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Comhairle Chontae Na Mí

Meath County Council

APPROPRIATE ASSESSMENT OF THE IMPACTS OF THE DISCHARGES FROM CARNAROSS, LLOYDS KELLS, ROBINSTOWN AND DUNDERRY WASTE WATER TREATMENT PLANTS ON THE RIVER BOYNE AND BLACKWATER SPECIAL AREA OF CONSERVATION

FINAL

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Director of Services,
Infrastructure,
Meath County Council,
County Hall,
Railway Street,
Navan, Co. Meath.

Jennings O'Donovan & Partners,
Consulting Engineers,
Finisklin Business Park, Sligo.
Tel.: 071 - 9161416
Fax: 071 - 9161080
e mail: info@jodireland.com

JENNINGS O'DONOVAN & PARTNERS
Project, Civil and Structural Consulting Engineers,
FINISKLIN BUSINESS PARK,
SLIGO,
IRELAND.

Telephone (071) 9161416
Fax (071) 9161080

Email info@jodireland.com
Web Site www.jodireland.com

DOCUMENT APPROVAL

PROJECT	Appropriate Assessment of the Impacts of the Discharges from Carnaross, Lloyd Kells, Robinstown and Dunderry WWTP on the River Boyne & River Blackwater Special Area of Conservation	
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	Prepared by	**Reviewed by**	**Approved by**
Document **DRAFT**	Name	Name	Name
Date	Signature	Signature	Signature

	Prepared by	**Reviewed by**	**Approved by**
Document **FINAL**	Name Michelle Howley	Name Nuala Carr Tomas McGloin	Name David Kiely
Date 29th July	Signature M. Howley	Signature Nuala Carr Tomas McGloin	Signature David Kiely

APPROPRIATE ASSESSMENT OF THE IMPACTS OF THE DISCHARGES FROM CARNAROSS, LLOYD KELLS, ROBINSTOWN AND DUNDERRY WASTE WATER TREATMENT PLANTS ON THE RIVER BOYNE AND RIVER BLACKWATER SPECIAL AREA OF CONSERVATION

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1.0 BACKGROUND TO THIS APPROPRIATE ASSESSMENT REPORT

1.1 PURPOSE OF THIS DOCUMENT

Jennings O'Donavan and Partners Consulting Engineers have been appointed by Meath County Council to carry out Appropriate Assessment to determine the potential effects, if any, of four existing waste water treatment works (WwTW) in County Meath on nearby sites with European conservation designations (i.e. Natura 2000 sites). The purpose of this assessment is to determine the appropriateness, or otherwise, of the schemes in the context of the conservation status of such sites.

The WwTW concerned are; Carnaross, Lloyds, Robinstown and Dunderry. The report has been produced to support the Waste Water Discharge Licence (WwDL) applications for these aforementioned agglomerations (EPA Application Register Numbers A0043-01, A0053-01, A0023-01 and A0019-01).

1.2 BACKGROUND AND REGULATORY CONTEXT

In order to gain waste water discharge licenses for the discharges from the aforementioned WwTW, Meath County Council submitted Waste Water Discharge License applications to the Environmental Protection Agency (EPA), as required under the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No 684 of 2007).

In response to these applications the EPA requested that Meath County Council *"Assess the likelihood of significant effects of the waste water discharges from the above agglomerations on relevant European sites by referring to Circular L8/08 Water Services Investments and Rural Water Programmes – Protection of Natural Heritage and National Monuments" issued by the Department of the Environment, Heritage and Local Government. In particular, the flow diagram in Appendix 1 should be completed and the results of each section recorded."* and *"If significant effects are likely then an appropriate assessment must be carried out"*

The discharges from all four WwTW ultimately discharge to the River Boyne and River Blackwater SAC and it was concluded after a Stage 1 Screening Assessment was carried out on each of the sites that an Appropriate Assessment would have to be

carried out. In order to address cumulative impacts of these discharges on this SAC it was deemed most appropriate to prepare one Appropriate Assessment Report for the discharges from all four WwTW with regard to the holistic approach taken in the Water Framework Directive. The National Parks and Wildlife Service (NPWS) were consulted in relation to the EPA Waste Water Discharge Certificate Application for Meath County Council. The purpose of the scoping letter was to incorporate NPWS recommendations and to determine if there was a need to carry out an Appropriate Assessment. A copy of this correspondence is included in Appendix 1. No response was issued by NPWS.

1.3 NATURA 2000 SITE DESIGNATION AND DESCRIPTION

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora better known as "The Habitats Directive" provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC) (better known as "The Birds Directive").

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment:

"*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*"

The River Boyne is one of Irelands larger river catchments. It rises near Edenderry on the borders of Counties Offaly and Kildare and flows in a northeasterly direction for 112km before entering the Irish Sea at Drogheda. Together with its tributaries, it drains a catchment of approximately 2,500 km^2.

The River Boyne and River Blackwater SAC is located primarily in Meath and Westmeath, but also drains smaller areas of Cavan and Louth. The designation covers the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. The location of the SAC and the WwTW for each of the four agglomerations is shown in Figure 1.

The primary discharge from Carnaross WwTP is to ground water within the River Blackwater catchment. Llyods WwTW's primary discharge is to the River Blackwater (SAC) which is a tributary of the designated River Boyne (SAC) and the primary discharge from Robinstown and Dunderry WwTW's is to the River Clady which is also a a tributary of the designated River Boyne (SAC).

1.4 THE APPROPRIATE ASSESSMENT PROCESS

1.4.1 Background

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. Firstly, the proposed scheme should aim to avoid any negative impacts on European sites by identifying possible impacts early in the plan making, and writing the plan in order to avoid such impacts. Secondly, mitigation measures should be developed, if necessary, during the AA process to the point, where no adverse impacts on the site(s) remain. Where a proposed scheme is still likely to result in adverse effects, and no alternative solutions are identified, if the proposed scheme is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, then compensation measures are required to offset any remaining adverse effect.

Appropriate Assessments must also consider "In Combination Impacts" with other plans or projects, including those being progressed by other competent

authorities as defined by the Habitats Regulations and with the prevailing background conditions.

In this case the developments (i.e. WwTW) are not new and are already in operation with final effluent discharges to the River Boyne and River Blackwater SAC. However, the EPA has deemed that AA may be necessary based on the requirements of the flow diagram in Circular L8/08. The requirements of this diagram will now be addressed for each of the WwTW.

Table 1: Carnaross WwTW impacts on relevant European sites.

Consideration	Response
1. Is the development in or on the boundary of a nature conservation site NHA/SAC/SPA?	No- The River Boyne and River Blackwater SAC is located 0.2 km east of the discharge Point.
2. Will nationally protected species be directly impacted? Wildlife Acts (1976 and 2000), Flora Protection order (S.I. 94 of 1999)?	No
3. Is the development a surface water discharge or abstraction in the surface water catchment or immediately downstream of a nature conservation site with water dependant qualifying habitats/species?	No
4. Is the development a groundwater discharge or abstraction in the ground water catchment or within 5km of a nature conservation site with water-dependant qualifying habitats/species?	Yes - The development discharges to groundwater. The River Boyne and River Blackwater SAC is located 0.2 km east of the discharge Point.
5. Is the development in the surface water or groundwater catchment of salmonid waters?	Yes – the site is located within the Boyne catchment.
6. Is the treatment plant in an active or former floodplain or flood zone of a river, lake, etc?	No.
7. Is the development a surface discharge or abstraction to or from marine waters and within 3km of a marine nature conservation site?	No.
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of nature conservation interest or the habitats of protected species?	No.

As the answer to one of the questions is 'yes', the project must be screened for its impacts. The flow diagram, below, was used for screening the project, with the red lines indicating the project-specific outcomes.

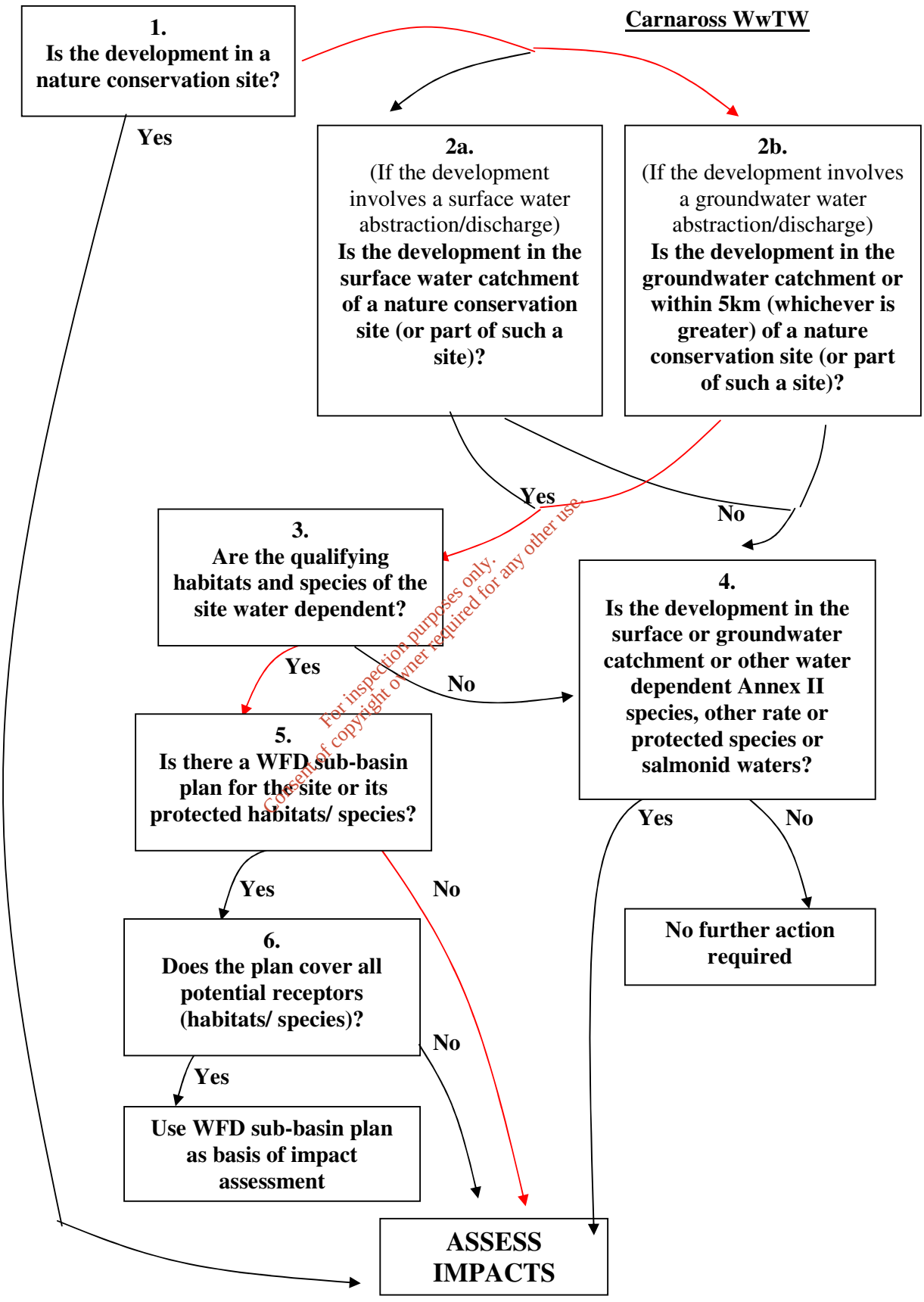


Table 2: Llyods WwTW impacts on relevant European sites.

Consideration	Response
1. Is the development in or on the boundary of a nature conservation site NHA/SAC/SPA?	The primary discharge point is located adjacent to the River Boyne & River Blackwater SAC.
2. Will nationally protected species be directly impacted? Wildlife Acts (1976 and 2000), Flora Protection order (S.I. 94 of 1999)?	No
3. Is the development a surface water discharge or abstraction in the surface water catchment or immediately downstream of a nature conservation site with water dependant qualifying habitats/species?	Yes – the development discharges to the River Boyne. The River Boyne & River Blackwater SAC.
4. Is the development a groundwater discharge or abstraction in the ground water catchment or within 5km of a nature conservation site with water-dependant qualifying habitats/species?	No.
5. Is the development in the surface water or groundwater catchment of salmonid waters?	Yes – the site is located within the Boyne catchment.
6. Is the treatment plant in an active or former floodplain or flood zone of a river, lake, etc?	No.
7. Is the development a surface discharge or abstraction to or from marine waters and within 3km of a marine nature conservation site?	No.
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of nature conservation interest or the habitats of protected species?	No.

As the answer to one of the questions is 'yes', the project must be screened for its impacts. The flow diagram, below, was used for screening the project, with the red lines indicating the project-specific outcomes.

Lloyds WwTW

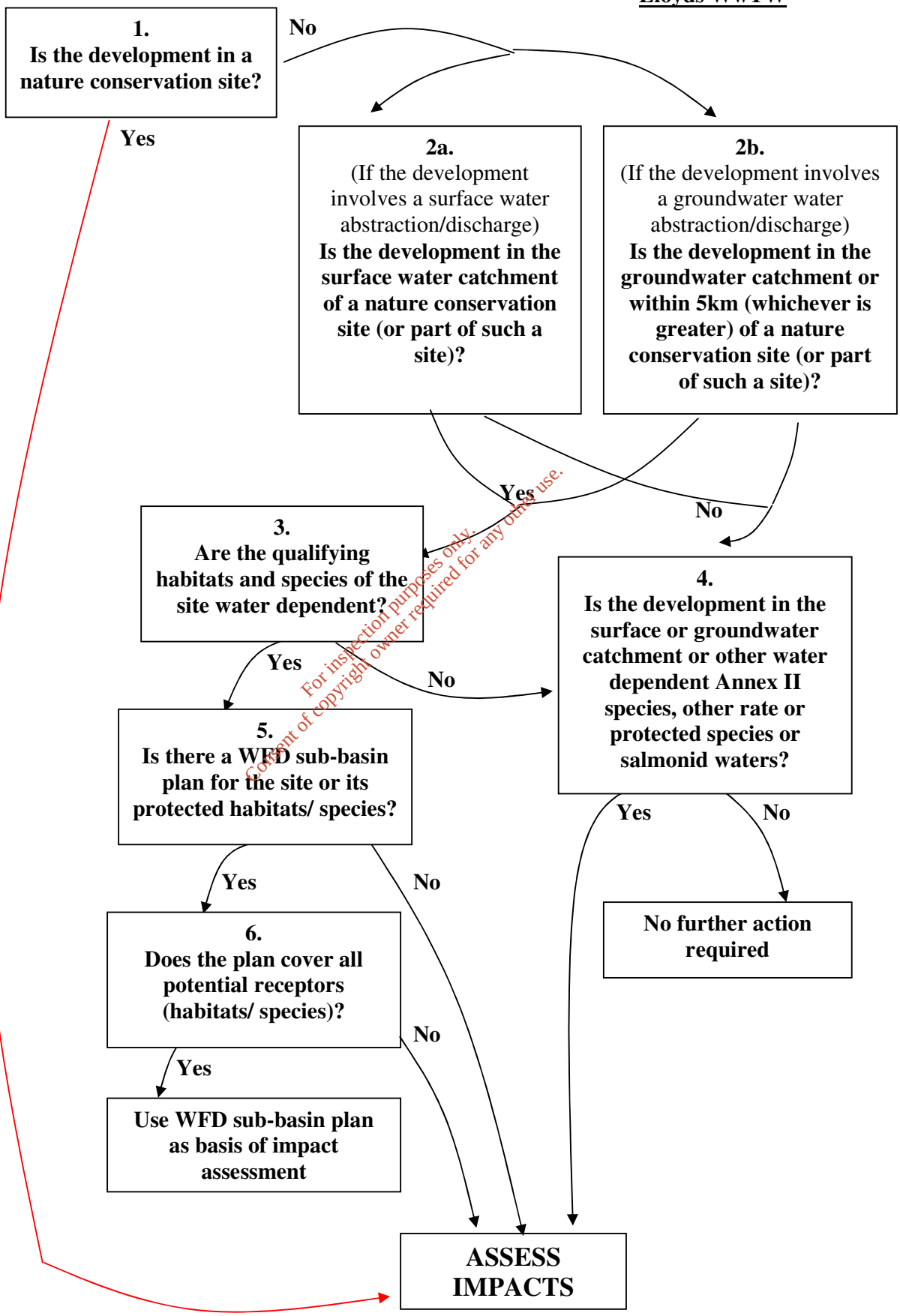


Table 3: Robinstown WwTW impacts on relevant European sites.

Consideration	Response
1. Is the development in or on the boundary of a nature conservation site NHA/SAC/SPA?	No – The River Boyne & River Blackwater SAC is located 0.7 km downstream.
2. Will nationally protected species be directly impacted? Wildlife Acts (1976 and 2000), Flora Protection order (S.I. 94 of 1999)?	No
3. Is the development a surface water discharge or abstraction in the surface water catchment or immediately downstream of a nature conservation site with water dependant qualifying habitats/species?	Yes – the development discharge is to surface water. The River Boyne & River Blackwater SAC is located 0.7 km downstream.
4. Is the development a groundwater discharge or abstraction in the ground water catchment or within 5km of a nature conservation site with water-dependant qualifying habitats/species?	No.
5. Is the development in the surface water or groundwater catchment of salmonid waters?	Yes – It is in the Boyne River Catcment. The River Boynes main channel is designated as a salmonid water
6. Is the treatment plant in an active or former floodplain or flood zone of a river, lake, etc?	No.
7. Is the development a surface discharge or abstraction to or from marine waters and within 3km of a marine nature conservation site?	No.
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of nature conservation interest or the habitats of protected species?	No.

As the answer to one of the questions is 'yes', the project must be screened for its impacts. The flow diagram, below, was used for screening the project, with the red lines indicating the project-specific outcomes.

Robinstown WwTW

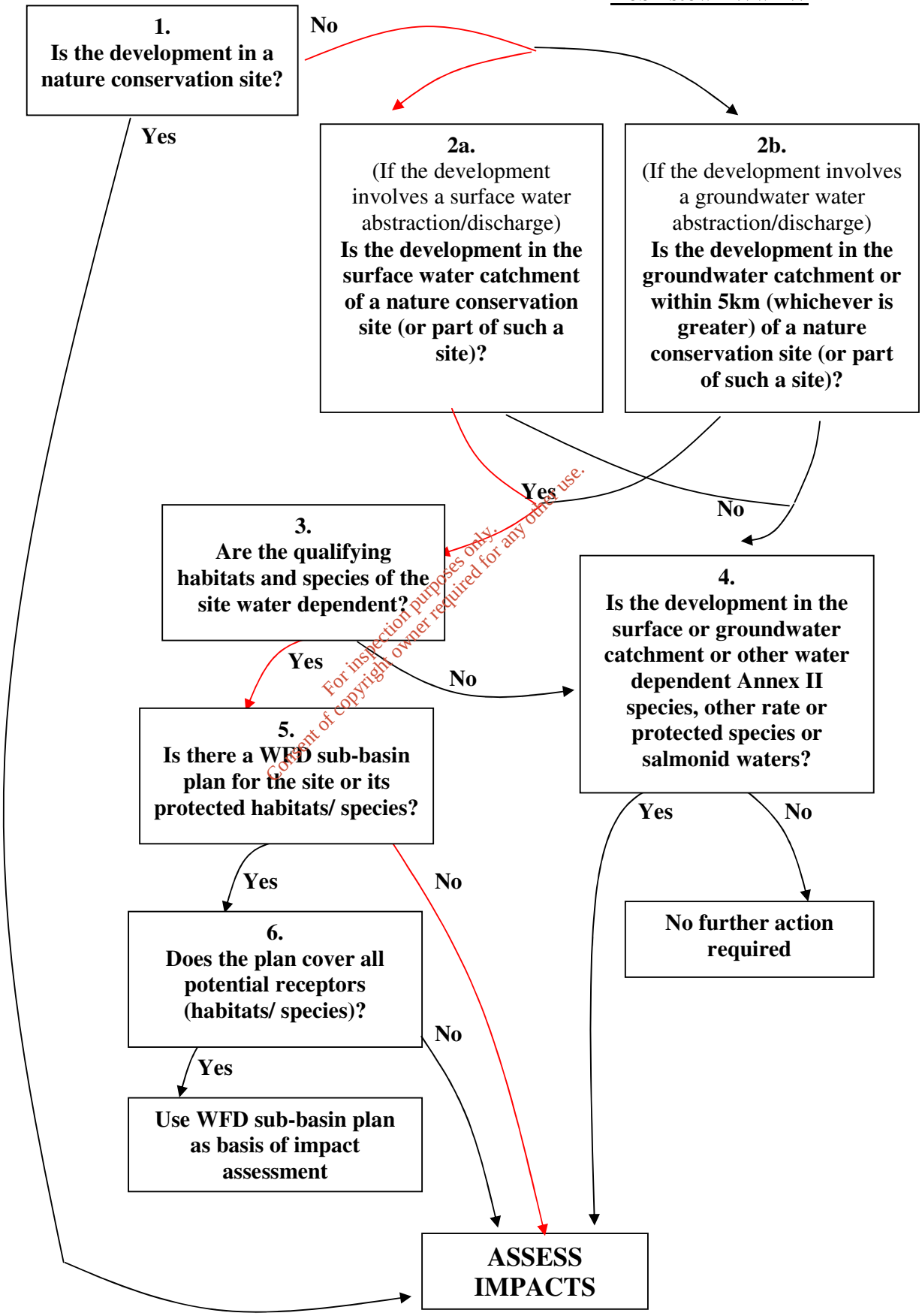
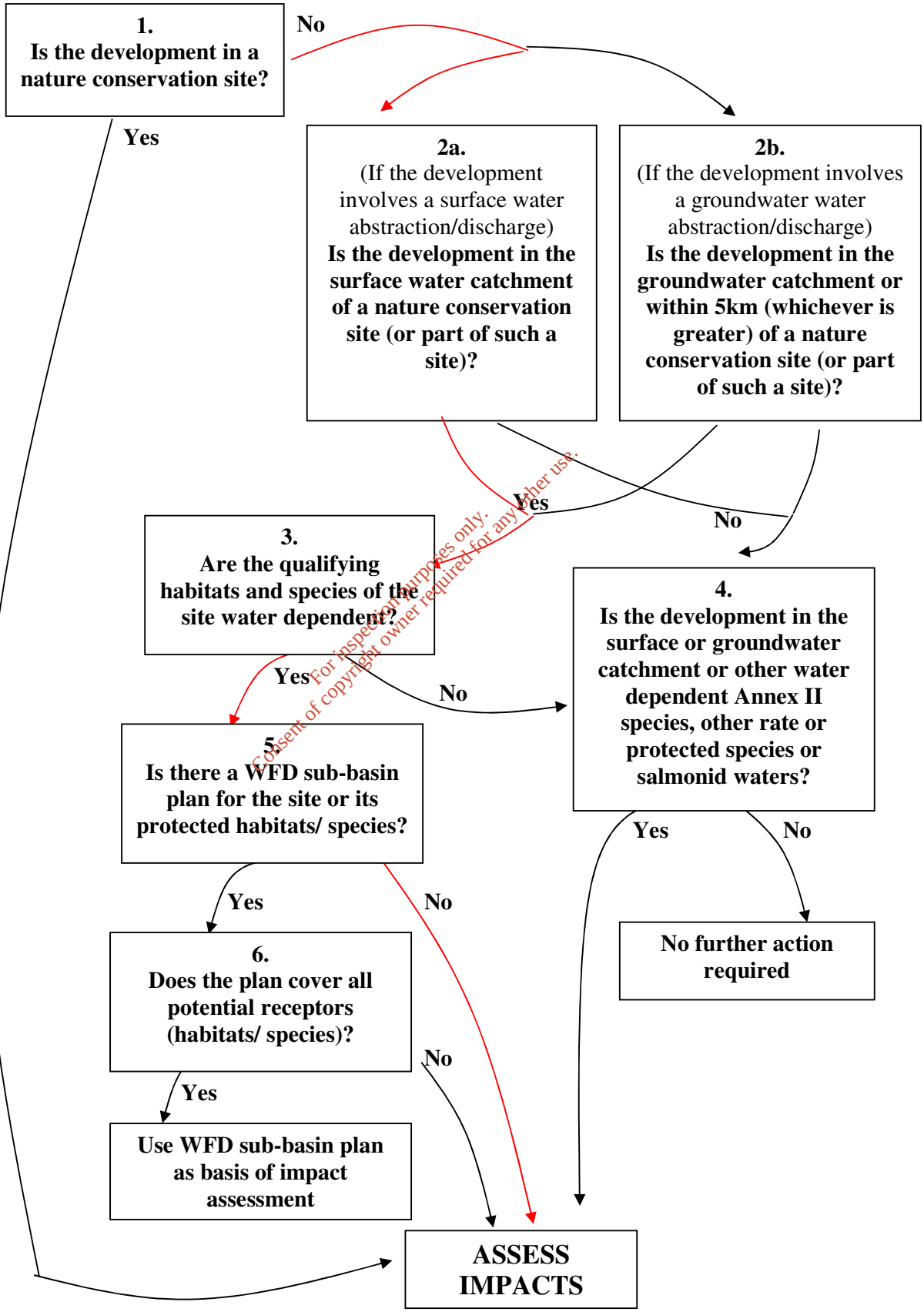


Table 4: Dunderry WwTW impacts on relevant European sites.

Consideration	Response
1. Is the development in or on the boundary of a nature conservation site NHA/SAC/SPA?	No
2. Will nationally protected species be directly impacted? Wildlife Acts (1976 and 2000), Flora Protection order (S.I. 94 of 1999)?	No
3. Is the development a surface water discharge or abstraction in the surface water catchment or immediately downstream of a nature conservation site with water dependant qualifying habitats/species?	Yes The development discharges to surface water, namely into the Clady River (5.4km upstream) (not designated) which drains into the River Boyne & River Blackwater SAC.
4. Is the development a groundwater discharge or abstraction in the ground water catchment or within 5km of a nature conservation site with water-dependant qualifying habitats/species?	No
5. Is the development in the surface water or groundwater catchment of salmonid waters?	Yes –the site is located within the Boyne catchment.
6. Is the treatment plant in an active or former floodplain or flood zone of a river, lake, etc?	No.
7. Is the development a surface discharge or abstraction to or from marine waters and within 3km of a marine nature conservation site?	No.
8. Will the project in combination with other projects (existing and proposed) or changes to such projects affect the hydrology or water levels of sites of nature conservation interest or the habitats of protected species?	No.

As the answer to one of the questions is 'yes', the project must be screened for its impacts. The flow diagram, below, was used for screening the project, with the red lines indicating the project-specific outcomes.

Dunderry WwTP



Based on the results of these flow diagrams we are required to assess the impacts of all 4 WwTW on the River Boyne and River Blackwater SAC.

1.4.2 Stages of Article 6 Assessment

As per the EPA explanatory note on Appropriate Assessment, there are four main stages to the Appropriate Assessment process.

Stage 1 of the process is Screening. This Stage identifies the likely impacts on European Sites of a plan or project either alone or in combination and considers whether these effects are likely to be significant.

In Stage 2 the impact of the project or plan on the integrity of the European Site is considered with respect to the Conservation Objectives of the site.

Stage 3 examines alternative ways of implementing the plan or project that would avoid any significant impact on the European Site.

Stage 4 addresses the question of significant impacts where there are reasons of overriding public interest or human Health and Safety considerations or important environmental benefits.

1.5 LIMITATIONS TO THE ASSESSMENT PROCESS

As per the Habitats Directive, the competent National Authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European Site concerned. In this case, the WwTW are not new plans or projects and are already in operation with discharges of Waste water to the River Boyne and River Blackwater SAC. The benefits of the Assessment Process when a plan or project is already in operation are questionable as the plan or project is already agreed on. However, the Assessment may identify any inadequacies in the existing works and identify mitigation measures if required. Alternatives to the plan or project are not really considered as it is assumed that the negative environmental impact of constructing an entirely new WwTP will far outweigh the environmental impact of the existing works.

2.0 STAGE 1 SCREENING

2.1 STEP 1: MANAGEMENT OF THE SITE

None of the WwTW are directly connected with or directly necessary to management of the The River Boyne and River Blackwater SAC.

2.2 STEP 2: DESCRIPTION OF THE PROJECT

2.2.1 Description of the Carnaross, Llyods, Robinstown and Dunderry waste water treatment plants

The elements of the WwTW's that have potential for having significant effects are the discharges of waste water to the River Boyne and River Blackwater SAC. A brief description of each WwTW and discharges is given here. More detailed information is contained in the WwDL Application for each agglomeration.

Carnaross WwTP

Carnaross is located in County Meath, on the N3 road from Navan to Cavan. It is approximately 5km west of Kells.

Carnaross has approximately 75 houses including a housing estate of 27 houses served by a short foul sewer network that discharges into a waste water treatment system.

The sewer system is separated and was built in two stages. The two sewer sections discharge into a single inlet manhole. The first section was recently built and serves 18 houses at the back of the housing estate. The second section serves the remaining 9 houses. The main foul sewer line is a 225mm diameter PVC pipe which is considered sufficient to convey foul flows to the treatment system. Junctions and house connections are below 150mm in diameter.

There is no storm overflow within the sewerage infrastructures in Carnaross. The existing treatment system (RBC – upgraded in the early 2000s) was recently upgraded when the 18 houses were built. It is closed off by a 1.8m high palisade fence.

It is estimated that the treatment system is designed on the basis of a population equivalent of approximately 150 p.e

Rotating Biological Contactors (RBC)

Primary and secondary treatment is being achieved by means of a RBC unit. The RBC unit consists of plastic media assembled on a horizontal shaft (as vertical discs) in the form of a cylinder approximately 2.5m wide and 7.5m long. The shaft is rotated at a rate varying from 1 to 10 revolutions per minute. The assembly is placed in a bulk fluid tank containing waste water, and the media are immersed to a depth of about 40% of their diameter. The rotation of the assembly ensures that the media are alternately in air and waste water resulting in a development of a biofilm.

Percolation area / Secondary Treatment

The waste water from the RBC unit then flows into a percolation system using soil as filtering media.

It is in the percolation area that the waste water undergoes secondary treatment and is purified. The waste water is distributed to the percolation area, which acts as a bio-filter. As the waste water flows into and through the soil, it undergoes surface filtration, straining, physico-chemical interactions and microbial breakdown.

The percolation system has an area of 500m^2.

Treated Effluent

The treated effluent percolates into the soil and then reaches the sub soil. There is no discharge to freshwater.

Control system

The plant is equipped with a control kiosk for the RBC unit. In case of system failure, a radio signal is sent directly to the caretaker.

Llyods WwTW

Lloyd is located in County Meath, approximately 2km west of Kells. It is accessed via the N3 road from Kells to Cavan. Lloyds serves an industrial estate by means of a foul sewer network that discharges into a waste water treatment system.

The sewer system is separated. The main foul sewer line is a 225mm diameter pipe which is considered sufficient to convey foul flows to the treatment system. There is no storm overflow within the sewerage infrastructures in the estate. There is 1 No pump station within the industrial estate and an additional pump station within the existing waste water treatment works site.

Existing Waste Water Treatment Works

The existing treatment system (activated sludge – 1973) is located adjacent to a housing estate. It is closed off by a 1.8m high fence.

It is estimated that the treatment system is designed on the basis of a population equivalent of approximately 400 p.e.

Meath County Council carried out a 14 day flow and load survey which indicate an average flow through the works of 7.1m^3/day which equates to 32 p.e. (225 l/h/day).

For the purpose of this application Meath County Council estimate an increase in non-domestic projected population of 100 p.e.

The treated effluent standards have to comply with the current Urban Waste water Treatment Regulations, 2001 (S.I. No. 254 of 2001) which gives further effect to EU Council Directives 91/271/EEC, 200/60/EC and 98/15/EC.

The Regulations require agglomerations with a P.E. of less than 2,000 pe, which discharge to freshwater or estuaries to have “appropriate treatment”. Appropriate treatment is defined in the Regulations as “treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and relevant provisions of the Directive and of other Community Directives”.

The treated effluent at Lloyds, Kells Business Park is currently meeting the standard limits as listed in the Urban Waste water Treatment Regulations for BOD, COD and SS.

The 2009 water quality results analysed by Meath County Council indicate that the quality of water within Blackwater River is presently meeting the standards upstream and downstream of the discharge point from the Lloyd, Kells Business Park waste water treatment plant for BOD, Dissolved Oxygen and Annual Orthophosphates.

It is envisaged that the WWTP can cater for additional hydraulic and organic load within design capacity.

Aeration unit

Flows from the estate are discharged into a single circular tank. Biological assimilation of the waste water is achieved within the peripheral part of the tank. Oxygen is provided by means of a surface aerator. The aeration unit of the tank is approximately 77m^2. The depth is 2.05m.

Settlement unit

Water from the aeration unit flows over a partition wall and reaches the central settlement unit where water is being separated.

The sludge and treated settlement unit of the tank is approximately 23m^2. The depth varies from 1.82 to 4.15m.

Sludge pumping

Sludge from the settling process is being pumped and returns to the aeration unit in order to maintain the microbial population.

In the settlement unit, excess sludge is removed on a monthly basis by tanker for further treatment.

Treated Effluent

The treated effluent overflows from the settlement unit to the outlet manhole. Treated water is then discharged into the River Blackwater.

Control system

The plant is equipped with a control kiosk for the aeration and pumping systems. In case of system failure, a radio signal is sent directly to the caretaker.

Robinstown WwTW

Robinstown is located in County Meath, approximately 8km south of Navan. The village is accessed via the R161 road from Navan to Trim.

The Robinstown WWTP was constructed during 2000 by a private developer in order to serve a new housing development. This developer has since gone into receivership and hence Meath County Council is being forced to take over this facility. From early 2010 Meath County Council will operate and maintain the scheme.

Robinstown has approximately 125 houses of which 59 are served by a foul sewer network that discharges into a waste water treatment system.

Sewer Network

The sewer system is separated. The main foul sewer line is a 225mm diameter pipe which is considered sufficient to convey foul flows to the treatment system. Junction to the various housing estate are 150mm in diameter. There is no storm overflow within the sewerage infrastructures in Robinstown.

Existing Waste Water Treatment Works

The existing treatment system (activated sludge – early 2000s) is located adjacent to a housing estate. It is closed off by a 1.8m high palisade fence.

It is estimated that the treatment system is designed on the basis of a population equivalent of approximately 300 PE.

For the purpose of this application Meath County Council estimate an increase in population of 12 p.e. therefore the figure allocated for projected population is 12 p.e.

The findings of the house count results in population equivalent of 156. There is also a school connected to the treatment plant with an estimated population of 38 p.e. that equates to a total current population equivalent of 194.

Meath County Council carried out a 14 day flow and load survey at the Robinstown WWTP. The findings of this indicate an average flow of 146.2m^3/day or 812 p.e (328.8m^3/day). This flow figure is higher than the results of the house count and non-domestic survey, the increase in flow levels may be a result of storm water, surface water and infiltration contributing to the incoming flows to the WWTP.

The treated effluent standards have to comply with the current Urban Waste water Treatment Regulations, 2001 (S.I. No. 254 of 2001) which gives further effect to EU Council Directives 91/271/EEC, 200/60/EC and 98/15/EC.

The Regulations require agglomerations with a P.E. of less than 2,000, which discharge to freshwater or estuaries to have "appropriate treatment". Appropriate treatment is defined in the Regulations as "treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and relevant provisions of the Directive and of other Community Directives".

The treated effluent at Robinstown is currently meeting the standard limits as listed in Urban Waste water Treatment Regulations for BOD, COD and SS.

The Local Government (Water Pollution) Act, 1977 (Water Quality Phosphorus) regulations, 1998 (S.I 258/1998) implements in part **EU Directive 76/464/EEC on pollution caused by substances discharged into the aquatic environment**. The regulations require that water quality has to be maintained or improved by reference to the Biological Quality (Q) Rating assigned by the EPA in 1997. The EPA monitoring station downstream of the discharge point is currently meeting the standard limits for BOD, DO and Orthophosphate.

The Robinstown WWTP is currently operating efficiently with spare capacity. It is envisaged that the WWTP can cater for additional hydraulic and organic load within design capacity.

An assessment of the likelihood of significant effects of the waste water discharges from the Robinstown Treatment Plant on relevant natural heritage and European sites – in this case the River Boyne and River Blackwater SAC is located 0.7km downstream of the Treatment Plant discharge point – has been carried out in accordance with Circular L8/08. Based on this assessment, it was found that the Robinstown Waste water Treatment Plant has potential to impact on the above SAC and will require further investigation – i.e. an Appropriate Assessment will have to be carried out in accordance with Article 6(3) of the Habitats Directive.

Inlet pump station

Flows from the town are first discharged into an inlet pump station equipped with a single non submersible pump.

There is no emergency overflow from the pump sump and in case of pump failure, sewerage backs up into the inlet sewer.

Sequencing Batch Reactor Unit

Flows from the pump sump are conveyed into a circular tank where biological assimilation of the waste water is achieved.

The Sequencing Batch Reactor process is a form of activated sludge treatment in which aeration, settlement and decanting occur in a single tank. The process employs a 5 stage cycle: fill, react, settle, empty and rest. Waste water enters the reactor during the fill stage; it is aerobically treated in the react stage; the biomass settles in the settle stage; the supernatant is decanted during the empty stage and sludge is withdrawn from the reactor during the rest stage; and the cycle commences again with inflow. The SBR unit is approximately 10m in diameter (i.e. 78.5m^2). The depth is 2.75m.

Settlement unit

Water from the SBR unit flows to the separate circular settlement unit.

The settlement unit is 10m in diameter (i.e. 78.5m^2). The depth is 1.5m.

Treated Effluent

The treated effluent overflows from the settlement unit to the outlet manhole. Treated water is then discharged into the Clady River.

Control system

The plant is equipped with a control kiosk for the aeration and pumping systems. In case of system failure, a radio signal is sent directly to the caretaker.

Dunderry WwTW

Dunderry is located in County Meath, approximately 8km southwest of Navan. The town is accessed via the N51 road from Navan to Athboy.

Dunderry has approximately 75 houses of which 67 are served by a foul sewer network that discharges into a waste water treatment system.

Sewer Network

The sewer system is separated. The main foul sewer line is a 150mm diameter pipe which is considered sufficient to convey foul flows to the treatment system.There is no storm overflow within the sewerage infrastructures in Dunderry

Existing Waste Water Treatment Works

The existing treatment system (activated sludge – 1973) is located adjacent to a housing estate. It is closed off by a 2.0m high masonry wall.

It is estimated that the treatment system is designed on the basis of a population equivalent of approximately 200 p.e.

The findings of the house count and short survey carried out as part of this application results in domestic population equivalent of 183 and a non-domestic population equivalent of 35 with the total population equivalent of 218.

Meath County Council carried out a flow and load survey for a 14 day period. The results of this survey indicate an average flow of 58.8m^3/day. This equates to a population equivalent of 225 l/h/day. It is envisaged that the additional flow relates to storm water flow and infiltration.

A search of planning applications for 2008 and 2009 revealed that there is no approved planning application proposing to connect to this sewerage scheme. Therefore no figure is allocated for pending development.

For the purpose of this application Meath County Council allocate an additional 15 p.e for projected population.

As mentioned above the design capacity of the Dunderry waste water treatment plant is 200. This indicates the waste water treatment plant is currently operating at full capacity.

The Dunderry waste water treatment plant is unable to cater for any additional hydraulic or organic load without posing an environmental risk to the River Clady.

The treated effluent standards have to comply with the current Urban Waste water Treatment Regulations, 2001 (S.I. No. 254 of 2001) which gives further effect to EU Council Directives 91/271/EEC, 200/60/EC and 98/15/EC.

The Regulations require agglomerations with a P.E. of less than 2,000 p.e, which discharge to freshwater or estuaries to have “appropriate treatment”. Appropriate treatment is defined in the Regulations as “treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and relevant provisions of the Directive and of other Community Directives”.

The Local Government (Water Pollution) Act, 1977 (Water Quality Phosphorus) regulations, 1998 (S.I 258/1998) implements in part **EU Directive 76/464/EEC on**

pollution caused by substances discharged into the aquatic environment. The regulations require that water quality has to be maintained or improved by reference to the Biological Quality (Q) Rating assigned by the EPA in 1997.

Sampling carried out by Meath County Council for the downstream monitoring point between 2007-2009 indicate the levels of BOD, Dissolved Oxygen and MPR are within the Quality Standards to be achieved in the River Clady which indicate a Q4 value.

An assessment of the likelihood of significant effects of the waste water discharges from the Dunderry Treatment Plant on relevant natural heritage and European sites – in this case, the Clady River drains into the River Boyne and River Blackwater SAC – has been carried out in accordance with Circular L8/08. Based on this assessment, it was found that the Dunderry Waste water Treatment Plant has potential to impact on the above SAC and will require further investigation – i.e. an Appropriate Assessment will have to be carried out in accordance with Article 6(3) of the Habitats Directive.

Aeration unit

Flows from the estate are discharged into a single tank with partition walls. Within the first part of the tank, biological assimilation of the waste water is achieved. Oxygen is provided by means of a surface aerator located next to the inlet. The aeration unit of the tank is approximately 25m^2 in area. The depth is 2.5 to 3m.

Settlement unit

Water from the aeration unit flows over a partition wall and reaches the settlement unit where sludge and treated water are being separated. The settlement unit of the tank is approximately 10m^2 in area. The depth is 2.0 to 2.5m.

Sludge pumping

Sludge from the settling process is being pumped and returns to the aeration unit in order to maintain the microbial population.

In the settlement unit, excess sludge is removed on a monthly basis by tanker for further treatment.

Treated Effluent

The treated effluent overflows from the settlement unit to the outlet manhole. Treated water is then discharged into the Clady River.

Control system

The plant is equipped with a control kiosk for the aeration and pumping systems. In case of system failure, a radio signal is sent directly to the caretaker.

The location of the WwTW's and their discharges in relation to the location of the SAC are shown in Figure 1.

2.2.2 In-combination impacts

At Stage 2 (Appropriate Assessment), the impact of the project or plan must consider "In Combination Impacts" with other plans or projects, including those being progressed by other competent authorities as defined by the Habitats Regulations and with the prevailing background conditions.

The River Boyne and River Blackwater SAC is located primarily in Meath and Westmeath, but also drains smaller areas of Cavan and Louth. The designation covers the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. In order to determine "In Combination Impacts" the entire SAC must be examined.

As this Appropriate Assessment is being carried out for Meath County Council, in combination impacts in County Meath (and downstream of the discharges from Carnaross, Lloyds, Robinstown and Dunderry) will be focused on.

EASTERN RIVER BASIN DISTRICT

In order to provide background information on the "In Combination Impacts", the Eastern River Basin District will be examined. Eight River Basin Districts were established in Ireland arising out of the legal requirements of the Water Framework Directive. The River Boyne forms part of the Eastern River Basin District.

One of the first tasks of the River Basin Districts was to establish a detailed summary of the state of the waters in each respective district. A Characterisation Report on the Eastern River Basin District was published in 2005. Section 5 of this Report deals specifically with characterisation of the Boyne Catchment. This section of the report is attached in Appendix 2. A brief summary will be given here.

One of the main requirements of the Water Framework Directive is that by 2015 all rivers achieve "good" status. Based on the Risk Assessment of River Water Bodies in the Boyne catchment, 71% are classed as at risk of not achieving this "good" status.

One of the main functions of the River Basin Districts is the formulation of River Basin Plans. The Eastern River Basin District Plan has been used as a source to aid in determining an overall picture of water quality in the area. The Eastern River Basin District is further divided into a number of local areas for which individual plans have been drafted. The local area plans detailing the section of the River into which our treatment plants discharges are as follows:

- The Blackwater North: Discharges from Carnaross WwTP
- The Blackwater North: Discharges from Lloyds, WwTP
- Athboy: Discharges from Robinstown WwTW
- The Boyne Lower: Discharges from Dunderry WwTP.

One of the main findings of these River Basin Plans is that in County Meath as a whole the primary pressures that might cause failure of meeting this "good" status are agriculture (60%), waste water and industrial discharges (30%) and waste water from unsewered properties 10%.

Environmental pressures that are listed as being present in the Boyne Catchment include:

- Diffuse sources
- Point sources
- Physical alterations
- Waste Disposal
- Water Abstraction
- Recreation and tourism

DIFFUSE SOURCES

The primary environmental problem in the Boyne Catchment is considered to be diffuse sources of agricultural run-off from pastures, arable lands, crop cultivation, managed forests and peatlands. These run-offs likely contain elevated levels of nutrients, namely nitrogen and phosphorus, suspended solids and residues of pesticides and herbicides.

POINT SOURCES

Discharges from other WwTW

There are approximately 40 waste water treatment plants in County Meath. 33 of these plants are operated by Meath County Council and 7 are operated by EPS Ireland on behalf of Meath County Council.

Of particular interest to this Appropriate Assessment are the WwTW discharging to the SAC (or its tributaries) in close proximity to the WwTW's. These are Longwood, Ballivor and Summerhill WwTW's. These WwTW are shown on **Figure 2.**

Longwood - The 1,845 p.e. agglomeration is currently served by the Longwood WwTP discharging to the River Blackwater, a tributary of the Boyne not designated at point of discharge as part of the SAC. This plant was upgraded and commissioned in Spring 2006, with a design capacity of 1,500 p.e.

Ballivor - The 1,792 p.e. agglomeration is served by the Ballivor WwTW which was upgraded and commissioned in 2006 to a design p.e. of 2,000. The plant discharges to the Stonyford River which is designated as part of the River Boyne and River Blackwater SAC.

Summerhill - The 975 p.e. agglomeration is served by the Summerhill WwTW originally designed for a p.e. of 600. A new 3,000 p.e. WwTP is currently under construction at Clonmahon. Discharge is to the Cloneymeath River which is not designated as part of the SAC.

INDUSTRIAL DISCHARGES

In the Boyne Catchment there are a total of 80 industries that produce waste water and are licensed under the following regimes

- 36 Integrated Pollution Control (IPC) by EPA
- 23 Water Pollution Act Section 4 by Local Authority
- 21 WPA Section 16 (to foul sewer) by Local Authority

2.2.3 Future in-combination impacts

It is assumed that in the current economic climate it is unlikely that there will be substantial industrial developments which will discharge directly to the River Boyne and Blackwater SAC. Such developments discharging to the SAC would be subject to an Appropriate Assessment to assess the potential impacts on the SAC and "in combination impacts" with existing WwTP.

2.2.4 Accounting for in-combination impacts

A description of the current discharges from Carnaross, Lloyds, Robinstown and Dunderry WwTW can be seen in Section 2.2.1. These discharges have potential to impact on the SAC. In order to account for In Combination Impacts described above the Waste Assimilative Capacity of the River will be assessed at each discharge point in Section 2.8.

2.2.5 Description of the River Boyne and River Blackwater SAC

The full site synopsis is appended in Appendix 3. The site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. The site is a candidate SAC selected for alkaline fen and alluvial woodlands, both habitats listed on Annex 1 of the E.U. Habitats Directive. The site is also selected for Atlantic Salmon, Otter and River Lamprey listed on Annex II of the same Directive.

2.3 STEP 3: CHARACTERISTICS OF THE SITE

The River Boyne and River Blackwater SAC has been designated to protect a number of habitats. These include:

Alkaline Fen (Habitat Code 7230)

A fen is a wetland with a permanently high water level. Its principal source of nutrients is from surface or ground-water and the substrate is an alkaline to slightly acid peat soil. Fens tend to occur in limestone regions where the water supply is

sufficiently rich in minerals. They occur throughout the country, most commonly in the West and Midlands of Ireland.

The site is a cSAC for Alkaline Fen. According to the site synopsis the main areas around the site where Fens are concentrated is in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. The hummocky nature of the terrain has led to speepages and springs which are rich in lime leading to the development of base rich marshes. Diversity of plant and animal life is high, and the flora in particular includes many rarities including Narrow-leaved Marsh Orchid (Dactylorhiza traunsteineri), Fen Bedstraw (Galium uliginosum), Cowbane (Cicuta virosa), Frogbit (Hydrocharis morsus-ranae) and Least Bur-reed (Sparganium minimum).

Like most peatland types in Ireland, fens have experienced a decline in quality, mostly as a result of activities such as peat mining, draining for cropland, infilling, and fertiliser pollution and eutrophication. Only limited measures have been introduced to address these damaging activities, which are likely to have increased in severity since the 1990's. The overall conservation status for alkaline fen habitat is bad.

The alkaline fen habitats described in the site synopsis are located upstream of the discharges from all of the WwTW. Therefore no impacts are possible and this habitat is not considered further as part of this assessment.

Alluvial Forests (Alluvial Woodlands) (Habitat Code 91E0)

Alluvial Forests are typically woodlands of alder (Alnus glutinosa) and ash (Fraxinus excelsior), often with willows (Salix spp.) and sometimes oak (Quercus robur). This habitat occurs in areas subject to periodic flooding along rivers and on lake shores. A species-rich and often luxuriant flora is associated with these woodlands, including creeping bent (Agrostis stolonifera), remote sedge (Carex remota), meadow-sweet (Filipendula ulmaria), reed-grass (Phalaris arundinacea) and water mint (Mentha aquatica). They occur widely throughout the country usually as small and isolated stands with the most extensive areas in the south-west.

According to the site synopsis Wet woodland fringes occur along many stretches of the Boyne. In particular, the Boyne River Islands are covered by dense Willow woodland and small areas of Alder Woodland. Water quality may affect the diversity of ground flora which grows in association with alluvial woodland.

There is the potential for adverse impacts upon this habitat and this habitat is considered further as part of this assessment.

Otter

Otters use a wide variety of rivers, streams, estuaries and coastal reaches, occupying home ranges from a few kilometres to over forty kilometres in length, depending on population density, food availability and habitat quality. Otters use a number of resting sites throughout their home ranges known as holts (covered sites such as cavities behind riparian ash or sycamore roots) and couches (uncovered sites such as above-ground cover amongst bramble or reeds). According to the SAC site synopsis otters are found throughout the site.

There is the potential for adverse impacts upon this species and it is considered further as part of this assessment.

Atlantic Salmon

Atlantic Salmon use the tributaries and headwaters of the River Boyne as spawning grounds. Atlantic Salmon run the Boyne almost every month of the year. The Boyne is most important as it represents an eastern river which holds large three-sea-winter fish from 20-30lb. These fish generally arrive in February with smaller spring fish (10lb) arriving in April/May. The grilse come in July, water permitting. The river gets a further run of fish in late August and this run would appear to last well after the fishing season.

There is the potential for adverse impacts upon this species and it is considered further as part of this assessment.

River Lamprey (Lampetra fluviatilis)

There are three types of lamprey in Ireland, the river lamprey, the sea lamprey and the brook lamprey. The river lamprey grows to 30cm and has a similar life history to the sea lamprey. River Lamprey is present in the lower reaches of the Boyne River.

There is the potential for adverse impacts upon this species and it is considered further as part of this assessment.

2.4 STAGE 2: APPROPRIATE ASSESSMENT

The purpose of the Stage 2 Appropriate Assessment is to evaluate the impacts/effects of the discharges from the four WwTW's on the integrity of the River Boyne and River Blackwater SAC.

Once the effects of the project or plan have been identified and predicted, it will be necessary to assess whether there will be adverse effects on the integrity of the site as defined by the conservation objectives and status of the site. This involves acquiring adequate information on the plan or project, predicting the likely effects (direct, indirect, short and long term, isolated, interactive and cumulative) and their impacts on the conservation objectives and status of the European Site. Finally, mitigation measures need to be identified and assessed against the adverse effects the plan or project is likely to cause. The importance of mitigating measures is aimed at minimising, cancelling out or ideally avoiding the negative impact of a plan or project. Mitigation measures may be an integral part of the specifications of a plan or project, or an add-on.

2.5 CONSERVATION OBJECTIVES – HABITATS

Information on the "plan or project" i.e. the WwTW has been provided in Stage 1. In relation to Conservation Objectives for the River Boyne and River Blackwater SAC and for the purposes of this assessment, the Conservation Objectives are assumed to be the maintenance of Favourable Conservation Status. Under the Habitats Regulations, Favorable Conservation Status for a natural habitat occurs when:

- Its natural range and areas it covers within that range are stable or increasing;

- The specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future;

- The conservation status of its typical species is favourable.

The habitats in the River Boyne and River Blackwater SAC that have a link to the Aquatic Environment downstream of the discharges from the WwTW in consideration are the areas of alluvial woodlands.

2.6 CONSERVATION OBJECTIVES – SPECIES

The River Boyne and River Blackwater SAC is designated for Atlantic Salmon, River Lamprey and Otter. The favourable conservation status for a species refers to:

- The population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;

- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;

- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations in a long-term basis.

Otter

Water quality generally has an indirect effect on otters by influencing prey availability rather than directly affecting the otters themselves (except in cases of toxic pollution). In Ireland, the otter diet is largely of aquatic origin, with diet predominantly consisting of salmonids, frogs and eels in freshwater areas.

Ireland has long been considered a stronghold for otter, and although recent national surveys have reported a decline in positive records, 70% of sites still showed evidence of use by otter in the 2004/5 National Survey.

The Conservation Status of this species in Ireland was assessed as Poor overall, mainly attributably to the otter population being below the favourable reference population, however the situation is expected to improve with future prospects considered to be good.

The following water quality impacts are cited in Chanin 2003, as being of relevance to otters:

Those having an indirect effect (mainly on food supply):

- Organic pollution from sewage treatment works, farms and the brewing, food and dairying Industries;
- Eutrophication as a result of run-off from farms and sewage treatment works; Acidification mainly in the form of acid rain, and Acid mine waste.

Those with mainly direct effects:

- Oil spillage, mainly in coastal areas, and
- Radioactivity.

Those with effects as a result of bioaccumulation:

- Metals, particularly mercury, but also cadmium and lead, and
- Pesticides and PCBs.

Literature cited in Chanin 2003 (Mason, 1989) concludes that PCBs have been the most important factor in limiting otter populations in Europe, while heavy metals may have had local effects but were not responsible for declines on a wide scale.

Salmon

The salmon population in Ireland has declined by 75% in recent decades and although salmon still occur in 148 Irish rivers only 43 of these have healthy populations. There are numerous factors which impact negatively on salmon, the most important of which are reduced marine survival (probably as a result of climate change), poor river water quality (resulting from factors such as inadequate sewage treatment, agricultural enrichment, acidification, erosion and siltation), forestry-related pressures and over-fishing. Salmon have different habitat requirements according to life stage but all stages are dependant on very good water quality.

The current estimates suggest that less than 10% of the wild smolts that go to sea from Irish rivers are surviving. There are real concerns relating to factors causing mortality at sea; however there is insufficient information on all factors at this stage. There have been some recent positive developments: the drift net fishery for salmon was closed in 2007 and water quality in Irish rivers and lakes in general is improving. However, the overall conservation status of salmon is still considered bad.

River Lamprey

Records of adult lampreys are sparse, with most fieldwork aimed at juveniles. Recent field surveys point to a widespread distribution of juvenile river/brook lamprey, throughout the country. They tend to be patchily distributed within catchments, but can occur in high densities (100/m2) where habitat and flow regimes are suitable.

There is a lack of data in relation to the water quality requirements of lamprey though it is generally assumed that quality should correspond to Q4. As river lamprey migrate downstream to the sea to spawn it is critical that their migration route is free from barriers.

According to a Survey of Juvenile Lamprey Populations in the Boyne Catchment, undertaken in 2005, lampreys (both river/brook) were present at reasonable

numbers at all sites and several age groups were present. Therefore the authors determined that the overall status is considered to be favourable.

The current status and future prospects of these species across Ireland appears to be good.

As salmon and lamprey have high water quality requirements and will be in closer proximity to the WwTW discharge than the Annex 1 habitats of the River, the approach taken within this assessment is that measures which mitigate for any impact on salmon and lamprey will also mitigate for potential impacts to the Annex 1 habitats.

2.7 PREDICTION OF LIKELY EFFECTS

Sewage discharges can potentially have several effects in receiving waters:

- Addition of toxic substances resulting in decline of species diversity and abundance
- Addition of suspended solids leading to clogging of gills and feeding mechanisms of filter feeders and decreased photosynthesis activity
- Addition of pathogens
- Deoxygenation due to inputs of readily oxidizable organic matter
- Nutrient (P and N) enrichment causing increased algal growth leading to eutrophication and a possible fall in dissolved oxygen levels

Potential adverse impacts relating to water quality for each of the designated features of the SAC is provided below in Table 5.

Table 5: Potential Impacts on European site due to WwTP's.

Designated Feature	Potential Impacts Due to WWTW
Alluvial woodlands	**Indirect** - Nutrient enrichment may result in effects upon site integrity, algal mats, knock on effects on invertebrates and wildfowl. Level of potential impacts is low. WAC will be checked to ensure assimilative capacity is available. **Direct** - Toxicants, including organic substances and metals, may bioaccumulate further up the food chain (knock on effect on wildfowl for example). While this is considered unlikely it is included for completeness. Results of dangerous substances monitoring have been checked to ensure all limits are met. **Short** -term - in catastrophic failure scenarios (e.g. failure of entire treatment works) there may be short term effects on the alluvial woodlands and species supported. **Long-term** - Build up of nutrients and toxic substances over time. The WAC and dangerous substances monitoring will be checked. **Isolated** - In catastrophic failure scenarios there may be associated isolated effects on the alluvial woodlands and species supported. **Interactive** - The interactive effects of discharges on designated features is considered.
Salmon & Lamprey	**Direct** - Fish potentially impacted through eutrophication, reduced oxygen, toxic effects (esp. from ammonia) and changes to suspended sediments which may cause gill abrasion and bed smothering impacts. WAC will be checked to ensure assimilative capacity is available. **Short** -term - in catastrophic failure scenarios (e.g. failure of entire treatment works) there may be short term detrimental effects on salmon and lamprey. **Long**-term - Build up of nutrients and toxic substances over time. The WAC and dangerous substances monitoring have been checked. **Isolated** - In catastrophic failure scenarios there may be associated isolated effects on salmon and lamprey. **Interactive** - The interactive effects of discharges on designated features is considered
Designated Areas	**Potential Impacts Due to WWTW**
Otter	**Indirect** - Adverse effects on food resources (mainly fish). Fish potentially impacted through eutrophication, reduced oxygen, toxic effects (esp. from ammonia) and changes to suspended sediments which may cause gill abrasion and bed smothering impacts **Direct** - Bioaccumulation of metals, particularly mercury, but also cadmium and lead. Toxic effects of pesticides and PCBs. While this is considered unlikely for the current scheme it is included for completeness. Results of dangerous substances monitoring have been checked to ensure all limits are met. **Short** -term - in catastrophic failure scenarios (e.g. failure of entire treatment works) there may be short term effects on otter. **Long-term** - Possible Bioaccumulation of metals. Toxic effects of pesticides and PCBs. While this is considered unlikely for the current scheme, included for completeness. Results of dangerous substances monitoring have been checked to ensure all limits are met. **Isolated**- In catastrophic failure scenarios there may be associated isolated effects on otter populations. **Interactive** - The interactive effects of discharges on designated features is considered.

2.8 QUALITY OF DISCHARGES

The Quality of discharges from each WwTW is fully detailed as part of the WwDL Applications. A brief summary is given here.

2.8.1 Carnaross waste water treatment plant

The findings of the grab sample taken during the 14 day flow and load survey indicate the treated effluent at Carnaross is meeting the standards for BOD, COD and SS.

2.8.2 Lloyds waste water treatment plant

The treated effluent at Lloyd, Kells Business Park is currently meeting the standard limits as listed in the Urban Waste water Treatment Regulations for BOD, COD and SS.

The 2009 water quality results analysed by Meath County Council indicate that the quality of water within Blackwater River is presently meeting the standards upstream and downstream of the discharge point from the Lloyds, Kells Business Park Waste Water Treatment Plant for BOD, Dissolved Oxygen and Annual Orthophosphates.

2.8.3 Robinstown waste water treatment plant

The Robinstown Waste Water Treatment Plant is currently operating within the recommended limits.

2.8.4 Dunderry waste water treatment plant

Sampling carried out by Meath County Council for the downstream monitoring point between 2007-2009 indicate the levels of BOD, Dissolved Oxygen and MPR are within the recommended limits.

2.9 EXISTING RIVER WATER QUALITY

A description of the water quality at each discharge location will now be given.

Carnaross Waste Water Treatment Plant

The upstream and downstream Biological Quality Ratings on the River Blackwater are both Q 3-4 - Moderate Status. The WFD Risk Category is “at risk of not achieving good status”.

The WAC have been determined using a p.e. of 150. Upstream and Downstream chemical data giving background concentrations is shown in the table below as presented in the EPA Report for Water Quality in Ireland 2001-2003.

Parameter	Concentration	
	Kells upstream Station EPA Station 1100	Kells downstream Station EPA Station 1300
BOD	2.5	2.4
Ortho Phosphate P	0.03	0.04
Ammonia N	0.03	0.05
Oxidised Nitrogen N	1.4	1.9

The dilution available in the Blackwater River is 767. This is based on a 95% flow of the river of 0.24m^3/s. The Dry Weather Flow to the WWTP is 0.000313m^3/s (at loading of 150 p.e.). The dilution factor in the River Blackwater is therefore: 0.24/ 0.000313 = 767.

BOD

Based on a treated effluent BOD of less than 25mg/l which is presently achieved by the plant based on the sampling carried out as part of the discharge licence application (23 mg/l on the 09/09/09), and using an allowable concentration of BOD of 3mg/l (lower than prescribed in the Salmonid Regulations and equivalent to Q4 waters i.e. increased quality target) the resultant loading to the river is less than the WAC calculated for the River and is therefore acceptable.

Ortho-Phosphate P

Ortho phosphate concentrations are presently equal to the maximum allowable concentration prescribed under the Phosphorus Regulation (i.e. 0.03 mg/l). It is however proposed to improve upstream concentrations through agricultural control. The assessment below takes into account such improvements on upstream concentrations (ortho phosphate levels decreased by 0.01 mg/l to 0.02 mg/l).

The existing WwTP at Carnaross does not include chemical dosing for phosphorus removal. Using the average effluent concentration of Ortho-Phosphate P of 10.4mg/l (sampling carried out as part of the Waste water Discharge Licence), the WwTP flowrate of 27m3/day and allowable Ortho-Phosphate concentration of 0.03mg/l

(Phosphorus Regulations and equivalent to Q4 waters), the effluent Ortho-Phosphate P is more than the WAC for the River.

As a result, even if improvements to background levels are made through better agricultural practice, the River has limited assimilative capacity for Ortho-Phosphate P. A possible solution would be to impose a final effluent phosphorous limit to ensure that levels are reduced below the average effluent concentration of 10.4mg/l. This may have an impact on improving the river water quality but the effect will be limited as Phosphorus removal technologies can presently only achieve a target concentration of 1 mg/l.

Ammonia

Using a maximum effluent Ammonia Concentration of 40mg/l (which is presently achieved by the WwTP), the flowrate of 27m3/day and target level in the River of 0.5mg/l the effluent Ammonia is less than the WAC for the River and is therefore acceptable.

Lloyds Waste Water Treatment Plant

The upstream and downstream Biological Quality Ratings on the River Blackwater are both Q 3-4 - Moderate Status. The WFD Risk Category is "at risk of not achieving good status".

The WAC have been determined using a p.e. of 400. Upstream and Downstream chemical data giving background concentrations is shown in the table below as presented in the EPA Report for Water Quality in Ireland 2001-2003.

Parameter	Concentration	
	Kells upstream Station EPA Station 1100	Kells downstream Station EPA Station 1300
BOD	2.5	2.4
Ortho Phosphate P	0.03	0.04
Ammonia N	0.03	0.05
Oxidised Nitrogen N	1.4	1.9

The dilution available in the Blackwater River is 230. This is based on a 95% flow of the river of 0.24m3/s. The Dry Weather Flow to the WWTP is 0.001042m3/s (at loading of 400p.e.). The dilution factor in the River Blackwater is therefore : 0.24/ 0.001042 = 230.

BOD

Assuming an effluent BOD of less than 25mg/l and using an allowable concentration of BOD of 3mg/l (lower than prescribed in the Salmonid Regulations and equivalent to Q4 waters i.e. increased quality target) the resultant loading to the river is less than the WAC calculated for the River and is therefore acceptable.

The concentration of 25 mg/l was however not achieved on the 10/09/2009 (sampling carried out as part of the Discharge Licence Application) and the effluent concentration was 32 mg BOD/l. Using this concentration, it was found that the BOD loading to the river is still significantly less than the assimilative capacity of the Blackwater River and is therefore acceptable.

Ortho-Phosphate P

Ortho phosphate concentrations are presently equal to the maximum allowable concentration prescribed under the Phosphorus Regulation (i.e. 0.03 mg/l). It is however proposed to improve upstream concentrations through agricultural control. The assessment below takes into account such improvements on upstream concentrations (ortho phosphate levels decreased by 0.01 mg/l to 0.02 mg/l).

The existing WwTP at Lloyd business park does not include chemical dosing for phosphorus removal. Using the average effluent concentration of Ortho-Phosphate P of 3.8mg/l (sampling carried out as part of the Waste water Discharge Licence), the WwTP flowrate of 90m3/day and allowable Ortho-Phosphate concentration of 0.03mg/l (Phosphorus Regulations and equivalent to Q4 waters), the effluent Ortho-Phosphate P is more than the WAC for the River.

As a result, even if improvements to background levels are made through better agricultural practice, the River has limited assimilative capacity for Ortho-Phosphate P. A possible solution would be to impose a final effluent phosphorous limit to ensure

that levels are reduced below the average current effluent concentration of 3.8mg/l. This may have an impact on improving the river water quality but the effect will be limited as Phosphorus removal technologies can presently only achieve a target concentration of 1 mg/l.

Ammonia

Using a maximum effluent Ammonia Concentration of 40mg/l (which is presently achieved by the WwTP), the flowrate of 90m3/day and target level in the River of 0.5mg/l the effluent Ammonia is less than the WAC for the River and is therefore acceptable.

Robinstown Waste Water Treatment Plant

The upstream and downstream Biological Quality Ratings on the River Boyne are both Q 3-4 - Moderate Status. The WFD Risk Category is "at risk of not achieving good status".

The WAC have been determined using a p.e. of 300. Upstream and Downstream chemical data giving background concentrations is shown in the table below as presented in the EPA Report for Water Quality in Ireland 2001-2003.

Parameter	Concentration	
	Upstream EPA Station	Downstream EPA Station
BOD	1.6	-
Ortho Phosphate P	0.05	0.03
Ammonia N	0.03	0.03

The dilution available in the Boyne River is 3,520. This is based on a 95% flow of the river of 2.75m3/s. The Dry Weather Flow to the WWTP is 0.000781m3/s (at loading of 300p.e.). The dilution factor in the River Boyne is therefore : 2.75/ 0.000781 = 3,520.

BOD

Based on a treated effluent BOD of less than 25mg/l which is presently achieved by the plant based on the sampling carried out as part of the discharge licence

application (14 mg/l on the 10/09/09), and using an allowable concentration of allowable BOD of 3mg/l (lower than prescribed in the Salmonid Regulations and equivalent to Q4 waters i.e. increased quality target) the resultant loading to the river is less than the WAC calculated for the River and is therefore acceptable.

Ortho-Phosphate P

Ortho phosphate concentrations are presently above the maximum allowable concentration prescribed under the Phosphorus Regulation (i.e. 0.03 mg/l). It is however proposed to improve upstream concentrations through agricultural control. The assessment below takes into account such improvements on upstream concentrations (ortho phosphate levels decreased by 0.01 mg/l to 0.02 mg/l).

The existing WwTP at Robinstown presently uses a Sequencing Batch Reactor Unit which is capable of reducing phosphorus levels. Using an average effluent concentration of Ortho-Phosphate P of 2.5mg/l (concentration based on sampling carried out as part of the discharge licence application), the WwTP flowrate of 67.5m3/day and allowable Ortho-Phosphate concentration of 0.03mg/l (Phosphorus Regulations and equivalent to Q4 waters), the effluent Ortho-Phosphate P is less than the WAC for the River and therefore acceptable.

However, it should be noted that if improvements to background levels are not made, the River has limited assimilative capacity for Ortho-Phosphate P. A possible solution would be to improve phosphorus removal capabilities of the Plant. This may have an impact on improving the river water quality but the effect will be limited as Phosphorus removal technologies can presently only achieve a target concentration of 1 mg/l.

Ammonia

Using a maximum effluent Ammonia Concentration of 40mg/l, the flowrate of 67.5m3/day and target level in the River of 0.5mg/l the effluent Ammonia is less than the WAC for the River and is therefore acceptable.

Dunderry Waste Water Treatment Plant

The upstream and downstream Biological Quality Ratings on the River Boyne are both Q 3-4 - Moderate Status. The WFD Risk Category is "at risk of not achieving good status".

The WAC have been determined using a p.e. of 200. Upstream and Downstream chemical data giving background concentrations is shown in the table below as presented in the EPA Report for Water Quality in Ireland 2001-2003.

Parameter	Concentration	
	Upstream EPA Station	Downstream EPA Station
BOD	1.6	-
Ortho Phosphate P	0.05	0.03
Ammonia N	0.03	0.03

The dilution available in the Boyne River is 5,280. This is based on a 95% flow of the river of 2.75m3/s. The Dry Weather Flow to the WWTP is 0.000521m3/s (at loading of 200p.e.). The dilution factor in the River Boyne is therefore : 2.75/ 0.000521 = 5,280.

BOD

Based on a treated effluent BOD of less than 25mg/l and using an allowable concentration of allowable BOD of 3mg/l (lower than prescribed in the Salmonid Regulations and equivalent to Q4 waters i.e. increased quality target) the resultant loading to the river is less than the WAC calculated for the River and is therefore acceptable.

Ortho-Phosphate P

Ortho phosphate concentrations are presently above the maximum allowable concentration prescribed under the Phosphorus Regulation (i.e. 0.03 mg/l). It is however proposed to improve upstream concentrations through agricultural control. The assessment below takes into account such improvements on upstream concentrations (ortho phosphate levels decreased by 0.01 mg/l to 0.02 mg/l).

The existing WwTP at Dunderry does not include chemical dosing for phosphorus removal. Using an average effluent concentration of Ortho-Phosphate P of 10.0mg/l, the WwTP flowrate of 45m3/day and allowable Ortho-Phosphate concentration of 0.03mg/l (Phosphorus Regulations and equivalent to Q4 waters), the effluent Ortho-Phosphate P is less than the WAC for the River and therefore acceptable.

However, it should be noted that if improvements to background levels are not made, the River has limited assimilative capacity for Ortho-Phosphate P. A possible solution would be to impose a final effluent phosphorous limit to ensure that levels are reduced. This may have an impact on improving the river water quality but the effect will be limited as Phosphorus removal technologies can presently only achieve a target concentration of 1 mg/l.

Ammonia

Using a maximum effluent Ammonia Concentration of 40mg/l, the flowrate of 45m3/day and target level in the River of 0.5mg/l the effluent Ammonia is less than the WAC for the River and is therefore acceptable.

3.0 MITIGATION MEASURES

A series of mitigation measures will be put in place following the issue of the Waste water Discharge Licences from the EPA. The mitigation measures are aimed at removing any negative impacts posed by the four waste water treatment plants on the River Boyne and Blackwater SAC.

The mitigation measures are as follows:

- A limit will be placed on final effluent phosphorous to unsure that levels will be reduced.

- Farm surveys have been carried out by Meath County Council with the aim of identifying excessive phosphorous discharges. The Water Pollution Act is used to rectify any pollution issues.

- Conditions set out in the Waste water Discharge Licence will be adhered to.

- Monitoring of effluent will be carried out at each WwTW to ensure no limit is exceeded.

- Each WwTP remaining organic and hydraulic treatment capacities will be assessed annually

- A programme of maintenance and operation will be established for all plant and equipment.

4.0 CONCLUSIONS

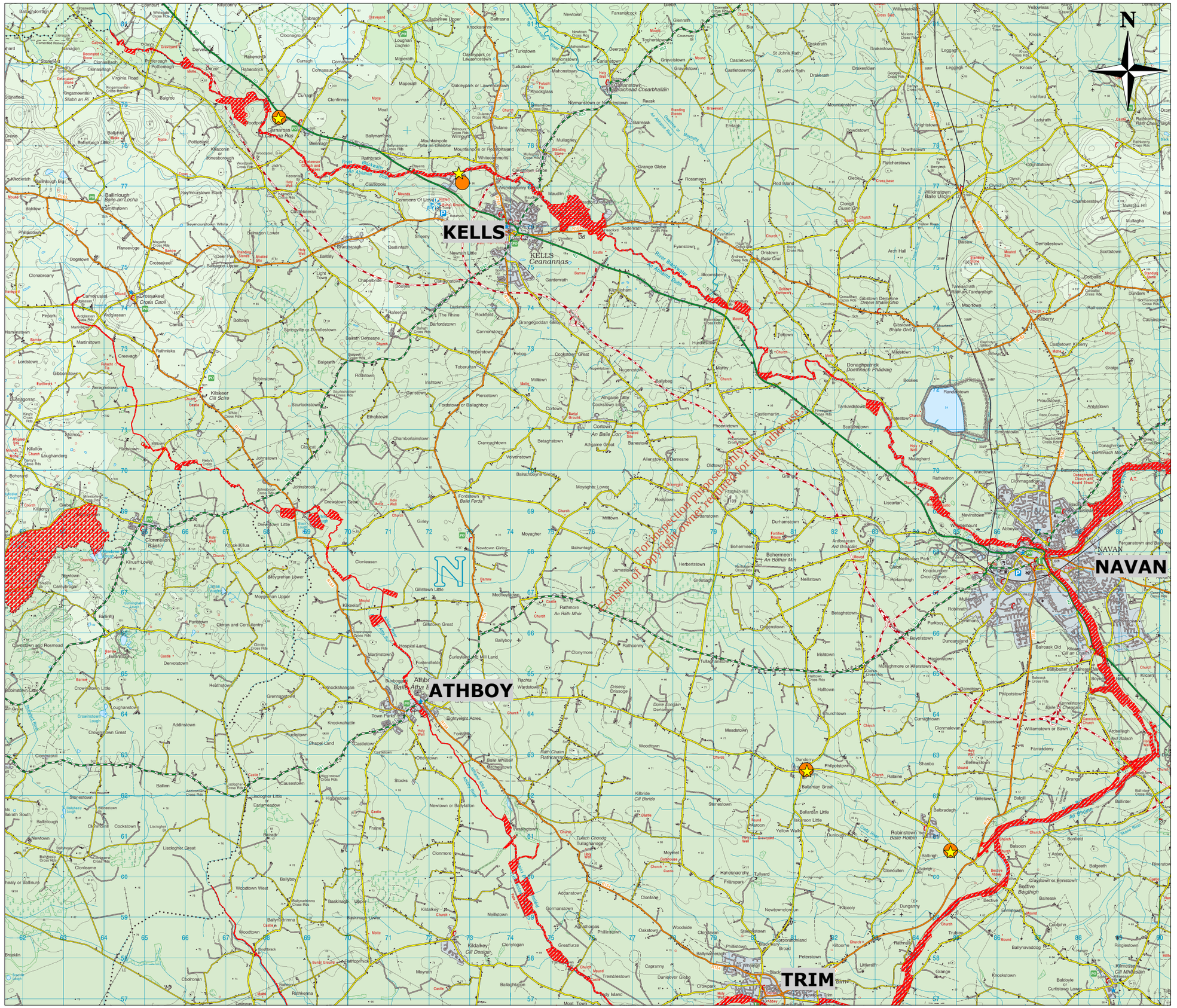
The River Boyne and Blackwater SAC is designated for two habitat types, Alkaline Fen and Alluvial Woodlands. The alkaline fen habitats are located upstream of the discharges from all of the WwTW. Therefore no impacts are possible and this habitat will not be affected. Alluvial Woodlands are not sensitive to discharges from waste water treatment plants.

The River Boyne and Backwater SAC is designated for the conservation of Atlantic Salmon, River Lamprey and Otter. These species may be vulnerable to discharges of untreated waste water. However it has been shown in Stage 1 and Stage 2 of this Assessment, the WAC Calculations and a review of the results of the Dangerous Substances Monitoring, that discharges from the WwTW do not cause adverse impacts on the integrity of the River Boyne and River Blackwater SAC.

The mitigation measures outlined in Section 3 of this report will further ensure that discharges from the four WwTW will not affect habitats and species of the SAC.

The Water Assimilative Capacity of the river at the discharge point from each WwTW was shown to be acceptable for ammonia and BOD levels with the exception of orthophosphate. The river has existing high levels of orthophosphate due to agricultural activities. It is proposed to improve upstream concentrations through agricultural control and by using The Water Pollution Act to rectify any pollution issues. This will result in Phosphate P being less than the WAC for the River and therefore acceptable.

Each of the four WwTW will adhere to the mitigation measures and effluent standards detailed in the WwDLs. This will result in the lowest possible level (negligible risk) of risk to the River Boyne and Blackwater SAC and thus it can be fully concluded that the integrity of the River Boyne and River Blackwater SAC will not be adversely affected by discharges of waste water from the Carnaross, Lloyds, Robinstown and Dunderry waste water Treatment Plants.



NOTES

- WWTP LOCATIONS
- PRIMARY DISCHARGE POINTS

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

MEATH COUNTY COUNCIL

Client Representative:

JENNINGS O'DONOVAN & PARTNERS
CONSULTING ENGINEERS

Project:

Appropriate Assessment of Four WWTW in County Meath

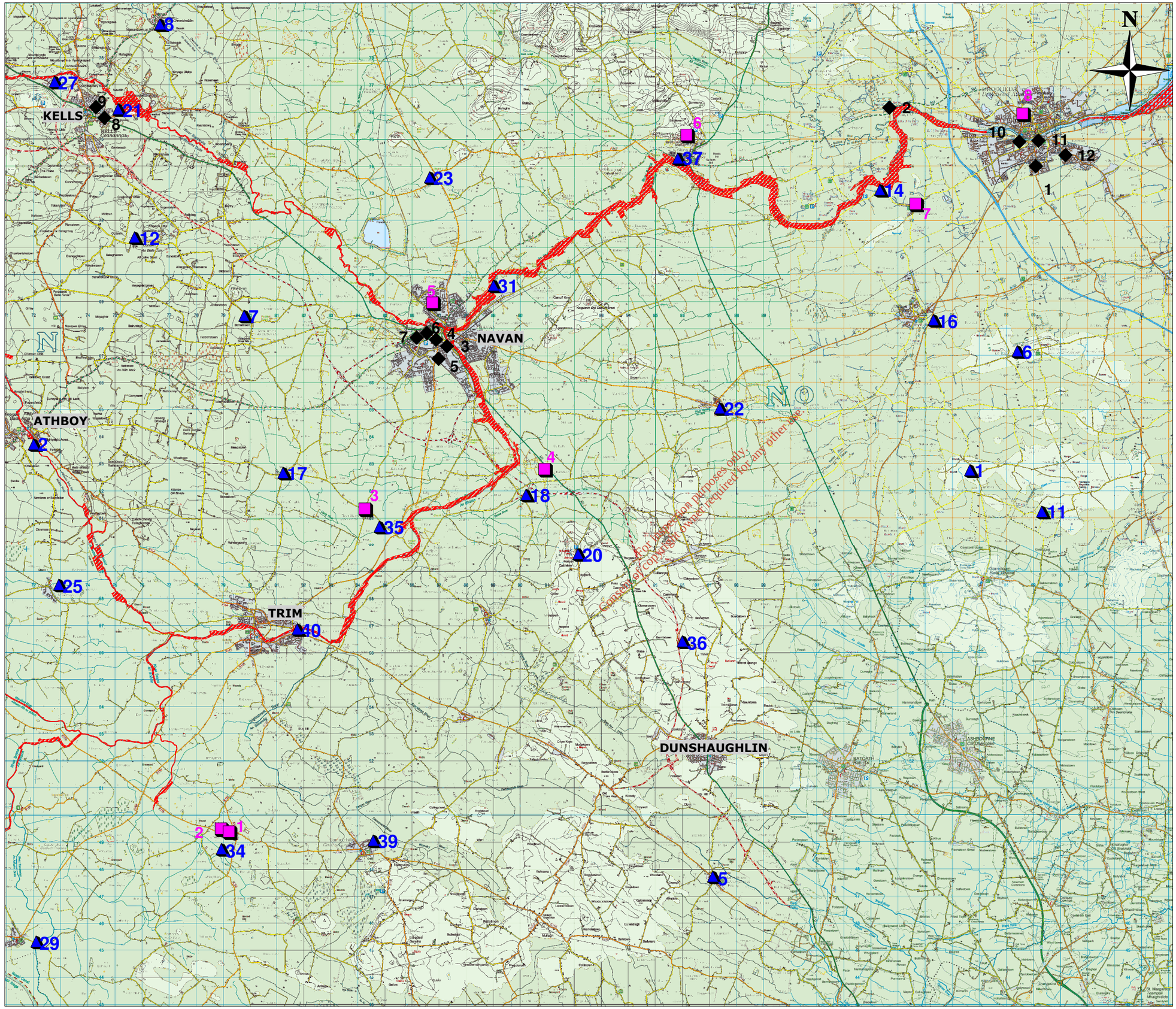
Drawing Title:

Site Location of Four WWTW

Drawn By:	T.C	Date:	July 2010
Checked By:	M.H	Date:	July 2010
Stage:	Appropriate Assessment		
Scales:	N.T.S		
Drawing No.	**Figure 1**	Revision:	

July 2010

CAD REF: 4654



NOTES

S.A.C.

IPPC Licensed Industries

1 Glanbia Foods Society
2 Superwarm Homes Ltd.
3 Boylan Print Ltd.
4 Premier Pericase
5 Marry Sow Unit
6 Sherlock Bros. Ltd.
7 Navan Carpets Ltd.
8 Cabglove Ltd.
9 Tara Mines Ltd.
10 Xtraterm Ltd.
11 Nells Stainless Ltd.
12 Complex Tooltip Ltd.

Waste Water Treatment Plants

1	Ardcath	21	Kells
2	Athboy	22	Kentstown
3	Ballinabrackey	23	Kilberry
4	Ballivor	24	Kilcloon
5	Batterstown	25	Kildakey
6	Bellewstown	26	Kilmainhamwood
7	Bohermeen	27	Lloyd/Kells
8	Carlanstown	28	Lobinstown
9	Carnaross	29	Longwood
10	Castletown	30	Moynalty
11	Clonalvy	31	Navan
12	Cortown	32	Nobber
13	Crossakeel	33	Oldcastle
14	Donore	34	Rathmolyon
15	Drumconrath	35	Robertstown
16	Duleek	36	Skreen
17	Dunderry	37	Slane
18	Dunshauglin	38	Stamullin
19	Enfield	39	Summerhill
20	Hill of Tara	40	Trim

Licensed Industries

1 TSH Enterprise Ltd.
2 M&M Construction Ltd.
3 Balbradagh Developments
4 Maynooth Mission to China
5 Peter & Ann Waters
6 Martin Naughton
7 Boyne Valley Visitors Centre
8 Marsh Oil Products

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

MEATH COUNTY COUNCIL

Client Representative:

JENNINGS O'DONOVAN & PARTNERS CONSULTING ENGINEERS

Project:

Appropriate Assessment of Four WWTW in County Meath

Drawing Title:

Incombination Impact

Drawn By:	T.C	Date:	July 2010
Checked By:	M.H	Date:	July 2010
Stage:	Appropriate Assessment		
Scales:	N.T.S		
Drawing No.	**Figure 2**	Revision:	

July 2010

CAD REF: 4654

APPENDICES

APPENDIX 1

JENNINGS O'DONOVAN & PARTNERS
CONSULTING ENGINEERS

Finisklin Business Park
Sligo

T: 071-91 61416 / 071-91 29292
F: 071-91 61080

E: info@jodireland.com
W: www.jodireland.com

4654/122/001/YMcM

12th November 2009

Ms. Mary Boothman,
Development Application Unit,
Department of the Environment,
Dùn Scéine,
Hardcourt Lane,
Dublin 2.

Re: EPA Waste Water Discharge Licence for 16 Villages in County Meath

Dear Mary,

Jennings O'Donovan & Partners are preparing EPA Waste Water Discharge Certificates Applications for Meath sewerage schemes in County Meath listed below:

1. Ardcath Sewerage Scheme (discharge to groundwater)
2. Ballinabrackey Sewerage Scheme (discharges to surface water)
3. Batterstown Sewerage Scheme (discharges to surface water)
4. Bellewstown Sewerage Scheme (discharges to Groundwater)
5. Bohermeen Sewerage Scheme (discharges to surface water)
6. Castletown Sewerage Scheme (discharges to surface water)
7. Clonalvy Sewerage Scheme (discharges to groundwater)
8. Carnaross Sewerage Scheme (discharges to groundwater)
9. Cortown Sewerage Scheme (discharges to groundwater)
10. Dunderry Sewerage Scheme (discharges to surface water)
11. Hill of Tara Sewerage Scheme (discharges to groundwater)
12. Kilberry Sewerage Scheme (discharges to surface water)
13. Lloyd, Kells Sewerage Scheme (discharges to surface water)
14. Lobinstown Sewerage Scheme (discharges to surface water)
15. Robinstown Sewerage Scheme (discharges to surface water)
16. Skryne Sewerage Scheme (discharges to surface water)

Please find enclosed site location drawings together with the local designated areas at the sixteen Wastewater Treatment Plants.

Section F of the application relating to the NPWS, requires us to give details of any designation that applies to the receiving water. After consultation with the EPA they advised us to get in contact with you to get a clear picture of the boundary of the SAC and SPA and in addition we require a letter from the NPWS stating whether the discharge is deemed impact the receivers waters or if an "Appropriate Assessment" is to be carried out.

We would be grateful for your input at your earliest convenience as the applications have to be submitted to the EPA by the 22nd of December 2009. If you have any questions regarding the above or wish to discuss the application, please do not hesitate to contact this office.

Yours sincerely,

Yvonne McMonagle
for: Jennings O'Donovan & Partners

Encl.

c.c. Mr. Gerry Boyle, Meath County Council

APPENDIX 2

Section 5
Characterisation of the Boyne Catchment

5.1 Driving Forces and Pressures in the Boyne Catchment

The primary environmental driving force in the Boyne Catchment/HA07 is considered to be agricultural production. HA07 contains 2560 km^2 of agricultural land (95% of the total catchment). Pastures comprise 74% of the catchment, while 15% is used for arable land and crop cultivation, up to 5% for managed peatlands and up to 1% for managed forest. Other ERBD driving forces of population growth (residential and tourists), industrial production, transportation, and energy demand and consumption are also present but to a lesser degree (Final Initial Characterisation Report, 2004).

The agricultural production and the other driving forces cause a number of pressures to exert negative impacts on water bodies and the larger natural environment. Environmental pressures present in the Boyne Catchment (HA07) include:

- Diffuse sources
- Point sources
- Physical alterations
- Waste disposal
- Water abstraction and
- Recreation and tourism

5.1.2 Point Sources

Thirty-six municipal wastewater treatment plants (MWWTPs) are located in the Boyne Catchment. The population equivalent (p.e.)-served range from 60 to 62,000, 24 have p.e. greater than 500. All discharge to surface waters, and all but two provide a minimum of secondary treatment. In the Boyne Catchment, there are a total of 80 industries that produce wastewater and are licensed under the following regimes:

- 36 Integrated Pollution Control (IPC) by EPA
- 23 Water Pollution Act (WPA) Section 4 (to water body) by Local Authority and
- 21 WPA Section 16 (to foul sewer) by Local Authority.

A wide range of industries is represented, with pig farms being one of the most common (12). There are also 25 active quarries or pits in the Boyne Catchment along with one mine, Tara Mines, located along the Yellow (Blackwater) Stream. Figure 5.1a presents the "municipal" point-source discharges in the Boyne Catchment, whilst Figure 5.1b shows the "industrial" point sources.

Figure 5.1a: Municipal Point Sources (HA07)

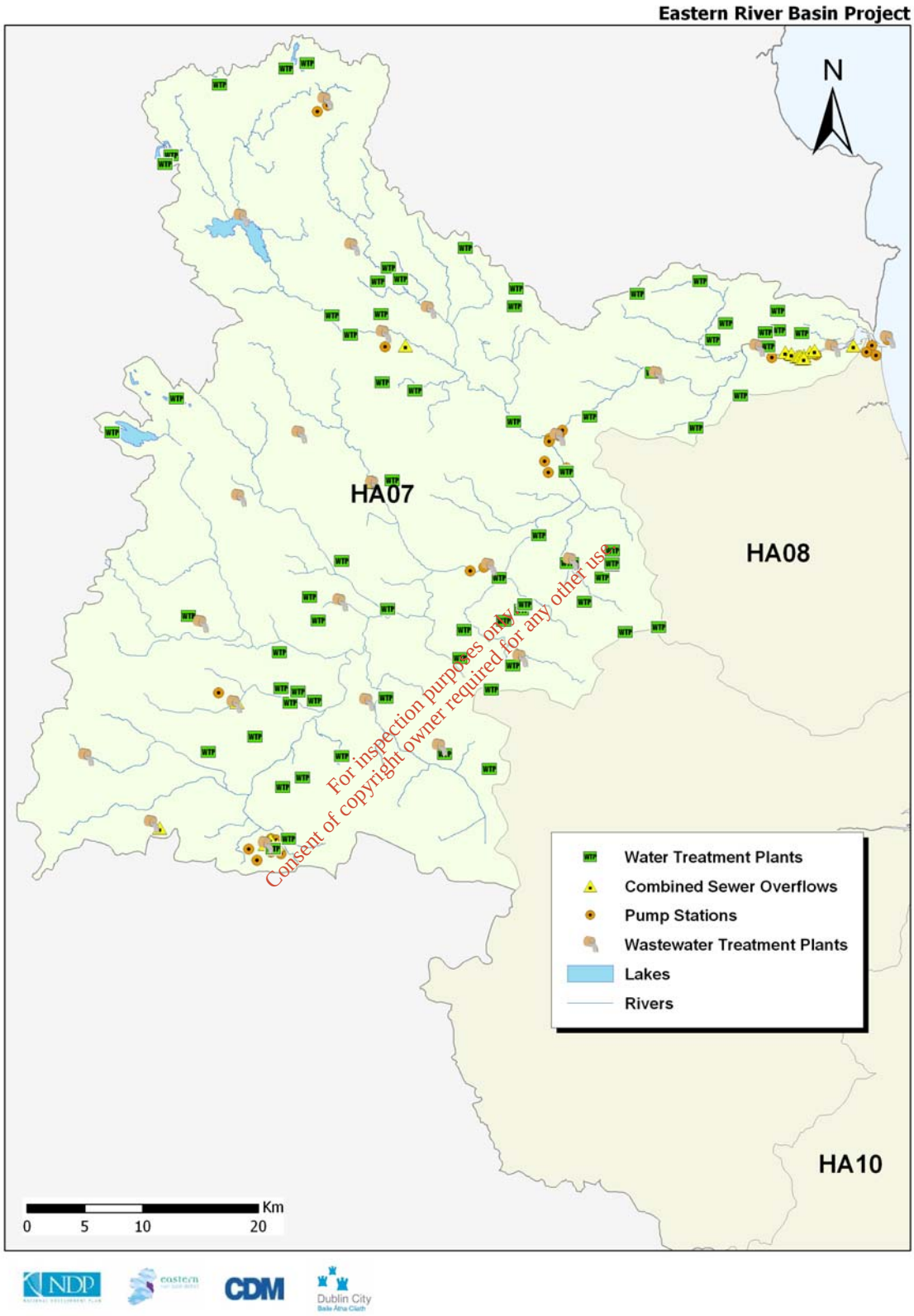
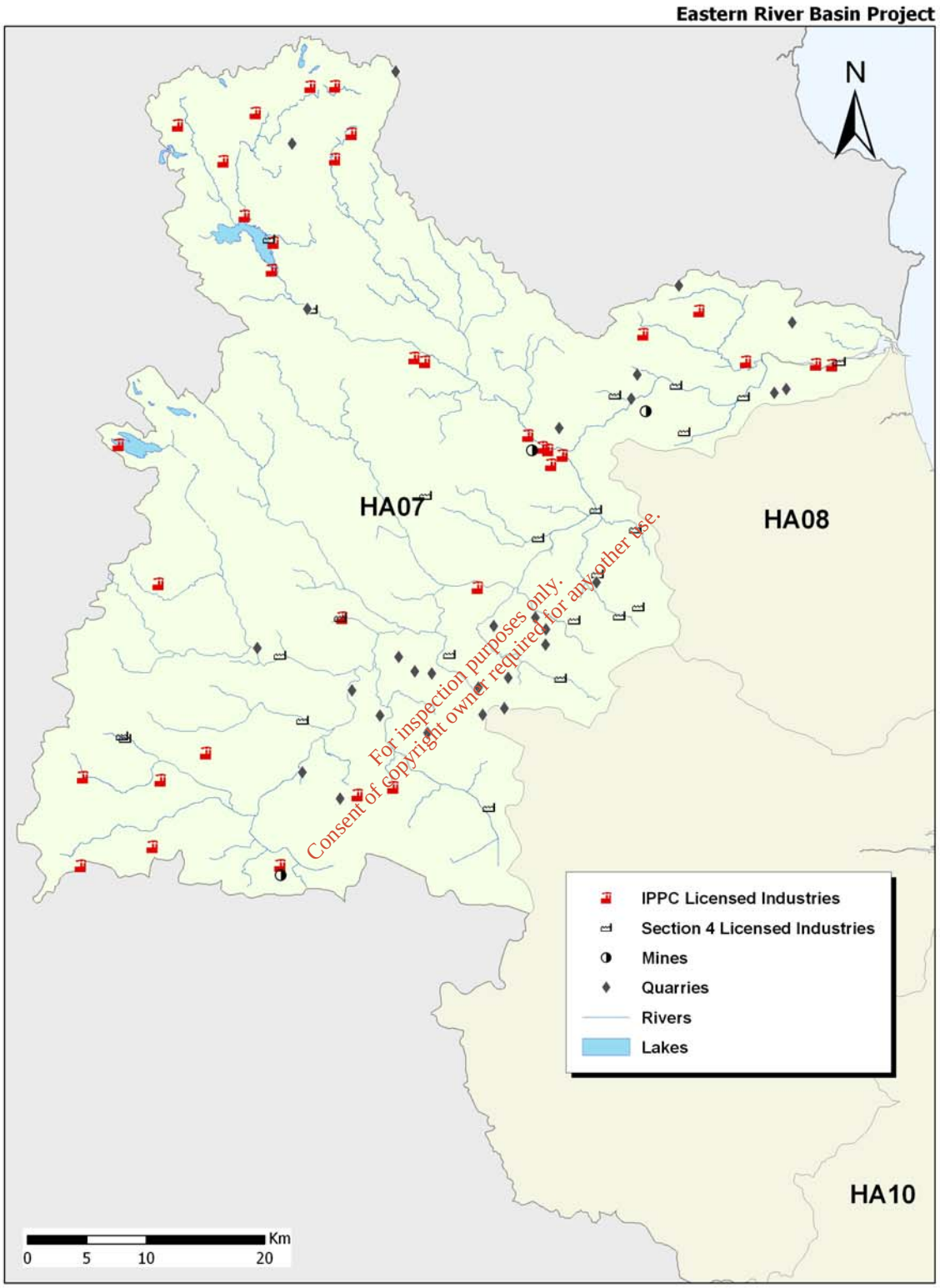


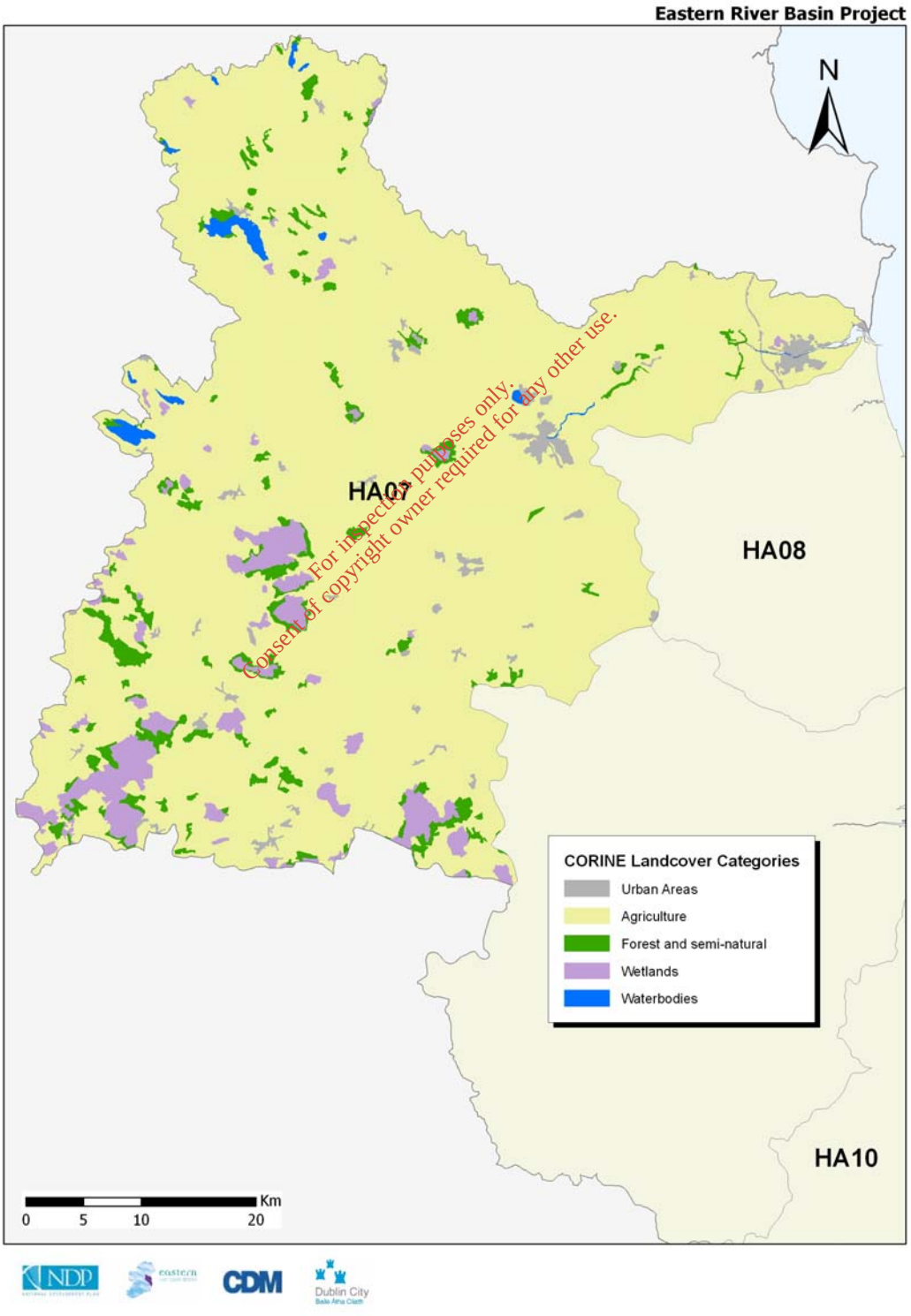
Figure 5.1b: Industrial Point Sources (HA07)



5.1.1 Diffuse Sources

Agricultural runoff has been identified as one of the primary environmental pressures in the Boyne Catchment due to the extensive presence of pastures, arable lands, and crop cultivation, as well as managed forests and peatlands. Runoff from these agricultural lands most likely includes elevated levels of nutrients, namely, nitrogen and phosphorus, suspended solids, and residues of pesticides and herbicides. Figure 5.2 shows the main land use pressures in the Boyne catchment.

Figure 5.2: Boyne Diffuse Sources (HA07)



While over a third of the agricultural land in the ERBD is being farmed under REPS guidelines, exports rates for nutrients are estimated to be high or medium for the majority of the HA07.

The Boyne Catchment contains 12 urban centres of more than 2000 people, and associated facilities covering a total of 30 km^2 or 2% of the catchment. These urban areas are a source of urban stormwater runoff and pollutant loads. Combined sewer overflows occur in the town of Drogheda. Since a substantial portion of the population of the Boyne Catchment resides outside of urban areas, a number of unsewered areas or septic tanks are probably present and may exert diffuse pressures on surface and ground waters.

5.1.3 Physical Alterations

Approximately 656 km of stream channels in HA07 have been modified to prevent flooding and to allow agricultural fields and urban development. There is one dam within HA07 that controls flows. It is located at the headwaters of a small tributary and creates the Killineer Reservoir. The estuary of the River Boyne has been altered to provide both safe harbour for boats and flood control. There are also 17 mills, 14 sluices, 5 culverts and 87 weirs on the Boyne system.

5.1.4 Solid Waste Disposal

A total of 19 waste disposal sites exist on the Boyne catchment. There are 5 active municipal licensed landfills in the Boyne Catchment. There are an additional 14 known closed sites. The number of private licensed or unlicensed landfills is unknown.

5.1.5 Water Abstraction

In HA07, water is abstracted at 15 surface water locations and at least 118 public and private groundwater locations. The largest facilities are concentrated near the towns of Drogheda, Trim, and Navan. The surface abstractions total 66,300 m^3/day, whilst the ground water abstracted volume is just over 23,000 m^3/day. These facilities are estimated to utilise less than 1% of the available water resources.

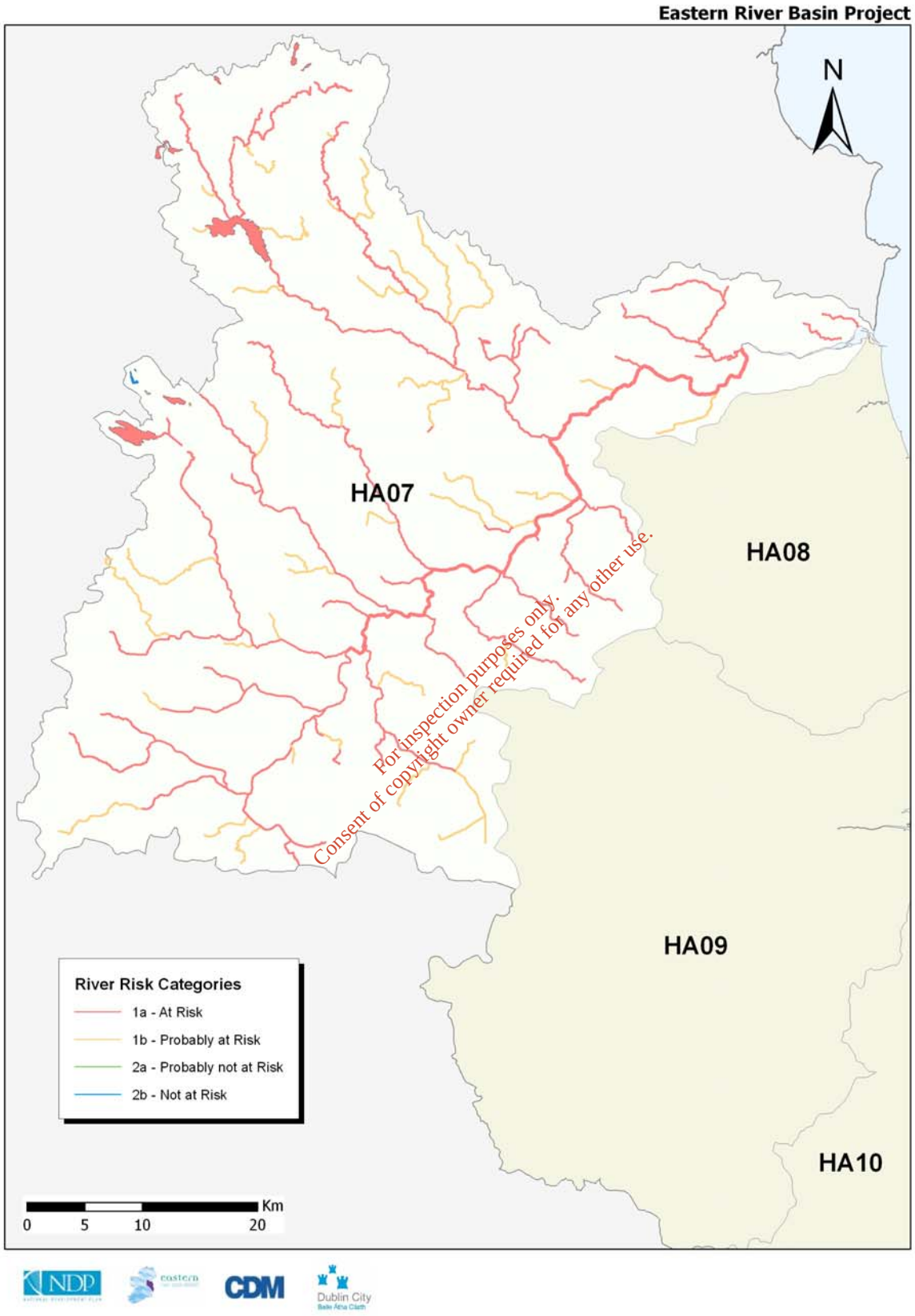
5.1.6 Tourism

Major tourist destinations located in the Boyne Catchment include Newgrange, the Trim Castle, and the Hill of Tara. Large numbers of tourists visit these sites but typically spend less than a day in the catchment.

5.2 Groundwater Evaluation

See Section 9.

Figure 5.3: Overall Risk Rivers (HA07)



5.3 River Evaluation - Boyne Catchment

5.3.1 River Water Bodies in the Boyne Catchment

The Boyne Catchment has 772 km of stream channels of various orders as previously shown in Section 3, Table 3.2. A total of 119 river water bodies have been identified in the Boyne Catchment. These water bodies are shown in Figure 5.3 and are listed in Table A.3 of Appendix A. The most common typology categories, defined in Section 4.3.2, are Type 31 (66%), Type 32 (12%) and Type 11 (11%), as shown in Figure 5.4.

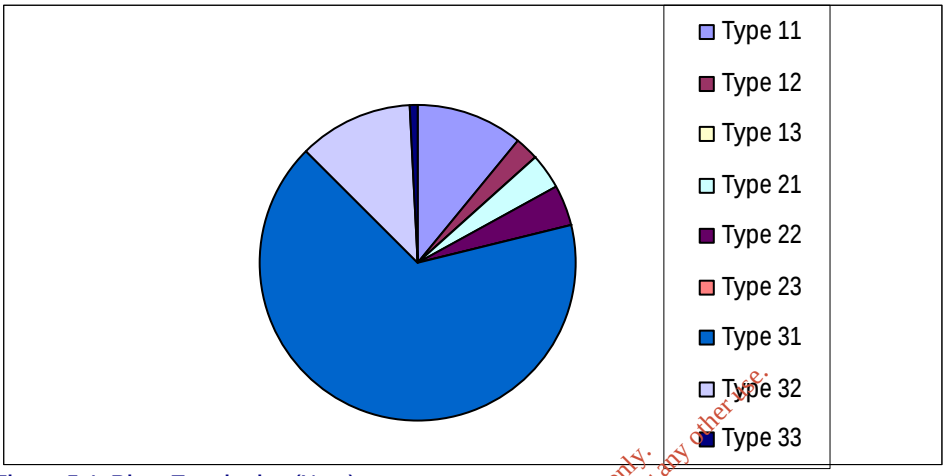


Figure 5.4: River Typologies (Num)

Water quality monitoring and biological monitoring at over 100 stations indicate that about 30% of the river water bodies are "unpolluted" (Class A) and 1% are considered "seriously polluted" (Class D). However, 42% of the monitored channels are considered "slightly polluted" (Class B) (*ERBD Initial Characterisation Report, 2004).*

In general, the lengths of "unpolluted" (Class A) and "moderately polluted" (Class C) channels have declined, while a slight increase in the "slightly polluted" channels has occurred. Impacted river channels were typically located in areas with pastures, arable land, and peat bogs, and/or downstream of MWWTPs.

5.3.2 Risk Assessment of River Water Bodies in the Boyne Catchment

Results of the risk assessment are summarised in Table 5.1. None of the river lengths are classified as "Not At Risk", or "Probably Not At Risk", i.e. 2a or 2b. Of the 1a and 1b water bodies, 71% are classed as being "At Risk" while 29% of them are classified as "Probably At Risk". Each water body identified on the map in Figure 5.3 has been colour coded to indicate the level of risk. Detailed results for individual water bodies are presented in Table A.3 of Appendix A. Results are also presented on a county basis in Appendices E – O.

Table 5.1: Summary of Risk Assessment for River Water Bodies in HA07

	Assessment Categories (number of water bodies)				Overall	River Length	% of Length
Risk Category	Morpho-logical	Hydrology	Diffuse	Point Source			
Not at risk (2b)	18	105	1	57	0	0	0
Probably not at risk (2a)	2	0	5	38	0	0	0
Probably at risk (1b)	97	5	85	16	52	225.6	29%
At risk (1a)	2	9	28	8	77	546.3	71%
TOTAL	119	119	119	119	119	771.9	100%

Figure 5.5: Morphological Risk (HA07)

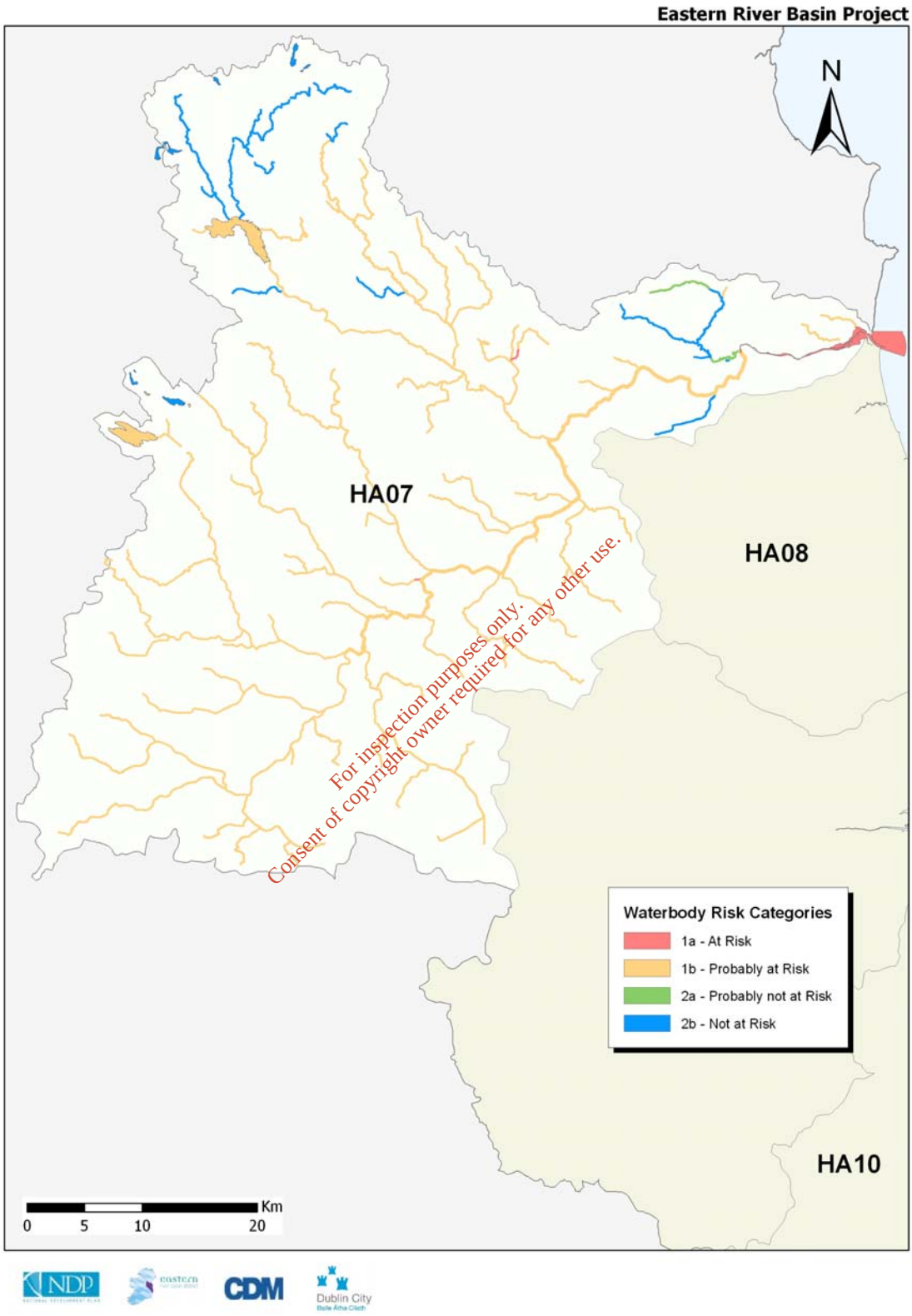
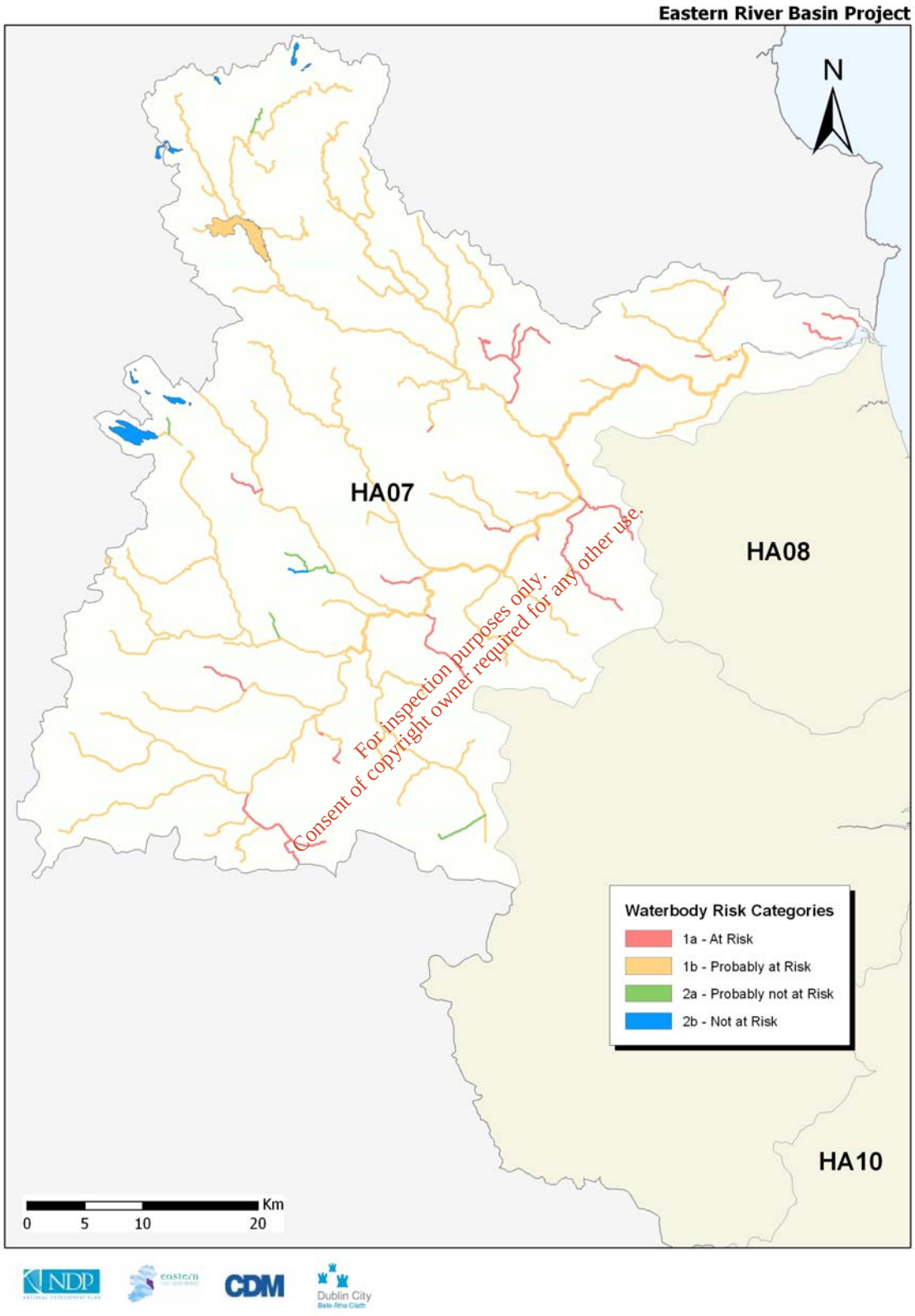


Figure 5.6: Diffuse Risk (HA07)



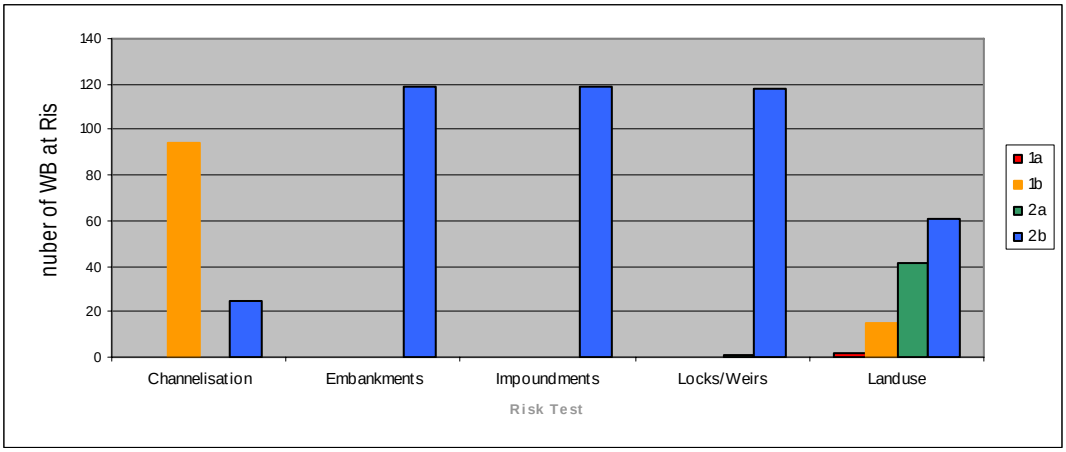


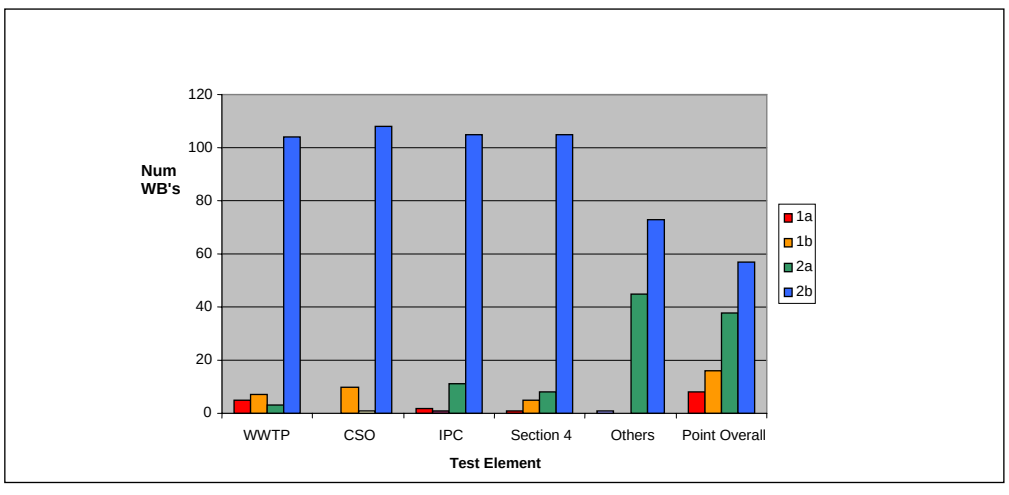
Figure 5.7: Morphological Risk – HA07

The causes of the high number of "At Risk" water bodies in the Boyne catchments are due to 2 main pressure areas, Diffuse Pollution and Morphological Pressures. Morphological pressures account for more than 83% of water bodies falling into the 2 "At Risk" categories. Figure 5.7 shows the breakdown of water bodies at risk in the 5 morphological elements. It can be seen that the highest incidence of risk comes from channelisation, and to a lesser degree, intensive land use. The Boyne catchment has been extensively drained, particularly in the 1970s and 1980s as a means to improve and expand farm land. This causes large areas of the Boyne to be classified as probably at risk, although it is difficult at this stage to fully assess the ecological effect of these drainage works with respect to the standard of "good ecological status". Figure 5.5 shows the morphological risk status in a map format.

The most significant sub-elements for the diffuse pollution risk tests are those for general diffuse pollution. Here, known ecological parameters were regressed against a wide range of land uses and activities. It was found that grassland, urban fabric and arable land have the most effect on ecological quality, represented by Q-value. In the Boyne catchment, 24% of water bodies are classed as "At Risk" from one or more of these pressures, with a further 71% of water bodies classed as "Probably At Risk" (Figure 5.6). The unsewered areas have been identified as another pressure putting water bodies into the 2a category. A significant number of clusters or agglomerations of dwellings that do not appear to be served by a foul sewer system. Were identified in HA07. These areas warrant further investigation as they have the potential to cause pollution, particularly in areas where drainage is poor, such as on heavy clay soils. Many of these 2a water bodies are on the Blackwater Kells and Blackwater Longwood sub-catchments.

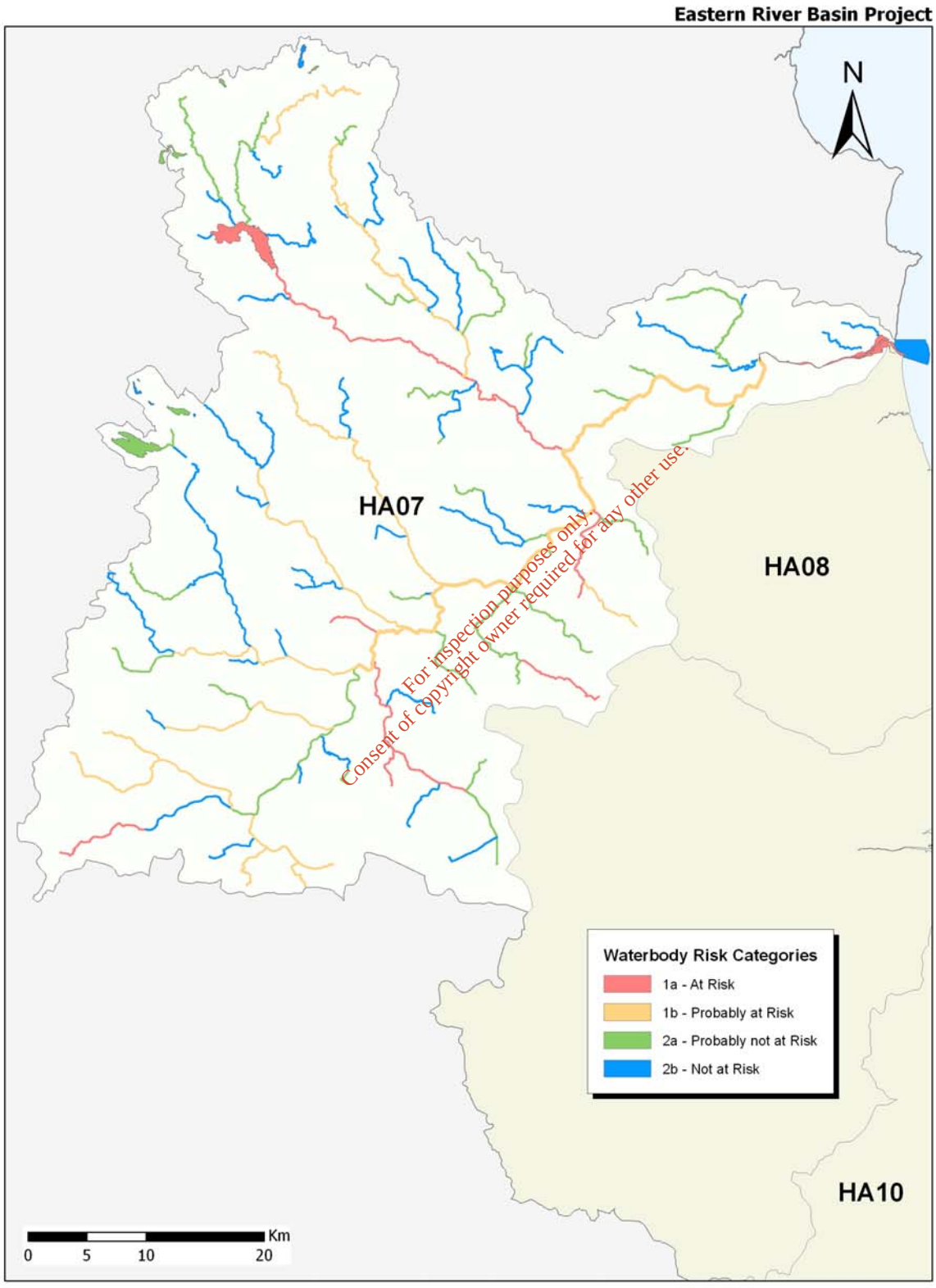
Figure 5.8 shows the effect of point sources. They are not as significant as morphology and diffuse sources in terms of risk, with a total of 8 water bodies classed as 1a and 16 as 1b risk classes. This gives a total of 24 river water bodies with some level of risk, which translates to 20% of river water bodies in the Boyne catchment (Figure 5.9).

Figure 5.8: Point Sources – HA07



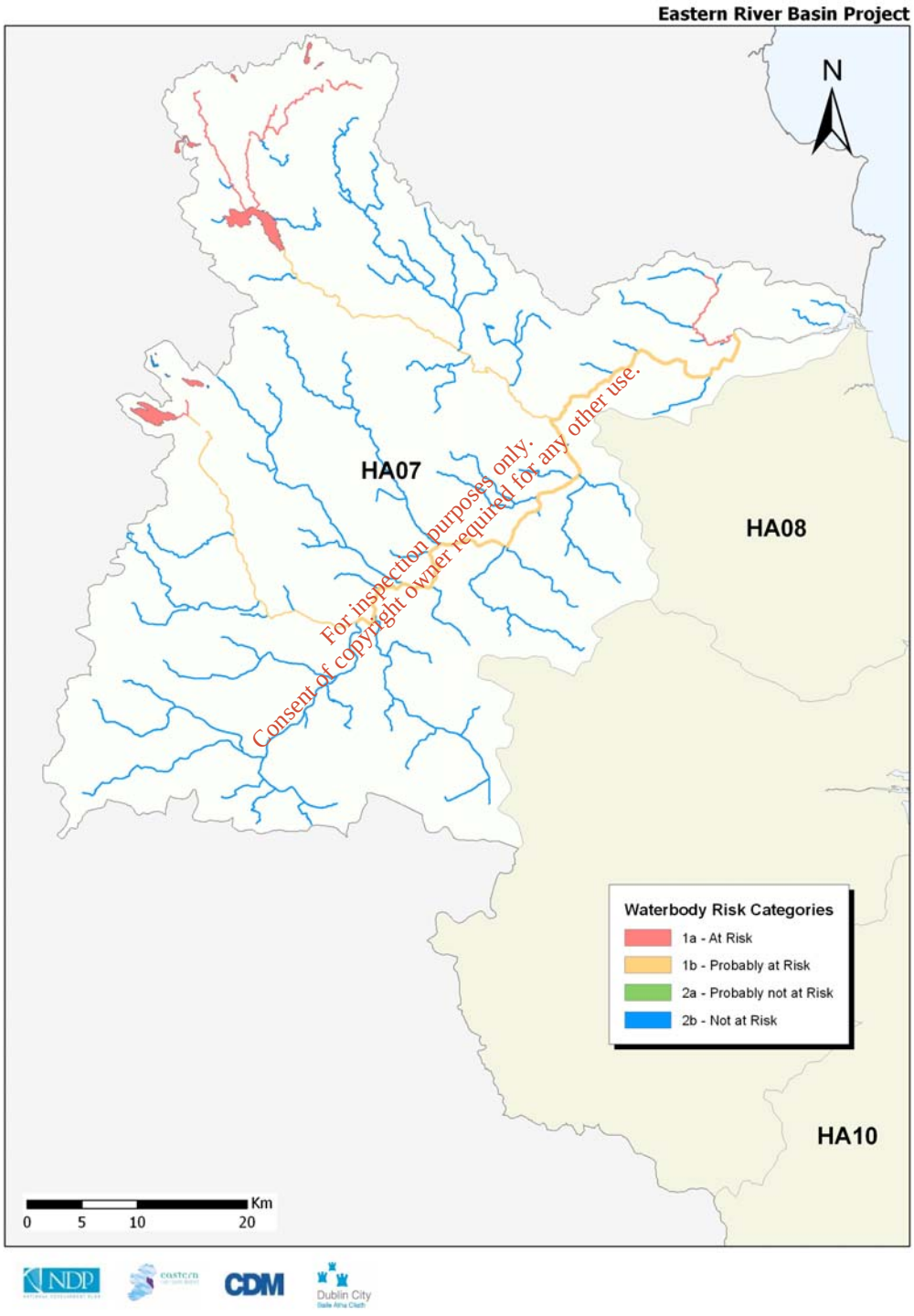
The most significant point sources are WWTPs and CSOs, however some risk is also associated with Section 4 trade effluents and IPC authorisations.

Figure 5.9: Point Source Risk (HA07)



Nine river bodies were characterised “At Risk” and a further 5 “Probably At Risk” from hydrological pressures. i.e. abstraction (Figure 5.10). This considers the volume abstracted from the river against the recharge from rain on the catchment. Over abstraction not only can cause direct ecological effects from reducing flow, drying out of spawning gravels and loss of in river habitat, but also indirect effects caused by lack of attenuation for downstream discharges.

Figure 5.10: Hydrological Risk (HA07)



5.4 Lake Evaluation in the Boyne Catchment

5.4.1 Lake Water Bodies in the Boyne Catchment

The Boyne Catchment contains 74 natural lakes, of which 13 have surface areas that exceed 10 ha (*ERBD Final Initial Characterisation Report*, 2004). Five lakes exceed the Water Framework Directive size qualification of 50 ha. They include Lough Ramor, Loughs Nadreegeel 1 and 2, Lough Skeagh, Lough Lene, and Lough Bane.

In addition, a further 6 lakes have been identified as reportable, either because they exceed abstraction thresholds or because they lie in SACs of particular sensitivity with regard to lakes. The 6 lakes are Loughs Annagh (SAC), Acurry (Abstraction), Drumkeery (Abstraction), Ben (SAC), Glass (SAC) and Doo (SAC). These 11 WFD lakes are located in the upper reaches of the Blackwater and Deel tributaries and are identified on the map in Figure 5.13.

WFD lakes of the Blackwater tributary (Lough Ramor, Loughs Nadreegeel 1 and 2, and Lough Skeagh) exhibit clear signs of deterioration of water quality as cited by the EPA (2001a). A number of smaller lakes lying in the Blackwater catchment have less than satisfactory water quality conditions as well. WFD lakes of the Deel tributary (Lough Lene, and Lough Bane) are relatively free of pollution with acceptable trophic status (*ERBD Final Initial Characterisation Report,* 2004).

5.4.2 Risk Assessment of Lake Water Bodies in the Boyne Catchment

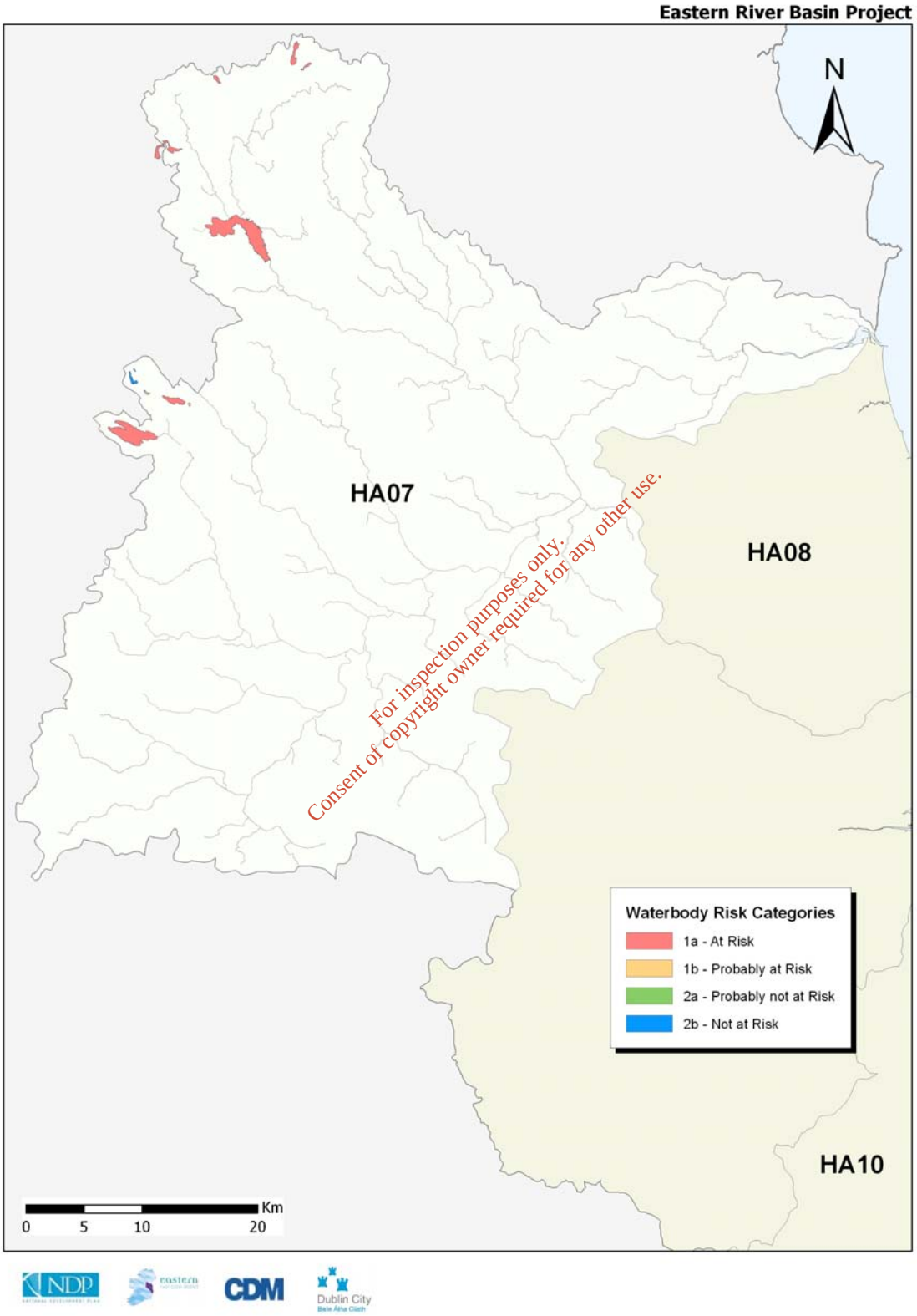
Results of the risk assessment performed on the WFD, and reportable, lakes located in the Boyne Catchment are summarised in Table 5.2. Of the 11 WFD lakes, 2 are classified as "Not At Risk," and these only represent 2% of the total surface area. The remaining 9 lakes, representing 98% of the surface area, are classified as "At Risk" (97%) or "Probably At Risk" (1%). Each WFD lake water body identified on the map in Figure 5.11 has been colour coded to indicate the level of risk. Detailed results of the assessments for individual water bodies are presented in Table A.4 of Appendix A. Results are also presented on a county basis in Appendices E-O.

Table 5.2: Summary of Risk Assessment for WFD Lake Water Bodies in HA07

Risk Category	Assessment Categories (number of water bodies)				Overall	Lake Area (ha)	% of area
	Morpho-logical	Hydrology	Diffuse	Point Source			
Not at risk (2b)	7	4	10	5	2	28	2
Probably not at risk (2a)	0	0	0	5	0	0	0
Probably at risk (1b)	0	0	0	0	2	10	1
At risk (1a)	4	7	1	1	7	1382	97
TOTAL	11	11	11	11	11	1420	100

As can be seen, hydrological and morphological pressures have the greatest effect on the lakes that are in the 1a and 1b categories. Channelisation of the inflowing stream is the most significant morphological pressure whilst abstraction is the most significant pressure.

Figure 5.11: Overall Risk Lakes (HA07)



Diffuse pollution of lakes is assessed by considering the risk status on their contributing catchment draining to the lakes. As many of the Boyne lakes are relatively high on their catchments, risk of diffuse pollution is less than lower in the catchments. In terms of point sources, only WWTPs and Section 4s are significant enough to exert an impact of the risk status of just 2 lakes.

5.5 Transitional Waters Evaluation in the Boyne Catchment

5.5.1 Transitional Water Bodies in the Boyne Catchment

The one transitional water body in the Boyne Catchment, as determined by the EPA from their draft typology (EPA, 2003d), is the Boyne Estuary. Its location is shown in Figure 5.12. The estuary is approximately 14 km in length from the limit of tidal influence above Drogheda to the sea at Mornington, and covers 3.2 km^2. The estuary flushes relatively quickly with a full exchange occurring between one and three days (Marine Institute, 1999).

The Boyne Estuary has mixed levels of quality. Nutrient concentrations in the estuary have been measured on numerous occasions and have remained above those considered to be limiting (NORSAP, 1992; Marine Institute, 2002). The primary sources appear to be nutrients from MWWTPs and diffuse sources located further upstream in the catchment. However, the high rate of flushing minimises negative impacts such as high algae levels or low dissolved oxygen levels.

Benthic studies indicate that the fauna is in a relatively unperturbed state (Wilson & Elkaim, 1991). Concentrations of hazardous substances have not exceeded the Environmental Quality standards, except for levels of arsenic and zinc detected in the sediments. No site-specific water quality data are available for County Louth beaches located in the Boyne Estuary. The water quality at bathing areas within the ERBD is typically within the national and European water quality standards. Bacteria contamination does occur on occasion.

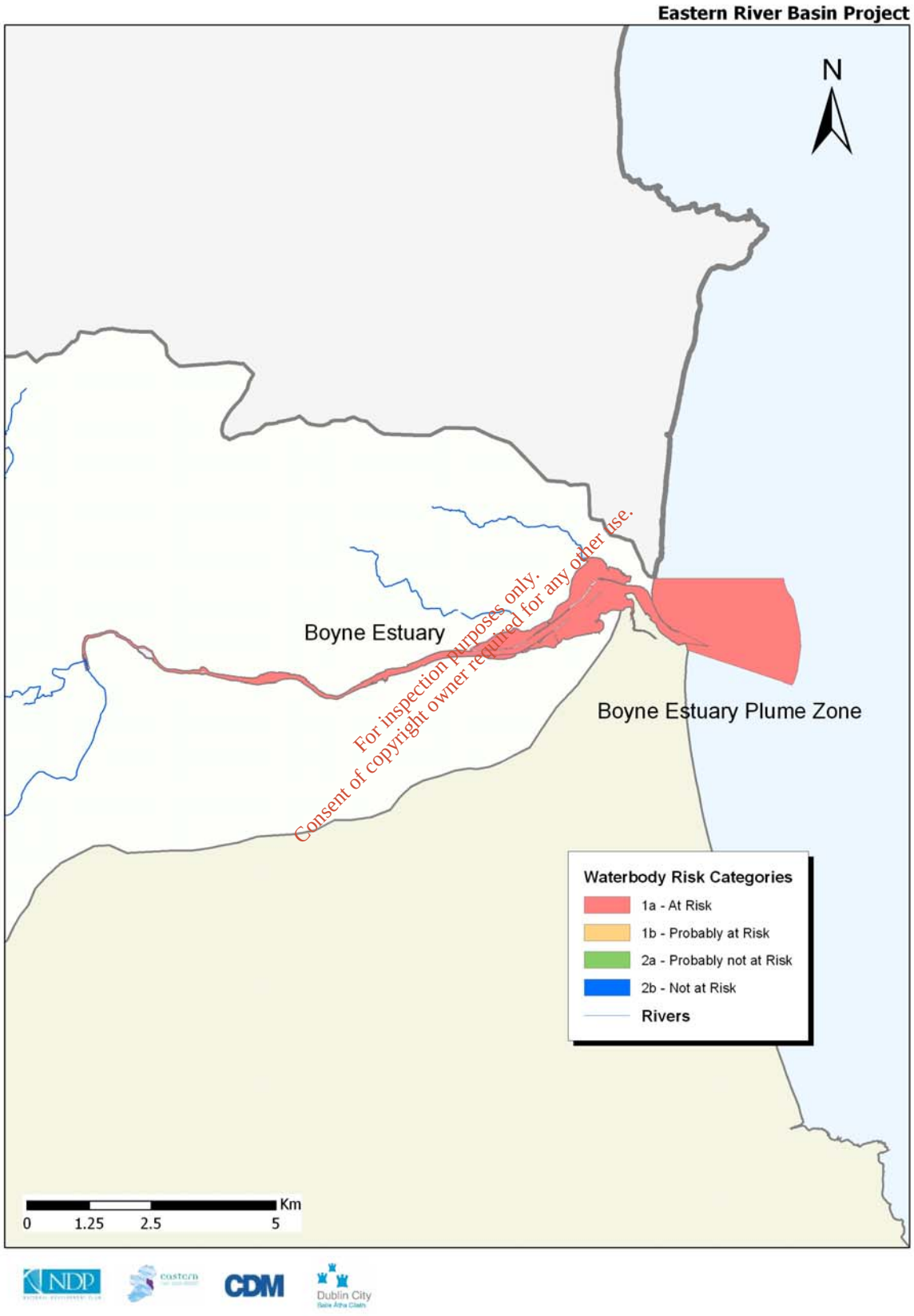
Water quality improvements in the Boyne estuary were recorded after a number of direct industrial discharges to the estuary were removed during the late 1970s and early 1980s. With the introduction of secondary treatment at the Drogheda MWWTP, further improvements in water quality in the vicinity of the town are expected (*ERBD Final Initial Characterisation Report,* 2004).

5.5.2 Risk Assessment of Transitional Water Bodies in the Boyne Catchment

The Boyne Estuary is considered "At Risk (1a)" of failing the WFD for transitional water bodies, based on the degree of intensive shoreline land use. Detailed results are presented in Table A.3 of Appendix A. The estuary in Figure 5.12 has been colour coded to indicate this level of risk. The detailed results are also presented for Counties Meath and Louth in the Appendices. The primary pressure that affects the Boyne Estuary is substantial structural modifications associated with harbour facilities in the town of Drogheda.

The estuary also rates as 1b from point source pressures. Of these pressures, the most significant are identified as WWTPs and CSO's, reflecting the urban pressures from Drogheda. The marine direct impact (MDI) score was also 1b, based on OSPAR calculations; no score was assessed for Dangerous Substances or UWWT sensitivity.

Figure 5.12: Marine Waters Evaluation (HA07)



5.6 Coastal Waters Evaluation in the Boyne Catchment

5.6.1 Coastal Water Bodies in the Boyne Catchment

The ocean coastal water body of the Boyne Catchment, according to the draft EPA typology (EPA, 2003d), is the Boyne Estuary Plume Zone. It is characterised as an "open" sub-type. The location of Boyne Estuary Plume Zone is shown in Figure 5.12. This coastal zone covers 4.6 km².

Very little data are available to evaluate the state of coastal water bodies of the ERBD, and, in particular, the Boyne Estuary Plume Zone.

Available data from studies of the Irish Sea and a proposed new sewage sludge disposal site off Bray Head indicate the coastal zones along the ERBD, including the Boyne Estuary Plume Zone, are of an acceptable quality in terms of water, sediment, and the benthic environment *(ERBD Final Initial Characterisation Report, 2004).*

The Boyne River is one of two substantial sources of pollution to the Boyne Estuary Plume Zone, the second being oceanic contributions through St George's Channel. No negative impacts from these loads have been identified.

5.6.2 Risk Assessment of Coastal Water Bodies in the Boyne Catchment

The Boyne Estuary Plume Zone was assessed as being 1a "At Risk" based on the port tonnage (morphology test CM4A) score of 1a. The amount of traffic using Drogheda Port was the primary pressure. This coastal water body also scored 1b on the MDI test, similarly to the adjoining transitional water. The coastal water body scored 2b for all of the other applicable tests, as indicate din the appendix.

5.7 Heavily Modified Water Bodies (HMWBs) Evaluation in the Boyne Catchment

5.7.1 Heavily Modified Water Bodies in the Boyne Catchment

No HMWBs were identified in the Boyne Catchment.

5.7.2 Risk Assessment of Heavily Modified Water bodies in the Boyne Catchment

No HMWBs were identified in the Boyne Catchment.

5.8 Artificial Water Bodies Evaluation in the Boyne Catchment

5.8.1 Artificial Water Bodies in the Boyne Catchment

The Boyne Catchment contains 10 artificial ponds, lakes, and reservoirs that range in surface area from 2.7 ha to 160 ha. Their uses include water supply (5), settling ponds (2), storage of mine tailings, and unknown (2). However, a limited number of water bodies were submitted for the purposes of EU reporting. These artificial water bodies are located on the map in Figure 5.13.

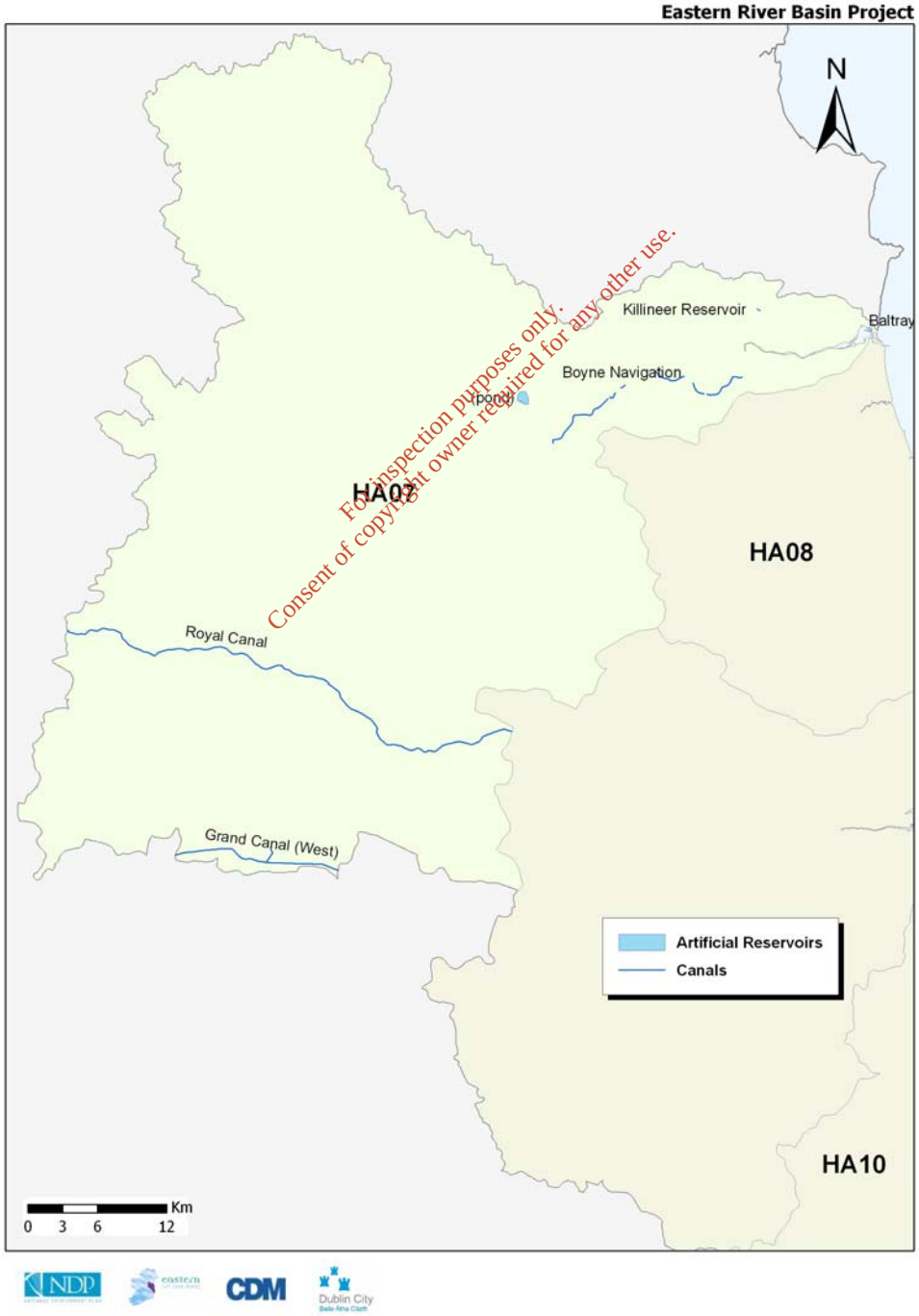
A portion of both the Grand Canal and Royal Canal are located in the south-west portion of the Boyne Catchment as shown in Figure 5.13. Nutrient concentrations in the canals are reported to be relatively low for artificial water bodies based on annual monitoring performed at various locations. The canals exhibit signs of being moderately impacted from nutrients with trophic status ranging between mesotrophic and eutrophic (Caffrey *et al*., 1998). In addition, the Boyne catchment contains a historic canal, the Boyne Navigation.

This waterway was constructed in 1748 to portage the worse rapids on the Boyne and allow barges to access from Drogheda and as far inland as Navan, a distance of approximately 19 miles. The Boyne Navigation is now the property of An Taisce.

5.8.2 Risk Assessment of Artificial Water Bodies in the Boyne Catchment

At this stage of the WFD process only the potential AWBs are required to be identified. Many of them do not yet have formal risk assessments. For example, a procedure for assessing risk in the canals has not been developed. Only one artificial lake or reservoir exceeds the Water Framework Directive size qualification of 50 ha, the Randalstown mine tailings facility associated with the Tara Mines. Since this artificial lake operates only for industrial waste treatment, a risk assessment under the WFD is not required.

Figure 5.13: Artificial Water Bodies (HA07)



5.9 Water Dependent habitats in the Boyne Catchment

The risk assessment has not been developed for water dependent habitats.

5.10 Protected Areas in the Boyne Catchment

The WFD requires that a Register of Protected Areas be established for the purposes of Characterisation. Risk assessment has not been developed for protected areas. The areas that require re-designating are areas concerned with:

- Abstraction of water intended for human consumption
- Protection of economically significant aquatic species (fish, shellfish)
- Recreational bathing waters
- Nutrient Sensitive Areas
- Protection of species (including birds)

In the Boyne Catchment, a total of 64 water bodies fall within the register of protected areas. They consist of 43 river water bodies, 11 lake water bodies, 7 groundwater bodies, and 1 each of coastal and transitional water bodies. Some water bodies are covered by more than 1 designation. For example, Castlepollard High Lake is an SAC, as well as a drinking water source. The designated Protected Areas are listed in Tables 3.5 and 3.6, with the relevant water bodies listed in Appendix A-7.

Abstraction

A total of 17 water bodies have been designated as protected areas for abstraction. These are listed in Appendix A-7. These include 7 ground water bodies, 6 lakes and 4 rivers. Of these, 9 were “At Risk”, 4 “Probably At Risk” and 4 “Probably Not At Risk”.

Significant Aquatic Species

No shellfish designated waters exist in ERBD, so the main designation that is applicable is salmonid waters. A total of 4 water bodies have been designated as protected areas on this basis. These are located on the Boyne main channel and consist of three river water bodies plus the transitional water body. All were “At Risk”.

Bathing Waters

A total of one water body has been designated as a protected area for bathing water. This is Castlepollard High Lake. This is considered to be “At Risk”.

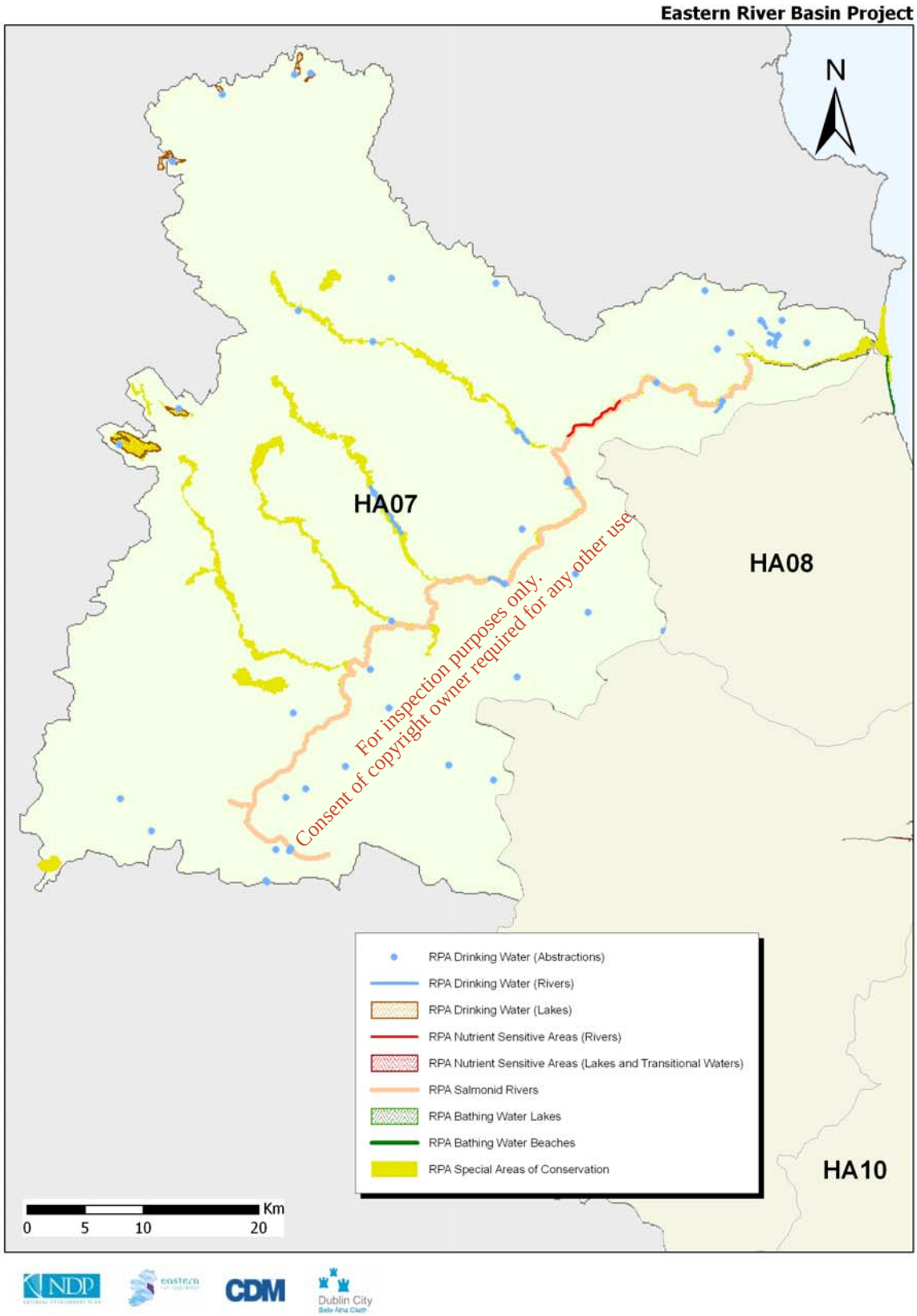
Nutrient Sensitive Areas

A total of one water body is designated as a nutrient sensitive area. This is the main channel Boyne downstream of Navan. This is considered to be “At Risk”.

Protection of Species/Habitats

A total of 48 water bodies have been designated as protected areas on this basis of being either an SAC or an SPA. These are listed in Appendix A7. These include 7 lakes, 1 coastal, 1 transitional and 39 rivers. Of these, are 31 ”At Risk”, 15 “Probably At Risk” and 2 “Not At Risk”.

Figure 5.14: Protected Areas (HA07)



APPENDIX 3

SITE SYNOPSIS

SITE NAME: RIVER BOYNE AND RIVER BLACKWATER

SITE CODE: 002299

This site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. These riverine stretches drain a considerable area of Meath and Westmeath and smaller areas of Cavan and Louth. The underlying geology is Carboniferous Limestone for the most part with areas of Upper, Lower and Middle well represented. In the vicinity of Kells Silurian Quartzite is present while close to Trim are Carboniferous Shales and Sandstones. There are many large towns adjacent to but not within the site. Towns both small and large, include Slane, Navan, Kells, Trim, Athboy and Ballivor.

The site is a candidate SAC selected for alkaline fen and alluvial woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Atlantic Salmon, Otter and River Lamprey.

The main areas of alkaline fen are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. The hummocky nature of the local terrain produces frequent springs and seepages which are rich in lime. A series of base-rich marshes have developed in the poorly-drained hollows, generally linked with these three lakes. Open water is usually fringed by Bulrush (*Typha latifolia*), Common Club-rush (*Scirpus lacustris*) or Common Reed (*Phragmites australis*) and this last species also extends shorewards where a dense stand of Great Fen Sedge or Saw Sedge (*Cladium mariscus*) frequently occurs. This in turn grades into a sedge and grass community (*Carex* spp., *Molinia caerulea*) or one dominated by the Black Bog-rush (*Schoenus nigricans*). An alternative direction for the aquatic/terrestrial transition to take is through a floating layer of vegetation. This is normally based on Bogbean (*Menyanthes trifoliata*) and Marsh cinquefoil (*Potentilla palustris*). Other species gradually become established on this cover, especially plants tolerant of low nutrient status e.g. bog mosses (*Sphagnum* spp.). Diversity of plant and animal life is high in the fen and the flora, includes many rarities. The plants of interest include Narrow-leaved Marsh Orchid (*Dactylorhiza traunsteineri*), Fen Bedstraw (*Galium uliginosum*), Cowbane (*Cicuta virosa*), Frogbit (*Hydrocharis morsus-ranae*) and Least Bur-reed (*Sparganium minimum*). These species tend to be restricted in their distribution in Ireland. Also notable is the abundance of aquatic Stoneworts (*Chara* spp.) which are characteristic of calcareous wetlands.

The rare plant, Round-leaved Wintergreen (*Pyrola rotundifolia*) occurs around Newtown Lough. This species is listed in the Red Data Book and is protected under the Flora Protection Order, 1999, and this site is its only occurrence in Co. Meath.

Wet woodland fringes many stretches of the Boyne. The Boyne River Islands are a small chain of three islands situated 2.5 km west of Drogheda. The islands were formed by the build up of alluvial sediment in this part of the river where water movement is sluggish. All of the islands are covered by dense thickets of wet, Willow (*Salix* spp.) woodland, with the following species occurring: Osier (*S. viminalis*), Crack Willow (*S. fragilis*), White Willow (*S. alba*), Purple Willow (*Salix purpurea*) and Grey Willow (*S. cinerea*). A small area of Alder (*Alnus glutinosa*) woodland is found on soft ground at the edge of the canal in the north-western section of the islands. Along other stretches of the rivers of the site Grey Willow scrub and pockets of wet woodland dominated by Alder have become established, particularly at the river edge of mature deciduous woodland. Ash (*Fraxinus excelsior*) and Birch (*Betula pubescens*) are common in the latter and the ground flora is typical of wet woodland with Meadowsweet (*Filipendula ulmaria*), Angelica (*Angelica sylvestris*), Yellow Iris, Horsetail (*Equisetum* spp.) and occasional tussocks of Greater Tussock-sedge (*Carex paniculata*).

The dominant habitat along the edges of the river is freshwater marsh - the following plant species occur commonly here: Yellow Flag (*Iris pseudacorus*), Creeping Bent (*Agrostis stolonifera*), Canary Reed-grass (*Phalaris arundinacea*), Marsh Bedstraw (Galium palustre), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*). In the wetter areas of the marsh Common Meadow-rue (*Thalictrum flavum*) is found. In the vicinity of Dowth, Fen Bedstraw (*Galium uliginosum*), a scarce species mainly confined to marshy areas in the midlands, is common in this vegetation. Swamp Meadow-grass (*Poa palustris*) is an introduced plant which has spread into the wild (naturalised) along the Boyne approximately 5 km south-west of Slane. It is a rare species which is listed in the Red Data Book and has been recorded among freshwater marsh vegetation on the banks of the Boyne in this site. The only other record for this species in the Republic is from a site in Co. Monaghan.

The secondary habitat associated with the marsh is wet grassland and species such as Tall Fescue (*Festuca arundinacea*), Silverweed (*Potentilla anserina*), Creeping Buttercup (*Ranunculus repens*), Meadowsweet (*Filipendula ulmaria*) and Meadow Vetchling (*Lathyrus pratensis*) are well represented. Strawberry Clover (*Trifolium fragiferum*), a plant generally restricted to coastal locations in Ireland, has been recorded from wet grassland vegetation at Trim. At Rossnaree river bank on the River Boyne, is Round-Fruited Rush (*Juncus compressus*) found in alluvial pasture, which is generally periodically flooded during the winter months. This rare plant is only found in three counties in Ireland.

Along much of the Boyne and along tributary stretches are areas of mature deciduous woodland on the steeper slopes above the floodplain marsh or wet woodland vegetation. Many of these are planted in origin. However the steeper areas of King Williams Glen and Townley Hall wood have been left unmanaged and now have a more natural character. East of Curley Hole the woodland has a natural appearance with few conifers. Broad-leaved species include Oak (*Quercus* spp.), Ash (*Fraxinus excelsior*), Willows, Hazel (*Corylus avellana*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Horse chestnut (*Aesculus* sp.) and the shrubs Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Elder (*Sambucus nigra*). South-west of Slane and in Dowth, the addition of some more exotic tree species such

as Wych Elm (*Ulmus glabra*), Beech (*Fagus sylvatica*), and occasionally Lime (*Tilia cordata*), are seen. Coniferous trees, Larch (*Larix* sp.) and Scots Pine (*Pinus sylvestris*) also occur. The woodland ground flora includes Barren Strawberry (*Potentilla sterilis*), Enchanter's Nightshade (*Circaea lutetiana*) and Ground-ivy (*Glechoma hederacea*), along with a range of ferns. Variation occurs in the composition of the canopy, for example, in wet patches alongside the river, White Willow and Alder form the canopy.

Other habitats present along the Boyne and Blackwater include lowland dry grassland, improved grassland, reedswamp, weedy wasteground areas, scrub, hedge, drainage ditches and canal. In the vicinity of Lough Shesk, the dry slopes of the morainic hummocks support grassland vegetation which, in some places, is partially colonised by Gorse (*Ulex europaeus*) scrub. Those grasslands which remain unimproved for pasture are species-rich with Common Knapweed (*Centaurea nigra*), Creeping Thistle (*Cirsium arvense*) and Ribwort Plantain (*Plantago lanceolata*) commonly present. Fringing the canal alongside the Boyne south-west of Slane, are Reed Sweet-grass (*Glyceria maxima*), Great Willowherb (*Epilobium hirsutum*) and Meadowsweet.

The Boyne and its tributaries is one of Ireland's premier game fisheries and it offers a wide range of angling from fishing for spring salmon and grilse to seatrout fishing and extensive brown trout fishing. Atlantic Salmon (*Salmo salar*) use the tributaries and headwaters as spawning grounds. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the Habitats Directive. Atlantic Salmon run the Boyne almost every month of the year. The Boyne is most important as it represents an eastern river which holds large three-sea-winter fish from 20 –30 lb. These fish generally arrive in February with smaller spring fish (10 lb) arriving in April/May. The grilse come in July, water permitting. The river gets a further run of fish in late August and this run would appear to last well after the fishing season. The salmon fishing season lasts from 1st March to 30th September.

The Blackwater is a medium sized limestone river which is still recovering from the effects of the arterial drainage scheme of the 70's. Salmon stocks have not recovered to the numbers pre drainage. The Deel, Riverstown, Stoneyford and Tremblestown Rivers are all spring fed with a continuous high volume of water. They are difficult to fish in that some are overgrown while others have been affected by drainage with the resulting high banks.

The site is also important for the populations of two other species listed on Annex II of the E.U. Habitats Directive, namely River Lamprey (*Lampetra fluviatilis*) which is present in the lower reaches of the Boyne River while the Otter (*Lutra lutra*) can be found throughout the site. In addition, the site also supports many more of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. Common Frog, another Red Data Book species, also occurs within the site. All of these animals with the addition of the Stoat and Red Squirrel, which also occur within the site, are protected under the Wildlife Act.

Whooper Swans winter regularly at several locations along the Boyne and Blackwater Rivers. Parts of these areas are within the cSAC site. Known sites are at Newgrange (c. 20 in recent winters), near Slane (20+ in recent winters), Wilkinstown (several records of 100+) and River Blackwater from Kells to Navan (104 at Kells in winter 1996/97, 182 at Headfort in winter 1997/98, 200-300 in winter 1999/00). The available information indicates that there is a regular wintering population of Whooper Swans based along the Boyne and Blackwater River valleys. The birds use a range of feeding sites but roosting sites are not well known. The population is substantial, certainly of national, and at times international, importance. Numbers are probably in the low hundreds.

Intensive agriculture is the main landuse along the site. Much of the grassland is in very large fields and is improved. Silage harvesting is carried out. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the lakes. In the more extensive agricultural areas sheep grazing is carried out.

Fishing is a main tourist attraction on the Boyne and Blackwater and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The Eastern Regional Fishery Board have erected fencing along selected stretches of the river as part of their salmonid enhancement programme. Parts of the river system have been arterially dredged. In 1969 an arterial dredging scheme commenced and disrupted angling for 18 years. The dredging altered the character of the river completely and resulted in many cases in leaving very high banks. The main channel from Drogheda upstream to Navan was left untouched, as were a few stretches on the Blackwater. Ongoing maintenance dredging is carried out along stretches of the river system where the gradient is low. This is extremely destructive to salmonid habitat in the area. Drainage of the adjacent river systems also impacts on the many small wetland areas throughout the site. The River Boyne is a designated Salmonid Water under the EU Freshwater Fish Directive.

The site supports populations of several species listed on Annex II of the EU Habitats Directive, and habitats listed on Annex I of this directive, as well as examples of other important habitats. Although the wet woodland areas appear small there are few similar examples of this type of alluvial wet woodland remaining in the country, particularly in the north-east. The semi-natural habitats, particularly the strips of woodland which extend along the river banks and the marsh and wet grasslands, increase the overall habitat diversity and add to the ecological value of the site as does the presence of a range of Red Data Book plant and animal species and the presence of nationally rare plant species.

19.06.2003