



*Comhairle Chontae Mhuineacháin*  
**Monaghan County Council**

**ADDITIONAL INFORMATION  
IN CONNECTION WITH THE**

**ENVIRONMENTAL IMPACT STATEMENT**

**FOR**

**EXPANSION OF CARRICKMACROSS  
WASTEWATER TREATMENT PLANT**

**September 2006**



## INTRODUCTION

Monaghan County Council propose to expand the capacity of the Waste Water Treatment Works (WWTW) at Carrickmacross to cater for the future loads from the town that are expected to arise in the coming years. In accordance with the Planning and Development Regulations of 2001, the Council has prepared an Environmental Impact Statement (EIS) and applied to An Bord Pleanála for approval to expand the plant in June of 2006. In response to issues raised by An Bord Pleanála in a letter to Monaghan County Council in connection with the expansion of the plant, the Council has decided to amend their proposals in respect of the position of the final effluent outfall from the expanded WWTW at Carrickmacross. The following has been prepared by way of additional information for the Board and describes the changes proposed and their predicted environmental impact.

## BACKGROUND

The EIS referred to above has been prepared on the basis of an expansion of the plant at Carrickmacross to a capacity of 44,000 Population Equivalent (PE) with treated effluent from the plant being discharged to the Proules River via an existing outfall on the north eastern boundary of the site of the existing WWTW. It is now proposed to modify the proposals to provide for the construction of a new final effluent outfall pipeline to convey the treated effluent from the expanded plant at Carrickmacross to a discharge point on the Longfield River downstream of Monalty Lough. The existing and proposed discharge locations are shown on Figure A1 which also shows the proposed route of the final effluent outfall pipeline. It is further proposed to modify the final effluent discharge standards to take account of the changes in the levels of dilution available at the new outfall location. The derivation of the discharge standard and a full description of the revised proposals and their anticipated environmental impact is described in the following sections.

Although the original proposals in the EIS were formulated to provide an acceptably low impact on the environment under all of the statutory headings, the Council recognises the environmental benefits that would be achieved by relocating the final effluent outfall from the plant at Carrickmacross on water quality in Lough Naglack and Monalty Lough. Both of these lakes are downstream of the existing final effluent outfall from the WWTW and the latter is used as the raw water source for the Killanny Group Water Supply scheme. The water treatment plant for the Killanny GWS has recently undergone a major upgrade and now provides for full (chemically assisted) treatment of the water to meet the drinking water regulations, including a disinfection stage. In accordance with an earlier response submitted to the Board, the Council confirmed that the original proposals would provide an improvement in water quality in the Proules River and in the lakes downstream. However relocation of the outfall is recognised as providing for a significant decrease in the phosphorous load to the lakes and this may be expected to contribute toward an improvement in their trophic status.

The proposals and descriptions that follow may be taken as superseding those in the main body of the original EIS where these are found to be in conflict with or to contradict statements or descriptions provided in the EIS report. The proposals in respect of plant capacity, odour control systems, stormwater storage, sludge handling and dewatering etc. are unaffected by the changes proposed and these can be taken 'as

read' from the main body of the EIS. Accordingly the proposals may be taken as modified only where this is specifically indicated hereunder.

**Note:** The names used to describe different reaches of the rivers in the Carrickmacross area varies between the Ordnance Survey, Monaghan County Council and the EPA. In the following sections and for the purposes of this report, the Proules River is taken to mean the river upstream and downstream of Carrickmacross as far as the inlet to Monalty Lough from Lough Naglack. The river downstream of Monalty lake as far as the confluence with the River Glyde is referred to as the Longfield River. (See Fig. A1)

## THE MODIFIED PROPOSALS

### *(1) Final Effluent Outfall Pipeline and Outfall Location*

It is proposed to construct a 600mm diameter outfall pipeline to convey treated effluent from the expanded Carrickmacross WWTW to a point on the Longfield River as shown on Figure A1. The outfall pipeline will originate within the boundary of the site of the WWTW and will cross the Proules River before heading north west into the verge of the link road which connects the Ardee Road and the Dundalk Road. The pipeline will thereafter run in the link road until it reaches the crossing of Bath Avenue at which point the pipeline will leave the link road and run along the avenue toward Lough Naglack. Bath Avenue is a pedestrian walkway approximately 3.5 m wide with a dense bitumen macadam surface. It is used to provide pedestrian access between the town centre and the Dundalk Road. The walkway runs through the Shanmullagh Plantation along the northern shore of Lough Naglack. This plantation comprises mature broadleaf trees (oaks, beeches etc.). However as the pathway provides a route through the plantation, it will not be necessary to remove any trees to construct the pipeline. The impact in terms of these trees would be confined to some relatively minor cutting of tree roots to excavate the c.1.6m deep trench for the pipeline. These roots would be expected to quickly become re-established and no long term adverse impact would be expected to occur.

The pathway terminates at its junction with the Dundalk road and the pipeline will be constructed within the road way, passing under the N2 bypass flyover and onward toward Monalty Lough. The pipeline will continue along the Dundalk Road before turning south east at Annacroft along a narrow public road. This road runs along the eastern shore of Monalty Lough. The pipeline will run along this road toward the outfall location shown on Figure A1. The outfall itself will comprise a wing wall structure with a concrete apron on the river bank.

As the outfall location is downstream from the WWTW, it should be theoretically possible to gravitate the flow between the two points. However pressurisation of outfall to a maximum of around 8m (0.8 barg) is proposed to allow the pipeline profile to undulate in accordance with the ground profile. This has the advantage of allowing construction at nominal cover (900mm in fields and 1.1m in roads) so that deep excavations are not required to ensure a continuous fall in the pipeline invert level. Final effluent pumps will be required at the WWTW to achieve the required hydraulic gradient.

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The pipeline will be designed to convey flows from the WWTW up to the FFT value. (Full Flow to Treatment) The existing outfall will be retained to discharge excess stormwater flows when the storm tanks are full to overflow.

## (2) Discharge Standards

The standard of treated effluent from the plant has been modified to take account of the increased levels of dilution available at the new outfall location. The Longfield River below Monalty Lough has a significantly larger catchment than the Proules river. Figure A2 shows the extent of the catchment draining to the river at the proposed outfall location. The total catchment area to this point is 60 km<sup>2</sup>. This compares with an area of only 12.6 km<sup>2</sup> draining to the Proules river at the existing outfall. Accordingly, it is to be expected that dilution levels would be significantly greater.

The *Hydra* software was used to examine low flow conditions on the Longfield River at the proposed outfall. The output from the software is shown in Appendix AA of this report. This software was compiled by the Institute of Hydrology under an EU funded contract for the European Small Hydropower Association. It is specifically designed to evaluate low flow conditions on Irish Rivers and is based on the local meteorological conditions for the particular location. For ungauged rivers such as the Longfield and the Proules, the software provides highly accurate estimates of low flows in rivers which are based on well understood hydrological principles.

Based on the above, the 95<sup>th</sup> percentile flow at the proposed outfall was estimated at 0.11 m<sup>3</sup>/s (110 l/s) and the mean flow at 0.981 m<sup>3</sup>/s (981 l/s). We note that this is more than five times the ninety fifth percentile flow of the Proules at the existing outfall location so that the proposal provides for a very substantial increase in the level of dilution available.

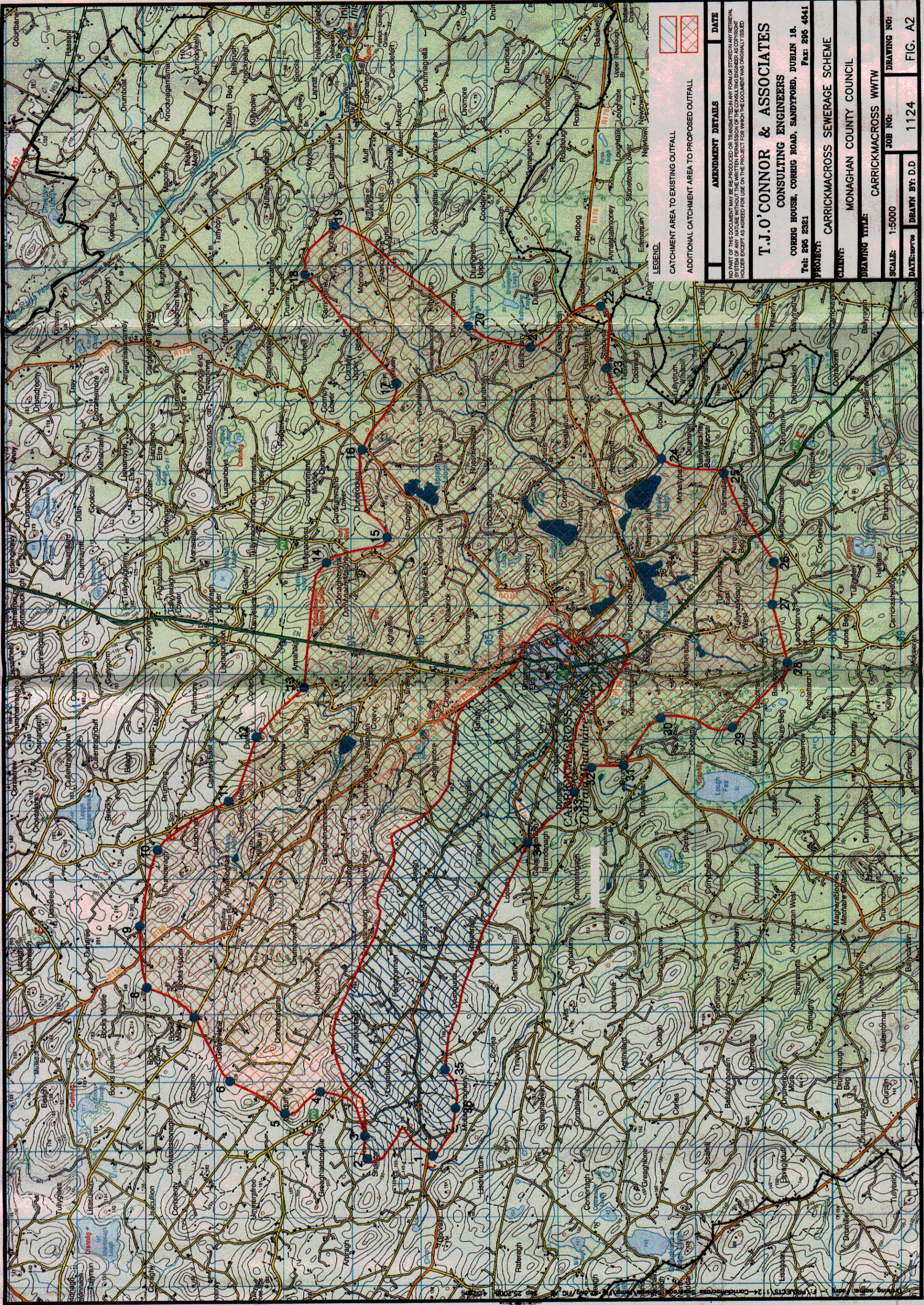
The required final effluent discharge standard for BOD was calculated using the equation below.

$$C_{FM} = \frac{(C_{EFF} * Q_{EFF}) + (Q_{BACK} * C_{BACK})}{(Q_{EFF} + Q_{BACK})}$$

where

$C_{EFF}$	Concentration of the treated effluent (mg/l)
$C_{BACK}$	Background level in the receiving water (mg/l)
$C_{FM}$	Concentration in the fully mixed final effluent/receiving water (mg/l)
$Q_{BACK}$	Background flow in the stream as 95 percentile (m <sup>3</sup> /day)
$Q_{EFF}$	Effluent flowrate (m <sup>3</sup> /day)

Based on the maintenance of a fully mixed final effluent/ receiving water combination of 4 mg/l below the final effluent outfall, the maximum allowable BOD in the effluent is calculated at 6.5 mg /l and this figure has been adopted as the discharge standard for the effluent from the plant. The calculation is based on a background BOD level of 2.5 mg/l this being the average value from the most recent results at the Ballymackney Bridge sampling station. The full set of the most recent water quality results for this station are given in Appendix AB. This station was chosen as being the nearest to the proposed final effluent outfall. The use of the average rather than the maximum value



**LEGEND:**  
 CATCHMENT AREA TO EXISTING OUTFALL  
 ADDITIONAL CATCHMENT AREA TO PROPOSED OUTFALL

AMENDMENT DETAILS		DATE
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PROJECT: CARRICKMACROSS SEWERAGE SCHEME		
CLIENT: MONAGHAN COUNTY COUNCIL		
DRAWING TITLE: CARRICKMACROSS WWTW		
SCALE: 1:5000	JOB NO:	DRAWING NO:
DATE: 2005	DRAWN BY: D.D	1124
		FIG. A2

is appropriate since flow in the river and BOD level may be treated as (approximately) independent stochastic variables. The probability of a 95<sup>th</sup> percentile flow coinciding with a maximum BOD level would therefore be the product of their individual probabilities and this would be much greater than the 95 percent limits called for in the salmonid and other water quality regulations.

A similar calculation of final effluent suspended solids concentration was used to calculate the maximum permissible level in the final effluent to achieve the salmonid standard of 25 mg/l as an average (rather than a 95<sup>th</sup> percentile). This calculation shows that the final effluent could discharge suspended solids at more than 50 mg/l. However it this would not be an appropriate standard to associate with a 6.5 mg/l BOD and 10 mg/l is instead proposed for the suspended solids concentration in the final treated effluent.

For phosphorous, the levels at the Ballymackney Bridge sampling station were again examined. The results in appendix AB show that the water quality in the Longfield river in respect of phosphorous is unsatisfactory/transitional with a median ortho-phosphate level of 0.04 mg/l (40 µg/l) for the results available. As the Phosphorous regulations are based on median rather than 95<sup>th</sup> percentile concentrations, the use of mean flows in the Longfield River is more appropriate than a 95<sup>th</sup> percentile flow. Based on the mean flow and median background concentration of MRP of 40 µg/l as above, the predicted P concentration below the outfall would be expected to increase by around 50 µg/l for a discharge standard of 1 mg/l P and by 8 µg/l for a discharge of 0.2 mg/l P. Clearly a 1 mg/l standard would represent a significant P load and would render compliance with the Phosphorous Regulations difficult to achieve regardless of reductions in upstream (background) levels. A 0.2 mg/l standard by contrast would represent a modest increase in P concentrations and would enable the Council to meet its obligations under the phosphorous regulations when the upstream sources, believed to be mainly associated with agricultural practices, are removed/reduced. The relocation of the outfall from Carrickmacross WWTW as proposed should also assist in this process. Accordingly the 0.2 mg/l standard is proposed as one which allows the Council to discharge its obligations under the Phosphorous Regulations and which would represent a lower limit in terms of the ability of the WWTW to reliably produce an effluent of a particular quality.

Additionally it is proposed to provide for full nitrification of the effluent from the plant to reduce total ammonia levels to less than 1 mg/l. This is again in-line with salmonid water quality standards and should further improve the quality of the receiving water and assist it making the Longfield River a viable habitat for game fish. The average ammonia concentration at the Ballymackney sampling station from the most recent water quality results was 0.076 mg/l. The addition of 6,196 m<sup>3</sup>/day of treated effluent at 1 mg/l N of ammonia would increase the fully mixed concentration below the outfall to 0.44 mg/l N at the 95<sup>th</sup> percentile flow. This is less than half the permitted concentration in the salmonid standard of 1 mg/l NH<sub>3</sub>. The relative concentration of total to un-ionised ammonia varies with water temperature and pH. For a typical summer time water temperature of (say) 15<sup>o</sup>C with a pH of 7.9, the fraction of un-ionised to total ammonia would be 0.021. Accordingly, un-ionised ammonia would be expected to be less than 0.009 mg/l N which is again well within the limits of the salmonid standards. This represents a further improvement in the standard of treated effluent from that proposed in the original EIS.

In summary therefore the effluent discharge standards proposed are as shown below.

<b>Parameter</b>	<b>Concentration</b>	<b>Unit</b>
BOD	6.5	mg/l O <sub>2</sub>
Suspended Solids	10	mg/l
Total Phosphorous	0.2	mg/l P
Total Ammonia	1.0	mg// N

## **PREDICTED IMPACT OF THE MODIFIED PROPOSALS**

### **(1) Water**

The targeting of salmonid water quality standards in the Longfield River and the decision to relocate the final effluent outfall downstream of both Lough Naglack and Monalty Lough may be expected to have a significant beneficial impact on the quality of the water in these water bodies. The modified proposals have been formulated for the sole purpose of effecting improvements in water quality. The proposal will also deal with any perceived risk to the quality of the raw water used to supply drinking water to consumers on the Killanny GWS.

The proposal was referred for study and comment to Aquens Limited who provided the specialist flora and fauna report for the original EIS. Their supplementary report is included in full in Appendix AC of this report. A brief summary of their findings follows below.

The Aquens supplementary report considered the impact of the proposal to relocate the final effluent outfall to the Longfield River. The study commenced with a characterization of the receiving water quality with reference to existing water quality results and to the sampling of the macroinvertebrate organisms which was specifically undertaken for the study. The study reinforced the findings of the earlier (2004) report concluding that the town of Carrickmacross (rather than the WWTW) introduces a significant pollutant load to the Proules River. The report concludes that where (as is proposed) salmonid water quality standards are maintained, the proposal should not have a significant impact on the aquatic flora and fauna in the Longfield River and would be expected to bring about/contribute to an improvement in the trophic status of Lough Naglack and Monalty Lough.

### **(2) Air**

The modified proposals have no bearing on the impacts identified in the EIS. The standards identified in the EIS in respect of maximum odour concentrations and noise and light levels will continue to have effect in the proposed DBO contract for the expansion of the plant..

### **(3) Soils**

No changes to the impacts on soils at the site of the WWTW are proposed. The construction of the new outfall pipeline will require excavation of a c.1.5m wide by 1.6m deep trench. The design of the pipeline will need to take account of ground



conditions along its route. These ground conditions will be established by means of a detailed site investigation which will be undertaken at a later date. However, the route may in places include soft ground where piled supports to the pipeline may be required. The pipeline will be bedded in imported granular material and all surplus excavated material will be disposed of at a licensed tipping site in accordance with the waste management regulations.

#### **(4) Ecological Impacts**

##### **(a) Land Based Habitats**

The flora and fauna at the site of the WWTW will be unaffected by the proposals described above.

##### **(b) Aquatic Habitats**

The proposal has the potential to impact on the aquatic habitat of the existing and proposed receiving waters and this was studied in detail by Aquens Limited as part of their supplementary report referred to above. The report is reproduced in full in Appendix AC. This concluded that where the salmonid standards are maintained as proposed, the impact of the discharge below the outfall would be negligible. The report also notes the expected positive impact of the proposals on the trophic status of Lough Naglack and Monalty Lough.

#### **(5) Socio Economic Impacts**

Closure of one lane of the Dundalk Road and of the laneway leading to the proposed outfall will be required to facilitate the construction of the pipeline. Some short term disruption of traffic will inevitably ensue. There will also be a small increase in construction traffic associated with the delivery of pipelines and the removal of surplus excavated material.

Otherwise there are no specific additional impacts under this heading associated with the proposals which have not already been described in the main report.

#### **(6) Material Assets**

##### **Assimilative Capacity of the Receiving Waters**

The assimilative capacity of the receiving waters has been established with reference to the available dilution in terms of flow and upstream pollutant concentrations. As has been noted above, the discharge standards for the final effluent take full account of the assimilative capacity of the receiving water. The general impact of the proposal is wholly positive as it is expected to improve the trophic status of Lough Naglack and Monalty Lough.

#### **(7) Visual Impact**

All of the pipeline with the possible exception of the outfall structure will be buried so that the scope for any visual impact is very limited. The outfall itself would be expected to comprise a reinforced concrete wing wall and apron structure recessed into the bank of the river, with a metal grill fixed over the pipeline to prevent access.

This would be expected to blend in with the natural environment as the bankside vegetation re-establishes.

### **(8) Cultural Heritage**

The proposal to construct a new outfall pipeline was referred to the Archaeological Services Unit of University College Cork for comment. Their report is reproduced in full in Appendix AD and the non technical summary from the report is given below.

‘A number of sources were consulted in order to assess the archaeological potential of the proposed development area. The proposed pipeline route directly impacts on one recorded monument and is in the vicinity of twenty-seven more. Furthermore, as yet unknown archaeological monuments in the development zone may be impacted upon by ground disturbance.

A number of mitigating strategies are therefore recommended in order to protect these monuments and to prevent accidental loss or damage to archaeological finds or features that lie below the present surface and have no visible surface remains.

Archaeological test trenching should be undertaken on the length of pipeline within the *zone of constraint* around the site of a souterrain (RMP MO031-042) and due to the density of sites in the environs, the monitoring of groundworks should be undertaken on the remaining pipeline route.’

### **SUMMARY OF LONG TERM IMPACTS AND INTERACTIONS**

The longer term impact of the proposal would be an expected improvement in the trophic status of Lough Naglack and Monalty Lough as well as an improvement in the quality of the Proules River below the existing outfall. The discharge standards proposed provide for remaining within the assimilative capacity of the river at the revised outfall location. As outlined above, part of the pipeline route is adjacent to an existing archaeological feature and test trenching is proposed to establish the precise position of the feature relative to the pipeline. Where the results of test trenching suggest direct impingement on this or any other feature, the pipeline will be re-routed locally in accordance with the instructions of the licensed archaeologist.

# APPENDIX AA

## Output from Hydra Software

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## Catchment Characteristics and Site Flow Details Carrickmacroos, Co. Monaghan.

Run Date / Time:	22 October 2006 at 01:54
Catchment definition file:	c:\hydra\carrick.cbf
Total area:	60.09 km <sup>2</sup>
Rainfall (average annual):	927 mm
Potential evaporation (average annual):	461 mm
Runoff (average annual):	515 mm
Mean flow estimate:	1.00 m <sup>3</sup> /s
Q95, as % of mean flow:	11.1 %
Q95 (absolute):	0.1 m <sup>3</sup> /s

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**Flow Regime Report  
Carrickmacroos, Co. Monaghan.**

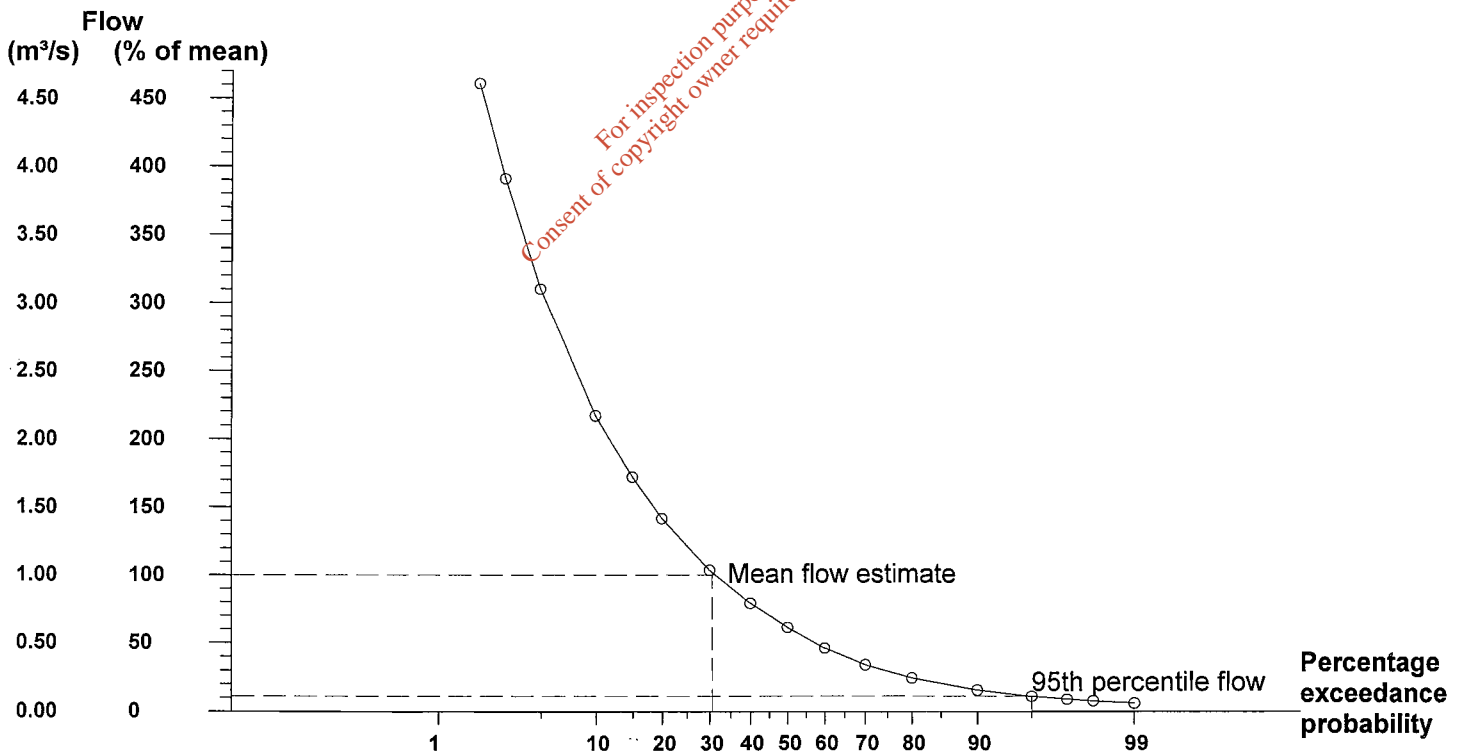
Run date / time: 22 October 2006 at 11:55

**Catchment Characteristics**

Total area: 60.1 km<sup>2</sup>  
 Rainfall (average annual): 927 mm  
 Potential evaporation (average annual): 461 mm  
 Runoff (average annual): 515 mm

**Flow Regime Results**

Mean flow estimate: 1.00 m<sup>3</sup>/s  
 Q95 (% of mean): 11.1 %  
 Q95 (absolute): 0.11 m<sup>3</sup>/s



Catchment Characteristics Processing

Site:  
Carrickmacroos, Co. Monaghan.

Grid cells each 1km by 1km

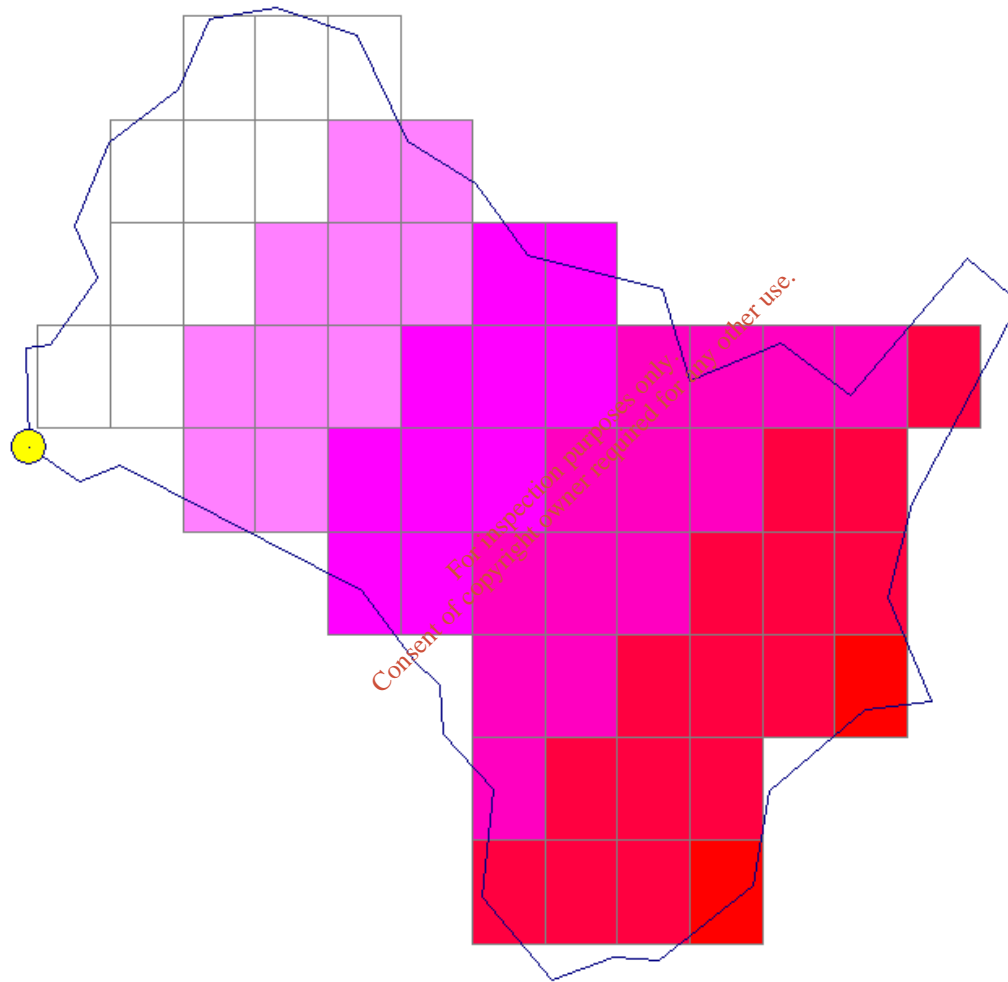
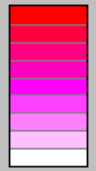
Boundary start / finish point: 

Potential evaporation

464mm

461.5mm

459mm



Display:

- Initial plot
- Rainfall
- Potential evaporation
- Q95 (relative)


Report

Quit

Catchment Characteristics Processing

Site:  
Carrickmacroos, Co. Monaghan.

Grid cells each 1km by 1km

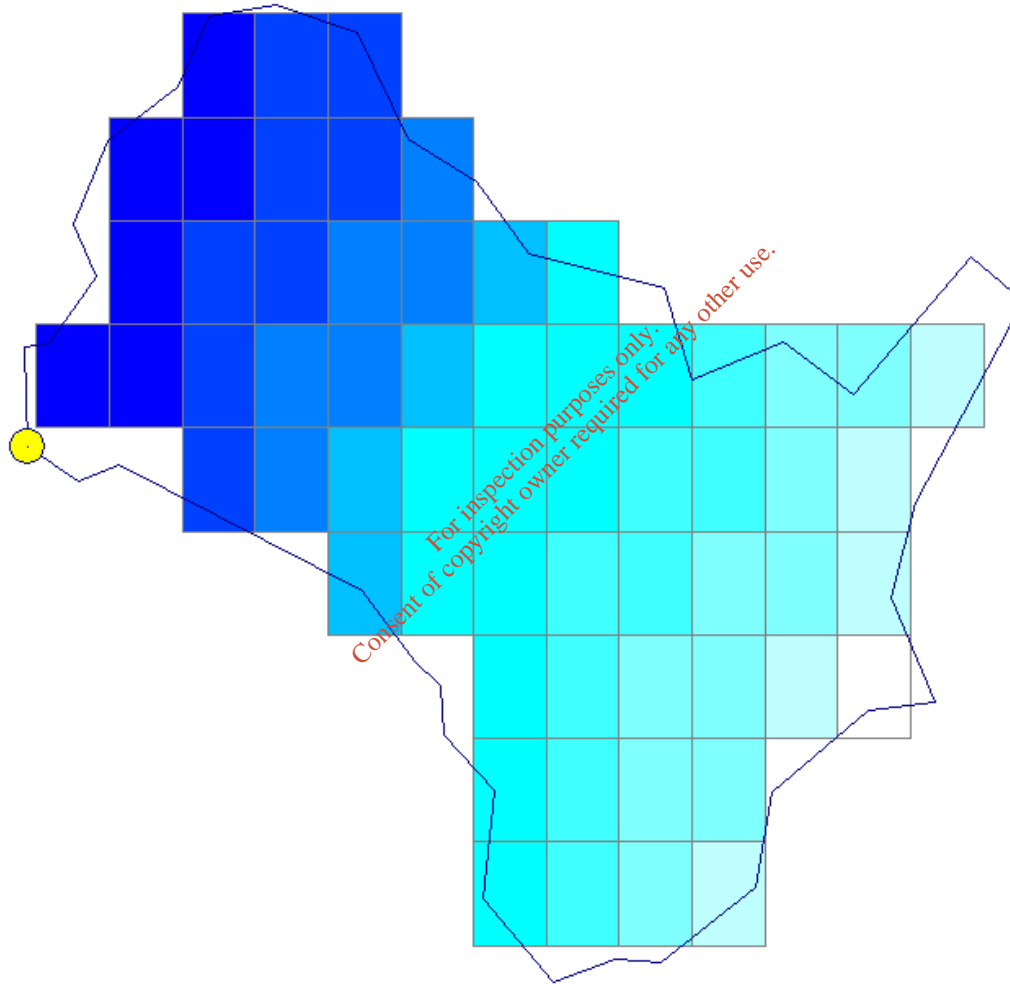
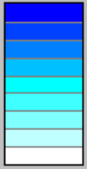
Boundary start / finish point: 

Rainfall

975mm

929mm

883mm



Display:

- Initial plot
- Rainfall
- Potential evaporation
- Q95 (relative)

Report

Quit



AMENDMENT DETAILS		DATE
CATCHMENT AREA TO EXISTING OUTFALL		
ADDITIONAL CATCHMENT AREA TO PROPOSED OUTFALL		
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<p>PROJECT: CARRICKMACROSS SEWERAGE SCHEME</p>		
<p>CLIENT: MONAGHAN COUNTY COUNCIL</p>		
<p>DRAWING TITLE: CARRICKMACROSS WWTW</p>		
<p>SCALE: 1:5000</p>		
<p>DATE: 15/04/04</p>		
<p>JOB NO: 1124</p>		
<p>DRAWN BY: D.D</p>		
<p>FIG. 5.1</p>		