works and pumping station. Two possible sites were identified on the turlough perimeter, one at the north western area of the turlough and a second site at the north east bank of the turlough. The relative merits of these sites are discussed further in the following paragraphs.

4.5.2 Site Identification and Assessment

Site No. 1

Site No. 1 (**Plate 5**) is located near on the north western part of the turlough. The site can be viewed for approximately 600m along the R362 road but is lower than the road level.

Site No. 2

Site No. 2 (**Plate 6**) is located at the north eastern part of the turlough. It too can be viewed from the R362 road and is generally the same level as the road. Both sites would require access roads to be built to gain access to the proposed regulating weir and control house. The access to the pumping station site would be via the proposed access to the regulating weir.

Plate 5: Option 1: Intake Works at northwest of Glenamaddy Turlough

Plate 6: Option 2: Intake Works at northeast of Glenamaddy Turlough

4.5.3 Framework Criteria and Rating

Site No. 1 and Site No. 2 were subjected to further technical, economic and environmental evaluation in the following sections.

4.5.3.1 Technical Evaluation

Both sites for the intake works and pumping station would require access roads. The sites are similar in terms of topography and ground make up though Site No.1 is lower and therefore has less of a visual impact from the adjacent R362 road.

4.5.3.2 Economic Evaluation

The cost of constructing the access road to Site No. 1 and Site No. 2 would be similar. The cost of constructing the pumping station building at Site No. 1 and Site No.2 would be similar. There would be less cost in constructing the rising main for the delivery of raw water to the preferred treatment plant at Mountkelly from site No. 1 as it is closer to the treatment plant.

4.5.3.3 Environmental Evaluation

Development at both sites would affect the ecology of the area as both are in the SAC. The rising main routes to the Mountkelly treatment works site would both also be in the SAC.

The location of the sump and pump ensure that it will have little landscape presence. There will be local stone used to clad walls and the building will be constructed to match up with the relevant landscape as much as possible.

At both sites the impacts of the intake works and control house will be negative and significant but extremely localised.

4.5.4 Preferred Site Location for Intake Works and Pumping Station

Based on technical, economical and environmental criteria Site No.1 is the preferred option, particularly in the context of the location of the treatment works at Mountkelly. The site is below the level of the road. This site is in the same location as the proposed regulating weir and therefore only one site will be impacted upon during construction. Site No. 1 is preferable to Site no. 2 in terms of the route and length of rising main to the treatment works at Mountkelly, The access to the intake works and pumping station site would be via the proposed access to the regulating weir.

4.6 Alternative Sites for Reservoirs

4.6.1 Stoolpark Reservoir

The proposed reservoir at Stoolpark is to be located approximately 800m to the northwest of Glenamaddy village. The proposed new reservoir cell will have a capacity of 500m^3 and a TWL of 95.0mOD. The proposed new Stooipark reservoir can be accommodated within the lands owned by Galway County Council at the existing site. The Stoolpark Reservoir site is located outside the boundary of the SAC and is shown in Appendix A - Maps.

There were no alternative sites examined for the location of the Stooipark reservoir. This is due to the fact that the majority of the land required is already in the ownership of Galway County Council. The proposed reservoir will be constructed at the southern side of the site away from the R362 road and no significant environmental impacts are anticipated.

4.6.2 Bushtown Reservoir

An alternative site for a reservoir to serve the Glenamaddy RWSS is at Bushtown, approximately 2km north of Glenamaddy village. There is already a reservoir at the Bushtown site. This reservoir would need to be decommissioned and demolished to allow the new reservoir to be constructed. The proposed new reservoir cell will have a capacity of 500m^3 and a TWL of 102.8mOD.

The Bushtown Reservoir site is located outside the boundary of the SAC and is shown in Appendix A.

4.6.3 Preferred Site Location for Reservoir

Both sites are proposed to be built in Galway County Council owned land and are outside the SAC. However, the reservoir at Stooipark is deemed to be the optimum site as:

- It is closer to the centre of the supply area
- An existing reservoir does not have to be decommissioned or demolished leading to higher construction cost and interference to existing water supply

4.7 Do Nothing Scenario

The Do Nothing Scenario is not recommended, as a new water supply scheme is urgently required in the Glenamaddy area. This proposed scheme will replace a number of existing sub standard sources and the new source in Glenamaddy will be able to serve the village and surrounding environs.

4.8 Locations of all sites

The locations of the sites and alternative sites for the Intake works, Water Treatment Works and Reservoir are shown in Appendix A - Maps.

PART III – ASPECTS OF THE ENVIRONMENT CONSIDERED

5 WATER – HYDROLOGY

5.1 Introduction

It is proposed to abstract water from Glenamaddy Turlough to supply the requirements of the Glenamaddy region. This section of the EIS assesses the probable impacts of the proposed development on the hydrology of the region.

Information for this chapter is taken from previous reports relating to the Glenamaddy area. There is a lack of information relating to the capacity of the Glenamaddy Turlough. For this report, it is assumed that it has sufficient yield to cater for the required flow abstraction to serve the scheme.

There is an intrinsic link between groundwater and surface water in Ireland and the quality of our surface water environment depends greatly on maintaining the quality of groundwater. Groundwater may provide base flow to surface water systems and as such its quality can influence surface water quality and its uses. *(Mott Macdonald Pettit, 2007)*

5.2 Receiving Environment

Glenamaddy is in the north-eastern part of County Galway. Generally, the ground in the area is gently undulating and low lying. Most of the area ranges in elevation from 60m A.O.D. to 90m A.O.D. with a few small areas of elevated ground over 100m A.O.D. The Glenamaddy area lies in the north eastern portions of the Clare/Corrib catchment and forms part of the Corrib/Clare Ground Water Body. *(Tobin, 2008)*

Lough Lurgeen Bog/Glenamaddy Turlough covers almost 1,200 ha and is situated east of the town of Glenamaddy. It consists of a very large turlough, over 170 ha in area and a vast expanse of over 1,000 ha of typical intact western raised bog. A small lake occurs on top of the bog. There are a number of rivers, streams and lakes in the area. These include the Gortgarrow stream, the yellow river, the island river, the Shiven River, Springfield River, Kiltullagh Lake, Lough Nahask and Pollagauraun loch. A number of swallow holes are also present in the area and linked to the turlough, the two largest being Pollanadeirce and Pollanargid. *(NPWS, 2012)*

The town of Glenamaddy is located in an area which is underlain by limestone which

is considered to be slightly clayey and fossiliferous. The depth to bedrock is variable, ranging from 1.0 to 3.2 m north of the Pollanargid Swallow Hole and 7.9 to 9.5m to the south of the swallow hole. *(Tobin, 2008)*

At the turlough, there are a number of interesting features, pool-hummock systems, a large fen and a number of flushes, dominated by Purple Moor-grass (*Molinia caerulea*). The lake is a traditional goose site and the turlough is now used by Greenland White-fronted geese. Other birds present are: Bewick's Swan, Whooper Swan, Wigeon, Teal, Mallard, Shoveler, Pochard, Golden Plover, Lapwing, Snipe, Curlew and Redshank. *(NPWS, 2012)*

The area at the Glenamaddy Turlough is also an aquifer of extreme vulnerability. Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Vulnerability maps can be formed for an area and are an important part of groundwater protection schemes and are an essential element in the decision-making on the location of potentially polluting activities. Firstly, the vulnerability rating for an area indicates, and is a measure of, the likelihood of contamination. Secondly, the vulnerability map helps to ensure that a groundwater protection scheme is not unnecessarily restrictive on human economic activity. Thirdly, the vulnerability map helps in the choice of preventative measures and enables developments, which have a significant potential to contaminate, to be located in areas of lower vulnerability. Table **5.1** shows vulnerability ratings for given hydrogeological conditions. *(GSI, 1999)*

Table 5.1 Vulnerability Ratings for Hydrogeological Conditions

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil	Low permeability (e.g. Claycy subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	> 3.0m	3.0 - 10.0m	3.0 - 5.0m	> 3.0m	N/A
Moderate (M)	N/A	> 10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	> 10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

5.3 Characteristics of the Proposal

It is proposed to abstract 700m^3 from Glenamaddy Turlough to serve the Glenamaddy Regional Water Supply Scheme. The turlough will be impounded to ensure sufficient supply of water. It is proposed to control the impoundment in such a manner as to begin storing water on the turlough in the springtime and to operate the controls on the regulating weir to try to keep levels near to the top of the proposed control band until late autumn. This will ensure that in a dry spell there will be sufficient water stored on the turlough to provide water for abstraction.

5.4 Potential Impacts

The development will control water levels on Glenamaddy Turlough, which may slightly impact linked water bodies such as Lough Lurgeen.

Turlough levels during the proposed control period will be generally higher than they would be without the control. From a hydrological point of view, this is considered to be a permanent slight negative impact. The consequences of this will be to give less attenuation for summer floods, requiring larger outflows from Glenamaddy Turlough (through an underground river to Lough Lurgeen) during summer floods in order to reduce flood levels on the turlough. Once the regulating weir is in place the lake will also cover slightly more land during the summer than it would without the regulating weir.

It is assumed that the abstraction volume will be approximately 2% of the median flow from the turlough. From a hydrological point of view this is considered to be a permanent slight positive impact. The consequences of this will be to provide extra attenuation for winter flows, reducing the flooded area around the margins of the lake. The lake levels during both summer and winter periods will remain within the current natural range of variation of levels on the lake. *(Tobin, 2007)*

The proposed water supply scheme will replace four existing schemes in the area. These schemes are served by four separate sources. From a hydrological viewpoint this is considered to be a permanent slight positive impact. The consequence of this is that the abandoned sources will experience less pressure in terms of yield and in dry summers the smaller lakes in particular should benefit from the reduced water abstraction.

The construction at all works sited may have a slight negative impact on the groundwater of the area as the area is an aquifer of extreme vulnerability. However, good construction practice as referred to in Section **5.5** will mitigate this impact.

During construction of pipelines, existing drains, culverts, streams and rivers may be crossed or interfered with. Flooding and/or contamination of water with construction runoff could potentially occur. This will mean a slight negative impact. However, the interference should only be temporary and for a short period of time.

The increased summer water level on Glenamaddy Turlough may have some ecological impacts while the changed summer flows to the underground river to Lough Lurgeen and the existence of the regulating weir may have some impacts on the flora and fauna. The reduction in abstraction from the existing sources may also have some ecological and recreational impacts.

5.5 Mitigation Measures

A control strategy, based on the hydrological data presented above, will be put in place with the operators of the regulating weir to ensure that water levels on Glenamaddy Turlough are managed to reduce the negative impacts associated with the regulation.

Good construction practice should be adhered to in the crossing of drains, culverts, streams and rivers. This should include:

- Ensuring method statements are drawn up and implemented
- Overpumping of water to prevent problems upstream and downstream
- Notify all relevant bodies such as Fisheries authorities, OPW
- Good communication with landowners

At the sites of the Reservoir, Water treatment works and Intake works, care should be taken to ensure runoff is treated before leaving site by using:

- Bunded areas to contain oils, greases, fuels
- Silt traps at runoff outfall points

6 HUMAN BEINGS – PUBLIC HEALTH

6.1 Introduction

This assessment was conducted in accordance with EPA Guidelines on the Information to be contained in Environmental Impact Statements (Environmental Protection Agency, 2002) and with EPA Advices Notes on Current Practice (in the preparation of Environmental Impact Statements) (Environmental Protection Agency, 2003).

The aim of this assessment was to examine baseline public health in relation to existing water supplies within the study area, to assess the potential impacts of the proposed development on public health in general and to propose measures to mitigate potential impacts where feasible and appropriate.

6.2 Receiving Environment

6.2.1 Study Methodology

This assessment comprised a desktop study, which included the following:

- liaison with the Water Services and Environment Sections, Galway County Council
- review of relevant County Council drinking and surface water quality data
- review of relevant EPA manuals, literature and legislation

6.2.2 Background

The proposed Regional Water Supply Scheme will supply Glenamaddy, an area in north east County Galway. The study area to be supplied by the proposed scheme comprises of the following areas, Glenamaddy village, Clooncon, Clooncon West, Stonepark, Mountkelly, Cloondoyle, Gortnagier, Scotland, Kiltullagh and Stoolpark. The population for the proposed supply area is estimated to be 2900. *(CSO, 2012)*

This study area is currently supplied by a number of existing schemes comprising of public water supply schemes and a number of group water supply schemes. As discussed in Section **2.1**, these schemes have problems, with all four existing sources being vulnerable to pollution and in terms of capacity all four sources struggle to meet current demands and will not be able to meet future demands.

6.2.3 Drinking Water Legislation

Drinking water legislation in Ireland is governed by the European Directive on the quality of water intended for human consumption (98/83/EC). This was transposed into Irish law on December 18th 2000 by the European Communities (Drinking Water) Regulations, 2000 (S.I. 439 of 2000) that took effect on January 1st 2004.

In 2007, the European Communities (Drinking Water) Regulations 2007 (S.I. No. 106 of 2007) came into effect. The 2007 regulations update and revoke the European Communities (Drinking Water) Regulations 2000. They transpose outstanding aspects of the EU Drinking Water Directive (98/83/EC of 3 November 1998) into Irish law.

The new Regulations replicate the existing Regulations, and provide also for the following significant additional provisions:

- the Environmental Protection Agency (EPA) will supervise sanitary authority water supplies, but sanitary authorities will continue to supervise all other supplies
- actual monitoring of all supplies will continue to be a function of sanitary authorities, but their monitoring programmes will be subject to approval by the EPA
- EPA will have powers of enforcement to ensure that sanitary authorities comply with their monitoring obligations
- supervisory authorities will be required to undertake periodic audits of all water supplies to ensure compliance with the regulations (as carried out at present by the EPA on sanitary authority supplies)
- it will in future be a duty of the water supplier to inform consumers of remedial action taken
- supervisory authorities will have powers of direct intervention to carry out necessary remedial works themselves if necessary, and recover their costs from the water supplier
- intervention in the event of a health risk in a water supply will be subject to agreement with the Health Service Executive (reflecting existing arrangements in practice)
- supervisory authorities will be required to keep a register of water suppliers under their supervision

- sanitary authorities will be required to keep up to date records on monitoring results, and make them available to the public
- registers/records may be kept in electronic format (such as on a website)
- water suppliers will be required to maintain records of any incidents, and, as directed by their sanitary authority, in relation to their operations generally, and make them available to their supervisory authority
- offence provisions now apply to all water suppliers
- additional offence provisions are included, in relation to -
    - failure to inform supervisory authorities of incidents or comply with directions
    - failure to maintain records or inform consumers of incidents
    - failure to keep the internal pipe network in premises supplying water to the public safe

The 2007 Regulations in summary:

- Set standards in relation to the quality of water intended for drinking, cooking, food preparation, other domestic purposes and food production (other than natural mineral waters, bottled water, certain medicinal products and exempted supplies)
- Provide for temporary departures from the standard where there is no threat to human health
- Require that information be made available to consumers in relation to various matters including water quality, exempted suppliers, departures granted, precautionary measures and remedial action in case of non-compliant supplies

(Tobin, 2007)

6.2.4 Existing Water Supplies

Table **6.1** presents details of the water supply schemes currently serving the study area.

Table 6.1: Details of Water Supply Schemes currently serving the Study Area.

Scheme	Avg. Daily Distribution Input (m^3/d)	Source	Public / Group	Area Served	Treatment
Gortgarrow Public Scheme	1,235	Gortgarrow Spring	Public	Glenamaddy Village South & East, Shannagh, Gortnagier, Ballyhard, Kiltullagh	Chlorination and Flouridation at pumphouse. Chlorine levels monitored but only manually adjusted
Bushtown	254	Bushtown Spring	Public	Glenamaddy Village North & West, Bushtown, Cloonminda	Chlorination only. No fluoridation
Kilkerrin/Moylough	1,700	Marganure Spring	Public	Kilkerrin Village, Ballaghduff	Treated at source
Boyounagh/Ballyedmond GWS	58	Gortgarrow Spring	Group	Boyounagh, Ballydesmond	Chlorination at pumphouse
Ballymoe	438	Ballymoe Springs	Public	Ballymoe Village & environs	Chlorination. No Flouridation
Williamstown	480	Springfield	Public	Williamstown Village & environs	Chlorination at pumphouse

Source: Mott MacDonald Pettit, 2006

Other group water schemes currently serving the study area include:

- Brackloon, Creggs Rd., Knockmascahill, Gortnagoyne Rd., Clooncun, Cloonminda, Shrule, Timicat, Fartown, Shankhill, Springlawn, Derrywode, Moneen, Shanbally, Booklagh, Kiltevna, Lissybroder, Toberowen.

6.2.5 Existing Drinking Water Quality

6.2.5.1 Water Quality at Existing Schemes

All Sanitary Authorities are obliged to ensure both check and audit monitoring is undertaken in accordance with the Drinking Water Regulations for each supply within their functional area. The check monitoring results from 2001 to 2005 for the existing water supply schemes within the study area were provided by the Water Services section of Galway County Council and subsequently were compared to the Drinking Water Regulations parametric and indicator values. Table **6.2** summarises any exceedances observed for this time period.

For the existing Dunmore/Glenamaddy RWSS the results were satisfactory with just one public scheme failure at Williamstown in April 2005. Two different monitoring locations showed the presence of total and e-coliforms. The presence of these coliforms is unacceptable in drinking water and a major cause for concern. Also, in the Galway Rural Strategic Plan, e-coliforms were found present in one sixth of samples taken from Williamstown.

A number of group water schemes showed water quality problems and failed on total and e-coliforms while Kiltevna GWS failed due to high levels of manganese.
There were *faecal coliform* occurrences in Shanbally, Booklagh/Ballymoe and Lissybroder Group Water Schemes between 2000 and 2001.
Exceedances in *manganese* were observed at Kiltevna GWS in October 2005, at Toberowen GWS in October 2005 and at Knockauns GWS in November 2003. *(Mott MacDonald Pettit, 2007)*

Furthermore, Galway County Council's website shows a water quality section for all public supply schemes. In more recent years, the Dunmore/Glenamaddy RWSS shows exceedances in:

- *Iron* – November 2009 and July 2010
- *Total Coliforms* – October 2011
- *Trihalomethanes* – 2008 to 2010 at various monitoring times

(Galway County Council, 2012)

Table 6.2 Drinking Water Quality for Existing Supplies within the Study Area

Scheme	Parameter (standard S.I. 439 of 2000)	Levels Date
Williamstown PS	Total Coliforms (0/100ml)	201 & 25 7/4/2005
	Faecal Coliforms (0/100 ml)	38 & 16 7/4/2005
Brackloon/Gurteen GWS	Total Coliforms (0/100 ml)	9 14/11/2005
Cathill GWS	Total Coliforms (0/100 ml))	10 13/7/2005
Creggs GWS	Faecal Coliforms (0/100 ml)	83 29/9/2005
	Total Coliforms (0/100 ml)	205 29/9/2005
Kiltevna GWS	Manganese (50 µg/l)	710 5/10/2005
	Total Coliforms (0/100 ml)	10 5/10/2005
Toberowen GWS	Total Coliforms (0/100ml)	201 22/6/2005
	Faecal Coliforms (0/100 ml)	201 22/6/2005
	Manganese (50 µg/l)	57 12/10/2005
Knockauns PWS	Manganese (50 µg/l)	69 12/11/2003
Shanbally	Total Coliforms (0/100ml)	140 5/7/2000
	Faecal Coliforms (0/100 ml)	140 5/7/2000

Source: Mott MacDonald Pettit, 2007

Table **6.3** shows Water quality parameter exceedance for DGRWSS since 2003.

Table 6.3 Water quality parameter exceedance for DGRWSS since 2003

Exceedences since 2003	Units	Highest Recorded Value	Total No. Samples	Total No. Exceedences	% Exceedences
Colour	mg/l	26.3	68	1	1%
Turbidity	NTU	4.8	76	74	97%
Iron	µg/l	322	68	10	15%
Total Coliforms	No. per 100ml	9	52	2	4%
Trihalomethanes	µg/l	122	38	6	16%

Source: Ryan Hanley, 2008

6.2.5.2 Effects of Exceeded Parameters

Manganese and Iron

Traces of manganese and iron are found in many waters. Both elements are essential trace elements for all living creatures. However, excessive quantities of both elements can cause damage and disturbance to distribution systems.

High concentrations of iron are not harmful to humans, but are undesirable on aesthetic grounds, making water unpalatable. Furthermore, such water can cause brown staining when used for laundry, and even small amounts of iron can lead to the accumulation of large deposits in distribution systems. Such deposits may subsequently give rise to iron bacteria that can produce slimes with obnoxious odours. *(Tobin, 2007)*

Total and Faecal Coliforms

Total and faecal coliforms are indicator organisms that may or may not be pathogenic themselves. The presence of non-faecal coliforms in water is indicative of contamination from the soil. The presence of faecal coliforms in water is indicative of recent pollution by human (sewage) or animal wastes. Faecal coliforms may indicate the presence of pathogenic organisms such as *Escherichia coli*, one group of coliforms, which live in human intestines. *(Tobin, 2007)*

6.2.6 Cryptosporidium Risk

One of the most significant drinking water and public health issues in recent years has been outbreaks of cryptosporidiosis related to drinking water supplies.

Cryptosporidiosis is caused by Cryptosporidium which is a microscopic protozoan parasite that is found in the intestines of infected humans and animals, and can survive in soil, water or surfaces that have been contaminated with infected humans or animal faeces. It has pathogenic effects in both children and adults when it enters the gastrointestinal tract and causes an infection called cryptosporidiosis. This disease can cause fever, stomach upset, weight loss and diarrhoea, and can be fatal in the old and young and those with compromised immune systems. *(Tobin, 2007)* This is a notifiable disease which means detection of the disease must be reported to the Health Protection Surveillance Unit.

A cryptosporidium risk assessment matrix for the scheme is included in Appendix B. The assessment was carried out in accordance with the EPA's "Drinking Water Regulations Guidance Booklet No 4 (22 January 2008)" for ground water sources. The score calculated was 134.9. This is classified as "very high" using EPA risk assessment methodology as shown in Table **6.4**. However, the introduction of the new water scheme including state of the art equipment and satisfactory water treatment will reduce the threat of a cryptosporidium occurrence.

Table 6.4 Cryptosporidium Risk Classification

Water Supply Risk Classification	Final Risk Assessment Score
Very High Risk	> 100
High Risk	76 – 100
Moderate Risk	50 – 75
Low Risk	< 50

Source: EPA

Table **6.5** shows the Cryptosporidium Risk Assessment Summary for the Dunmore/Glenamaddy Regional Water Supply Scheme.

Table 6.5 DGRWSS – Cryptosporidium Risk Assessment Summary

Dunmore-Glenamaddy WSS Cryptosporidium Risk Assessment Summary	
Total Groundwater - SPR Catchment Risk Score:	**83**
Total Groundwater - Treatment, Operation and Management Risk Score	**16**
Total Groundwater Risk Assessment Score:	**99**
Total population served by the supply (P):	**2551**
Population Weighting Factor (0.4 x log10 (population))	**1.36**
Final Weighted Risk Assessment Score	**134.9**
Risk Classification – Very High Risk (> 100)	

Source: Ryan Hanley, 2008

6.3 Characteristics of the Proposal

The proposed development is a water supply scheme, which consists of a water treatment works, an intake works, a regulating weir, a gauging station, and a reservoir in an area in north east Galway. The development is to provide a water supply to cater for existing and future populations within the supply area in compliance with the Drinking Water Regulations.

6.4 Potential Impacts

6.4.1 Characteristics of the Proposal

For the purposes of this section, the Glenamaddy RWSS will replace the following existing schemes:

- Bushtown
- Gortgarrow
- Group Water Schemes listed on page 42 above

While the exact treatment method for the proposed works has not yet been established, based on the raw water quality data analysed, it is likely that treatment will consist of the following general steps:

- Chemical dosing, including soda ash, alum and polyelectrolyte

- Settlement
- Filtration, incorporating backwashing and washwater recovery
- Sludge thickening and treatment

The raw water will be further subjected to chlorination and fluoridation treatments which are statutory in public water supplies in Ireland.

6.4.2 Potential Impacts

As outlined in Section **6.2.5**, most of the existing water supply schemes have exceeded guidelines for several parameters during recent years. In addition, the risk of Cryptosporidium outbreak is very high.

The proposed Glenamaddy RWSS will replace these supply schemes in the Glenamaddy area. Water produced at the treatment works for the proposed RWSS will be required to meet the water quality standards of European Communities (Drinking Water) Regulations, including the indicator parameters. An optimum quality drinking water will be provided for populations in the region thereby having an overall positive impact on public health. This proposed RWSS will also fulfil recommendations outlined in a report from the EU Committee on Petitions which includes establishing a reliable and clean resource of water for the inhabitants of Glenamaddy.

6.5 Mitigation Measures

As impacts arising from the proposed development on public health are expected to be positive, no mitigation measures are deemed necessary.

However, in order to ensure appropriate water treatment is incorporated into the design of the proposed scheme, it is recommended that:

- Regular surface water monitoring of the proposed source is undertaken, including microbiological and chemical analyses
- The measures which are outlined in the Cryptosporidium risk assessment in are implemented

6.5.1 Predicted Impact of the Proposal

The overall impact of the proposal on human health is expected to be positive.

6.5.2 Monitoring

It is recommended that regular monitoring of treated drinking water be undertaken at the proposed supply to ensure compliance with legislation. It is also recommended that water quality monitoring of Glenamaddy Turlough be carried out and the results sent to National Parks and Wildlife Service for review.

7 HUMAN BEINGS - SOCIO-ECONOMICS

7.1 Introduction

7.1.1 Introduction

Human Beings are a vital element to be considered as part of the EIA process. The purpose of this assessment is to examine the existing environment as well as potential impacts of the proposed development on human beings. An EIS should provide mitigating measures against any potential negative impacts. This section provides an assessment of the relevant socio-economic context of the proposed development. A focus will be placed on population, employment, land use and material assets. *(Tobin, 2007)*

7.1.2 Study Methodology

This section is prepared as a desktop study. The sources that have been used to complete this chapter included the Census of Population (CSO), the Quarterly National Household Survey (QNHS), the County Galway Development Plan 2009 – 2015 and the County Galway Settlement Strategy.

7.2 Receiving Environment

The proposed Regional Water Supply Scheme will supply Glenamaddy, an area in north east County Galway. The study area comprises of the following areas: Glenamaddy village, Clooncon, Clooncon West, Stonepark, Mountkelly, Cloondoyle, Gortnagier, Scotland, Kiltullagh and Stoolpark.

The village of Glenamaddy is on the R362, the main Dunmore - Athlone road. Glenamaddy is situated 40 miles north of Galway City. It is the largest settlement in the study area.

7.2.1 Existing Population

The settlements to be supplied by the water scheme are located in the Local Electoral Area (LEA) of Tuam. *(Galway County Council, 2012)* The Tuam electoral area can be broken into District Electoral Divisions (DEDs). The areas to be connected to the water scheme do not fit neatly into the DEDs. However, using a DED map for the area the scheme will generally take place within the DEDs of Glenamaddy, Toberroe, Ballynakill, Ballinastack, Boyounagh, Raheen and Kiltullagh.

Table **7.1** below illustrates the population and the percentage change of the population between 2006 and 2011 in the State, Connaught, Galway County and the seven DEDs that generally comprise the study area of Glenamaddy.

Table 7.1: Comparison Population Figures 2006-2011

	2006	**2011**	**% Change**
State	4,239,848	4,588,252	8.2
Connaught	504,121	542,547	7.6
Galway (ex. city)	159,256	175,124	9.9
Study Area	2897	2878	-0.6

Source: CSO, 2012

Table **7.1** shows that while the population in the State, Connaught and Galway (ex. city) increased on average by 8.2%, over the 2006-2011 period; the study area has experienced a population decrease of -0.6% over the same period. Using the figures from the CSO, 3.8% of the total population live in County Galway (ex. city), while 1.8% of the population of County Galway (ex. city) live in the study area.

Table **7.2** offers a further breakdown of the seven DEDs of the study area. It shows the population and the percentage change of the population in the study area between 2006 and 2011.

Table 7.2: Population and Percentage change for DEDs in Glenamaddy Area

	2006	**2011**	**% Change**
Glenamaddy	862	867	0.6
Toberroe	316	321	1.6
Ballynakill	451	419	-7.6
Ballinastack	327	324	-0.9
Boyounagh	271	257	-5.4
Raheen	490	492	0.4
Kiltullagh	180	198	1.0
Total	**2897**	**2878**	**-0.7**

Source: CSO, 2012

Between the period of 2006 and 2011 Ballynakill experienced a population decrease of 7.6% and Boyounagh experienced a population decrease of 5.4%. This illustrates that depopulation is occurring in some of the settlements in the study area. It also indicates that household sizes are decreasing. According to the census the average

household size in 2006 was 2.81 and decreased to 2.70 by 2011. *(CSO, 2012)*

Table **7.3** provides an overview of the population figures for the combined areas of the Glenamaddy RWSS at present (2011) and for 2032.

Table 7.3: Population Figures for Study Area

	2011	**2032**
Glenamaddy	867	980
Toberroe	321	434
Ballynakill	419	532
Ballinastack	324	437
Boyounagh	257	370
Raheen	492	605
Kiltullagh	198	311
Total	**2,878**	**3,669**

Source: CSO, 2012

The figures in Table **7.3** above show that the population of the study area is expected to increase to 3,669 over the next 20 years. The total figures take into account all lands zoned for residential use. The calculations are based on the 2011 population figures, with an average growth of two houses per annum (assumed) in each of the sub-areas. In the Glenamaddy DED between 2006 and 2011, an average of two houses a year were built according to the 2011 census. Considering the economic conditions and the current state of the construction industry, it is assumed that this building rate will not increase and that two houses per annum will be built in each DED making up the study area between 2011 and 2032. An occupancy rate of 2.70 is assumed.

7.2.2 Unemployment Levels

Employment is an important indicator of the economic standing of an area. This section examines unemployment levels, employment status and industrial group. The Quarterly National Household Survey (QNHS) provides details of unemployment on a regional level for the country. As the study area is located in the West Region, this region will be representative of the study area. The most recent survey was for Quarter One (January to March 2012).

Table 7.4: Quarterly National Household Survey (Q1 2012)

	Unemployment Rate	Participation Rate
State	14.7%	59.8%
West Region	16.1%	57.2%

Source: CSO, 2012

Table **7.4** above illustrates the findings from QNHS Quarter One 2012. The unemployment rate is the number of unemployed persons expressed as a percentage of the total labour force. The unemployment rate for the State was 14.7% while the unemployment rate for the West Region, which contains the study area, was 16.1%. This is slightly more than the national average.

The participation rate is the number of persons in the labour force expressed as a percentage of the total population (over 15 years old). Currently the participation rate in the State is 59.8% while the participation rate in the West Region is 57.2%, slightly less then the national average.

The CSO publish figures for the live register. These figures are not strictly a measure of unemployment as they include persons who are legitimately working part time and signing on part time. However, they can be used to provide an overall trend within an area. *(Tobin, 2007)*

7.2.3 Socio-Economic Profile of the Locality

Statistics in relation to occupational group are not provided by the CSO for areas with a population below 1000. Therefore Galway County (ex. city) will be used to illustrate the occupational group in the study area.

Table 7.5: Persons aged 15 years plus Classified by Industrial Group

	State	Connacht	Galway (ex. city)
Agriculture, forestry, fishing	94,247	17,071	6,034
Mining, quarrying, turf production	5,674	901	293
Manufacturing	193,080	26,101	9,352
Electricity, gas, water supply	13,116	1,357	405
Construction	90,357	11,810	4,442
Wholesale, retail trade	265,751	29,829	9,187
Hotels and restaurant	103,560	13,624	3,511

Transport, storage, communications	97,569	8,065	2,729
Banking, financial services	93,151	5,650	1,871
Real Estate, renting, business activities	184,251	15,865	5,267
Public admin, defence	113,521	13,856	3,735
Education	163,728	20,311	7,136
Health and Social work	203,379	26,424	8,539
Other community/social services	84,665	8,800	2,848
Not stated	101,311	11,972	3,858
TOTAL	**1,807,360**	**211,636**	**69,207**

Source: CSO, 2012

Table **7.5** above illustrates the industrial group of workers in the State, Connacht and Galway (ex. city). It shows that County Galway has a similar percentage (8.7%) of people employed in agriculture, forestry and fishing as Connacht (8.1%) but greater than the national average (5.2%). With regard to real estate, renting and business activity, the percentage of persons employed in County Galway accounts for 7.6% while the percentage in the State accounts for 10.1%, and in Connacht 7.5%.

Table 7.6: Principle Economic Status of Persons in County Galway

Economic Status	County Galway
At Work	1,807,360
Looking for 1st job	34,166
Unemployed having lost 1st job	390,677
Student	408,838
Looking after family / home	339,918
Retired	457,394
Unable to work due to a Disability	156,993
Other	13,316

Source: CSO, 2012

7.2.4 Land Use

The land use of the study area will be assessed using the DEDs that generally comprise the study area - Glenamaddy, Toberroe, Ballynakill, Ballinastack, Boyounagh, Raheen and Kiltullagh.

According to the CSO 9,258ha of land in the study area is farmed. There are 444 farms located it the study area. Table **7.7** below provides a further breakdown of farm types in the study area. *(CSO, 2012)*

Table 7.7: Type of Farm

Type of Crop	Area Farmed (hA)
Total Crops, Fruit, Horticulture	262 (2.8%)
Hay	625 (6.8%)
Pasture	5,160 (55.7%)
Silage	2,674 (28.9%)
Rough Grazing	465 (5.0%)
Potatoes	1 (0.01%)

Source: CSO Census of Agriculture 2000

The agricultural census of 2000 also shows that there are 15,642 cattle in total in the seven DEDs that make up the study area. The total number of sheep in the study area is 10,798.

7.2.5 Material Assets

7.2.5.1 Planning Permissions

The CSO provides figures relating to planning permissions granted and the class of development. Table **7.8** below illustrates the types of developments that were granted permission in the State, West Region, and County Galway for Quarter One (January - March 2012). There are no figures available at town level. The figures for new dwellings granted planning permission in the West Region (39.7%) and County Galway (43.6%) are similar; however they are higher than the national average (28.4%). The number of extensions in the West Region (36.6%) and County Galway (35.4%) are similar to the national average (39.8%). Table **7.8** below provides a summary of Planning Permissions granted in the first quarter of 2012.

Table 7.8: Summary of Planning Permissions Granted (Q1, 2012)

		State	West	County Galway (excluding City)
New	**Dwelling**	957 28.4%	152 39.7%	79 43.6%
	Other	695 20.6%	59 15.4%	28 15.5%
Extension		1339 39.8%	140 36.6%	64 35.4%
Alteration / Conversion		377 11.2%	32 8.4%	10 5.5%
Total		3368	383	181

Source: CSO, 2012

It is envisaged that the additional water supply may lead to an increase in the numbers of planning applications submitted to Galway County Council for both residential and commercial development in the immediate area. This has the potential to negatively impact the existing area as the increased development could alter the existing character of the area. This will impact on the existing rural landscape and visual amenity of the area.

7.2.5.2 Infrastructure

The Galway County Development Plan 2009 - 2015 acknowledges that there is little spare capacity in relation to water supply in the study area. In addition many of the houses within the study are not connected to a sewerage system and septic tanks are the predominant form of treatment.

Table **7.9** lists other water supply schemes that are currently proposed in Galway. This shows that Galway County Council is committed to upgrading existing schemes and installing new infrastructural services.

Table 7.9: Regional Water Supply Schemes in Galway

Location	Cost (Estimated)	Start Date
Costelloe RWSS	15.2M	2010-2012
Ballinasloe RWSS	0.8M	2010-2012
Clifden WSS	0.5M	2010-2012
Galway Water Conservation	13.7M	2010-2012

Source: Water Services Investment Programme 2010 - 2012

Galway County Council currently operates and maintains 44 public water supply schemes and they operate and maintain 26 public sewerage schemes. *(Galway County Council, 2012)*

7.2.5.3 Transportation

Due to the regions peripheral location the predominant mode of transport is the private car. The closest train station to the study area is in Roscommon, which is approximately 30km away. The road network, which serves the study area, can be placed in the non-national roads category. This category includes regional and local roads only. There are no national primary or secondary roads in the study area. The study area is approximately 40km from the M6 motorway. The only public

transport that services the area is Bus Éireann, bus service number 429 serving Galway – Tuam – Castlerea return, once daily on Tuesday, Thursday and Saturday. The study area is on average, located approximately 70km from Galway's train and bus station and 70 km from Galway Airport. Refer to Chapter 9 for further detail on traffic issues. *(Bus Eireann, 2012)*

7.2.5.4 Settlement Strategy

A settlement strategy is a spatial expression of population distribution, settlement size, role and hierarchy. Together with the Core Spatial Strategy, the County Settlement Strategy provides a planning framework for the location of development and population over the six year life of the county development plan. It identifies potential development patterns for different areas of the county. Glenamaddy village would be classified in "Other settlements and the countryside" in the settlement hierarchy. Only basic services are to be provided to these settlements. Despite the small number of services, these settlements are distinguished from mere house clusters by the presence of such services which serve an important community purpose and provide the basis for further future development.

In policies SS5 and SS6 of the Settlement Strategy, it will be the policy of Galway County Council to support the development of rural areas like Glenamaddy in a balanced, sustainable manner, having regard to the social, economic and environmental characteristics of the area and its residents and in the case of smaller settlements for which no specific plans are available, development shall be considered on the basis of its connectivity, capacity (social, cultural and economic) and compliance with the settlement strategy, good design, community gain (this requirement shall not apply to single houses) and proper planning and sustainable development. *(Galway County Council 2009 – 2015)*

7.3 Characteristics of the Proposal

The proposed development is a water supply scheme, which consists of a water treatment works, an intake works, a regulating weir, a gauging station and a service reservoir in an area in north east county Galway. The development is to provide a water supply to cater for existing and future developments within the supply area in compliance with the Drinking Water Regulations.

7.4 Potential Impacts

7.4.1 Potential Impacts on the Population

During construction there may be negative impacts on the population - this may include limited vehicular or pedestrian access, to facilitate the installation of the system. Dust and noise generation from the construction phase has the potential to negatively impact on the local population. However with correct management of the site and implementation of all mitigation measures, the impact will be significantly reduced. The noise impacts will be dealt with in Chapter 8. There are a number of agricultural farms in the study area. This proposed development will not negatively impact on the livelihood of local residents. With the additional water supply it is possible that there will be an increase in residential and commercial development in the area. This growth in the study area could potentially have a negative impact on the existing character of the area. Direct negative impacts on the population could relate to the construction phase, as it will result in disturbances to pedestrian and vehicle access. The increased capacity will possibly lead to an increase in population, which could have negative impacts on the existing rural landscape and visual amenities of local residents. However the impacts on the population will mainly be positive once the system has been put in place.

7.4.2 Effects on Employment

The development will have a positive effect on employment, both directly and indirectly. Implementing the RWSS will require direct employment. Once the water supply system is in place the study area will be more suitable to a variety of mixed use developments, including commercial, retail and industrial which will have positive effects for employment in the area.

7.4.3 Effects on Surrounding Landowners

Once the new regulating weir is in place the lake will cover slightly more land during the summer than it would without the regulating weir. This will have an impact on the surrounding landowners, as this will slightly reduce lands available for grazing.

7.5 Mitigation Measures

7.5.1 Potential Impacts on the Population

The mitigating measures that are proposed are to ensure that residential amenity is

maintained throughout the construction phase. Disruption to water supply should be restricted to ensure residential amenity. It should be ensured that limited works be carried out that would involve the closure of walkway or road networks. Planning control measures will ensure that new developments that arise as a consequence to the upgrading of the water supply system will have an imperceptible impact.

7.5.2 Potential impacts on Employment

The development will generate employment in the area and therefore boost the local economy. The spin off effects of this development will be beneficial; therefore no mitigation measures are required.

7.5.3 Predicted Impact of the Proposal

In relation to the impact on human beings from the proposed development there will be a generally positive outcome. There will however be some minor disturbances during construction. When all mitigation measures are complied with there should be only minor significant impacts arising from the construction of the water supply scheme. It is anticipated that the development will not have a negative impact on the everyday activities and lifestyles of the residents of the study area. However with the increased capacity in water supply it is likely that the area will become attractive for new developments. This may impact on the existing character of the study area.

No monitoring measures are necessary in relation to the socio-economic aspects of this development.

8 NOISE

8.1 Introduction

8.1.1 Introduction

In this section, the impact of noise originating from the construction, operation and maintenance of the Glenamaddy RWSS is considered.

Generally, the EIS author/engineer avails of the services of a specialist to assess existing noise emissions from the study area. This was not possible for this report. Instead, noise levels based on levels for other similar rural areas are used. For this report, the Costelloe RWSS noise survey results were used.

The main purpose of a noise study is to:

- Establish the existing noise levels in the environs of the proposed development
- Project and assess the noise levels generated by the development
- Specify appropriate ameliorative measures where deemed necessary

8.1.2 Acoustic Terminology

Sound is simply the pressure oscillations that reach our ears. These are characterised by their amplitude, measured in decibels (dB) and their frequency, measured in Hertz (Hz). Noise is defined as unwanted or undesirable sound, it does not accumulate in the environment and is normally localised. The criteria for environmental noise control are of annoyance or nuisance rather than damage. In general a noise level is liable to provoke a complaint whenever levels exceed by a certain margin the pre-existing noise level or when it attains an absolute level. *(Tobin, 2007)*

The units of measurement of noise must reflect our overall response to it. The basic difficulty in measuring noise is the huge range in the sensitivity of the ear. Audible sound pressures range between the threshold of hearing 20μPa [0.00002 Newton per metre squared (N/m^2)] and the threshold of feeling 200Pa ($20N/m^2$), which corresponds to a ratio of 1:1,000,000. In order to cover this wide range, a logarithmic unit, the decibel (dB) is used. The dB scale ranges from 0 dB (the threshold of hearing) to 140 dB (the threshold of pain). While the size of the pressure fluctuations is measured in dB, the rate of pressure fluctuations is

measured in cycles per seconds or Hertz (Hz). Environmental noise levels are generally measured in terms of 'A' weighted decibels, dB(A). A noise level in excess of 85 dB(A) gives a significant risk of hearing damage. A noise level increase of 3 dB(A) is barely perceptible, while an increase in noise level of 10 dB(A) is perceived as a twofold increase in 'loudness'. *(Tobin, 2007)* As a rough guide, if it's difficult to hear normal conversation at 2m, the noise level is probably too high. (over 85Dba) *(HSA, 2006)*

Where noise levels vary in time, statistical analysis of the variation can be carried out. The results are usually stated in the form LN (L for level), where N is the percentage of time a level is equalled or exceeded. Hence if L90 = 40 dB(A), the noise level exceeds 40 dB(A) for 90% of the time measured period (i.e. background noise level is 40 dB(A). Consequently, background noise level could be described as the lowest 10% of noise level over a given period. *(Tobin, 2007)*

In addition to the statistical units, the equivalent continuous level is also measured. The equivalent continuous level, Leq, is measured in dB(A) and is a notional steady level that has the same sound energy as the real fluctuating sound over the same measurement period. It is measured using an integrating sound level meter (SLM). Leq is often described as the total noise level for a specified period. *(Tobin, 2007)*

8.1.3 Noise Criteria

The criterion is one of annoyance or nuisance rather than damage. The relevant standard presently in use is ISO 1996 (3 parts). This standard does not use the criteria of differentials, however and increase in noise level of 5 dB(A) is considered as one of only marginal significance. In general a noise is liable to provoke a complaint whenever its level exceeds by a certain margin the pre-existing noise level or when it attains an absolute level. The method of deriving a criterion is related to the existing ambient noise level taking into account the various features of the noise environment at the nearest relevant residences to the development.

In accordance with International Standard ISO 1996 (3 Parts) and British Standard 4142: 1990, most planning criteria are now stated in terms of LAeq.

Road traffic noise may cause annoyance and the parameter currently used in the assessment of traffic noise is the L10 dB(A) level .The parameter used in the UK

(Ref: Calculation of Road Traffic Noise 1998, Dept of Transport Welsh Office: HMSO) and by local authorities in Ireland is the 18 hour L10, this is the arithmetic mean of the hourly L10 levels in the period 06.00 to 24.00 hours. *(Tobin, 2007)*

Construction and industrial noise is usually expressed in LAeq. The daytime criterion for industrial noise is normally between 45 – 55 dB(A) (Ref EPA's Guidance Note in Relation to Scheduled Activities). For construction development noise there are no Irish Standards applicable, however it is normal to apply one of best endeavour, which means keeping the daily Leq values as low as practicable (less than 65 dB(A)). *(Tobin, 2007)*

8.1.4 Legislation

The European Communities (Exposure to Noise) Regulations 1990 aimed to protect workers from the risks to their hearing caused by noise and preventing hearing loss and deafness. The regulations applied to all workplaces and workers and included requirements for:

- Identifying a noise problem and assessing the levels
- Keeping and inspecting records
- Reducing risk of noise at source
- Ear protectors
- Hearing checks
- Penalties for breach of regulations

8.1.5 Health problems associated with noise

Exposure to noise can harm peoples' health. The most well known effect of noise is loss of hearing. However, it can also exacerbate stress and increase the risk of accidents. Health problems induced include:

- Hearing Impairment
- Noise-induced hearing loss
- Tinnitus (Ringing or hissing sensation in the ears)

Exposure of pregnant women to high level noises can affect the unborn child. Communication problems during periods of long noise can increase risk of accidents. *(HSA, 2006)*

8.1.6 Assessment Methodology

The assessment of noise impacts was based on the following:

- gathering of baseline noise data for the location of the proposed Glenamaddy RWSS (obtained from the Costelloe RWSS)
- prediction of impacts at noise sensitive locations using data
- recommendation of mitigation measures

8.2 Receiving Environment

8.2.1 Noise Survey Methodology (survey used in Costelloe RWSS)

Baseline noise monitoring was carried out on representative working weekdays at N2 and N3. A baseline noise survey was carried out at N1.

The monitoring points are described in **Table 8.1**. All measurements were carried out in accordance with ISO 1996, Part 1 (Description and Measurement of Environmental Noise – Part 1: Basic Quantities and Procedures).

Table 8.1 Noise Monitoring Locations

Monitoring Point	Location
N1	Near to residential dwelling adjacent to location of proposed Treatment Works at Mountkelly
N2	At roadside near location of proposed regulating weir, intake works and pumping station on the Glenamaddy Turlough.
N3	At residential dwelling adjacent to proposed Reservoir at Stoolpark.

The environmental noise levels were determined using the A-weighted network and fast response. A Larson David 824 precision Integrating sound Level Analyser and Frequency Analyser and a Larson Davis 812 precision Integrating Sound Level Analyser were used. At each of the noise measurement points the Sound Level Meter (SLM) was mounted on a tripod so that the microphone was maintained at 1.5 metres above ground level and at least 3.5 metres from any noise reflecting surface. The logged data from monitoring was later downloaded using software and a personal computer.

All acoustic instrumentation was calibrated before and after each survey and no drift from calibration was observed (calibration level 114 dB at 1000 Hz).

At each of the monitoring locations the following data were recorded:

L(A)eq: Equivalent Continuous A-weighted Sound Level. The continuous steady noise level, which would have the same total A-weighted acoustic energy as the real fluctuating noise measured over the same period of time.

$L(A)_{10}$: The A-weighted noise level that is equalled or exceeded for 10% of the measurement period; and

$L(A)_{90}$: The A-weighted noise level that is equalled or exceeded for 90% of the measurement period.

At present there are no statutory limits for environmental noise levels, however, the EPA recommend that ideally, on sites of industrial nature or similar, if the total noise level from all sources is taken into account, the noise level at sensitive locations should be kept below and L(A)eq value of 55 dB(A) by daytime (08:00 to 22:00) and 45 dB(A) at night time (22:00 to 08:00). *(Tobin, 2007)*

8.2.2 Existing Noise Environment

Existing noise levels were established over the duration of the survey at each of the proposed development sites described in Table **8.1**. Noise levels during the survey are representative of a rural environment. At all monitoring locations the ambient noise levels are controlled by wind noise and at N3 road traffic on the R362 also contributed to noise levels.

8.2.3 Baseline Noise Survey Results

Table **8.2** contains the results from the noise monitoring locations as described in Table **8.1.**

Table 8.2 Baseline Noise Monitoring Results

Location	Date	Period	L(A)eq, 1 hr dB(A)	$L(A)_{90}$, 1hr dB(A)	$L(A)_{10}$, 1hr dB(A)
N1	16th April 2012	13:00 – 14:00	57.5	37.3	59.4
N2	23rd April 2012	12:55 – 13:55	72.5	64.0	76.5
N3	23rd Feb 2012	14:25 – 15:25	63.1	58.8	64.9

Source: Tobin, 2007

Monitoring Location N1

Monitoring location N1 was adjacent a residential dwelling near to the location of the proposed water treatment works at Mountkelly. Road traffic on the R362 was the dominant noise source at N1. Continuous birdsong was also audible as well as background traffic. The Leq, 1 hr recorded at this location (in April 2012 with dry, calm weather conditions) was 57.5 dB(A).

Monitoring Location N2

Monitoring location N2 is at the roadside approximately 100m from the site of the proposed regulating weir, intake works and pumping station on the Glenamaddy Turlough. The dominant source of noise at N2 was wind noise. The equivalent continuous sound pressure level (Leq, 1 hr) recorded at this location was 72.5 dB(A).

Monitoring Location N3

Monitoring location N3 is at a residential dwelling adjacent to the site of the Stoolpark Reservoir. The sound level meter was positioned in front of the house. Wind noise in vegetation and road traffic on the nearby road as well as a barking dog contributed to noise levels at N3. The Leq, 1 hr recorded was 63.1 dB(A).

8.3 Characteristics of the Proposal

The proposed Glenamaddy Regional Water Supply Scheme includes the following elements:

- Gauging Station on the Glenamaddy Turlough
- Regulating Weir on Glenamaddy Turlough
- Intake works and pumping station on Glenamaddy Turlough (at regulating weir site)
- 200mm raw water rising main from the pumping station to the proposed treatment works at Mountkelly
- Water treatment works at Mountkelly
- New watermain network
- Reservoir at Stoolpark
- Access roads, site development and ancillary works at each site

8.4 Potential Impacts

8.4.1 Construction Phase

Leq measurements taken of construction noise sources at other sites within the country at 20m from the geometric centre of activity when equipment was in continuous operating mode are given in Table **8.3**, were as follows:

Table 8.3 Noise Levels from Construction Activity

Noise Source	Noise Level - Leq
Readymix truck	70 dB(A)
Large Excavator	73 dB(A)
Forklift / Height	68 dB(A)
Volvo dump truck	71 dB(A)
Vibratory Roller	70 dB(A)

Source: Tobin, 2007

Calculation and Prediction of Construction Noise

Methodology

$Lp2 = Lp1 + \Delta L\psi - \Sigma\Delta L$

Where,

Lp2 = Sound Pressure level in decibels at Residence.

Lp1 = Sound pressure level in decibels at 20 metres.

$\Delta L\psi$ = correction for direction effects in a horizontal plane,

$\Sigma\Delta L = \Delta Ld + \Delta La + \Delta Lr + \Delta Ls + \Delta Lv + \Delta Lg + \Delta Lw$, and

where,

ΔLd = geometric spreading (spherical radiation) and is calculated according to:

$\Delta Ld = 20 \log_{10} (d1/d2)$, where, d1 is the residence distance in metres, while d2 is

20 metres.

ΔLa = air absorption

ΔLr = reflection and diffraction

ΔLs = screening

ΔLv = vegetation

ΔLg = ground absorption

ΔLw = wind gradients

The impact of construction noise levels are predicted at noise sensitive locations. These locations are described as follows:

- H1 - Residential dwelling nearest to location of proposed treatment works at Mountkelly
- H2 - Residential dwelling nearest to Stoolpark Reservoir

In predicting noise levels at sensitive receptors, the attenuation effects due to air absorption, reflection, refraction and vegetation are small and in the predictive calculation the attenuation from these factors is assumed to be zero. There is no attenuation from ground absorption or screening. The predicted levels (in one hour Leq values) are given in Table **8.4**.

Table 8.4: Predicted Noise Levels during Construction Phase

Receiver Position	Predicted Maximum Levels LAeq,1hr dB(A)	Predicted Typical Levels LAeq,1hr dB(A)
H1	62.1	52.9
H2	61.9	57.8

Source: Tobin, 2007

The maximum noise levels will pertain for short periods (less than one week equivalent at any prediction location), while typical noise levels are for a period in excess of 50% of the total construction period. *(Tobin, 2007)*

Construction of Pipelines

It is proposed to construct a short section of pipeline within an area that is designated as an SAC, however the pipeline will be installed in the roads. There is the potential for disturbance to noise sensitive mammals/birds that inhabit the SAC. However, it is expected that noise impacts will be of short duration at any one location.

Construction Road Traffic

The construction phase of the proposed regional water supply scheme will result in

increased traffic flow on the local road network. There is a logarithmic relationship between noise levels and traffic volume and the higher the existing traffic volume the greater the traffic increase required to produce a perceptible noise change. Typically, doubling the traffic flow produces a 3dB change in noise level. The increase in noise levels resulting from construction road traffic will be short-term in nature.

8.4.2 Operation Phase

Once the Glenamaddy Regional Water Supply scheme has been constructed, significant noise impacts are not predicted. Operation of the scheme will lead to a slight increase in vehicle movements on the R362. Doubling of traffic flow produces a 3dB change in noise level, which is barely perceptible. Therefore no perceptible increase in noise levels due to traffic will result from operation of the proposed Glenamaddy Regional Water Supply Scheme.

8.5 Mitigation Measures

8.5.1 Construction Phase

This noise will slightly affect lands in the study area on a temporary basis. As the works will be carried out during day light hours the construction will not impinge to any extent on night time noise levels.

All construction will be carried out in accordance with BS 5228: Part 1: 1997 (Noise Control on Construction and Open Sites – Part 1 *Code of Practice for Basic Information and Procedures for Noise Control*. During the construction stage of the project there will be noise from construction plant and construction operations. All construction traffic to be used on site will have effective well-maintained silencers. Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery.

Predicted noise levels associated with construction activity will not exceed the guideline level of Leq (1h) 65 dB(A). With efficient use of well maintained mobile equipment, considerably lower noise levels (3-6 dB(A)) than those predicted can be attained. The Project Engineer will closely supervise all construction activity.
Wooden acoustic barriers may be erected for the construction phase.

8.5.2 Operation Phase

All extraction fans, openings for cooling units/vents etc. attached to superstructures at the treatment works and elsewhere in the development will be acoustically treated so that noise emissions at the site boundary will be less than 45 dB(A) and there will be no night-time tonal noise emissions. All plant and equipment (e.g. pumps) for raw water processing etc. will be regularly maintained to avoid tonal noise emissions at noise sensitive locations.

It is proposed that all machines with high or medium noise generating potential will be enclosed in noise attenuation equipment which will limit noise to 70dBA at one metre from the equipment and that all such equipment will be located within buildings with a high sound insulation level which will limit consequent noise levels to 45dBA at the nearest site boundary.
(Tobin, 2007)

9 TRAFFIC

9.1 Introduction

This section examines the traffic aspects of the proposed Glenamaddy Regional Water Supply Scheme. The aim of this report is to assess the traffic impact of the proposed development on the surrounding road network.

The report includes an appraisal of all transport-related issues related to the water supply scheme and includes the following:

- The proposed development
- The current traffic and road situation
- The preferred route for vehicular access to the proposed development
- Traffic impact of the development on the surrounding road network
- Mitigation measures applicable to the current road network to facilitate the proposed development

9.2 Receiving Environment

9.2.1 The Current Traffic Situation

The site for the proposed gauging station will be located on the Glenamaddy Turlough. The access to the proposed gauging station site is from an unclassified unpaved road running from the R362 to the lake.

The site for the regulating weir, intake works and pumping station will be located on the north-western part of Glenamaddy Turlough. The access to the proposed regulating weir is from an unclassified unpaved road running from the R362 to the turlough.

The site for the treatment works is in Mountkelly. The site is located off the R362 road.

The proposed reservoir at Stoolpark is to be located a short distance northwest of Glenamaddy Village. The site is located off the R362 road.

9.2.2 Routes for Vehicles Wishing to Access the Development

The road network from Dunmore (the nearest town) to the proposed sites consists of the following roads and key junctions:

Gauging Station

Roads:

- R360
- R362
- Gravel road to the turlough

Junctions:

- R362 with R364

Regulating Weir, Intake Works and Pumping Station

Roads:

- R360
- R362
- Gravel Road to the turlough

Junctions:

- R362 with R364

Water Treatment Works site

Roads:

- R360
- R362
- Gravel road to the site

Junctions:

- R362 with R364

Stoolpark Reservoir

Roads:

- R360
- R362

- Local county road to Williamstown

Junctions:

- R362 with Local County Road to Williamstown

9.3 Characteristics of the Proposal

The proposed development consists of the construction of an intake works, pumping station, regulating weir, gauging station, water treatment works and storage reservoir in the Glenamaddy area.

The impact of the proposed development on material assets mainly relates to the impact on the road infrastructure in the vicinity of the treatment works. The treatment works site will be located off the R362 immediately northwest of Glenamaddy Turlough. On completion of the treatment works the traffic movements will relate to activities related to routine monitoring and maintenance.

9.4 Potential Impacts

The development of the Glenamaddy Regional Water Supply Scheme will result in increased traffic flows and traffic disruption during construction. This effect will be short-term. The vehicle movements during construction will largely comprise the haulage of materials to and from the sites.

The construction phase is likely to lead to an increased noise, air quality (dust) and negative visual impact. The construction phase will impact negatively on the surface of the road, particularly at the entrance to the different construction sites.

The long term operation of the water treatment works at Mountkelly will lead to a slight increase in vehicle movements on the R362 road. The long term operation of the reservoir and the regulating weir at Glenamaddy Turlough will not lead to any considerable increase in vehicle movements.

9.5 Mitigation Measures

Measures to mitigate against the impact of the proposed development on the road structure could recommend the inclusion of an appropriate sum in the construction contract to cover the repair of haul roads. Also careful selection of designated haul

routes for the construction phase would lessen the impact on the road structure.

It is proposed to implement traffic management measures along roads while pipelaying is in progress in accordance with Chapter 8 of Traffic Signs Manual.

10 INTERACTIONS OF ENVIRONMENTAL EFFECTS

In addition to describing the likely significant effects of the proposed development on particular aspects of the environment, the European Communities (Environmental Impact Assessment) Regulations, 1999 require us to consider the interactions between those aspects where an interaction is considered to be both likely and significant.

As with any large scale development the examination of environmental impacts cannot be treated as if the impacts are mutually exclusive. The individual chapters have covered the effects of the interaction of environmental impacts, where these interactions are critical.

Listed below is a summary of the most important interactions between environmental impacts. Many, but not all, of these interactions relate to the effect on Human Beings, i.e. a localised effect on the population in the immediate vicinity of the treatment works, gauging station, regulating weir, intake works and reservoir. *(Tobin, 2007)*

10.1.1 Interaction between Water and Ecology Impacts

The construction of the gauging station, regulating weir and intake works takes place on the banks of Glenamaddy Turlough. The main pollution risk associated with construction work is run-off that is laden with suspended solids. The construction of the gauging station, regulating weir and intake works has the possibility of affecting the water quality. This effect on water quality has an obvious bearing on the quality of flora and fauna in the river and lake.

10.1.2 Interaction between Visual and Human Being Impacts

The construction of the Glenamaddy Regional Water Supply Scheme will result in alterations to ground levels and will involve the construction of new buildings and other structures associated with any large scale water supply scheme.

However given that the reservoirs are proposed on elevated land, this could have a negative effect on the rural area, if adequate landscaping measures are not put in place for the buildings. The impact on Human Beings (i.e. the local residents) can only be mitigated by careful and adequate landscaping measures.

10.1.3 Interaction between Noise and Human Being Impacts

The proposed Treatment Works and Stoolpark Reservoir are in proximity to existing houses. Noise impact has a direct relationship to the impact on human beings, as discussed in Chapter 8. All construction traffic to be used on site will have effective well-maintained silencers. Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery. Construction activity due to its nature is a temporary activity and thus any impacts will be short term. All construction works will be carried out during daytime periods.

10.1.4 Interaction between Noise and Landscape Impacts

There is a direct relationship between landscaping and the abatement of noise impact. Landscaping will be put in place at the treatment works to reduce the visual impact of the development, which will have a secondary benefit of reducing noise levels from the treatment works.

11 CONCLUSIONS

The Glenamaddy Regional Water Supply Scheme is a significant project with regard to the public health of the people in the supply area. It will serve an area in north east Galway that currently has problems with its sources' quality and capacity.

This EIS is based on information from previous preliminary reports, information from relevant websites and local knowledge. Some of the proposed works will be undertaken in a cSAC. The cSAC concerned is the Lough Lurgeen Bog/Glenamaddy Turlough SAC (SAC 000301). Lough Lurgeen Bog/Glenamaddy Turlough covers almost 1,200 ha and is situated east of the town of Glenamaddy. It consists of a very large turlough, over 170 ha in area and a vast expanse of over 1,000 ha of typical intact western raised bog.

In this report, the existing study area is described in detail in chapter 2 and also in chapters 5 to 9 under the relevant aspects of the environment being considered. In chapter 4, a number of alternatives were examined with respect to water source and sites for the intake works, regulating weir and treatment works. This was carried out so as to minimise the environmental impact of the scheme.

Chapters 5 to 9 examine the environmental impact of constructing, operating and maintaining a regional water supply scheme at Glenamaddy in north east County Galway under the following headings:

- Water – Hydrology
- Human Beings – Public Health
- Human Beings – Socio Economics
- Noise
- Traffic

The interactions of some of the above environmental aspects are analysed in chapter 10.

Included in this report are relevant photographs, maps, information tables and a cryptosporidium risk assessment matrix for the existing Dunmore/Glenamaddy Regional Water Supply Scheme.

Although, there are some negative environmental impacts associated with a new regional water supply scheme for the Glenamaddy area, it is considered that the introduction of the new scheme will overall have a positive effect on the region and its people.

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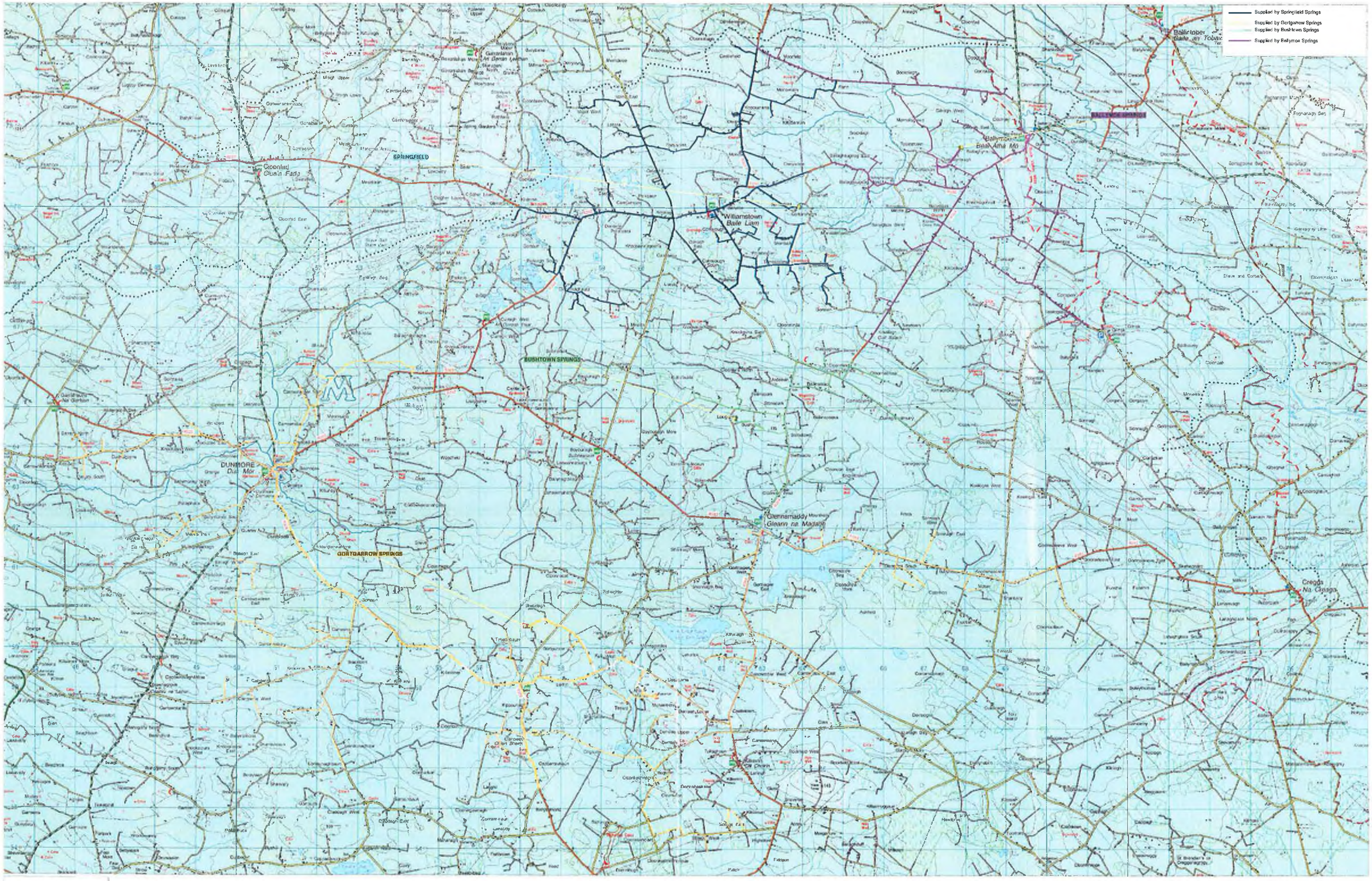
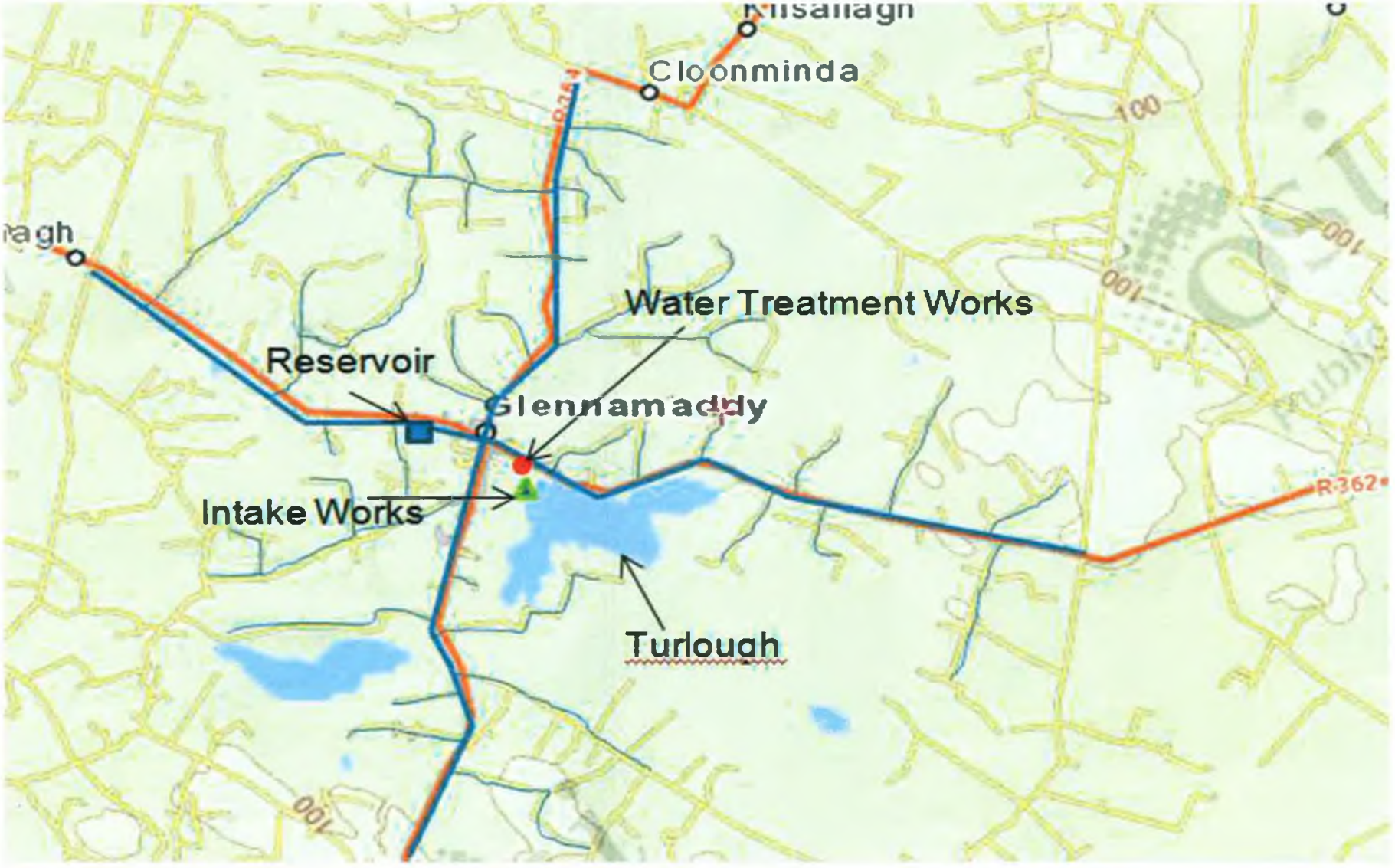
Appendix A

Maps



Layout of Existing Distribution System by Source



Map of Proposed Scheme. Source: OSI Mapping

Map of Alternative sites for Reservoir, Intake Works and Water Treatment Works. Source: OSI Mapping

Appendix B

Cryptosporidium Risk Assessment Matrix

		Section No.	Factor	Specified Score	Dunmore / Glenamaddy EXISTING Spring	Dunmore / Glenamaddy PROPOSED Spring
		Section 1	Pressure Factor			
SOURCE (PRESSURE) FACTOR	1 - Animals within the Catchment	1.1	Cattle/calves at less than or equal to one livestock unit per hectare of forage area	5		
			Cattle/calves at more than one livestock unit per hectare of forage area	10	10	10
			No cattle/calves in the catchment	0		
		1.2	Sheep/lambs at less than or equal one livestock unit per hectare of forage area	5		
			Sheep/lambs at more than one livestock unit per hectare of forage area	10	10	10
			No sheep/lambs in the catchment	0		
		1.3	Wild or farmed deer in the catchment	2		
			No wild or farmed deer in the catchment	0	0	0
		1.4	Pig farms in the catchment	2	2	2
			No pig farms in the catchment	0		
		1.5	Animals have direct access to sinking streams	4	4	4
			Fencing preventing access to sinking streams	-2		
		1.6	High numbers of birds	2	0	0
		1.7	Any other farmed animal or bird	1	1	1
		TOTAL (Animals within the Catchment):			27	27
		Section 2	Pressure Factor			
	2 - Agricultural Practices within the Catchment	2.1	Slurry spraying in the source protection area	6	6	6
		2.2	Dung spreading in the source protection area	3	3	3
		2.3	Slurry or dung stores	3	3	3
		2.4	Sheep pens or cattle sheds	6	6	6
		2.5	Lambing or calving on the catchment	8	8	8
		2.6	Full compliance with the Good Agricultural Practice Regulations verified by inspections	-6	0	0
		TOTAL (Agricultural Practices within the Catchment):			26	26
		Section 3	Pressure Factor			
	3 - Discharges to the Catchment/Source Protection Areas	3.1	Population equivalent served by individual on-site wastewater treatment system 100 PE	4	0	0
			Population equivalent served by individual on-site wastewater treatment system > 100 PE	6	6	6
		3.2	On-site wastewater treament systems all known to be functioning properly	-2	0	0
		3.3	Population equivalent served by all wastewater treatment plants discharging to groundwater <500	6	6	6
			Population equivalent served by all wastewater treatment plants discharging to groundwater 500 to 5,000	8	0	0
		3.4	Storm sewage overflows discharging to groundwater	2	0	0
		3.5	Section 4 or Integrated Pollution Prevention Control (IPPC) Licence discharging to groundwater from intensive agricultural activity or agriculturally related discharge	2	0	0
		3.6	All wastewater treatment plants discharging to groundwater complying with the UWWT Regulations quality standards	-1	0	0
		3.7	UV inactivation at outlet of wastewater treatment plants	-2	0	0
		TOTAL (Discharges to the Catchment/Source Protection Areas):			12	12
		Section 4	Pressure Factor			
	4 - Catchment / Source Protection Area Inspections	4.1	Source Protection Area inspections carried out at least monthly	-3		
			Source Protection Area inspections carried out less frequently	6	6	6
		4.2	Procedures in place to deal with irregularities on the Source Protection Area	-3	0	0
		TOTAL (Catchment / Source Protection Area Inspections):		0	6	6
		Section 5	Pathway Factor			
PATHWAY FACTOR	5 - Geology/hydrogeology	5.0	Section No. * / Pathway Factor — Section 5a: Source Protection Area; Section 5b: Aquifer Categories (for aquifers with no source protection area delineated)			

Vulnerability Rating	Section 5a: Source Protection Area (SI)	Section 5a: Source Protection Area (SO)	Section 5b: Karst (Rk & Lk)	Section 5b: Fissured (Rf & Lm)	Section 5b: Sand/ gravel* (Rg & Lg)	Section 5b: Ll	Section 5b: Poor (Pu & Pl)
Extreme (0-1 m soil/subsoil)	4	2	4	2	0	2	2
Extreme (1-3 m subsoil)	2	0	2	0	0	0	0
High	+30	+30	+30	+30	+30	+30	+30
Moderate	+45	+45	+45	+45	+45	+45	+45
Low	+60	+60	+60	+60	+60	+60	+60

Total for Section 5:

					Karst Extreme	Karst Extreme
		TOTAL (Geology/hydrogeology):			2	2
		Section 6	Pathway Factor			
	6 - Rapid Bypass of Unsaturated Zone	6.1	Presence of karst feature such as swallow holes, sinking streams	6	6	6
			Likelihood of karst features or direct transmission of surface water run-off to groundwater	3	-	-
			Direct transmission of surface run-off unlikely	0	-	-
		TOTAL (Rapid By-pass of Unsaturated Zone):		9	6	6
		Section 7	Receptor Factor			
RECEPTOR FACTOR	7 - Water Source Type	7.1	Spring	6	6	6
			Well (<3m depth of well)	4	-	-
			Borehole (>3m depth of borehole)	2	-	-
			Well field	2	-	-
		TOTAL (Water Source Type):		14	6	6
		Section 8	Receptor Factor			
	8 - Sanitary Protection of Groundwater Supply	8.1	Inadequate protection of spring source	12	-	-
			Spring receptor adequate protection	6	6	6
		8.2	Borehole with known or suspected poor casing integrity or no grouting	12	-	-
			Borehole with suspected, not proven good casing integrity or grouting	8	-	-
			Borehole with proven good casing integrity and good grouting	-8	-	-
		8.3	Headworks in outside chamber and/or below ground level, liable to flooding or leaking structure	12	-	-
			Headworks in outside chamber but sealed and dry	9	-	-
			Headworks inside building with cover flush to floor or imperfectly sealed	6	-	-
			Headworks inside building with completely sealed raised cover	-8	-8	-8
		TOTAL (Sanitary Protection of Groundwater Supply):		45	-1	-2
		GRAND TOTAL Groundwater Source-Pathway-Receptor (Catchment) Risk Score:			83	83

		Section 9	Risk Factor	Specified Score		
RISK MANAGEMENT FACTORS	9 - Water Treatment Processes	9.1	Disinfection (not including UV)	16	16	-
			Ozone Inactivation	-15	-	-15
			Membrance filtration (DWI approved)	-16	-	-
			Membrance filtration (Not DWI approved)	-2	-	-
		TOTAL(Water Treatment Processes):			16	-15
		Section 10	Risk Management Factor			
		10a	Membrane Filtration			
	10 - Treatment Works Monitoring of Filtration	10.1	Plant monitored and alarmed for integrity	-10	-	-
			Plant monitored for integrity but not alarmed	-3	-	-
			Plant not monitored for integrity	10	-	-
		10.2	Particle counter used continuously to monitor filter performance	-5	-	-
		TOTAL for Section 10a:			0	0
		10b	Ozone or UV Inactivation			
		10.3	Plant monitored for integrity and dosage	-2	-	-
			Plant monitored and alarmed for integrity and dosage	-10	-	-10
			Plant neither monitored nor alarmed	10	-	-
		10.4	Influent turbidity consistently < 0.2 NTU	-5	-	-
			Influent turbidity consistently < 1.0 NTU	-3	-	-
			Influent turbidity consistently > 1.0NTU	-1	-	-1
		TOTAL for Section 10b:			0	-11
		Section 11	Risk Factor			
WATER TREATMENT FACTORS	11 - Treatment Works Operation	11.1	Process control manuals specific to works available	-2	-	-2
			Process control manuals specific to works not available	2	2	-
		11.2	Auditable action plans available for dealing with deviations in quality	-2	-	-2
			Auditable action plans not available for dealing with deviations in quality	2	2	-
		11.3	Water flow through works when operating has not varied by >10% in < 30 minutes in the last 12 months	-2	-2	-2
			Water flow through works when operating has varied by >10% in < 30 minutes in the last 12 months	2	-	-
		11.4	Flow through works above design flow for >10% of time in last 12 months	4	-	-
			Flow through works above design flow for≤10% of time in last 12 months	0	0	0
			Flow through works >130% above design flow for >50% of time in last 12 months	6	-	-
		11.5	Membrane, Ozone or UV filters bypassed during year	6	-	-
		TOTAL(Treatment Works Operation):			0	-4
		GRAND TOTAL (Groundwater Treatment and Supply Risk Score):			16	-12

Total Groundwater - SPR Catchment Risk Score	**83**	**83**
Total Groundwater - Treatment, Operation and Management Risk Score	**16**	**-12**
Groundwater Risk Assessmnet Score	99	71
Population	2551	2551
Population Weighting Factor (0.4 x log10 (population))	1.36	1.36
Final Weighted Risk Assessmnet Score	**134.9**	**96.5**
Water Supply Risk Classification	**Very High**	**Moderate Risk**