Environmental Impact Statement

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1.0 SECTION 1 – INTRODUCTION

1.1 The Project

1.1.1 Introduction

1.1.1.1 The project involves the upgrading of an existing Waste Water Treatment Plant (WWTP) to treat the effluent from the town of Mullingar and the surrounding environs. It also includes the provision of a Sludge Treatment Installation for the town of Mullingar and environs. In line with current practice in Ireland, it is probable that the project will be procured using the Design/Build/Operate type of contract, incorporating Performance Requirements enforced by process guarantees. This is discussed in more detail in Section 3.

1.2 Appointment/Brief and History

1.2.1 Introduction

1.2.1.1 In 2001, J. B. Barry & Partners and White Young Green Ireland were appointed by Westmeath County Council to carry out the "Mullingar Sewerage Improvement Scheme". The Scheme incorporates two main elements: -

- Analysis of the Mullingar Main Drainage Scheme and recommendations on a wastewater collecting system to cater for the needs of Mullingar and its environs for a fifty year design horizon. The wastewater treatment and pumping facilities should cater for a twenty-five year period.
- Identification and analysis of the causes of flooding of the River Brosna and its tributaries. Identification of flood prevention and alleviation measures. The completed preliminary Report will provide information, which will assist with making informed decisions on planning applications for future development in the catchment areas described below.

1.2.1.2 The catchment area for the Study is defined as follows:

- All of the area zoned in the Mullingar Town Development Map
- Any other areas outside the zoned area which form part of the natural catchment and are regarded as developable lands.
- Any other areas defined following discussion with the Planning Section of Westmeath County Council.

1.2.1.3 This Environmental Impact Statement deals with the Waste Water Treatment Plant at Mullingar.

1.3 Environmental Impact Statement

1.3.1 Introduction

1.3.1.1 Regulations enacted in Irish Law (1989 to 1999) under the EU Directive on Environmental Impact Assessment (85/337/EEC) came into effect on 1st February 1990. These regulations stipulate the type and scale of development that are subjected to an EIA. Environmental Impact Statements (EIS) are required for Waste Water Treatment Plants that have a capacity in excess of 10,000 Population Equivalent (P.E.).

1.3.1.2 It is proposed to upgrade the existing Waste Water Treatment Plant at Mullingar to cater for the projected population and the commercial/institutional and industrial loadings from Mullingar Town and Environs. ***As the ultimate design capacity of the proposed waste water treatment plant is 55,000 PE, an EIS is required.*** The project will incorporate sludge treatment facilities for waste sludge generated at the WWTP and also for sludge imported from other smaller WWTPs in County Westmeath.

1.3.1.3 The plant will be required to comply with current EU and Irish legislation including the EU Urban Waste Water Treatment Directive (91/271/EEC).

1.3.1.4 This Environmental Impact Statement has been prepared in accordance with the European Communities (Environmental Impact Assessment) Regulations, 1989 to 1999. The preparation of the Environmental Impact Statement is also in accordance with the *Draft Guidelines on the Information to be contained in Environmental Impact Statements* (Environmental Protection Agency) and the *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (Environmental Protection Agency).

1.3.2 EIS – Topics

1.3.2.1 The EIS addresses the following:

- Description of the proposed development
- Description of the existing environment

- Description of the likely significant effects of the proposal on the environment
- Avoidance, remedial or mitigation measures
- Monitoring
- Forecasting Methods
- Difficulties in acquiring information

1.3.3 The Written Statement

1.3.3.1 The EIS is presented in two volumes as follows:

Environmental Impact Statement

- Non Technical Summaries
- Environmental Impact Statement

Environmental Impact Statement - Appendices

- Odour Impact Assessment
- Environmental Noise Impact
- Landscape & Visual Study
- Flora and Fauna
- Archaeology and Cultural Heritage
- Material Assets – Traffic Assessment
- Soils Geology and Hydrogeology

1.3.4 The EIS Team

1.3.4.1 The overall co-ordination of the EIS was carried out by the Sewerage Improvement Study Team, who briefed all the specialist consultants, co-ordinated their input and then prepared the EIS. The team assembled for the preparation of the EIS consisted of the following consultants:

- Odour Impact - RPS Environmental Sciences
- Noise - ANV Technology
- Landscape / Visual - Brody Shipman Martin

- Flora & Fauna - Natura Environmental Consultants
- Archaeology / Cultural Heritage - Margaret Gowen & Co. Ltd
- Material Assets / Traffic - J B Barry & Partners
- Soils, Geology & Hydrogeology - White Young Green (Irl) Ltd

1.3.5 Difficulties Encountered

1.3.5.1 In consideration of paragraph 2(d), Second Schedule of the European Communities (Environmental Impact Statement) Regulations, 1999 (S.I. No. 93 of 1999), which allows for the inclusion of a description of difficulties encountered in compiling the EIS, it is concluded that adequate technical knowledge and information has been available in the production of this statement.

2.0 SECTION 2 – PROJECT DESCRIPTION

2.1 Introduction

2.1.1 Existing Environment

2.1.1.1 The town of Mullingar is located in County Westmeath, on the main Dublin/Sligo Road (N4). As the county town, it is located centrally in the county and it stretches for some 5 kilometres along the banks of the Royal Canal. It is predominantly a market town serving the surrounding rural towns and is very much associated with agriculture and is noted as a prime cattle rearing district. The town, though still having great farming ties, is a busy, vibrant commercial centre. Due to its long association with angling, its location and the abundance of lakes in the area, the town is appropriately named the "Capital of the Lakelands". There are a number of small to medium sized industries and a significant amount of commercial businesses, which are associated with tourism and the town also boasts excellent shops, quality accommodation, top class restaurants and lively pubs.

2.1.1.2 The existing Wastewater Treatment Plant at Clonmore, Mullingar was extended in 1992 and was initially designed to cater for an ultimate population equivalent of 32,000 using both existing and new systems. However, once the extension was commissioned, the old works became redundant and are now in a poor state of repair reducing the serviced Population Equivalent. The treatment system in operation is an extended aeration system using a carousel type tank, which provides secondary treatment and phosphate removal for an estimated PE of 17,000. The River Brosna, which discharges to Lough Ennell, is the principal natural waterway flowing through Mullingar.

2.1.1.3 The existing Clonmore plant has an estimated total phosphorus influent loading from the domestic population and industries discharging to sewer, which is 13.8 T per annum. The annual average total phosphorus and BOD effluent concentrations measured at the plant are presented in Table 2.1

Table 2.1 Mullingar Wastewater Treatment plant, Effluent Quality

Year	Average Total Phosphorus (mg/l)	Average BOD (mg/l)
1998	0.9	7.2
1999	0.9	6.2
2000	0.7	6.9

Source: Lough Ree & Lough Derg Final Report

2.1.1.4 The total phosphorus loading to the River Brosna was 1.7 T per annum (based on measured concentration and flow data) indicating that the plant had removed 88% of the influent loading. The phosphate removal facilities were therefore operating close to peak efficiency.

2.1.1.5 Monitoring data indicates that the plant has been producing a satisfactory effluent quality over the period 1998-2000.

2.1.2 Need for the Project

2.1.2.1 A review of the current drainage infrastructure in the town of Mullingar and Environs was carried out as part of the Mullingar Sewerage Improvement Preliminary Report, by John B. Barry & Partners and White Young Green Ireland Consulting Engineers. This involved a review of the operational performance of the current WWTP at Clonmore.

2.1.2.2 Due to recent developments it is now necessary to re-examine the present and future industrial and residential loading on the treatment plant and to assess the ability of the plant and the process to treat the wastes and to comply with requirements of the Urban Wastewater Directive 91/271/EEC.

- The project entails analysis of the Mullingar Sewerage Improvement Scheme and recommendations on a wastewater collecting system to cater for the needs of Mullingar and its environs for a fifty-year design horizon. The wastewater treatment and pumping facilities should cater for a twenty-five year period.
- Identification and analysis of the causes of flooding from the Rivers Brosna and its tributaries. Identification of flood prevention and alleviation measures.

2.1.3 Proposed Scheme

2.1.3.1 The proposed scheme involves the upgrading of the existing Waste Water Treatment Plant to a 55,000 PE to treat effluent generated from the whole of Mullingar and the adjoining environs for a twenty-five year design horizon. There is an existing waste water treatment plant at Clonmore and an outfall for treated effluent disposal into the River Brosna.

2.1.3.2 The projected population of Mullingar and Environs for the year 2027 was calculated, details of which are included in Section 2 of the Preliminary Report. A figure of 55,000 PE has been adopted as the design population for the new Waste Water Treatment Plant.

2.2 Site Selection

2.2.1 Preliminary Report – 2002

2.2.1.1 The scheme was the subject of the Mullingar Sewerage Improvement Preliminary Report completed by John B. Barry and Partners/ White Young Green Ireland in October 2002.

2.2.2 Site Selection

2.2.2.1 It is recommended that the new Waste Water Treatment Plant for Mullingar and Environs should be a single 55,000PE facility located at the site of the existing Clonmore treatment plant. It is also recommended that a new access road be provided as indicated in Figure 2.

2.2.2.2 The waste water treatment process proposed by the tendering contractors will be required to comply fully with the Performance Requirements set out in the Contract Documentation. Figure 3 details a large footprint wastewater treatment plant layout.

2.3 Sludge Treatment

2.3.1 Sludge Treatment Requirements

2.3.1.1 In 1993, the Department of the Environment commissioned a National Sludge Strategy Study on the treatment and disposal of sewage sludge in Ireland. Weston F.T.A carried out the study. The study report was submitted to the Department of the Environment in November 1993. The Government accepted the findings of that study, and the recommendations in the study are the starting point for official Irish policy for sludge treatment and disposal. Subsequent

studies and guidelines have amended the policy document so that the requirement is for a Class A sludge.

2.3.1.2 The National Sludge Strategy Study recommends that regional sludge treatment facilities be located in each county and/or urban area. It is proposed that the sludge acceptance plant should include for screening all incoming sludge (to 5mm).

2.3.1.3 Each regional Sludge Treatment centre would be sized to cater for the sludge from the Sewage Treatment Plant at which it is located, in addition to sludge from other sources within its operational area. Transport routes are limited to 40 km approximately. It is considered that the proposals will result in economic treatment of sludge for Ireland as a whole, as the sludge treatment plant will be quite large in capacity terms, with corresponding economies of scale, and reduced operating costs.

2.3.1.4 The disposal options, which were considered in the National Sludge Strategy Study, included:

- Land application for agricultural purposes.
- Forestry.
- Land reclamation.
- Restoration of peat bogs, and
- Landfill - co-disposal with Solid Waste.

2.3.1.5 The above ranking is in terms of desirability, with the least desirable being landfilling, i.e. co-disposal with municipal solid waste. It is recognised that a major promotional campaign is necessary to achieve the agricultural route. However, it is considered that this route is most desirable, involving a significant re-use of the sludge. The forestry route is viewed in similar terms. Land reclamation is viewed as having limited applicability, being largely "opportunistic". Restoration of peat bogs is seen as a valuable disposal route, but is limited to regions proximate to bogs.

2.4 Alternatives - Sludge Treatment

2.4.1.1 Sludge disposal in Mullingar is being examined currently in relation to preparation of a Sludge Management Plan for County Westmeath.

It was proposed in the National Sludge Strategy Study that County Westmeath should have two regional Sludge Treatment Centres, at the following locations:

- Athlone
- Mullingar

2.4.1.2 The population equivalent from the WWTPs in County Westmeath is 44,750. These figures are being reviewed in the County Westmeath Sludge Management Plan, currently in course of preparation.

2.4.1.3 The Preliminary Report for the Mullingar Sewerage Improvement Scheme, therefore, takes cognisance of a Sludge Treatment Centre (STC) proposed in Mullingar and recommends that the Mullingar STC be constructed on the existing Clonmore WWTP Site.

Sludge Treatment and Disposal – Mullingar

- A 55,000 PE WWTP to serve Mullingar and its environs is currently being proposed for construction at Clonmore, south west of the town. Sludge treatment will consist of the following:
- Thickening
- Dewatering
- Pasteurisation

2.4.1.4 The Sludge Treatment Facility, which will be procured under a Design Build Operate (DBO Contract), will include a sludge acceptance plant to receive, screen and treat incoming sludges from WWTPs in County Westmeath, as identified in the Sludge Management Plan.

2.4.1.5 The Mullingar plant will include for sludge dewatering and pasteurisation as per the Sludge Management Plan.

County Westmeath Sludge Management Plan

- It is expected that a final draft of the County Westmeath Sludge Management Plan will be available shortly.
- In the circumstances, it is considered that the finalisation of Sludge Disposal Planning for the Mullingar Sewerage Improvement Scheme should await the finalisation of the County Westmeath Sludge Management Plan.

Mullingar Sewerage Improvement Scheme – Sludge Treatment and Disposal

- The sludge arising in County Westmeath, including Mullingar, for the horizon year of 2020, will amount to at least 3500 TDS/year, from a population of circa 141,500PE. As discussed above, these figures will be developed in detail in the County Westmeath Sludge Management Plan. Transport economics will influence the quantities transferred to Mullingar and Athlone for treatment and subsequent disposal. A major factor in the transport study will be the dried solids content, and the level of dewatering which will be required at the various WWTPs. Studies carried out in other parts of Ireland to date have indicated that sludge should be dewatered to at least 18/20% D.S. before transport. Once the sludge is delivered to the STC it may have to be rewatered before further processing.
- In these circumstances, it is considered most probable that dewatering to 18/20% D.S. will be required at the Clonmore WWTP.

2.5 Recommended System

2.5.1 Waste Water Treatment Plant and Sludge Treatment Installation

2.5.1.1 The conclusion made within the preliminary report having considered the alternatives available in Mullingar, and taking into account any relevant previous reports, was that a single 55,000PE Waste Water Treatment Plant should be located at the existing Clonmore site to treat the combined effluent from Mullingar town and environs, utilising as much of the existing facilities in the town as possible.

2.5.1.2 It is most probable that sludge produced will be dewatered to 18-20%D.S. It is also most probable that sludges from other WWTW in County Westmeath will be transported to Mullingar Sludge Treatment Centre for further treatment.

2.5.2 Treated Effluent Disposal

2.5.3 Water Quality

2.5.3.1 As set out above, the construction of the new 55,000 PE WWTP for Mullingar town, sized to cater for the combined populations of Mullingar, will significantly improve water quality in the receiving waters of the River Brosna and Lough Ennell.

2.5.3.2 Water Quality Standards

- The WWTP must comply with the Urban Waste Water Treatment Directive. This will lead to the improvement and protection of water quality in the River Brosna and Lough Ennell.
- The Water Quality Standards selected for use on the Mullingar Sewerage Improvement Scheme are derived from:-
- EU Directive 76/160/EEC relating to the Quality of designated Bathing Waters and the enabling Bathing Water Quality Regulations, SI 155 of 1992, SI 145 of 1994 and SI 230 of 1996.
- EU Directive 91/271 EEC and amending Directive 98/15/EEC relating to Urban Waste Water Treatment and the Urban Waste Water Treatment regulations, SI 419 of 1994.
- EU Directive relating to Freshwater Fish (78/659/EEC)
- European Communities (Quality of Salmonid Waters) Regulations SI 293, 1988
- Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorous) Regulations, SI 258 (1998).

3.0 SECTION 3 – MULLINGAR TOWN AND ENVIRONS PROPOSED WASTE WATER TREATMENT PLANT

3.1 Introduction

3.1.1.1 As set out above, the proposal involves the upgrading of the existing waste water treatment plant and a sludge treatment installation for Mullingar Town and Environs. It is intended that the contract will include an operate element, for a 20/25 year period.

3.2 Procurement

3.2.1.1 In line with current government and DoELG policies Contracts such as Design and Build (D&B) or Design, Build, Operate (DBO) are becoming more widely used. The DBO type of contract is a contractual relationship between the local authority and a contractor from the private sector for the design, construction or refurbishment and extension of a plant and for the operation and maintenance of the works over a specified contract period (typically in the region of 20 years).

3.2.1.2 It is most likely that the Mullingar Sewerage Improvement scheme project will be procured using the Design, Build and Operate (DBO) form of contract. The DBO form of contract combines the requirement to design and construct the asset and deliver the service associated with the project. Such projects are financed from public funds with the responsibility for the construction of the facility and its operation of a defined period coming from the private sector. DBO offers advantages with regard to reliability of equipment and robustness of the process design.

3.2.1.3 Conventional contracts tend to separate the responsibilities for the design and construction. This has the potential disadvantage that the designers have to make assumptions about how a project will be constructed before the contractor has been chosen and his method of construction is known or when construction is underway design changes have to be undertaken to take advantage of the contractor's recommendations. Therefore in D&B/DBO contracts the responsibility for the design and construction is with the contractor.

3.2.1.4 It is proposed to use the **DBO** form of contract for the Mullingar Sewerage Improvement Scheme.

3.2.1.5 The Contract specification and documentation will include Performance Requirements for the facility. These Performance Requirements will cover a range of issues, including, but not limited to the following:

- Waste Water Treatment Process Requirements
- Air Emissions including odour and noise
- Maximum footprint and height requirements relating to both tanks and buildings
- External building fabric
- Landscaping
- Other environmental issues

3.3 Waste Water Treatment Process Alternatives

3.3.1 Introduction

3.3.1.1 The Waste Water Treatment processes for the Mullingar WWTP will be required to result in a treated effluent which meets the following standards:

- BOD : 10mg/l
- TSS : 10mg/l
- TN : 10mg/l
- TP : 0.3mg/l

3.3.1.2 The above parameters will be set as Performance Requirements in the Design/Build/ Operate contract. The compliance levels will be as required by the EU Urban Waste Water Treatment Directive, and as further set out in the EPA document "The Environmental Protection Agency Act 1992, Urban Wastewater Treatment Regulations, 1994 - A handbook on implementation for Sanitary Authorities"

3.3.1.3 A wide variety of waste water treatment processes will result in compliance with the process requirements set out above. These would include, but not be limited to, the following:

- Conventional Activated Sludge or extended aeration including chemical / biological phosphorous removal in addition to tertiary treatment e.g. rapid gravity sand filters
- Membrane Bioreactors
- Sequencing Batch Reactors including chemical phosphorous removal in addition to tertiary treatment

3.3.1.4 The waste water treatment process proposed by the tendering contractors will be required to comply fully with the Performance Requirements set out in the Contract Documentation.

3.3.1.5 Figure 3 details a possible wastewater treatment alternative. This alternative will, in all probability be the maximum size layout, which will be required. This arrangement may be altered to suit the treatment installation being put forward by the Contractor. Other alternatives would probably result in a smaller "footprint".

3.4 Waste Water and Sludge Treatment Process Alternatives

3.4.1 Introduction

3.4.1.1 Any alternative waste water or sludge treatment design or layout will only be considered appropriate if:

- It's impacts are equal to the impacts described in this EIS and/or
- It's positive impacts are of greater significance that those outlined in this EIS, and/or
- It's negative impacts are of lesser significance that those outlined in this EIS

3.4.1.2 The site is circa 2.89 ha in area (including landscaping). The construction and operation of the plant will take place within these boundaries.

3.4.1.3 The contract documentation will identify process requirements or standards that the facility is required to achieve but will not specify the type of treatment processes which will be required to meet those standards.

3.4.1.4 Contractors will be required to put forward the Waste Water Treatment Process, which they feel is most appropriate in this specific circumstance. They will also be required to put forward proposals relating to environmental and other requirements such as health and safety. The contractor will be required to provide process guarantees for all these requirements. The contract also will include a 20 year operation and maintenance element and ensure that monitoring is in compliance with process requirements.

3.4.2 Landscaping

3.4.2.1 The proposal involves landscaping provisions, to achieve the following:

- Boundary vegetation will be managed to increase viability and replaced on a phased basis to ensure long term screening is achieved.
- Routing the proposed new access road to retain as much of the existing hedgerow as possible.
- Selected screen planting to the eastern boundary of the site.
- To provide areas where the excavated material from the ground on the site can be permanently stored on site.

3.4.2.2 The full landscaping plan developed by the Landscape Consultants, Brady Shipman Martin, will be as detailed in this Environmental Impact Statement.

3.4.3 External Building Finishes, Tank Finishes Etc.

3.4.3.1 The proposed buildings will be required to be clad in grey in accordance with the recommendations of the landscape architect. The Sludge Treatment Centre, as outlined on Figure 3, is shown as 12 m above existing ground level and in all probability will be the maximum size layout, which will be required.

3.4.3.2 The various waste water treatment process tanks will project over ground, in exposed reinforced concrete. Where required for Health, Safety and Operational purposes, tanks will be fitted with protective railings, 1.2m high, with central horizontal rails and kicker plates (where appropriate), all in accordance with the relevant technical and safety codes.

3.5 Odour Control Measures

3.5.1.1 Odour control measures will be required to be put in place by the Contractors who will be designing and constructing the Waste Water Treatment Plant.

3.5.1.2 The Performance requirements in relation to the odour control measures will require that the plant, when in routine operating mode, will result in no discernible odour at the plant boundary.

3.5.1.3 The odour modelling, which was carried out by RPS Environmental Sciences, is based on a Conventional Activated Sludge layout. The Contractor will be required to carry out additional and similar odour modelling to predict odour residuals from the plant design being put forward by him. This odour modelling will be considered carefully by the Client's Representative, before acceptance by him. Furthermore, the Contractor will be required to provide Process Guarantees, guaranteeing that his design will result in compliance with the specified performance requirements in regard to odour. As detailed hereafter, the performance of the plant will be monitored in a comprehensive manner, and

the Process Guarantees provided by the Contractor will be enforced, in the event of non-compliance.

3.5.1.4 Further requirements in the Contract Documentation will include, where appropriate, the following:

- **Inlet Works**: The inlet chamber and flow splitter will be required to be covered with closely fitting covers, and all air from underneath the covers ducted through air scrubbing equipment before emission to atmosphere. All flow channels for screening and grit removal will be covered with closely fitting covers ducted through air scrubbing equipment before emission to the atmosphere.
- **Sludge Tanks**: All tanks, where included, for the thickening, mixing and storage of sludge will be fitted with airtight covers. It will be required that the air from underneath these covers be ducted to odour scrubbing systems before emission to atmosphere.
- **Centrate/Filtrate**: Centrate and filtrate from sludge thickening, dewatering and mixing operations will be required to be handled/pumped in closed systems, transferred back and discharged underwater in the Aeration Reactor. The Contractor will be required to demonstrate that this provision will limit, in an environmentally acceptable way, odour emissions from this source.
- **Sludge Treatment Building**: It is a requirement that the air handling system in the Sludge Treatment Building achieves a minimum of 8 air changes per hour in the operational areas. It is also a requirement that all air extracted from these operational areas is ducted through an odour scrubbing system before emission to atmosphere.

- **Odour Scrubbing**: The Contractor will be required to provide comprehensive ducting and odour scrubbing systems, from the enclosed areas as described above. The odour scrubbing will be required to provide appropriate, but at least 98% removal of odour causing compounds, including but not limited to the following:-
- Hydrogen Sulphide (H_2S)
- Skatoles
- Ketones
- Amines
- Indoles
- Mercaptons

3.5.1.5 Appropriate odour scrubbing systems, would include, but not be limited to the following:

- Thermal oxidisers
- Carbon or activated carbon scrubbing systems
- Concurrent and co-current chemical scrubbing systems

3.5.1.6 The odour scrubbing systems will be required, in normal, routine operational circumstances, to achieve compliance with the overall odour emission standards for the waste water treatment plant.

3.6 Noise Control Measures

3.6.1.1 Noise limitations will be included in the Performance Requirements both in relation to the construction of the plant, and subsequently during the normal routine operational phase. The Contract will specify the selection of quiet equipment or acoustic screening as standard mitigation measures.

3.6.1.2 Mitigation measures are recommended to ensure that the cumulative noise level due to all plant noise sources is limited to less than 40 dB (A) at the houses. There is potential for exceeding these criteria at the northern end of the site. Equipment at the northern end of the site should be limited in noise emission to less than 50 dB (A) at 10m, measured in the direction of the nearest houses. These design specifications should be incorporated in contract documents for the new waste water treatment plant.

3.6.1.3 Vibration isolation should be incorporated where required, to ensure that equipment installed near the northern end of the site does not transmit audible ground borne vibration to nearby houses.

3.7 Waste Water Treatment Plant Operation and Maintenance

3.7.1 Long Term Operate and Maintain Contract

3.7.1.1 The Design, Build and Operate (DBO) contract for Wastewater Treatment Plants will include a 10 to 20 year operation and maintenance contract. This has the advantage that the design of the plant will take full cognisance of operation and maintenance issues, including long term plant replacement, material usage and energy costs.

3.7.1.2 The DBO contract shall be structured so that more stringent treatment standards, if imposed in the future, and variations in industrial and domestic loadings, can be fully accommodated.

3.7.2 Process Guarantees

3.7.2.1 The DBO contract will specify the standards required for water quality, noise and odour during construction, commissioning and normal operation and maintenance. The operation and maintenance element of the contract will include a significant monitoring requirement to confirm that the waste water treatment plant meets the required standards. The Contractor will be required to provide process guarantees. Financial penalties shall be imposed should the required standards not be met. The DBO contract will also stipulate the footprint for the site, general appearance and landscaping details.

3.7.3 Monitoring

3.7.3.1 Plant monitoring requirements will be structured as set on in the EPA document "The Environmental Protection Agency Act 1992, Urban Wastewater Treatment Regulations, 1994. A handbook on implementation for Sanitary Authorities" and in the Urban Waste Water Treatment Regulations. The frequency of water quality monitoring shall be as defined in the fifth schedule of the regulations. Flow-proportional or time-based 24-hour samples shall be collected at the same well-defined point in the outlet. Good laboratory practices aimed at minimising the degradation of samples between collection and analysis shall be applied. Extreme values for water quality will not be taken into consideration if they are as a result of unusual conditions such as mechanical breakdown, power failure or extreme weather conditions.

4.0 SECTION 4 – HUMAN BEINGS

4.1 Introduction

4.1.1 General

4.1.1.1 Human Beings clearly comprise the most significant element of the "environment" and any potential impact on the status of human beings by a development proposal must therefore be comprehensively addressed. The principal concern in this respect is that human beings experience no significant unacceptable diminution in any aspect, or aspects of "quality of life" as a consequence of the construction and operation of the proposed development. Components of "quality of life" relevant to this section of the Environmental Impact Statement include community and socio-economic aspects, with relevance to population profile and trends in these.

4.2 Receiving Environment

4.2.1.1 The site for the proposed upgrading of the Wastewater Treatment plant is located to the south west of Mullingar town in County Westmeath. The proposed treatment works will cater for the town of Mullingar and Environs.

4.2.1.2 The population of County Westmeath over a twenty-five year period shows that it experienced growth of nearly 15 per cent in the ten years from 1971 to 1981. This was followed by a sharp reduction in the rate of increase in the early 1980`s followed by a decline in population between 1986 and 1991 – when the population actually fell by 2.4 per cent. Between 1991 and 1996 the population of the County regained stability and in line with national trends there was an increase in excess of 2 per cent. It is now close to the national average.

4.2.1.3 Mullingar Urban and Rural Districts taken together showed an increase in population within the County in the period 1986-1991, was second only to that of Athlone and its environs. In the period 1991-1996, the decline of 2.4 per cent in the previous period was changed to growth of 5.9 per cent – faster than any other location within the County. Between 1996 and 2002, the growth rate increased significantly to 21.8 per cent.

4.2.1.4 The highest percentage increases in DED populations within the County have occurred in the areas, which surround the urban nodes of Mullingar and Athlone and along the major routeways of the N4 and N6. A detailed examination of population change in the District Electoral Divisions comprising Mullingar Rural District shows that growth is occurring principally in the area between Mullingar and Kinnegad. Between 1991 and 1996 thirteen DEDs experienced a population

increase in excess of 10 per cent. Ten of these thirteen DEDs are located in the area between Mullingar and Kinnegad.

Table 4.1: Population Growth Rates in the period 1991-2002 for Mullingar Town, environs and broader catchment

Area	1991	1996	2002	Average Annual Growth Rate (%) 1991-1996	Average Annual Growth Rate (%) 1996-2002
Mullingar Town *	8,003	8,040	8,833	0.093	1.580
Mullingar Rural **	4,157	4,747	7,007	2.690	6.705
Sub Total	12,160	12,787	15,840	1.011	3.633
Environs of Mullingar ***	3,777	4,089	4,716	1.600	2.410
Total	**15,937**	**16,876**	**20,556**	**1.152**	**3.342**

* Persons in Mullingar town includes Mullingar North Urban and Mullingar South Urban DEDs

** Mullingar Rural DED

*** Environs of Mullingar includes Belvedere, Castle, Cloghan, Heathstown, Hopestown, Knockdrin, Owel, Russelstown and Tullaghan

Table 4.2: Population figures for the 1981-2002 period for Mullingar Urban District

Area	1981	1986	1991	1996	2002
Mullingar Urban District	7,854	8,077	8,003	8,040	8,833

Source: Central Statistics Office

4.2.1.5 It is interesting to note from Table 4.2 above that the population figures for Mullingar Urban District over a 15 year period between 1981 and 1996 were highest in 1986. There was a slight decrease in population during the 1986-1991 period and a slight increase in population during the 1991-1996 period. It can be concluded that the population of Mullingar Urban District remained static over this period with only slight variations in population. There was a significant increase in population figures between 1996 and 2002.

4.2.1.6 Mullingar being the capital town of County Westmeath serves as the commercial/industrial hub of the county.

4.2.2 Household Size

4.2.2.1 Census population trends indicate that average household size in Ireland is experiencing a gradual decline over time. Between 1986 and 1996, the national average household size fell from 3.6 to 3.2 per household. The Economic and Social Research Institute (ESRI) estimates that by the year 2011, the average household size in the state will be 1.98. The process is more pronounced in Urban Areas such as Dublin, whereby modest population growth is accompanied by rapid new household formation.

4.2.2.2 The 1996 Census of population enumerated 19,216 households in County Westmeath, housing the county population of 63,314, giving an average household size of 3.21 persons, in line with the national average of 3.14 persons. Within the Mullingar Urban District and Environs household sizes are slightly below the national average at 3.00 persons per household.

4.2.3 Age Profiles

4.2.3.1 Two principal factors are examined in the analysis of age profiles of the population of the receiving environment: the dependant population, i.e. those persons within the 0-14 and 65+ age cohorts and the percentage of the population within the working age group, i.e. in the 15-64 year cohorts.

4.2.4 Dependant Age Cohorts

4.2.4.1 In 1996, the percentage of the population of Mullingar Urban District in the 0-19 age cohort was 34.81%, for Co. Westmeath the figure was 34.83% while The State figure was 33.06%. The 65+ cohort revealed a figure of 11.83% for Mullingar Urban District, 10.87% for Co. Westmeath and 11.41% for the State.

Table 4.3: % Population Comparison in the 1996 period for Mullingar Town, Co. Westmeath and the State

Area	Age Groups as %			
	0-19	20-39	40-64	65+
Mullingar Urban District	34.81	28.71	24.65	11.83
Co. Westmeath	34.83	27.88	25.54	10.87
The State	33.06	29.48	26.04	11.41

Source: Census of Population 1996

4.2.4.2 Overall, age groups within the Mullingar Urban District and Environs are in line with The State as there is only a slight variation from the National figures.

4.2.5 Working Age Cohorts

4.2.5.1 Table 4.4 below shows a comparison for the 1996 Census data for Mullingar in relation to the State for Employment structure by industry.

Table 4.4: Employment Structure in Mullingar & Catchment (1996) - at work by industry

Employment Structure	1996	%	State % 1996
Agriculture & Mining	42	1.54	10.69
Manufacturing	494	18.08	19.06
Building & Construction	157	5.74	6.69
Electricity & Gas	12	0.44	0.90
Commerce	626	22.91	20.81
Transport	147	5.38	5.98
Public Administration	255	9.33	5.98
Professional Services	664	24.30	18.47
Other	336	12.29	11.42
Total	**2733**	**100.0**	**100.0**

Source: Census of Population 1996

4.2.5.2 All of the figures more or less reflect the National Average figures apart from Agriculture/Mining and Professional Services. The Agriculture/Mining figure for Mullingar is well below the National Average for this category. This indicates that not too many people in the town of Mullingar were dependent on Agriculture or Mining as a source of income in 1996. The Professional Services figure of 24.30 % is well above the National Average for 1996 of 18.47 % indicating that the town was well catered for Professional Services in relation to other towns on 1996 available data.

4.2.6 Summary

4.2.6.1 Mullingar has experienced continuous population increase over the last 20 years which reflects the prosperity which has taken place in the town over that period. From the information provided above it is clear that the population structure within the area has remained much in line with the national average.

4.2.6.2 The working age population is typical of an area where there exists a sufficient commercial/industrial structure to keep people of that age within the area. Rural areas often have a much lower percentage of working age population as they leave the area to find work in larger towns and cities.

4.3 Proposal

4.3.1 Characteristics of the Proposal

4.3.1.1 The proposal is for the construction of a 55,000 PE Waste Water Treatment Plant at the site of the existing Waste Water Treatment Plant at Clonmore. The area of the existing site is 2.82 hectares (7 acres).

4.3.2 Potential Impact of the proposal

4.3.2.1 The population increases in Mullingar Urban District and Environs in recent years should continue to rise over the next number of years. A realistic growth rate of 3.57% was adopted when designing the size of the wastewater treatment plant. The construction of the new wastewater treatment works will have no perceivable negative impact on the population or demography of residents in the area.

4.3.2.2 Impacts, if any, upon population as a result of the construction of the 55,000 PE WWTP will be positive. The new treatment plant will provide the surrounding population with a proper system for the disposal of wastewater and will facilitate the future construction of residential/industrial and commercial developments in the area.

4.3.2.3 Sustaining an adequate balance of residential and employment opportunities will help maintain a balanced population structure within the area.

4.3.3 'Do Nothing' Impact

4.3.3.1 For this proposal, a 'do-nothing' impact would result in the town continuing with a sub-standard Waste Water Treatment System and the potential for future residential/employment development would be hampered.

4.3.4 Remedial or Reductive Measures

4.3.4.1 No remedial or reductive measures are proposed, as the development will be entirely beneficial in employment terms.

4.3.5 Predicted Impact of the Proposal

4.3.5.1 The actual impact will be the same as the potential impact.

4.3.6 Monitoring

4.3.6.1 No post-development monitoring of population will be necessary with this development.

4.4 Employment

4.4.1 Receiving Environment

4.4.1.1 From the latest Census data available at the time of writing, the 1996 Census, the amount of people at work in County Westmeath was 22,328 with only 2,910 registered as unemployed. In Mullingar Urban District and Environs the amount of people at work was 2,733 with 474 registered as unemployed.

4.4.1.2 Mullingar is a market town with a rich heritage dating back to Norman times. It is a thriving business, administrative and industrial centre. Mullingar is well served by schools, commercial premises, and retail outlets. There are a number of small to medium industrial premises in the area also. As a result there are good employment opportunities within the area.

4.4.1.3 In terms of its position as the county town of Westmeath, Mullingar provides a greater level of services than is required to meet the needs of its own population. Therefore it acts as the main service and employment centre for a wide area of County Westmeath. Mullingar is also of major significance in terms of the Midland region.

4.4.1.4 The proximity of Dublin and Athlone and associated industrial centres means that a lot of people living in Mullingar are employed in either the town itself, Dublin or within neighbouring towns in the midlands.

4.4.1.5 In 1999 over 1,000 new houses were being built in Mullingar mainly on the eastern and western boundaries of the town. It is clear that the improved road and rail connection between Mullingar and Dublin and the opening of the Mullingar by-pass are having a positive effect on the town as hundreds of people commute to Dublin daily from Mullingar.

4.4.1.6 At present there are three people employed at the existing waste water treatment works in Mullingar.

4.4.2 Potential Impacts of the Development

4.4.2.1 The potential impacts associated with the proposed development in direct employment terms is largely confined to the construction phase of the project when the development of the new WWTP will generate direct and indirect employment over the estimated 12 month construction period.

4.4.2.2 Three people will be employed in the operation of the completed WWTP. This will not create new employment as the personnel at the existing WWTP in Mullingar may or may not be employed at the new plant.

4.4.2.3 Once operational the WWTP will facilitate the creation of employment in the general area. Larger industries could be attracted to the area as a result of having a proper waste water treatment facility in the area. Provision for future industrial and commercial loading was incorporated into the design of the proposed WWTP.

4.4.3 'Do Nothing' Impact

4.4.3.1 For this proposal, a 'do-nothing' impact would be that employment opportunities during the construction phase of the project would not be generated.

4.4.4 Remedial or Reductive Measures

4.4.4.1 No remedial or reductive measures are proposed, as the development will be entirely beneficial in employment terms.

4.4.5 Predicted Impact of the Proposal

4.4.5.1 The actual impact will be the same as the potential impact. The facilities proposed will generate both full time and part time employment during the

construction phase and have the potential to help generate a range of full-time and part time employment once operational.

4.4.6 Monitoring

4.4.6.1 No post-development monitoring of employment will be necessary with this development.

4.5 Amenities

4.5.1 Existing Environment

4.5.1.1 Mullingar is centrally located in the county of Westmeath on the main Dublin Sligo (N4) road, 80 km from Dublin and 117km from Sligo. The River Brosna flows through the central area of Mullingar and forms the principal surface water collector. The Royal Canal also flows through Mullingar town.

4.5.1.2 Mullingar town offers a wide variety of tourist, sports and leisure facilities. Attractions include Belvedere House, Gardens and Park three miles from Mullingar on the Tullamore road. This early 18th century stately home stands on 160 acres of parkland on the shores of Lough Ennell. The prolific limestone lakes of Lough Ennell and Lough Owel are renowned Brown Trout waters and the Royal Canal is noted for Coarse Angling. The Railway station is another attraction due to steam trains and an art and cultural centre now open. The Mullingar Arts Centre adjacent to the County Buildings provides a full programme of events catering for theatre-goers, music lovers and art enthusiasts. Mullingar Cathedral whose twin spires tower 140 feet houses an Ecclesiastical Museum with an interesting collection dating back to the Penal Times when the Catholic religion was suppressed. Recreational activities in the area include a golf course, tennis courts, football pitches as well as Walking Trails along the Royal Canal.

4.5.1.3 Amenities in the vicinity of the WWTP site are Mullingar Greyhound Track located approximately 700m north east of the development site. The land to the north of the site is residential housing as well as land to the north west of the site. To the west of the site there is a proposed new access road from the Industrial Estate which is being constructed at the moment. The remainder of the surrounding land in the vicinity of the treatment works site is in agricultural use. The proposed site is not of significance for present amenity use. The nearest residence to the WWTP is located approximately 25m north west of the proposed site.

4.5.2 Potential Impacts of the Proposal.

4.5.2.1 A development of this nature in this location would potentially have the following temporary local impacts during the construction phase, which would affect the local amenities in the vicinity of the site.

- Increased vehicular traffic.
- Increased noise, dirt and dust generation.

4.5.2.2 The potential impacts once fully operational are as follows:

- Increased level of treatment of all wastewater from the town of Mullingar and its environs resulting in better water quality in the River Brosna and Lough Ennell.
- Knowledge that the expanded system will adhere to mandatory EC and Irish standards for effluent constituents in the future may also help to attract new users and tourists to the area.

4.5.3 'Do Nothing' Impact

4.5.3.1 If the proposal did not proceed, the potential impacts outlined above would not occur.

4.5.4 Remedial or Reductive Measures

4.5.4.1 A noise assessment study was carried out for the proposed development. It is detailed in Section 8 of this report. Night time conditions have the greatest potential for noise impact and therefore it was noted that night time noise levels could potentially reach 44 dB (A) at the nearest houses. While this is lower than the EPA 45 dB (A) night time limit, mitigation measures are recommended, given the relatively quiet existing suburban environment.

4.5.4.2 Noise levels during the construction phase are likely to be moderate by construction noise standards. If there is protracted work near the northern boundary involving heavy machinery, or if there is protracted concrete breaking or other noisy activities, appropriate mitigation measures, such as noise screening, should be incorporated to minimise the noise impact at the adjoining properties. During the construction phase, the noise impact during daytime will be small and will last only for a limited period, and special mitigation measures are not required.

4.5.5 Predicted Impact of the Proposal

4.5.5.1 The predicted impact of the development is negligible as it will not have any significant impact of the majority of amenities in the area. Slight disturbances will be felt at Clonmore in terms of traffic during the construction stage.

4.5.5.2 The proposed development will benefit water based amenities in the Mullingar area by resulting in better water quality in the River Brosna and Lough Ennell thus complying with EC and Irish Wastewater directives.

4.5.5.3 There will be no significant loss of land based amenity resulting from the development in the proposed site.

4.6 Health and Safety

4.6.1 Receiving Environment

4.6.1.1 The site comprises 2.89 hectares of land on an existing sewage treatment works site. It is located approximately 25m from the nearest houses which is also in the nearest built-up residential area.

4.6.2 Characteristics of the proposal

4.6.2.1 The potential risks to the safety and health of persons is set out in the Safety, Health and Welfare at Work (Construction) Regulations, 2001 (SI 481 of 2001). Health and Safety impacts of the WWTP are divided into those:

- During construction; and
- During operation

During Construction

4.6.2.2 In relation to the construction of the WWTP such as the upgrading of the Mullingar Town project, the following risks could be potential impacts on the health and safety of human beings:

- Risk associated with the erection and installation of buildings and equipment
- Risk from chemical or biological substances e.g. paint, solvents, dust
- Risk of drowning e.g. during commissioning of tanks, pump sumps and pipelines

- Risks associated with construction traffic e.g. movement and operation of heavy-duty construction traffic, spillage of materials from spoil trucks

During Operation

4.6.2.3 In relation to the operation of the proposed WWTP, the following associated risks to health and safety of human beings would be introduced:

- Electricity Supply
- Gas Supply
- Hazardous Areas
- Moving Parts
- High Temperatures

4.6.3 Mitigating and Reductive measures

4.6.3.1 The health and safety issues associated with the construction and operation of the WWTP are addressed to mitigate any potential adverse impacts.

Construction

4.6.3.2 The duties of the Project Supervisor are outlined in Part 2 of the Safety, Health and Welfare at Work (Construction) Regulations, 2001 and the duties of the Contractor are outlined in Part 3 of the Safety, Health and Welfare at Work (Construction) Regulations, 2001 (SI No. 481 of 2001). These duties will be adhered to in an effort to reduce adverse health and safety impacts incurred during the construction phase, especially regarding the contaminated soil excavation. The health and safety issues to be addressed will include:

- Management of Site
- Systems for co-ordination and communication
- Active and re-active monitoring of safety performance
- Training
- Site Rules and Procedures (including suitable protective clothing, gloves and eye/face protection)
- Information provided to the Project Supervisor

- Operation and maintenance
- Accident and hazardous conditions reporting

Operation

4.6.3.3 In a treatment plant of this type and scale there are many potential hazards both for operating personnel and visitors to the site. These hazards include:

- Deep open tanks
- Mechanical equipment
- Electrical equipment
- Hazardous zones
- Pathogen transfer through contact with sewage/sludge
- Chemical storage and usage

4.6.3.4 A management system will be developed to ensure that impacts on health and safety during operation of the WWTP will be controlled.

4.6.3.5 The management system will address:

- Routine servicing
- Safe working procedures
- Emergency response
- Equipment replacement
- Monitoring programme

4.6.4 Predicted Impact of the Proposal

4.6.4.1 As long as the measures outlined within this section are implemented, the proposed development will have no impact on the health and safety of Human Beings in the area.

4.6.5 Monitoring

4.6.5.1 Proper and regular maintenance will be carried out on all mechanical equipment on site to ensure the equipment is in safe working order and does not pose a threat to the health and safety of either workers or members of the public.

5.0 SECTION 5 – FLORA AND FAUNA

5.1 Introduction

5.1.1 Background

5.1.1.1 Natura Environmental Consultants Ltd. *(NATURA)* were commissioned by White Young Green Ireland Ltd to undertake an ecological survey of land proposed as an extension to the existing waste water treatment plant (WWTP) at Clonmore, Mullingar, Co. Westmeath. This survey forms part of an Environmental Impact Statement carried out in compliance with Environmental Impact Assessment Regulations (1999). It follows the *Draft Guidelines on the information to be contained in Environmental Impact Statements* (Environmental Protection Agency, 1992). This report does not cover the impacts on flora and fauna of the discharge from the WWTP to receiving waters which may be required at detailed design stage. Water quality impacts are discussed in section 7.

Methodology

5.1.1.2 The site of the proposed development, and the surrounding area, were traversed on foot and a survey of the habitats was carried out in February 2001. A description of the habitats based on dominant plant species was made using *A Guide to Habitats in Ireland* (Fossitt 2000). Habitat codes used by Fossitt are given in parentheses. This does not comprise a comprehensive list of plant species but is sufficient to describe the character of the vegetation and to evaluate the ecological significance of the flora. Mammals and birds were assessed using a combination of direct sightings and observations of signs, tracks and droppings.

Description of Existing Environment

5.1.1.3 Description of the surrounding area

5.1.1.4 Location and surrounding habitats

5.1.1.5 The existing Mullingar Waste Water Treatment Plant is located on the southern outskirts of the town, approximately 1km from the centre of Mullingar. The land is on the edge of the floodplain of the River Brosna which flows in a south-westerly direction approximately 300m south of the site.

5.1.1.6 Land surrounding the southern and south-eastern part of the site is mainly wet grassland (GS4) in agricultural use. It contains abundant rush *(Juncus effuses)* and yellow flag *(Iris pseudocorus).* These fields are poorly drained and separated by drainage ditches instead of hedgerows. To the south-west of the site is an area of improved agricultural grassland (GA1) which is heavily poached by

grazing cattle. Grasses predominate but there is also some rush, ragwort, *(Senecio jacobea)*, nettle *(Urtica dioica),* creeping buttercup *(Ranunculus repens)* and thistles *(Cirsium arvense* and *C. vulgare).* To the north and north-west of the site some small areas of amenity grassland (GA2) separate the site from nearby housing. To the north-east of the site is an area of fill which is now recolonising bare ground (ED3).

Designated areas

5.1.1.7 The site is not covered by any designations for conservation. There are three designated areas within a 5km radius of the site, as shown in Table 1. The only possible effect of the development on any designated area would be through discharge to a tributary of the River Brosna with possible indirect effects on Lough Ennell.

Table 1. Designated areas within 5km of the proposed development.

Code	Site Name	Designated status*	Distance from site
2103	Royal Canal	pNHA	0.5km north
0044	Lough Ennell	PNHA, SPA, cSAC	2km south-west
1731	Walshstown Fen	pNHA	4km north-west

*** pNHA = proposed Natural Heritage Area; SPA = Special Protection Area; cSAC = candidate Special Area of Conservation.**

Description of the site

5.1.1.8 The site is urban in character and contains a number of buildings, concrete tanks and other wastewater treatment installations. Its boundaries are marked by a security fence and a perimeter hedgerow. To the west of the site, a new access road is proposed in an area of agricultural grassland.

Habitats

5.1.1.9 ***Amenity grassland (GA2):*** The majority of the site, between the roads and installations, is covered with amenity grassland, which is regularly mown and uniform in character.

5.1.1.10 ***Ornamental non-native shrub (WS3):*** A small area of shrubbery has been planted in the northern part of the site. This contains a mixture of dogwood *(Cornus* sp.), willow *(Salix* sp.) and a number of horticultural shrubs. It has a few young trees, including ash *(Fraxinus excelsior)* and a variety of non-native species.

5.1.1.11 ***Hedgerow (WL1):*** The perimeter hedge (H1), which surrounds the site, contains a mixture of native and non-native shrub and tree species. The predominant canopy species are hawthorn *(Crataegus monogyna)* and elder *(Sambucus nigra).* Occasional mature ash, beech *(Fagus sylvatica)* and sycamore *(Acer pseudoplatanus)* trees occur in the hedge. Around the northern and western perimeters of the site, a row of mature cypress *(Cupressus leylandii)* and poplar *(Populus* sp.) trees has been planted to screen the site from nearby housing. There are also some mature willows in this part of the hedge. A second hedge (H2), which runs parallel to the proposed access road, is comprised of cypress trees and remnant hawthorns with a significant number of gaps.

5.1.1.12 ***Drainage ditch (FW4):*** There are two drainage ditches in the site area. One runs parallel to the proposed access road, and follows the south-west boundary of the site. The other, larger stream emerges from a culvert at the western extremity of the site and flows in a southerly direction to join the River Brosna. The existing outfall from the WWTP discharges into the latter stream. Both watercourses have abundant floating vegetation, mainly watercress *(Nasturtium officinale).*

Vertebrate Fauna

5.1.1.13 Birds present in the hedgerows around the perimeter of the site include robin *(Erithacus rubecula),* chaffinch *(Fringilla coelebs),* blackbird *(Turdus merula)* and wren *(Troglodytes troglodytes).* These are likely to breed in the spring/summer period. Flocks of starling *(Sturnus vulgaris),* jackdaw *(Corvus monedula)* and redwing *(Turdus iliacus)* were also present in the hedgerows but these are mainly winter visitors. The water flowing through the treatment plant attracts small numbers of rook *(Corvus frugilegus),* jackdaw and pied wagtail *(Motacilla alba).*

5.1.1.14 No signs of mammals were detected in the site and it is likely that the security fence would deter larger species. A hare *(Lepus timidus)* was observed in the fields immediately east of the site and droppings of fox *(Vulpes vulpes)* were located on the recolonising bare ground to the north-east.

Evaluation

5.1.1.15 The site of the proposed development is largely artificial in origin and is of low ecological value. The proposed access road from the west is located in an area of degraded agricultural grassland which is also of low ecological value. All species of vertebrate fauna recorded on the site and surrounds are common and widespread in similar habitats.

Likely significant impacts

5.1.1.16 As the habitats present are all of low ecological value, there are no significant impacts on flora and fauna within the site of the upgraded WWTP and its access road. The perimeter hedge and drainage ditches which surround the site will not be impacted by the development.

5.1.1.17 The only likely significant impact of the scheme on the surrounding area is the discharge of treated effluent to receiving waters.

Mitigation measures

5.1.1.18 No mitigation measures are required for flora and fauna within the site or on the proposed access road.

6.0 SECTION 6 – SOILS, GEOLOGY AND HYDROGEOLOGY

6.1 Introduction

6.1.1.1 White Young Green Ireland carried out the field and desk study work relating to the soils, geology and hydrogeology section of the EIS. This section assesses the Soils, Geology and Hydrogeology of the site of the existing Wastewater Treatment Works at Clonmore, Mullingar. As part of the upgrading of the Mullingar Sewerage Improvement Scheme, it is proposed to construct a new waste water treatment plant (WWTP) at the site of the existing Clonmore Road Works. These works will have a capacity for a population equivalent of 55,000 and as such requires a full environmental impact assessment to be carried out. The location of the site is shown in Figure 6.1.

6.1.1.2 The assessment involved desk and field studies of the Soils, Geology and Hydrogeology of the area. Field studies assessed the underlying ground and water conditions of the WWTP. Borehole drilling, topographic surveying and groundwater sampling work was carried out to establish the following:

- The depth to the water table at specific locations on the site
- The direction of groundwater flow
- The type and thickness of the subsurface deposits
- Groundwater quality, in accordance to EPA baseline guidelines

6.1.1.3 The baseline (existing) environment at the works along with potential impacts of the development and proposed mitigation measures are detailed below.

6.2 Existing Environment

6.2.1 Bedrock Geology

6.2.1.1 Lower Carboniferous rocks dominate the regional bedrock geology in the Mullingar area. These consist of the younger Derravaragh Cherts (DV) and Lucan Formations (LU) and the older Waulsortian Limestones (WA). Bedrock geology information was largely obtained from "Geology of Longford-Roscommon" 1999 GSI publication. A bedrock geology map is shown in Figure 6.2.

6.2.1.2 The WWTP itself is underlain by the Lucan Formation which underlies large areas of central and northern Westmeath and eastern Longford. The Waulsortian Limestones occur to the east of Lough Ennell in a north-south trending strip of older rocks within the Lucan Formation. They also run 10 kms to

the west of Mullingar in a structural system which has some of the oldest Carboniferous rocks in the area, the Meath Formation at its centre. The Derravaragh Cherts lie to the north east of Lough Owel and along the shores of Lough Derravaragh.

6.2.1.3 Carboniferous rocks in this area vary in their composition and age; they were all formed in the lower Carboniferous but vary from the very youngest (Waulsortian) to the oldest (Limestones of the Navan Group). During this time land was progressively submerged with near-shore deposition of sand and mud followed by the deposition of limestones such as the Waulsortian occurring in shallow tropical seas. Continued subsidence resulted in the deposition of deeper marine sediments forming the basinal limestone rocks such as the Lucan Formation. The Waulsortian limestones consist of massive unbedded lime muds which are often karstified although this is not a feature of the Waulsortian in Meath or Westmeath. Medium to dark grey fossiliferous, argillaceous calcarenites interbedded with thin calcareous shales make up the Lucan Formation. The Derravaragh Cherts consist of cherty limestones and thin shales.

6.2.1.4 Structurally there are no major folds and faults in the area. Minor faults do occur; they tend to run in a northeast-southwest direction. One of these faults runs approximately 2 km to the east of the WWTP.

6.2.2 Overburden Geology (Subsoils)

6.2.2.1 The type and thickness of the subsoils overlying the bedrock at the WWTP was ascertained by the drilling of three monitoring boreholes at the site.

6.2.2.2 Additional information on the depth to bedrock is also available from the Clonmore Link Road Project for which soil probing was carried out. The line of the probing straddles the River Brosna approximately 400 metres to the south east of the sewage treatment works. The overburden thickness varies from 9 metres to greater than 29.4 metres deep. In many cases the drilling encountered obstructions which may or may not have been rock and therefore the exact thickness is difficult to ascertain. The overburden consists of between 2.1 and 29.4 metres of subsoil deposits comprising peats underlain by varying thicknesses of silts and clays, which are in turn underlain by very coarse sands and gravels containing large cobbles and boulders.

6.2.2.3 Three boreholes were drilled between the 18th and 20th of February 2002. A truck mounted air rotary rig was used for drilling due to the unknown depth of bedrock in the region, enabling drilling through overburden and solid rock. The completed well designs and geological logs are shown in Appendix A and a brief description of the boreholes are given in the table below.

Borehole No.	Depth below Ground Level (m)	Soil Description
BH1	Ground Level – 1.2m	Silty Clay rich topsoil
	1.2m - 3.6m	Grey boulder Clay
	3.6m - 4.5m	Pebbly gravel which grades into cobbly gravel with depth
	4.5m - 6.6m	Cobbly gravel
	6.6m - 6.8m	Limestone Bedrock
BH2	Ground Level - 0.5m	Silty brown topsoil
	0.5m - 2.8m	Poorly sorted gravel
	2.8m - 6.5m	Coarse Gravel
	6.5m - 8m	Limestone Bedrock
BH3	Ground Level - 0.5m	Peaty Clay topsoil
	.5m - 2.75m	Soft brown organic peat
	2.75m - 11.7m	Fine grained, grey brown, water saturated silt

6.2.3 Soils

6.2.3.1 Soil information was obtained from drilling and also from An Foras Talúntais Soils of Co. Westmeath, 1977. The soils are shown in Figure 3. The soils in this area have been divided into series with geographic names based on the location in which particular soils are exemplified or most widely found. On a broad scale a great soil group consists of a soil series sharing one or more distinguishing features in common.

6.2.3.2 The Grey Brown Podzolic Group covers a large area to the south and west of Mullingar surrounding Lough Ennell. This group is predominantly the Patrickswell series, which developed from a limestone till. These soils possess a heavy texture, are well to moderately well drained and have a well-developed structure.

6.2.3.3 The Rathowen series Grey Brown Podzol is associated with the Patrickswell series, and is present over a large area to the north of and surrounding Mullingar.

The Rathowen series developed from a shale and limestone till. The series is normally 0.8 m to 0.1 m deep and moderately well drained. However, in places the series is less than 0.6 m deep and in these situations the soils structure is weak and its water holding capacity is high, resulting in less well-drained soils.

6.2.3.4 The WWTP site is located on the Rathowen Grey Brown Podzol. It is described as a moderately well drained, gravelly loam, with a silty texture and a deep water table. This soil, with its weak structure and potential water holding capacity is liable to compaction.

6.2.4 Vulnerability

6.2.4.1 The information from the monitoring boreholes allows the groundwater vulnerability to be assessed. Vulnerability is the term applied to the likelihood of groundwater in a particular location to become polluted. It is defined according to the GSI Vulnerability Mapping Guidelines, which are shown in Appendix 7. The location of these boreholes is shown in Figure 4.

6.2.4.2 The vulnerability of the site varies over the area of the site. BH 1 and 3 at the southern end of the WWTP show the presence of more clay-rich, impermeable strata. BH 2 is underlain by more permeable gravelly deposits. According to the guidelines the site is a mixture of high vulnerability material at BH2, high to moderate at BH1 and low vulnerability at BH3.

6.2.5 Aquifer Classification

6.2.5.1 The Geological Survey of Ireland (GSI) has not to date published aquifer maps for the solid geology of Co. Westmeath. However, they have produced an aquifer map for County Meath. The site is underlain by the Lucan Formation which is considered to be dominated by low permeability, fine-grained and argillaceous limestones and shales and are thus inherently low yielding. As the site is located relatively close to the Meath border it is considered reasonable to extrapolate the aquifer data from Meath into Westmeath based on similar geological types in the adjoining counties. In regional hydrogeological terms, the aquifer status of the Carboniferous Limestone is dependent on the degree of fracturing and karstification. The Lucan Formation is also commonly known as the Calp Formation in older geological publications. As such it is defined in Meath as a locally important aquifer which is generally productive (Lm). This classification is based on well yields of between 10 and 400 m3/d. The Calp limestones can produce higher yields when a fracture or fault has been intersected. There are no specific karst features recorded in the Mullingar area.

6.2.5.2 There are no major recognised gravel aquifers in the Mullingar area. However, site investigations carried out in connection with the N52 Mullingar Bypass have shown that there are overburden deposits up to 30 metres thick in the vicinity of the treatment works. Many of the probes encountered a layer of gravel at the rockhead. It is quite likely that wells developed in this gravel layer could have high yields. There are no records of wells in the area. The nearby housing developments are serviced by local authority mains water.

6.2.6 Groundwater Flow

6.2.6.1 Upon completion of drilling a topographic survey was carried out. The relative difference in elevation of the borehole heads, water levels and ground-level at each well was measured.

6.2.6.2 The stream to the right of the entrance gate, beside BH 1 was also surveyed as was the drain at the back of the site, measured at the bottom of the steps. These water levels were used to obtain groundwater flow direction and gradient on the site. These water levels show that the groundwater on site is flowing in an easterly direction towards the drain at the back of the site, with a gradient of 0.043.

6.2.6.3 The groundwater flow direction for the general area around the town of Mullingar is in the general direction of the surface water features namely, the River Brosna and Lough Ennell. Rainfall that recharges the underlying aquifer through infiltration provide baseflow to the river and the lake. The relative water levels obtained through the topographic shows that groundwater on site enters the drain at the rear of the site. This drain joins the River Brosna approximately 500m to the south of the WWTP, at a location approximately 2.5 km upstream of Lough Ennell.

6.2.7 Groundwater Sampling

6.2.7.1 Clean samples from BH 1 and BH 2 on site, were collected after bailing three annular well volumes of water from the boreholes. The samples were collected according to EPA list 1 and 2 screen guidelines and sent to an accredited laboratory for analysis. The results of this analysis are given in Appendix 7 and a summary of the analysis is shown in the table below.

Borehole No.	Water Analysis Description
BH1	Elevated concentrations of Chloride, Sulphate, Sodium
	Elevated conductivity
	High concentrations of Calcium, Iron, Manganese, Ammonium, Nickel
BH2	Lower levels of Chloride, Sulphate, Sodium, Calcium, Conductivity
	Iron, Manganese, Ammonium, Nickel above MAC values

6.2.7.2 In general the groundwater beneath BH1 is of a marginally poorer quality of that beneath BH2. The type of contamination is indicative of recent contamination from a local source as is indicated by the high ammonium and low relative nitrogen levels.

6.3 Potential Impacts

6.3.1 Groundwater Levels and Quantity

6.3.1.1 There are no proposed abstractions from groundwater therefore the groundwater level and quantity will not be affected.

6.3.2 Groundwater Quality

6.3.2.1 There are no proposed direct discharges to the groundwater from the WWTP. Treated water is to be discharged to surface water via a 600 mm outfall pipe which enters a connecting drain behind the administration building.

6.3.2.2 There is potential for accidental discharges of sewage from:

- leaking settling tanks and inflow/outfall pipes
- overflow from tanks
- accidental spillages

6.4 Mitigation Measures

6.4.1 Groundwater Levels and Yield

6.4.1.1 As there are no proposed abstractions from the groundwater system, there are no proposed mitigation measures necessary.

6.4.2 Groundwater Quality

6.4.2.1 No direct discharges to groundwater are proposed and therefore no mitigation is required.

6.4.2.2 Any site run-off, leaking, spillages or overflows from tanks will pass into the drain system where it will pass through the treatment system prior to discharge.

6.4.2.3 Indirect discharges below ground due to spillages will pass through the overburden deposits and into the bedrock aquifer. Depending on the location of the spillage, the local vulnerability of the overburden deposits will allow attenuation to occur to varying degrees. Filtration of the spillage will result in the removal of a certain proportion of bacteriological and chemical pollution.

6.4.2.4 All tanks and pipes on site will be constructed according to best practice guidelines to minimise the risk of leakage and overflow. Accidental spillages cannot be mitigated for by design but will be mitigated by the natural attenuation of overburden and the passing of the surface run-off through the treatment system.

6.4.2.5 The existing groundwater quality at the site shows the presence of slight levels of contamination, which are higher nearer to BH 1. These analyses will act as a baseline situation against which future changes can be compared.

6.4.2.6 The local discharge point of the bedrock aquifer is the River Brosna. Therefore, any spillages will discharge rapidly from the groundwater system into the surface water system. Due to natural filtration these discharges will experience a certain amount of treatment prior to discharge to surface water.

6.4.2.7 There is no potential for contamination of groundwater on the east side of the Brosna.

6.4.2.8 There are no users of groundwater between the WWTP and the River Brosna as this area of Mullingar is served by water mains and is sparsely populated to the south and south-east.

7.0 SECTION 7 - WATER QUALITY

7.1 Receiving Environment

7.1.1 General

7.1.1.1 The treated effluent from the Mullingar WWTP is currently discharged to the River Brosna at an outfall point located some 3 km upstream of the Brosna inflow to Lough Ennell. The two water bodies immediately affected by the Mullingar WWTP are therefore the upper Brosna river and Lough Ennell.

7.1.1.2 This section assesses the quality of water in both the Brosna and Lough Ennell and identifies trends in the quality of the river and the lake over recent years.

7.1.1.3 This section also examines the current standards in relation to discharges from Combined Sewer Overflows (CSOs) to the Brosna. Although no such overflow is proposed in the rehabilitated sewerage scheme, there will be storm water overflow pumping from the upgraded pumping station at Bleach Yard. This is discussed further later in this report. It was noted earlier (Section 4) that there are frequent discharges from the existing CSOs into the Brosna.

7.1.2 Upper River Brosna

7.1.2.1 The Brosna catchment area at the Mullingar WWTP outfall location is estimated to be about 30 km^2. Based on hydrometric data derived from the gauging station at Mullingar Pumphouse (Station No. 25050, catchment area 23.7 km^2), the lowest river flow expected at the outfall location is about 0.2 m^3/s, while the 95% exceedence flow is about 0.3 m^3/s.

7.1.2.2 The annual average rainfall rates recorded at the Mullingar Meteorological Station for the 30-year period 1970-2001 are plotted on Figure 7.1. The year of lowest rainfall was 1971 (647.1 mm), followed by 1975 (738.3 mm).

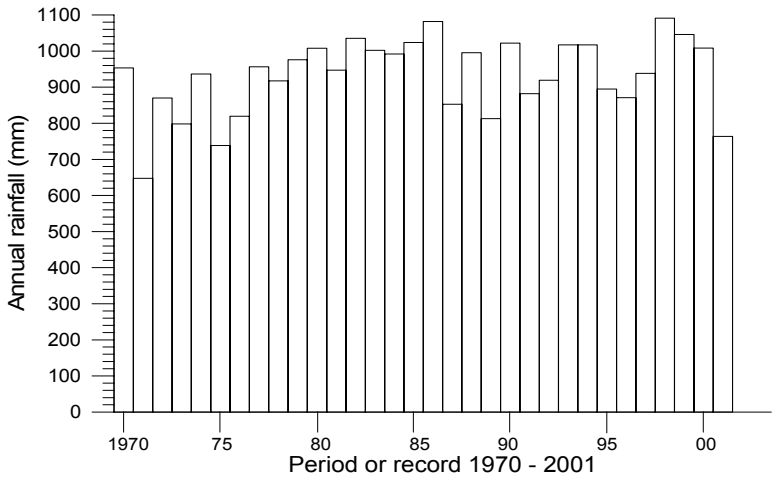


Figure 7.1 Annual rainfall depths at Mullingar

7.1.3 Lough Ennell

7.1.3.1 Lough Ennell is located in the upper reaches of the river Brosna, which flows into the river Shannon at Shannon Harbour, County Offaly. The main topographical features of Lough Ennell are summarised in Table 7.1 overleaf.

7.1.3.2 Arterial drainage works, carried out in the Brosna catchment in the 1950s, lowered the lake level by about 1.5m and reduced its plan area from 14 km^2 to 11.75 km^2. The lake has an extensive, shallow littoral zone with approximately 50% of the surface area overlying a water depth of less than 3m.

7.1.3.3 The overall catchment area of Lough Ennell is estimated to be about 138.9 km^2; it includes ten sub-catchments, as listed in Table 7.2 overleaf.

Table 7.1 - Lough Ennell: Topographical data summary	
National Grid Reference (lake centre)	N40 47
Altitude (mOD)	82.0
Surface area (km^2)	11.75
Max. length (km)	7.5
Max. width (km)	3.5
Max. depth (m)	30.0
Mean depth (m)	7.5
Volume (m^3)	88 x 10^6

Table 7.2 - Lough Ennell Catchment		
Sub-catchment	**Area (km^2)**	**% total**
Brosna (Butler's Bridge)	43.0	30.96
Belvidere	2.0	1.44
Rochfort	19.5	14.04
Carrick Mill	5.5	3.96
Robinstown	4.5	3.24
Rathnamuddagh	18.5	13.32
Dysart	9.0	6.48
Hanstown	8.4	6.05
Keoltown	8.2	5.90
Kilpatrick	8.5	6.12
Lough Ennell	11.8	8.49
Totals	138.9	100

7.1.3.4 The average retention time in Lough Ennell is estimated to be 1.3 years. The estimated retention time for 1975, which was an exceptionally dry year (refer Figure 7.1), was 2 years.

7.2 Monitoring river quality in Ireland

7.2.1 EPA Monitoring Programme

7.2.1.1 The quality of rivers and streams is routinely monitored by the Environmental Protection Agency (EPA) as part of a Biological River Quality Monitoring Programme. In addition, many of these rivers and streams are monitored for physio-chemical parameters by this agency or by local authorities. The EPA publishes the results of these surveys. The data presented in this section is taken from biological and physio-chemical survey reports published by the EPA. The report used for this study was: Water Quality in Ireland Statistical Compendium of River Quality Data - 1998-2000 (EPA)

7.2.1.2 The results of the biological surveys (i.e. macroinvertebrate, macrophyte and algal species list) are condensed into a format readily understandable by non-biologists. They are presented as a scale of biotic indices ("Biological Quality Ratings" or "Q Values") ranging from Q5 to Q1 with intermediate values also (i.e. Q1-2, Q2-3, Q3-4 etc.)

7.2.1.3 The Q5 value represents pristine unpolluted condition whereas Q1 represents grossly polluted conditions. In the interests of simplicity the nine-point scale of Q Values may be related to four "Quality Classes" as shown in Table 7.3 below;

Table 7.3 – River Quality Classes

Quality Ratings	Quality Class	Pollution Status	Condition (re beneficial uses)
Q5, Q4-5, Q4	Class A	Unpolluted	Satisfactory
Q3-4	Class B	Slightly polluted	Unsatisfactory
Q3, Q2-3	Class C	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Class D	Seriously polluted	Unsatisfactory

7.2.1.4 The general characteristics of the various quality classes are given in Table 7.4 below;

Table 7.4 – General Characteristics of various Biological Quality Classes			
Quality Classes	**Class A**		**Class B**
Quality Ratings (Q)	**Q5**	**Q4**	**Q3-4**
Pollution status	Pristine, Unpolluted	Unpolluted	Slight pollution
Organic waste load	None	None	Light
Max. BOD	Low (<3 mg/l)	Low (<3 mg/l)	Occasionally elevated
Dissolved oxygen	Close to 100% at all times	80-120%	Fluctuates from <80% to >120%
Annual median Ortho-Phosphate	0.015 mg P/l	0.03 mg P/l	0.045 mg P/l
Siltation	None	May be light	May be light
Water quality	Highest quality	Fair quality	Variable quality
Abstraction potential	Suitable for all	Suitable for all	Potential problems
Fishery potential	Game fisheries	Good game fisheries	Game fish at risk
Amenity value	Very high	High	Considerable
Condition	Suitable for all	Suitable for all	Considerable

Table 7.4 contd.– General Characteristics of various Biological Quality Classes			
Quality Classes	**Class C**		**Class D**
Quality Ratings (Q)	**Q3**	**Q2**	**Q1**
Pollution status	Moderate pollution	Heavy pollution	Gross pollution
Organic waste load	Considerable	Heavy	Excessive
Max. BOD	High at times	Usually high	Usually very high
Dissolved oxygen	Very unstable Potential fish kills	Low, sometimes zero	Very low, often zero
Annual median Ortho-Phosphate	0.070 mg P/l	>0.1 mg P/l	>0.1 mg P/l
Siltation	May be considerable	Usually heavy	Usually very heavy and anaerobic
Water quality	Doubtful quality	Poor quality	Bad quality
Abstraction potential	Advanced treatment	Low grade abstractions	Extremely limited
Fishery potential	Coarse fisheries	Fish usually absent	Fish absent
Amenity value	Reduced	Low	Zero
Condition	Unsatisfactory	Unsatisfactory	Unsatisfactory

7.2.1.5 The EPA has assessed the River Brosna, at various sampling stations along the river. The Biological Quality Ratings (Q Values) for recent years are given in Table 7.5 below;

Table 7.5 – Biological Quality Rating for River Brosna during the period 1982 to 1999

Sampling Stations		Biological Quality Ratings (Q Values)					
No.	**Location**	**1982**	**1984**	**1987**	**1993**	**1996**	**1999**
0009	0.4 km u/s Canal Crossing	-	-	-	-	-	-
0010	Mullingar : Canal Crossing	-	-	2-3	3	-	-
0030	Mullingar: Bridge in town	-	-	-	-	-	-
0038	Dog Track, 0.4 km u/s Ind Est bridge	-	-	-	-	-	-
0040	Mullingar: Ind.Est Bridge	-	3-4	2-3	3	3	3
0080	Mullingar: d/s STW	-	-	-	-	-	-
0100	Butler's Bridge	1-2	2-3	2	2-3	3	2-3
0200	Newell's Bridge	4	4	4	3-4	3-4	3

7.2.1.6 Unfortunately the sampling results are not comprehensive, however, it is noted that there appears to have been a slight improvement in river quality at the Lynn Road Industrial Estate Bridge and a marginal deterioration at Butler's Bridge, which is located downstream of the Mullingar WWTP. Similarly, there has been a marginal deterioration at Newell's Bridge; however, this sampling station is located on the Brosna at the outlet to Lough Ennell. In the 1998-2000 surveys, 46% of the river Brosna (surveyed length 77km) was classified as being unpolluted, 38% was classified as being slightly polluted/eutrophic, and 16% was classified as being moderately polluted.

7.3 Treated effluent disposal from Mullingar WWTP

7.3.1 Water Quality Considerations

7.3.1.1 Water quality issues relating to both the River Brosna and to Lough Ennell have to be taken into consideration in the setting of target effluent standards for the expanded Mullingar WWTP.

7.3.1.2 The target water quality standards for the Brosna upstream of Lough Ennell are determined by reference to the following Regulations:

(i) Urban Waste Water Treatment Regulations (S.I. No. 254 of 2001).

(ii) Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations (S.I. No. 258 of 1998).

7.3.2 River Brosna

7.3.2.1 The reach of the river Brosna, between the Mullingar WWTP outfall and Lough Ennell has been designated as a "sensitive area" in the Urban Wastewater Treatment Regulations, 2001 (S.I. No. 254 of 2001). The Total Nitrogen and Total Phosphorus limits for effluent discharges to sensitive waters, imposed by the Regulations, are summarised in Table 7.6 below.

Table 7.6 - Requirements for discharges from urban wastewater treatment plants to sensitive areas.

Parameters	Concentration	Minimum percentage of reduction
Total phosphorus	2 mg/l (10 000 – 100 000 p.e.) 1 mg/l (>100 000 p.e.)	80
Total nitrogen	15 mg/l (10 000 – 100 000 p.e.) 10 mg/l (>100 000 p.e.)	70 – 80

** One or both parameters may be applied depending on the local situation. The values for concentration or for the percentage reduction shall apply (S.I. No. 254 of 2001).*

7.3.2.2 The Phosphorus Regulations (S.I. No. 258 of 1998) set Quality Standards for rivers based on their existing Biological Quality Rating or Q Index, as assigned by the EPA, based on monitoring carried out in the period 1998-2000. These new standards must be met by 31st December 2007. The Quality Standards for rivers are summarised in Table 7.7.

Table 7.7 - Quality Standards for Rivers (WQ Standards For Phosphorus) (S.I. 258 of 1998)		
Column 1	**Column 2**	**Column 3**
Existing Biological Quality (Q) Rating / Q Index	**Minimum target Biological Quality (Q) Rating/ Q Index**	**MRP* median concentration (mgP/m^3)/(ug/l)**
Unpolluted 5	5	15
4 – 5	4-5	20
4	4	30
Slightly polluted 3 - 4	4	30
Moderately polluted 3	3 – 4	50
2 - 3	3	70
Seriously polluted ≤ 2	3	70

**Molybdate-Reactive Phosphorus*

7.3.2.3 The Brosna reach upstream of Lough Ennell has been categorised as "moderately polluted" (Column 1 value, Table 7.7). Hence, the target median MRP for the river is taken to be within the range 50-70 mgP/m^3 (Column 3 value, Table 7.7). The variation in annual median MRP at the Butler's Bridge sampling station on the Brosna (inflow to Lough Ennell) for the period 1985-2001 is plotted on Figure 7.3.

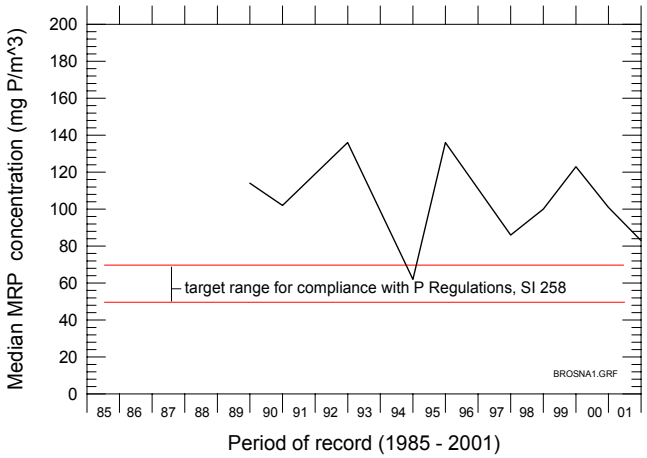


Figure 7.3 – R. Brosna Annual variation in median MRP (Butlers Bridge)

7.3.3 Lough Ennell

7.3.3.1 The water quality classification scheme currently used for Irish lakes (EPA, 2000) is outlined in Table 7.8 It is a modification of a 1982 scheme proposed by the OECD, an outline of which is presented in Table 7.9. The modifications to the OECD scheme were made on the grounds that the relevant data available are often limited to chlorophyll and measurements are not frequent enough to allow the calculation of annual means used in the OECD scheme. Where data are available these usually cover the summer months when the highest concentrations of chlorophyll are likely to occur. Thus, in practice, the highest value measured during the summer/autumn period is taken as the annual maximum chlorophyll concentration. A further modification of the OECD scheme is the sub-division of the eutrophic category into three sub-categories in order to give a more precise assessment of the trophic status.

Table 7.8 - Classification of Lake Water quality (EPA, 2000)

Trophic Category	Annual max. chlorophyll (mg/m^3)	Algal growth	Degree of deoxygenation in hypolimnion	Level of pollution	Impairment of use of lake
Oligotrophic (O)	<8	Low	Low	Very low	Probably none
Mesotrophic (M)	8 - 25	Moderate	Moderate	Low	Very little
Eutrophic (m-E)	25-35	Substantial	May be high	Significant	Maybe appreciable
(s-E)	35 – 55	High	High	Strong	Appreciable
(h-E)	55 - 75	High	Probably total	High	High
Hypertrophic (H)	>75	Very high	Probably total	Very high	High

Table 7.9 – Classification of Lakes (OECD, 1982)

Trophic Category	TP(mg/m^3)	Clorophyll a (mg/m^3)		Transparency (m)	
	Mean	**Mean**	**Maximum**	**Mean**	**Minimum**
Ultra-oligotrophic	<4	<1	<2.5	>12	>6
Oligotrophic	<10	<2.5	<8	>6	>3
Mesotrophic	10 – 35	2.5 – 8	8 – 25	6 – 3	3 – 1.5
Eutrophic	35 – 100	8 – 25	25 – 75	3 – 1.5	1.5 – 0.7
Hyper-eutrophic	>100	>25	>75	<1.5	<0.7

7.3.3.2 The Phosphorus Regulations (S.I. No. 258 of 1998) also set Quality Standards for lakes based on the existing trophic status during the 1998 – 2000 period. The relevant details are given in Table 7.10.

Table 7.10 – Quality Standards for Lakes (WQ Standards for Phosphorus)

(S.I. 258 of 1998)

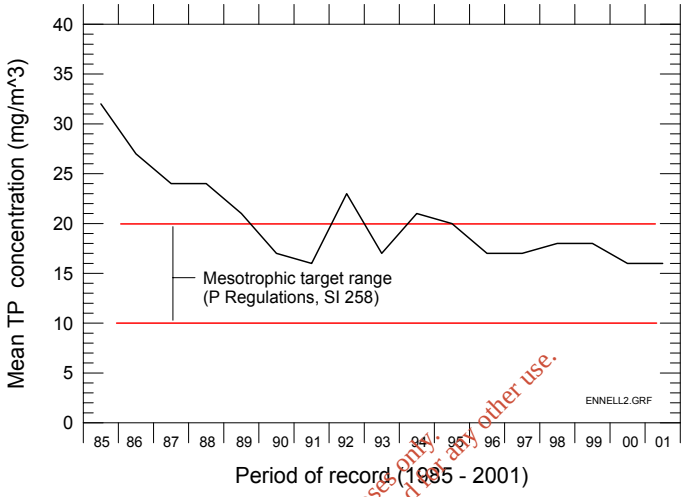
Column 1		Column 2	Column 3
Existing trophic status		**Minimum target trophic status**	**Mean TP Concentration (mg/m^3)**
Satisfactory:	Ultra-Oligotrophic	Ultra-Oligotrophic	≤ 5
	Oligotrophic	Oligotrophic	5 ≤ 10
	Mesotrophic	Mesotrophic	10 ≤ 20
Unsatisfactory:	Eutrophic	Mesotrophic	10 ≤ 20
	Hypertrophic	Eutrophic	20 ≤ 50

7.3.3.3 Westmeath County Council has employed Aquatic Services Unit (ASU) of University College Cork since 1974 to carry out water quality survey analysis of Louth Ennell. The annual survey also includes sampling and analysis of the Lough Ennell main catchment feeder streams and the Mullingar WWTP.

7.3.3.4 Key indices of Lough Ennell water quality for the period 1985 – 2001 are plotted

Figure 7.5 - Lough Ennell: Annual variation in TP concentration

(ASU Report, 2001)



on Figure 7.5 (mean TP) and Figure 7.6 (max. chlorophyll and min Transparency).

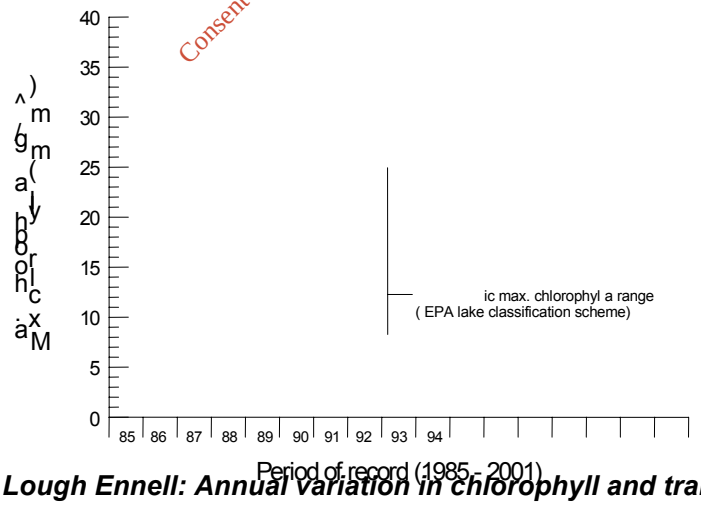


Figure 7.6 - Lough Ennell: Annual variation in chlorophyll and transparency

(ASU Report, 2001)

7.3.3.5 The estimated phosphorus loading on Lough Ennell in the period 1975 – 2001 is plotted on Figure 7.7, which shows the separate contributions of the Mullingar

WWTP and diffuse sources. Unfortunately, there is a gap in the data for the 10 year period 1985-95. The data indicate a relatively constant TP input from diffuse sources of about 3 t/a. The Mullingar WWTP input has been significantly reduced from a high value of almost 14 t/a in 1975 to a value of about 2 t/a in 1986. The data indicate that it has remained close to this value in the period of 1997 – 2001.

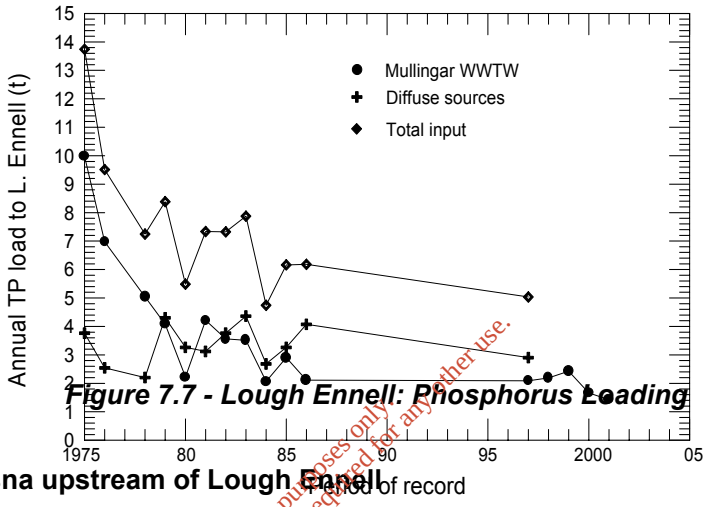


Figure 7.7 - Lough Ennell: Phosphorus Loading

7.4 Summary

7.4.1 River Brosna upstream of Lough Ennell

7.4.1.1 The foregoing water quality data indicate that the river Brosna upstream of Lough Ennell is classified in the "moderately polluted" category, as designated by the Phosphorus Regulations (S.I. 258 of 1998). This stretch of the river has been designated a "sensitive area" in the Urban Wastewater Treatment Regulations of 2001 (S.I. 254).

7.4.1.2 The data show that the annual median MRP concentration in the river at Butler's Bridge (Figure 7.3) has varied in the range 80–120 mg/m^3 in the period 1996-2001. The target median MRP for the river, based on the Water Quality Standards for Phosphorus Regulations (refer Table 7.7), is in the range 50-70 mg/m^3, based on a moderately polluted river classification.

7.4.1.3 The Aquatic Services Unit survey of 2001 for Lough Ennell and its feeder streams reports a dissolved oxygen range at Butler's Bridge of 42 –104% saturation with a median value of 63% saturation.

7.4.1.4 It is clear that the river Brosna upstream of Lough Ennell is currently under a degree of environmental stress, both in relation to its nutrient load and also in respect of dissolved oxygen. In effect, it has no residual margin for the acceptance of additional pollution load from Mullingar WWTP.

7.4.1.5 Based on the projected future design capacity of 55,000 PE and dry weather flow of 225 l/PE.d, the dilution ratio available in the Brosna at extreme low flow (estimated as 0.2 m^3/s) is calculated to be 1.4:1. At this low dilution ratio, serious DO depression would result from mixing of the river flow and an effluent discharge devoid of DO. Hence, the effluent DO would require to be raised in a post-treatment aeration process.

7.4.2 Lough Ennell

7.4.2.1 The foregoing data indicate that there has been a gradual improvement in Lough Ennell water quality, particularly since 1996, giving the lake its current Mesotrophic status, as defined by the EPA lake classification scheme. Hence, the minimum target standard for the lake, as required by the Water Quality Standards for Phosphorus Regulations (refer Table 7.10), is the retention of this status. It will be noted from the foregoing data (refer Figures 7.5, 7.6), however, that Lough Ennell deteriorated into a Eutrophic state in the late 1980s and also in the mid-1990s. It would appear that the improvement has been due to a reduction in the P-load discharged from the Mullingar WWTP (refer Figure 7.7).

7.4.2.2 The observed response of Lough Ennell to P-input over the past twenty years provides the most reliable yardstick for gauging the permissible P-loading of the lake, consistent with the retention of a Mesotrophic status. Based on the data plotted on Figures 7.5 and 7.7, it would appear that the upper P-load limit for the lake is about 5 t/a TP, which would permit a TP load from the Mullingar WWTP of 2 t/a as TP.

7.4.2.3 The limitation of the TP discharge from the Mullingar WWTP to 2 t/a, when expanded to the projected future design capacity of 55,000 PE, will require the setting of a final effluent threshold TP concentration at about 0.3 mg/l, based on an hydraulic load of 225 l/PE.d.

7.4.2.4 It is estimated that, under extreme low flow conditions (e.g. September 1975), the WWTP discharge could constitute up to about 10% of the total lake inflow.

7.5 Treated Effluent Disposal Options From Mullingar WWTP

7.5.1.1 The foregoing review of environmental issues related to the impact of the projected future treated effluent discharge from the Mullingar WWTP points to two possible design options:

(1) Continued discharge at the existing outfall location, requiring the provision of an advanced treatment system, to meet more stringent effluent quality targets than currently apply.

(2) Diversion of treated effluent downstream of Lough Ennell, requiring the installation of a treated effluent pumping station and a 14.5 km long rising main.

7.5.2 Option (1)

7.5.2.1 Option (1) is based on the provision of a wastewater treatment plant that will allow continued treated effluent discharge to the upper Brosna river, while meeting the environmental quality criteria for the river and for Lough Ennell.

7.5.2.2 The required effluent quality must take account of the quality targets defined by the Phosphorus Regulations and the fact that the upper Brosna has been designated a sensitive area in the Urban Waste Water Regulations of 2001.

7.5.2.3 Based on the analysis of the recent environmental quality trends for the receiving water resources, outlined earlier, a satisfactory quality can be maintained under Option (1) by setting appropriate effluent quality standards, as outlined in Table 7.11.

Table 7.11 Proposed effluent quality parameter values

Option (1): Treated effluent discharge to upper Brosna

Parameter	Limit Value
BOD_5 (mg/l)	10.0
TSS (mg/l)	10.0
TN (mg/l)	10.0
TP (mg/l)	0.30
DO (% sat.)	50.0

7.5.2.4 Selection of the appropriate process technology to achieve an effluent TP concentration of 0.3 mg/l will require detailed evaluation at the detailed design stage. It will almost certainly be based on a combination of biological and chemical P-removal processes. The achievement of a very low treated effluent TSS (10 mg/l) is considered essential to limit the discharge of particulate P.

7.5.2.5 The treated effluent TN limit of 10 mg/l can be achieved by the use of a conventional combination of nitrifying and denitrifying activated sludge processes.

7.5.2.6 It would be necessary to aerate the final effluent prior to discharge in order to meet the proposed effluent DO standard of 50% saturation. A post-aeration process would be necessary to avoid oxygen depletion in the River Brosna under low flow conditions.

7.5.3 Option (2)

7.5.3.1 Option (2) is based on the provision of a wastewater treatment plant with the diversion of the Mullingar WWTP treated effluent discharge downstream of Lough Ennell. This option requires the installation of a treated effluent pumping station and rising main of approximately 14.5km length.

7.5.3.2 Based on the analysis of the recent environmental quality trends for the receiving water resources, outlined earlier, a satisfactory quality can be maintained under Option (2) by setting appropriate effluent quality standards, as outlined in Table 7.12;

Table 7.12 Proposed effluent quality parameter values

Option (2): Treated effluent discharge to downstream of Lough Ennell

Parameter	Limit Value
BOD_5 (mg/l)	25
COD (mg/l)	125
TSS (mg/l)	35
TP (mg/l)	1

7.5.3.3 From a capitalized cost reviews of the WWTP options, Option 1 is clearly the most technically and economically advantageous, and is the recommended option. This option entails the expansion of the WWTP, at the existing Clonmore site, to 55,000 PE, with continued discharge of the treated effluent upstream of Lough Ennell. The treated effluent quality standards to be achieved are: -

BOD 10mg/l, TSS 10mg/l, TN 10mg/l, TP 0.3mg/l

7.5.3.4 It is also recommended that the treated effluent outfall is to be located upstream of Lough Ennell, in proximity to the existing outfall location. The existing water quality standards in the Brosna River and Lough Ennell will be enhanced by the high level of treatment proposed.

7.6 Receiving Waters And Overflow Frequency

7.6.1 General

7.6.1.1 Irish and EU Legislation together with the Department of Environment & Local Government (DOELG) guidelines provide a set of design parameters for overflows to receiving waters. Under the proposed scheme the upgraded Pumping Stations will be required to deal with influent stormwater and so therefore stormwater storage will be provided at the stations. The guidelines govern the frequency and quality of stormwater discharges from combined sewer systems into rivers and water bodies. The guidelines referred to principally are those listed below;

- EU 'Bathing Water Directive'
- DOELG 'Procedures and Crirteria in Relation to Storm Water Overflows'
- WRc FR0488 'Guide to the Design of Combined Sewer Overflow Structures'

7.6.1.2 *Bating Water Directive*: The main bathing beach for Mullingar is located at Lilliput along the shores of Lough Ennell. The term *bathing water* refers to those waters where bathing is not prohibited and is traditionally practised by a large number of bathers. It is essential that any overflows from the upgraded sewerage scheme in Mullingar do not have a detrimental effect on the water quality of the beach at Lilliput. The Bathing Water Regulations generally require compliance with the imperative standards prescribed. The Directive requires that a regular sampling regime throughout the bathing season for a number of water quality determinants, including Total Coliforms and Faecal Coliforms.

7.6.1.3 The receiving waters in the upper Brosna at Mullingar (Bleach Yard, Lynn Road and Clonmore WWTP) into which overflows will discharge are not regarded as bathing waters. Rather the upper Brosna has been defined as *water contact / recreational use* in determining spill frequencies.

7.6.1.4 *Procedures and Criteria in Relation to SWOs*: The DOELG's paper sets out criteria for limiting pollution from stormwater overflows to receiving waters, involving the restriction of the spill frequency and the volume of storm water discharged.

7.6.1.5 The DOELG paper refers to the National Rivers Authority (NRA) (now the Environment Agency),"UK Standards for Consenting Overflows".

- Maximum number of independent storm events discharging via SWO affecting bathing waters must not, on average exceed 3 times per bathing season, unless it can be shown that the design will achieve the water quality standards for Bathing Water Directive for at least 98.2% of the time
- Maximum number of independent storm events discharging via SWO affecting water contact / recreational waters must not, on average exceed 7 times per bathing season (May to August)
- Soffit level of overflow outfall must be below the level of the Mean Low Water Spring Tide (MLWS), otherwise a spill frequency criterion of 1 spill in 5 bathing seasons will apply
- Normally the incoming flow must exceed that calculated from Formula A, before the SWO spills unless there are high dilutions available. Formula A is as follows:

  Formula A = DWF + 1350P + 2E litres/day

  Where DWF = dry weather flow (litres/day, avg, daily rate)

  P = population

  E = Industrial effluent (litres/day, average daily rate)

- Discharge flows are required to be screened to at least 10mm and where the frequency of spill is greater than once per year 80% of the volume should be screened to at least 6mm

7.6.1.6 *FWR "Urban Pollution Manual":* reference is made to the Urban Pollution Manual (UPM) in the DOELG guidelines. The UPM provides an 'Indicative Assessment Criteria for SWO to Coastal Waters and Estuaries', under three definitions, viz;

- Low Significance Estuarial and coastal waters not containing EU identified bathing waters and shellfish waters
- Medium Significance Population equivalent 2,000-10,000. Affects identified bathing waters and shellfish waters. Only if both criteria apply
- High Significance Population equivalent >10,000. Affects identified bathing waters and shellfish waters. Only if both criteria apply

7.6.1.7 Soffit level of overflow outfall must be below the level of the Mean Low Water Spring Tide (MLWS); otherwise a spill frequency criterion of 1 spill in 5 bathing seasons will apply.

7.6.1.8 Normally, the incoming flow must exceed that calculated from "Formula A" before the storm water overflow spills unless there are high dilutions available.

Formula A is as follows:

Formula A: Setting = DWF + 1350P + 2E litres/day

Where DWF = Dry Weather Flow (litres/day, average daily rate)

P = Population
E = Industrial Effluent (litres/day average daily rate)

7.6.1.9 Discharge flows are required to be screened to at least 10mm and where the frequency of spill is greater than once per year 80% of the volume should be screened to at least 6mm.

7.6.1.10 The waters receiving discharge from the Mullingar WWTP and the main pumping stations have been defined as *water contact/recreational waters*. Therefore, an average of seven spills per bathing season from the WWTP and main pumping stations are permissible. However, in light of the Brosna being designated as 'sensitive', **it is recommended that the number of spills from overflows in the upgraded sewerage scheme is limited to 6 spills per annum.**

7.6.1.11 The existing contribution to the sewer system is estimated at 25,875, with the ultimate design contribution for the year 2052 estimated at 125,000. Therefore, taking into consideration of the Brosna being 'sensitive' and the beach at Lilliput being an identified bathing water, at present and in the long-term overflows assume *"high significance"*. The UPM prescribes recommended *approaches to the assessment of overflows* to receiving waters. These approaches can be summarised as follows:

- *Medium Significance*: Use of hydraulic network model to assess compliance with a spill frequency criterion for coastal waters. Sizing of storm water detention facilities with the use of the model.
- *High Significance*: For marine situations an advection/dispersion model is required to assess the bacteriological impact relative to the criteria set down in the Bathing Water Directive.

7.6.1.12 The hydraulic modelling exercise which was carried out for this study, comprised: *Hydraulic modelling* of the existing and proposed collection using

HydroWorks/InfoWorks software, in order to assess network performance, design further sewers and ancillaries including the design storage for the proposed pumping stations and WWTP.

7.6.1.13 It may be a requirement at detailed design stage to carry out a hydrodynamic and water quality model in order to assess the impact of all proposed discharges (treated effluent and storm water overflows) on the River Brosna.

7.6.1.14 Reference was also made to *FR 0488 Guide to the Design of Combined Sewer Overflow Structures.* This guide refers to the National Rivers Authority (UK) "Guidelines for AMP2. Periodic Review, 1993" for aesthetic control requirements for combined sewer overflows (refer to Table 4.11).

Table 4.11 Aesthetic Control Requirements for CSOs (NRA, 1993)

Amenity Use Category	**Expected Frequency of Spills**	**Emission Standard**
High Amenity	>1 spill / year < 1 spill /year	6 mm solids separation 10 mm solids separation
Moderate Amenity	>30 spill / year < 30 spill / year	6 mm solids separation 10 mm solids separation
Low Amenity & Non-Amenity		Solids separation to be achieved through good engineering design

7.6.1.15 *High amenity* has been defined as:

> "Areas where bathing and water contact sport (immersion e.g. wind surfing, sports canoeing) are regularly practised used. Watercourse passes through formal public park or beside formal picnic site. Shellfish waters".

7.6.1.16 *Moderate amenity* has been defined as:

> "Areas used for recreation and contact sport (non-immersion, e.g. boating). Popular footpaths adjacent to watercourses or where watercourses pass through housing developments (e.g. bridges, pedestrian areas and shopping areas).

7.6.1.17 To obtain compliance which is based on percentage compliance of randomly distributed events it is necessary to assess the risk of non-compliance.

7.6.1.18 Theoretically a design solution for a 1 year return storm can still result in a failure three times in any one year although the probability is quite low.

7.6.1.19 In order to comply with the requirements of the DOELG paper on Combined Sewer Overflows it is necessary to limit overflow events on the scheme as follows:

Bleach Yard Pumping Station: On average maximum 6 spills per annum

Clonmore WWTP: On average maximum 6 spills per annum

7.6.1.20 The criteria have been adopted based on the waters at the Pumping Station and WWTP being classified water contact/recreational use.

7.6.1.21 While there remains a risk that the spill frequencies could be exceeded in any one year this is likely to be an extreme event and on average the limited number of spills per annum would be achieved.

7.6.1.22 For the purposes of this project the receiving waters at the Pumping Station and WWTP are defined as high amenity. Therefore, 6 mm solids separation/ 6 mm screenings of overflow discharges are required for the Pumping Station and WWTP.

7.7 Conclusions

7.7.1 Do nothing option

7.7.1.1 In a do nothing scenario, increased volumes of discharge from CSOs and treated effluent will enter the river Brosna resulting in a deterioration in water quality.

7.7.2 CSO discharge

7.7.2.1 In order to comply with the requirements of the DOELG for Combined Sewer Overflows it is necessary to limit overflow events on the scheme as follows:

Bleach Yard Pumping Station: On average maximum 6 spills per annum

Clonmore WWTP: On average maximum 6 spills per annum

7.7.2.2 For the purposes of this project, the receiving waters at the Pumping Station and WWTP are defined as high amenity. Therefore, 6 mm screenings of overflow discharges are required for the Pumping Station and WWTP.

7.7.3 WWTP discharge

7.7.3.1 From a capitalized cost, reviews of the WWTP options, Option 1 is clearly the most technically and economically advantageous, and is the recommended option. This option entails the expansion of the WWTP, at the existing Clonmore site, to 55,000 PE, with continued discharge of the treated effluent upstream of Lough Ennell. The treated effluent quality standards to be achieved are: -

BOD 10mg/l, TSS 10mg/l, TN 10mg/l, TP 0.3mg/l

7.7.3.2 It is also recommended that the treated effluent outfall is to be located upstream of Lough Ennell, in proximity to the existing outfall location. **The existing water quality standards in the Brosna River and Lough Ennell will be enhanced by the high level of treatment proposed.**

7.7.3.3 Following the construction of the proposed upgrades, on-going monitoring will be carried out to record the quantity and quality of the treated effluent.

8.0 SECTION 8 - ODOUR

8.1 Introduction

8.1.1 General

8.1.1.1 Odour is the sensation transmitted to the brain by the olfactory receptors in the nasal cavity to so called odorous substances in the inhaled air. If these substances are of a malodorous nature and are present in the air above a certain threshold concentration, they may cause annoyance and constitute an environmental issue.

8.1.1.2 An odour sensation consists of a number of inter-linked factors. These include:

- Odour threshold/concentration
- Odour intensity
- Hedonic tone
- Quality/Characteristics
- Component characteristics

8.1.1.3 The odour threshold concentration dictates the concentration of the odour in Ou m^{-3}. Its numerical value is quantified as the number of dilutions with clean air required to reach the odour perception threshold. The odour perception threshold is the lowest odour concentration which is detectable by half the members of a test panel (half the panel smell nothing while the other half smell something).

8.1.1.4 The odour intensity dictates the strength of the odour. The Hedonic quality allows for the determination of pleasantness/unpleasantness. Odour quality/ characteristics allow for the comparison of the odour to a known smell (e.g. similar to dead fish). Individual chemical component identity determines the individual chemical components that constitute the odour (i.e. ammonia, hydrogen sulphide, benzyl aldehyde). Once odour qualities are determined, the overall odour impact can be assessed. This odour impact assessment can then be used to determine if an odour abatement technology is to be implemented and if so, which technology.

8.1.2 Wastewater Odours

8.1.2.1 Wastewater odours arise either through the discharge of odorous substances of industrial origin to the sewer system or from the anaerobic decomposition of biodegradable matter in the wastewater. Anaerobic biodegradation produces

volatile fatty acids and a variety of reduced sulphur compounds most of which have a very low threshold concentration as indicated in Table 8.1.

8.1.2.2 Anaerobic biodegradation is inhibited in the presence of dissolved oxygen and thus does not occur while wastewater remains aerobic. However, where there is a long residence time in the sewer system or where sewer gradients are small, resulting in low velocities and solids deposition, wastewater are likely to become septic and malodorous. Biodegradation rates are strongly influenced by temperature, hence odour problems are likely to be accentuated during warm weather or where industrial discharges raise the wastewater temperature.

Table 8.1: Odour Threshold Concentrations of a series compounds

Chemical component	Threshold Concentration (mg m^{-3})
Ammonia	0.03-37.8
Methylamine	0.0012-6.1
trimethylamine	0.00026-2.1
Indole	0.0006-0.0071
Scatole	0.00035-0.00078
Hydrogen Sulphide	0.001-0.27
Methyl mercaptan	0.0000003-0.038
Ethyl mercaptan	0.000043-0.00033
Butyric acid	0.0004—42
Valeric acid	0.0008-0.12

O'Neill & Phillips et al. (1992)

8.1.2.3 Typically domestic sewage sludge contains 3-6 mg L^{-1} organic sulphur, mainly arising from proteinaceous material, approximately 4 mg L^{-1} from sulphonates contained in household detergents and 30-60 mg L^{-1} inorganic sulphur (as sulphonates) (Burgess et al. 2001).

8.1.2.4 The formation of odourous components at WWTPs is usually limited to inlet works, Primary settlement tanks and to the areas of sludge production and handling, particularly during the handling of primary sludge. Under anaerobic conditions, the untreated primary sludge will readily decay, producing odourous components in the process. The possibility for anaerobic conversion of surplus

activated sludge depends on the sludge loading rate (k) in the activated sludge works. At a lower sludge-loading rate, the surplus activated sludge tends to be more stabilised, thus giving less cause for odour nuisance. In general the following values can be adhered to:

- k < 0.05; extreme sludge stabilisation, no anaerobic bacterial decay to be expected;
- 0.05 < k < 0.1; moderate sludge stabilisation, some decay possible;
- k > 0.01 partial sludge stabilisation, anaerobic bacterial decay is most likely to occur.

8.1.2.5 The production of odourous components depends on the reduction-oxidation potential (redox potential) and on the Biological Oxygen Demand (BOD) of the wastewater. The redox potential is the condition under which decay can take place, while BOD is the parameter most commonly used to define the pollution strength of a wastewater.

8.1.2.6 Anaerobic bacterial decay will only take place if the redox potential of the wastewater is low enough. Frequently this condition arises in rising mains, where anaerobic conditions occur. In gravitational sewers a slight draft provides enough oxygen to prevent this, as oxygen is highly toxic to anaerobic bacteria (EIA, 1996). It is important to use sophisticated monitoring equipment to measure dissolved oxygen and pH of the liquor to maintain ideal conditions for aerobic processes to dominate.

8.1.3 Annoyance Criteria

8.1.3.1 Commonly used odour annoyance criteria for the Netherlands, Germany and the UK are illustrated in Table 8.2.

Table 8.2: Annoyance Criteria for Odours derived from WWTP

Concentration Limit Ou m^{-3}	Percentile value %	Application
Netherlands **<1.5**	98	WWTW existing site, residential dwellings in area
<3.5	98	WWTW existing site, rural area or industrial estate
Germany **<4**	98	Wastewater Treatment Works level at which odour nuisance experienced Frenchen 1995
UK **<5**	98	WWTW Greenfield site
<10	98	WWTW existing site, some nuisance expected.
Ireland (pig Industry) **<1.5**	98	No nuisance expected around facility
<3.0	98	Limit value for new facilities
<6.0	98	Limit value for existing facilities

[(McIntyre et al. 2000, EPA, 2001), Frenchen (1995)]

8.1.4 Formation of Odour emissions from WWTPs

8.1.4.1 The rate of release of odorous compounds into the atmosphere at WWTPs is influenced by:

- overloading of the WWTPs
- long residence time of sewage in sewer
- temperature of mixed liquor (increased temperature causes increased anaerobic conditions
- the concentration of odourous compounds in the liquid phase exposed to air

- processes that generate surface turbulence
- total air/surface wastewater interface area
- maintenance of aerobic conditions within WWTPs

8.1.4.2 Raw wastewater and sludges have a high concentration of odourous substances. Processes that create surface turbulence and high rates of interface renewal, such as open channel flow, weir overflows, biofilter flow distribution systems etc., have much higher rates of volatilisation of odourous compounds than quiescent processes such as sedimentation as these processes allow for the change in the partial pressure at the surface interface and the mass transfer of the odourous compounds to the gaseous phase.

8.1.4.3 The main sources of odour emissions from WWTPs are wastewater screening, grit separators, primary treatment processes and sludge handling processes. With the exception of aerobically stabilised sludges, sludge residues are the primary sources of odour emissions.

8.1.5 Atmospheric Dispersion Modelling of Odours

8.1.5.1 The malodours emitted from WWTPs are carried downwind and are diluted through atmospheric dispersion by mixing and transport mechanisms. This atmospheric dilution process can be mathematically modelled as a Gaussian plume, taking wind speed, wind direction and atmospheric stability conditions into account. Atmospheric dispersion modelling has been applied to the assessment and control of odours for many years, originally using Gaussian form and more recently utilising advanced boundary-layer physics models such as ADMS and AERMOD.

8.1.5.2 Thus, using the local meteorological data and the estimated odour emission rates from the individual treatment processes, it is possible to compute the odour concentration fluctuation at sensitive receptor locations in the vicinity of a new WWTP.

8.2 Overview of Plant Design and Potential Odour Emission Sources

8.2.1 Introduction

8.2.1.1 Like the majority of wastewater treatment plants (WWTPs), the proposed upgrading of Clonmore WWTPs is faced with the issue of preventing odours causing nuisance to the public at large. By way of atmospheric dispersion modelling, the overall odour impact of the WWTPs can be assessed with and

without abatement technologies implemented. The key odour causing processes are identified and possible abatement strategies discussed.

8.2.1.2 The WWTP is designed to cater for 55,000 PE (population equivalent). The site will extend over an area of about 5 hectares. The construction contract is design/build/operate. This means that the Contractor will carry out the design. The DBO contract will include performance specifications particularly in relation to water quality, noise and odour. The Contractor is required to carry out an odour model once the design is complete. The Contractor is also required to monitor odours and to ensure compliance with odour limits during normal routine operation of the plant.

8.2.1.3 As the design has not been carried out, and for the purpose of this EIS, it has been assumed, at this stage, that a conventional activated sludge process shall be used and any assumptions made in this part of the EIS are based on an Activated Sludge Process.

8.2.1.4 The Conventional Activated Sludge process may include the following components:

- Inlet Works
- Storm water holding tanks
- Primary settlement
- Diffused air aeration
- Secondary settlement
- Sludge handling and de-watering

8.2.1.5 The influent flow to each of the components of the treatment plant will be fully monitored by a comprehensive Supervisory, Control and Data Acquisition (SCADA) system.

8.2.2 Inlet Works

8.2.2.1 The inlet works of a WWTP can be a major source of odour due to the collection and deposition of solid matter in the wastewater. Screening devices can clog if not cleaned regularly and this causes the development of anaerobic zones to occur. Fine material can collect or deposit in the channels of grit chambers due to low flow conditions. The material collected from grit chambers if stored in open skips for a number of days can also be a source of offensive odours.

8.2.2.2 It is proposed to cover the inlet chamber and flow splitter which receive the raw sewage with closely fitting covers, and all air from underneath the covers ducted through air scrubbing system before emission to atmosphere. All flow channels for screening and grit removal will be covered with closely fitting covers ducted through an air scrubbing system before emission to the atmosphere. It should be noted that in relation to grit removal, the grit that is removed from the system will be washed and stored in an open skip. Any leachate from these units is passed back through the WWTPs for treatment.

8.2.3 Storm Water Holding Tank

8.2.3.1 During periods of excess rainfall which leads to a high inflow is the only time that the storm water holding tank will be used. It is recommended that the liquid in the tank will undergo screening. After periods of excess rainfall the liquor in the tank will be returned for primary and secondary treatment at a controlled rate.

8.2.3.2 There is potential for odourous conditions to arise from organic material deposited on the floor of the tank once the influent has been discharged. To lessen this problem it is recommended to clean the tank by flushing after it has been emptied. This should eliminate the formation of any odourous compounds.

8.2.4 Primary sedimentation

8.2.4.1 Odour formation from the primary sedimentation process mainly depends on the Biochemical Oxygen Demand (BOD) load of the influent. The rate of volatilisation of odorous compounds from the surface of the influent and the turbulence at the peripheral overflow weirs is also a factor as well as the significance of the surface area exposed to the atmosphere of these tanks.

8.2.5 Aeration tanks

8.2.5.1 Aeration of the activated sludge is recommended to be carried out using fine bubble diffused aeration to obtain a maximum aeration capacity of the activated sludge. This also minimises turbulence at the surface of the tank which increase the volatilisation of odourous compounds.

8.2.5.2 Due to the aerobic conditions that exist in Aeration tanks Odour emissions from these tanks are generally low. The aerobic breakdown of odourous compounds eliminates the formation of anaerobic zones which lead to Odour emissions.

8.2.6 Secondary sedimentation

8.2.6.1 A low BOD and relatively stable sludge occupying the tank gives an indication of a Wastewater Treatment Works with proper operation. This reduces sludge

decay and odourous compound formation. Odour emissions from similar plants around Ireland indicate that secondary sedimentation odours are relatively low.

8.2.7 Sludge Thickeners and De-watering

8.2.7.1 Picket fence thickening tanks with airtight covers will be used to eliminate the emission of odourous compounds of the sludge. Airtight covers will also be fitted to the thickened sludge mixing tanks and sludge storage skips. Air from underneath these covers will be required to be passed through an odour scrubbing system before emission to the atmosphere.

8.2.7.2 Any centrate and filtered liquid arising from sludge thickening, dewatering and mixing operations will be required to be pumped in closed systems. This will then be transferred back and discharged underwater in the Aeration Tank in an environmentally acceptable way so as to remove odour emissions from this source. A minimum of 8 air changes per hour in the operational areas of the air handling system of the Sludge Treatment Building is recommended so as to maintain air quality for the workers of the Waste Water Treatment Works. All air extracted from these operational areas will again be required to be passed through an odour scrubbing system before emission to the atmosphere.

8.2.8 Odour Abatement System

8.2.8.1 It is recommended that comprehensive ducting and odour abatement systems be provided for the enclosed areas as described above. The odour abatement system will be required to provide appropriate, but at least 98% removal of odour causing compounds.

8.2.8.2 Appropriate odour abatement systems will include:

- Thermal oxidisers
- Activated carbon systems
- Concurrent and co-current chemical scrubbing systems
- Biotrickling Filtration System
- Bioscrubbers

8.2.8.3 All the above odour abatement system have be shown to obtain >98% efficiency if proper engineering design parameters and operational parameters are implemented. It should be noted that bioscrubbers, biotrickling filtration and activated carbon systems are most cost effective.

8.3 Impact of Proposed Development

8.3.1 Introduction

8.3.1.1 Short-term odour concentrations downwind of the proposed treatment plant site were computed assuming a conventional activated sludge process. AERMOD air quality gaussian dispersion model was used.

8.3.1.2 Emission rates for the various components of the treatment works are calculated and a series of calculations are then carried out to predict the rate of dilution from the boundary of the plant to the property in the neighbourhood where a potential odour nuisance could arise. The predicted concentrations were based on the worst case climatological conditions, i.e. the combination of wind speed and wind direction that result in the maximum short term ground level concentration at various downwind distances for each atmospheric stability category examined.

8.3.1.3 Four years worth of hourly sequential meteorology data representative of the area was used for the operation of AERMOD atmospheric dispersion model. Hourly wind speed, direction, temperature and cloud cover were used to determine the overall impact of odour emissions from the proposed upgrading of the WWTPs at Clonmore.

8.3.2 Emission Estimates

8.3.2.1 Two data sets for odour emission are examined:

- The estimated odour emission rate without the implementation of abatement (Table 8.3);
- The estimated reduced odour emission rate with the implementation of odour abatement (Table 8.4).

8.3.2.2 From examination of the estimates it can be seen that the overall odour emission reduction due to the implementation of odour abatement is 81%. All odour emission data was obtained for a compilation of emission rates (Dutch Emission Index, ECOMA Olfactometry, Germany and published English data. based on normal WWTPs operation. A worst case emission scenario was implemented.

8.3.2.3 The odour emission rates are then input into the computer model and the downwind concentration/odour nuisance is calculated and used in the dispersion model.

Table 8.3: Estimated Emission Rate without Odour Abatement

Source	Exposed surface area (m^2)	Specific Odour emission rate (Ou m^{-2} s^{-1})	Process emission (Ou s^{-1})
Inlet Works	400	1.5	600
-grit chamber	110	5.55	610.0
Grit containers	12	19	228
Primary Sed. Tank	1590	1.76	2796.0
Aeration tank	1650	0.47	775.5
Secondary Tank	1412	1.7	2400.0
Picket fence TT (4)	113	16	1808.6
WAS Balancing Tank	254	16	4064.0
Thickened Sludge MT	113	1.4	158.0
Storm Tank	800	0.15	120
Sludge Building	5.4 m^3 s^{-1}	3500 Ou m^{-3}	18900
Sludge Skip	12	4	48
Total			32736.1

Table 8.4: Estimated Emission Rate with Odour Abatement

Source	Exposed surface area (m^2)	Specific Odour emission rate (Ou m^{-2} s^{-1})	Process emission (Ou s^{-1})
Inlet Works	0	-	12.0[1]
-grit chamber	0	-	12.2[1]
Grit containers	0	2	9.1[1]
Primary Sed. Tank	1590	1.76	2796
Aeration Tank	1650	0.47	775.5

Table 8.4: Estimated Emission Rate with Odour Abatement (Continued)

Source	Exposed surface area (m^2)	Specific Odour emission rate (Ou m^{-2} s^{-1})	Process emission (Ou s^{-1})
Secondary Tank	1412	1.7	2400
Picket fence TT (4)	0	-	36.1[1]
WAS Balancing Tank	0	-	81.3[1]
Thickened Sludge MT	0	-	3.2[1]
Storm Tank	0	0.15	0[2]
Sludge Building	5.4 m^3 s^{-1}	2% of original	378[1]
Sludge Skip	0	-	0.96[1]
Total			**6504.3**

[1] denotes the total emission contributed to odour abatement system and emitted to atmosphere at least 3 to 5 meters above the height of the surrounding buildings.

[2] denotes the total emission contributed if storm tank only used for reserve holding in unfavourable weather conditions.

TT denotes Thickening Tanks.

MT denotes Mixing Tank.

8.3.2.4 The emission rates used in the odour dispersion model were expressed in terms of the odour dilution factor rather than as a specific compound emission rate due to the mix of compounds that may be emitted. For emission sources that are either point sources such as emissions from odour control units or specific 'small area' sources within the treatment plant the odour emission rate in terms of o.u/s were computed. In the case of larger area emission sources - sedimentation, aeration and final clarifier tanks, the emission rates were expressed in terms of the odour emission rate per unit area per second (o.u/m^2.s).

8.3.3 Results of Air Quality Dispersion Model

8.3.3.1 AERMOD was used to determine the overall odour impact criteria of Clonmore WWTPs as set out in annoyance criteria Table 8.2. The output data was analysed to define the 98 percentile for odour concentrations of 1.5, 3.5 and 5 Ou

m^{-3}. The 98 percentile corresponds to 2% or 175 hours of exceedence in one-year test period.

8.3.3.2 The intensity of the odour from various sections of the WWTPs will depend on the strength of the initial odour threshold concentration from the surface of the tanks and ventilation air from the sludge building and the distance downwind at which the prediction and/or measurement is being made. Where the odour emission plumes from a number of sources combine downwind, then the predicted odour concentrations may be significantly higher than that resulting from an individual emission source. An odour threshold concentration of 1 Ou m^{-3} is the level at which an odour is detectable by 50% of the screened panelists. According to research, the odour recognition threshold is approximately 3-5 times this concentration and is liable to cause offence (3-5 Ou m^{-3}). An odour impact criterion of 5 Ou m^{-3} is implemented in England for WWTPs. and is accepted in planning applications for these facilities to limit odour nuisance.

8.3.3.3 As shown in the plotted odour isopleths in Figure 8.1 & 8.2 for the 98 percentile (175 hours of exceedence), the odour plume from the WWTPs (without abatement) is approximately along a north east south west axis. The maximum radial spread of the plume for a concentration of 1.5, 3.5 and 5.0 Ou m^{-3} is approximately 600m, 300m and 200m respectively with no abatement measures implemented. The maximum radial spread of the odour plume for a concentration of 1.5 and 3.5 Ou m^{-3} is approximately 100m and 20m respectively with abatement measures implemented.

8.4 Odour Mitigation Measures

8.4.1 Introduction

8.4.1.1 Control of odorous emissions from various parts of the treatment plant by dry or wet scrubbing is an important part of the design of this plant. The methods that will be considered include biofiltration, scrubbing systems (activated carbon dry scrubbing systems, wet gas scrubbing in a packed tower) or ozone. The final method has not been agreed and may indeed incorporate a combination of scrubbing processes. However it is recommended that the approved system should achieve an odour removal efficiency in excess of 98% so that emissions from the odour control units are minimised and not detected beyond a few metres from the buildings.

8.4.1.2 The following measures are proposed in the design and operation of the plant:

- The inlet works will be covered and screening equipment will be cleaned regularly. Air will be removed from the inlet area and treated

with air scrubbing equipment. Screened material will be stored in a covered skip.

- The storm tank will only be used in emergency conditions. When the tank is not in use all organic material will be cleaned from the floor of the tank.
- The primary sedimentation process will not be overloaded.
- Proper operation of the Secondary sedimentation process will result in a low BOD and relatively stable sludge which will minimise odourous compound formation.
- Diffused Air Aeration to be used. Fine bubbled diffused aeration to be used to obtain maximum aeration capacity of the activated sludge and to minimise turbulence at the surface of the tank that increases the volatilisation of odourous compounds.
- Picket fence thickening tanks, thickened sludge mixing tanks and sludge storage skips will be fitted with airtight covers to eliminate the emission of odourous compounds.
- Air extracted from operational areas will be passed through an odour scrubbing system before emission to atmosphere.
- Centrate and filtrate from sludge thickening; dewatering will be pumped in closed systems, transferred back and discharged underwater in the aeration tank to eliminate odour emissions.
- Odourous air abatement technology will be required to provide approximately 98% removal of odour causing compounds.
- The exhaust of the odour abatement systems be located 3 to 5 metres higher than the surrounding buildings in order to enhance dispersion.

8.5 Conclusion

8.5.1.1 Overall, the design and operation of the upgrading of the WWTP at Mullingar will ensure that odorous emissions are kept to a minimum. The Design/Build/Operate contract will include performance requirements at the plant boundary. Process guarantees will be required and enforced. Following commissioning of the WWTP, odour levels will be monitored at the treatment plant boundary in order to establish compliance with the performance specifications.

8.5.1.2 The proposed method of activated sludge treatment with sub-surface diffusion will also result in a low potential for malodours and aerosols to be generated.

The sludge thickening tanks will be covered and so this further reduces the potential for odours from this part of the treatment plant. The foul air from the dewatering plant will be passed through a high efficiency odour control unit before being exhausted to atmosphere via a vent located on the roof of the dewatering building.

8.5.1.3 A worst case odour emission scenario was modelled using the atmospheric dispersion model AERMOD and 4 years worth of hourly sequential meteorology data. Odour impact distances were discussed for the operation of the WWTPs with and without the implementation of abatement.

8.5.1.4 It was predicted that using an odour impact criteria of 1.5, 3.5 and 5 Ou m^{-3} at the 98 percentile that odour concentrations of between 1.5 and 3.5 Ou m^{-3} could be detected up to 600m from the proposed new WWTP. This would cause odour nuisance to the surrounding population situated in the northeast, north and north west of the facility.

8.5.1.5 With the implementation of abatement an 81% reduction in odour emission is achieved. It was predicted that an odour concentration of between 1.5-3.5 Ou m^{-3} could be detected up to 800m from the WWTPs. According to the English odour impact criterion of 5 Ou m^{-3}, no adverse odour nuisance will remain with the implementation of abatement. Several houses along the N18 will be subject to a concentration 1.5-3.5 Ou m^{-3} but it is not expected that this will cause any odour nuisance in the vicinity of these houses.

8.5.1.6 It is recommended that all odour abatement and minimisation procedures stated in this report be implemented throughout the proposed WWTPs in order to prevent any odour nuisance in the surrounding vicinity.

8.6 Predicted Impact of the Development

8.6.1 Introduction

8.6.1.1 Once mitigation measures are implemented to the design of the WWTP, no adverse impact on the ambient air quality of the area around the proposed site is predicted.

8.7 Monitoring

8.7.1 Introduction

8.7.1.1 The contractor awarded the Design Build and Operate Contract for the WWTP will be required to carry out an odour impact model for the design put forward by

the contractor in order to ensure that it does not cause any impact to the surrounding air quality environment.

8.7.1.2 The contractor is required to carry out odour monitoring to ensure compliance with odour limits during the routine operation of the WWTP.

Figure 8.1: **Predicted 98 Percentile Odour Concentrations for Mullingar WWTP without Abatement.**

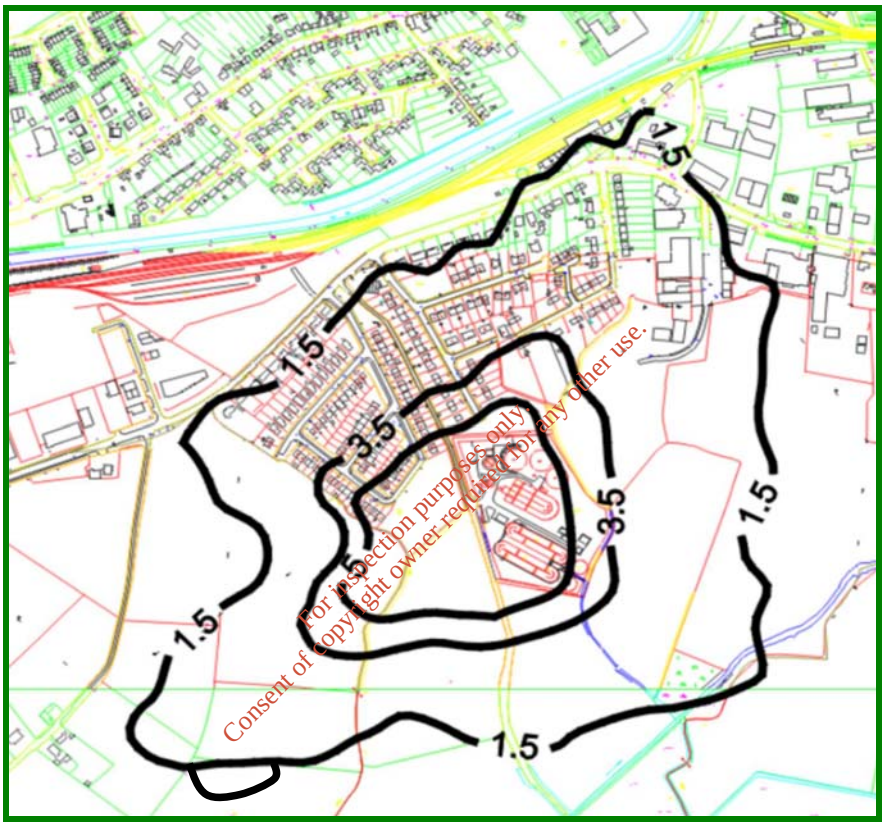
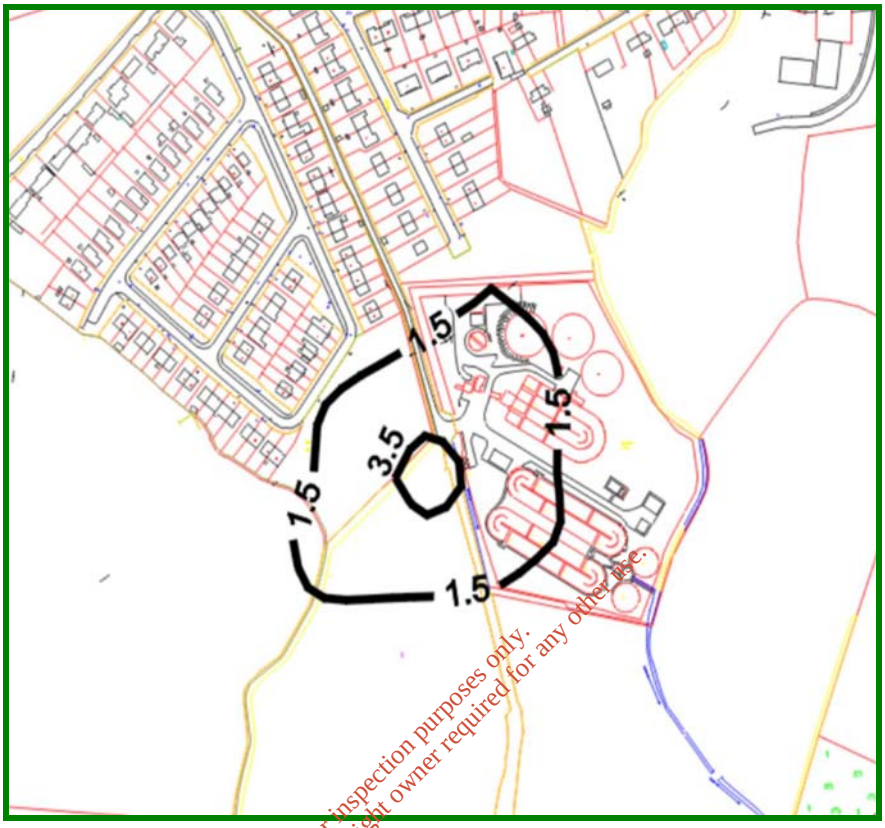


Figure 8.2: **Predicted 98 Percentile Odour Concentrations for Mullingar WWTP with Abatement.**



9.0 SECTION 9 – NOISE AND VIBRATION

9.1 Introduction

9.1.1.1 Any sound, which can cause nuisance or a deterioration of amenities and the quality of life, is examined under this topic.

9.1.1.2 Sound levels are measured with a meter in decibel (dB) units. Environmental noise levels are usually assessed in terms of A-weighted decibels, the dB (A). The A-weighting approximates to the response of the human ear. Industrial, occupational and environmental noise is usually expressed in equivalent continuous levels, LA_{eq}. This is based on the energy average level over the relevant time interval.

9.1.1.3 The Environmental Protection Agency (EPA) publication "Guidance notes for noise in Relation to Scheduled Activities" contains the following guidance:

"….. the noise level at sensitive locations should be kept below a value of 55 dB (A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should be kept below an LA_{eq} value of 45 dB (A)."

9.1.1.4 The environmental noise impact of the upgrading of the waste water treatment plant at Clonmore, Mullingar was assessed by ANV Technology. The assessment involved:

- Measurement of existing noise levels at the proposed site, during the day and night
- Measurement of noise emissions from a similar waste water treatment plant
- Prediction of noise levels at nearby houses, and assessment of impact against standard criteria

9.1.1.5 The noise assessment criteria used are based on EPA guideline noise limits, and on assessment procedures described in British Standard (BS) 4142. The impact of both the construction and operation phases are assessed.

9.1.1.6 Noise sensitive locations were chosen at the following locations as indicated in Figure 9.1.

- Location A: Near the houses at Clonmore Heights (measurements here are representative of the noise environment at house groups H2 and H3)
- Location B: Near the houses at Newbrook Drive (measurements here are representative of the noise environment at house group H1)

9.1.1.7 Measurements were recorded from these locations during the daytime of the 12th / 13th February 2002 with night time measurements recorded on the 13th February 2002.

9.1.1.8 All noise levels recorded are L_{Aeq} average noise level parameters unless otherwise indicated.

9.2 Existing Environment

9.2.1.1 The existing noise environment measurements show noise in the vicinity of the existing WWTP as intermittent construction and industrial noise, distant traffic, dog barking and birds. These measurements were taken during the day with night time readings showing the same measurements plus intermittent noise from the sludge building. (For full details on ambient noise levels, see Noise Assessment Report – Appendix 2).

9.2.1.2 The measured existing ambient noise levels were low by day and by night.

9.2.1.3 At location A - Clonmore Heights, the daytime ambient noise level was 48 dB(A), with a steady underlying background component of 45 dB(A) L_{A90}. At night time, noise levels were slightly lower, with an ambient noise level of 39 dB(A), with a steady underlying background component of 38 dB(A) L_{A90}.

9.2.1.4 At location B - Newbrook Drive, the daytime ambient noise level was 50 dB(A), with an underlying background component of 47 dB(A) $L_{A90.}$ At night time, noise levels were again slightly lower, with an ambient noise level of 42 dB(A), with an underlying background component of 40 dB(A) L_{A90}.

9.3 Impacts of the Proposed Development

9.3.1 Introduction

9.3.1.1 The proposed development is a WWTP. The type of equipment that will be employed may include air blowers and submersible pumps. The equipment may operate on a 24-hour a day basis.

9.3.1.2 When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages;

the short term impact of the construction phase and the longer term impact of the operational development.

9.3.2 Impacts during Construction

9.3.2.1 The calculated mean construction noise levels are in the range 50 to 60 dB. Construction noise levels of up to 70 dB(A) would generally be considered tolerable for limited duration construction projects. There may be occasions when construction noise levels will exceed 70 dB(A), at the nearest houses H2 and H3, for relatively short durations. These higher noise levels would probably be tolerable for durations of a few days. If noise activities are expected to be protracted at boundaries near these houses, or if protracted noisy activities such as concrete breaking are required, then appropriate mitigation measures should be incorporated to ensure noise impact is minimised.

9.3.2.2 Construction activities at night time could have a significant impact at the nearest houses.

9.3.3 Predicted Noise Levels From WWTP

9.3.3.1 The predicted noise levels due to the waste water treatment plant are shown in Figure 9.2. This noise map represents the expected noise level at night time.

9.3.3.2 The calculated night time noise levels due to the plant at the assessment locations are:

- H1: 40 dB(A)
- H2: 44 dB(A)
- H3: 44 dB(A)
- H4: 40 dB(A)

9.3.3.3 Note that the predicted noise levels from the new waste water treatment plant are within 2 dB of the measured noise levels from the existing plant. Given that the typical accuracy of noise prediction models is +/- 3 dB, it can be concluded that according to the noise model, no significant change in noise level is expected.

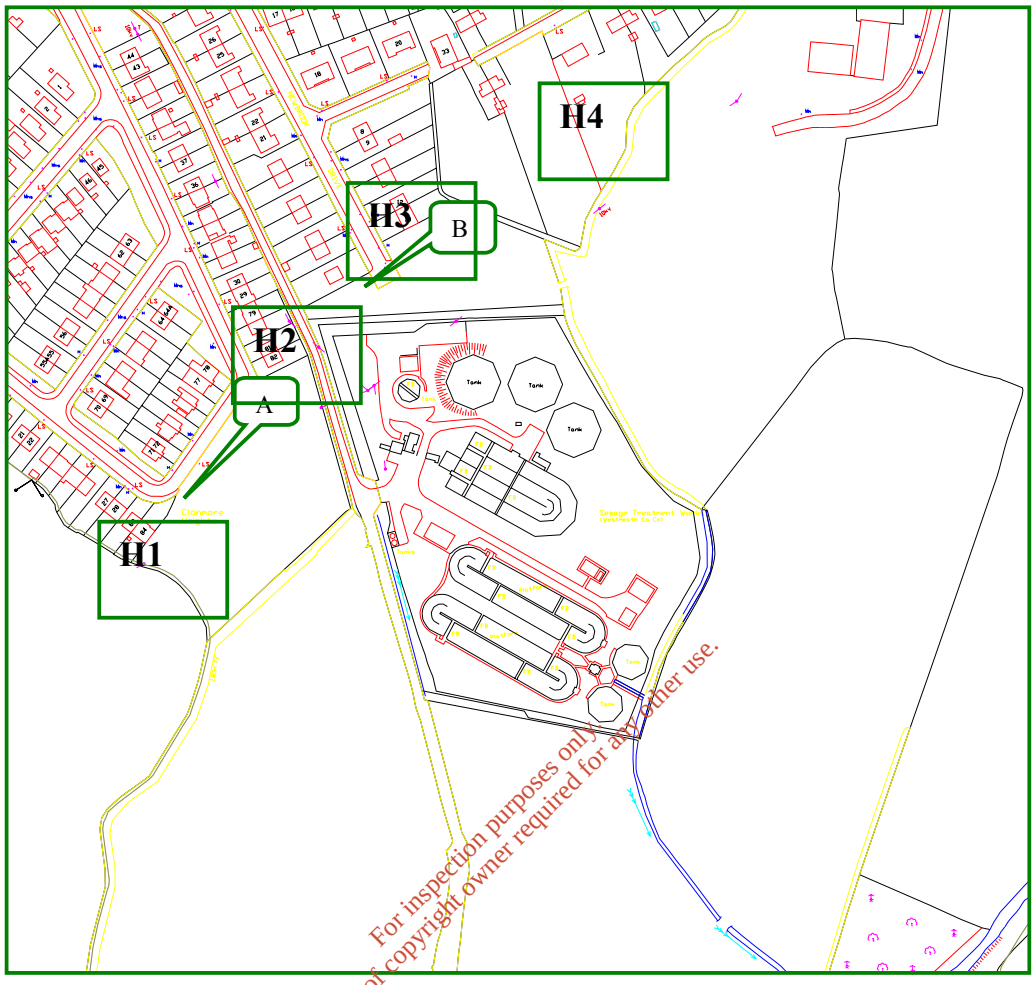


Figure 9.1: Measurement locations A and B. House assessment locations H1 to H4

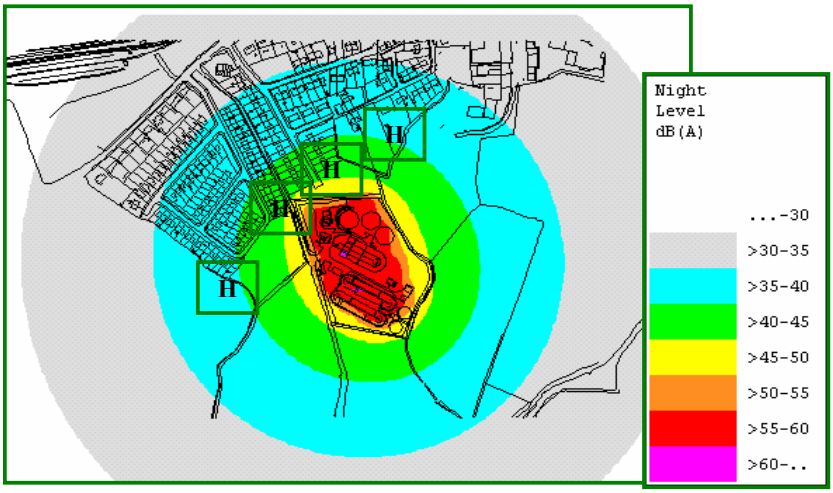


Figure 9.2: Calculated noise contours due to new Mullingar Waste Water Treatment Plant, night time

9.4 Assessment of Noise Impact

9.4.1 Waste Water Treatment Plant

9.4.1.1 The Environmental Protection Agency (EPA) guideline night time noise limit at noise sensitive location is 45 dB(A). This limit is commonly applied in mixed residential and industrial zones. In quiet rural settings, a night time limit of about 40 dB(A) may be more appropriate.

9.4.1.2 The proposed upgrading of the wastewater treatment plant is predicted to produce night time noise levels of 40 dB(A) at the nearest house. This is within the typical guideline limit in rural areas.

9.4.1.3 The existing underlying background noise at the nearest house is 38 dB(A) L_{A90} at night time. The predicted plant noise level is 2 dB lower than the existing background noise. Consequently it is unlikely to be noticeable.

9.4.1.4 Daytime ambient noise levels at the nearest house are expected to be approximately 50 dB(A). Noise levels due to the waste water treatment plant will be considerably lower than the ambient background noise, and the plant will not be audible at the nearest house.

9.4.1.5 Daytime ambient noise levels at the nearest house are expected to be approximately 50 dB(A). Noise levels due to the waste water treatment plant will be considerably lower than the ambient background noise, and the plant will not be audible at the nearest house.

9.4.2 Construction

9.4.2.1 During construction, the highest noise levels are likely to be generated during demolition and removal of existing facilities, site preparation, laying foundations for new buildings, and construction of the new access road.

9.4.2.2 Using data for typical earth moving and construction equipment from BS 5228, and allowing for propagation distances to the various noise sensitive locations, the following noise levels could be expected at the houses:

Mean Noise Level LAeq	*Highest Noise Level LAeq*
• H1: 58 dB(A)	65
• H2: 60 dB(A)	77
• H3: 60 dB(A)	77
• H4: 50 dB(A)	68

9.4.2.3 As construction activity moves about the site, the distance between the noise source and noise sensitive location will vary. The mean noise levels are calculated assuming the construction vehicles and noisy activities are distributed throughout the site, which represents the average over the complete construction period.

9.4.2.4 The highest noise levels are calculated for the case where the construction activities are in progress at the boundary closest to the affected house, or when particularly noisy operations are in progress, such as concrete breaking. These higher levels could be expected to be of short duration, relative to the total construction period.

9.5 Mitigation Measures

9.5.1.1 Mitigation measures are recommended to ensure that the cumulative noise level due to all plant noise sources, is limited to less than 40 dB(A) at the houses. The main potential for exceedence of this criterion is at the northern end of the site. Equipment at the northern end of the site should be limited in noise emission to less than 50 dB(A) at 10m, measured in the direction of the nearest houses. These design specifications should be incorporated in contract documents for the new waste water treatment plant.

9.5.1.2 Vibration isolation should be incorporated where required, to ensure that equipment installed near the northern end of the site does not transmit audible ground borne vibration to nearby houses.

9.6 Predicted Impact of the Proposal

9.6.1 Predicted Impact during Construction

9.6.1.1 With implementation of the recommended mitigation measures, there is likely to be some minor disturbance during construction but, given the limited duration, this is likely to be acceptable.

9.6.2 Residual Impact

9.6.2.1 It is considered that these design noise criteria will be reasonable achievable using standard mitigation measures such as selection of quiet equipment, or acoustic screening. With these mitigation measures incorporated in the design, the residual noise impact can be kept to less than 40 dB (A) outside the nearest house, which would represent a negligible noise impact.

9.7 Monitoring

9.7.1 Construction

9.7.1.1 During construction the Environmental Protection Agency night time noise limit criteria at noise sensitive locations as well as the British Standard 4142 “Rating industrial noise affecting mixed residential and industrial areas” will be followed. The selection of quiet equipment or acoustic screening will also help in reducing noise impacts to the nearest houses.

9.7.2 Operation

9.7.2.1 During operation of the works, monitoring of the noise levels will be carried out to ensure compliance with Environmental Protection Agency requirement.

10.0 SECTION 10 – MATERIAL ASSETS

10.1 Introduction

Material assets are examined under the headings of Roads and Traffic, and property values. Aspects of the environment which are addressed under Material assets are:

- Roads & Traffic
- Population
- Commercial Activity
- Industrial Development

10.2 Material Assets in the Existing Environment

10.2.1 Existing Conditions

Location and Existing Environment

10.2.1.1 The site for the proposed new wastewater treatment facility is located on lands comprising an existing treatment plant at Clonmore, south of the Mullingar town centre.

10.2.1.2 The subject site is set back from Clonmore Road a distance of approximately 350 metres. Surrounding land uses to the north are predominately residential. The Clonmore Shopping Centre is located just east of the driveway that provides current access to the site. There is also a driveway just west of the site access that serves a residential estate. Vacant land fronts the site in all other directions.

10.2.1.3 Along both directions of Clonmore Road, land use is predominantly industrial and residential in nature.

10.2.1.4 Access to the site is via a narrow, approximately 5-metre wide, unsealed road set in a narrow vegetated road reservation.

Existing Road Network

10.2.1.5 The National Secondary N52 route provides the main regional access in the vicinity of the subject site. This road also provides access to the National Primary N4 route to the east of the town.

10.2.1.6 The N52, which runs north-south, originates in Dundalk, runs through the centre of Mullingar, through Tullamore and terminates in Nenagh. The section of the

route through Mullingar results in a high volume of through traffic (particularly trucks) travelling through the centre of the town and causing high levels of congestion and delay during most of the day.

10.2.1.7 Clonmore Road runs east-west from the N52 (south of the town centre and adjacent to the railway line) to the Regional Road R390. The total length of the road is approximately 2 kilometres. Roundabouts control the junctions at each end of Clonmore Road.

10.2.1.8 In the vicinity of the site, Clonmore Road is a wide two-way road with a road pavement width of approximately 7 metres along most of its length. The road services a number of industrial and residential estates constructed along the road.

10.2.1.9 The posted speed limit along Clonmore Road is 30 miles per hour. Good lighting is provided along the road.

10.2.1.10 The 5-metre driveway that currently provides access to the wastewater treatment plant widens to around 15 metres at the mouth of its junction with Clonmore Road. This provides an increased turning circle for trucks. The driveway was widened about a year ago to allow improved vehicle access (particularly for trucks).

10.2.1.11 The driveway varies in width but is wide enough to allow two trucks to pass each other over most of its length.

10.2.1.12 The driveway to the wastewater treatment plant is located on a slight bend in Clonmore Road. This restricts visibility to the right for drivers exiting the driveway.

10.2.1.13 To the west of the existing wastewater treatment plant along Clonmore Road is an industrial estate. The driveway to the industrial estate will provide the long-term access to the site.

10.2.1.14 The industrial estate driveway is approximately 7.5 metres wide with kerb and channel constructed along most of its length. The junction of the industrial estate driveway with Clonmore Road is very wide (large turning circles) but is not clearly defined and has not been constructed with kerb and channel. Opposite, a driveway to a smaller industrial estate forms the forth leg of the intersection. Through traffic along Clonmore Road has priority over vehicles exiting the estates.

10.2.1.15 Observations on-site during wet weather conditions showed that Clonmore Road at the junction with the industrial estate was subject to flooding due with poor drainage.

Existing Traffic Conditions

10.2.1.16 Traffic volumes supplied by Westmeath County Council showed that the N52 south of Mullingar had an Average Annual Daily Traffic (AADT) flow of 4,381 vehicles, with 16 percent Heavy Goods Vehicles in 1998.

10.2.1.17 Other data collected closer to town showed a higher AADT, in the order of 8,800 vehicles per day along the N52 (Lynn Road) near the junction with the Clonmore Road in 1999.

10.2.1.18 The traffic data supplied also showed an AADT of around 1,250 vehicles along the R390 (with around 7.5 percent HGVs) at the junction with the R391.

10.2.1.19 So as to determine the existing traffic volumes along Clonmore Road at the junction with the industrial estate driveway (i.e. the proposed long-term access) a traffic survey was conducted during the evening peak hour on Tuesday 22 January, and during the morning peak hour on Wednesday 23 January, 2002.

10.2.1.20 The results of the survey for the evening peak hour (5:00pm-6:00pm) and the morning peak hour (8:30am-9:30am) showed that:-

- Clonmore Road carried a high percentage of trucks and vans (approximately 17 percent);
- Most origins and destinations from the industrial estate driveway were to the east along Clonmore Road (i.e. 70 percent);
- As with most industrial estates, it was during the morning peak hour that most traffic was generated to the driveway; and
- The smaller industrial estate opposite the main industrial estate driveway generated lower levels of traffic. Some vehicles were observed travelling between the two estates.

10.2.1.21 It is important to note that during the survey period, many of the trucks observed on the main estate driveway were associated with building construction works.

10.2.1.22 During both the evening and morning survey periods, no vehicles were observed experiencing any significant delay exiting the industrial estates, and no queuing was observed.

10.2.1.23 Reference to RT201 "Expansion Factors for Short Period Traffic Counts", An Foras Forbartha specifies an afternoon peak hour expansion factor of 13.5 (with a 10 per cent confidence limits) to obtain an AADT flow. This translates to an AADT of approximately 9,000 vehicles for Clonmore Road. This volume is well within the capacity of the road.

10.2.1.24 The existing treatment plant currently generates traffic five days a week mainly from the existing staff. The number of vehicles generated to the site is approximately 10-20 cars per day and a maximum of 5 trucks per day.

10.2.1.25 Observations at the existing driveway to the wastewater treatment plant during the afternoon peak hour, revealed only 3 cars exited the site onto Clonmore Road. All three cars made right turn movements.

10.2.2 Proposed Industrial Estate Road Extension

10.2.2.1 As previously mentioned, it is proposed to provide access to the site via an extension of the industrial estate driveway.

10.2.2.2 Westmeath County Council proposes to construct an extension of the industrial estate driveway to the south. The extension of the driveway will include a link to the wastewater treatment plant.

10.2.2.3 This new link will provide improved access to the wastewater treatment plant, particularly for larger size vehicles.

10.2.2.4 It is envisaged that the intersection of industrial estate driveway with Clonmore Road will be upgraded with improved drainage to clearly define the junction. Westmeath County Council will also need to address a long-term strategy for this junction based on expected future growth along Clonmore Road.

10.2.3 Proposed N52 Road Improvement Scheme and Mullingar Bypass

10.2.3.1 As identified in the National Roads Needs Study and as part of the National Development Plan 2000-2006, it is proposed to bypass/upgrade the existing N52 to the east of its current alignment from the National Primary N4 to Belvedere.

10.2.3.2 The Preliminary Design Phase of the road improvement scheme has been completed including the CPO and Public Inquiry component.

10.2.3.3 The Mullingar Bypass will lead to a reduction of through traffic in the town and along Lynn Road (i.e. the roundabout access to Clonmore Road).

10.2.3.4 Traffic modelling undertaken for the Mullingar Bypass shows that the section of the current N52 at the roundabout junction with Clonmore Road will carry around the same traffic volumes in the Year 2018 as current traffic volumes. The proposal will also significantly reduce the volume of Heavy Goods Vehicles travelling through the town.

10.2.3.5 The N52 Mullingar Bypass plans also show a future possible link from the current N52 to Clonmore Road at its western end. If this proposal eventuates it would form part of a southern orbital route of Mullingar and significantly reduce traffic volumes along Clonmore Road.

10.2.3.6 Depending on the nature of any objections to the scheme, and the available funding from the Government, the Mullingar Bypass could be open before the construction of the new wastewater treatment facility.

10.2.4 Population equivalent/design loading

10.2.4.1 The new WWTP will be designed to cater for a population equivalent of 55,000 PE for the year 2027. Detailed analysis of the population growth is included in the Preliminary Report. Detailed analysis of the population growth and an assessment of the impact of the proposed development is included in the Preliminary Report and in Section 3 of the Environmental Impact Statement.

10.2.5 Commercial and Industrial Activity

10.2.5.1 Mullingar being the capital town of County Westmeath serves as the commercial/industrial hub of the county. Table 10.2 below shows the population variation within Mullingar Urban District over the period 1981 – 2002.

Table 10.2: Population figures for the 1981-2002 period for Mullingar Urban District

Area	1981	1986	1991	1996	2002
Mullingar Urban District	7854	8077	8003	8040	8833

Source: **Central Statistics Office**

10.2.5.2 It is interesting to note from Table 10.2 above that the population figures for Mullingar Urban District over a 15 year period between 1981 and 1996 were highest in 1986. There was a slight decrease in population during the 1986-1991 period and a slight increase in population during the 1991-1996 period. It can be concluded that the population of Mullingar Urban District remained

static over this period with only slight variations in population. There was a significant increase in population figures between 1996 and 2002.

10.2.5.3 Mullingar is well served by schools, commercial premises, and retail outlets. As an important population centre and a major regional centre, Mullingar's extensive range of retail and commercial services caters for a much larger population than is resident in the town and its environs. As a result there are good employment opportunities within these areas.

10.2.5.4 There are a number of small to medium industrial premises in the area also. However, Industrial development within the area has not experienced the same boom as shown in other towns in Ireland like Athlone over the last 15 years with no real large-scale developments taking place within the area. Employment opportunities within this area are therefore limited and this is reflected by the number of the resident population of Mullingar commuting outside the county and in particular to Dublin to work. For a more detailed assessment of existing employment trends within the county, see section 4 of this EIS.

10.3 Impacts on Material Assets

10.3.1 Traffic

Potential Traffic Impact

10.3.1.1 The potential environmental impacts generated by traffic associated with the proposal are in relation to the existing road system and inhabitants within the town. This will apply at both the construction and operational stages.

10.3.1.2 This increased volume of traffic will have potential impacts on humans such as:

- Increased noise and vibration levels
- Visual Impact
- Community Severance
- Pedestrian Delay
- Cyclist Delay
- Driver Delay

- Increased Accident Potential
- Increased Air Pollution
- Increased Dust Generation

10.3.1.3 The above impacts, although not necessarily significant require consideration to determine their extent. Certain groups of people whose immune systems are suppressed, that is the very young and the elderly or those in sensitive locations, (i.e. hospitals, schools, etc) may be affected more than others. Others who may be affected are those at home, work, walking or cycling.

10.3.1.4 The impact on the above groups will depend on various factors such as:

- Volume of traffic
- Speeds and operational characteristics
- Composition of traffic (e.g. the heavy vehicle content)

10.3.1.5 The perception of traffic change on humans will depend on factors such as:

- Existing traffic
- Traffic route
- Time of day
- Variation of traffic volume
- Design and layout of roads in the vicinity
- Land use activities adjacent to the route

Expected Traffic Generation

10.3.1.6 Two stages of the development need to be considered in relation to traffic loading namely:

- Construction Stage
- Operational Stage

Construction Stage:

10.3.1.7 Although the exact details of the proposed new wastewater treatment facility have not been determined, it is expected that the greatest volume of traffic generated by the proposed development at peak times will occur during the

construction stage of the development. Construction of the proposed development is expected to last for approximately 12 months with between 10-20 people employed on the site. Normal working hours will be between 8.00am and 6.00pm, five days per week with probable working on Saturday mornings. Assuming each of the construction workers arrives to work by car, and assuming 20 people are employed on the site, a maximum of 20 cars will arrive at the site between 7.30 and 8.30am, and the same number will leave between 5:30- 6.30pm.

10.3.1.8 During construction, trucks and vans will be delivering materials to the site daily. It is estimated that this could amount to 20-30 trucks per day coming to the site depending on the construction activity. The arrival of trucks and vans to the site are expected to be evenly spread throughout the day.

10.3.1.9 The existing driveway providing access to the site will be adequate for large trucks; however the proposed new link to the industrial estate driveway to the west of the site maybe constructed prior the proposed new wastewater treatment facility. This would allow improved access to the site for all vehicles (including trucks) during the construction stage.

10.3.1.10 Vehicles accessing the site would have origins and destinations in both directions along Clonmore Road. However, the majority of vehicles would be expected to have origins towards the east (i.e. towards the N52 and N4).

10.3.1.11 In summary, it is expected that during the construction period, a maximum of up to 30 trucks per day could be arriving at, and leaving the site during the day and up to 20 cars could arrive in the morning and leave in the evening.

During Operation

10.3.1.12 The operational stage of the project will generate an increase in the existing volume of traffic. The following is a schedule of the traffic, which will be generated by the new wastewater treatment facility, when it is operational:-

- Cars bringing employees to and from work (staff cars)
- Maintenance trucks/vans and visitors coming to/from the plant
- Delivery of admixtures to the plant
- Delivery of sludges from a number of outlying treatment plants
- Removal of washed/dewatered screenings from the site
- Removal of treated sludge from site

10.3.1.13 The level of traffic generated to the site will depend upon the Sludge Management Strategy for the area and the site. The following is the most likely projected traffic loadings for the plant operation at full capacity (i.e. Year 2020):

Staff Cars

10.3.1.14 It is only expected that 6 full time and a small number of part time staff will continue to be employed in the operation of the plant. Assuming that each person arrives to work in their own car, this translates to a maximum of 10 vehicle trips during both the morning and afternoon peak hour. There may also be additional vehicle trips during the day (i.e. at lunchtime).

Maintenance/Visitors

10.3.1.15 This would not be regarded as regular or extensive. An allowance of 1 truck/van visit per day associated with maintenance and 2 car visits per day associated for visitor/inspections would be the highest level of traffic generation associated with the plant during operation.

Admixtures In

10.3.1.16 Admixtures will be used as part of the sludging drying process and will be delivered in bulk to the plant by trucks and stored on-site. The number of trucks delivering chemicals to the plant is expected to be small and no more than 3 truck deliveries per week.

Sludge Delivery In

10.3.1.17 The new facility will generate liquid sludge from other plants in the surrounding area. The sludge will be transported in sealed tankers or skips, on a five-day week basis. The expected number of trucks delivering sludge to the plant will be a maximum of 20 trucks per week.

Screenings Out

10.3.1.18 Screenings and grit will be collected on-site and discharged into covered skips for removal. The volume of this material will result in one truck movement generated to the site per week.

Dewatered Sludge Out

10.3.1.19 The removal of dewatered sludge, which will contain 60 percent dry solids, will be transported from the plant by trucks for further treatment. It is expected that this component will generate no more than 3 trucks per day.

Summary of Total Traffic Movements

10.3.1.20 On busy days, the plant could generate up to 30 car trips and an absolute maximum of 25 trucks per day.

10.3.1.21 On most days a lesser volume of traffic is expected to be generated to the site.

10.3.1.22 Truck movements would normally be spread over an 8-hour period, and most car traffic would be concentrated in the morning and evening peak hours.

10.3.1.23 Trucks generated to the site are expected to be similar in size to those currently accessing the site.

10.3.1.24 It is expected that most of the trucks generated to the site will have origins and destinations to both directions along Clonmore Road.

10.3.2 Expected Traffic Impact

10.3.2.1 Traffic volumes along the N52 in the vicinity of the subject site are expected to dramatically reduce following the construction of the new N52 Bypass. The reduction of the traffic volumes along the N52 will improve the operation of the road from both a capacity and safety perspective.

10.3.2.2 Existing traffic volumes along Clonmore Road are well within the capacity of the road and the expected increase in traffic with the proposed development will have no significant impact. Furthermore, if the proposed orbital bypass road from the existing N52 to the western end of Clonmore Road is constructed, traffic volumes along Clonmore Road past the subject site will reduce dramatically.

10.3.2.3 The proposed new site access via the link to the industrial estate driveway will provide improved access from current arrangements.

10.3.2.4 Westmeath County Council should review the development in the area and along Clonmore Road to determine what traffic management is required. Appropriate treatments will depend upon expected future growth, proposed development, and the timeframe for roadworks.

10.3.3 Population and Commercial / Industrial Activity

10.3.3.1 The potential impacts associated with the proposed development in direct employment terms is largely confined to the construction phase of the project when the development of the new WWTP will generate direct and indirect employment over the estimated 12 month construction period.

10.3.3.2 Once operational the WWTP will facilitate the creation of employment in the general area. Larger industries could be attracted to the area as a result of having a proper waste water treatment facility in the area. Provision for future industrial and commercial loading is incorporated into the design of the proposed WWTP.

10.4 Mitigating Adverse Impacts on Material Assets

10.4.1 Roads and Traffic Environment

10.4.1.1 The sludge delivery and removal will be transported in sealed tankers, manufactured to avoid loss of material or odour escape during transportation. The transport of grit and screenings material has no associated odour problem and will involve the use of covered skip trucks to avoid material loss.

10.4.1.2 Within the site it is recommended that the layout of the site ensure that sufficient space is allocated to allow trucks to turn safely around on-site.

10.4.1.3 The current driveway was recently widened to allow improved truck access. The current access configurations are considered adequate until the new link to the industrial estate driveway extension has been constructed.

10.4.1.4 In order to improve vehicle access to the site it is recommended that directional and warning signage be installed along the Clonmore Road approaches to the site notifying drivers of the location of the facility and to make other drivers aware that vehicles will be turning out of the driveway.

Commercial / Industrial Activity

10.4.1.5 No remedial or reductive measures are proposed, as the development will be entirely beneficial in employment terms.

10.5 Alternatives Considered

10.5.1 Roads and Traffic Environment

10.5.1.1 It is not necessary to consider any site alternatives for the current proposal as the site currently comprises a wastewater treatment plant and there is sufficient land to incorporate the new facility.

10.5.1.2 In relation to access to the site, the proposal to provide a link from the proposed industrial estate driveway extension to the site is considered to be the best arrangement. This new road, will most likely be constructed with a road pavement width of around 7.5 metres (i.e. to tie into the current road) and include kerb and channel. This type of road configuration will be suitable for trucks and other vehicles accessing the site.

10.5.1.3 The junction of the industrial estate driveway and the Clonmore Road has good horizontal sight distances and the intersection can easily be upgraded to a high design standard.

10.5.1.4 The current access arrangements, which are considered to be of a lesser standard, will then become obsolete.

11.0 SECTION 11 - LANDSCAPE AND VISUAL STUDY

11.1 Introduction

11.1.1.1 This section examines the landscape and visual impacts relating to the upgrading of the Mullingar Sewerage Treatment Works and the provision of a new access road. The purpose of this study is to appraise the existing landscape of the application site and its wider setting, to assess the likely impacts arising from the proposed development and describe the proposed mitigation measures.

11.2 Methodology

11.2.1 Introduction

11.2.1.1 The basis of the assessment follows the Draft Guidelines on the information to be contained in Environmental Impact Statements (Environmental Protection Agency, 1995) and the assessment itself entailed: -

- Visiting the area in January 2002 and preparing a photographic record of views and landscape features.
- Undertaking a desk study of the site in relation to its local and regional significance.
- Studying O.S. maps of the area, and tree and hedgerow survey of the site.
- Reviewing the photomontages of the scheme.
- Reviewing site photography to determine the zone of visual influence of the proposals.
- Predicting both winter and summer screening conditions.

11.2.2 Aspects of Impact

11.2.2.1 Impact on the landscape arising from development has two distinct but closely related aspects. This first is impact in the form of change to the character of the landscape and the consequential responses which may be felt towards the combined effects of the new development. The significance of these will partially depend on how people perceive a particular landscape and how much the changes will matter in relation to other senses i.e. sound, feelings etc. The second aspect, visual impact, is less subjective. Visual impact occurs by means of intrusion and/or obstruction where 'visual intrusion' is impact within a view without blocking it and 'visual obstruction' is impact on a view involving full or substantial blocking thereof.

11.2.3 Significance Criteria

11.2.3.1 Whenever appropriate the following terms are used to describe the degree, quality and duration of an impact:

- *Imperceptible/No Impact* – arises where the development proposal is either distant or adequately screened by existing landform, vegetation or built environment.
- *Slight Impact* – arises where views affected by the proposal form only a small element in the overall panorama, or where there is a small change in the character of the area.
- *Moderate Impact* – arises where an appreciable segment of the panorama is affected, where there is an intrusion in the foreground or where there is a noticeable change in the character of the area.
- *Significant Impact* – arises where the views are affected, obstructed or dominated to such a degree that the proposal becomes the focus of the viewer's attention. A significant impact on character arises where there is a substantial alteration in the character of an area but the essential experience of the original character remains.
- *Profound Impact* – arises where a significant view is completely obscured or altered or where the character of an area has been completely changed.

11.2.3.2 Note: Moderate impacts are not included in the EPA Glossary of Impacts. Moderate impacts have been included in the scale of impacts to cover the substantial gap between slight and significant impacts as they relate to landscape assessment.

Terms used to describe the quality of change:

- *Negative Impact* – A change that reduces the quality of the visual environment or adversely affects the character of the landscape.
- *Neutral Impact* – A change, which does not affect the quality of the landscape.
- *Positive Impact* – A change, which improves the quality of the environment.

Terms used to describe the duration of impact:

- *Temporary Impact* – Impact lasting for one year or less.
- *Short Term Impact* – Impact lasting for one to seven years.
- *Medium Term Impact* – Impact lasting for seven to twenty years
- *Long Term Impact* – Impact lasting twenty to fifty years
- *Permanent Impact* – Impact lasting over fifty years

11.3 The Receiving Environment

11.3.1 Site Context:

11.3.1.1 The site is located to the immediate south of Mullingar Town on the boundary between the built up area of the town and adjacent agricultural land. The surrounding area is comprised mainly of a mixture of housing and light industry on the edge of the town and agricultural land merging with rural areas in the surrounding locality to the south. The site is on the northern edge of the River Brosna floodplain where the ground level starts to rise. The floodplain itself is comprised of agricultural land while the fringes of the floodplain close to the town are largely developed. The site lies on the edge of this developed fringe.

11.3.1.2 The site is bordered to the north by the Newgrove housing development and to the north-east by the Brosna housing development, both comprised of typical semi-detached dwellings. A small public open space area (0.85ha.) associated with the Newgrove housing development lies between the site and the adjacent houses. To the east the site is bordered by an area of disused land which is zoned for as yet unspecified future use. To the south east, south and parts of the western boundary the site is bordered by agricultural land used for permanent grazing. The pasture is criss-crossed by a number of streams feeding in to the Brosna River, and is poorly drained due to its location within the floodplain of the river. There are a number of patchy hedgerows dividing the pasture into fields but these are of modest size and apart from one small block of woodland, the area is generally open in character. The remainder of the western boundary is bordered by the site access lane and public open space associated with the Clonmore Heights housing development, another typical semi-detached suburban development. Mullingar Business Park, currently under construction, is located further to the west and further light industrial developments located further to the north east. Further afield, the N52 Road between Mullingar and Tyrellspass is located on the far side of the agricultural lands to the east. Several houses are located on the far side of the road (to the east) and a filling station and a number of light industrial businesses flank the opposite side of the road and back on to

the agricultural land. The site is accessed via a laneway from Newbrook road to the north.

11.3.2 Site Description:

11.3.2.1 The site of approximately 2.82ha is comprised of the existing wastewater treatment plant and associated treatment structures. These include a number of open circular and rectangular tanks of variable sizes but generally not more than 1m in height above ground level, several single storey flat roofed buildings, and access roads and pathways. The site slopes from north to south with a change in elevation of approximately 4m. The site is bound on all sides by a 2.4m high palisade fence with a secondary concrete post and chainlink fence to the outside along parts of the boundary.

Individual boundaries are described as follows:-

- Northern Boundary with Public Open Space: This boundary is comprised of a 2.4m palisade fence to the inside of the site, outside of which is a 5m wide belt of screen planting. Half of this planting is comprised mainly of Monterey cypress (Cuppressus macrocarpa) up to 4m high with Lombardy poplar (Populus nigra) trees up to 17m high. The other half is comprised of a range of coniferous tree species up to 3m in height with beech trees (Fagus sylvatica) up to 9m in height. This boundary offers effective screening even during the winter months.
- Eastern Boundary with Disused Land: This boundary is comprised the 2.4m pallidade fence to the site interior and a 3.0 to 4.0m high hedge of mainly of elder (Sambucus nigra). A single beech tree of 10m height is located within the north eastern corner of the site. The elder hedge gives good screening at ground level due to the density of planting, but overall screening is limited due to the limited height of the hedgerow.

- South-eastern boundary with agricultural land: This boundary is comprised of the 2.4m palisade fence, a small stream to the outside of the site and 3 individual trees. As there is no hedgerow planting, there is virtually no screening along this boundary.
- South and south-western boundary with agricultural land: This boundary is comprised of the 2.4m palisade fence, a belt of planting comprised of alternate sections of Monterey cypress and elder, a 2.4m concrete post and chainlink fence and a small stream. The Monterey cypress planting, being up to 12m in height offers effective screening throughout the year. The sections of elder hedge offer less screening due to a maximum height of 4.0m.
- Western boundary with access road: This boundary is comprised of a 2.4m palisade fence to the inside of the site, 2m to the outside of which is an additional chainlink fence and boundary planting in-between. This planting is comprised mainly of Monterey cypress (Cuppressus macrocarpa) up to 6m high with Lombardy poplar (Populus nigra) trees up to 17m high.

11.3.2.2 While the current site boundaries provide good screening to three sides of the site, the boundary vegetation is relatively mature. As a result, unless ongoing management is put in place to replace and augment this vegetation, the level of screening provided will be gradually reduced as the existing vegetation declines.

11.3.2.3 A further portion of land to the west of the sewerage treatment works will be required for the construction of a new access road to the site from the adjacent business park. This is comprised of an area of agricultural grazing and adjacent hedgerow and stream.

11.3.3 Significance

11.3.3.1 The site is not included within Listed Views, Areas of High Amenity or any other landscape protection objective of the 1994 Westmeath County Development Plan.

11.3.4 Visibility

11.3.4.1 The site is visible from a large area to the south due to its location on the edge of the developed area of the town adjacent to the agricultural pasture. In addition this area of pasture is open in character apart from a single block of woodland and some minor hedgerows. However, while this is the most visually exposed part of the site it is also the least populated area, and the closest public

viewpoints are a considerable distance from the site (circa. 500m). From elsewhere the site is partially visible from the rear of three housing developments, the rear of some light industrial units and associated access roads. The built up nature of the areas to the northwest, north and north east effectively screens the site from the surrounding area and from Mullingar in general. In addition, the existing trees and hedgerows to the site boundary provide good additional screening.

11.3.4.2 There are six particular areas/locations where significant views into the site are afforded:

- N52 Mullingar to Tyrellspass Road (refer to View no.1, Figure 1.3, Appendix no. 3): The N52 is located at a minimum distance of 530m to the east of the site and runs in a north-south direction. The western side of the road (the side facing the site) is generally undeveloped, a filling station and single warehouse complex being the only significant built elements. The remainder of the road environs on this side are comprised of either agricultural or disused land. The road boundary is comprised of a fence with intermittent patches of hedgerow. The area between the road and the site is generally open in character, the only major screening element being a single copse of trees. The site is most clearly visible from the road on the approaches to Mullingar along a 300m stretch wherever the roadside hedgerow subsides. Elsewhere minor undulations in the landform, hedgerows and the copse of trees screen the site from the road. The eastern side of the road is flanked by detached houses which are generally located at least 30m from the roadside. Two of these houses are elevated well above road level and so have views to the site. The remaining houses have limited views depending on the extent of the hedgerow on the opposite of the road and on the planting within front gardens. The site when viewed from this direction is set against a backdrop of light industrial development and warehouses. While the site is not well screened along this boundary, it is not a significant element within this view due to the small scale of the existing structures, the large scale of the surrounding industrial buildings and the relatively low elevation compared to surrounding development. In addition, this view will become increasingly industrial as the adjacent business park develops.

- Mullingar Business Park (refer to View no.2, Figure 1.3, Appendix no. 3): The business park is currently under construction. Access roads have been built but only a few plots of the park have been developed, the remainder being either under construction, or for the most part

disused. The boundary of the business park is 115m from the site boundary at the closest point. However, the new site access road will be routed via the business park so this area is in closer proximity to the park and clearly visible. The existing trees around the site boundary provide effective screening and none of the built elements within the site are currently visible. As the business park develops views to the site will become more limited, eventually being confined to the rear of the closest units.

- Clonmore Heights (refer to View no. 2, Figure 1.3, Appendix no. 3):17 properties within the Clonmore Heights development have views to the site. The front elevations of 10 properties face the site, 3 properties have views from the rear, and 4 properties have partial view at an angle. Most properties view the site across the public open space area and so are set back from the site boundary. In addition, there is good screening along the site boundary as viewed from this area. A small gap in the screening at the site entrance allows limited views in to the site and a small portion of one of the aeration tanks is visible. None of the structures within the remainder of the site are visible.

- Newbrook Residential Development: Within this area the site is most visible from Newbrook Drive, the end of this cul de sac terminating in the open space area adjacent to the site. Two properties border this open space area and the site boundary is clearly visible from their front gardens. A further 11 properties have oblique views of the site boundary. The screen planting along this boundary is very effective and none of the structures within the site are visible.

- Brosna Residential Development (refer to View no.3, Figure 1.3, Appendix no. 3): One property in this development backs on to the Newbrook public open space area. A further 8 properties back on to the area of disused land that borders the eastern boundary of the site. The site is not visible from the house with the garden that backs on to the Newbrook public open space area due to planting to the garden boundary and the fact that the house is located 110m from the site. The remaining 8 properties are located further from the site but have views to the site due to there being no screen planting to the garden boundaries and the fact that the boundary is defined by a palisade fence which is visibly permeable. However, while the screen planting to the site boundary at this point is only 4.0m in height, this is sufficient to screen virtually all of the existing structures within the site.

- Other light industrial/commercial areas to the immediate south of Mullingar (refer to View no.3, Figure 1.3, Appendix no. 3). Remaining areas to the northwest of the site that border the adjacent agricultural land are comprised of the rear of industrial structures and warehouses. Views of the site from these areas are limited both due to the nature of their property boundaries and due to the distances involved (200-500m). Viewed from this area the site effectively merges into the surrounding agricultural land due to the scale of boundary planting and the screening provided.

11.4 Impact Assessment

11.4.1 Impacting Features (see Appendix 3, Figure 1.2)

11.4.1.1 The proposed scheme involves the upgrading of existing sewerage treatment facilities together with a new access road. The upgrading of facilities will more than likely include the construction of a new aeration tank, 2 new sedimentation tanks, a new inlet works building, a new sludge building and other minor structures and works. A belt of tree planting will also be provided along the eastern boundary of the site and a management and replacement strategy put in place for the existing boundary vegetation. The principal elements that are anticipated will give rise to visual impacts are as follows:

- Site excavation and ground modelling/contouring.
- Sludge Building
- Inlet works building
- New access road into development from existing adjacent business park
- New boundary planting

11.4.2 Impact on Landscape Character (see Appendix 3, Figure 1.3)

11.4.2.1 The site is located on the fringes of the developed area of Mullingar Town at the interface between light industrial and residential areas of the town and adjacent agricultural pasture. The character of the area will not change to any significant degree as a result of this proposed development. The existing sewerage treatment complex on the site and adjacent warehouses and light industrial structures has already established a strong visual precedent. The proposed development is merely an extension to an existing facility and does not alter the existing landscape character.

11.4.3 Impact on Views - Public Roads (see Appendix 3, Figure 1.3)

N52 Mullingar to Tyrellspass

11.4.3.1 The proposed development will be visible from certain parts of the N52 adjacent to Mullingar. The views of most significance will be those within 300m of the built up area of the town where the site is approximately 500m from the road. The most visible structure will be the new Inlet Works Building which will be visible against a backdrop of housing and warehouse buildings. However, the impact of this structure on the view will be slight due to the distance from the site and the existing context of similarly large structures both around the site and adjacent to the N52. The impact of the development on this view is therefore likely to be *slight*, *negative* and *long-term*.

11.4.3.2 The proposed development will not be visible from any other public roads.

11.4.4 Impact on Views - Residential Property (see Appendix 3, Figure 1.3)

Clonmore Heights Residential Development

11.4.4.1 The development will be almost entirely screened from Clonmore Heights. However, the top of the proposed Inlet Works building will be partially visible during the winter months when the poplar trees along the western boundary of the site have shed their leaves. Given that almost all of the existing elements within the sewerage treatment works are currently screened from this area, the scale of this building will change the perceived character of this view and will have a *slight negative* and *long term* visual impact on 12 properties within Clonmore Heights. The impact on remaining properties will be *imperceptible*.

Newbrook Residential Development

11.4.4.2 The development will not be visible from houses within the Newbrook residential development. This is due to the effective screening offered by vegetation on the northern site boundary. The visual impact on residential properties in this area will therefore be *imperceptible*.

Brosna Residential Development

11.4.4.3 The top of the proposed inlet works building will be clearly visible during the winter months from the rear of 9 properties within the Brosna residential development, and partially visible during the remainder of the year. The scale of this building will partially alter the character of the view from the rear of these properties. However, while none of the existing structures within the sewerage treatment works are currently visible in this area, buildings of a similar scale and proximity are clearly visible to east. A precedent has therefore already been set

in the locality for buildings of this scale. While the proposed planting will over time screen a large proportion of the new building, the top of the building may still be visible over the top of the trees. The visual impact on these properties will therefore be *slight*, but *negative* and *long term*.

Properties adjacent to the N52

11.4.4.4 Two houses which are in an elevated position adjacent to the N52 will have a clear view of the proposed new structures and especially the proposed inlet works building and sludge building. However, given the existing context of large light industrial buildings in this portion of the view, the fact that the new structures will not break the horizon line, and the distance of the site from these properties (560m), the visual impact of the development will be *slight* but *negative* and *long term*. The remaining properties adjacent to the N52 in this area have at best only partial views of the site, are a considerable distance from the site (530m minimum) and are at a relatively low elevation. The proposed structures will form a very minor element within this view. The visual impact on these properties will therefore be *imperceptible*.

11.4.5 Impact on Views – Commercial Property

Mullingar Business Park

11.4.5.1 The site will be accessed through the business park via a new road to the eastern corner of the park. The new road will be clearly visible initially but will appear to be an extension to one of the business park access roads and will therefore not alter the character of the view. The top of the proposed inlet works building will also be visible. While the business park is characterised by buildings of a similar scale and appearance to the proposed building and while similar buildings are visible in the distance in this direction, the character of this view will be altered. This is due to the close proximity of the proposed building and the fact that none of the existing sewerage treatment works structures are currently visible. However, as the business park is developed, the character of the locality will be altered and large light industrial buildings will predominate. In addition, future new structures within the business park are likely to screen the site and proposed structures from the users of the business park. The visual impact of the development on the business park will therefore be *slight* and *negative* initially, but this impact is likely to be *short* to *medium* term in duration and will be *imperceptible* once the business park has been completed.

Properties adjacent to the N52

11.4.5.2 The proposed development will be visible from a filling station and transport company adjacent to the N52. However, views from within these businesses are

limited in this direction due to the fact that they have been designed to front on to the road and away from the site. The proposed development will therefore have an *imperceptible* visual impact on users of these premises.

Other commercial properties in the locality

11.4.5.3 The proposed inlet woks building will be visible from the rear of industrial structures and warehouses to the northwest of the site that border the adjacent agricultural land. However, views will be limited due to the nature of the buildings, their property boundaries and due to the distances involved (200-500m). In addition, the proposed screen planting along the eastern boundary of the site will over time screen a large portion of this building. The visual impact on one of these properties that faces in the direction of the site will be *slight*, *negative* and *long term.* The impact on the remaining properties will be *imperceptible*.

11.4.6 Impacting Features – Temporary/Short Term

11.4.6.1 The construction operations of the development will give rise to *temporary - short term* impacts over the construction period. This will involve the construction of a contractor's compound, temporary stockpiling of earthworks material and topsoil, the movement of heavy goods vehicles and the actual construction operations including the erection of a crane(s) and scaffolding. Some residences located in Clonmore Heights and Brosna residential developments may experience *moderate short term negative* visual impacts. Some residences in Newbrook Drive and adjacent to the N52 may experience *slight short term negative* impacts as may the adjacent business park. Elsewhere the visual impacts due to construction should not be significantly greater than those experienced by the finished development

11.5 Mitigation Measures

11.5.1 Design Development

11.5.1.1 Mitigation of visual impact has been duly considered within the overall constraints of the development brief and is reflected in the following aspects of the proposed layout and design:

- The concentration of the proposed built elements to the western and northern half of the site where their visual impact on the landscape is most limited.

- Existing boundary vegetation, which provides effective screening of the site has all been retained. In addition, this vegetation will be managed to increase viability and replaced over a phased basis to ensure that long term screening will be achieved. Replacement will be on a phased basis so as not to expose large areas of the development at any one time.
- The routing of the proposed new access road has been chosen so as to retain a large proportion of the adjacent hedgerow which will provide effective screening of this road and help to integrate the road into the landscape.
- The proposed buildings will be clad in a grey finish so as to minimise visual impact.
- Provision of screen tree planting to the eastern boundary of the site.

11.5.2 Monitoring

11.5.2.1 The boundary planting around the site will be monitored on an ongoing basis to assess the need for replacement and ensure that ongoing screening is maintained and augmented. In addition, the proposed screen planting along the eastern boundary of the site will be monitored to assess management needs to ensure that the desired screening effect is achieved.

11.6 Residual Impacts of the Development

11.6.1 Residual Impacts

11.6.1.1 The proposed development will generally have only *slight* or *imperceptible* visual impact on views from surrounding public roads, residential properties and commercial properties. This is due to a combination of the viewing distance from the development, topography, buildings, intervening tree belts and hedgerows and existing surrounding context. The proposed screen planting to the east of the site will also provide increasing screening as trees mature. In addition, the context of the sewerage treatment plant is likely to change as the adjacent business park develops with large scale semi-industrial and warehouse buildings becoming the dominant built form in the locality. The significance of the sewerage treatment works as a visual element in the landscape will therefore be reduced over time. Effective management and ongoing replacement of the site boundary planting will also help to ensure that visual impacts are kept to a minimum.

12.0 SECTION 12 – CLIMATE

12.1 Introduction

12.1.1.1 The island of Ireland is bounded on the north, west and south by the Atlantic Ocean and by the Irish Sea to the east of the country. The topography can be described as a flat, low central plain surrounded by mountains and hills with peaks ranging from 500m to 1000m. Only about 5% of the country is above 300m O.D and most of this area is within 50km of the sea. The climate is influenced by the North Atlantic Drift and the prevailing south westerly winds.

12.1.1.2 Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. Average annual temperature is about 9^{o}C. In the middle and east of the country temperatures tend to be somewhat more extreme than in other parts of the country. For example, summer mean daily maximum is about 19^{o}C and winter mean daily minimum is about 2.5^{o}C in these areas. Mean annual wind speed varies between about 4 m/sec in the east midlands and 7 m/sec in the northwest. Strong winds tend to be more frequent in winter than in summer. Sunshine duration is highest in the southeast of the country. Average rainfall varies between about 800 and 2,800mm.

12.1.1.3 As part of the Environmental Impact Statement Climate is assessed to ensure that the proposed development will not have an impact on the immediate climate within the area of Mullingar. This study was carried out by obtaining Meteorological Data for the Mullingar area from the Irish Meteorological Service Met Eireann.

12.2 Existing Climate

12.2.1 Temperature

12.2.1.1 According to Met Eireann, the mean daily air temperature in Mullingar is about 4^{o}C in January and 14.7^{o}C in July, with a year round average of about 8.8^{o}C.

12.2.2 Rainfall

12.2.2.1 The mean annual rainfall is about 934.3mm, and on 157 days of the year the rainfall is more than 1mm. The annual greatest daily rainfall is about 69.8 mm.

12.2.3 Wind

12.2.3.1 The mean annual wind speed for Mullingar is 8.5 knots. The annual maximum gust mean is 79 knots and the annual mean no. of days with gales is 2.5.

12.2.4 Sunshine

12.2.4.1 The annual mean daily sunshine duration for Mullingar is 3.5 hours ranging from about 1.73 hours in January to over 4.57 hours in July.

12.3 Characteristics of the Proposal

12.3.1.1 The site is located to the south of Mullingar town in County Westmeath. An existing waste water treatment plant occupies the site already.

12.3.1.2 The vegetation on the site is mainly grass with coniferous trees bordering the north, west and south of the site. The east of the site is exposed with only some hedging as it borders a drain feeding into the River Brosna.

12.4 Parameters of the Proposal

12.4.1.1 The parameters of the proposed development of relevance to local climate or microclimate are:

- Dimensions of buildings (length, breath and height)
- Emissions to the atmosphere

12.4.1.2 The site is circa 2.82 ha in area (including landscaping). The construction and operation of the plant will take place within these boundaries.

12.4.1.3 The contract documentation will identify process requirements or standards that the facility is required to achieve but will not specify the type of treatment processes, which will be required to meet those standards.

12.4.1.4 Contractors will be required to put forward the Waste Water Treatment Process, which they feel is most appropriate in this specific circumstance. They will also be required to put forward proposals relating to environmental and other requirements such as health and safety. The contractor will be required to provide process guarantees for all these requirements. The contract also will include a 20 year operation and maintenance element and ensure that monitoring is in compliance with process requirements.

12.4.1.5 Drawing No. MUL-SIS/PR/305 details a possible wastewater treatment alternative. This alternative will, in all probability, be the maximum size layout which would be required. This arrangement may be altered to suit the treatments installation being put forward by the Contractor. Other alternatives would probably result in a smaller “footprint”.

12.5 Potential Impacts on Climate

12.5.1.1 The only aspect of Climate or microclimate which this development could have an impact upon is local wind/airflow.

12.5.1.2 Large buildings/structures can have an effect on wind airflow in the surrounding area. The main impacts are the creation of turbulence and creation of eddies. The only impacts on airflow would be on the immediate vicinity of the building.

12.6 Mitigating Adverse Impacts on Climate

12.6.1.1 No mitigative measures are required as the effect on wind airflow will only be felt close to the buildings and does not impact negatively on the local environment.

12.7 Predicted Impact of the Development

12.7.1.1 It is predicted that the proposed Sewerage Improvement Scheme at Mullingar will not adversely impact climate.

13.0 SECTION 13 - CULTURAL HERITAGE/ARCHAEOLOGY

13.1 Introduction

13.1.1.1 This section describes an assessment of the archaeological and historical importance of the area into which it is proposed to upgrade the Clonmore Wastewater treatment facility. The main purpose of the study is to evaluate the impact of the Scheme on the Cultural Heritage/Archaeology in, or immediately adjacent to, the existing site and to propose measures to safeguard any monuments, features or finds of antiquity. Margaret Gowen & Co. Ltd undertook the archaeological study of the WWTP site.

13.1.1.2 The assessment considering in detail the Clonmore WWTP site was undertaken in January 2002. The assessment was carried out in two stages:

- A desk survey of all existing information, published and unpublished, about archaeological monuments and finds of artefacts in the area. This involved an examination of the extensive archaeological files housed in the National Museum of Ireland and the National Monuments Service. Relevant cartographic and literary material was also consulted, as were aerial photographs.
- A field inspection of the site, allowing first-hand observations to be made of the local topography, current and previous land use.

13.2 The Existing Environment

13.2.1.1 The existing Wastewater Treatment site is located to the south west of Mullingar town on relatively flat ground. A palisade fence lines the perimeter of the site. The site is bound to the east by field drains which flow into the River Brosna. The existing site consists of an operational waste treatment works to the north and derelict works to the south.

13.2.1.2 The proposed access road commences adjacent to the existing WWTP site entrance and will run in a northeast southwest direction through a field of pasture adjacent to a field boundary. The field is low-lying and waterlogged.

13.2.1.3 A field inspection was carried out on the site of the treatment works on January 24th 2002. The site for the new treatment works is currently occupied by the site of the existing works. There is no record of any archaeological features recorded at the site and no features of an archaeological nature were noticed during the field investigation. However there is the possibility that stray finds may occur once any moving of topsoil occurs during earthmoving.

13.3 Potential Impacts

13.3.1.1 The existing site area of the Wastewater Treatment Plant covers 2.82 hectares of land. There are no archaeological sites within 500m of the existing WWTP. As the proposed development lies within the confines of the existing WWTP site, it is therefore unlikely that this proposed development will disturb any archaeological remains or have an adverse impact on the nearest recorded RMP sites.

13.3.1.2 The proposed New Access Road also showed no surface trace of archaeological activity along its path at the time of the field inspection. However the low-lying waterlogged nature of the field was identified as an area of archaeological potential for sites such as the Bronze Age *fulachta fiadh.*

13.3.1.3 The impact if any on Archaeological/Cultural Heritage will be minimal as it is not expected to find anything of archaeological/cultural heritage significance. There are no substantial archaeological issues predicted. This conclusion is confirmed by the recent field inspection, which failed to identify anything of archaeological significance. However, in any development involving earth-moving works, archaeological features, soils or artefacts could be revealed.

13.3.1.4 The following mitigation measures will therefore be observed on-site.

13.4 Mitigation Measures

Proposed Waste Water Treatment Plant (WWTP)

13.4.1.1 No mitigation measures will be required in respect of archaeology within the WWTP site. It is highly doubtful that any archaeological features have survived two phases of development. However with the development attention is drawn to the relevant sections of national monuments legislation (1930–1994), which states that in the event of the discovery of archaeological finds or remains, Dúchas and the National Museum of Ireland should be notified immediately by the developer. Provision should also be allowed for the necessary archaeological monitoring, inspection and excavation works that may be needed on the site during the site preparation and construction phases of development.

Proposed Access Road

13.4.1.2 As with all development involving earthmoving works there is a possibility that stray finds or subsurface archaeological features with no surface expression will be revealed. It is therefore recommended that a licensed archaeologist be present during all preliminary earthmoving works associated with the proposed access road to ensure the appropriate excavation and recording of any archaeological soils, features or deposits that could be revealed during topsoil

removal. Monitoring will be carried out under licence to and in consultation with Dúchas. If nothing of archaeological significance is revealed, the development should require no further archaeological involvement.

13.4.1.3 All recommendations regarding the site will be subject to discussion with and approval from Dúchas, The Heritage Service which may impose additional or alternative requirements.

13.5 Predicted Impact

13.5.1.1 No definite predicted impacts in respect of archaeology are envisaged as a result of this development given its current location. However, sub-surface archaeological remains can occur anywhere and therefore attention is again drawn to section 13.4.1.3 of this report.

13.6 Monitoring

13.6.1.1 No monitoring is required.

14.0 SECTION 14 – INTERACTION OF THE FOREGOING

14.1 Introduction

14.1.1.1 In addition to the requirement to describe the likely significant effects of the proposed development on particular aspects of the environment, the cumulation and inter-action of these effects must also be considered. Individual actions may have an insignificant effect by themselves, but the aggregate of these effects may have a significant effect.

14.1.1.2 In this statement the interactions are identified by a simple two dimensional matrix with each aspect referenced against all other aspects in alphabetical order. Where there may be a significant inter-action, a reference number is given and the interactions are described in numerical order.

TABLE 14.1

	Flora & Fauna Aquatic	Flora & Fauna Site	Human Beings	Landscape	Noise	Odour	Soil	Vibration	Water Quality
Flora & Fauna Site	1	3							
Human Beings		4							
Landscape			6						
Noise			7						
Odour			8						
Soil		5	9	12					
Vibration			10		13				
Water Quality	2		11						

14.1.1.3 The following interactions are identified:

14.2 1, 3 and 6-11: Human Beings and All Other Aspects:

14.2.1.1 All the effects of a development impact directly or indirectly on human beings and there are therefore inter-actions between all issues and human beings. Where there are impacts satisfactory mitigation measures have been developed. In summary, no significant adverse impact on the environment arises.

14.3 2 : Water Quality/Flora and Fauna Aquatic:

14.3.1.1 The improvements in water quality will result from the provision of wastewater treatment facilities which will provide a greater standard of treatment than presently exists will have a positive impact on the flora and fauna.

14.4 4, 5, 12: Landscape/Flora and Fauna – Site/Soil

14.4.1.1 The development will involve the stripping of topsoil on the proposed new road entrance which will be carried out as part of the landscaping proposals.

14.4.1.2 The development will not involve the removal of any existing hedgerows. Compensatory hedge planting will be carried out as part of the mitigation measures for the proposed development (section 11) and this will in time attract a range of birds, mammals and invertebrates so the overall impact will be neutral.

14.5 13: Vibration/Noise

14.5.1.1 Construction specifications will ensure that no nuisance results.

15.0 SECTION 15 – CONCLUSIONS & RECOMMENDATIONS

15.1 General

15.1.1.1 In conclusion an Environmental Impact Statement has been prepared for the upgrading of the Wastewater Treatment Works at Clonmore, Mullingar to cater for a population equivalent of 55,000 over an anticipated 25 year design horizon. The EIS was prepared in accordance with the European Communities Environmental Impact Assessment (Amendment) Regulations 1999 and the Environmental Protection Agency Act 1992.

15.1.1.2 As part of the Environmental Impact Statement a number of topics were examined to assess if the proposed upgrading of the Wastewater Treatment Works will have an effect on the immediate environment at Clonmore, Mullingar. A brief description of the findings of each topic examined is given below as follows.

15.2 Human Beings

15.2.1.1 The proposed scheme is expected to be generally positive in terms of its impact on human beings in relation to employment and local amenities. It will facilitate future residential, commercial, industrial and leisure development in the area. Such a development however, may have various effects on the environment. All of these effects, as described in this EIS can be lessened or made less severe leading to no adverse impacts on the lives of human beings in the immediate vicinity of the development.

15.3 Flora and Fauna

15.3.1.1 The Flora and Fauna assessment was undertaken by Natura Environmental Consultants. The assessment involved:

- A review of existing documentation, designated areas and protected species.
- A habitat survey of vegetation on the site and the proposed new access road. Hedgerow survey and evaluation in the above areas and field observations of birds and mammal signs.

15.3.1.2 The site of the proposed new Waste Water Treatment Plant and Sludge Treatment Centre consists mainly of amenity grassland, ornamental non native shrub in the northern part of the site and a perimeter hedge comprising of a mixture of native and non-native shrub and tree species. A new access road is proposed in an area of agricultural grassland to the west of the site. In general

the site is of low ecological significance and is not covered by any designations for conservation. No mitigation measures are required for flora and fauna within the site or on the proposed new access road.

15.4 Soils & Geology

15.4.1.1 The site of the wastewater treatment plant is comprised mainly of the Lucan Formation which are a form of Lower Carboniferous rocks. As no direct discharges to groundwater are proposed no mitigation measures are necessary. Potential impacts of the development are described in the main report. All tanks and pipes on site will be constructed according to best practice guidelines to minimise the risk of leakage and overflow. Accidental spillages cannot be mitigated for in the design but can be mitigated for by the natural attenuation of the subsoils.

15.5 Water

15.5.1.1 It is considered that the proposed development will have a positive effect on water quality in the area. The installation of the proposed WWTP for Mullingar Town and Environs will significantly improve water quality in the receiving waters in the River Brosna and Lough Ennell.

15.6 Odour

15.6.1.1 An odour dispersion modelling study was undertaken to predict/examine odour concentrations around the plant, at the site boundaries and at surrounding residences. The odour model was based on a Conventional Activated Sludge process. The Contractor will be required to carry out an additional and similar model to predict odour residuals from the proposed plant.

15.6.1.2 The project proposal incorporates a number of design features specifically aimed at ensuring that odour from the commissioned plant does not give rise to nuisance. These include:

- The inlet works will be covered and screening equipment will be cleaned regularly. Air will be removed from the inlet area and treated with air scrubbing equipment. Screened material will be stored in a covered skip.
- The storm tank will only be used in emergency conditions. When the tank is not in use all organic material will be cleaned from the floor of the tank.
- The primary sedimentation process will not be overloaded.
- Proper operation of the Secondary sedimentation process will result in a low BOD and relatively stable sludge which will minimise odourous compound formation.
- Diffused Air Aeration is to be used. Fine bubbled diffused aeration to be used to obtain maximum aeration capacity of the activated sludge and to minimise turbulence at the surface of the tank that increases the volatilisation of odourous compounds.
- Picket fence thickening tanks, thickened sludge mixing tanks and sludge storage skips will be fitted with airtight covers to eliminate the emission of odourous compounds.
- Air extracted from operational areas will be passed through an odour scrubbing system before emission to the atmosphere.
- Centrate and filtrate from sludge thickening, dewatering will be pumped in closed systems, transferred back and discharged underwater in the aeration tank to eliminate odour emissions.
- Odourous air abatement technology will be required to provide approximately 98% removal of odour causing compounds.
- The exhaust of the odour abatement systems is to be located 3 to 5 metres higher than the surrounding buildings in order to enhance dispersion.

No adverse impact in terms of concentrations of odours is therefore likely to result in nuisance from the new WWTP.

15.7 Noise

15.7.1.1 It was found that Night time noise levels could potentially reach 44dB(A) at the nearest houses. While this is lower than the EPA 45dB(A) night time limit, mitigation measures are recommended due to the existing quiet suburban environment ensuring that the cumulative noise levels of all plant sources is

limited to less than 40dB(A) at the nearest houses. Using standard mitigation measures such as the selection of quiet equipment or acoustic screening the design noise criteria will be achievable. These design specifications will be incorporated into the contract documents for the new Wastewater Treatment plant.

15.8 Climate

15.8.1.1 A study of Climate was carried out by the project team. This was done by obtaining Meteorological Data for the Mullingar area from the Irish Meteorological Service Met Eireann. Large buildings or structures can have an effect on wind airflow in the surrounding area. The main impacts are the creation of turbulence and creation of eddies. The only impacts on airflow would be on the immediate vicinity of the building. It is predicted that the proposed Sewerage Improvement Scheme at Mullingar will not adversely impact climate. No mitigative measures are required as the effect on wind airflow will only be felt close to the buildings at the plant and does not negatively impact on the local environment.

15.9 Landscape

15.9.1.1 Mitigation of visual impact has been duly considered within the overall constraints of the development brief and will be reflected in aspects of the proposed layout and design:

- The concentration of the proposed built elements to the western and northern half of the site where their visual impact on the landscape is most limited.
- Existing boundary vegetation which provides effective screening of the site has all been retained. In addition, this vegetation will be managed to increase viability and replaced over a phased basis to ensure that long term screening will be achieved. Replacement will be on a phased basis so as not to expose large areas of the development at any one time.
- The routing of the proposed new access road has been chosen so as to retain a large proportion of the adjacent hedgerow which will provide effective screening of this road and help to integrate the road into the landscape.
- The proposed buildings will be clad in a grey finish so as to minimise visual impact.
- Provision of screen tree planting to the eastern boundary of the site.

15.10 Material Assets

15.10.1.1 Although the exact details of the proposed new wastewater treatment facility have not been determined, it is expected that the greatest volume of traffic generated by the proposed development at peak times will occur during the construction stage of the development. Construction of the proposed development is expected to last for approximately 12 months with between 10-20 people employed on the site. During the construction period there would be a continuous flow of traffic towards the site and it should be noted that the new access road will be built first before work commences on the WWTP site. This will ensure that the new access road will be used for heavy vehicles as the main haul route instead of the existing access road. On busy days, the plant could generate up to 30 car trips and an absolute maximum of 25 trucks per day.

15.10.1.2 On most days a lesser volume of traffic is expected to be generated to the site.

15.10.1.3 Truck movements would normally be spread over an 8-hour period, and most car traffic would be concentrated in the morning and evening peak hours. Trucks generated to the site are expected to be similar in size to those currently accessing the site. It is expected that most of the trucks generated to the site will have origins and destinations to both directions along Clonmore Road.

15.11 Cultural Heritage/Archaeology

15.11.1.1 It was found that there are no archaeological sites within 500m of the proposed new WWTP and it is highly unlikely that the development will disturb any archaeological remains or have an adverse impact on the nearest recorded RMP sites. The proposed new access road also shows no surface trace of archaeological activity however due to the water logged nature of the field there is the possibility for Bronze Age sites such as *fulacht fiadh* or burnt mound commonly known as Bronze Age cooking places.

15.11.1.2 No mitigation measures are required as part of the development. However as with all development work there is the possibility that stray finds or subsurface archaeological features will be revealed. It is recommended that a licensed Archaeologist be present during all preliminary earthmoving works associated with the proposed new access road.

15.12 Interaction of Foregoing

15.12.1.1 All environmental factors are inter-related to some extent. The combination of two impacts may have a greater adverse effect than the sum of the same two impacts. It is important to co-ordinate individual topics and examine the **overall** impact of the proposed development.

15.12.1.2 Human Beings for example, while included in the EIS as an individual topic (S.I. No. 349 of 1989), is also impacted on, directly or indirectly by most other topics of the proposed development. Where there are impacts, satisfactory mitigation measures have been developed and are evident throughout the EIS.

15.13 Summary

15.13.1.1 After a detailed EIS examination for the upgrading of the Clonmore Wastewater Treatment Works at Mullingar no adverse environmental effects have been discovered. However some discomfort may be felt by local residences during the 12 month contract period envisaged. The degree of disturbance is difficult to estimate at this stage. As well as depending on meteorological conditions, factors such as type of construction plant used, distance from source of disturbance, will all be determining factors.

15.13.1.2 The contract will most likely be procured using the Design, Build and Operate (DBO) form of contract and will include performance requirements and process guarantees. It is recommended that the mitigation measures mentioned in the EIS topics examined above are incorporated into the Contract Documents.