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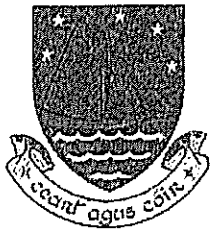

COSTELLOE REGIONAL WATER SUPPLY SCHEME
ENVIRONMENTAL IMPACT STATEMENT

NON-TECHNICAL SUMMARY

Volume 1 of 3

REVISION E - JUNE 2007

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1 FOREWORD

The Costelloe Regional Water Supply Scheme (RWSS) involves the development of a new water supply scheme using Glenicmurrin Lough as its source. The scheme will serve an area in south Connemara.

Galway County Council, in a letter to An Bord Pleanála in January 2005, requested an opinion from the Board on the requirement for an EIS for the project. An Bord Pleanála, in a letter to Galway County Council on 1st June 2005, directed Galway County Council to prepare an Environmental Impact Statement in respect of the proposed Costelloe Regional Water Supply Scheme.

2 INTRODUCTION

The study area comprises the general Costelloe region of South Connemara and includes the following sub-areas: Carraroe, Muicineach, Bealadangan, Lettermore, Tir an Fhia, Gorumna, Lettermullan, Camus/Screebe, Rosmuc and Spiddal/Rossaveal.

This study area encompasses the following existing water supply schemes:

- Carraroe WSS
- Tir an Fhia/Lettermore WSS
- Rosmuc WSS
- Spiddal RWSS
- Sceim na nOilean GWS
- Camus Eighter GWS
- Camus Oughter GWS

The proposed scheme will replace a number of existing sub standard sources and in particular Loughaunwillan, the source for the existing Carraroe Water Supply Scheme, which has been the subject of a petition to the European Union (Petition) No.333/1998 regarding contaminated drinking water in the Carraroe area.

3 DESCRIPTION OF PROPOSED DEVELOPMENT

The principal element of the development is to provide an area in south Connemara with a water supply to cater for existing and future developments within the supply area in compliance with the Drinking Water Regulations (S.I. No. 106 of 2007).

The principal elements of the development will consist of:

- Gauging Station on the stream entering Glenicmurrin Lough.
- Regulating Weir on Glenicmurrin Lough (replaces existing weir).
- Intake works and pumping station on Glenicmurrin Lough (at regulating weir site).
- 300mm raw water rising main from the pumping station to the proposed treatment works at Cashla.
- Water treatment works at Cashla.
- New watermain network, which will be constructed in a number of phases.
- Reservoir at Glenmore.
- Reservoir at Rosmuc.
- Reservoir at Lettermore.
- Access roads, site development and ancillary works at each site

A layout of the overall scheme can be seen in Figure 3.1 and Figure 3.2. A photo of the existing regulating weir on Glenicmurrin Lough is shown in Plate 3.1.

Plate 3.1 Glenicmurrin Lake Outlet Control Structure – looking upstream

In the Public Private Partnership Assessment Report, in line with DEHLG water services policy, TOBIN Consulting Engineers have recommended that certain scheme elements be procured using the Design Build Operate form of contract. For this reason final designs have not yet been developed for these elements, but indicative designs have been developed by TOBIN Consulting Engineers to enable baseline environmental criteria and mitigation measures to be proposed. The elements for which it is proposed to follow a DBO procurement route are:

- Gauging Station on Glenicmurrin Lough inlet
- Regulating Weir, Intake Pump Sump and Control House at Glenicmurrin Lough
- Access Road to Regulating Weir site
- Rising Main from Glenicmurrin Lough intake to Cashla Water Treatment Works
- Water Treatment Works at Cashla

4 ALTERNATIVES

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

A large area north-west of Carraroe has been designated as a cSAC. These environmental designations can be seen in Figure 3.10. The majority of the area around Glenicmurrin Lough is located in this cSAC. It was not possible to locate all of the proposed sites outside the cSAC, however following careful consideration of alternatives, most of the main elements of infrastructure, including the water treatment works, have been located outside the cSAC.

4.1.1 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. Nine different sources were examined for the water supply for the Costelloe Regional Water Supply Scheme. The alternative water sources are shown in Figure 4.1.

Glenicmurrin Lough was selected as the source for the water supply scheme due to its proximity to the proposed supply area and its large catchment. Glenicmurrin Lough has advantages over the other lakes in the catchment as it is the biggest lake and is the furthest downstream in the catchment. There would be less of an impoundment required at Glenicmurrin Lough as it has the greatest contributing catchment area and is the biggest lake. There is a water abstraction order in place to abstract 3,640m^3/day from Glenicmurrin Lough. There is a formal agreement under Seal executed by Costelloe and Fermoyle Fisheries Co. and Galway County Council to allow for the abstraction of 3,640 m^3/d.

The other sources considered for the scheme are presented in Table 4.1 below.

Table 4.1 Source Options

Source	Catch-ment Area (ha)	Lake Area (ha)	Water Quality	Comment
Local to Supply Area (outside the cSAC)				
Loughaunwillan	390	38	Poor, at high risk from cryptosporidium	Required impoundment depth would present a problem, no public confidence in source water quality as this source is seen as a temporary solution
Lough Hibbirt	372	25	No major issues arising	Supplies Gorumna GWS, remote from Costelloe supply area, large impoundment (2455mm) depth required
Lough Aroolagh	173	21	At moderate risk from cryptosporidium	Very limited catchment area, large impoundment (3046mm) depth required
Lough Nambroughania	140	30	No major issues arising	Very limited catchment area, large impoundment depth required (2162mm), lake is remote from main supply centre
Local to Supply Area (inside the cSAC)				
Glenicmurrin Lough	6,700	164	At low risk from cryptosporidium, good raw water quality	Largest catchment of the various options, minimal impoundment depth required (600mm), history of regulation
Lough Cloonadoon	146	50	No major issues arising	Not suitable for impoundment, acts as a balancing lake (flow reverses occasionally), very limited catchment, no engineering advantage over Glenicmurrin Lough

Source	Catchment Area (ha:)	Lake Area (ha:)	Water Quality	Comment
Lough Muckanagh	500	86	No major issues arising	Construction of two regulating weirs required to impound the lake, no engineering advantage over Glenicmurrin Lough
Sources Remote from Supply Area / Other Sources				
Lough Corrib	not necessary to calculate	not necessary to calculate	Generally good in the Upper lake.	Remote from supply area, high cost involved in serving Costelloe area, unlikely to be accepted publicly
Desalination	n/a	n/a	n/a	High cost involved, not a viable option

4.1.2 Alternative Sites for Treatment Works

Four different sites were examined as possible locations for the treatment works. These options are:

- Option No. 1 — Locating the Treatment Works and Clear Water Tanks together as shown in Figure 4.3.
- Option No. 2 — Locating the Clear Water Tanks on higher ground and locating the Treatment Works on lower ground as shown in Figure 4.3.
- Option No. 3 – Western Option – Locating the Treatment Works to the West of Glenicmurrin Lough with water storage provided as a substantial Water Tower near Lettermuckoo as shown in Figure 4.3.
- Option No. 4 – Locating the Water Treatment Works at Cashla, locating the Intake Works adjacent to the regulating weir and operation of most of the network as a pumped system as shown in Figure 4.3.

Option No. 1 and 2 were not chosen as the preferred option as they are located in the SAC. Option No. 3 was not chosen as the preferred option as it is adjudged to give rise to more potential impacts on the landscape character of the area than Options 1 and 2. The water tower associated with the western Option 3 is impossible to screen and would be visually intrusive in the landscape.

Comparing the four options, Option 4 is the preferred choice. This option reflects a radical scheme redesign when compared to that outlined in the Preliminary Report and is an attempt to relocate the main treatment elements outside of the cSAC boundary, while still avoiding the high visual impact of a water tower. The site for the water treatment works would be located adjacent to the industrial estate at Cashla, outside of the cSAC. In addition the intake works would be located at the site for the regulating weir to minimise the impact on the SAC (only a single access road would be required, and part of this is also outside the cSAC).

The main advantages of Option 4 are:

- The site for the water treatment works is located outside of the SAC.
- The combination of the intake and regulating weir further reduces the impact on the SAC.

The main disadvantages of Option 4 are:

- Treated water storage would not be located at high level close to the source, but instead treated water would have to be pumped to local storage at Carraroe and Rosmuc.
- The water treatment works would be located closer to existing development.

4.1.3 Alternative Sites for Gauging Station

Given the choice to use Glenicmurrin Lough as the source, there is only one option for locating the gauging station i.e. on the stream entering Glenicmurrin Lough from Cloonadoon Lough. A gauging station will be constructed on the river at the inlet to Glenicmurrin Lough to measure the inflow to the lake. It is considered that there is no alternative site for the gauging station. However alternative methods of access (for construction and management) are considered.

4.1.4 Alternative Sites for Regulating Weir

The proposed regulating weir will replace an existing weir at the outlet of Glenicmurrin Lough. Given the choice to use Glenicmurrin Lough as the source, there is only one option for locating the regulating weir, i.e. at the stream outlet to the lake. However alternative methods of access (for construction and management) are considered.

4.1.5 Alternative Sites for Intake Works and Pumping Station

Three possible sites were identified on the lake perimeter. These are:

- Site No. 1 is located near the existing boat slip on the southeastern part of the lake.
- Site No. 2 is also located in the same area as Site No. 1 but is located nearer to the access road.
- Site No. 3 is located near the existing weir on the southwestern part of the lake.

Site No. 3 is the preferred choice for the intake works and pumping station.

Site No. 1 is located near a very small dystrophic pool, which has all the typical features of this habitat. The construction of the intake works at the Site No. 1 would result in the loss of the small dystrophic pool, through infilling, drainage or both.

Site No. 2 was considered as an alternative, as it is further away from the dystrophic pool than Site No. 1. The location of Site No. 2 will not impact on the dystrophic pool. At Site No. 2 the pumping station building will be less visible from the Costelloe-Oughterard road than Site No. 1.

Site No. 3 is the preferred option as it is in the same location as the regulating weir. The site is low lying and screened from the road. This site is in the same location of the proposed regulating weir and therefore only one site will be impacted upon during construction. The access to the intake works and pumping station site would be via the proposed access to the regulating weir. It is preferable to Options 1 and 2 in terms of the route and length of rising main to the treatment works at Cashla.

Site No. 1, 2 and 3 are shown in Figure 4.9 and 4.10.

4.1.6 Alternative Sites for Reservoirs

Glenmore Reservoir

The proposed reservoir at Glenmore is to be located beside the existing 455m^3 reservoir as shown in Figure 3.1 and 3.2. The reservoir site is located outside the boundary of the SAC. The proposed reservoir will have a capacity of 1,700m^3 and a TWL of 62.3mOD. The proposed new reservoir can be accommodated within the lands owned by Galway County Council at the existing site. There were no alternative sites examined for the location of the Glenmore reservoir. This is due to the fact that there is already an existing reservoir on the proposed site and the majority of the land required is already in the ownership of Galway

County Council. The proposed reservoir will be constructed adjacent to the existing one and no environmental impact is anticipated.

Lettermore Reservoir

The proposed Lettermore Reservoir is to be located on Lettermore Island as shown in Figure 3.1 and 3.2. The reservoir is to be situated on an area of high ground in order to obtain a TWL of 58.3m OD at the reservoir. The proposed reservoir will have a capacity of 1000m^3. A site was selected adjoining existing residential development. This site will not require disturbance of secluded or isolated areas. The proposed site is located outside the SAC. Alternative sites were examined along this stretch of land. However, considering that the reservoir has to have a TWL of 58.3mOD the number of alternative sites is limited.

Rosmuc Reservoir

The proposed Reservoir is to be located at Glencoh, Rosmuc as shown in Figure 3.1 and 3.2. The reservoir is to be situated on high ground in order to obtain a TWL of 63m OD at the reservoir. The proposed reservoir will have a capacity of 500m^3.

A site was identified approximately 200m to the east of the existing Rosmuc reservoir. After initial site screening was undertaken it was discovered that the proposed reservoir footprint covered an area of currently ungrazed Ling and Western Gorse wet and dry heath with locally abundant Juniper Juniperus communis. This corresponds to the Annex I EU habitat type 'Juniperus communis formations on heaths or calcareous grasslands (5130)' and is in excellent condition. The heath with juniper at this site is of national value. This site was not considered further due to the presence of heath with juniper.

Site No. 2 was identified when Site No. 1 was no longer the preferred choice. Site No. 2 is located off a boreen servicing residential development east of the church. The site is elevated and is not well screened by the adjoining topography or planting. The site is located outside the SAC. Site No. 1 and Site No. 2 are shown in Figure 4.11.

5 WATER - WATER QUALITY

A desktop study was carried out to assess the existing water quality of aquatic areas affected by the proposed scheme. Sources included the reports of the Environmental Protection Agency. To augment water quality information available from previously published sources, a biological and chemical water quality survey was also undertaken as part of the current investigation.

The Costelloe Regional Water Supply Scheme would affect one major river catchment; the Glenicmurrin Lough Catchment (OS Catchment No: 138) and several smaller catchments. The two main affected areas would be Glenicmurrin Lough and the Cashla River. Both of these water bodies have a high water quality; although some enrichment of the Cashla River at the lake outflow was recorded during the current survey. The other watercourses, lakes and marine inlets that are in the supply area are considered to have a high water quality with the exception of Loughaunwillan. Loughaunwillan, the source for the existing Carraroe Water Supply Scheme, has been the subject of a petition to the European Union (Petition) No.333/1998 regarding contaminated drinking water in the Carraroe area.

During the construction phase the main potential impact would be pollution by suspended solids as a result of riparian or in-lake / in-river works. Other materials could also be released from works in and adjacent to aquatic areas. These materials could include raw concrete, fuels, lubricants, paints and sanitary wastes - all of which can be toxic to aquatic life. When the scheme becomes operational, the main potential impact of the proposed scheme would be releases of materials as a result of maintenance works and emissions from the treatment works. Indirect impacts as a result of reduced river flows could also potentially occur.

The EIS outlines the extensive measures devised to avoid or mitigate against negative impacts from this proposed development. These measures will ensure that Glenicmurrin Lough, the Cashla River or other affected watercourses described will not suffer any significant deterioration in their water quality status as a result of the construction and operation of the Costelloe Regional water Supply Scheme.

During the construction phase of the project, the generation of suspended solids will be reduced by adhering to 'best work practices' and the scale and extent of work in aquatic areas will be minimised as far as possible. Restoration of aquatic, riparian and terrestrial habitats within the construction area to their original condition will be undertaken immediately

following completion of construction work.

During the operation of the scheme lake levels will be maintained within their natural range. No releases of materials will occur during the maintenance or normal operation of the gauging station, regulating weir, intake works or treatment works.

6 WATER – HYDROLOGY

The development will control water levels on Glenicmurrin Lough, and control flows downstream in the Cashla River. Water will be controlled in a 600mm band during the control period, which will typically run from mid-April to the end of September. "Compensation flow" from the lake to the Cashla River will be provided at all times to ensure a flow of water in the Cashla River.

The 600mm "control band" lies entirely within the natural range of lake levels. The lowest recorded lake level in the period from mid 1976 to early 2003 was 353mm below the proposed bottom of the control band. The highest recorded lake level in the same period was 1037mm above the top of the proposed control band.

Lake levels during the proposed control period will be generally higher than they would be without the control. The higher lake levels will leave less available storage for summer floods, increasing the speed at which such floods will be passed through the lake. 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.

Lake levels during the winter months will be generally slightly lower than they would be without the scheme, as water abstracted for treatment will reduce water levels on the lake. The hydrological consequences of this will be to provide extra attenuation for winter flows, reducing the flooded area around the margins of the lake and giving slightly lower flows into the Cashla River.

Flows in the Cashla River will be affected, especially during the control period for the lake. The proposed regulating weir will have a fish pass and other means of releasing 'compensation' water into the river. The consequences of the control are that the flow in the river during the summer months will be generally reduced from flow, which would exist without the control. During very dry spells when the natural flow in the river would be very low, the compensation flow provided would be greater than the flow, which would otherwise occur.

7 FLORA AND FAUNA

A desktop study was carried out to identify features of ecological importance within the proposed development sites and environs. Sites designated as being of conservation importance were reviewed in a 5km radius around the proposed scheme. Existing data on the Glenicmurrin Lough and the Cashla River, including fish census records from the Marine Institute fish counter and rod catches, were compiled. NPWS data on the designated areas was also accessed.

A field survey of the study areas were undertaken during April 2006 with additional survey work completed during June 2006 and April 2007. The fieldwork included detailed terrestrial and aquatic investigations, including a phase 1 habitat survey of the affected areas and a number of fish stock surveys. Particular attention was given to assessing the presence of rare species or habitats within the study area.

Much of the study area lies within areas designated for nature conservation. These mainly comprise two large proposed candidate Special Areas of Conservation (pcSACs), namely Connemara Bog Complex (site code 2034) and Kilkieran Bay and Islands (site code 2111). Glenicmurrin Lough (NHA site code 1270) and Glenicmurrin Bog (NHA site code 1991) are also proposed National Heritage Areas (NHAs). The total area of the SAC is 70,324ha. The total area of land required for the project elements in the SAC are as follows:

- The access road, regulating weir and pumping station requires 1.97ha of land.
- The gauging station requires 0.38ha of land in the SAC.

The total amount of land required for the structures in the SAC is 2.35ha, which is 0.003% of the total area of the SAC. It is therefore evident that only a tiny fraction of the SAC would be impacted on by the Costelloe RWSS.

A number of waterbodies and watercourses lie within the study area and may be affected by the proposed scheme. The main area, which would potentially be affected, is the Cashla River catchment. Water would be abstracted from Glenicmurrin Lough and the existing regulating weir at the lake outlet will be replaced. The Cashla River and Glenicmurrin Lough are renowned sea trout fisheries. The rare fish Arctic char was confirmed to be present in the lake during the current survey. A total of thirty two different habitat types were recorded during the survey, reflecting the high biodiversity found in this part of Co. Galway.

As water will be abstracted from the Glenicmurrin Lough, an important sea trout fishery that falls within the boundaries of a proposed candidate Special Area of Conservation (The Connemara Bog Complex), there is potential for negative impacts on this internationally important site to occur. The construction of treatment works, reservoirs and a rising main network could also result in significant impacts on both the terrestrial and aquatic environment. Potential impacts associated with the proposed scheme could occur during the construction and operation of the project and a series of mitigation measures have been designed to avoid or minimise these impacts.

During the construction phase the main potential impact would be habitat loss at the footprints of the components of the scheme along with pollution by suspended solids as a result of riparian or in-lake / in-river works. Other materials could also be released from works in and adjacent to aquatic areas. These materials could include raw concrete, fuels, lubricants, paints and sanitary wastes - all of which can be toxic to aquatic life. In addition, direct disturbance of the river / lakebed would occur and this would impact directly on fish and other aquatic life. This would be particularly severe if it occurred during a sensitive time, i.e. when fish were spawning. When the scheme becomes operational, the main potential impact of the proposed scheme would be potential effects on lake water levels and river flows which could impact on both fish migration, angling and aquatic life. If not adequately designed, the proposed regulating weir could also act as a barrier to migration for fish and mammals.

During the EIA process there has been extensive consultation with the various appropriate statutory bodies including National Parks and Wildlife Service (NPWS) and the Western Regional Fisheries Board (WRFB). The concerns of the statutory bodies have been addressed in the scope of research conducted and in the design of mitigation measures which meet the requirements imposed by the relevant National and European legislation.

The EIS outlines the extensive measures devised to avoid or mitigate against potential negative impacts from this proposed development. These measures will ensure that Glenicmurrin Lough, the Cashla River or other affected watercourses described will not suffer any significant deterioration in their water quality status or aquatic ecological and fisheries value as a result of the construction and operation of the Costelloe Regional Water Supply Scheme. The locations of the intake works, treatment works, reservoirs and watermains have been carefully selected to avoid the most sensitive habitats in the area.

During the construction phase of the project, in-stream / in-lake works will be carefully timed so that they do not coincide with sensitive periods (i.e. fish spawning). The generation of suspended solids will be reduced by adhering to 'best work practices' and the scale and extent of work in aquatic areas will be minimised as far as possible. Restoration of aquatic, riparian and terrestrial habitats within the construction area to their original condition will be undertaken immediately following completion of construction work.

During the operation of the scheme, lake levels will be maintained within their natural levels. No regulation of lake levels will take place during the winter months to ensure that no interference with char spawning occurs. A compensation flow will be provided for the Cashla River and this and the design of the fish pass will be agreed in advance with both the engineering section of the Department of Communications Marine and Natural Resources and the Western Region Fisheries Board. Fish migration and char spawning in the lake will be monitored on an ongoing basis. A modern fish counting system will be provided at the new regulating weir.

8 HUMAN BEINGS – PUBLIC HEALTH

This study comprised a desktop assessment of information and data collated from Galway County Council and the Environmental Protection Agency. The proposed Costelloe Regional Water Supply Scheme will replace 3 existing public water supplies and 3 existing group water supplies. These schemes include Carraroe Water Supply Scheme, which has been the subject of a petition lodged with the European Union (Petition) No. 333/1998 regarding contaminated drinking water in the Carraroe Area. A report from the EU Committee on Petitions recommended that urgent measures need to be taken to ensure this supply complies with the provisions of the Drinking Water Directive, and that financial resources for a reliable and clean resource of water should be made available for the inhabitants of Carraroe. Drinking water quality results during the period from 2001 to 2005 for the existing water supplies in the Costelloe Region were reviewed and compared to the European Communities (Drinking Water) Regulations. Exceedances were noted for a number of parameters at all supplies during that period, namely, faecal coliforms, total coliforms, odour, iron and manganese. Recent water quality results for the proposed supply, Glenicmurrin Lough indicate that untreated water more or less complies with the 2001 Regulations. One of the most significant drinking water and public health issues in recent years has been outbreaks of cryptosporidiosis related to drinking water supplies. *Cryptosporidium* risk assessments for the existing public water supplies within the Costelloe Region indicate that two of the existing supplies are at very high risk and two of the supplies are of moderate risk.

An overall positive impact on public health is expected, as the proposed Costelloe Regional Water Supply Scheme will replace six existing schemes. Furthermore, the proposed Scheme will fulfil recommendations outlined in the report from the EU Committee on Petitions, which includes establishing a reliable and clean resource of water for the inhabitants of Carraroe.

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; and
- *Cryptosporidium* risk assessment be conducted for the proposed supply, with subsequent monitoring and remediation measures undertaken as required.

9 HUMAN BEINGS – SOCIO - ECONOMICS

The proposed Regional Water Supply Scheme (RWSS) will supply Costelloe, an area in South Connemara, in West Galway. Costello comprises of the following areas, Camus, Carraroe, Costelloe, Gorumna Island Lettermore Island, Lettermullan, Rosmuc, Rossaveal and their environs. These settlements are located in the Local Electoral Area (LEA) of Connemara. Connemara itself can be broken into 44 District Electoral Divisions (DED). The areas to be connected to the water scheme do not fit neatly into the DED's. However, using a DED map for the area the scheme will generally take place within the DED's of Camus, Crumpaun, Gorumna, Kilcummin, Lettermore, Ross and Turlough.

The study area is characterised by dispersed rural housing and farm buildings. The most popular type of farming in the area is Rough Grazing. Using available information from the CSO the population for the study area is estimated to be 5,462. Five of the seven DED's have experienced population decline over the last decade. Carraroe is the largest village in the area and is designated as a Service Hub. The population of Carraroe and its environs is estimated to be 2,266.

Connemara is rich in landscape, cultural, natural and built heritage. The study area is located in close proximity to a Special Protection Area (SPA), a Natural Heritage Area (NHA) and is partly contained within a Special Area of Conservation (SAC).

On average, tourists to Ireland spend 34% of their time in the West Region. In 2004 the number of tourists to Galway was approximately one million, while the total revenue generated from these tourists was €350 million. According to the Galway County Development Plan 2003-2009, Galway possesses extensive areas of scenic beauty which when added to its distinctive heritage, culture and leisure facilities are a major indigenous resource. Tourism is an excellent way to generate additional incomes in rural areas. It is a policy in the County Development Plan to promote tourism related developments in the countryside. The provision of the Costelloe RWSS will have a positive impact on tourism.

The study area consists largely of agricultural land and one-off rural housing. There are a number of agricultural farms in the study area. The proposed development will not negatively impact on the livelihood of local residents. With the additional water supply it is expected 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.

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.

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.

The increase in population that could potentially occur from the proposed development may negatively impact on the visual amenities of the study area and existing rural landscape.

Mitigation measures to control the affect of the proposed RWSS on amenities and tourism include;

- Limit works that would involve the closure of walkways or road networks.
- Limit working hours to between 08.00am and 18.00pm except in exceptional circumstances.
- No works to be carried out on weekends and bank holidays.

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

Costelloe and Fermoyle Fisheries

The Costello and Fermoyle Fishery is a renowned sea trout fishery and consists of the Cashla River, Glenicmurrin Lough and a number of other lakes in the catchment, including Lough Fermoyle. Glenicmurrin Lough is the largest Lough in the Cashla catchment.

Glenicmurrin Lough is part of the fishery operated by the Costello and Fermoyle Fisheries Company Ltd. It is of prime importance not to damage the operations of the fishery in any

way. There is also a fish hatchery downstream of the lake on the Cashla River. While this does not seem to be in operation at the moment the planning permission granted to the hatchery in the mid-eighties allows them to abstract up to one third of the water flowing in the river at any time.

Monitoring measures will be required to ensure that there is no impact on Costelloe and Fermoyle Fisheries.

10 NOISE

A noise impact assessment has been carried out of the proposed Costello Regional Water Supply Scheme. A baseline noise survey was carried out which indicated that the noise environment in the area is representative of a rural environment. Ambient noise levels are controlled by wind noise and road traffic on the local road network.

It is expected that construction of the Costello Regional Water Supply Scheme will result in short term noise impacts at noise sensitive locations during the construction stage. However, predicted noise levels associated with construction activity will not exceed the guideline level of Leq (1h) 65 dB(A). During the operational phase of the water supply scheme, significant noise impacts are not predicted.

With regard to mitigation measures, it is recommended that all construction 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*). Accordingly, all construction plant 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.

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. Construction activity due to its nature is a temporary activity and thus any impacts will be short term. Construction works will generally be carried out during daytime periods.

On operation of the regional water supply scheme, it is recommended that all extraction fans, openings for cooling units/vents etc. attached to superstructures at the treatment works and elsewhere in the development 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.

11 LANDSCAPE AND VISUAL

Given the nature of the proposed development and its location in a semi-wild and expansive landscape of scenic and cultural importance adverse impacts are inevitable. However, the scheme as presented has been selected following consideration of an alternative configuration of the key elements of the scheme and this alternative was adjudged to give rise to lesser impacts. Furthermore, the individual elements have been carefully considered and where possible modified to alleviate potential impacts.

The proposed reservoirs will give rise to local impacts by reason of the required location on elevated ground. They are small discrete elements and while all are in sensitive sites they should all be capable of construction without giving rise to significant impacts outside the immediate area. The reservoirs although small are all located in highly visible locations and their profile and the associated earthworks will have to be carefully designed to avoid generating artificial profiles in open, elevated landscapes or on top of a prominent ridges.

The gauging station will not have any impact on the area.

The regulating weir, intake works and pumping station while it will have a significant effect on the immediate locality of the stream will not have any impact on the wider area.

The site of the proposed treatment works is to be located adjacent to an existing settlement and beside an established industrial estate. There will be a slight effect on character as buildings, tanks and related plant are provided on an existing open site. There will be a slight effect on views from roads and residential properties in the immediate vicinity. The apartment building to the southwest of the site (which gables on to the majority of the site rather than fronts on) will have limited views over the site however many of these views already include the industrial facilities to the east and north of the proposed development. The scale of the elements with the scheme with overall heights of 3-5 metres over ground level is essentially domestic and as such there will be a slight negative impact on the existing residential properties in Cashla. There will also be a slight impact on the sites of a number of proposed houses (planning permission granted) to the south and east of the site. The overall impact on views and the landscape character of the area is adjudged as slight and neutral.

An appropriate methodology to deal with reinstatement, embankments and cut faces in the landscape will be required. The techniques should be based upon ecological principals using

native material preferably from local sources.

The proposed development is considered essential to provide a safe and consistent water supply to residents in the area and there is no viable alternative method of supplying and treating the water, other than that mentioned above. It is against this background that the impacts on the landscape arising from the proposed scheme should be evaluated.

12 CULTURAL HERITAGE

The cultural heritage section is divided into two components; the first considers terrestrial cultural heritage and the second addresses the underwater cultural heritage. The purpose of the assessment was to identify and quantify the potential impact of the proposed development on any archaeological features or deposits, which may be in the subject area. In addition, the assessment recommends mitigatory measures to ensure the protection of such material.

Terrestrial Cultural Heritage

A combined survey strategy was employed, this consisted of consultation of primary sources including maps and relevant depositories, site inspections, photographic records and written descriptions.

Potential Impacts on the cultural resource were classed under the following categories; Low, Medium and High impacts. Having carried out a full examination of the proposed development area the majority of the proposed development is restricted to the existing roadway and the potential for impact upon the receiving archaeological landscape is low. However, it is recommended that groundwork be subject to regular inspections.

The potential for impact of excavation for pipelines through Greenfield areas and in the vicinity of recorded monuments is rated as medium. It is therefore recommended that a suitably qualified archaeologist monitor all excavation works.

It is also recommended that peat and soil stripping in relation to the locations of the proposed gauging station, regulating weir, intake works, water treatment works and reservoirs are fully excavated in the presence of a suitably qualified archaeologist. Dependant upon construction methodology, it is further recommended that consideration be given to the completion of underwater archaeological surveys in the vicinity of the proposed water crossings.

Preventative measures should be taken to avoid any damage to architectural structures along the route of the pipeline. These include bridges, buildings and boundary walls of the structures. While the majority of works follow the course of existing roads special care should be taken to prevent damage to vernacular field walls, gates and piers.

Underwater Cultural Heritage

The underwater assessment of the impact of the development on Glenicmurrin Lough was centred on one location at Glenicmurrin Lough/Cashla River, at the site of the proposed regulating weir, intake works and pumping station .

The underwater assessment was divided into two parts; the diver visual survey and the diver metal detection survey.

The diver visual survey of the area downstream of the proposed regulating weir recorded that the riverbed consisted of bare bedrock overlain by angular stones (small, medium and large) and coarse gravel pockets. There were no archaeological deposits or features noted in this area. The upstream area of the proposed regulating weir included the current but now derelict structure. Upstream of this, the river broadens into a shallow 'V' shaped riverbed, which is fed from the nearby lake. There were no archaeological features or deposits noted in this area. The metal detection survey of this development area did not record the presence of any archaeological ferrous material.

13 SOILS - GEOLOGY

Potential Impacts on the soil and geology were classed under the following categories; Low, Medium and High impacts. The proposed development includes the installation of headworks, trunk and distribution mains and storage reservoirs. Having carried out a full examination of the proposed development area the majority of the proposed development is restricted to the existing roadway and the potential for impact upon the receiving soil and hydrogeological environment is considered low. The greatest impact on the site will occur during the construction phase.

The geological material existing within the sites of the Costelloe RWSS have been generated by the deposition of volcanic material approx 400 millions years ago. The geological material underlying the proposed sites is largely concealed, due to the deposition of postglacial peat.

Visual assessment of the water treatment works site at Cashla indicates that shallow soils occur across the entire site. In the locations of the Glenmore and Lettermore Reservoirs rock is at surface or less than 1 metre deep. The Connemara Bog Complex is characterized by areas of deeper peat surrounded by granite outcrops, covered by shallow heath vegetation. The regulating weir, access road to the regulating weir and gauging station are located within the Connemara Bog Complex.

A site walkover and ninety-one probes were carried out along the proposed access road to the Intake Works/Regulating Weir site. Dry fibrous peat was encountered along the entire route and generally ranged in thickness from 0.3m to 1.5m in depth, except for a 60m long section where depths increased to 2.5 - 3.5m. Peat depths along the transects increased away from the road alignment, indicating that the chosen route is the preferred one in terms of minimising disturbance to peat.

Bedrock Geology

The geological map, published by the GSI, indicates that the sites are underlain by Galway Granite deposited during the late Silurian to early Devonian Period (440 to 390 million years ago).

Hydrogeology

The GSI have indicated that the Galway Granites will be classified as Poor Aquifers productive only in local zones (Pl).

A fault is interpreted, by the GSI Geological Map Sheet 10, to be present in the southern region of the Lough Glenicmurrin running south towards Costelloe and Rossaveel, which may result in a higher permeability zone. The fault is located close to the area of the proposed regulating weir.

With respect to the regional geological environment, the proposed development will not impact on the ground conditions outside the proposed site boundaries.

In order to minimise any potential impact on the environment, including the soil and geological environment, 'Avoidance of Impact' was incorporated into the design of the development.

14 MATERIAL ASSETS - TRAFFIC

The site for the proposed gauging station will be located on the northern part of Glenicmurrin Lough. The access to the proposed gauging station site is from an unclassified unpaved road running from the R336 to north of the lake.

The site for the regulating weir, intake works and pumping station will be located on the southwestern part of Glenicmurrin Lough. The access to the proposed regulating weir is from an unclassified unpaved road running from the R336 to the lakes.

The site for the treatment works is in Cashla. The site is located off the R336 Road.

The proposed reservoir at Glenmore is to be located a short distance east of Carraroe Village. The site is located off a local county road, which is located off the R343.

The proposed Lettermore reservoir is to be sited in Lettermore Island. The proposed site is located to the west of the R374. The access to this site is off a local county road.

The proposed reservoir at Rosmuc is to be located at Glencoh, Gortmore. The site is located on elevated ground off a boreen off the R340.

The roads are shown in Figure 14.1.

The development of the Costelloe 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 site.

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 Cashla will lead to a slight increase in vehicle movements on the R336 Road. The long-term operation of the reservoirs and the regulating weir, pumping station and intake works at Glenicmurrin Lough will not lead to any considerable increase in vehicle movements.

Measures to mitigate against the impact of the proposed development on the road structure could include 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.

15 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 an assessment of the interactions between those aspects where an interaction is considered to be both likely and significant. Listed below is a summary of the most important interactions between environmental impacts.

Interaction between Water and Ecology Impacts

The construction of the gauging station, regulating weir and intake works takes place on the banks of Glenicmurrin Lough and Cashla River. 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.

Interaction between Visual and Human Being Impacts

The construction of the Costelloe 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.

Interaction between Noise and Human Being Impacts

The proposed Glenmore Reservoir, Lettermore Reservoir and Rosmuc Reservoir are in proximity to existing houses. 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.

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.