

MONAGHAN COUNTY COUNCIL
COMHAIRLE CHONTAE MHUINEACHÁIN



**EXPANSION OF CARRICKMACROSS WASTEWATER
TREATMENT PLANT**

ENVIRONMENTAL IMPACT STATEMENT



March 2006



Environmental Impact Statement

On Proposed

Expansion of the Wastewater Treatment Works

at

Carrickmacross, Co. Monaghan

For

Monaghan County Council

T J O'Connor & Associates

Consulting Engineers

March 2006

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1 NON TECHNICAL SUMMARY

1.1 Preamble

Monaghan County Council propose to extend the existing wastewater treatment works to treat wastewaters from both domestic and industrial sources in Carrickmacross Town and its environs. The existing wastewater treatment works is operating above its design capacity and the proposed extension is required to provide additional capacity to cater for the existing loads and for the future loads expected to arise as the town continues to expand.

The existing wastewater treatment plant is located at a site adjacent to the Ardee Road in Carrickmacross town and has a nominal design capacity to treat flows from a population equivalent of 12,150. Wastewater treatment capacity is usually defined in terms of Population Equivalent (PE) where one PE represents the pollutant load associated with a single person. Estimates of the load currently arriving at the works suggest that the average daily load corresponds to 23,000 PE with peak loads exceeding 43,000 PE arising on occasion. The difference between the population of Carrickmacross (some 4,500 people including environs) and the loads referred to above is accounted for by discharges from industry, commercial premises, shops, schools and other sources, excluding dwellings, which are collectively referred to as non-domestic discharges. Although the nominal capacity of the existing plant is only 12,150 PE as described above, the plant operators continue to treat the wastewater to the required standards by availing of a certain amount of redundancy in the original plant design, some temporary improvement works and the fact that most of the wastewater is of industrial origin. It is now clear however that with further increases in both the domestic population and non domestic discharges as provided for in the development plans for the town and its environs, the plant capacity will need to be increased to 44,000 PE to cater for the longer term development of the town.

The wastewater treatment process will continue to be to a tertiary standard and will result in a substantial reduction in the polluting capacity of the raw sewage. Since 1994, and well in advance of the statutory requirements, the process also achieves a reduction in the phosphorus concentration of the treated effluent. This reduction is in accordance with the requirements for the treatment of urban wastewater as outlined in S.I. No. 254 of June 2001. This requires that the effluent from the WWTW incorporates phosphorous reduction

to a specified efficiency by no later than December 2008. The treated effluent is then discharged via an outfall pipe to the Proules River.

An environmental impact assessment has been completed for the proposed expansion to the wastewater treatment works at Carrickmacross. In this study, the likely impacts of the proposed development on the environment have been systematically and comprehensively examined and suitable measures to limit, to an acceptable level, the effects of any negative impacts have been identified.

This report presents the findings of the Environmental Impact Assessment process. The non-technical summary presents the results of the study in a condensed form. It will be made available to the public, for a period of six weeks, so that any person, if they so wish, may make submissions and observations in relation to the effects of the proposed development on the environment.

1.2 The Need for Additional Wastewater Treatment Capacity

The Urban Wastewater Treatment Directive, enacted under Irish law, requires that wastewater from all towns with populations greater than 10,000 discharging to specified waters, including the River Proules, must be subject to secondary treatment or a similar level of treatment by the 31st of December, 2005. These regulations additionally require that the total phosphorus concentration in the treated effluent should not exceed 2 parts per million by weight (2 mg/l). At the time of writing, wastewaters arising in Carrickmacross have been subject to secondary treatment for more than 30 years and in accordance with the regulations a phosphorus reduction stage was installed and became operational during the early nineties. These regulations continue to have legislative effect so that anticipated increased loading of the works associated with the expansion of the town must be treated to the same standard. The existing plant with a design capacity of 12,150 PE is already overloaded and this situation will be exacerbated as more developments are connected to the wastewater collection system in Carrickmacross. A study of the wastewater needs of the town based on a complete take up of zoned lands both within and outside the town council boundary suggests a longer term requirement for a plant of 44,000 PE and upgrading of the existing plant to this capacity is the subject of this Environmental Impact Statement (E.I.S.).

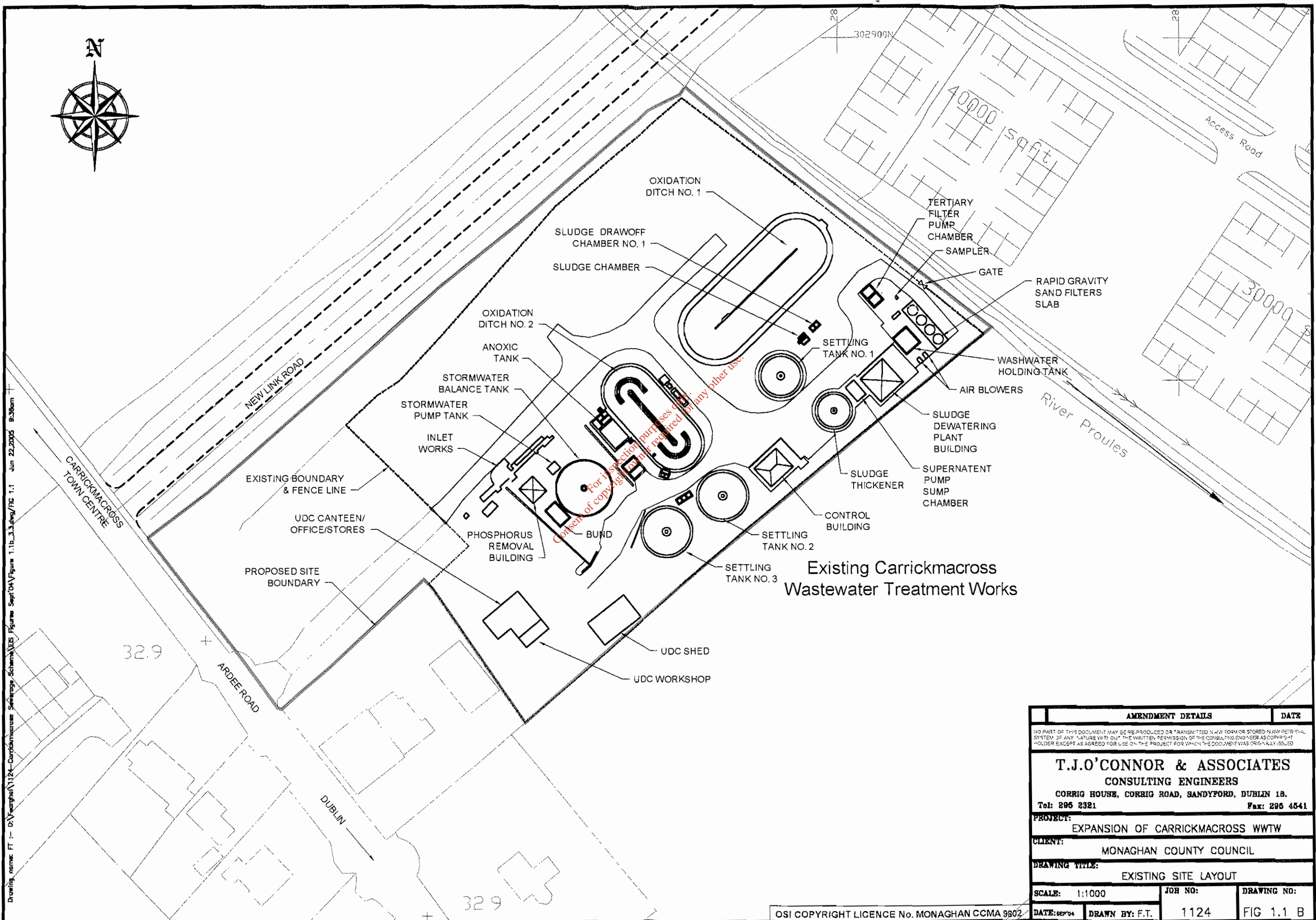


LOCATION OF EXISTING WASTEWATER TREATMENT WORKS

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CLIENT: MONAGHAN COUNTY COUNCIL		
DRAWING TITLE: AERIAL VIEW OF SITE LOCATION		
SCALE: NTS	JOB NO: 1124	DRAWING NO: FIG 1.1 A
DATE: SEP-04	DRAWN BY: F.T.	

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Drawing name: FT - D:\Projects\124-Carrickmacross Sewerage Scheme\ES Figures Sep'04\Figures 1.1b_3.3.dwg/FIG 1.1 Jun 22 2005 9:36am
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Existing Carrickmacross Wastewater Treatment Works

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1.3 The Proposal

It is proposed to construct an extension to the existing wastewater treatment works at the Ardee Road to cater for an ultimate PE of 44,000. This includes for pollution loads from both domestic and non-domestic sources, such as shops, hotels, restaurants and local industries. In accordance with the regulations, the WWTW will continue to treat flows arising to a tertiary standard, including Phosphorus removal. However, a much higher effluent standard will be required as part of the upgrading process.

Figure 1.1A shows the location of the treatment works in Carrickmacross and figure 1.1B shows the layout of the existing plant. The plant includes a screen to remove objects suspended in the flow that cannot be broken down in the treatment works. Removal of grit from the flow is also included to reduce the wear on moving parts such as scrapers and sludge pumps in the remainder of the WWTW. From the inlet works the flow is directed to an anoxic tank and thereafter to one of the aeration tanks. There are two aeration tanks in the Carrickmacross plant the second of which was constructed in 1998 as part of the expansion of the plant at that time. The older aeration tank dates from the original plant construction in the 1970s and includes horizontal rotors to agitate the wastewater and cause oxygen from the atmosphere to be dissolved into the effluent. In the newer tank, air compressors (blowers) are used to deliver pressurised air to diffusers on the floor of the aeration tank and these create fine bubbles which rise through the wastewater and impart oxygen. A large population of bacteria in the aeration tanks continuously consumes this oxygen in the wastewater. This allows the bacteria to absorb further nutrients from the flow.

Prior to entering the aeration tanks, the wastewater is mixed a high population of biomass (sludge) recirculated from the treatment process further downstream. The mixture is referred to as mixed liquor and since the early nineties, this liquor has been dosed with a chemical (ferric sulphate) that reacts with certain constituents in the wastewater, causing the formation of solid particles. This chemical dosing was introduced in 1994 to reduce phosphorous levels in the final effluent discharge, in response to worsening water quality in the Proules River as well as Lough Naglack and Moynalty Lough. Both of these lakes are downstream of the final effluent outfall. After the aeration tanks the flow is directed to one of three final settlement tanks. The final stage in the treatment of the wastewater at the existing Carrickmacross WWTW is sand filtration in which the settled effluent from the clarifiers is forced through a bed of sand to filter out and residual solids. Thereafter the final effluent is discharged to the Proules River.



Photograph 1.1 – Aeration tank at the Carrickmacross works

Procurement of the expansion to the works will be by means of a design, build and operate contract. This will allow tenderers to put forward their own design for meeting the specified discharge standards. Selection of a preferred design will be on the basis of a number of criteria including cost, compliance with relevant standards etc. and will be in accordance with the Department of the Environment, Heritage and Local Government (DoEHLG) Water Services guidelines for the evaluation of tenders. Only those tenders which can meet specified requirements in terms of final effluent discharge standards and other specified environmental standards (eg odour, noise) can be considered for acceptance.

Typical designs based on the above are shown in Figures 1.2A| and 1.2B below and are described in more detail in Section 3 of the main body of the report. However tenderers will be free to offer their own designs which may differ from that shown and described below. The typical designs shown may therefore be taken as indicative only of the type of plant layout that may ultimately be constructed. Tenderers are free to offer alternative designs/layouts provided the plant offered can meet the required final effluent standards, is consistent with this environmental impact statement and complies with any additional requirements set out by the local authority in the tender documents.



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River Proles

047/41/01

INDICATIVE TREATMENT PLANT LAYOUT ALTERNATIVE 2 :

KEY

- 1. INLET WORKS
- 2. STORM TANKS
- 3. ADMINISTRATION BUILDING
- 4. BLOWER BUILDING
- 5. FERRIC STORAGE / DOSING
- 6. OXIDATION DITCH
- 7. INLET PUMP STATION
- 8. MEMBRANE BUILDING
- 9. CONTROL BUILDING
- 10. SLUDGE TREATMENT FACILITIES
- 11. WEIGHBRIDGE
- 12. PICKETFEENCE THICKENERS
- 13. OUTFALL PUMPING STATION

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River Proles

NEW LINK ROAD

INDICATIVE TREATMENT PLANT LAYOUT ALTERNATIVE 2 :

KEY

- 1. INLET WORKS
- 2. STORM TANKS
- 3. ADMINISTRATION BUILDING
- 4. BLOWER BUILDING
- 5. FERRIC STORAGE / DOSING
- 6. OXIDATION DITCH
- 7. INLET PUMP STATION
- 8. MEMBRANE BUILDING
- 9. CONTROL BUILDING
- 10. SLUDGE TREATMENT FACILITIES
- 11. WEIGHBRIDGE
- 12. CLARIFIER TANK
- 13. PICKET FENCE THICKENERS
- 14. OUTFALL PUMPING STATION

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CLIENT: MONAGHAN COUNTY COUNCIL		
DRAWING TITLE: INDICATIVE TREATMENT PLANT LAYOUT ALTERNATIVE NO. 2		
SCALE: 1:500	JOB NO: 1124	DRAWING NO: FIG 1.2B
DATE: SEP04	DRAWN BY: F.T.	

Figure 1.2A shows an indicative design prepared for this EIS. The design is based on the replacement of the older aeration tank and the retention the 1998 aeration tank as described above. The mixed liquor from the aeration tanks would be directed to a membrane reactor. This reactor would comprise a tank to hold the mixed liquor from the aeration tanks. Banks of small diameter hollow tube membrane cassettes are immersed in the tank. These tubes would collectively measure several kilometres and are connected to the suction side of pumps which maintain a negative pressure (sucking action) across the tubes. The tubes act in a similar manner to a filter or strainer with solids above a particular size being retained on the external surface of the tube. However the effective pore size at (typically) less than one thousandth of a millimetre (1 micron) is much smaller than conventional strainers or mechanical filters. The tubes are manufactured from specially designed plastics which permit water to pass through the tube (membrane). This water, referred to as permeate, is of a particularly high quality and is almost completely free of solid (particulate and colloidal) matter. The removal of solid matter has a consequential impact on BOD as these solids have an associated BOD load. To prevent the pores of the membrane from clogging-up (fouling), coarse bubble air diffusers on the floor of the reactor are used to create a scouring action on the surface of the tubes and remove solids. Additionally flow reversal with permeate being directed outward from inside the tubes causes any solids lodged to be blown out into the mixed liquor. The concentration of solids in the mixed liquor is maintained at a high level and regulated by continuous withdrawal of sludge. This sludge is subsequently recirculated to the influent to the aeration tank. However a surplus of sludge is always generated and this is 'wasted' by being pumped to the holding tanks (Picket Fence Thickeners) for disposal.

Figure 1.2B shows an alternative design to 1.2A above in which a final settlement stage is retained and a membrane reactor used as an effluent polishing stage. This process would be as described above except that the mixed liquor from the aeration tanks would be directed to one of three secondary clarifier tanks. The proposal would allow for the retention of two of the existing three clarifiers and the construction of a new larger clarifier to serve the new aeration basin as proposed above. The clarifiers allow the bacterial growths developed in the aeration tank to settle to the floor of the tanks. The tanks are fitted with scrapers that continuously rotate about the centre of the tank, directing clumps of the bacterial growths (sludge) to a central hopper from where it is conveyed to a pumping station. A proportion of the sludge is recirculated to the aeration tanks and the remainder pumped to the sludge treatment. The final stage in the treatment of the wastewater under design is membrane filtration. This entails drawing the effluent from the

clarifiers through small diameter, hollow porous tubes which would be immersed in the settled effluent. A different (less expensive) type of membrane system could be used than proposed in Figure 1.2A to achieve the required standard of final effluent. The proposal would make greatest use of the existing tankage and would require a smaller tank for the immersion of the membrane cassettes. Either proposal would be capable of meeting the stringent final effluent discharge standards proposed.

As the final works layout cannot be specified at this stage the layout drawings shown should be taken as indicative only of the type of wastewater treatment plant to be constructed. The main elements of the indicative designs shown are as follows:-

- The present inlet works will be replaced by a new covered inlet works housing the inlet channels, storm overflow and preliminary treatment units.
- Additional stormwater holding tankage will be constructed.
- The existing No 1 aeration tank will be demolished and replaced with a new tank
- A membrane reactor will be provided in an enclosed building.
- A second sludge picket fence thickener will be constructed
- Air extraction and treatment systems will be provided to limit odours from the plant
- A new final clarifier may be constructed

The main parameters used to measure the efficiency of the treatment processes in removing the pollutant load from the wastewaters are:

The Biochemical Oxygen Demand (BOD), which is a measure of the amount of oxygen required to degrade or stabilize the organic pollutants in the wastewater, and

The Suspended Solids (SS) content, which is a measure of the amount of solid matter in the wastewaters.

The Total Phosphorous (TP) content, which is a measure of the amount of phosphorous in the wastewaters. For inland waterways and particularly lakes, phosphorous is associated with eutrophication in which aquatic organisms grow to an extent that they deplete the oxygen level and cause distress or death to fish and other aquatic organisms.

Typically, domestic sewage has a BOD of around 300mg/l, a SS of around 250mg/l and a TP of around 10 mg/l. Preliminary, secondary and tertiary treatment will achieve at least a

85-90% reduction in these levels, thereby complying with relevant EU legislation with regard to the treatment of urban wastewaters.

A schematic representation of a typical sewage treatment process is shown in Figure 1.3. The various stages of a typical wastewater treatment process may be described as follows:

1. The preliminary treatment process is essentially a physical process involving the removal of grit and screening of the wastewater to remove rags and coarse solids. These would cause mechanical damage and inhibit biological activity if allowed to progress to the primary and secondary treatment processes. The accumulated grit and screenings would be washed to limit the generation of malodours and then compacted for ease of disposal, generally to landfill. These units would normally be covered or housed in a building equipped with an odour control system. The sewage flow into the plant would be continuously monitored.
2. The secondary treatment stage incorporates biological and chemical treatment methods in different tanks. The biological treatment occurs in anaerobic and aeration basins where the primary effluent is retained in a micro-organism enriched environment. The dissolved and colloidal solid particles in the effluent are then converted to harmless substances (water, carbon dioxide, methane, etc.) through natural biological degradation or converted into cell matter. The aeration basin effluent is then passed to a clarifier where, possibly using chemical assistance, much of the remaining suspended solids including the cell matter referred to above, are settled out. The clarifier effluent represents a 90% reduction in the BOD, SS and pathogen levels when compared to the untreated wastewater.
3. The tertiary treatment stage is used as a polishing stage which further reduces the concentrations of BOD, SS, nutrients and pathogens. There is a wide variety of tertiary treatment processes such as sand filtration, membrane installations, reed beds and disinfection units.



Photograph 1.2 – Existing effluent polishing filters at Carrickmacross

There are two effluent streams from most wastewater treatment plants - *i.e.* the clarified water and the so-called “sludge” stream. It is intended that the Carrickmacross works will continue to dewater its own excess sludge and will also dewater the sludge from smaller wastewater treatment plants which are close to Carrickmacross. These imported sludges will be taken to the Carrickmacross works in tankers. This dewatered sludge will be transported off site for further treatment to allow the sludge to be re-used as a fertiliser in accordance with the County Monaghan Sludge Management Plan.

Safety measures at the wastewater treatment works are designed to provide a safe working environment for the plant’s operatives and to limit access to the site by unauthorized personnel. Generally all external equipment with moving parts would be capable of being shut down locally by means of emergency stop switches. A security fence and intruder alarm system will be installed as required.

Under the proposed indicative design, the treated wastewater would be discharged to the River Proules at the existing outfall pipe location at the boundary of the works.

The proposed expansion of the plant is to be constructed within the boundaries of the existing plant. The site is bounded to the north by a new link road to the Carrickmacross by-pass, to the west by the Ardee Road, to the east by the River Proules and to the south

WASTE WATER IS A MIXTURE OF DOMESTIC AND INDUSTRIAL WASTE AND RAIN. WHEN TREATED IT GOES THROUGH THE FOLLOWING PROCESS.

① THE WASTE WATER IS PASSED THROUGH SCREENS TO REMOVE SOLID OBJECTS, SUCH AS RAGS, PIECES OF WOOD AND PLASTICS.

② IT THEN TRAVELS THROUGH SPECIALLY-DESIGNED CHANNELS THAT CONTROL THE RATE OF FLOW, ALLOWING ANY GRIT TO SETTLE. THE GRIT IS THEN REMOVED AND WASHED FOR DISPOSAL OFF-SITE TO LICENSED TIPS.

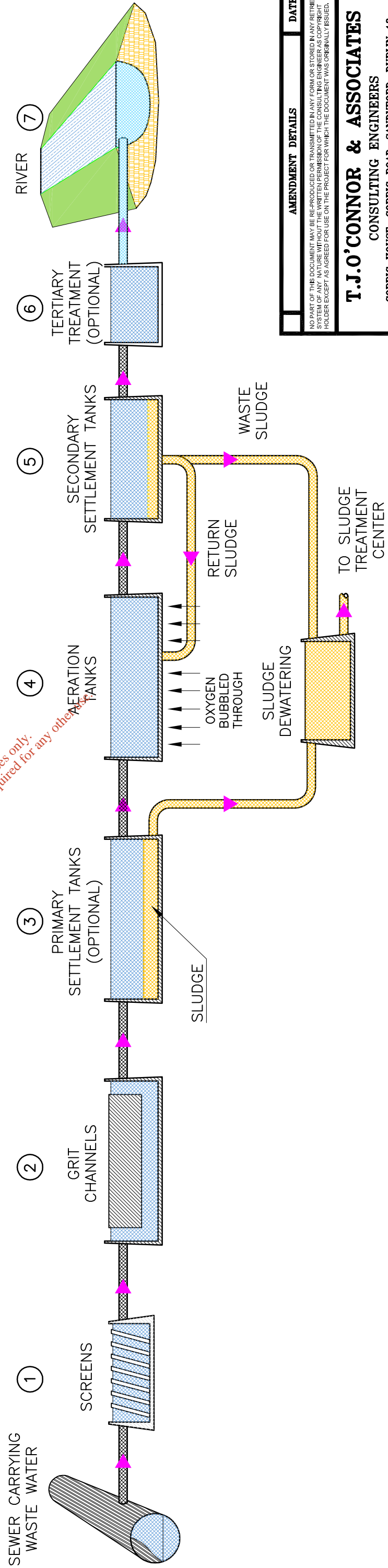
③ THE WASTE WATER IS THEN PASSED THROUGH TANKS WHICH ALLOW ORGANIC SOLIDS TO SETTLE. THESE SOLIDS ARE KNOWN AS SLUDGE. THE SLUDGE IS THEN PUMPED TO THE SLUDGE DEWATERING HOUSE.

④ AFTER SETTLEMENT, THE REMAINING LIQUID PASSES TO AERATION TANKS WHERE IT IS MIXED WITH BACTERIA. OXYGEN IS BUBBLED THROUGH IT TO ENCOURAGE THE BACTERIA TO 'EAT' THE ORGANIC MATERIAL. THIS WOULD IN NATURE - BUT MUCH MORE SLOWLY.

⑤ THE AERATED MIXTURE IS THEN PASSED TO MORE TANKS TO ALLOW THE REMAINING FINE SEDIMENT TO SETTLE AGAIN. SOME OF THE SLUDGE IS RETURNED TO THE AERATION TANKS TO KEEP THE BACTERIA NUMBERS CONSTANT.

⑥ A FINAL TREATMENT STEP CAN BE NECESSARY TO POLISH THE FINAL EFFLUENT AND REDUCE THE CONCENTRATIONS OF NUTRIENTS

⑦ FINALLY, THE TREATED WATER, WHICH IS STRICTLY MONITORED FOR QUALITY, IS DISCHARGED INTO THE RIVER.



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by a field. The nearest dwellings are approximately 100 metres from the site boundary. A rigorous assessment of the predicted odour and noise levels following the proposed expansion of the plant was carried out. All necessary mitigation measures recommended as a result of the assessment will be incorporated into the proposed works in order to limit any adverse impact on the closest residence to an acceptable level.

The layout of the treatment works on which this E.I.S. is based may be taken as indicative only. Contractors competing for the contract for the construction of the Carrickmacross works will be free to put forward any design capable of providing the required level of performance. It is expected that such alternatives will be based on variations in the secondary or tertiary treatment process.

The E.I.S. is concerned primarily with the impact of the development on the environment and, while the layouts shown are indicative only, the specifications for the project will clearly set out the performance criteria which the finally constructed treatment works must achieve in terms of: -

- Final effluent standards (see 1.6 below)
- Odour levels.
- Noise Levels.
- Heights of buildings and structures on the site.
- Proximity of buildings and structures to site boundaries.
- Screening at site boundaries.
- Sludge handling and disposal.
- Proven technology.
- Reliability of Plant and Equipment.
- Other impacts such as traffic movements, visual impacts of site lighting etc.

Accordingly an alternative design and layout will only be considered if:-

1. The impacts are equal to the impacts outlined in this E.I.S.

and/or

2. The positive impacts are of greater significance than those outlined in this E.I.S.

and/or

3. The negative impacts are of lesser significance than those outlined in this E.I.S.

1.4 Alternatives Considered

Because of the scale and cost of this development, a number of alternative treatment processes and alternative locations were examined.

1.4.1 Alternative Treatment Processes

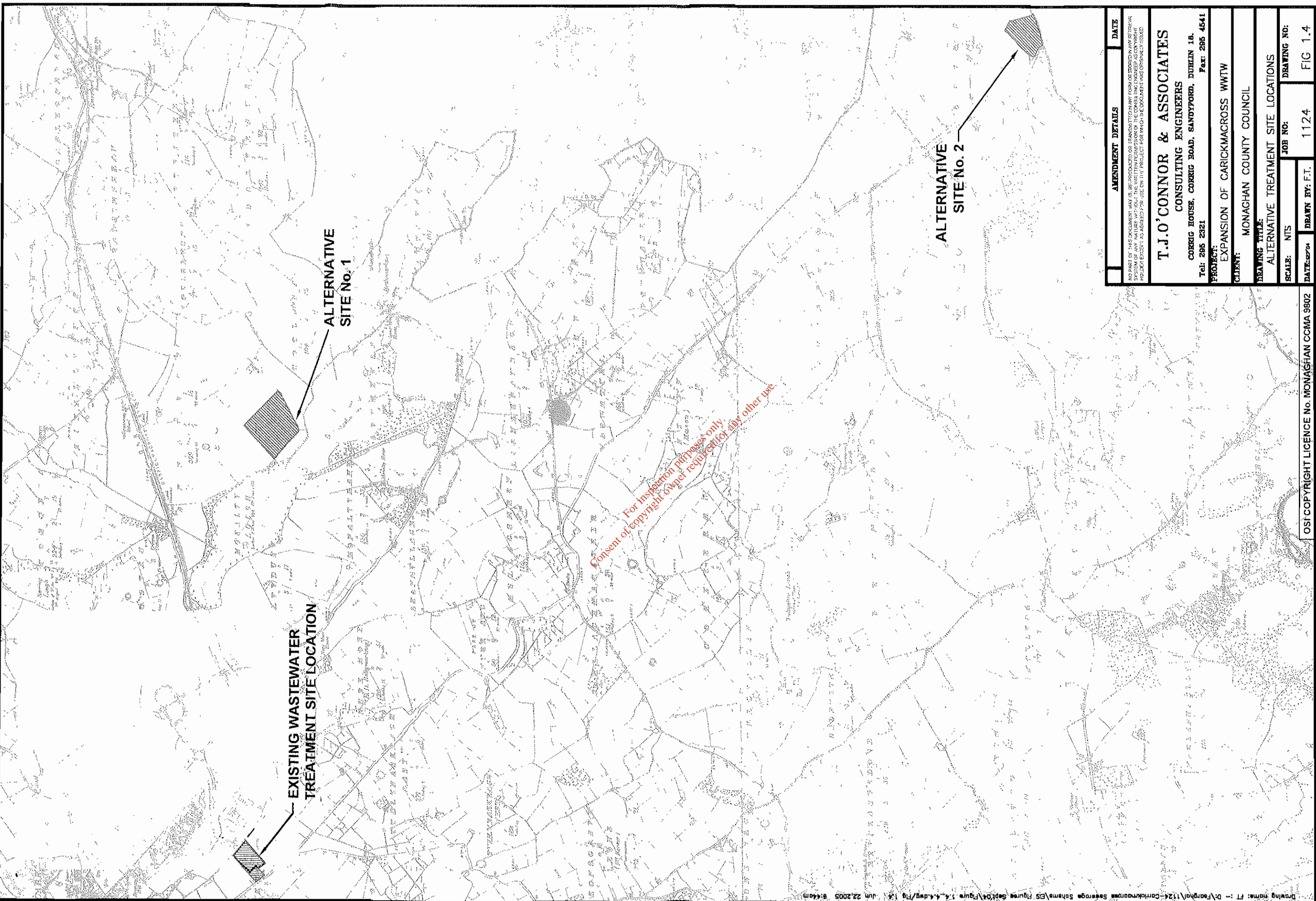
In terms of process many alternatives would be available for the secondary treatment stage based on variations of the activated sludge process described earlier. However only a limited number of processes would be capable of producing an effluent of the required standard. Amongst these would be the membrane process described earlier and constructed wetlands (reed beds). The latter process would not generally be considered as reliable as membrane treatment. It also has a very high space requirement which could not be accommodated within the boundaries of the existing site. The very high space requirements for reed beds means that this process can be discounted as an alternative to the indicative design described.

1.4.2 Alternative Locations

Three alternative sites were given close consideration. The proposed site has been selected following extensive investigations. These included flora and fauna studies, an assessment of the level of additional construction works, noise and odour impact studies and cost estimates. The sites which were considered are situated downstream of Carrickmacross town and are shown on Figure 1.4.

Alternative No. 1 proposes constructing a wastewater treatment plant on a green field site adjacent to the Proules River just downstream of Moynalty Lough. The main advantages of relocating to this site would include an increased level of dilution for the treated effluent, relocation of the effluent discharge to a point downstream of Monalty Lake which is used as a source of drinking water for the Killanny Group Water Supply Scheme, and the availability of additional space for a further expansion of the WWTW. The disadvantages associated with this site is that the wastewater has to be pumped to the new location, a new access road has to be constructed and the dilution is only marginally increased compared to the existing location. Furthermore, part of the existing site would have to be retained as a location for the pumping station.

Alternative No. 2 proposes constructing a new wastewater treatment works on a green field site adjacent to the River Glyde. This would have similar advantages and



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SCALE:	NTS	
DATE: 07/04	DRAWN BY: F.T.	1124
		DRAWING NO: FIG 1.4

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disadvantages to Alternative No. 1, but the main advantages would be the increased level of dilution available and the fact that the Glyde is not designated as a sensitive water under the waste water treatment regulations. This in turn means that a less onerous discharge standard for the final effluent would be required, in terms of BOD and suspended solids and also phosphorous.

Alternative No. 3 is to expand the capacity of the WWTW at the existing site off the Ardee Road. The main advantages are that there is an established land use for wastewater treatment, no additional pipelines would be required and the existing access route would only require upgrading.

Of the alternatives considered, the proposal to remain at the existing WWTW location is deemed to be the most economical, has an acceptably low impact on the environment, both actual and perceived, and is therefore considered to be the most suitable location for the treatment works.

1.5 Environmental Considerations

The proposal for the wastewater treatment works has been assessed in terms of its impacts on the natural and man-made environment and on the people who live and work in Carrickmacross and its environs.

The impacts are discussed in detail in Chapters 5 to 12 of this E.I.S. where each impact is addressed under the following sub-headings:

- Receiving Environment;
- Characteristics of the Proposal;
- Potential Impact of the Proposal;
- Mitigation Measures;
- Predicted Impact of the Proposal;
- Monitoring
- Reinstatement.

They are summarised here in the same sequence as they appear in the main statement.

1.6 Water

1.6.1 The River Proules

Analyses of available water quality measurements for both the Proules river and the treated effluent from the existing works have been considered in conjunction with current legislation to derive appropriate standards for the treated effluent from the upgraded works. The legislation considered included the following:

- The Urban Waste Water Treatment Regulations
- The Phosphorus Regulations
- Quality of Surface Water intended for human consumption Regulations

The assimilative Capacity of the River Proules was also (separately) taken into account.

The final effluent discharge standards proposed taking account of the above requirements are shown in table 1.1 below. The derivation of these standards is described in detail in Section 5 of the main body of the E.I.S.

Parameter	Concentration	Unit
BOD	4	mg/l
Suspended Solids	4	mg/l
Total Phosphorus	0.2	mg/l

Table 1.1 - Proposed Treated Effluent Discharge Standards



Photograph 1.3 – River Proules immediately downstream of the outfall pipe.

The application of these final effluent standards to the upgraded plant represents a substantial improvement on the quality of the existing effluent discharge. The benefits will include:

- The standard of treatment of the wastewater will be substantially improved;
- There will be a substantial improvement in the quality of the water in the river including the achievement of an improved Q rating for the river downstream of the works;
- The amenity value of the river and downstream lakes for the local community will be enhanced;

The predicted impact of the discharge on the aquatic flora and fauna was studied in detail by Aquens Limited as part of this EIS. Their report is reproduced in full in an Appendix to the EIS. It concluded that the improved standard of final effluent proposed should have a positive effect on the ecological health of the river resulting in more diverse flora and fauna. It also noted that the Proules river is being impacted on by other sources from activities upstream of the WWTW and that the improvement brought about could be limited where these (agricultural) activities continue.

The site of the WWTW overlies a bedrock aquifer which is classed as extremely vulnerable under the County Monaghan Groundwater Protection Scheme. The appropriate design codes for pipework and process tanks as well as commissioning tests will be used to ensure that the units are watertight and that no wastewater will escape to ground. Bunds will be provided to all chemical storage tanks to reduce the risk of contamination from leaks or accidental spillages.

1.7 Air

The boundary of the WWTW site is approximately 100 metres from the nearest residential area. It was considered essential to assess the main airborne parameters (noise and odour) for the upgraded works to specify the allowable levels of odour and noise to ensure that any potential impacts on the local community are mitigated to an acceptable level.

1.7.1 Noise

Mr. Fred Walsh of Acoustic Associates conducted a noise survey at the WWTW site. The results of this survey are detailed in Section 6.2 and attached in full in Appendix A.

The analysis carried out by Acoustic Associates has led to the recommendation of maximum acceptable noise level criteria at the nearest house or any house, varying from

50dB(A) in daytime to 35dB(A) at night-time, in order to ensure that there is no noise disturbance to the community arising from the operation of the works.

A number of mitigation measures have been recommended to help achieve the recommended limits. These are detailed in Section 6.2 along with additional mitigation measures for the construction phase and include:

- Careful selection of plant;
- Construction of an earthen berm along the northern and western boundaries;
- Acoustic insulation on buildings where appropriate, especially the blower building and the inlet works building;
- Construction of pumping stations, using submersible pumps, to achieve the noise limits;
- Positioning of noisier plant to optimise screening;
- Sound attenuation on any fan or opening likely to emit excess noise.
-

These mitigation measures apply during the operation of the plant. Table 1.2 shows typical sound levels in terms of dBA units.

Levels in dB(A) (Decibels)	Source of Situation
140	Fireworks, Jet Takeoff at c.100m
130	Threshold of Pain
120	Night Clubs, Noisy Toys, Chainsaws, Stereos
110	Personal Stereo at high sound level
100	Video Arcades, Classical Music
90	Lawnmower, Motorbike, Crying Child
80	City or Town Traffic, Nearby Ringing Phone
70	Outside Busy Roadside House
60	Normal Conversation at c.1 metre
50-55	Normally acceptable by day, outdoors
40	Refrigerator, Quiet Living Room, Library
35-40	Normally acceptable at night, outside houses
25-30	Inside Bedrooms
20	Whisper
10	Very Quiet Countryside
0	Threshold of Hearing

Table 1.2 – Typical Noise Levels from Common Activities and Sources

With these mitigation measures in place, Acoustic Associates advise that the noise level outside the nearest house will be less than the maximum permissible levels of 35dB(A) at night and 50dB(A) by day, thereby ensuring an acceptably low noise impact on the residents.

1.7.2 Odour

Odours are often perceived to be the principal potential negative impact of wastewater treatment works. Mr. Michael Bailey of Envirocon has assessed the probable impacts of odour generation from locating the works at the existing site at Ardee Road. The results of this survey are detailed in Section 6.3 and attached in full in Appendix B to the main body of the report. Mr. Bailey's brief was to assess the adequacy of the odour control measures in the indicative design of the works and to make further recommendations as required.

An assessment of the odour producing potential associated with the indicative design at the Ardee Road site concluded that odour levels at the nearest residence (at the other side of the Ardee Road) and beyond could be kept below the barely perceptible level (1 – 2 odour units) on a 98 percentile basis, provided certain mitigation measures are put in place.

The measures initially proposed in the indicative design included the following:

- The inlet works channels and screening/grit removal equipment would be housed in a purpose designed building
- Screened material and grit from the grit trap would be washed and transferred into covered skips located within the inlet works building.
- Diffused aeration in the activated sludge aeration tanks would be used to reduce the turbulence and hence the potential for generating malodours and aerosols from the tank surface. In addition, the level of oxygen present in the tank liquor would be continuously monitored to ensure an adequate level is present to prevent anaerobic conditions forming.
- Desludging chambers would be covered and the foul air passed through an odour control unit before being vented to atmosphere.
- The sludge thickening tanks would be covered and the headspace ducted to a high efficiency odour control unit.
- Emissions from the sludge treatment plant would be passed through an extraction system connected to an odour control unit to extract any foul odours.

- The installed odour control units would operate with removal efficiencies of over 95%. Single or dual stage units may be required to achieve the necessary reduction in odour levels in the exhaust gases. It is planned that one odour control unit would treat foul air from the inlet works, with a second unit for treating headspace air from the sludge tanks and dewatering building. These units may be stand-alone systems installed at ground level or emission vents located on the buildings. The location and design of the exhaust stacks to these units would ensure that adequate mixing of emissions is achieved. The odour control systems to be installed would ensure that no significant malodours occur beyond the site boundary.

The aim of the above measures is to prevent an odour nuisance arising beyond the site boundary. The complete elimination of odour would be practically impossible and would entail enormous cost. The anticipated level of odour of 1– 2 odour units at the nearest residence is barely perceptible and is well below the established nuisance threshold of 5 odour units. The installation of odour abatement measures consistent with the levels outlined above will be a condition for award of the contract. Accordingly, only those designs that can meet these requirements will be considered. Specific penalty clauses will be applied under the Contract with respect to the odour standards with breaches resulting in a reduction in payments to the contractor.

1.7.3 Aerosols

Aerosols are produced in the activated sludge process at the aeration tanks when mechanical surface aerators are used to transfer oxygen to the mixed liquor or due to the effect of wind on the surface of the liquor. They can also be produced locally when final effluent is used as wash water for activities such as pressure washing. The design prepared for the E.I.S. envisages the decommissioning of the existing rotors.

The Employer's Requirements will dictate that the aeration must be by either fine bubble diffused air systems, which have a negligible hazard or by surface aerators, which have additional measures to prevent the production of aerosols.

If wash water is to be reused then it would normally be disinfected before use. It is generally accepted that aerosols do not constitute a health hazard beyond 20m from the source. Even within this distance the risk is limited. There are no documented cases of infection being transmitted via aerosols. The concentration of bacteria and viruses in

sewage aerosols can be high but the droplets evaporate quickly and the bacteria and viruses, being dependant on moisture for survival, are killed.

1.7.4 Light

The development of the treatment works site will increase the generation of artificial lighting at the edge of the town. Flood lighting will be required for safety and security but will only be fully operated at night if the treatment plant is manned or if the intruder alarm system is activated.

Careful positioning of the lighting columns and screening with trees and shrubs will minimize over-spill of light outside the site boundary.

1.7.5 Climate

The climate in Carrickmacross and Monaghan in general is typical of Ireland. There will be no effects on the climate resulting from the new works nor are there any particular climatic issues that need to be addressed in this E.I.S..

1.8 Soils

1.8.1 Type/Characteristics

Carrickmacross is located in a drumlin area with elevations in the catchment varying between about 30 mAOD at the treatment works site, to over 75 mAOD at the upper extent of the existing wastewater catchment. The land around Carrickmacross is generally good quality agricultural land. At the WWTW site, the overburden comprises a layer of made ground on glacial tills on top of silty sand. Below this level the ground is mostly limestone bedrock.

1.8.2 Foundations

Piled foundations may be required to support certain units. Anchors may be required to hold down the tanks against flotation when empty.

1.9 Ecological Impacts

1.9.1 Land Based Habitats

A study of the flora and fauna was undertaken as part of the E.I.S. by Aquens Limited, which is a 'campus company' operating out of the Zoology Department of University College Dublin. The results of this survey are detailed in Section 8 and attached in full in Appendix C. The report notes that although there is evidence of numerous species of birds

using the site, the temporary disruption caused to their activities during the construction phase could be offset by sensitive landscaping and that re-colonization should quickly occur. The development would have no significant medium or long-term impacts on the plant populations.

1.9.2 Aquatic Habitats

There is limited fish life in the River Proules, although efforts have recently been made to reintroduce trout into the river. As described in Section 1.6, the treatment of wastewater at Carrickmacross will result in an improvement in water quality in the river that would be beneficial to the aquatic flora and fauna.

1.10 Socio-Economic Impacts

The existing site is already in use for the treatment of wastewater and the upgrading would not result in any change of designation. The adjacent land is used as storage area for the local council.

Although Carrickmacross was not designated as a gateway or hub in the National Spatial Strategy, the governmental decentralisation programme proposes to relocate part of the Department of Social and Family Affairs to Carrickmacross. This combined with the generally high levels of economic activity and the completion of the M1 motorway from Dundalk to Dublin is expected to result in a substantial growth of the town in the coming years. Furthermore, the Carrickmacross bypass was recently finished further reducing commuting times to Dublin, and taking the N2 traffic away from the town centre. In other similar situations this has led to significant population growth.

The upgrading of the works will be a major part of this infrastructure and will be an essential driver of growth in the region. It will allow the development of industry and residential areas to proceed unhindered.

There are existing power and water supplies to the site that should only require some upgrading.

1.10.1 Transport and Communications

The level of traffic entering the site will naturally increase during the construction phase. The overall level of traffic during the operational phase will be slightly higher than the

current level (average anticipated level would be 1 tanker per day). Given the level of traffic in the area and the proximity to the ring road this will not have a significant effect.

1.10.2 Sludge, Screenings and Grit Disposal

The County Monaghan Sludge Management Plan designated the WWTW at Monaghan Town as the hub centre for the treatment of wastewater sludges in the county. The plan also provided for the optional designation of a second hub centre at Carrickmacross. This option has since been rejected by the council and all wastewater treatment sludges arising in Carrickmacross are to be dewatered prior to onward transportation to Monaghan for treatment. Provision will be also be made for accepting and dewatering imported liquid sludges from a number of smaller wastewater treatment plants near Carrickmacross to minimise transportation costs to the hub centre in Monaghan.

Under the indicative design prepared for the E.I.S., compacted screenings and grit are to be sent to landfill. The comparatively small volumes (perhaps 1 No. skip per week) arising and the low organic content, makes landfill the most suitable means of disposal.

1.11 Material Assets

The site is already owned by Monaghan County Council. It is anticipated that the upgraded works will allow sustainable growth in the area and prove to be a valuable asset for both the County Council and the Carrickmacross Town Council in the future.

1.12 Visual Impact

1.12.1 Topography

The north-western boundary of the wastewater treatment plant site is formed by a new road linking the N2 Carrickmacross bypass and the Ardee Road. The Ardee Road itself is situated on the south-western side of the WWTW. Both roads and the surrounding ground are a few metres higher than the ground level of the WWTW site.

The area could be characterised as mixed commercial/industrial/residential with residential development confined to the western side of the Ardee Road. Due to the lack of any screening along the roads, the site is visible from both roads and from the surrounding commercial and residential development.

1.12.2 Landscape and Buildings

The proposals described in the indicative design provide for the construction of new process tanks and buildings as required to meet the final effluent discharge standards proposed. The tanks may be expected to be no more than 1.5m above existing ground levels while new buildings will be significantly higher. Landscaping in the form of gently sloping mounds planted with shrubbery will soften the impact. Under the indicative design a new preliminary treatment works building is to be constructed which may be up to 15m in height. Landscaping and planting will form an integral part of the proposed work with the contractor required to develop specific landscaping proposals to suit the requirements of his particular design. These proposals may be expected to include the construction of softly contoured screening embankments and tree/shrub planting. Tree planting may be expected to soften the impact of the taller buildings. However it is expected that the taller buildings will remain visible because of the general topography of the area. The type and choice of planting will reflect the indigenous landscape of the area. In time, and with proper care and maintenance, plants, shrubs and trees will become more established and mature, and enhance the visual appearance of the area generally.

The different treatment units comprising a typical works are identified in Figure 1.2A and 1.2B. Photo montages illustrating the impact of the development are given in section 11 of the main body of the report.

1.13 Cultural Heritage

The existing wastewater treatment plant is located south-east of Carrickmacross town in the townland of Magheross, in the barony of Farney. The town of Carrickmacross is a district market town, located in the south of County Monaghan and has been termed the gateway to county Monaghan and to Ulster. Six known archaeological sites are recorded in the environs of the site. The Archaeological Services Unit of University College Cork has conducted an archaeological survey at the WWTW site. The results of this survey are detailed in Section 12 and attached in full in Appendix D.

The existing WWTW and the proposed area of the development was originally a boggy greenfield site. The existing treatment plant has since disturbed most of this ground. That which has not been built on has been landscaped, covered with concrete or stone gravel and used as a storage area.

1.14 Recommendations

The upgrading of the sewage treatment works at Carrickmacross will improve the

environment of the River Proules and enhance the amenity value of the river and downstream lakes to the town. It is an integral part of the infrastructure to enable growth in the region and is essential to the future development of the town. Failure to provide a suitable treatment facility will restrict growth in the town and in the county as a whole. Mitigation measures will be provided at the site at Ardee Road in order to minimise any potential negative impacts. It is therefore recommended that the proposed sewage treatment works be located there.

In summary, it is recommended that:

- Monaghan County Council proceed with their proposal to upgrade the wastewater treatment works as outlined in this document;
- This treatment works be sited at the existing site at Ardee Road;
- The associated mains/sewers be upgraded to convey wastewater to the works;
- The measures as outlined in this document be provided for the mitigation of any negative impacts on the environment resulting from this development.

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