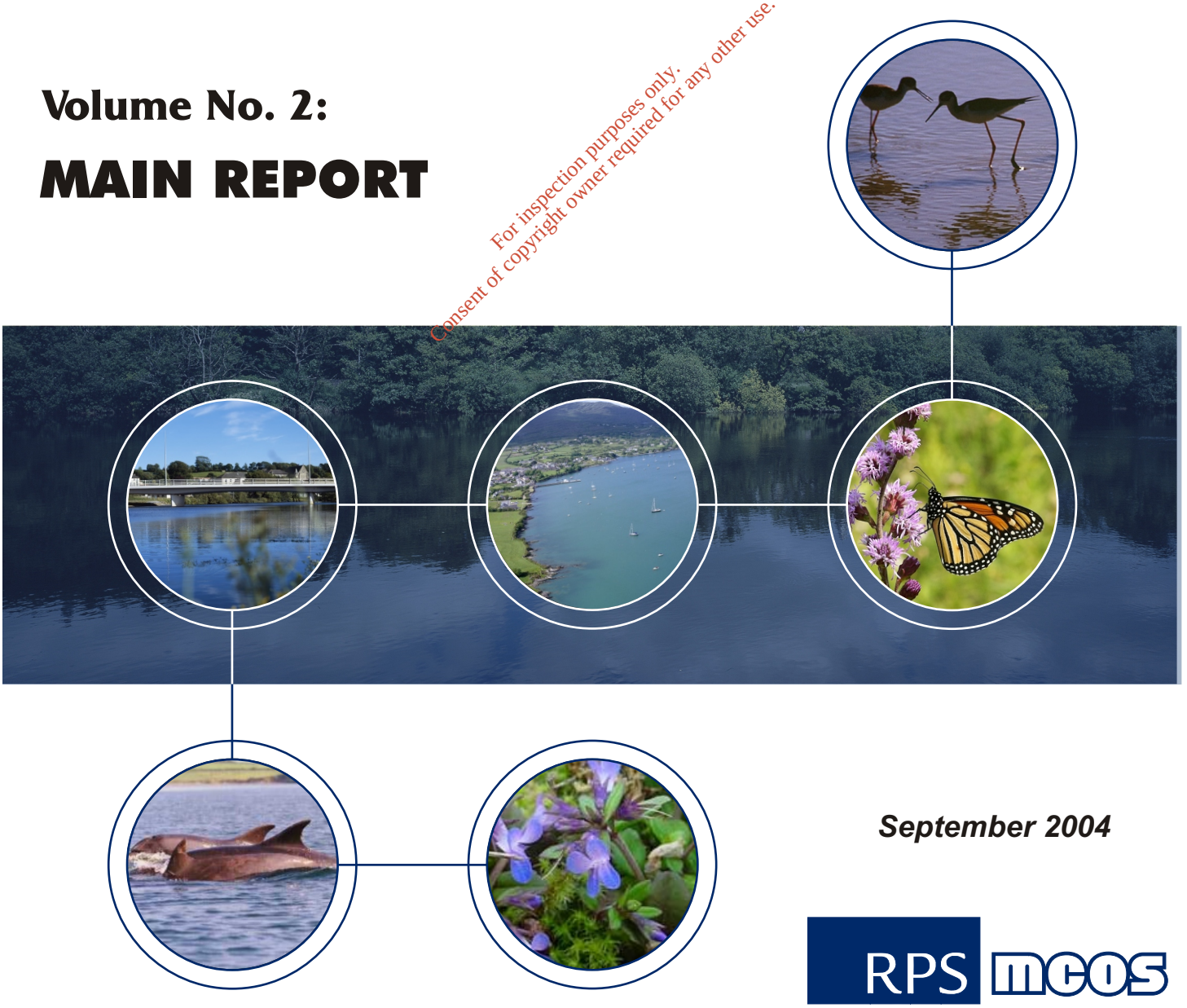
CORK COUNTY COUNCIL
Comhairle Chontae Chorcaí

Environmental Impact Statement

Skibbereen Wastewater Treatment Plant

Volume No. 2:

MAIN REPORT



September 2004

RPS mcos

DOCUMENT CONTROL SHEET

Client	Cork County Council					
Project Title	Skibbereen Wastewater Treatment Plant					
Document Title	Environmental Impact Statement – **Volume II Main Report**					
Document No.	RPS-MCOS/MCW0153RP0012F01					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	4	87	1	1	5

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Final Issue	B Brice	M Attridge	B Brice	Cork	8th September 2004

Cork County Council

ENVIRONMENTAL IMPACT STATEMENT

for the

SKIBBEREEN SEWERAGE SCHEME
WASTEWATER TREATMENT PLANT

SEPTEMBER 2004

VOLUME I NON-TECHNICAL SUMMARY

VOLUME II MAIN REPORT

VOLUME III TECHNICAL APPENDICES

RPS mcos

VOLUME II

MAIN REPORT

TABLE OF CONTENTS

VOLUME 1 NON TECHNICAL SUMMARY

VOLUME 2 MAIN REPORT

VOLUME 3 TECHNICAL APPENDICES

LIST OF FIGURES

LIST OF TABLES

PREAMBLE

A Preliminary Report was first prepared for the Skibbereen Sewerage Scheme in 1971. This report recommended a new pipe sewer system for the town. The effluent was to be pumped to a new outfall works incorporating a tidal holding tank and a lunar penstock to allow discharge of wastewater on the ebb tide. The Preliminary Report was approved and the Contract Documents were submitted to the Town Council in April, 1975 which included the addition of a comminutor station at the outfall site.

The scheme was not proceeded with and in May 1983 RPS-MCOS (formerly M.C. O'Sullivan & Co. Ltd.) examined the question of relocating the treatment plant and outfall to a point downstream of New Bridge. This site had a number of advantages over the previous site and the Contract Documents were altered to allow for this.

In the 1984 Road Traffic and Flood Study for Skibbereen, the piped sewer system and a major pumping station in the town were redesigned to be compatible with the proposed Flood Relief Works. However, the proposed outfall arrangements were not altered in that report.

In October 1990, Skibbereen Town Council were advised by the Department of the Environment that the planning of the sewerage scheme should now to be based on the provision of full secondary treatment. In accordance with the Department's guidelines, RPS-MCOS were instructed to prepare an Environmental Impact Statement under the provisions of the European Community Regulations 1989 for the Wastewater Treatment and Disposal of Sludge. This report was to consider options for full secondary treatment and the disposal of sludge other than by discharge to the Ilen Estuary and to consider the optimum location for the siting of the treatment works.

Wastewater Treatment Plant – Preliminary Report 1993

In January 1993, RPS-MCOS submitted a Preliminary Report for a revised Sewerage Scheme for the town of Skibbereen incorporating a secondary treatment plant. This report dealt with:-

(i) The treatment of Skibbereen wastewater to secondary standards.

(ii) An examination of the effects of the discharge of treated wastewater on the Ilen Estuary.

(iii) Alterations to the proposed pipe network arising from the inclusion of a secondary treatment plant.

The wastewater treatment plant proposed in the Preliminary Report was based on treating the incoming wastewater to a secondary standard in aeration basins. The plant is laid out so that fluctuations in population can be catered for and allowance has been made for future expansion.

The outfall arrangement recommended in the report is for discharge to the Ilen Estuary on an ebb tide only via a holding tank controlled by a lunar penstock.

Skibbereen Sewerage Scheme Design Review – 2000

In 1999, RPS-MCOS were again asked to re-examine the sewerage scheme for Skibbereen taking cognisance of:-

- EC Directive No. 91/271/EEC (Urban Wastewater).
- Expansion of the town in the period from 1988 to 2000.
- Areas where genuine interest in planning had been shown for locating large scale housing development.
- The proposal to set up a hub centre for the treatment of sewage sludge from West Cork at Skibbereen.

Council Directive concerning Urban Wastewater Treatment

The EC Commission on 19th November 1989 proposed a Council Directive on Urban Wastewater Treatment. On May, 21st 1991 EC Directive 91/271/EEC concerning Urban Wastewater Treatment was adopted by the Council. The Directive was a comprehensive policy statement relating to all aspects of urban wastewater management and it sets out treatment standards and other requirements for collection systems, effluent and sludge disposal. This directive was initially implemented in Ireland under S.I. 419 of 1994 the "Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment) Regulations, 1994".

Statutory Instrument (S.I.) 254 of 2001

In June 2001 the Department of the Environment and Local Government published S.I. 254 of 2001 entitled Urban Waste Water Treatment Regulations 2001, replacing S.I. 419 of 1994. This S.I. designated additional areas of environmental sensitivity to those listed in S.I. 419 of 1994 and also incorporated amendments included Commission Directive of 27th February, 1998 (No. 98/15/EC).

In accordance with the above regulations, sanitary authorities shall provide a collection system for urban wastewater by 31st December, 2005 for every agglomeration with a population equivalent between 2,000 and 15,000 and shall provide to secondary treatment or equivalent to waste water entering such collection systems also by 31st December, 2005.

Government Policies relating to Tourism

Tourism is a very important industry to the Irish economy and as such warrants special treatment by the Government. Because of its strategic location in West Cork, a major tourist centre, this could have a long-term beneficial effect on Skibbereen. The potential of Skibbereen as a major tourist centre can only be fully realised when a comprehensive wastewater collection and treatment facility have been installed in the town.

Therefore, apart from the regulations pertaining to wastewater treatment there is a very real need to progress with the installation of a full collection system and a modern treatment plant in the town.

Environmental Impact Statement

An Environmental Impact Statement for the Skibbereen Wastewater Treatment Plant was first published in March 1993 dealing with the scheme as was envisaged at that time.

The EIS herein is now amended to reflect the change in both design philosophy and implementation philosophy, which has occurred in the interim.

One of the main changes is in the area of implementation. It is now Government Policy, where possible and practical to do so, to put wastewater treatment plants to tender as 'Design Build and Operate' projects. Therefore, this EIS is based on an indicative design for the treatment plant.

This report, which details the Environment Impact Study carried out, presents an assessment and base line study of the existing natural environment in and around the site of the proposed treatment plant and outfall pipe with reference to the flora and fauna, water quality, noise and air emissions and other amenity and beneficial uses of the area.

This Statement also includes a technical description of a standard treatment works including details of design capacity and standards of effluent discharged at the outfall point.

The Statement includes an evaluation of the beneficial and adverse impacts on the existing environment of the construction and subsequent operation of the proposed treatment works. It also sets out the features that are incorporated in the design of the plant to mitigate any adverse impact of the proposed development.

Non Technical Summary

A Non-Technical Summary setting out the main content of the EIS is provided separate from this volume.

ACKNOWLEDGMENTS

RPS-MCOS Ltd. acknowledge the contributions to the Environmental Impact Statement (EIS) made by the following experts/agencies in the various specialist disciplines:-

1.	**Flora & Fauna**	Roger Goodwillie BA, MSc, Application Ecologist, CAAS Environmental Services Ltd., 8 Merrion Square, Dublin 2.
2.	**Visual Impact**	Niall Hyde, B.Arch, MLA, (Landscape Architects) Niall Hyde & Associates, Heritage House, 23 St. Stephens Green, Dublin 2. RPS-McHugh Ltd., Innishmore, Ballincollig, Co. Cork.
3.	**Noise Impact**	EOLAS, The Irish Science & Technology Agency, Glasnevin, Dublin 9.
4.	**Water Quality Impact**	Irish Hydrodata Ltd., Rathmacullig West, Ballygarvan, Co. Cork.
5.	**Odour Impact**	AWN Consulting Limited The Tecpro Building Clonshaugh Industrial Estate Dublin 17
6.	**Archaeological Impact**	Rose Cleary MA, MIAI, Archaeological Services Unit, University College Cork, Cork.
7.	**Underwater Archaeological Impact**	Eoghan Kieran 210 Silverlawns Navan Co. Meath

1 INTRODUCTION

1.1 BACKGROUND

Skibbereen Town is located in west County Cork. It has a current population of approximately 2,000 persons however this population increases in the summer time due to the local tourism industry. The town is built along the banks of the Ilen River.

Currently there is no wastewater treatment system in the town and raw wastewater discharges directly the Ilen River or its tributary the Caol Stream. An engineering report on the requirements for a proposed sewerage scheme for the town has recommended that wastewater from the town should be collected and pumped to a header manhole and discharge by gravity to a treatment plant sited at Coronea adjacent to the graveyard. The inlet works and outfall at the treatment plant should be designed for a future population equivalent of 9,400 persons. All other elements of the works should be designed for 4,700 PE with the provision for expansion of the treatment plant at a later stage.

RPS-MCOS have prepared this Environmental Impact Statement for the proposed wastewater treatment plant on behalf of Cork County Council. This statement assesses potential environmental impacts in accordance with the guidelines published by the Environmental Protection Agency (EPA).

The following is a brief synopsis of the history of the sewerage scheme.

History of Sewerage Scheme

RPS-MCOS were first appointed in 1969 to prepare a Preliminary Report on the sewering of the town of Skibbereen. This report was submitted to the Town Clerk in January 1971 recommending the construction of approximately 10,000 lin.m. of sewer varying in diameter from 150 mm to 525 mm, the construction of a pumping station and an outfall works consisting of a holding tank controlled by lunar penstock.

The Department of Local Government with the recommendation that comminutors be included in the scheme, granted sanction for this scheme. This sanction was granted in December 1973. Contract Documents were prepared and sent for approval in April 1975. The scheme, however, was not advanced.

In 1983, RPS-MCOS undertook a major study of the town of Skibbereen with regard to traffic, flooding and sewerage. This report was completed and submitted to the Urban District Council in May 1984. In that report, the piped sewerage system and main pumping station were redesigned to fit in with the proposed flood relief works. The outfall was to be located approximately 170 m downstream of New Bridge, the wastewater was to be comminuted, held in a holding tank and released on an outgoing tide controlled by lunar penstock.

Contract Documents were prepared for this scheme and sent to the then Urban District Council in September 1988. In October, 1990 RPS-MCOS were asked to reconsider the proposals of the 1984 report and to consider the inclusion of secondary treatment of the town wastewater before discharge to the estuary. A Preliminary Report was prepared and submitted for approval.

In 1999 RPS-MCOS were requested to further review the design of the collection and treatment system in light of the modern design standards and recent development of the town. Furthermore, it had been decided to proceed with the wastewater treatment plant on the basis of a Design Build Operate (DBO) type construction contract separate to the collection network in the town.

In January 2004 draft contract documents for the collection system were issued to the Department of Environment, Heritage and Local Government for approval. It is currently envisaged that tenders for the wastewater treatment plant DBO contract will be requested at the end of 2004 or early 2005.

1.2 THE NEED FOR AN EIS

The requirement for an EIS was determined by examining the most recent legislation pertaining to Environmental Impact Statements in Ireland. Council Directives 85/337/EEC and 97/11/EC (amending the former) require under article 4(1) that Environmental Impact Assessment reports must be made for certain development projects. This Directive is implemented in Ireland through S.I. 349 of 1989 and is amended by S.I. 93 of 1999 entitled European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1999. Such projects are listed in Part II of the First Schedule of S.I. No. 93 of 1999 and include "waste water treatment plants with a capacity greater than 10,000 population equivalent as defined in Article 2(6) of Directive 91/271/EEC not included in Part 1 of this schedule". The proposed scheme in Skibbereen is slightly below the threshold at 9,400PE. Although the proposed wastewater treatment plant capacity could be considered to be sub-threshold development, following consultation with Cork County Council Planning Department it was considered prudent to prepare an EIS for this development.

This EIS concerns the proposed wastewater treatment plant for Skibbereen, which is one element of the overall sewerage collection and treatment strategy proposed for the town. The other elements of the sewerage scheme, involving sewers, pumping stations, overflow structures and other works will be the subject of separate statutory processes, as appropriate, prior to their development.

1.3 STRUCTURE OF THE REPORT

The EIS comprises three main parts:

Volume 1: **Non-Technical Summary** of the information contained in the EIS.

Volume 2: **Main Report** which:

- Gives general information about the project.
- Discusses project background information and peripheral issues.
- Outlines the need for the scheme.
- Describes the characteristics of the proposed wastewater treatment plant.
- Describes the current receiving environment and examines the likely significant impacts of the proposed plant on that environment.
- Proposes measures to mitigate adverse impacts and identifies any residual impacts after mitigation.
- Addresses potential impacts relating to the construction of the plant.

Volume 3: **Technical Appendices** which contains additional data to substantiate various sections of the Main Report.

1.4 LEGISLATIVE CONTEXT

The legislation listed in Section 1.2 and 1.5 requires that an authority prepare a statement of the likely effects on the environment of a proposed development such as the proposed Skibbereen Wastewater Treatment Plant. The Environmental Impact Statement (EIS) is to include a description of the likely significant effects, both direct and indirect, on:

- Human Beings;
- Flora and Fauna;
- Soil, Water, Air, Climate and the landscape;
- Material Assets;
- Cultural Heritage; and
- The interaction between any of the matters referred to above.

Legislation also requires that the public be notified through the press that the EIS has been prepared and submitted to An Bord Pleanála. This notification must include the locations where the EIS may be viewed or purchased and the date prior to which written submissions (in relation to the likely effects of the proposed development on the environment) must be received by An Bord Pleanála.

An Bord Pleanála may:

- Request the relevant authority submitting the EIS to furnish him/her with specified additional information in relation to likely environmental effects of the proposed development,
- Make provision for a public inquiry in relation to the proposed development,
- Approve a proposed development with or without modification or
- Refuse to approve such a development

Before approving the proposed development, An Bord Pleanála shall consider the EIS, any additional specified information requested from the authority and any submissions made by the public or prescribed bodies. An Bord Pleanála's decision shall be published in the press.

1.5 SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT

This EIS has been prepared in accordance with the following:

- The EU directives on Environmental Impact Assessment (85/337/EEC) & (97/11/EC) and associated National Regulations referred to as the European Communities (Environmental Impact Assessment) Regulations, 1989-2001 (S.I. 349 of 1989, S.I. 84 of 1994, S.I. 101 of 1996, S.I. 351 of 1998, S.I. 93 of 1999, S.I. 450 of 2000 & S.I. 538 of 2001)
- The Local Government (Planning and Development) Regulations, 2001 (S.I. 600 of 2001);
- Advice notes on current practice in the preparation of Environmental Impact Statements published by the Environmental Protection Agency (2000)

In addition to the above the further legislation was also considered with respect to the Ilen Estuary adjacent to the Skibbereen Wastewater treatment plant site including:

- EU Urban Wastewater Treatment Directive 91/271/EEC and the Urban Wastewater Treatment Regulations, 2001 (S.I. 254 of 2001).
- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. 293 of 1988).
- The Local Government (Water Pollution) Act 1977 (Water Quality Standards for Phosphorous) Regulations, 1998 (S.I. 258 of 1998).
- EU Water Framework Directive (2000/60/EC).

1.6 CONSULTATION PROCESS

Prior to publication of this EIS, Cork County Council has consulted with both statutory and non-statutory bodies in relation to the proposed development. This consultation comprised a request for submissions from selected potential stakeholders. Discussions were held with and/or submissions were requested from the following statutory bodies, government agencies, non-governmental organisations and other potentially interested parties:

- An Bord Pleanála
- An Comhairle Ealaion
- An Taisce
- (Bord Fáilte) Failte Ireland
- Bord Iascaigh Mhara
- Coillte Teoranta
- Cork County Council, Planning Department
- Department of Agriculture and Food
- Department of Arts, Sport and Tourism
- Department of Communications, Marine and Natural Resources
- Department of Community, Rural and Gaeltacht Affairs
- Department of the Environment, Heritage and Local Government
- Eircom
- Environmental Protection Agency
- ESB
- Irish Farming Association
- Irish Landscape Institute
- Irish Wildlife Federation
- Local Residents
- National Roads Authority
- Office of Public Works
- River Ilen Anglers Club
- Skibbereen Rowing Club
- South Western Regional Fisheries Board
- Teagasc
- The Geological Survey of Ireland
- The Heritage Council

Prior to completion of this EIS written submissions were received from a number of the above organisations, local groups and residents. These submissions were considered in preparation of this EIS.

1.7 EIS PUBLICATION

Following completion of this EIS a notice will be published in the public press advising that it has been prepared and forwarded to An Bord Pleanála for approval. Copies of the EIS will also be forwarded for the review of certain prescribed bodies as required by legislation.

Copies of the EIS will be available for inspection by the public during normal office hours for the period specified in the notice at the offices of

Cork County Council
Courthouse
Skibbereen
Co. Cork

Any interested person may make submissions or observations on the environmental impact of the proposed development to An Bord Pleanála during the period specified in the notice.

2 THE EXISTING SITUATION

2.1 INTRODUCTION

The town of Skibbereen, which is located approximately 54 miles west of Cork City, is situated at the head of the River Ilen Estuary. The River Ilen flows north to south until it reaches Skibbereen Town and then turns almost due west. To the east and south red sandstone hills rise steeply almost from the rivers edge. The town of Skibbereen is pinned in between these hills and the river. The river Ilen discharges to Baltimore Harbour and Roaringwater Bay, a candidate Special Area of Conservation (cSAC). A site location map is included in Figure 2.1.

The valley of the Caol Stream forms a gap in the hills and this stream discharges to the southern bank of the River Ilen approximately in the centre of the town. The valley of the Caol is extremely flat and is subject to frequent flooding. The town development has been largely forced along the Caol and Ilen valleys as the steepness of the adjacent hillsides largely limited the development.

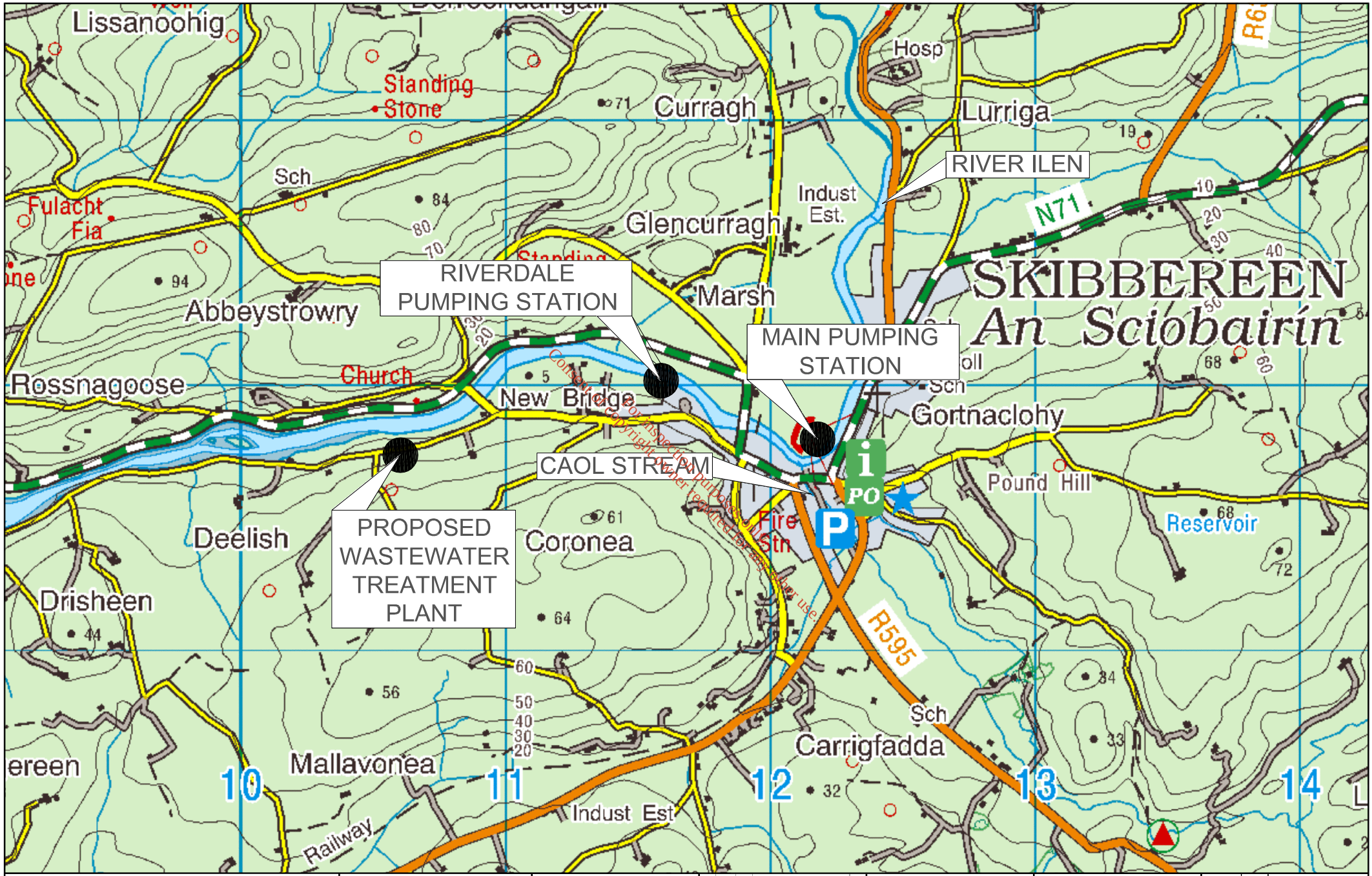
The result is that the town centre is located around the confluence of the Caol Stream and Ilen River with the remainder consisting largely of ribbon development north along the Clonakilty Road, south along the Baltimore Road, eastward along High Street and westward along Upper Bridge Street. The ribbon nature of the development makes satisfactory drainage even more difficult because of the long length of sewer required to collect in the whole of the development.

The Ilen River is tidal to a point upstream of the town in the vicinity of the hospital, north of the town. Similarly, the Caol Stream is tidal for a considerable distance upstream of the town.

2.2 EXISTING SCHEME

The existing sewerage system in the town consists of masonry culverts carrying foul flows and storm water run off from the streets and roofs, masonry culverts carrying subsurface ground water as well as soil flows and piped sewers. These flows discharge to either the Ilen River or Caol Stream in a multiplicity of outfalls. Both of these watercourses are subject to the influence of the tide with the result that there is a continuous problem of contamination from the discharge of municipal wastewater.

The works included in the Contract Documents prepared in 1988 allowed for the collection of all foul wastewater in a new piped system at a pumping station upstream of Kennedy Bridge in the Marsh area. A revised engineering design report prepared in 1993 proposed that the wastewater from this pumphouse be pumped to a new secondary treatment plant situated in the townland of Coronea adjacent to the graveyard.



Client:

Cork County Council
Comhairle Chontae Chorcaí

RPS MCOS
RPS-MCOS Ltd., Innishmore, Ballincollig, Co. Cork, Ireland.
T: +353 21 487 0200 - F: +353 1 487 3742
E: rpsmcos@rpsgroup.ie W: www.rpsmcos.ie

NOTES

1. This drawing is the property of RPS-MCOS Ltd.. It is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. All Levels refer to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only, If in doubt ask.

No.	Date		Amendment / Issue	App.
F01	MAR'04		REPORT	A

Project: SKIBBEREEN SEWERAGE SCHEME WASTEWATER TREATMENT PLANT

Title: LOCATION MAP

Drawn by:	AOC	Job No:	MCW0153
Checked by:	BB	File No:	MCW0153SK0013
Approved by:		Drg. No:	FIG. 2.1
Scale:	NTS	Rev:	F01
Date:	MAR '04		

2.3 RECEIVING WATERS

It is proposed as part of this scheme to discharge treated effluent from the treatment plant to the Ilen River via an outfall constructed within the main channel of the river. This section briefly describes the receiving waters. Baseline conditions are, however, described in more detail in later sections of this EIS.

The Ilen River is tidal to a point upstream of the town. Approximately 10km downstream of the town the Ilen discharges into Roaringwater Bay a candidate Special Area of Conservation. The river is an important local resource. However, it is not designated as a 'Sensitive Area' under the Urban Wastewater Directive (S.I. 254 of 2001). Based on the results of sampling by the EPA the existing water quality in the Ilen is generally good. However, there is a noticeable reduction in water quality i.e. increased oxygen demand and nutrient levels both within and downstream of the town. This is probably as a result of the current untreated wastewater discharges to the river.

Although the river is a popular fishery it is not designated as a 'Salmonid Water' under the Salmonid Waters Regulations (S.I. 293 of 1988). The Ilen River is not designated under either the Shellfish (S.I. 200 of 1994) or Bathing Water (S.I. 155:1992 and S.I. 230 of 1996) Regulations, however, downstream of the development Roaringwater Bay is designated as a Shellfish Area under S.I. 200 of 1994.

2.4 ALTERNATIVES CONSIDERED

The principal alternatives examined in the development of this scheme were:-

- Do nothing
- Alternative locations for the proposed treatment plant

2.4.1 Do nothing Scenario

The design of the proposed wastewater treatment plant is such that over the design life up to 9,400 population equivalent can be treated within the plant. At present there is no municipal wastewater treatment within Skibbereen. The design of the plant is such that it will cater for the growing population of Skibbereen in two phases over the coming years and will treat all municipal wastewater in the town to the required standard. The do nothing scenario would mean the continued discharge of untreated effluent to the Ilen River and Estuary. This could result in the following effects:

- Skibbereen town and environs may have difficulties in socio-economic terms by being at a distinct disadvantage in attracting proposed new residential, commercial and leisure developments.
- Increased risk of wastewater effluent concentrations jeopardising public health and aquatic ecology.
- Non-compliance of mandatory final effluent limits as set by the Urban Wastewater Treatment Directive and water quality limits as set down in Regulations.

2.4.2 Alternative Site Locations

The optimal location for the proposed treatment plant was identified by RPS-MCOS following an extensive site selection process carried out as part of the Preliminary Report for the scheme submitted to Cork County Council in 1993.

EPA Export 26-07-2013:02:57:56

Client:

Cork County Council
Comhairle Chontae Chorcaí

RPS MCOS

RPS-MCOS Ltd., Innishmore, Ballincollig, Co. Cork, Ireland.
T: +353 21 487 0200 - F: +353 1 487 3742
E: rpsmcos@rpsgroup.ie W: www.rpsmcos.ie

NOTES

1. This drawing is the property of RPS-MCOS Ltd.. It is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. All Levels refer to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only, If in doubt ask.

No.	Date		Amendment / Issue	App.
F01	MAR'04		REPORT	A

Project:

SKIBBEREEN SEWERAGE SCHEME WASTEWATER TREATMENT PLANT

Title:

LOCATION OF ALTERNATIVE SITES

Drawn by:	AOC	Job No:	MCW0153
Checked by:	BB	File No:	MCW0153SK0012
Approved by:		Drg. No:	FIG. 2.2
Scale:	NTS	Rev:	F01
Date:	MAR '04		

Although all potential alternative sites were examined a total of five sites were considered in detail. The five site considered in detail are shown on Figure 2.2 and comprised:-

- Site 1 Coronea adjacent to cemetery
- Site 2 Marsh Area
- Site 3 Deelish Road west of Riverdale Estate
- Site 4 Drisheen Townland west of Deelish Road
- Site 5 Derrygereen Townland

In addition to these sites, the location of the proposed treatment plant to the north of the Ilen west of the town was also considered. The land on this side of the river slopes steeply upwards away for the flood plain of the river. Therefore, a potentially suitable site was not identified in this area.

A assessment of the following criteria was carried out in the case of the sites shown on Figure 2.2:-

- Existing Land use
- Proximity to Residences
- Visual Impact
- Traffic Impact
- Proximity to discharge point
- Archaeology
- Flora & Fauna
- Material Assets
- Convenience to users
- Site Ownership
- Topography and Ground Conditions
- Cost

The following is a brief description of each of the five sites examined with due regard for their significant impacts on the existing environment and engineering feasibility. Table 2.1 presents a matrix summarising the detailed assessment of each of the sites.

Site No. 1

This site is situated in the townland of Coronea adjacent to the cemetery and has an area of approximately 4 acres. The nearest house to the boundaries of the site is approximately 140 m to the east. There are three more houses within 210 m of the site boundaries and a further four houses within 300 m.

The topography of the land at Coronea is such that the whole site is visible only from one house within 300 m radius. This house is approximately 120 m to the east of the site boundary. The northern part of the site is visible from another house approximately 210 m south of the site. There are a further 4 No. houses to the north of the site on high ground overlooking the site just outside the 300 m radius. There are 9No. houses within 300m of the boundary of the site. The landscaping around the perimeter of the site as recommended in Section 5.7 will screen the site from adjacent dwellings.

A ringfort (RMP CO141-122) is located to the south of the site. Although this ringfort is located outside the boundary of the proposed treatment plant site the potential archaeological impact must be considered. A detailed archaeological assessment has been completed and is included in Section 5.12 of this EIS. This assessment recommended that an archaeologist should monitor topsoil stripping within the site boundaries. This archaeologist would excavate and record any previously unrecorded archaeological material.

The site slopes gently from south to north which is ideal for the layout of a gravity based wastewater treatment plant without having to resort to embankments of pumping to create hydraulic gradients.

The size of the proposed site is such as to allow for future expansion to 9,400 population equivalent, if necessary. All pipework to and from the site is designed to cater for the long-term expansion.

Wherever the treatment plant is located, the raw wastewater must be pumped from the pumping stations located within the town. In the case of Site No. 1, it is proposed to pump the wastewater to a high point to the east of the site and to gravitate from there to the treatment plant.

Where ground conditions, topography and accessibility are comparable the cost of the main elements of the treatment plant is relatively independent of site location. However, the elements which are subject to change in cost depending on the site location include rising main, gravity main and outfall pipe. The costs of construction of these site dependent elements at this site are likely to be greater that Site No. 3, considered to be the most cost effective site.

Site No. 2

This site to be considered is the area to the north of the town known as the Marsh, the main attraction as a potential site being that it is presently in the ownership of Cork County Council.

On first glance, it would appear that there is ample room here to accommodate a treatment plant. However, in the Road Traffic and Flooding Study Report of 1984 and again in the 1997 Skibbereen Flood Report it was proposed to divert the River Ilen through this land and to construct a new bridge and bypass road from the Cork Road to the Ballydehob Road north of the town also through the Marsh.

However, in 2002 Skibbereen Town Council completed an urban study of the town to examine the future options for the physical development of Skibbereen. As a result of this study Skibbereen Town Council have adopted a plan to develop the Marsh to improve the facilities and amenities available to the town.

The relief road has recently been constructed through the Marsh. In the area to the south of the road, it is proposed to construct car parks and to develop the remainder of this area into an amenity area incorporating walkways, planted bunds, a flood relief channel and pond.

The lands to the north of the bypass have been zoned for both industrial/commercial/office development and playing pitches.

Regarding ground conditions in the Marsh, in 1987 a site investigation was carried out in the Marsh to examine its suitability for the river diversion and relief road. In 1999, a second site investigation was carried out at the location of the relief road and bridge. In summary, the ground conditions in the Marsh Area are very soft i.e. up to 40 m of silt before hitting bedrock. Extensive and expensive measures would be required to allow a treatment plant to be constructed at this location. This would significantly reduce the cost effectiveness of this site.

The topography of this site is such that it is a flat low-lying site clearly visible from all the surrounding premises in North Street, Main Street, Bridge Street, Marsh Road and some of Ilen Street, though, as in the case of Site No. 1, this can be counteracted by the planting of a belt of trees around the site. There are 24 No. houses within 300m of the site and the closes house to the site boundary would be 135m. The site is readily accessible being 180m from the N71.

If the plant was sited in this location the rising main to the plant would be relatively short (approximately 420 lin.m.). However, the treated wastewater would have to be pumped to an outfall downstream of the town to facilitate dispersion of the treated effluent.

Site No. 3

Site No. 3 is located in the fields west of Riverdale Estate bounded by the road to the south and approximately 70 m from the walkway along the river bank. The site is 290m from the N71.

The nearest house bounds the site to the south west. A housing development bounds the site on the south east. There approximately 61 No. houses with 300m of the site.

The topography of the site is such that it slopes gently from south to north making an ideal site for a gravity plant. However, it is overlooked by a house from the north-west, from which it is unlikely that even a tree belt will form an adequate screen.

Pumping to this site would be as envisaged in the 1984 Report along the public road to a high point adjacent to the entrance to Riverdale Estate from which the raw wastewater would gravitate to the treatment plant. The submersible pumping station east of Riverdale would pump to the same location.

The cost of constructing rising mains and gravity sewers to this location is considered to be the most costs effective of the 5 sites considered.

Site No. 4

The next site examined is in Drisheen Townland just west of Deelish House. The nearest house to this site is approximately 165m distant. There are 6 No. houses within 300m of the site.

The site slopes upward to the south from the public road and lends itself to total screening by the growth of trees around the perimeter. It is further downstream along the estuary so that an outfall at this site would be further from the town.

The site is relatively distant from major roads being approximately 1.6km from the N71. Therefore the site is not a accessible as those previously discussed.

A disadvantage of this site would be that pumping would be required over the entire length from the pumping stations in the town to this site. This site is not considered to be as cost effective as Site No. 3.

Site No. 5

This site is located in the townland of Derrygereen where the river bends from due west to due south. There are 5 No. houses within 300 m of this site. The nearest house is approximately 180m from the site boundary.

The site slopes to the river from the road and is thus suitable for a gravity flow through the treatment plant. However, it is a further 1 km west of Site No. 4 with no real benefit in terms of isolation.

This site is the most distant from major roads, and therefore least accessible, being approximately 2.6km from the N71.

A disadvantage of this site would be that pumping would be required over the entire length from the pumping stations in the town to this site. This site is not considered to be as cost effective as Site No. 3.

SUMMARY

Table 2.1 indicates areas where certain sites would be more advantageous than others from an environmental point of view. From an engineering point of view some of the sites are more advantageous than others as outlined above. As far as the operation of the treatment plant is concerned, all sites are comparable and the difference in running costs for plants in the various locations is small.

Based on this site assessment matrix, Table 2.1, and the foregoing discussion the proposed treatment plant located at Coronea (Site No. 1) is considered to be the most suitable alternative site.

Selected Site

The proposed wastewater treatment plant is located in the townland of Coronea, approximately 2km west of the centre of the town. The site is bounded on the north by the road to Deelish Pier, on the west by the road between the site and the graveyard and on the south and east by farmland. The area of the site is approximately 1.6 Ha (4 Acres).

- Site Access

  Access to the treatment works site would be from the road running south past the entrance to the graveyard. This road would be widened to accommodate some extra car parking for people attending funerals and the entrance to the proposed plant will be at the south-west corner so as to cause as little interference as possible with those visiting the graveyard. The site is located less than 1km from the N71.

- Existing Land Use

  The land on which the wastewater treatment plant is proposed is currently used for agricultural purposes. The nearest residence is approximately 120 m to the east of the site. The majority of the site is zoned for use as a wastewater treatment plant in the Cork county Development Plan.

- Site Topography

  The selected site slopes in a northerly direction towards the river from a high point of approximately 27mOD to 17mOD at the north-eastern corner.

2.4.3 Conclusion

The do-nothing scenario is not considered a viable alternative for Skibbereen Town and environs. Based on the assessment outlined above there are no apparent significant environmental impacts which would prohibit the use of the site at Coronea (Site 1).

Table 2.1: Summary Alternative Site Assessment Matrix

Site Selection Criteria	**Site 1 –** Coronea adjacent to cemetery	**Site 2 –** Marsh	**Site 3 -** West of Riverdale Estate	**Site 4 -** Drisheen Townland	**Site 5 -** Derrygereen Townland	**Preferred Option**
Existing Landuse	Agricultural	Agricultural/undeveloped	Vacant plot / undeveloped	Agricultural / undeveloped	Agricultural / undeveloped	All sites comparable
Nearest Residences	140m	135m	Site bounded by dwellings	190m	180m	Sites 1, 2, 4 & 5 comparable
Visual Impact	Visible from 1No. dwelling selected screening required	Site clearly visible extensive screening required	Following screening site may still be visible from dwellings	Screening of site feasible	Existing site has good screening and remote from residences	Sites 1 & 5 comparable
Traffic Impact	Access road via existing road - 0.71km from N71	Access road via existing road - 0.2km for N71	Access via existing road - 0.3km from N71	Access via Deelish to Drisheen road - 1.6km from N71	Access via existing road - 2.6km from N71	Sites 1, 2 & 3 are within 1km of N71
Proximity To Surface Water Body	Site in close proximity to proposed outfall point on River Ilen	Pumping required for outfall to discharge point downstream of town	Site in close proximity to proposed outfall point on River Ilen	Adjacent to River Ilen downstream of proposed outfall point	Adjacent to River Ilen downstream of proposed outfall point	Site 1, 4 & 5 comparable
Archaeology	No known archaeological features on site. Ringfort located to the south of the site	Site not listed as being of archaeological importance	Site not listed as being of archaeological importance	Site not listed as being of archaeological importance	Site not listed as being of archaeological importance	Sites 2, 3, 4 & 5 comparable
Flora & Fauna	Existing greenfield site. Possible impact on existing hedgerows	Existing greenfield site bounded by fencing	Existing scrubland. Possible impact on hedgerows.	Existing greenfield site. Possible impact on existing hedgerows	Mature hedgerows and trees bounding site	All site comparable
Material Assets	Site in agricultural use. Majority of the site is zoned for Utility / Infrastructure in 2003 Cork County Development Plan	Greenfield site currently in agricultural use, zoned for industrial use in the Skibbereen Town Council Development Plan	Land is currently in agricultural use, zoned for residential use in the Skibbereen Town Council Development Plan	Land is currently in agricultural use	Land is currently in agricultural use	Site 1 is zoned for use as a wastewater treatment plant site.
Convenience to Users	Site is located on outskirts of town in relatively remote location	Site is located adjacent to the main pumping station proposed for the sewerage scheme	Site is located close to the town and the proposed outfall site	Site is located approx 2.6km west of the town	Site is located approx 3.6km west of the town	Site 1 & 2 comparable
Site Ownership	Site is in private ownership	Site is owned by the local authority	Site is in private ownership	Site is owned by the local authority	Site is in private ownership	Sites 2 & 3 comparable
Topography & Ground Conditions	Site slopes in a northerly direction toward the river Ilen	Site is relatively flat, poor ground conditions	Site slopes in a northerly direction toward the river Ilen	Site slopes upwards to the south from the public road	Site gently slopes downward toward the river Ilen	Sites 1,3,4 & 5 comparable
Cost (site dependent elements only excluding site purchase)	Slightly more expensive than cheapest site	More expensive than cheapest site having increased construction costs due to poor ground conditions at site and additional pipeline costs	Considered the most cost effective site based on rising mains, gravity mains and outfall pipework costs	More expensive that cheapest site	More expensive than cheapest site	Site 3
					Preferred Location	**Site 1**

3 PROPOSED DEVELOPMENT

3.1 INTRODUCTION

This EIS is solely concerned with the provision of a wastewater treatment plant at the preferred site as outlined in Section 2.4. Cork County Council is also undertaking separate contracts with respect of the collection network in the town. This network is outside of the scope of this EIS. However, elements of this network will be the subject of separate statutory processes e.g. planning procedures, foreshore licence etc.

3.2 PROCUREMENT

In line with the Department of the Environment, Heritage and Local Government (DoEHLG) has a policy of procuring wastewater treatment plant facilities, it is anticipated that the Skibbereen Wastewater Treatment Plant will proceed as a Design, Build and Operate Contract. For this reason the wastewater treatment plant will not be designed in detail until the relevant partner has been appointed. Within this EIS the treatment plant design is indicative and will be outlined sufficiently to encompass the likely treatment processes that will be ultimately put in place. Therefore, specific processes will not be prescribed but environmental parameters will be set down with which the treatment plant operations must comply when complete.

3.3 PROPOSED DEVELOPMENT

Approximately 90% of the wastewater of the town will be collected through a new piped system in a main pumping station located in the Marsh, upstream of Kennedy Bridge. A second pumping station will be located on the southern bank of the river east of Riverdale. Both of these pumping stations will pump the raw wastewater to a high point on the high ground to the south-west of Riverdale Estate from where it will gravitate to the proposed treatment works. The wastewater discharges from houses in the vicinity of the rising main header manhole, as well as any future development to the south-west will be accommodated in the gravity main to the works. Furthermore, 3No smaller pumping stations will be constructed on the Mill Road, Marsh Road and Glencurragh Road to assist the collection of wastewater at the main pumping station in the Marsh.

The proposed wastewater treatment plant at Coronea will be constructed as a staged development. It is proposed that the main elements be designed to cater for a population equivalent of 4,700 in Stage 1. There is adequate space on the site to extend the capacity of the treatment plant to 9,400 population equivalent in stage 2 and the trunk main, intake works and outfall pipe has been designed to cater for these flows. The following table illustrates the flows and biological loadings:

	Stage 1	**Stage 2**
Population Equivalent	4,700	9,400
BOD Load	282 kgs	564 kgs
Dry Weather Flow	1,081 m^3/day	2,162 m^3/day

The dry weather flow in the Ilen River is approximately 21,600 m^3/day (0.25 m^3/sec). In order to control water quality parameters in the river resultant from the proposed treated wastewater discharge it was decided to make use of the tidal influence. Therefore a tidal holding tank is to be incorporated in the treatment plant to ensure that effluent is released only on an ebb tide when the flow in the river channel is well above that which is required to assimilate the proposed discharges.

In order to ensure adequate dispersion of the discharged effluent the proposed outfall will be located downstream of New Bridge. As part of the environmental impact assessment of the development, Irish Hydrodata Ltd. has studied in detail the effects of this discharge on the Ilen Estuary. The findings of their study, which are discussed in Section 5.9, limit the discharge of effluent to a 4 hour period on the ebb tide, i.e. High Water plus 0.5 hours to High Water plus 4.5 hours. The nett effect of this is that wherever the treatment plant is located, the point of discharge to the estuary must be either at or downstream of the location monitored by Irish Hydrodata Ltd. Accordingly a tidal holding tank will be designed to hold 8 hours of 3 x DWF which for Stage 1 will require 1081m^3. A second holding tank would be required as part of Stage 2. The outfall pipe is to be designed to empty the tidal holding tank (Stage 2 capacity) as well as the full capacity of the pumping plant discharging to the treatment works over the defined 4 hour discharge period.

The outfall pipe will run in a northerly direction across the Deelish Road to the river, a distance of approximately 170m. It is proposed to locate this pipeline along the existing fenceline to minimise the impact on the agricultural land. At the point of discharge at mid channel the pipe will always be below water level.

3.4 DESIGN LOADS

The 1996 census showed the number of persons resident within the urban area as 1,926 persons. The following is the estimated population equivalent based on the findings of the engineering design review carried out by RPS-MCOS in 2000.

People Resident within the Town Council	1,926
Schools – Pupils and Teachers	459
Hospital	115
Hotels and Guesthouses	425
Light Industry	1,000
Expansion of Scheme to areas outside of the Town Council boundary	800
	4,725
	====
	Say 4,700

Based on the above, the design of the secondary wastewater treatment plant will cater for an equivalent population of 4,700 with the option for expansion to 9,400 population equivalent in the future.

The wastewater flow and biological loading at the wastewater treatment plant is based on a per capita production of the wastewater of 0.230 m^3/day and a BOD per capita load of 0.06 kg/day. Based on the above the following are calculated for Stage 1 of treatment plant -

Volume:	4,700 x 0.230 m^3/day	= 1,081 m^3/day
Pollution Load:	4,700 x 0.06 kg	= 282 kg/day

3.5 TREATMENT PLANT INDICATIVE DESIGN

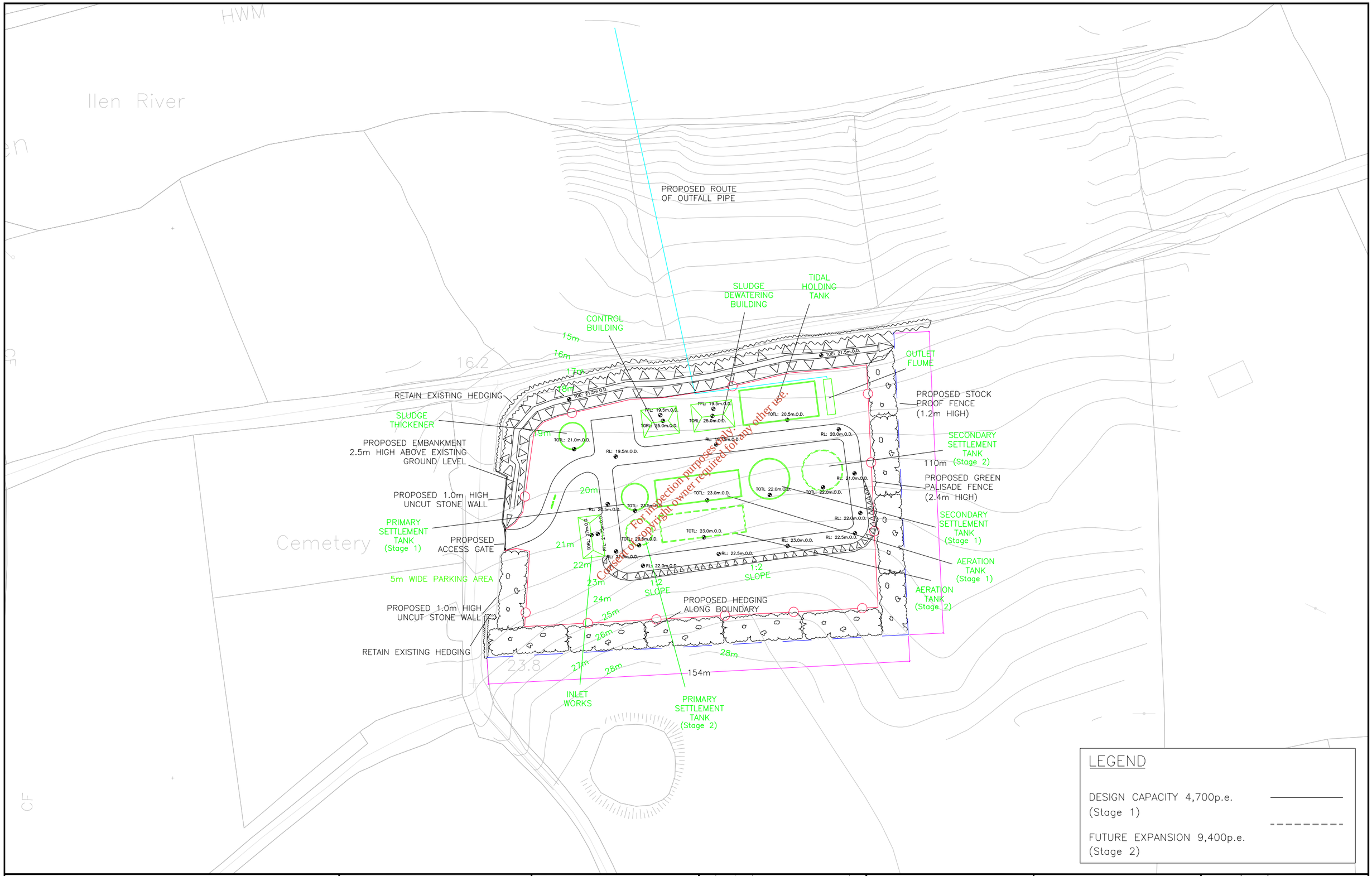
This EIS is based on an indicative design that can meet the effluent discharge criteria as defined in the relevant EU Directives and National Regulation.

This indicative design, shown in Figure 3.1, comprises the following treatment elements:-

- Covered inlet works comprising
    - 6mm fine screen with screenings, removal, washing and compaction
    - Grit trap with grit removal, washing and compaction
    - Measurement flume
    - Air extraction from the covered spaces and its treatment in biological filters to remove foul odours
- Primary Settlement comprising
    - 2No. 8m diameter radial flow primary settlement tanks
    - Tanks to be covered and the air extracted and treated in biological filters for odour removal.
- Aeration Basin based on a conventional activated sludge process using a plug-flow system. Aeration achieved using fine bubble diffused air system.
- Secondary Settlement / Clarification
- Sludge Thickening, Dewatering & Removal. Sludge thickened in a covered tank and the air extracted and odour removed.
- Tidal Holding and Effluent Discharge

The arrangement of tanks and buildings shown in Figure 3.1 is typical of the works required. Indicative levels for the proposed structures and buildings are also shown to facilitate the visual impact assessment of the treatment plant. This figure shows the treatment plant following completion of Stages 1 and 2, i.e. 9,400PE capacity. Structures required for Stage 2 but not required for Stage 1 are indicated as dotted lines.

Note that the size and location of the proposed structures may vary. However, it is envisaged that the final design will be comparable with those indicated. All reasonable measures will be taken to minimise the visual impact of the required structures on the predominantly rural landscape. These measures may include the choice of appropriate cladding for structures and limiting the maximum heights to that reasonable practicable.



LEGEND

DESIGN CAPACITY 4,700p.e. (Stage 1) ——————

FUTURE EXPANSION 9,400p.e. (Stage 2) - - - - - - - - -

Client:

Cork County Council
Comhairle Chontae Chorcaí

RPS MCOS
RPS-MCOS Ltd., Innishmore, Ballincollig, Co. Cork, Ireland.
T: +353 21 487 0200 - F: +353 1 487 3742
E: rpsmcos@rpsgroup.ie W: www.rpsmcos.ie

NOTES

1. This drawing is the property of RPS-MCOS Ltd., it is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. All Levels refer to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only, if in doubt ask.

No.	Date	Dr. / Ch.	Amendment / Issue	App.
F01	MAR'04	AOC / BB	REPORT	A

Project: SKIBBEREEN SEWERAGE SCHEME WASTEWATER TREATMENT PLANT

Title: INDICATIVE SITE LAYOUT PLAN

Drawn by:	AOC	Job No:	MCW0153
Checked by:	BB	File No:	MCW0153SK0014
Approved by:		Drg. No:	FIG. 3.1
Scale:	NTS	Rev:	F01
Date:	MAR '04		

3.6 FINAL EFFLUENT QUALITY

3.6.1 Biological Removal

The treatment process at the wastewater treatment plant is designed to producing an effluent to satisfy the requirements EC Directive 91/271/EEC concerning Urban Wastewater Treatment (SI 491 of 1994 as amended by SI 254 of 2001). The applicable effluent standards as defined in the Directive are shown in Table 3.1 below.

Table 3.1: Minimum Effluent Standards based on SI 254 of 2001

Parameter	Conc. (mg/l)	Minimum Percentage of Reduction
Biochemical Oxygen Demand (BOD)	25	70 – 90
Chemical Oxygen Demand (COD)	125	75
Suspended Solids	35	90

The aeration plant proposed in the indicative design for Skibbereen is ideally suited to achieve these levels of efficiency for BOD, COD and Suspended Solids removal. Efficiencies of BOD removal for similar plants typically are in excess of 90%. The effect of the above BOD discharges on the quality of the receiving waters is assessed in detail in Section 5.9 of this EIS.

3.6.2 Nutrient Removal

The nutrient per capita production and concentrations in domestic wastewater for Skibbereen are set out in Table 3.2 below. These values have been determined from wastewater flows carried out by RPS-MCOS in various towns throughout Ireland. The results obtained from these surveys compare very favourably with textbook concentrations and per capita loadings for these nutrients.

Table 3.2: Expected Untreated Nutrient Loadings

Nutrient	Per Capita Loading (g/head/day)	Concentration (mg/l)	Stage 1 Works (kg)	Stage 2 Works (kg)
Phosphorous	2	8.7	9.4	18.8
Ammonia	5.75	25	27.03	54.06
Organic Nitrogen	4.6	20	21.62	43.24

Nitrogen is present in two forms in domestic wastewater, ammonia nitrogen at a concentration of approximately 25 mg/l and organic nitrogen at a concentration of approximately 20 mg/l. Total kjeldahl nitrogen (TKN) is the expression of both organic and ammonia nitrogen in a sample and for domestic effluent this is typically 45 mg/l which is equivalent to 10.4 grams/head/day TKN.

Nutrient removal is a term attributed to those processes which are applied both in conjunction with, or as part of, secondary treatment systems in order to remove excess nitrogen and phosphorous compounds from wastewater. The rule of thumb estimates for the uptake of nitrogen and phosphorous from biomass synthesis in conventional secondary treatment systems is provided by the relationships: BOD:N:P = 100:5:1. Note that treatment plants incorporating extended aeration processes have a higher efficiency for the removal of nutrients.

As a natural consequence of secondary treatment, there will be an uptake of nitrogen and phosphorous for biomass synthesis at the wastewater treatment plant in Skibbereen. Based on an incoming BOD concentration in the order of 300 mg/l, the expected uptake of phosphorous based on the ratios outlined above will be 3 mg/l. As the expected concentration of phosphorous in the incoming effluent is 8.7 mg/l, the result of biomass uptake would reduce the expected effluent concentration of phosphorous to 5.7 mg/l.

Similarly, the biomass synthesis of secondary treatment requires the uptake of nitrogen, at a rate of 100:5. Based on the incoming BOD concentration of 300 mg/l the expected nitrogen biomass synthesis requirement is 15 mg/l. The total concentration of nitrogen expressed as TKN in the incoming effluent is 45 mg/l. The final effluent therefore, without further treatment should contain a concentration of 30 mg/l.

Therefore the anticipated concentration of nutrients in the final effluent based on the indicative treatment plant design, i.e. a conventional plant without additional nutrient removal processes, are as follows:-

- Total Nitrogen - 30 mg/l
- Total Phosphorus - 5.7 mg/l

The impact of these nutrient discharges on the quality of the receiving waters is assessed in detail in Section 5.9 of this EIS. Note that the mitigation measures recommended in Section 5.9 will result in lower nutrient concentrations in the final effluent discharged to the Ilen.

3.6.3 Bacteria Removal

The reduction of bacteria is of major importance in wastewater treatment processes. From surveys carried out at wastewater treatment works with similar combined sewerage systems from domestic sources the faecal coliform bacteria count, which might be expected in the raw wastewater at Skibbereen would have:-

Maximum values	9.6×10^6 No/100 ml
Minimum values	5.5×10^4 No/100 ml
Mean values	1.5×10^6 No/100 ml

The number of faecal coliform would be reduced during the passage through the secondary treatment plant by a factor of approximately 93% which would leave a faecal coliform count of: -

Maximum	6.70×10^5 No/100 ml
Minimum	3.85×10^3 No/100 ml
Mean	10.5×10^4 No/100 ml

The effect of these bacteriological discharges on the quality of the receiving waters is assessed in detail in Section 5.9 of this EIS.

3.6.4 Metals Removal

Normally the metal content in domestic wastewater is low and in general does not pose a problem to the wastewater treatment process, nor does it result in high metal contents in the final effluent. Typical metal concentrations for raw wastewater are given in Table 3.3.

Table 3.3: Typical Metal Concentration in Raw Domestic Wastewater

Metal	Concentration (mg/l)
Iron (Fe)	0.5 – 8.6
Chromium (Cr)	0.01 – 0.14
Nickel (Ni)	0.01 – 1.86
Lead (Pb)	0.01 – 0.28
Copper (Cu)	0.01 – 0.28
Manganese (Mn)	0.01 – 0.26
Cadmium (Cd)	0.01 – 0.20
Zinc (Zn)	0.01 – 1.28

High levels of metals including Chromium, Nickel, Lead, Copper and Zinc would seriously reduce biological activity in the biomass mixed liquor suspended solids of an aeration tank. The levels of these metals in the wastewater expected at the Skibbereen treatment plant will be low as the wastewater is primarily domestic with no heavy industrial discharges present.

The metal content of the wastewater will precipitate and settle out with the sludge in the secondary settling tank. This sludge will be re-circulated to the aeration basin from where it will be wasted to the sludge dewatering area, thus removing the metals from the effluent flow and the expected concentration of metals in the final effluent will be negligible.

3.7 SLUDGE TREATMENT

The primary and secondary sludges are to be pumped to a sludge thickening tank where the sludge is thickened to approximately 4% dry solids. This tank will also be covered and the air extracted and odour removed. The thickened sludge will then be dewatered in a dewatering machine housed in a building for that purpose. From here the sludge will be transported for further treatment in accordance with the County Sludge Management Plan.

Waste production and disposal is discussed in more detail in Section 4 of this EIS.

4 WASTE PRODUCTION AND DISPOSAL

The main sources of waste from the Skibbereen Treatment Plant Works will be:-

(a) Grit and detritus from the grit trap installed at the inlet to the works.

(b) Screenings from the screen and compactors also at the inlet.

(c) Sludge from the dewatering building.

(d) Domestic refuse from the administration building.

(e) Chemical containers, wrappers, etc.

(f) Grass cuttings.

It is proposed to dispose of the grit, screenings and domestic refuse to the nearest available licensed landfill site. The chemical containers are normally reusable and will be returned to the manufacturers. Grass cuttings will not pose a problem as these can be composted and used for fertilising the various shrub beds around the site. Sludge will be transported treatment in accordance with the requirements of the Sludge Management Plan.

4.1 GRIT AND DETRITUS REMOVAL

The quantity of grit and detritus is very variable, being least in domestic wastewater from separate systems and most from combined systems taking the flow from heavily gritted roads. The quantity also varies from time to time as storm flows tend to bring the large quantities of grit and detritus to the collection system. The quantity of grit removed from combined sewerage systems usually amounts to 3.8 m^3/1,000 persons to 9.8 m^3/annum, the lower figure applying to densely built-up areas.

In the case of Skibbereen, the expected volume of grit/annum from the residential population of 4,700 is in the region of 18 to 36 m^3 annually, giving a volume of approximately 0.5 m^3 of grit per week. This volume would double to approximately 1.0 m^3 per week should the plant be expanded as part of Stage 2 to cater for a population of 9,400.

In the indicative design, it is proposed that the grit will be removed from the wastewater flow by means of a proprietary vortex type grit removal system located at the inlet to the works. This item of plant removes grit from the wastewater flow and deposits it to a separate collection chamber. The grit will be washed and the washing water, containing organics, returned to the wastewater flow. On a daily basis, the grit will be removed from the grit chamber and deposited in a covered bin for removal off site on a weekly basis.

4.2 SCREENINGS REMOVAL

The quantity of screenings entering a wastewater collection system is dependent on the domestic population served. The volume of screenings removed from the wastewater flow is dependent on the effectiveness of the screens installed to remove the floating solids.

The quantity of screenings expected is 0.02 m^3/1,000 head of population per day. Based on a domestic residential population for the Stage 1 works of 4,700 people, the volume of screenings expected per day is 0.1 m^3. For the fully extended plant, the volume of screenings expected per day will be 0.2 m^3.

The screenings will be washed and compacted and the moisture content is expected to be in the region of 85% with a weight of 800 kg/ m^3. Based on a production of screenings of 0.1 m^3/day for the Stage 1 works and 0.2 m^3 for the Stage 2 works, the total weekly volume should be 0.7 and 1.4 m^3 per week for the Stage 1 and Stage 2 works respectively.

The screenings will be collected and deposited to a covered collection bin and, on a weekly basis, this bin will be taken from the treatment works site to the nearest available licensed landfill site.

The screenings will be washed and compacted prior to deposition into the bin and, as such, should be odour free. However, it is proposed to provide an enclosed bin at the site to ensure that there are no problems from odours.

4.3 SLUDGE PRODUCTION

The sludge produced at the wastewater treatment plant will be thickened and dewatered in the sludge treatment process at the site. This sludge treatment involves thickening of the raw sludge to 3% - 4% dry solid content followed by dewatering in the dewatering house to a solids content of 16% - 20%.

Based on a typical sludge production of 0.75 kg of Dry Solids per kg BOD removed the expected sludge production for the Stage 1 (4,700 PE) and fully developed Stage 2 (9,400 PE) plant are set out in Table 4.1 below.

Table 4.1: Sludge Production from the Works

	Population Equivalent	Annual Sludge Product (tonne) Dry Solids
Stage 1	4,700	77.2
Stage 2	9,400	154.4

It can be seen that the expected sludge production from the Stage 1 plant with a population of 4,700 is 77 tonne/annum. The expected sludge production from the fully developed site from a population of 9,400 is 154 tonnes of dry solids/annum.

Following sludge thickening and dewatering, the expected solids content of the wastewater sludge will be 16% - 20%. This will result in a Stage 1 annual sludge volume of approximately 430m^3 and a Stage 2 sludge production of 860m^3.

4.4 SUMMARY OF WASTE PRODUCED

Based on the foregoing, the total volume of waste produced from the wastewater treatment plant and from the grit and screening removal equipment is in the region of 1.35m^3 from the Stage 1 works and 2.70m^3 from the fully developed Stage 2 works. The derivation of these volumes is given in Table 4.2.

Table 4.2: Waste Production at the Works

Waste	Stage 1 volume	Stage 2 volume
Grit (m^3/day)	0.07	0.14
Screenings (m^3/day)	0.10	0.20
Sludge (m^3/day)	1.18	2.36
Total (m^3/day)	**1.35**	**2.70**

It is envisaged that the grit, screenings and domestic waste would be disposed of on a weekly basis to the nearest licensed landfill. The disposal of the wastewater sludge to the sludge treatment centre would also be on a weekly basis.

4.5 IMPACT

All wastes will be disposed of offsite at a suitable licensed disposal facility. The volumes of wastes produced, along with their stable nature and means of disposal, will ensure there will be little impact on the environment from these wastes.

5 POTENTIAL IMPACTS AND MITIGATION MEASURES

5.1 INTRODUCTION

This section comprises an appraisal of the impacts of the proposed development as described in previous sections on the following aspects of the environment. Where necessary ameliorative measures are recommended to reduce significant impacts.

- Human Beings
- Air and Odour
- Climate
- Noise and Vibration
- Visual and Landscape
- Flora and Fauna
- Aquatic Environment
- Geology, Hydrogeology and Soils
- Material Assets
- Cultural Heritage

The impact of both the construction and operational phases of the project are assessed.

5.2 INTERACTION OF ENVIRONMENTAL ASPECTS

All aspects of the environment interact with one another to a greater or lesser extent. A potential impact of the development on an element of the environment may have a significant knock-on effect on another. For example, any potential detrimental impact on water quality due to wastewater discharges could potentially impact on the amenity value of the receiving waters in terms of boating or fishing which in turn may have a detrimental impact on tourist potential.

The most significant interactions between environmental aspects in relation to the proposed development are identified as follows:

Human Beings: Human beings interact most significantly with the following aspects of the environment; air quality, noise, landscape, cultural heritage, material assets and the river / estuarine environment.

Ecology: Flora and fauna interact most significantly with water with respect to the river and estuarine environment and with air quality, noise, climate and soil with respect to the terrestrial ecology.

The significant impacts of the proposed treatment plant are discussed in more detail below in the following sections.

5.3 HUMAN BEINGS

5.3.1 Introduction

This section considers both the positive and negative impacts of the proposed development on the human beings with which it interacts. The impact of the development on human beings may be considered at a number of levels, including:

- Nuisance including, noise, odour, traffic and construction impacts;
- Visual impacts;
- Amenity impacts; and
- Socio-economic impacts.

Traffic nuisance, amenity and social-economic impacts are considered in this section while noise, odour and construction impacts are considered separately within this EIS.

In addition, the potential impacts on the Coronea Burial Ground, located adjacent to the proposed treatment facility, are discussed in Section 5.3.6.

5.3.2 Existing Environment within the vicinity of the Treatment Plant

The proposed wastewater treatment plant is located in the townland of Coronea, approximately 1 mile west of the centre of the town. The site is bounded on the north by the road to Deelish Pier, on the west by the road between the site and the graveyard and on the south and east by farmland. The area of the site is approximately 1.6 ha (4 acres).

5.3.3 Potential Positive Impacts

The scheme will have a number of potential positive impacts on the social and economic environment of Skibbereen and its environs through:-

- Catering for new and existing residential developments;
- Catering for new and existing employment zones in the catchment areas;
- Catering for future leisure development in the area;
- Providing additional employment opportunities to the area during both the construction and operational phase of the development;
- Protecting and improving public health and freshwater aquatic environment through achieving a consistently compliant final effluent quality.

5.3.4 Potential Negative Impacts and Mitigation

The scheme may have a number of potential negative impacts on the social and economic environment of Skibbereen arising from:

- **Odour:** Offensive odours and their potential significant impact on the surrounding environment are considered in Section 5.4 below. Odour limits and mitigation measures are proposed to minimise the impact of the wastewater treatment plant on local residents. Mitigation measures such as adequate filtered ventilation and covered tanks are proposed.

- **Traffic:** The impact of construction traffic on local residents is dealt with in Section 5.13 below. The proposed development will not lead to a significant increase in traffic during operation and any increases in traffic will be confined to the construction phase of the project. The removal of dewatered sludge off-site will be undertaken using enclosed tankers and enforcing a speed limit on the access road to minimise the impact on local residents.

- **Visual Intrusion/Obstruction:** The potential visual impacts are associated with possible impaired or unsightly views are discussed in Section 5.7. Mitigation measures include the suitable planting of indigenous hedgerow species. Consideration will be given to minimising the impact when designing the proposed structures.

- **Health & Safety:** Permanent security fencing will be constructed around the treatment plant to protect member of the public. Secure site fencing will also be constructed during the construction stage for protection of the public. All phases of the development will be managed in accordance with the requirements of the Safety and Health legislation furthermore the removal of the untreated discharges from within the town will reduce the risks to public hygiene.

- **Construction:** The potential impacts from construction are temporary and relate to traffic, noise, dust and vibration and are dealt with in more detail in Section 5.13. The contractor will be required to implement mitigation measures to reduce the impact of the construction on local residents and businesses in Skibbereen Town.

5.3.5 Residual Impacts

Some residual impacts on human beings from the scheme may occur in relation to visual, construction and amenity aspects. However, these impacts will be mitigated by the employment of various measures designed to lessen the adverse effects associated with these issues. These measures are discussed in more detail in the following sections and are summarised in Section 6 of this EIS. The impact of the proposed scheme on Human Beings can be generally summarised as being positive.

5.3.6 Impacts on Coronea Burial Ground

Coronea Burial Ground is located adjacent to the western boundary and entrance to the treatment plant. Both the construction and operation phases of the treatment plant have the potential to negatively impact on visitors and funeral ceremonies at the cemetery. The area where the cemetery is located comprises a mixture of agricultural land and rural housing with relatively low levels of traffic.

Traffic disruption and noise impacts have been identified as the most significant potential impacts from the proposed development on the Coronea Burial Ground. It is proposed to provide some additional off road car parking at the entrance to the treatment plant for the adjacent graveyard. This is likely to

result in a positive impact. The following mitigation measures are recommended to reduce adverse negative impacts associated with development:-

- Both construction and operations activities on the treatment plant site are to be mindful of the sensitivities associated with activities at the cemetery.
- Parking of construction or operational traffic outside the perimeter of the treatment plant site shall not take place at any time.
- No heavy vehicle movements should take place while ceremonies are ongoing at the cemetery.
- Construction and operations activities that may entail elevated noise levels should not take place for the duration of any ceremonies at the cemetery.

5.4 AIR AND ODOUR

The following is the air and odour impact assessment for the proposed Skibbereen Wastewater Treatment Plant as prepared by specialist sub consultants AWN Consulting Ltd.

5.4.1 Introduction

A proposed secondary wastewater treatment plant is proposed for Coronea, Skibbereen, Co. Cork. The plant will be designed initially to cater for a population equivalent of 4,700 in Stage 1 with the facility to extend the capacity of the treatment plant to 9,400 population equivalent. This section outlines the appropriate odour compliance criteria which will ensure that no odour nuisance occurs from the proposed facility.

5.4.2 Odour Perception & Characterisation

Odours are sensations resulting from the reception of a stimulus by the olfactory sensory system, which consists of two separate subsystems: the olfactory epithelium and the trigeminal nerve. The olfactory epithelium, located in the nose, is capable of detecting and discriminating between many thousands of different odours and can detect some of them in concentrations lower than those detectable by currently available analytical instruments[(1)]. The function of the trigeminal nerve is to trigger a reflex action that produces a painful sensation. It can initiate protective reflexes such as sneezing to interrupt inhalation. The olfactory system is extremely complex and peoples' responses to odours can be variable. This variability is the result of differences in the ability to detect odour; subjective acceptance or rejection of an odour due to past experience; circumstances under which the odour is detected; and the age, health and attitudes of the human receptor. The perception of odour is complex and a number of properties of odour need to be considered including the intensity of the odour, its character, hedonic tone and the frequency of occurrence of the odour.

Odour intensity is a measure of the strength of the odour sensation and is related to the odour concentration. However, this relationship is not linear but logarithmic in nature. Thus, if the concentration of the odour increases tenfold, the perceived increase in intensity will be by a much smaller amount. The odour threshold refers to the minimum concentration of an odorant that produces an olfactory response or sensation. This threshold is normally determined by an odour panel consisting of a specified number of people, and the numerical result is typically expressed as occurring when 50% of the panel correctly detect the odour. The odour threshold is not a precisely determined value, but depends on the sensitivity of the odour panellists and the method of presenting the odour stimulus to the panellists. An odour detection threshold relates to the minimum odorant concentration required to perceive the existence of the stimulus, whereas an odour recognition threshold relates to the minimum odorant concentration required to recognise the character of the stimulus. Typically, the recognition threshold exceeds the detection threshold by a factor of 2 to 10[(1,2)].

The character of an odour distinguishes it from another odour of equal intensity whereas the hedonic tone of an odour relates to its pleasantness or unpleasantness. Odours are characterised on the basis of odour descriptor terms (e.g. putrid, fishy, fruity etc.). Odour character is evaluated by comparison with other odours, either directly or through the use of descriptor words. When an odour is evaluated in the laboratory for its hedonic tone in the neutral context of an olfactometric presentation, the panellist is exposed to a stimulus of controlled intensity and duration. The degree of pleasantness or unpleasantness is determined by each panellist's experience and emotional associations. The responses among panellists may vary depending on odour character; an odour pleasant to many may be declared highly unpleasant by others.

In terms of frequency of occurrence of the odour, adaptation, or olfactory fatigue, is a phenomenon that occurs when people with a normal sense of smell experience a decrease in perceived intensity of an odour if the stimulus is received continually. Adaptation to a specific odorant typically does not interfere with the ability of a person to detect other odours. Another phenomenon known as habituation or occupational anosmia occurs when a worker in an industrial situation experiences a long-term exposure and develops a higher threshold tolerance to the odour.

5.4.3 Odour Standards & Guidelines

The exposure of the population to a particular odour consists of two factors; the concentration and the length of time that the population may perceive the odour. By definition, 1 ou/m^3 is the detection threshold of 50% of a qualified panel of observers working in an odour-free laboratory using odour-free air as the zero reference. The recognition threshold is generally about five times this concentration (5 ou/m^3) and the concentration at which the odour may be considered a nuisance has historically been assumed to occur between 5 and 10 ou/m^3[3(3)]. Clarkson and Misslebrook[(4)] proposed that a "faint odour" was an acceptable threshold criteria for the assessment of odour as a nuisance. Until recently, it was generally accepted that odour concentrations of between 5 and 10 ou/m^3 would give rise to a faint odour only, and that only a distinct odour (concentration of >10 ou/m^3) could give rise to a nuisance[(5)]. In 1990, a survey of the populations surrounding 200 industrial odour sources in the Netherlands showed that there were no justifiable complaints when 98%ile compliance with an odour exposure standard of a "faint odour" (5-10 ou/m^3) was achieved[(5)].

Recent approaches to odour compliance criteria are moving away from a purely arithmetic approach to odour, based on odour concentration, to one where the dose effect relationship is investigated. This dose-response relationship will depend on factors such as on the offensiveness of odour, the Peak/Mean ratio and the sensitivity of the surrounding environment[(6)].

As part of the dose-response approach to odour assessment, the odour concentration is corrected to reflect the offensiveness and nature of the odour. Hangartner[(6)] has produced a table (Table 5.1) which shows the concentration of various sources of odour that would need to be present to extract the same hedonic response as that from pure hydrogen sulphide. Assuming that the baseline annoyance threshold of 5 ou/m^3 is appropriate for hydrogen sulphide (as is likely), this data can be used to determine the annoyance threshold for other sources of odour:

Table 5.1: Annoyance Threshold Corrections (Hangartner 1988).

Odour Type	Value on Hangartner Scale	Value Relative to H_2S
Hydrogen Sulphide	8	1
Rendering Plant	5	0.6
Biofilter	40	5
Bakery	500	62

An uncontrolled rendering plant is particularly offensive (see Table 5.1) and thus a correction would be applied over and above the detected odour concentration in order to reflect the nauseous nature of these odours. In contrast, biofilters should be corrected downwards to reflect the generally inoffensive nature of their odour. In this regard, an odour concentration measurement of 25 odour units from a biofilter should in fact lead to an odour intensity as perceived at the receptor of 5 odour units or alternatively the corrected annoyance threshold for a biofilter should be 25 ou/m^3[(6)].

In the current context, the odour which will be experienced will be both untreated wastewater treatment plant odours (H_2S, mercaptans, amines etc.) and treated biofilter odour, if necessary, from abatement on-site. Biofilter media comprise solid porous materials which react with the odorous material through biological oxidation leading to usually much less odorous compounds. In general, biofilters typically have a distinct residual odour which will not be far below 100-300 ou/m^3[7]. However, this residual odour will in most cases resemble the odour of the soil, which is an earthy odour generally not recognised as annoying, as its character resembles that of odours naturally emitted from soil[7].

It is also appropriate to apply a correction to the concentration component for land use, location and population intensity. The current location is in a low population rural environment of low sensitivity. The sensitivity of the current environment is low both due to high existing background odours (silage, manure, etc) and because the opportunities for people to be affected by the odours are reduced due to the low population density. The recommended corrected annoyance threshold for a low sensitivity environment is 10 ou/m^3 (compared to the standard annoyance threshold of 5 ou/m^3) which is the same as for a moderately sensitive environment[6]. In addition, the rural nature of the site may lead to the masking of the odour by the existing background odour and thus reduce the impact of the facility beyond the site boundary.

Another factor which needs to be considered in the assessment procedure is the peak to mean ratio likely due to emissions from the facility. Due to the averaging period of standard air dispersion models (1-hour means), much higher levels may be detected over short periods although the mean hourly value may be below the annoyance threshold. In order to account for this, a peak to mean (P/M) ratio has been derived which incorporates the ratio of that odour peak smelled by the nose over a very short period and the average result of a dispersion model over 1-hour. Recent research by Katestone Scientific (1998) identified the maximum concentration that has a 10^{-3} probability level for exceedance with a nasal response time of 0.1-1 sec. Complaints are likely if such events occur over a significant number of occasions (0.5-2%)[6]. In respect to the current scenario, which involves area sources, volume sources and wake-effected point sources a P/M ratio (based on a 1-hour averaging period) of 2.3 for both the near and far field is recommended.

In terms of selection of the appropriate percentile, the 98th%ile has been most commonly applied in odour thresholds and standards. This represents a compromise between the use of very high percentiles which corresponds with the particular conditions which cause most odour complaints and the fact that the uncertainty of the model increases significantly at very high percentiles[7].

In summary, the appropriate assessment criteria for waste water odour emissions in a rural setting taking into account the P/M ratio, annoyance threshold correction factor and the land-use correction factor, has been detailed below:

Odour annoyance threshold for a wastewater treatment plant at Skibbereen:

= 5.0 ou/m^3 (default based on a 98th%ile for H_2S)

x 1	(no annoyance threshold correction factor relative to H_2S)
x 2	(correction factor for low sensitivity environment)
x 1/ (2.3)	(Peak/Mean ratio for wake-affected point sources, area sources, volume sources)

= 4.3 ou/m^3 (based on a 98th%ile of hourly concentrations)

=> **Threshold = 4 ou/m^3 (based on a 98th%ile of hourly concentrations)**

(In relation to biofilter-treated odour, a lower odour annoyance threshold of 21.7 ou/m^3 as a 98th%ile of hourly concentrations would be appropriate).

The above odour annoyance threshold can be compared with recent standards and guidance set by several European countries. The Netherlands has set differentiated target values between 0.5 – 3.5 ou/m^3 as a 98th%ile for industrial sources. The UK in it's recent guidance documents[8-9] has set an indicative odour exposure criteria for waste water treatment works of 1.5 ou/m^3 as a 98th%ile. This indicative criterion can then be adjusted to allow for relevant local factors. In the current case, the rural nature of the facility would allow a more lenient exposure criteria to be applied. Recently, the EPA has set a target value and two limit values for use in pig production units[7]. The target value is 1.5 ou/m^3 as a 98th%ile at all sensitive locations. In relation to limit values, a value of 3.0 ou/m^3 as a 98th%ile has been set for new pig production units whilst for existing facilities a value of 6.0 ou/m^3 as a 98th%ile has been set.

5.4.4 Odour Emission from Wastewater Processes

Inlet Works

The inlet works, which will consist of fine screens, grit removal and flow measurement. The collected grit will be washed and on a daily basis, the grit will be removed from the grit chamber and deposited in a covered bin for removal off site on a weekly basis. All screenings will be automatically removed from the screens, washed and deposited in a covered skip for disposal off site. Similarly, all grit extracted from the influent will be washed and mechanically transferred to a covered skip for disposal off site. The screenings will be washed and compacted prior to deposition into the bin and, as such, should be odour free. However, it is proposed to provide an enclosed bin at the site to ensure that there are no problems from odours. All channels and chambers which constitute the intake works will be covered and the air extracted and purified in a biological odour treatment unit.

Settling Tanks

All settling tanks incorporated in the treatment plant will be covered and air extracted and purified as for the inlet works. These tanks will be desludged in an enclosed system and pumped to the sludge treatment building for dewatering.

Sludge Treatment

If a sludge thickening tank is to be incorporated into the design, this will also be covered and the air treated as for the settling tanks. The remainder of the sludge treatment (dewatering) will take place indoors in a sludge treatment building which will also incorporate air extraction and air purifying plant. The primary and secondary sludges are to be pumped to a sludge thickening tank where the sludge is thickened to approximately 4% dry solids. This tank will also be covered and the air extracted and odour removed. The thickened sludge will then be dewatered in a dewatering machine housed in a building for that purpose. Finally, the end sludge product will be deposited in an enclosed skip for removal off site to the sludge treatment centre. This dewatered sludge will be odour free and will not cause an odour nuisance during transportation.

5.4.5 Odour Abatement

Odour abatement options start with process management to limit the production of odour at source. Remaining emissions to the atmosphere from industrial processes have traditionally been controlled by end-of-pipe abatement equipment and dispersion of the pollutants using a chimney of suitable height. Bio-filters are commonly used to treat odours from animal by-product rendering facilities, composting works, wastewater treatment plants, intensive livestock raising and a number of industrial facilities. Bio-filtration works on the principle of passing the waste gases into a space above or below a bed of organic material. As the gas passes through the filter, the odorants are retained on the filter material, mainly by absorption into the aqueous phase. The compounds are subsequently degraded by micro-organisms which reside on the organic material and can mutate and adapt to treat a wide variety of organic and inorganic compounds. A number of media can be used in bio-filters, the most common of which are soil, peat, compost and bark. The efficiency of soil bio-filters can be >99% and

that of peat/heather bio-filters >95%[2]. As well as reducing the odour emissions from a facility, bio-filtration also changes the hedonic tone of the odour emitted. This can be an important factor in cases where the odour of the untreated waste gases is particularly unpleasant.

In wastewater treatment plants, the principal potential sources of odours are:-

(a) Septic wastewater containing hydrogen sulphide on arrival at the plant. This will not occur if the sewer system is adequately designed and vented.

(b) Industrial waste discharging to the collection system, which, in the case of Skibbereen, is minimal.

(c) Unwashed grit and screening removals.

(d) Scum on settling tanks.

(e) Sludge thickening tanks if infrequently desludged.

(f) Infrequent desludging of settling tanks.

(g) Scum on walls of storm holding tanks.

In general, odour control is accomplished in a wastewater treatment plant by proper operation of the various processes to ensure that the wastewater is maintained in a fresh condition throughout the treatment system.

Where the need for odour control is required, chemical oxidation (chlorine and ozone), absorption or masking of the odours with chemical additives and aerosols is carried out. However, this type of odour control is generally not necessary in a properly maintained wastewater treatment plant.

5.4.6 Odour Controls at Skibbereen

This indicative design comprises the following treatment elements:-

- Covered inlet works comprising
  - 6mm fine screen with screenings, removal, washing and compaction
  - Grit trap with grit removal, washing and compaction
  - Measurement flume
  - Air extraction from the covered spaces and its treatment in biological filters to remove foul odours
- Primary Settlement comprising
  - 2No. 8m diameter radial flow primary settlement tanks
  - Tanks to be covered and the air extracted and treated in biological filters for odour removal.
- Aeration Basin based on a conventional activated sludge process using a plug-flow system. Aeration achieved using fine bubble diffused air system.
- Secondary Settlement / Clarification
- Sludge Thickening, Dewatering & Removal. Sludge thickened in a covered tank and the air extracted and odour removed.
- Tidal Holding and Effluent Discharge

5.4.7 Odour Modelling

The proposed facility is to be built as part of a Design Build Operate contract (DBO). In this form of contract the Contractor chooses the appropriate plant to meet the specified design criteria. Due to the DBO nature of the contract, the details of the plant at the planning stage are indicative only. When detailed design is available, an air dispersion modelling assessment of odour releases from the facility should be undertaken to ensure that the facility, as designed, will meet the odour compliance criteria. In the event that the modelling exercise indicates that compliance will not be achieved under the proposed design, a cost-effective abatement strategy should be formulated for the facility to ensure the criterion is achieved.

5.4.8 Mitigation Measures

Apart from the covering of the aforementioned elements of the treatment plant and the accompanying cleansing of the air extracted, it is also intended to surround the treatment plant with trees and shrubs which will cut down on aerosol transmission and so further protect the surrounding environment. A restriction of not in excess of 4 ou/m^3 at the nearest sensitive receptors as a 98th%ile will ensure that the facility will not cause an odour nuisance.

5.4.9 Residual Impacts

The wastewater treatment plant will be designed and operated in accordance with the above guidelines and therefore the standard laid down should be achievable within the economic confines of the Best Available Technology (BAT) principle.

5.4.10 Conclusion

Provided that the proposed wastewater treatment plant is designed and operated using best available technologies it should not have a significant impact on the environment with respect to odour emissions. Appropriate treatment facilities will be installed to remove all potentially offensive odour sources such that a limit of 4 ou/m^3 as a 98th%ile non-exceedance level is attained at the nearest sensitive receptors.

References

(1) Water Environment Federation, 1995. "Odour Control in Wastewater Treatment Plants"

(2) AEA Technology, 1994. "Odour Measurement and Control – An Update", M. Woodfield and D. Hall (Eds)

(3) Warren Spring Laboratory, 1980. "Odour Control – a concise guide", F.F.H. Valentine and A.A. North (Eds)

(4) C.R. Clarkson and T.H. Misselbrook, 1991. "Odour emissions from Broiler Chickens" in "Odour Emissions from Livestock Farming", Elsevier Applied Science Publishers London

(5) J.E. McGovern, C.R. Clarkson, 1994. in "The Development of Northumbrian Water Limited's Approach to Odour Abatement for Wastewater Facilities", Proceedings of Symposium on Odour Control and Prevention in the Water Industry

(6) CH2M Beca Ltd, 2000 "Analysis of Options For Odour Evaluation For Industrial & Trade Processes" Prepared for Auckland Regional Council

(7) EPA & OdourNet UK, 2000 "Odour Impacts and Odour Emission Control Measures for Intensive Agriculture"

(8) Environment Agency (2002) IPPC Draft Horizontal Guidance for Odour Part 1- Regulation and Permitting.

(9) Environment Agency (2002) IPPC Draft Horizontal Guidance for Odour Part 2 – Assessment and Control.

5.5 CLIMATE

5.5.1 Introduction

The potential impacts on climate with respect to the proposed scheme relate to emissions associated with the various process options.

5.5.2 Energy Requirements

Approximately 94% of Ireland's electricity requirements are supplied by fossil fuels. Therefore any imported energy required to operate the wastewater treatment plant will contribute directly to an increase in greenhouse gas emissions. From an environmental viewpoint, treatment processes that have comparatively lower energy requirements can be considered to have a lesser effect on global warming.

5.5.3 Greenhouse Gas Emissions from Digestion of Waste

The natural carbon cycle involves plants absorbing gases from the atmosphere most notably CO_2 and converting these compounds into biomass. Some of this biomass is then either consumed directly or indirectly by humans. This portion of carbon is then excreted as waste in the form of various carbon compounds.

Without treatment, waste degrades naturally either aerobically or anaerobically. Aerobic degradation will produce principally CO_2 with some minor gas compounds. Anaerobic digestion will produce principally CO_2 and Methane Gas. Methane may then oxidise to CO_2 or rise into the atmosphere. Therefore, if more methane molecules are produced (as in a purely natural process) the greenhouse gas effect is increased. With aerobic degradation, the overall process from photosynthesis to degradation is CO_2 and greenhouse gad emission neutral.

The natural degradation of the waste can be accelerated and controlled by the use of a wastewater treatment plant. The net effect of proposed aerobic treatment option in the production of CO_2 over natural aerobic degradation is zero. However, greenhouse gases (methane) would be generated from an anaerobic treatment design option and if released to the atmosphere, could be considered to add to the global production of greenhouse gases (though at a very minor scale). However, this increase in greenhouse gas emissions could be counteracted through the design of an energy efficient treatment plant such as one that uses these gases to generate energy on site to supplement the energy requirements of the treatment facility.