Laois - Kilkenny Reinforcement Project Environmental Reports

Route Corridor Assessment Report – Hydrology and Hydrogeology

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

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1. Introduction

This section provides an assessment of the potential route corridors within the study area for the proposed Laois Kilkenny Reinforcement Project. The purpose of this assessment is to recommend the route corridor that will have the least potential environmental impacts in terms of the water environment (hydrology and hydrogeology). A previous report *(Study Area Constraints Report, Hydrology & Hydrogeology, AOS Planning Ltd. October 2010*) identified the most significant constraints within the study area and the associated potential impacts. This report was prepared by Mr. Brian Tiernan, Environmental Consultant – AWN Consulting.

The key constraints identified in relation to hydrology and hydrogeology are the following:

- Physical constraints – rivers, lakes and reservoirs located across the study area
- Historical flooding
- Groundwater Vulnerability – bedrock aquifers and sand & gravel aquifers of local and regional importance
- 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.

The potential route corridors have been designed having regard to the identified constraints.

The purpose of this section is to provide the Lead Consultant, ESBI, with an assessment identifying the most to least preferred corridor nodes.

2. Assessment of Route Corridors

The magnitude of potential impacts is defined in accordance with the criteria provided in the EPA publication "Guidelines on the Information to be contained in Environmental Impact Statements" (2002), outlined in Tables 2.1 and 2.2:

Quality of Impacts	Description
Positive Impact	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities).
Neutral Impact	A change which does not affect the quality of the environment.
Negative Impact	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

Table 2.1 Impact Assessment Criteria (Quality)

Magnitude of Impact	Description
Imperceptible	An impact capable of measurement but without noticeable consequences
Slight	An impact that alters the character of the environment without affecting its sensitivities
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing or emerging trends
Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Profound	An impact which obliterates all previous sensitive characteristics

Table 2.2 Impact Assessment Criteria (Magnitude)

Estimation of the magnitude of potential impacts on Hydrology & Hydrogeology for Nodes 5-10, the Western 110kV Route Corridor option between Nodes 1–10 and Eastern 110kV Route Corridor option between Nodes 1–10 (and associated 400kV Route Corridor) are shown in Table 2.3:

Attribute	Attribute Importance	Potential Impact	Level of Impact
Water Quality - Current WFD Status of the majority of rivers within the study area is moderate. WFD status of rivers can be seen in constraints report.	Very High	Some construction works on site may take place in the riparian zone. This could impact on the water quality of the receiving water course(s) and in turn the rivers located within each catchment.	Moderate Negative
Regionally important sand and gravel aquifer.	High	Impact on groundwater quality, abstraction rate and recharge	Moderate Negative
Locally Important sand and gravel aquifer.	Medium	Impact on groundwater quality, abstraction rate and recharge	Slight Negative
Regionally important karstified (diffuse) bedrock aquifer.	Medium	Impact on groundwater quality, abstraction rate and recharge if bedrock is encountered.	Slight Negative
Poor bedrock aquifer.	Low	Impact on groundwater quality, abstraction rate and recharge if bedrock is encountered.	Slight Negative
Bedrock aquifer vulnerability - Extreme & High	Very High	Impact on groundwater quality and water supply quality	Moderate Negative

Table 2.3 Estimation of Magnitude of Potential Impacts on Water (Nodes 5-10, Western 110kV Route Corridor option between Nodes 1–10 and Eastern 110kV Route Corridor option between Nodes 1–10 and associated 400kV Route Corridor)

Estimation of the magnitude of potential impacts on Hydrology & Hydrogeology for Nodes 1-5 are shown in Table 2.4:

Attribute	Attribute Importance	Potential Impact	Level of Impact
Water Quality - Current WFD Status of the majority of rivers within the study area is moderate. WFD status of rivers can be seen in constraints report.	Very High	Some construction works on site may take place in the riparian zone. This could impact on the water quality of the receiving water course(s) and in turn the rivers located within each catchment.	Moderate Negative
Regionally important sand and gravel aquifer.	High	Impact on groundwater quality, abstraction rate and recharge	Moderate Negative
Regionally important karstified (diffuse) bedrock aquifer.	Medium	Impact on groundwater quality, abstraction rate and recharge if bedrock is encountered.	Slight Negative
Poor bedrock aquifer.	Low	Impact on groundwater quality, abstraction rate and recharge if bedrock is encountered.	Slight Negative
Bedrock aquifer vulnerability - Extreme & High	Very High	Impact on groundwater quality and water supply quality	Moderate Negative

Table 2.4 Estimation of Magnitude of Potential Impacts on Water (Nodes 1-5)

Estimation of magnitude of potential impacts on Hydrology & Hydrogeology for the route corridor options between the following nodes is shown in Table 2.5:

- Nodes 8-10 (110kV Sub-Route Corridor and associated 400kV Route Corridor)
- Nodes 9-10 (Central 110kV Route Corridor and associated 400kV Route Corridor)
- Nodes 7-8 (Central 110kV Route Corridor)
- Nodes 7-9 (110kV Sub-Route Corridor)

Attribute	Attribute Importance	Potential Impact	Level of Impact
Water Quality - Current WFD Status of the majority of rivers within the study area is moderate. WFD status of rivers can be seen in constraints report.	Very High	Some construction works on site may take place in the riparian zone. This is could impact on the water quality of the receiving watercourse(s) and in turn the rivers located within each catchment.	Moderate Negative
Locally important sand and gravel aquifer.	Medium	Impact on groundwater, quality, abstraction rate and recharge	Slight Negative
Regionally important karstified (diffuse) bedrock aquifer.	Medium	Impact on groundwater quality, abstraction rate and recharge if bedrock is encountered.	Slight Negative
Bedrock aquifer vulnerability - Extreme & High	Very High	Impact on groundwater quality and water supply quality	Moderate Negative

***Table 2.5 Estimation of Magnitude of Potential Impacts on Water* (Nodes 8-9, 8–10, 9–10, 7–8 and 7–9)**

Estimation of magnitude of potential impacts on Water for the route corridor options between the following nodes are shown in Table 2.6:

- Nodes 2-4 (110kV Sub-Route Corridor)
- Nodes 5-6 (110kV Sub-Route Corridor)

Attribute	Attribute Importance	Potential Impact	Level of Impact
Water Quality - Current WFD Status of the majority of rivers within the study area is moderate. WFD status of rivers can be seen in constraints report.	Very High	Some construction works on site may take place in the riparian zone. This is could impact on the water quality of the receiving watercourse(s) and in turn the rivers located within each catchment.	Moderate Negative
Regionally important sand and gravel aquifer.	High	Impact on groundwater quality, abstraction rate and recharge	Moderate Negative
Regionally Important karstified (diffuse) bedrock aquifer.	Medium	Impact on groundwater quality, abstraction rate and recharge if bedrock is encountered.	Slight Negative
Bedrock aquifer vulnerability - Extreme & High	Very High	Impact on groundwater quality and water supply quality	Moderate Negative

Table 2.6 Estimation of Magnitude of Potential Impacts on Water (Nodes 2–4 and 5–6)

Estimation of magnitude of potential impacts on Water for the route corridor options between the following nodes are shown in Table 2.7:

- Nodes 1-2 (Central 110kV Route Corridor)
- Nodes 2-3 (Central 110kV Route Corridor)
- Nodes 3-4 (Central 110kV Route Corridor)
- Nodes 3-7 (110kV Sub-Route Corridor)
- Nodes 4-6 (Central 110kV Route Corridor)
- Nodes 6-7 (Central 110kV Route Corridor)

Attribute	Attribute Importance	Potential Impact	Level of Impact
Water Quality - Current WFD Status of the majority of rivers within the study area is moderate. WFD status of rivers can be seen in constraints report.	Very High	Some construction works on site may take place in the riparian zone. This is could impact on the water quality of the receiving watercourse(s) and in turn the rivers located within each catchment.	Moderate Negative
Poor bedrock aquifer.	Low	Impact on groundwater abstraction rate and recharge if bedrock is encountered. Impact on groundwater quality.	Slight Negative
Bedrock aquifer vulnerability - Extreme & High	Very High	Impact on groundwater quality and water supply quality	Moderate Negative

Table 2.7 Estimation of Magnitude of Potential Impacts on Water (Nodes 1-2, 2–3, 3–4, 3–7, 4–6 and 6–7)

3. Preferred Corridor Option

The potential impacts relating to the water environment are generally related to the construction phase and the management of machinery on site. The application of the mitigation measures will ensure that the potential impacts for each route option are imperceptible during the construction phase and the operational phase.

In terms of the route corridor selection the level of impact identified was a combination of slight negative and moderate negative for all route corridors. Based on the estimation of magnitude of impact on hydrology and hydrogeology and using the Tables 2.1 and 2.2 to describe the impact of the magnitude, the least preferred options in terms of potential water impacts would be Nodes 5-10, the Western 110kV Route Corridor option between Nodes 1–10 and Eastern 110kV Route Corridor option between Nodes 1–10 (and associated 400kV Route Corridor) due to the presence of both regionally and locally important sand & gravel and bedrock aquifers.

Based on the number of potential impacts and the level of impacts the less preferred route options would be the following nodes:

- Nodes 1-5 (Western 110kV Route Corridor)
- Nodes 8-9 (Central 110kV Route Corridor)
- Nodes 8-10 (110kV Sub-Route Corridor and associated 400kV Route Corridor)
- Nodes 9-10 (Central 110kV Route Corridor and associated 400kV Route Corridor)

- Nodes 7-8 (Central 110kV Route Corridor)
- Nodes 7-9 (110kV Sub-Route Corridor)
- Nodes 2-4 (110kV Sub-Route Corridor)
- Nodes 5-6 (110kV Sub-Route Corridor)

Based on the number of potential impacts and the level of impacts the preferred route options would be the following nodes:

- Nodes 1-2 (Central 110kV Route Corridor)
- Nodes 2-3 (Central 110kV Route Corridor)
- Nodes 3-4 (Central 110kV Route Corridor)
- Nodes 3-7 (110kV Sub-Route Corridor)
- Nodes 4-6 (Central 110kV Route Corridor)
- Nodes 6-7 (Central 110kV Route Corridor)