

## SECTION F – EXISTING ENVIRONMENT & IMPACT OF THE DISCHARGE(S)

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### Attachment F1: Assessment of Impact on Receiving Surface or Ground Water

- Attachment F.1(A): An Assessment of the Impacts of Any Existing or Proposed Emissions on the Environment
- Attachment F.1(B): Monitoring of the Receiving Water Primary Discharge Point
  - Table F.1(a): Surface/Ground Water Monitoring - Downstream
  - Table F.1(b): Surface/Ground Water Monitoring (Dangerous Substances) - Downstream
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  - Table F.1(b): Surface/Ground Water Monitoring (Dangerous Substances) - Upstream
- Attachment F.1(C): Monitoring of the Receiving Water Secondary Discharge Point
- Attachment F.1(D): Ground Emissions
- Attachment F.1(E): Water Quality of the Existing Environment
- Attachment F.1(F): Emissions of Main Polluting Substances (Defined in Dangerous Substances Regulations, S.I. 12 of 2001)
- Attachment F.1(G): Protection of Downstream Water Abstraction Points
- Attachment F.1(H): Emissions Effects on European Sites
- Attachment F.1(I): Measures for Minimising Pollution Over Long Distances or in the Territory of Other States
- Attachment F.1(J): Modelling of Discharges

**ATTACHMENT F.1(A)**  
**AN ASSESSMENT OF THE IMPACTS OF ANY EXISTING OR PROPOSED EMISSIONS**  
**ON THE ENVIRONMENT**

There are 2 no. existing emission points from the Carlanstown Sewerage Agglomeration, namely:

- SW1 Primary Discharge Point - Fully Treated Effluent, from the Carlanstown Waste Water Treatment Plant (WWTP);
- SW2 Storm Water Overflow - Effluent from the Storm Water Holding Tank at the Carlanstown WWTP.

There are presently no plans proposed to increase the number of emission points from the Carlanstown Sewerage Agglomeration.

All possible impacts of the existing emissions on the environment will be assessed below:

**AIR (NOISE/DUST):**

There is a certain amount of noise and dust impact on the environment related to the operation of the Carlanstown Waste Water Treatment Plant. However, this licence application relates only to the 2 no. emissions from the Carlanstown Agglomeration. The 2 no. emissions are of effluent (treated and untreated) discharging directly to the Moynalty River. The discharge points are below the water level of the Moynalty River and as such do not pose any noise or dust impact on the surrounding environment.

**ECOLOGY:**

As will be discussed in Attachment F.1(E) and F.1(H) below, the 2 no. emissions discharge to the Moynalty River, which has no designation of ecological significance. The 2 no. discharges are in existence for some time and as will be discussed in sections below, do not appear to be having a negative effect on the water quality in the Moynalty River. It is therefore not expected that the discharges are having any negative affect on the surrounding ecology (aquatic).

**GROUNDWATER:**

There are no emissions to ground/groundwater from the Carlanstown Sewerage Agglomeration; therefore any impact on ground/groundwater is unexpected.



## SURFACE WATER:

The 2 no. emission points from the Carlanstown Agglomeration are to Surface Water (Moynalty River). The results of water quality analysis from the once-off sampling event carried out in the Moynalty River (upstream aSW-1u & downstream aSW-1d of the discharge points), for this application are presented in Tables F.1(i)(a) & F.1(i)(b) overleaf. The results show an improvement in surface water quality from the upstream sampling location (aSW-1u) to the downstream sampling location (aSW-1d), for concentrations of suspended solids, BOD, nitrite, phosphorous, orthophosphate, sulphate, chromium, copper, lead, nickel, zinc & barium. This improvement in water quality would indicate that the Carlanstown WWTP is not having a negative affect on the water quality of the Moynalty River.

The EPA monitor water quality in the Moynalty River at stations upstream and downstream of the discharges from Carlanstown WWTP. The EPA Q-Value system describes the relationship between water quality and the macro invertebrate community in numerical terms. Q5 & Q4-5 waters have high water quality (unpolluted), Q4 waters have good water quality (unpolluted), Q3-4 have moderate water quality (slightly polluted), Q3 & Q2-3 have poor water quality (moderately polluted) and Q2, Q1-2 & Q1 have bad water quality (seriously polluted). The closest EPA station upstream of the agglomeration (07M030800) has a most recent Q-Value rating of Q3-4 ( = moderate water quality (slightly polluted)), whilst the closest EPA station downstream of the agglomeration (07M030900) also has a most recent Q-Value rating of Q3-4 ( =moderate water quality (slightly polluted)). This consistency in water quality from upstream of the Carlanstown WWTP discharge locations, to that downstream of the discharge locations, would indicate that the quality of the effluent discharged is not having a negative effect on the quality of the Moynalty River.

The Moynalty River (into which Carlanstown emissions discharge) is situated within the Boyne River Catchment and forms part of the Eastern River Basin District. An Office of Public Works (OPW) Hydrometric Station exists approximately 5.1km downstream from the Primary Discharge Point at Carlanstown WWTP. This Station is registered on the EPA the Register of Hydrometric Stations 2007 as Fyanstown, Autographic Recorder, Station No. 07006. According to the EPA Office of Environmental Assessment, flow measurements have been carried out at this station from 1945 to 2008.

Figure F1.A-1 overleaf indicates the extent of the upstream surface water river catchment area of the Moynalty River at Carlanstown WWTP Primary Discharge Point, as provided by the EPA Office of Environmental Assessment.

The estimated upstream catchment area of the Moynalty River to Station Number 07006 is approximately 187.7km<sup>2</sup>, while the upstream catchment area of the Moynalty River to the Carlanstown WWTP Primary Discharge Point approximately 122.5km<sup>2</sup>.



The estimated long-term flows in the Moynalty River at co-ordinates E 276742 N 279159 are as follows:

Estimated 95 percentile (based on flow measurements at Station No 07006) - **0.124m<sup>3</sup>/s**.

Estimated Dry Weather Flow (based on flow measurements at Station No 07006) – **0.059m<sup>3</sup>/s**.

Estimated 50 percentile (based on continuous records from Station No 07006) – **1.19m<sup>3</sup>/s**

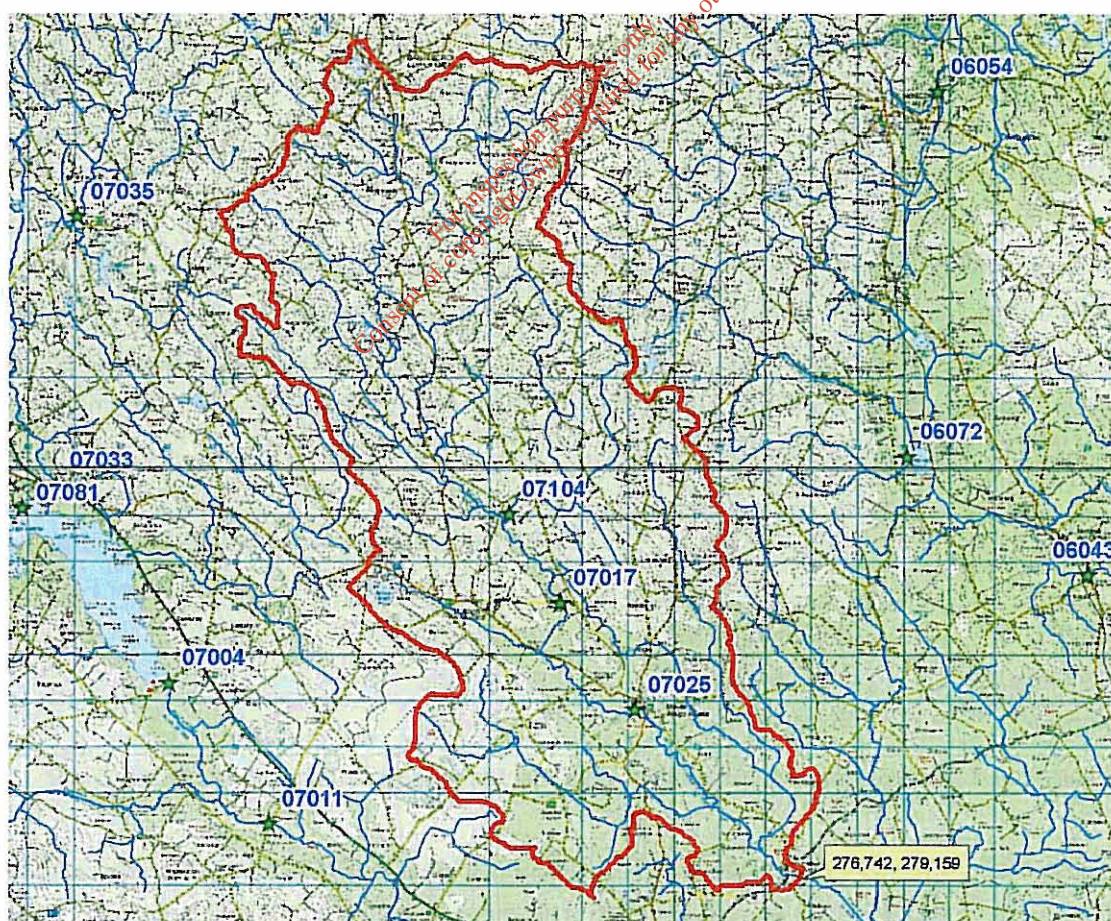
The magnitude and frequency of occurrence of river flows is required for various purposes. In general the above flow rates are used for the following:

Dry Weather Flow – for water abstraction for domestic and industrial use

95 percentile flow – licence conditions for effluent discharge during low flow

50 percentile flow – for average flow conditions in the river

The above flow rates are the best available estimates, as provided by the EPA Office of Environmental Assessment.



**Figure F1.A-1: Catchment Area of the Moynalty River upstream of the Carlanstown WWTP Primary Discharge Point – data provided by EPA, Office of Environmental Assessment.**



Meath County Council have a fixed flow meter on the inlet to the Carlanstown WWTP. The inlet flow meter reading results indicate the following:

Average / Normal Daily flow WWTP (MCC inlet flow meter) – **110.0 m<sup>3</sup>/d**

Peak Daily flow from the WWTP (MCC inlet flow meter) – **175.0 m<sup>3</sup>/d**

The DWF Rate to the Carlanstown WWTP was calculated based on an average loading per household and commercial unit connected to the scheme. Details of the DWF calculations are contained in Section B9 of this application.

Average DWF from the WWTP (2009)- **108.7 m<sup>3</sup>/d**

By converting these flow rates from m<sup>3</sup>/d to m<sup>3</sup>/s gives the following:

Average DWF from the WWTP (2009)- **0.00126 m<sup>3</sup>/s**

Average / Normal Daily flow WWTP (MCC inlet flow meter) – **0.00127 m<sup>3</sup>/s**

Peak Daily flow from the WWTP (MCC inlet flow meter) – **0.00203 m<sup>3</sup>/s**

The rates of flow of foul sewage are dependant on the distribution of population and on the rate at which water is used. In terms of foul flow the average flow is called the Dry Weather Flow (DWF) and is the average rate of flow of domestic and industrial wastewater, together with an allowance for infiltration.

A simple assessment designed to indicate the available dilution in the receiving waters at the primary discharge point from the WWTP has been carried out. The dilution effects of the Carlanstown WWTP effluent discharge on the receiving waters under various flow conditions have been tabulated below. For the purpose of these calculations it has been assumed that the WWTP Dry Weather Flow Rate is equal to the 95 percentile low flow rate.

Flow	WWTP	Moynalty River	WWTP discharge as a % of River Flow
<b>DWF</b>	0.00126 m <sup>3</sup> /s	0.059 m <sup>3</sup> /s	2.1%
<b>95%-tile</b>	0.00126 m <sup>3</sup> /s	0.124 m <sup>3</sup> /s	1.0%
<b>50%-tile</b>	0.00127 m <sup>3</sup> /s	1.190 m <sup>3</sup> /s	0.1%

**Table F1.A-1: Volumetric Contribution by WWTP Discharge to River Flows in Receiving Water**

Table F1A-1 indicates that under DWF conditions in the Moynalty River the flow rate is 0.059m<sup>3</sup>/s. The DWF is the annual minimum daily mean flow with a probability of exceedence of 0.98 (i.e. with a return period of 50 years). The DWF Rate is therefore an unusual event.

Due to the extremity of the DWF interest is more often centred on low flows where pollution is a concern. The practise in relation to WWTP effluent discharges is to use the 95 percentile flow, that is the flow equalled or exceeded at least 95% of the time, in determining dilution rates. The table above indicates under low flow conditions it is predicted that the WWTP final effluent discharge accounts for 1% of the total flow in the receiving waters.

During 50 percentile (average) flow condition in the receiving water, it is predicted that the WWTP final effluent discharge accounts for 0.1% of the total flow.

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**ATTACHMENT F.1(B)**  
**MONITORING OF THE RECEIVING WATER**  
**PRIMARY DISCHARGE POINT**

- Table F.1(i)(a): Surface/Ground Water Monitoring - Downstream
- Table F.1(i)(b): Surface/Ground Water Monitoring (Dangerous Substances) - Downstream
- Table F.1(i)(a): Surface/Ground Water Monitoring - Upstream
- Table F.1(i)(b): Surface/Ground Water Monitoring (Dangerous Substances) - Upstream

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TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

## Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1d
Grid Ref (12 digits, 6E, 6N)	277097 / 279109

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	11/05/09						
pH	= 8.33				Grab	1	Meter
Temperature	= 0				Grab	0	
Electrical Conductivity (@ 25°C)	= 257				Grab	14	Meter
Suspended Solids	= 9.5				Grab	2	Gravimetric
Ammonia (as N)	= 0.238				Grab	0.2	Spectro
Biochemical Oxygen Demand	= 1.84				Grab	1	5 Day ATU
Chemical Oxygen Demand	= 27.7				Grab	1	Spectro
Dissolved Oxygen	= 10.1				Grab	1	Meter
Hardness (as CaCO <sub>3</sub> )	= 119				Grab	1	ICP MS
Total Nitrogen (as N)	< 6				Grab	2	Spectro
Nitrite (as N)	= 0.00609				Grab	0.0152	Kone
Nitrate (as N)	= 1.5				Grab	0.0677	Kone
Total Phosphorous (as P)	= 0.0541				Grab	0.0183	ICP IRIS
OrthoPhosphate (as P)	< 0.03				Grab	0.03	Kone
Sulphate (SO <sub>4</sub> )	= 11.9				Grab	3	Kone
Phenols (Sum)	< 2				Grab	2	HPLC

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper

For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	
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TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

## Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1d
Grid Ref (12 digits, 6E, 6N)	277097 / 279109

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	11/05/09						
Atrazine	< 0.07				Grab	0.07	GCMS
Dichloromethane	< 3				Grab	3	Instrument
Simazine	< 0.04				Grab	0.04	GCMS
Toluene	< 1				Grab	1	Instrument
Tributyltin	< 0.02				Grab	0.02	GCMS
Xylenes	< 1				Grab	1	Instrument
Arsenic	< 0.75				Grab	0.75	ICP MS
Chromium	< 0.7				Grab	0.7	ICP MS
Copper	< 1.6				Grab	1.6	ICP MS
Cyanide	< 5				Grab	5	Distillation
Fluoride	< 500				Grab	500	Kone
Lead	< 0.4				Grab	0.4	ICP MS
Nickel	= 1.56				Grab	1.5	ICP MS
Zinc	< 5				Grab	5	ICP MS
Boron	< 18				Grab	18	ICP MS
Cadmium	< 0.22				Grab	0.22	ICP MS
Mercury	< 0.01				Grab	0.01	CV AA
Selenium	= 1.02				Grab	1	ICP MS
Barium	= 84.1				Grab	0.8	ICP MS

Additional Comments:	
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TABLE F.1(i)(a): SURFACE/GROUND WATER MONITORING

## Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1u
Grid Ref (12 digits, 6E, 6N)	276474 / 279249

Parameter	Results (mg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	11/05/09						
pH	= 8.26				Grab	1	Meter
Temperature	= 0				Grab		
Electrical Conductivity (@ 25°C)	= 262				Grab	14	Meter
Suspended Solids	= 20				Grab	2	Gravimetric
Ammonia (as N)	< 0.2				Grab	0.2	Spectro
Biochemical Oxygen Demand	= 8.08				Grab	1	5 Day ATU
Chemical Oxygen Demand	= 26.3				Grab	7	Spectro
Dissolved Oxygen	= 9.3				Grab	1	Meter
Hardness (as CaCO <sub>3</sub> )	= 119				Grab	1	ICP MS
Total Nitrogen (as N)	< 6				Grab	2	Spectro
Nitrite (as N)	= 0.0304				Grab	0.0152	Kone
Nitrate (as N)	= 1.64				Grab	0.0677	Kone
Total Phosphorous (as P)	= 0.162				Grab	0.0183	ICP IRIS
OrthoPhosphate (as P)	= 0.0731				Grab	0.03	Kone
Sulphate (SO <sub>4</sub> )	= 13.7				Grab	3	Kone
Phenols (Sum)	< 2				Grab	2	HPLC

For Orthophosphate: this monitoring should be undertaken on a sample filtered on 0.45µm filter paper

For Phenols: USEPA Method 604, AWWA Standard Method 6240, or equivalent.

Additional Comments:	
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TABLE F.1(i)(b): SURFACE/GROUND WATER MONITORING (Dangerous Substances)

## Primary Discharge Point

Discharge Point Code:	SW-1
MONITORING POINT CODE:	aSW-1u
Grid Ref (12 digits, 6E, 6N)	276474 / 279249

Parameter	Results (µg/l)				Sampling method	Limit of Quantitation	Analysis method / technique
	11/05/09						
Atrazine	< 0.07				Grab	0.07	GCMS
Dichloromethane	< 3				Grab	3	Instrument
Simazine	< 0.04				Grab	0.04	GCMS
Toluene	< 1				Grab	1	Instrument
Tributyltin	< 0.02				Grab	0.02	GCMS
Xylenes	< 1				Grab	1	Instrument
Arsenic	< 0.75				Grab	0.75	ICP MS
Chromium	= 1.03				Grab	0.7	ICP MS
Copper	= 24.9				Grab	1.6	ICP MS
Cyanide	< 5				Grab	5	Distillation
Fluoride	< 500				Grab	500	Kone
Lead	= 3.61				Grab	0.4	ICP MS
Nickel	= 2.25				Grab	1.5	ICP MS
Zinc	= 23.6				Grab	5	ICP MS
Boron	< 18				Grab	18	ICP MS
Cadmium	< 0.22				Grab	0.22	ICP MS
Mercury	< 0.01				Grab	0.01	CV AA
Selenium	< 1				Grab	1	ICP MS
Barium	= 92.3				Grab	0.8	ICP MS

Additional Comments:	
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**ATTACHMENT F.1(C)**  
**MONITORING OF THE RECEIVING WATER**  
**SECONDARY DISCHARGE POINT**

The Carlanstown Sewerage Agglomeration does not have any Secondary Discharge Points.

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**ATTACHMENT F.1(D)**  
**GROUND EMISSIONS**

There are no emissions to ground/groundwater from the Carlanstown Sewerage Agglomeration; therefore any impact on ground/groundwater is unexpected.

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**ATTACHMENT F.1(E)**  
**WATER QUALITY OF THE EXISTING ENVIRONMENT**

The Water Quality of the existing environment is discussed in Attachment F.1(A) above.

As previously discussed, the 2 no. emissions discharge to the Moynalty River, which has no designation of ecological significance.

The Moynalty River is not classified as nutrient sensitive under the Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) or any subsequent amendments thereof.

The Moynalty River flows within the Boyne Catchment and forms part of the Eastern River Basin District. A copy of the '*River Boyne Water Quality Management Plan*' (November 1997) has been included in Attachment F.1(E) of this application.

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**ATTACHMENT F.1(F)**  
**EMISSIONS OF MAIN POLLUTING SUBSTANCES**  
**(DEFINED IN DANGEROUS SUBSTANCES REGULATIONS, S.I. 12 OF 2001)**

Based on the once-off analysis of Effluent (Primary Discharge Point) Analysis presented on Table D.1(i)(c), it is concluded that Fluoride alone and none of the other substances listed in Annex X of the Water Framework Directive (2000/60/EC) or any of the Relevant Pollutants listed in Annex VIII of the Water Framework Directive (2000/60/EC) are seen to be present in the effluent from the works, at concentrations above the standards set in the Water Quality (Dangerous Substances) Regulations, 2001 (S.I. 12 of 2001). Fluoride concentrations in the treated effluent were recorded at 666ug/l, which is above the standard of <500ug/l set by the above regulations (where the hardness of the water measured in mg/l CaCo3 is >100mg/l).

Based on the analysis of water upstream and downstream of the Primary Discharge Point (Tables F.1(i)(a) & F.1(i)(b)), it is concluded that none of the substances listed in Annex X of the Water Framework Directive (2000/60/EC) or any of the Relevant Pollutants listed in Annex VIII of the Water Framework Directive (2000/60/EC) are seen to be present in the receiving water environment upstream or downstream of the discharge from the works, at concentrations above the standards set in the Water Quality (Dangerous Substances) Regulations, 2001 (S.I. 12 of 2001).

Therefore, although an elevated concentrations of Fluoride was identified in the treated effluent from Carlanstown WWTP on the date of the once-off sampling event (carried out as part of this licence application), the surface water sampled within the receiving water (Moynalty River) downstream of the discharge point had a concentration of <500mg/l on that same date, indicating that the high Fluoride concentrations from the WWTP were not having a negative affect on the receiving water quality in the Moynalty River.

The source of the increased fluoride concentrations in the treated effluent may be related to fluorinated drinking water sources or may be naturally occurring in the surrounding groundwater that may be infiltrating the sewer network. Meath County Council will continue to monitor for 'Fluoride' in the treated effluent from the WWTP on a monthly basis, to examine if it is a persistent issue. If it is proven to be a persistent issue, Meath County Council will investigate further.

**ATTACHMENT F.1(G)**  
**PROTECTION OF DOWNSTREAM WATER ABSTRACTION POINTS**

As will be presented in Attachment F.2, there are 2 no. Meath County Council Drinking Water Abstraction Points (Liscarton & Roughgrange) located ca. 15.85km & 39.23km downstream (respectively) of the Carlanstown Agglomeration Primary Discharge Point.

The quality of the final effluent being discharged from the Carlanstown WWTP, coupled with the very large distances (15.85km & 39.23km) between the Carlanstown Primary Discharge Point and the 2 no. Meath County Council Drinking Water Abstraction Points, indicate that the Drinking Water Abstraction Points are adequately protected.

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**ATTACHMENT F.1(H)**  
**EMISSIONS EFFECTS ON EUROPEAN SITES**

As previously discussed, all 2 no. emissions from Carlanstown WWTP (SW-1 & SW-2) discharge to the Moynalty River, which has no European Site Designation.

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**ATTACHMENT F.1(I)**  
**MEASURES FOR MINIMISING POLLUTION OVER LONG DISTANCES**  
**OR IN THE TERRITORY OF OTHER STATES**

The impact of the discharge from the Carlanstown wastewater treatment plant has been assessed and considering the present standard of treatment at the Carlanstown WWTP and the small scale of the treatment facility, it is not envisaged that the discharge from the Carlanstown WWTP will cause any adverse pollution impact on the receiving waters over long distances or in the territory of other states.

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**ATTACHMENT F.1(J)**  
**MODELLING OF DISCHARGES**

There has been no modelling of discharges from the Carlanstown Sewerage Agglomeration.

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## SECTION F – EXISTING ENVIRONMENT & IMPACT OF THE DISCHARGES

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### Attachment F2: Tabular Data on Drinking Water Abstraction Point(s)

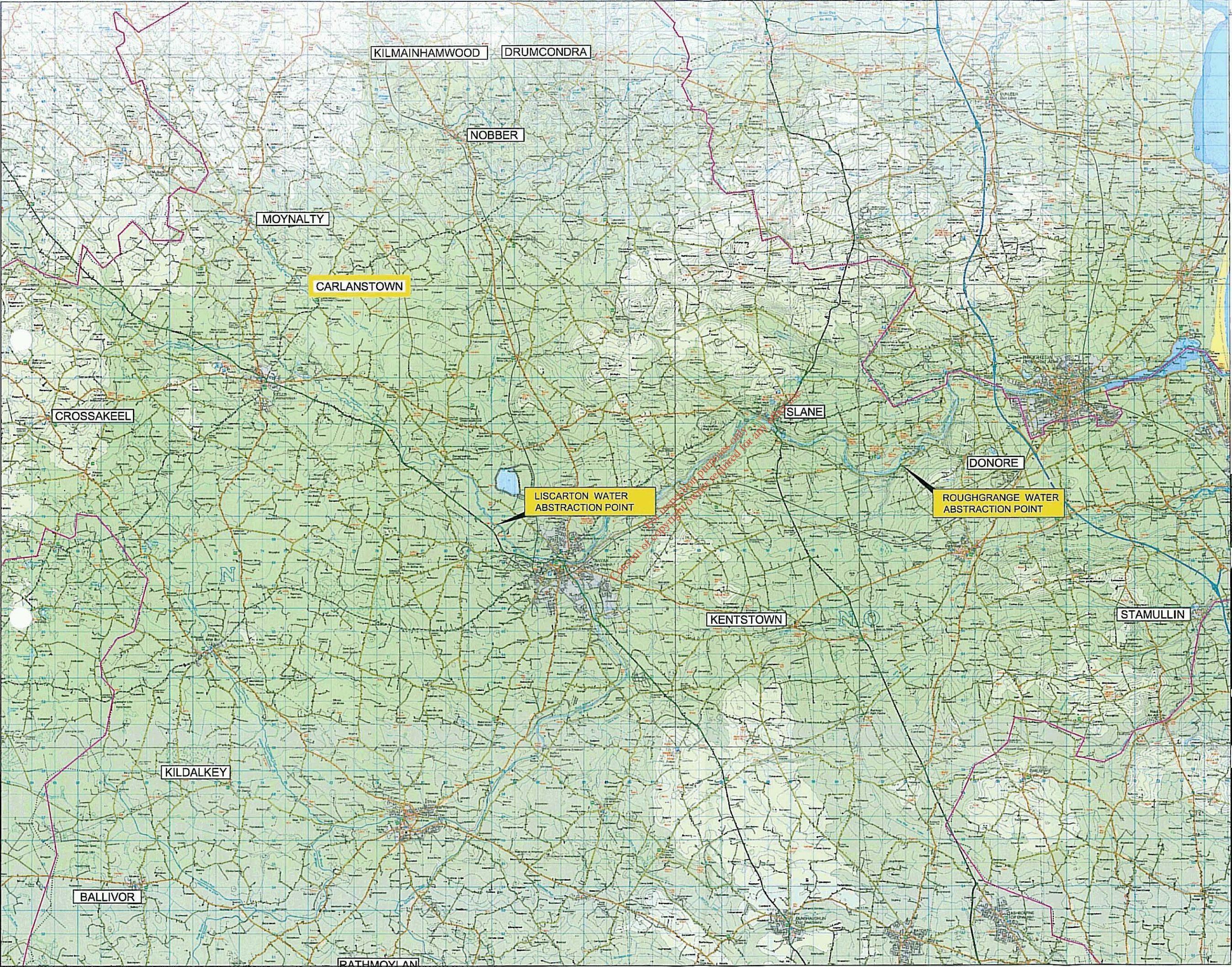
- Table F.2: Tabular Data on Downstream Drinking Water Abstraction Points
- Drawing 5270-2796
- Potential Risks to Downstream Drinking Water Abstraction Points from Waste Water Discharge(s)

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Table F2

[illegible]





LEGEND

MEATH COUNTY  
BOUNDARY

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chk'd
A	19.06.09	ISSUE TO MEATH CO. CD.	RK	MH

Client:

MEATH COUNTY COUNCIL

Project:

CARLANSTOWN WASTE WATER  
DISCHARGE LICENCE  
APPLICATION

Title:

DOWNSTREAM WATER  
ABSTRACTION POINT  
( SECTION / ATTACHMENT F.2 )

Scale @ A3:

1 : 150,000

Prepared by:

R.K.

Checked:

M.H.

Date:

03.06.09

Project Director:

M.F.G.

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Drawing No.:

5270-2796

Revision:

A



**POTENTIAL RISKS TO DOWNSTREAM DRINKING WATER ABSTRACTION POINTS**  
**FROM WASTE WATER DISCHARGE(S)**

As discussed in Attachment F.1(G) above, there are 2 no. Meath County Council Drinking Water Abstraction Points (Liscarton & Roughgrange) located ca. 15.85km & 39.23km downstream (respectively) of the Carlanstown Agglomeration Primary Discharge Point.

The quality of the final effluent being discharged from the Carlanstown WWTP, coupled with the very large distances (15.85km & 39.23km) between the Carlanstown Primary Discharge Point and the 2 no. Meath County Council Drinking Water Abstraction Points, indicate that the Drinking Water Abstraction Points are adequately protected.

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