Dunmanway to Clashavoon 110kV Overhead Line Environmental Reports

Constraints Report – Water

Submission to: ESB International

Stephen Court

St. Stephens Green

Dublin 2

By: AOS Planning Limited

2nd Floor The Courtyard

25 Great Strand Street

Dublin 1

Tel 01 874 7704

E-mail: enquiries@aosplanning.ie

12th August 2010

1.0 WATER

1.1 Introduction

This section identifies the water (hydrology and hydrogeology) constraints that exist in the study area associated with the proposed 110kV line from Clashavoon to Dunmanway, Co. Cork. The study area is approximately 520km^2. The northern section includes the urban area of Macroom and surrounding townlands, the central section is made up of agricultural land uses with undulating topography and the southern section is dominated by the Bandon River and includes the urban area of Dunmanway.

1.2 Methodology and Information Sources

The following list of maps and publications together with the databases noted were reviewed as part of the desk study:

- The Geological Survey of Ireland (GSI) well and groundwater records, with reference to hydrology and hydrogeology;
- Ordnance Survey of Ireland Discovery Series 1:50, 000 Map Series, Nos. 79, 85 & 86
- EPA water quality monitoring data for watercourses in the area;
- Water Framework Directive Monitoring Programme, EPA 2006;
- South Western River Basin District Management Plan (Draft);
- Office of Public Works flood mapping data; and
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (Natura and the NRA, 2005);
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (2008)"

1.3 Hydrology

The study area is located within the South Western River Basin District, as defined by European Communities Directive 2000/60EC, establishing a framework for community action if the field of water policy, (commonly known as the Water Framework Directive [WFD]). There are a number of rivers within the study area. A river is defined in the Water Framework Directive as "a body of inland water flowing for the most part on the surface of the land but which may flow underground for part of its course".

1.3.1 Surface Water Features

The river catchments located within the study area are the River Lee (northern section of study area) and the Bandon River (southern section of study area).

The River Lee rises in West Cork adjacent to the Co. Kerry border, flows due east through County Cork for 65km and discharges into tidal waters just upstream of Cork City. Most of the Lee's tributaries join it from the north, the principal ones being the Shournagh & Martin, Dripsey, both outside the study area and the Laney, Sullane and Toon. From the south the principal tributary is the River Bride which joins the Lee approximately 3km upstream of Ballincollig. Two large manmade lakes Carrigadrohid and Inniscarra reservoirs are also part of the main Lee channel.

The River Lee consists of the following tributaries:

- *Foherish*
  The River Foherish is a tributary of the River Sullane. It rises in the Derrynasaggart Mountains and flows south until it joins the River Sullane at Carrigaphooca.
- *Laney*
  The River Laney is a tributary of the River Sullane. It rises in the Boggeragh Mountains and flows southwards where in meets the River Sullane at Laney Bridge on the outskirts of Macroom.

- *Sullane*
  The River Sullane is a tributary of the River Lee and is a major subcatchment of the River Lee system, collecting inflows from two main tributaries the River Foherish and the River Laney, which in turn drain large upland areas. The Sullane drains directly into Carrigadrohid Reservoir, upstream of Inniscarra Reservoir.

- *Cummer*
  The River Cummer is a tributary of the River Lee. It rises in the townland of Knockane to the east of Terelton and enters the River Lee at Dooniskey.

- *Toon*
  The River Toon is a tributary of the River Lee.

- *Bride*
  The River Bride is a tributary of the River Lee. It discharges to the river Lee (19L03) upstream of site 0600, which is downstream of Inniscarra reservoir.

The Bandon River rises near Barrboy Mountain and flows generally in an eastern direction to Innishannon. At this point it changes direction and flows in a southeastern direction before entering tidal water between Templebreedy Battery and Mizen Head, Co. Cork.

The Bandon River consists of the following tributaries:

- *Dirty*
  The River Dirty is a tributary of the Bandon River. It joins the Bandon River at Dunmanway.

- *Blackwater*
  The River Blackwater is a tributary of the Bandon River. It rises in Clashbrendane at Owenbaun Stream and flows southwards where it discharges to the River Blackwater at Dromidiclogh West.

Lakes
The Carrigadrohid Reservoir is located to the Southeast of Macroom. It is the responsibility of the ESB and was commissioned in 1957. It is a source of water supply for Cork City and provides flood attenuation and recreational activities. The EPA, in its latest monitoring event (2003), classified the lake as Mesotrophic (unpolluted).

1.3.2 Water Framework Directive Requirements

The European Water Framework Directive (2000/60/EC) (WFD) was implemented in Ireland by S.I. 722 of 2003, European Communities (Water Policy) Regulations 2003. These regulations established in Irish law a framework for community action in the field of water

policy. The Water Framework Directive requires 'good water status' for all European waters by 2015, to be achieved through a system of river basin management planning and extensive monitoring. The study area is located within the South Western River Basin District. Table 1.1 shows the current status of the rivers monitored in the study area as part of the WFD monitoring program.

Table 1.1 WFD Status of rivers within the study area

River	WFD Status
Lee (within study area)	Expected to achieve 'Good Status'
Foherish	Expected to achieve 'Good Status'
Laney	Strongly expected to achieve 'good status'
Sullane	Expected to achieve 'Good Status'
Cummer	At risk of not achieving 'Good Status'
Toon	Expected to achieve 'Good Status'
Bride	Expected to achieve 'Good Status'
Bandon	At risk of not achieving 'Good Status'
Dirty	At risk of not achieving 'Good Status'
Blackwater	At risk of not achieving 'Good Status'

The causes of the high number of "At Risk" Category Rivers are due to the following;

- Diffuse Pollution (i.e. Agriculture);
- Point Source Pollution (Wastewater);
- Morphological Pressures;
- Water abstraction; and
- Tourism and Recreation.

1.3.3 Surface Water Quality

The water quality of the major rivers in Ireland is monitored continuously by the EPA. The monitoring programme was established under the Environmental Protection Act 1992. The objectives of the programme are the following:

a) to establish the ongoing quality status of our rivers and streams
b) to monitor quality changes and trends over time
c) to assess the performance of pollution control and abatement measures
d) to provide feedback to the responsible control agencies and
e) to inform the general public.

Q Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. See Table 1.2 for an explanation of the ratings. Q1 indicates a seriously polluted water body; Q5 indicates unpolluted water of high quality.

Quality Ratings	Quality Class	Pollution Status	Condition
Q5, Q4-5, Q4	Class A	Unpolluted	Satisfactory
Q3-4	Class B	Slightly Polluted	Unsatisfactory
Q3, Q2-3	Class C	Moderately Polluted	Unsatisfactory
Q2, Q1-2, Q1	Class D	Seriously Polluted	Unsatisfactory

Table 1.2 EPA Biological Q Ratings

Table 1.3 shows the results of the EPA monitoring[1] at the relevant rivers over the past decade.

Table 1.3 Biotic indices (2000-2005) for the Major Rivers in Study Area

River	Monitoring Location	Biotic Index			
		2000	2002	2003	2005
River Lee	Foot-bridge downstream of Inchigeelagh	-	4	-	4
	Dromcarra Bridge	-	4	-	4
River Sullane	Sullane Bridge	-	4-5	-	4-5
	Linnamilla Bridge	-	4	-	4
	Ford up stream of Laney River confluence	-	4	-	4
River Foherish	Carrigaphooca Bridge	-	4-5	-	4-5
River Laney	Morris's Bridge	-	4-5	-	4-5
River Cummer	Bridge West of Dunmarklun	-	4	-	4
	Ahagearagh Bridge	-	3-4	-	3-4
	Athsollis Bridge	-	3-4	-	3-4
River Toon	Second Bridge upstream of Lee River confluence	-	4-5	-	4
	Bridge upstream of Lee River confluence (Toon Bridge)	-	4	-	4
River Bride	Hornhill Bridge	-	-	4	4
	Bridge at Crookstown Left Hand	-	-	4-5	4
Bandon River	Ardcahan Bridge	4	-	4	-
	Bealboy Bridge	3-4	-	3-4	-
River Dirty	Bridge North West of Tonafora	4	-	3-4	-
	Bridge up stream of Bandon	3-4	-	4	-
River Blackwater	Geara Bridge	4	-	4-5	-
	Bridge North West of Teenah	3-4	-	3-4	-
	Blackwater Bridge	4-5	-	4-5	-

The latest EPA monitoring results show that the water quality of the rivers at the particular monitoring stations within the study area can be classified as slightly polluted to unpolluted.

The most common type of pollution in surface water bodies is organic pollution caused by sewage, animal manure slurries and food processing wastes. The main effects of organic pollution are therefore, the depletion of oxygen in the area immediately downstream of the discharge point and eutrophication (i.e., enrichment) in the recovery zone further downstream. Eutrophication, which is caused by the inappropriate and/or excessive application of organic (slurry) and inorganic (artificial) manure to agricultural and forestry lands, is also a factor.

1.3.4 Water Supply

Water usage in the study area is primarily supplied by Cork County Council from their surface water abstractions of water courses and supplemented by groundwater abstraction boreholes. There are also a number of private wells are used by individual landowners. A search of the GSI well database shows there are a number of wells in the area with uses varying from private to agricultural use. Refer to Table 1.4 for details.

1.3.5 Flooding

The Office of Public Works (OPW) Flood Hazard Database was used in order to obtain information on historical flooding events within the study area. This information was used to establish the current baseline conditions in terms of sections of the study area that are liable to flood.

A number of historical flood events were recorded within the study area. Hurricane Charlie in 1986 lead to floods in the Macroom region; the Rivers Sullane, Lee, Laney and Toon recorded flood events. In November 2009 flooding was also noted from the River Sullane at Macroom.

In the central section of the study area it was noted that along the River Cummer recurring flooding events have occurred at Teereeven, Poulanargid, west of Kilmurray village.

In the southern section of the study area the Bandon River and its tributaries have been noted to flood. The OPW recorded flood events in 1991 and 2000 on the Dirty River and the Bandon River at Dunmanway.

1.4 Hydrogeology

1.4.1 Aquifer Classification

Bedrock Aquifers

The GSI online maps and publications[2, 3, 4] were consulted in relation to the occurrence of bedrock aquifers in the study area. The study area consists of the following:

- Lk – Locally important aquifer – karstified
- Pi – Poor aquifer, bedrock which is generally unproductive, except in local zones
- Li - locally important aquifers, bedrock which is moderately productive in local zones.

The majority of the study area consists of poor aquifers and locally important bedrock aquifers. A locally important karstified bedrock aquifer is located at Annahalla, west of the Gereagh nature reserve.

Gravel Aquifers

There are locally important sand/gravel aquifers present within the study area. These are located at the following:

- Immediate North West of Kilmurray village, grid reference 137301 67575.
- Enniskeane village, grid reference 136804 54223

The GSI Well Card Index presented in Table 1.4 shows the occurrence of recorded wells within the study area, information regarding the depth to bedrock, and hence the depth of

overburden is noted for a large number of the wells. The well card data shows there are a large number of wells in the area with uses varying from domestic to agricultural use. It shows that water strikes recorded in the study area range from surface level to 103.6m Below Ground Level (BGL). The groundwater yield also varies throughout the study area; the majority of yield is classed by the GSI as poor to moderate.

GSI Code	Easting	Northing	Townland	Well Use	Yield Class	Yield m3d	DTB	Water Strike
1105NEW044	137260	61940	Bengour West	Other	-	-	-	2.5
1105NEW054	136130	65340	Dunmarklun	Dom	M	-	2.4	18
1105NEW056	129210	67570	Dromcarra South	Dom	Po	-	4.6	94.5
1105NEW058	134730	60580	Moneynacroha	Dom	Mo	-	4.6	30.4
1105NEW067	133550	69680	Toomsbog	B	P	-	0.9	73.2
1105NEW069	136830	61730	Bengour West	B	-	-	7.6	25.9
1105NEW070	128930	69330	Mileen	B	P	-	15.8	41.1
1105NEW071	127500	61680	Shanacashelkneeves	B	P	-	3.1	10.7
1105NEW072	129960	68330	Inchisine	B	P	-	4.3	103.6
1105NEW073	130650	66830	Moneycusker	B	P	17.5	4.6	27.4
1105NEW074	130650	66830	Cloonshear Bog	B	P	28	4.6	36.6
1105NEW075	127480	68480	Glasheen	B	P	28	16.8	60.9
1105NEW077	134300	66030	Ardnaeen	B	P	-	3	30.5
1105NEW078	128030	63850	Coolclevane	B	P	-	4.6	37
1105NEW079	129380	66740	Cooldorragha	B	P	21.8	10	-
1105NEW081	130550	69110	Inchisine	B	P		4.6	67
1105NEW082	138360	62790	Bengour West	B	P	27.3	3.1	27.4
1105NEW083	138120	67890	Dunisky	B	P		4.6	48.8
1105NEW085	130150	65520	Cooldorragha	B	P	28	4.6	88.1
1105NEW087	129270	67630	Dromcarra South	Dom	P		4.6	38.4
1105NEW088	130710	62270	Dane	Dom	Mo	21.8	10.1	27.4
1105NEW089	133350	69110	Tooms West	Dom	P		3.1	86.9
1105SEW049	139010	52980	Knockmacool	Dom	Mo	32.7	7	21.3
1105SEW059	133800	58810	Ballineen	Other	-	27.3	-	4.5
1105SEW060	133710	58630	Ballineen	I	-	21.8	-	16
1105SEW061	132450	53500	Ballineen	I	-	27.3	-	4
1105SEW062	132450	53550	Ballineen	I	-	21.8	7	4
1105SEW063	132500	53600	Ballineen	I	-	21.8	-	4
1105SEW064	132300	53550	Ballineen	I	-	21.8	-	4.5
1105SEW066	134380	59290	Moneynacroha	B	P	27.3	4.6	51.2
1105SEW067	138460	55940	Sranaviddoge	B	Mo	32.7	4.6	91.4
1105SEW068	132420	56640	Cloonareague	Dom	P	21.8	3.7	54.9
1107SEW115	132500	73330	Macroom	U	-	281	7.7	0
1107SEW116	132580	73340	Macroom	U	-	-	12	4.5
1107SEW120	132510	73450	Gurteenroe	B	Mo	109	0.6	24.4

Table 1.4 GSI Well Data for Study Area

A – Agricultural Use
U – Unknown
D – Domestic Use Only
E – Excellent (>400m3/d)
I – Industrial Use
M – Moderate (40– 100m3/d)
Pub – Public Supply
G – Good (100 – 400m3/d)
Po – Poor (<40m3/d)
DTB – Depth to Bedrock
Dom – Domestic use only
B – Agricultural & domestic Use

1.4.2 Groundwater Vulnerability

The GSI, EPA and the Department of the Environment, Heritage and Local Government (DoEHLG) have developed a programme of Groundwater Protection Schemes[5], with the aim of maintaining the quantity and quality of groundwater in Ireland; in addition the programme aims, in some cases to improve groundwater quality by applying a risk assessment approach to groundwater protection and sustainable development. The DoEHLG, EPA and GSI vulnerability mapping guidelines allow for the assignment of vulnerability ratings from "extreme" to "low", depending upon the subsoil type and thickness.

Groundwater vulnerability was varied throughout the study area but was largely classed as extreme. The upland areas are largely classed as 'Extreme – Rock near Surface'. In the southern section it is classed as 'High-Low' as only an interim study has taken place for the area.

An aquifer in the Bandon catchment is classified by the GSI as extremely vulnerable extends for a short length along the Bandon River in the Dunmanway rural district, occupying almost 5% of the total Bandon River catchment area.

1.5 Constraints of Study Area – Water

The key constraints in relation to water are the following:

- **Physical constraints –** rivers, lakes and reservoirs located across the study area. The requirements for the crossing of water bodies would be the main constraint. Some construction works on site may take place in the vicinity of watercourses in the riparian zone. A buffer area should be established to protect the riparian and aquatic zones from disturbance. All watercourse crossings should be planned in consultation with Cork County Council, the Fisheries Board and in accordance with the necessary guidelines.

- **Historical flooding-** there is a history of flooding in some locations within the study area e.g. Macroom and Dunmanway. Cognisance should be made to the locations of these previous flood events when locating structures, particularly in the vicinity of watercourses and floodplains and other surface water features.

- **Groundwater Supplies –** a number of groundwater supplies have been identified from the GSI well database. Additional public or private water supplies may be present in the area. A comprehensive database of supplies should be completed as part of the EIA process.

1.6 Conclusions

The constraints in relation to water are highlighted in the previous section, the potential impact of the proposed development, in relation to water, will be identified in the final environmental assessment. The implementation of appropriate mitigation measures in the will ensure there will be no significant residual impact on the environment from the proposed development in respect of water.

REFERENCES

1. EPA, (2002), EPA 2002 Water Quality Database, Johnstown Castle Estate, Wexford.

2. Sleeman, A.G. & Pracht, M., (1995), Geology of South Cork, Sheet 25. Geological Survey of Ireland.

3. Pracht, M., (1997), Geology of Kerry-Cork, Sheet 21. Geological Survey of Ireland.

4. Pracht, M. and Sleeman, A.G., (2002), Geology of West Cork, Sheet 24. Geological Survey of Ireland.

5. DoEHLG, EPA & GSI, (1999), Groundwater Protection Scheme Guidelines.