BALLINA MAIN DRAINAGE SCHEME

ENVIRONMENTAL IMPACT STATEMENT
FOR EXTENSION
OF THE
EXISTING WASTEWATER TREATMENT PLANT
TO TREAT INDUSTRIAL EFFLUENT
FROM THE
PROPOSED COCA-COLA PRODUCTION FACILITY

August 1998
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1. INTRODUCTION

1.1 BACKGROUND

This Environmental Impact Statement for the Ballina Main Drainage Scheme has been prepared for Mayo County Council in accordance with the provisions of:

(a) The European Communities (Environmental Impact Assessment) Regulations 1989 (S.I. 349 of 1989) referred to as the "Environmental Impact Assessment Regulations"; These Regulations provide for the incorporation into Irish law, in respect of relevant developments other than motorways, of EU Directive on the assessment of the effects of certain public and private projects on the environment; and

(b) Local Government (Planning and Development) Regulations (S.I. 86 of 1994).

Part IX of the Local Government (Planning and Development) Regulations deals with the Environmental Impact Assessment of Certain Developments by or on behalf of Local Authorities.

In particular, Article 116 of the Regulations states:

"116. Where development proposed to be carried out by or on behalf of a local authority is of a class for the time being specified under Article 24 of the Environmental Impact Assessment Regulations, or under any provision amending or replacing the said Article 24, the local authority shall cause an environmental impact statement to be prepared in respect of that development."

Article 24 of the Environmental Impact Assessment Regulations specifies the developments which are subject to an Environmental Impact Assessment.

This includes by virtue of 11(d) of Part II of the First Schedule of the Regulations the following:

"Wastewater Treatment Plants with a capacity greater than 10,000 population equivalent".

The EU Directive on Environmental Impact Assessment refers to the duties of the "Developer" and the "Competent Authority". For the purposes of this project, the "Developer" is Mayo County Council and the

Ryan Hanley & company, consulting engineers.
"Competent Authority" is the Minister for the Environment by virtue of the Planning Regulations (SI No. 86 of 1994).

The proposed works will involve an extension to the existing Ballina municipal wastewater treatment works in the form of a separate treatment process stream to treat industrial effluent volumes from the proposed Coca-Cola production facility. This new treatment process stream will cater for industrial discharges with an equivalent population ranging from 17450-27,800 persons and accordingly is subject to an Environmental Impact Assessment under the above Regulations.

Ryan Hanley & Company was instructed by Mayo County Council by letter dated the 15th March 1998 to prepare an Environmental Impact Statement for the scheme.

Ryan Hanley & Company prepared this Environmental Impact Statement with assistance from a number of specialists as follows:

- T.M.S Consultancy Ltd carried out an Environmental Impact Study on air including noise and odour aspects.
- Irish Hydrodata Ltd carried out a bathymetric and drogue tracking survey of the Moy Estuary as a precursor to simulation modelling of treated effluent discharges to the river and their dispersion and diffusion in tidal river waters. Also the likely impact of nutrients in treated effluent discharges were evaluated.
- Aqua-Fact International Services Ltd carried out an Environmental Impact Study on ecology.
- Tom Smyth of Quinn Savage Smyth Architects carried out an Environmental Impact Study on landscape character and visual impacts.
- Gerry Walsh, Archaeologist carried out an Environmental Impact Study on Archaeology.

1.2 STRUCTURE
In preparing the Environmental Impact Statement reference was made to the "Draft Guidelines on the Information to be contained in Environmental Impact Statements" and "Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)" published by the Environmental Protection Agency in 1995. The statement is prepared in accordance with the "Grouped Format Structure" whereby each of the environmental factors is considered as a single topic. Each of the environmental factors is considered in terms of (a) the existing environment (b) the impacts of the project and (c) mitigation.
measures.

Table 1.1 shows where each of the topics set out in the Second Schedule of the Environmental Impact Assessment Regulations is dealt with in the report.

**TABLE 1.1 TOPIC LAYOUT**

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>RELEVANT SECTION OF REPORT</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Beings</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Flora</td>
<td>3.2</td>
<td>Included under Ecology</td>
</tr>
<tr>
<td>Fauna</td>
<td>3.2</td>
<td>Included under Ecology</td>
</tr>
<tr>
<td>Soil</td>
<td>3.3</td>
<td>Deals with Soils and Geology</td>
</tr>
<tr>
<td>Water</td>
<td>3.4</td>
<td>Deals with Freshwater and Marine water.</td>
</tr>
<tr>
<td>Air</td>
<td>3.5</td>
<td>Deals with Odours, Dust and Noise</td>
</tr>
<tr>
<td>Climate</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>The Landscape</td>
<td>3.7</td>
<td>Deals with Landscape Character and Visual Impacts</td>
</tr>
<tr>
<td>The Interaction of the Foregoing</td>
<td>3.10</td>
<td></td>
</tr>
<tr>
<td>Material Assets</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>3.8</td>
<td>Deals with Archaeology</td>
</tr>
</tbody>
</table>

The report prepared by the various specialists referred to in Section 1.1 are included in Appendices 4 to 8.
2. DESCRIPTION OF THE PROPOSED PROJECT

2.1 DEVELOPMENT OF EXISTING DRAINAGE SCHEME

Ballina, located in the north-east of County Mayo, has a population of 8167 persons residing within the town and its environs. Drawing no 1 is an extract from the map of Ireland and Drawing No 2 shows the location of Ballina in the north coast of Co. Mayo in relation to the existing road network.

Stage 1 of Ballina Main Drainage Scheme was constructed in 1982/83 and includes the existing wastewater treatment works, which was officially opened in May 1984.

The treatment works is a conventional aeration plant which effects secondary treatment and discharge of treated effluent to a tidal stretch of the River Moy, just south of the landmark locally known as the Icehouse. Facilities for sludge thickening and sludge dewatering are also provided within the site.

2.2 THE EXISTING WASTEWATER TREATMENT WORKS SITE

The planning, design and construction of the existing wastewater treatment works predated the E.C. (Environmental Impact Assessment) Regulations 1989.

The area of the existing fenced wastewater treatment works site is 2.43 hectares. The location of the existing works at Belleek is shown relative to the town on Drawing no. 3. The two optional access roadways from the town to the existing works are shown thereon.

A layout of the existing tanks and buildings within the works site is detailed on Drawing no.4. The proposed extension to the wastewater treatment works will be contained within the extent of this existing fenced treatment plant. The existing wastewater treatment works was designed for a population equivalent of 20,000 persons. The population equivalent now contributing to the existing plant is approximately 13,000.
The proposed project to treat industrial effluent from Coca-Cola will not utilise the spare capacity within the existing wastewater treatment plant. New process units will be provided to treat the expected influent loads from Coca-Cola Ltd. Treated effluent from the industrial process and from the existing municipal treatment plant will be combined for discharge to the River Moy.

2.3 DESCRIPTION OF THE PROPOSED WORKS

1. Characteristics of influent to the proposed Industrial Treatment Plant

The proposed development will involve the construction of additional wastewater treatment units within the existing site at Belleek.

The design loadings for the proposed new treatment units are set out in the following Table 2.1 in accordance with information furnished to Mayo County Council by the Coca-Cola Company.

Table 2.1. Ballina Main Drainage Scheme - Industrial Effluent Treatment Plant

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>DESIGN LOADING</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average hydraulic load (Phase 1)</td>
<td>716</td>
<td>m³/day</td>
</tr>
<tr>
<td>Normal max. hydraulic load (Phase 1)</td>
<td>1074</td>
<td>m³/day</td>
</tr>
<tr>
<td>Future max. hydraulic load (Phase 2)</td>
<td>1766</td>
<td>m³/day</td>
</tr>
<tr>
<td>BOD load</td>
<td>975</td>
<td>mg/l</td>
</tr>
<tr>
<td>Average daily BOD load (Phase 1)</td>
<td>698</td>
<td>kg/day</td>
</tr>
<tr>
<td>Normal max. daily BOD load (Phase 1)</td>
<td>1047</td>
<td>kg/day</td>
</tr>
<tr>
<td>Future max. daily BOD load (Phase 2)</td>
<td>1722</td>
<td>kg/day</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>800</td>
<td>mg/l</td>
</tr>
<tr>
<td>Average daily SS load (Phase 1)</td>
<td>573</td>
<td>kg/day</td>
</tr>
<tr>
<td>Normal max. SS load (Phase 1)</td>
<td>859</td>
<td>kg/day</td>
</tr>
<tr>
<td>Future max. daily load (Phase 2)</td>
<td>1413</td>
<td>kg/day</td>
</tr>
<tr>
<td>pH</td>
<td>6.5 - 8.5</td>
<td></td>
</tr>
<tr>
<td>Phosphorous</td>
<td>50</td>
<td>mg/l</td>
</tr>
<tr>
<td>Nitrates</td>
<td>5-10</td>
<td>mg/l</td>
</tr>
</tbody>
</table>
The waste discharges will be generated within the works on the basis of 2 No. 8 hour shifts per day, 5 days per week. Balancing/mixing tanks and pH correction equipment within the Coca-Cola site will provide partial treatment prior to discharge to the municipal wastewater treatment works.

2. Treatment Standards

The standard of treated effluent to be discharged from the proposed extension of the existing municipal works is largely determined by establishment of the existing environment and by consideration of the following relevant EU Directives and the national regulations implementing these directives.

- **Surface Water Directive** 75/440/EEC
- **Freshwater Fish Directive** 78/659/EEC
- **Urban Wastewater Treatment** 91/271/EEC

The EC Directive - Urban Waste Water Directive (91/271/EEC) requires that the proposed treatment process shall be capable of producing an effluent with a BOD not exceeding 25mg/l and suspended solids not exceeding 35 mg/l with percentage reduction of 70-90% in BOD.

Mayo County Council also proposes to incorporate equipment to effect a 90% reduction in the phosphorous levels of discharges from Coca-Cola to the proposed treatment process. The process will also include plant and equipment to reduce levels of nitrates in the untreated effluent by 80% prior to discharge of treated effluent from the proposed works to the River Moy.

3. Process for the treatment of industrial influent from Coca-Cola Ltd

The planned construction and commissioning of this industrial process will be phased. Initially process tanks and equipment will be provided under Phase 1 for the normal maximum hydraulic load of 1074m³/day. Space adjacent to the process tanks will be retained for the future addition of further tanks in Phase 2 to treat industrial effluent volumes up to the future maximum hydraulic load.
Sludges generated by the proposed industrial process will be treated in conjunction with municipal plant sludges by plant to be installed as part of a future upgrade of municipal works. The position of the proposed industrial treatment units within the site is shown on Drawing no. 6, relative to the existing municipal works. Sections through the proposed process tanks are included on Drawing No. 7.

The proposed industrial treatment process is based on the conventional aeration process with modifications to include facilities for the reduction of phosphorous and nitrogen.

A process and instrumentation diagram for the proposed treatment of Coca-Cola industrial influent is shown in schematic form on Drawing No.5.

Waste discharges from Coca-Cola Ltd will be pumped to the preliminary works of the proposed industrial plant. From there influent will flow via the anoxic tank and the first stage aeration tank to the intermediate setting tanks. Supernatant from the top of this intermediate setting tank will be discharged to a pumping station from which it will be pumped to the second stage aeration tank. After second stage aeration discharge will flow through the second stage settling tank. Effluent from the second stage settling tank will be combined with the treated effluent from the municipal process units and discharged from the treatment works site via a new outfall pipe to be laid into the River Moy for a distance of 40 metres.

Sludge settling in the central hopper of the intermediate and final settling tanks will be returned on a continuous basis to the anoxic tank. In addition sludge will be periodically wasted to a sludge thickener. Supernatant from the sludge thickener will be routed back to the head of the industrial treatment works.

Nitrogen reduction will be achieved by use of pumps which will return effluent from the clarified effluent pumping chamber to the anoxic zone. This recirculation of nitrified effluent in conjunction with fresh influent, returned sludge solids and low dissolved oxygen conditions within the anoxic tank will result in the reduction of nitrogen in the final effluent to be discharged to the River Moy.

The reduction of phosphates in the influent to the plant will be achieved by addition of a coagulant chemical such as ferric sulphate to precipitate phosphorous compounds from the treated effluent.
Indicative sizes of various tanks, chambers, and buildings are included in Table 2.2 below.

Table 2.2  Ballina Main Drainage Scheme - Industrial influent Treatment Process
Scale of Tanks, Chambers and Building

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>NO. OF UNITS</th>
<th>LENGTH</th>
<th>WIDTH</th>
<th>DEPTH</th>
<th>HEIGHT OVER FINISHED GROUND LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>Preliminary Works</td>
<td>1</td>
<td>8,000</td>
<td>1,650</td>
<td>1,100</td>
<td>1050</td>
</tr>
<tr>
<td>Anoxic Tank</td>
<td>1</td>
<td>3,000</td>
<td>3,000</td>
<td>2,500</td>
<td>1,050</td>
</tr>
<tr>
<td>1st Stage Aeration Tank</td>
<td>1</td>
<td>16,800</td>
<td>4,000</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Intermediate Settling Tank</td>
<td>1</td>
<td>8,100</td>
<td>5,000</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Supernatant Pumping</td>
<td>1</td>
<td>6,000</td>
<td>6,000</td>
<td>3,400</td>
<td>1,200</td>
</tr>
<tr>
<td>2nd Stage Aeration Tank</td>
<td>1</td>
<td>9,400</td>
<td>-</td>
<td>2,950</td>
<td></td>
</tr>
<tr>
<td>Final Settling Tank</td>
<td>1</td>
<td>8,100</td>
<td>5,000</td>
<td>2,700</td>
<td></td>
</tr>
<tr>
<td>Final Effluent Flume</td>
<td>1</td>
<td>4,400</td>
<td>1,650</td>
<td>1,100</td>
<td>1,050</td>
</tr>
<tr>
<td>Sludge Thickener</td>
<td>1</td>
<td>10,000</td>
<td>4,000</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td>Process Building</td>
<td>1</td>
<td>10,000</td>
<td>7,000</td>
<td>-</td>
<td>4,500</td>
</tr>
</tbody>
</table>

3. Description of process units

The description of the various tanks, pumping stations and process units is based on the feasibility report proposals for the project and is intended to give an indication of the scale of the proposed plant.

There may be some changes to the process and to dimensions of the various elements when detailing the works at the Contract Document stage of the project.
i. Preliminary Works

This will comprise a concrete structure, which is rectangular in shape and will incorporate a number of items of mechanical plant and instrumentation, one of which will extend above the top of the wall of the structure namely:

- An influent sampling unit which will be mounted on top of the peripheral wall of the structure and which will consist of a glass reinforced plastic cabinet to house the containers for sampled industrial influent.

Instrumentation included in the preliminary works will include an instrument to measure flow rates of influent through the process and an instrument to monitor the pH level of industrial influent discharges.

Due to the nature and characteristics of discharges notified by Coca-Cola, as set out in sub-clause 1 above, equipment for the screening of influent to the proposed works is not proposed at this time.

ii Anoxic Tank

This tank will comprise a square reinforced concrete tank into which discharges from the following will flow:

- Pumped influent from the Coca-Cola production facility.
- Returned activated sludge pumped from the settling tanks
- Returned nitrified effluent pumped from the clarified effluent pumping station

These combined inflows will be gently mixed within the tank in low dissolved oxygen conditions.

iii First Stage Aeration Tank
This is the initial stage in the aeration treatment process and involves the biological oxidation of the industrial influent. The tank will be an open precast concrete structure with the top of the wall standing approximately 4 metres above finished ground levels. Oxygen input will be by the diffused air process rather than the more usual surface aerators. The diffused air process has a number of advantages, including the fact that it is more energy efficient, that noise levels are lower and that the impact of aerosols is considerably reduced. This will require a pipe manifold system on the base of the tank complete with diffusers. Air will be fed to this pipeline system by means of an air blower. The air blowers will be housed in a room in the air plant/ ferric dosing building. The tank may also incorporate a mixer to keep solids in suspension.

**Intermediate Settling Tank**

The settling tank will be of precast concrete construction. The top of the wall of the tank will generally be 4.0m above finished ground levels. The tank will incorporate a rotating bridge scraper, which will concentrate the sludge in the central hopper of the tanks. Effluent from this tank will overflow a peripheral weir from which flows will be discharged to the wet well of the clarified effluent pumping station.

**Clarified Effluent Pump Sump**

This will incorporate a concrete underground sump with two compartments, a wet well and a valve chamber. The wet well will house 4 no. Sewage pumps, 2 no. Pumps (1 duty, 1 standby) to return nitrified supernatant from the Aeration Tank to the Anoxic Tank and 2 no. Pumps (1 duty, 1 standby) to pump clarified effluent to the second stage Aeration Tank.

**Second Stage Aeration Tank**

This is the second stage in the aeration treatment process and involves the further biological oxidation of the industrial influent. The tank will be a precast concrete structure with the top of the wall standing approximately 2.6 metres above finished ground levels. Oxygen input will be by the diffused air process using the air blowers housed in the adjacent building.
Final Settling Tank

The settling tank will be of precast concrete construction. The top of the wall of the tank will generally be 2.3m above finished ground levels. The tank will incorporate a rotating bridge scraper, which will concentrate the sludge in the central hopper of the tanks.

Sludge Pump Sump

This structure will incorporate a concrete underground sump with two compartments, a wet well and a valve chamber. The wet well will house 4 no. Sewage pumps, 2 no. Pumps (1 duty, 1 standby) to pump return activated sludge to the anoxic tank and 2 no. Pumps (1 duty, 1 standby) to pump excess/waste sludge to the sludge-thickening tank.

Sludge Thickening Tank

This structure will be a circular precast concrete tank in plan with a conical base. Waste sludge will be pumped from the pump sump to this thickening tank and allowed to settle. The supernatant, or clear liquid at the top of the tank, will be decanted and returned to the anoxic tank. The thickened sludge at the base of the tank will be drawn off and pumped to the existing sludge dewatering plant and to future sludge treatment plant to be constructed as a further extension to the municipal plant.

Industrial Treatment Process Building

The building will incorporate a steel portal frame structure, blockwork construction to a height of 2.4 metres and a pitched roof above that level, constructed of insulated steel cladding panels. The exterior finish will be rendered blockwork or Forticrete blockwork finish.

The Industrial Treatment Process Building will include a number of areas as follows:

- Entrance lobby
- Air plant room, which will accommodate two air blowers for the pumping of air to the pipe, manifolds along the bases of the aeration tanks.
Ballina Main Drainage Scheme  Environmental Impact Statement for treatment of industrial effluent from Coca-Cola Ltd

- Control room incorporating control panels and control equipment
- Day tanks and dosing pumps for the addition of a coagulant chemical such as ferric sulphate to facilitate the precipitation of phosphorous from the final treated effluent

An open reinforced concrete storage tank will be constructed immediately adjacent to the Industrial Treatment Process Building to contain the bulk storage tanks for the coagulant chemical. The quantity of chemical to be used each day in the process will be transferred by pump from these tanks to the day tanks located internally within the adjacent building. No drains will be provided within these storage bunds whose volume will be designed to totally retain the maximum possible accidental spillage of chemical. The internal surfaces of this concrete bund tank will be coated with a specialist coating of epoxy resin to protect the concrete in the unlikely event of a spillage.

Final Effluent Flume

This will incorporate an underground concrete structure, rectangular in plan, and with a surrounding handrail. This flume will measure the flow of final effluent from the works and will be used for sampling the final effluent. The sampling unit will be mounted on top of the peripheral wall of the structure and will consist of a glass reinforced plastic cabinet to house the containers for sampled industrial influent.

Effluent Outfall Pipe

It is proposed to lay a new 560mm diameter outfall pipe in the bed of the River Moy for a distance of 40 metres to replace the existing 300mm diameter outfall pipe from the existing wastewater treatment plant. The new outfall pipe will discharge combined treated effluent from industrial and municipal treatment processes via a number of diffusion ports along the bed of the river Moy. The new outfall will be located immediately upstream of the existing outfall, which now discharges, treated effluent at the bank of the river.

The width of the River Moy at the existing and proposed outfall points is approximately 110m. The Hydrographic survey of flow conditions in the river and dispersion modelling of the Moy...
Estuary (included in Appendix 5) concludes that a new outfall, as proposed, would enhance the assimilation of both existing and proposed treated effluent volumes into the river.

**Handrails**

In general, walls of tanks will be over 1000mm above finished ground level and so avoid the need for handrailing at the perimeter of the various tanks. However, there will be a number of places as follows in the proposed treatment works where handrailing will be required:

- At the Preliminary units.
- Along the top of the retaining wall between the Anoxic Tank and the first stage Aeration Tank
- Along the access walkways, which traverse the centres of the Aeration Tanks and Settling Tanks.
- Along the access bridge across the Sludge Thickener
- At the perimeter of the final effluent flume.

**Site Development**

Site development work associated with the proposed industrial treatment units will include the following:

- Interconnecting pipework to link the various tanks and chambers. The pipework will be located underground for the most part except at the entry/exit points of some of the tanks.
- There will be slight alterations to the existing concrete circulation road (4 - 5 metres wide) within the existing treatment works site to provide access to the various units.
- There will be underground ducts for electrical and signal cables and watermains.
- On completion of construction further landscaping will be provided to lands within the site boundary in the vicinity of the proposed works.
- A number of lighting columns will be erected adjacent to the proposed industrial process units and Process Building.
4. Sludge Treatment and Disposal

In 1993 a report entitled "Sludge Study on Options for the Treatment and Disposal of Sewage Sludge in Ireland" was prepared for the Dept of the Environment to formulate proposals for the treatment of sewage sludges countrywide.

The main recommendations of the Study for Region 6, which relates to the Ballina Main Drainage Scheme, are as follows:

- A regional sludge treatment centre is proposed at the Ballina municipal wastewater treatment works for the treatment of sewage sludges from North County Mayo and West County Sligo including sludges generated within the towns of Ballina, Crossmolina, Tubbercurry, Foxford and Belmullet.

- The sludge treatment system proposed is a process called thermophilic aerobic digestion prior to sludge reuse on lands.

These proposals for sludge treatment at the Ballina wastewater treatment works do not form part of the present proposals and as such are not covered by this Environmental Impact Statement.

It is proposed however that this sludge treatment plant to be provided as a future extension to the municipal works will treat sludges generated by the proposed industrial treatment process in the future. Until this sludge treatment plant is commissioned it is proposed that sludges thickened in the proposed thickening tank will be dewatered and disposed with the existing volume of municipal sludge produced daily.

Estimation of the likely additional volumes of sludges to be generated by the proposed treatment of Coca-Cola industrial effluent indicates the transport of an additional trailer of dewatered sludge per day from the site.
2.4. CONSIDERATION OF ALTERNATIVES

1. Siting of proposed process tanks and structures

The location of the existing municipal wastewater treatment works relative to the proposed Coca-Cola production facility is set out on Drawing no. 6.

The site of the existing works was deemed to be the best location for the biological treatment process to treat industrial effluent from Coca-Cola, for the following reasons:

- The fenced land take for the existing wastewater treatment works is sufficiently large to permit the location of the proposed and future process tanks within the site.
- The existing works is located between the proposed production facility and the River Moy.
- The topography of the existing wastewater treatment works and the existence of mature trees surrounding the site provide a visually secluded site for the industrial process tanks. If located at the Coca-Cola site, mitigation of visual impact would have to await the maturing of landscaping surrounding the proposed Coca-Cola plant.
- Future plans to locate a major sludge treatment plant elsewhere within the existing site will provide for future treatment of sludge generated by the proposed process without road transport or sludge pumping.
- Monitoring and control of effluent discharged to the River Moy will be carried out by Mayo Council.

2. Alternative factors considered in design

It is expected that that a degree of colour will persist in the treated effluent, even after biological treatment of Coca-Cola industrial effluent.

In formulating proposals for the treatment of Coca-Cola industrial effluent, consideration was given to the provision of plant and equipment to reduce the anticipated colour content of the effluent. The additional process to effect this colour removal would involve the following:

- Addition of large doses of a chemical called Sodium Hypochlorite to bleach the colour followed by the dosage of Sulphur Dioxide to remove the chlorine residual remaining in the water.

It was decided not to provide this additional colour removal process for the following reasons.
Aquatic toxicity testing of the colour content of treated effluent, as discussed in Appendix 6, indicate that it will not have a discernible impact on the fauna of the River Moy.

It is known that chlorine levels in river water above 0.5 parts per million can be harmful to fish life. The colour removal process would involve the storage and dosing of large volumes of the aforementioned chlorine chemical.

The effect of accidental spillages or equipment malfunction was not sustainable in view of the importance of the fishery which is the River Moy. In any case, the low toxicity of effluent colour and the large assimilative capacity of the Moy, even at low flows, dictates that the omission of the colour removal process was the more environmentally friendly solution. In order to optimise the dispersion of the effluent in the river, it was decided to include a new outfall pipe along the bed of the river for 40 metres in accordance with the specialist study included in Appendix no 5.

2.5 CONSTRUCTION OF THE PROJECT

Construction of the industrial wastewater treatment works and outfall pipeline will involve a medium scale civil engineering project of 3-6 months duration.

1. Land Use Requirement

The construction stage of the works will involve a land use requirement separate from that required for the permanent works:

- The Contractor appointed to carry out the construction works will be required to set up a site compound in the general vicinity of the existing wastewater treatment works site for purpose of parking, offices, canteen and storage of materials.
- The Contractor may use existing access routes to the existing municipal wastewater treatment works in order to facilitate transport of materials to the site of the proposed works and removal of surplus material therefrom.
- Construction of the works will result in surplus soil from excavation for tanks, pipelines, etc. The Contractor will be responsible for making arrangements for disposal of such surplus material.
2. Proposed Construction Works

At the commencement of the construction of the works the Contractor will prepare a programme for the execution of the works to take account of:

- Time allowed under the contract to complete the works.
- Any constraints on the programme under the terms of the Contract.
- Time of year at which works commences.

Table 2.3 below gives an estimate of the duration of construction works for each of the elements of the project expressed as a percentage of the overall Contract period.

<table>
<thead>
<tr>
<th>Project Element</th>
<th>Duration as a Percentage of Contract Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering Works</td>
<td>100%</td>
</tr>
<tr>
<td>Delivery and Assembly of Process Tanks</td>
<td>40%</td>
</tr>
<tr>
<td>Mechanical and Electrical Installation</td>
<td>40%</td>
</tr>
<tr>
<td>Construction of Outfall Pipeline</td>
<td>25%</td>
</tr>
<tr>
<td>Mechanical and Electrical Commission</td>
<td>20%</td>
</tr>
</tbody>
</table>

The major temporary features associated with the construction of the works are:

Wastewater Treatment Works: Track excavators, pumps, dump trucks, crane, and stockpile, site compound, scaffolding and formwork.

Outfall pipe: As for wastewater treatment works but on a smaller scale and shorter duration.

3. Significant Effects